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Western Australian Planning Commission

Metropolitan Region Scheme Amendment 1344/57 – Maida Vale Urban Precinct Environmental Assessment

Date: June 2023

Assessment No: 2175

people planet professional

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Invitation to make a submission

The Western Australian Planning Commission (WAPC) invites people to make a submission on the Environmental Review Document (ERD) for MRS amendment 1344/57 - Maida Vale Urban Precinct.

The WAPC is proposing to amend 178 hectares (ha) of land zoned 'Rural' to 'Urban Deferred' to enable future development within the Amendment Area. The WAPC resolved that the Amendment Area be zoned 'Urban Deferred' to enable resolution of the following items:

- the Transport Impact Assessment (TIA) being updated to the satisfaction of Main Roads WA (MRWA) and Department of Transport (DoT);
- confirmation on the location of the proposed Roe Highway overpass; and
- the completion of water and wastewater reviews for the subject land by the Water Corporation.

If the above items are addressed to the satisfaction of the WAPC the amendment could be modified to the Urban zone at the final determination stage.

The Environmental Protection Authority (EPA) has determined that the proposed MRS is assessed under Division 3 Part IV of the *Environmental Protection Act 1986 Act* (EP Act).

The ERD is being prepared by the proponent (the WAPC) to describe the amendment, its likely effects on the environment and the environmental mitigation and management measures for the proposed MRS amendment.

The ERD and MRS amendment will be available for public review simultaneously. The ERD document is available for a public review period for 60 days from Friday 29 September 2023, closing on Tuesday 28 November 2023.

Information on the amendment from the public and the EPA's assessment will assist the EPA to prepare a Report and Recommendations to Minister for Environment.

Why write a submission?

The WAPC seeks information that will inform the EPA's consideration of the likely effect of the amendment, if implemented, on the environment. This may include relevant new information that is not in the ERD, such as alternative courses of action or approaches.

In preparing its Report and Recommendations for the Minister for Environment, the EPA will consider the information in submissions, the proponent's responses, and other relevant information.

Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the *Freedom of Information Act 1992*.

Why not join a group?

It may be worthwhile joining a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group. If you form a small group (up to ten people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on information in the ERD.

When making comments on specific elements in the ERD:

- Clearly state your point of view and give reasons for your conclusions
- Reference the source of your information, where applicable
- Suggest alternatives to improve the outcomes on the environment.

What to include in your submission

Include the following in your submission to make it easier for the EPA to consider your submission:

- Your contact details – name and address.
- Date of your submission.
- Whether you want your contact details to be confidential.
- Summary of your submission if your submission is long.
- List points so that issues raised are clear, preferably by environmental factor.
- Refer each point to the page, section and if possible, paragraph of the ERD.
- Attach any reference material, if applicable. Make sure your information is accurate.

The closing date for public submissions will occur simultaneously with the MRS amendment.

The WAPC prefers submissions to be made electronically via email: info@dplh.wa.gov.au.

Alternatively, submissions can be:

- Posted to: Chairman, WAPC Locked Bag 2506, PERTH WA 6001 or
- Delivered to: WAPC 140 William Street PERTH WA 6000.

If you have any questions on how to make a submission, please contact the WAPC on (08) 6551 8002.

Scoping Checklist

Task No.	Required work	Section and Page No.
Environmental Factor 1 - Flora and Vegetation		
1.	Identify and describe the vegetation and flora species present and likely to be present within the Amendment Area. Demonstrate how surveys are consistent with current EPA policy and guidance set out below. Include a summary of survey findings and an analysis of the significance of flora and vegetation in local and regional contexts as appropriate in accordance with relevant guidance set out below. Note: if surveys were undertaken at the referral stage, survey results and a demonstration of how the guidance has been followed are to be included in the ER. Ensure species database searches and taxonomic identifications are current.	Section 5
2.	Provide a map depicting the recorded locations of significant flora, ecological communities, and vegetation in relation to the Amendment Area in accordance with the relevant guidelines set out below. Clearly show any areas/lots unable to be surveyed.	Figures 7 Figure 11 Appendix F
3.	Provide a map depicting areas of vegetation and flora to be retained and protected from future urban development. Assess the potential direct and indirect impacts of future urban development on the identified environmental values. Include a quantitative assessment of levels of impact on significant flora, listed ecological communities and all vegetation units. Describe and assess the extent of any cumulative impacts within local and regional contexts as appropriate.	Figure 9 Figure 10 Figure 11 and Section 5.1.4
4.	Describe any proposed avoidance, mitigation, and management measures to reduce the potential impacts of urban development. Include any proposed management and/or monitoring plans that will be implemented pre- and post-construction to ensure residual impacts are not greater than predicted.	Section 5.1.5
5.	Identify, describe, and quantify the potential residual impacts (direct, indirect, and cumulative) that may occur following completion of urban development after considering and applying avoidance and minimisation measures.	Section 5.1.6
Environmental Factor 2 - Terrestrial Fauna		
6.	In accordance with the requirements of EPA Guidance: (a) conduct a Level 1 (basic) terrestrial fauna survey, including a desktop study that incorporates existing regional terrestrial fauna surveys and databases; and (b) as required based on the outcomes of the Level 1 (basic) survey undertake terrestrial fauna surveys, including targeted surveys for significant species, to identify and characterise terrestrial fauna and fauna habitat, at a local and regional scale, that may be impacted directly and indirectly by urban development. This should include sampling inside and outside the impact areas and consideration of cumulative impacts. For significant species, this must include information on: I. the abundance, distribution, ecology, and habitat preferences, together with baseline information and mapping of local	Appendix B, C and F

Task No.	Required work	Section and Page No.
	and regional occurrences. II. a population size and importance of the population from a local and regional perspective; and III. information on conservation value of each habitat type (e.g. breeding, migration, feeding, resting) from a local and regional perspective, including the percentage representation of each habitat site in relation to its local and regional extent. Note: Surveys should include both Terrestrial Vertebrate Fauna and Short-range Endemic (and/or other significant) Invertebrate Fauna. Survey results and a demonstration of how the requirements have been met are to be included in the ER. If multiple surveys have been undertaken to support the assessment, a consolidated report should be provided including the integrated results of the surveys. Where surveys were undertaken prior to scoping, justification should be provided to demonstrate that they are relevant and consistent with EPA Guidance. IBSA data packages should be provided in accordance with EPA guidance. Multiple surveys should be combined in one report. Separate reports are required for Short-range Endemic Invertebrate Fauna and Vertebrate Fauna.	
7.	Describe the values and significance of fauna and fauna habitat that maybe impacted directly and indirectly by urban development and describe the significance of these values in a local and regional context. Habitats that are important to significant species, and the reasons for their importance, should be identified. Discussions of habitats should quantify the absolute and relative areas of the habitats in question, and that these discussions should be supported by tables and figures that illustrate the extents of habitats.	Section 6.1.3
8.	Provide a map illustrating the known recorded locations of conservation significant species, other significant fauna, and fauna habitat in relation to the Amendment Area. Clearly show any areas/lots unable to be surveyed.	Figures 13, 14 and 18
9.	Provide a map depicting areas of fauna habitat to be retained and protected from future urban development. Describe and assess the extent of direct and indirect impacts as a result of future urban development to terrestrial fauna taking into consideration cumulative impacts and the significance of fauna and fauna habitat. This should include an assessment of the risk posed to any significant species as a result of urban development. For significant species, this should be done on a species-by-species basis. Significant species discussed should include short-range endemic and other significant invertebrates.	Figures 3 and 13 Section 6.1.4
10.	Predict the residual impacts to terrestrial fauna after considering and applying avoidance and minimisation measures.	Section 6.1.6
11.	Discuss proposed management, monitoring and mitigation methods to be implemented to ensure residual impacts (direct and indirect) are not greater than predicted.	Section 6.1.5

Task No.	Required work	Section and Page No.
Environmental Factor 3 - Inland Waters		
12.	Identify and assess the values and significance of hydrological and soil characteristics within the Amendment Area and immediate adjacent area and describe these values in a local and regional context.	Section 7.1.3
13.	Describe and assess the potential impacts (direct and indirect) as a result of future urban development on water quantity and quality in relation to ground water, surface water and waterways.	Section 7.1.4
14.	Predict the extent, severity, and duration of potential impacts, including changes to local and regional groundwater flows and levels, drawdown, local water quality and impacts to other groundwater users as a result of urban development.	Section 7.1.6
15.	Prepare a Foreshore Assessment Report (FAR) to determine the extent of the waterway foreshore areas to be protected, in accordance with Operational Policy 4.3: Identifying and establishing waterways foreshore areas (DoW, 2012).	Appendix D
16.	Based on the outcomes of the above and taking into consideration the principles of avoidance and minimisation, identify an environmentally acceptable area for development.	Section 7.1.7
17.	Provide a summary of residual impacts of future urban development within the Amendment Area.	Section 7.1.6
18.	Describe any proposed avoidance, mitigation and management measures that demonstrate the EPA's objectives can be met.	Section 7.1.5
19.	Prepare a District Water Management Strategy (DWMS) in accordance with the Guidelines for district water management strategies (DoW, 2013).	Appendix E
	Other Environmental Factors or Matters	Section 8
	Offsets	Section 9
	Holistic Impact Assessment	Section 10
	Cumulative Impact Assessment	Section 11

Executive Summary

360 Environmental Pty Ltd (360 Environmental) was commissioned by M Group to undertake this ER in support of the rezoning of the subject Amendment Area from 'Rural' to 'Urban Deferred' under MRS Amendment No. 1344/57 - Maida Vale Urban Precinct to facilitate future urban development, which includes residential development, associated infrastructure and areas of Public Open Space (POS) and conservation. The WAPC resolved that the site be zoned 'Urban Deferred' to enable resolution of the following items:

- The Transport Impact Assessment (TIA) being updated to the satisfaction of Main Roads WA (MRWA) and Department of Transport (dot);
- Confirmation on the location of the proposed Roe Highway overpass; and
- The completion of water and wastewater reviews for the subject land by the Water Corporation.

However, if the above items are addressed to the satisfaction of the WAPC the amendment could be modified to the Urban zone at the final determination stage.

Under Section 38 of the *Planning and Development Act 2005* (P&D Act), the WAPC are to refer an amendment to a Region Planning Scheme to the EPA.

Under Section 39 of the P&D Act, when the EPA has acted under Section 48C(1)(a) of the EP Act, the WAPC are to undertake an ER of the amendment in accordance with the relevant instructions.

The EPA has determined that the abovementioned MRS amendment will be assessed under Division 3 of Part IV of the EP Act. The reason for it being assessed is because the future development permitted by the proposed 'Urban Deferred' zoning has the potential to have a significant effect on the environmental values within the existing Amendment Area, including:

- Poorly represented vegetation complexes (*Forrestfield and Southern River*)
- *Threatened Ecological Communities* (TECs) listed as *Critically Endangered* and *Endangered* under the *Biodiversity Conservation Act 2016* (BC Act) and *Endangered* under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Conospermum undulatum* (listed as Vulnerable flora under the BC and EPBC Acts)
- Habitat for threatened species of fauna
- Two waterways, known as Crumpet Creek and Poison Gully, that support some of the above vegetation.

The ERD has been prepared to fulfill the assessment requirements (Assessment No. 2175) under Section 48A of the EP Act. It has been prepared in accordance with the EP Act *Environmental Impact Assessment* (Part IV Divisions 1 and 2) *Administrative Procedures 2021* (EPA 2021a), the *Guidelines for Preparing an Environmental Review Document* (EPA 2018a) and to the requirements of the *Instructions for Environmental Review* (EPA 2018b).

The Amendment Area has been extensively cleared and contains small pockets of highly fragmented vegetation. The condition of the vegetation is mostly degraded, with 12.3 ha of vegetation considered to be in good condition, very good condition or excellent condition.

Fauna habitat comprises of 66.4 ha of the Amendment Area. There are 574 potential black cockatoo breeding trees and 38.55 ha of high-quality black cockatoo foraging habitat across the Amendment Area. Direct or indirect impacts to fauna resulting from the proposed MRS amendment are not considered to be significant. Areas containing high quality fauna habitat or black cockatoo breeding habitat have been considered in the MRS amendment Concept Plan through the protection and retention of open space which will continue to be refined during subsequent Local Planning Scheme (LPS) amendment and Local Structure Plan (LSP) stages for the Amendment Area.

An EPBC Referral will be prepared to address Matters of National Environmental Significance (MNES) upon endorsement of the MRS amendment. The Foreshore Assessment Report (FAR) identified that the vegetation along the creek is considered to have low biodiversity of endemic species, with the area east of Brewer Road exhibiting severely altered vegetation and minimal native species. A preliminary 30 m buffer has been recommended (Figure 8: 360 Environmental 2021) which will protect significant areas from future urban development and enable the protection of significant flora and vegetation, flooding, and fauna habitat. Further investigations will be necessary to confirm the extent of the foreshore buffer area during the LSP stages and development of a Local Water Management Strategy (LWMS) and Urban Water Management Plan (UWMP) within the Amendment Area.

Overall, a significant impact is not expected to the flora and vegetation biodiversity, fauna integrity and biodiversity, inland water integrity and biodiversity of foreshore areas and management of water, ecological integrity of the region and social surroundings of the region.

Detailed design of the Amendment Area during the LSP amendment and LSP planning approval processes will continue to ensure proposed retention areas are protected, managed and where possible expanded, to preserve and improve environmental values and outcomes across the Amendment Area.

Overview of the amendment

The WAPC initiated the MRS amendment No. 1344/57 which seeks to rezone the land in Maida Vale from 'Rural' to 'Urban Deferred' (Figure 2 and Table 1).

Table 1: Summary of amendment

Scheme Amendment	Metropolitan Region Scheme Amendment 1344/57
Responsible Authority	WAPC
Location	Land in Maida Vale generally bound by Hawtin Road, Sultana Road East, Roe Highway, Lot 104, Lot 102, Reserve 12564, Lot 33 and Lot 32 Oxford Court, Lot 101 Brewer Road, and Harold Road.
Short Description	Rezoning of approximately 178 ha of land from the 'Rural' zone to 'Urban Deferred' zone to allow for future urban development which includes residential development, associated infrastructure, and areas of POS and conservation. It is noted that 10.59 ha is associated with existing City of Kalamunda managed local road reserves that are not subject to development and 14.10 ha associated with a Western Power Easement that will remain land subject to Western Power management.

The MRS amendment once endorsed by WAPC (and following subsequent transfer to the Urban zone), will enable the progression of a LPS amendment, LSP and subsequent subdivision and development approvals for the Amendment Area.

MRS amendment 1344/57 has been referred to the EPA for assessment. The EPA has determined that the MRS Amendment be assessed under Division 3 of Part IV of the EP Act. The MRS Amendment is being assessed to determine if implementation of the scheme through future development has the potential to have a significant effect on environmental values known to exist within the Amendment Area.

This ERD acknowledges those significant environmental values applicable to the proposed MRS amendment and identifies the potential environmental impacts, residual impacts, proposed mitigation, and environmental management measures to be implemented throughout the planning approval process for the Amendment Area.

Table 2 provides a summary of the potential environmental impacts, residual impacts, proposed mitigation, and environmental outcomes applicable to the MRS amendment.

Table 2: Summary of Potential Impacts, Proposed Mitigation and Outcomes

Preliminary Key Environmental Factor 1: Flora and Vegetation	
Potential impacts	**Direct** Permanent loss through clearing of native vegetation including: • poorly represented vegetation complexes (including 2.34 ha of Forrestfield and 0.34 ha of Southern River). • up to 3.95 ha of SCP20a (Endangered pursuant to BC Act), 0.87 ha of SCP20b (Endangered pursuant to BC Act and EPBC Act and Vulnerable in WA pursuant to BC Act) of which 1.43 ha SCP 20a and 0.15 ha of SCP 3b has been recorded within the existing Western Power Easement. • up to three individuals of *Conospermum undulatum* (Vulnerable flora under the BC and EPBC Acts) that have been recorded within the existing Western Power easement corridor. • up to two individuals of *Isopogon autumnalis* (P3) that have been recorded within the existing Western Power easement corridor. **Indirect** • Fragmentation or isolation of vegetation and *Conospermum undulatum* or other conservation significant flora populations. • Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to introduction and/or spread of weeds or plant disease including Phytophthora dieback and *Quambalaria coyrecup*. • Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to altered fire regime.
Mitigation hierarchy	**Avoid** The MRS amendment area includes 2.91 ha of land already under reservation by the City of Kalamunda for Local Open Space. The proposed amendment includes a total of 16.43 ha to be set aside as retention areas (Figure 10). The total extent of native vegetation to be retained across both the proposed retention areas and City Kalamunda's reservation is 19.34 ha. City of Kalamunda Local Open Space reservation includes: • 0.01 ha of TEC of SCP 20a and 1.14 ha of SCP 3b • 1.14 ha of vegetation in good to excellent condition. The proposed retention areas include: • 6.51 ha of SCP 20a, 0.34 ha of TEC SCP 20b and 1.27 ha of SCP 3b • 20 individuals of Threatened and Priority Species • 7.48 ha of vegetation in good to excellent condition. **Minimise** • Manage and protect intact native vegetation that are analogous within the Forrestfield and Southern River vegetation complexes within areas of open space wherever practicable during the LPS amendment and Local Structure Plan approval process.

	• Manage and protect a minimum of 8 ha of TEC, 7 individuals of *Conospermum undulatum* (T) and 13 individuals of *Isopogon autumnalis* (P3) recorded through the establishment of retention areas. • A Bushfire Management Plan (BMP) has been prepared and will be implemented to minimise the risk of human sources of bushfire ignition by the MRS amendment. • Implementation of general hygiene measures during construction and revegetation in accordance with DBCA Management Guidelines to minimise the spread of weed species, dieback and pathogens entering vegetated areas. The vegetation and riparian corridor will be rehabilitated and maintained. Appropriate management plans and strategies would be implemented to address these impacts. **Rehabilitate** • In accordance with the Operational Policy 4.3 – identifying and establishing waterways foreshore areas, a Foreshore Management Plan (FMP) will be prepared and implemented at a subsequent planning approval stage when an appropriate level of design detail is available and a LWMS or UWMP has been prepared. • In areas outside the foreshore management area, that have been cleared during civil construction works associated with implementation of the amendment or are in a degraded condition, progressive rehabilitation and revegetation will be undertaken. Rehabilitation in the form of streetscaping associated with road reserves and open space throughout the Amendment Area will utilise native species where possible.
Residual impacts, including assessment of significance	The proposed amendment will result in clearing of up to 25.05 ha of native vegetation including vegetation representative of the Forrestfield and Southern River complexes. Assuming implementation of the MRS amendment results in clearing of all developable areas then at the SCP scale, the estimated areas for clearing of vegetation mapped as Forrestfield Complex is 2.34 ha and Southern River Complexes is 0.34 ha. This represents a reduction of 0.08 % and <0.01 % of the current extents on the SCP (Table 20) with neither of the vegetation complexes being reduced to <10% as a result of the MRS amendment and consistent with retention objectives for urban constrained areas (DER, 2014). Including the Western Power Easement corridor, implementation of the amendment is likely to result in a permanent loss through clearing of the 4.98 ha (34.9%) TECs of up to: • 3.95 ha (37.7%) FCT SCP20a of which 1.43 ha is located within the Western Power Easement corridor • 0.87 ha (71.9%) FCT SCP20b • 0.16 ha (6.2%) FCT SCP3b of which 0.15 ha is located within the Western Power Easement corridor.

	Seven of the ten recorded *Conspermum undulatum* individuals are located within proposed retention areas and will not be cleared as part of the amendment. The remaining three *Conspermum undulatum* (T) individuals are located within the existing Western Power easement corridor. 13 of the 15 *Isopogon autumnalis* (P3) individuals are located within proposed retention areas and City of Kalamunda reservation and will not be cleared as part of the amendment. There are two individuals located within the existing Western Power easement corridor. While no development or clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. Habitat loss for conservation significant flora populations is unlikely to be significant as a result of the amendment as most of the vegetation communities associated with the conservation flora are located either in areas under reservation by the City of Kalamunda or in areas identified for retention. Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to the introduction and/or spread of exotic weeds is unlikely to be significant as a result of the amendment as there is already an extensive presence of weed infestations as a dominant feature of the survey area due to existing land uses and human activity. Degradation of vegetation due to plant diseases including Phytophthora dieback are unlikely to be significant due to the implementation of the proposed management measures including general hygiene management measures during high-risk activities. There was no evidence of recent fire observed within the Amendment Area or surrounding the area during the inspection of the Amendment Area. The BMP identified that the Amendment Area and surrounding area is not considered a likely occurrent for bushfire. It is also unlikely to alter the frequency, intensity, or extent of fires in this location.
Proposed environmental outcomes	• The proposed clearing will not reduce the pre-European extent of Forrestfield and Southern River vegetation complexes to 10 % or less remaining. • Retention of at least 20 individuals Threatened or Priority flora species recorded across the Amendment Area, of which seven Threatened and 13 Priority flora species are located within areas proposed for retention. The remaining five individuals are recorded within the existing Western Power easement corridor. While no development or clearing of this easement corridor is proposed, as the HV power lines will remain, the land is subject to Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.

	• Retention of at least 9.27 ha (65.1%) of TECs in existing LOS and proposed retention areas. • Retention of at least 8.62 ha (70.3%) of vegetation in Good to Excellent condition in existing LOS and proposed retention areas. • Indirect impacts from weeds and fire will be minimised through construction procedures including the preparation and implementation of a CEMP, BMP and FMP as a result of increased human activities from the MRS amendment. Through the implementation of the mitigation measures and consideration of the scale and nature of the impacts, the location in the context of sensitive environmental areas, as well as the State planning approval process, the MRS amendment is not expected to result in significant impacts to flora and vegetation. It is expected that the EPA objective to protect flora and vegetation so that biological diversity and ecological integrity are maintained will be met.
Assessment of offsets (if relevant)	Subject to the outcomes of detailed structure planning, an offset may be required to address the clearing associated with TECs and habitat loss.
Preliminary Key Environmental Factor 2: Terrestrial Fauna	
Potential impacts	**Direct** Permanent loss of fauna habitat, including black cockatoo foraging habitat and potential breeding trees prior to mitigation measures include up to: • Excluding the Western Power Easement corridor, 21.33 ha (55.5%) of vegetation providing high quality foraging habitat for black cockatoos. • Excluding the Western Power Easement corridor, 257 potential breeding trees providing potential roosting and breeding habitat for all three (3) black cockatoo species. • 33 potential breeding trees providing potential roosting and breeding habitat for all three (3) black cockatoo species and 3.9 ha high quality foraging habitat located within the Western Power Easement corridor in the Western Power Easement corridor. • 5.66 ha SRE habitat of moderate suitability of which 1.95 ha is within the Western Power Easement corridor. • 52.51 ha of fauna habitat of which 5.89 ha is within the Western Power Easement corridor. **Indirect** • Fragmentation of fauna habitat and loss of ecological connectivity. • Degradation of fauna habitat and habitat modification from the introduction and spread of weed and/or disease, altered surface water flows and edge effects. • Altered fauna behaviour due to noise, lighting, and human presence.

	• Degradation of fauna habitat due to altered fire regime.
Mitigation hierarchy	**Avoid** The City of Kalamunda's reservation includes: • 2.78 ha of high-quality black cockatoo foraging habitat. • 47 potential breeding trees of which six have at least one suitable hollow. • 2.6 SRE habitat of moderate suitability including collection site MVSRE06 where Pseudodiploexochus sp. Indet was recorded. • 2.8 ha fauna habitat. The proposed retention areas include: • 10.39 ha of high-quality black cockatoo foraging habitat. • 156 potential breeding trees of which 10 have hollows. • 6.15 ha SRE habitat of moderate suitability. • 11.11 ha of fauna habitat. Outside of the proposed retention areas 81 potential breeding trees of which one has at least one suitable hollow are proposed to be retained within areas of open space, road reserves and residential lots. **Minimise** • Terrestrial fauna habitat values located within the Crumpet Creek foreshore area reserve will be managed through the preparation and implementation of a Foreshore Management Plan (FMP) in accordance with the Operational Policy 4.3 – identifying and establishing waterways foreshore areas, to ensure the biodiversity and integrity of Crumpet Creek applicable for the proposed MRS amendment. • A proposed 30 m foreshore buffer both sides along Crumpet Creek will be established that will retain a minimum of 0.37 ha of the vegetation within the foreshore buffer area in good to excellent condition. The 30 m buffer will protect against flooding and conserve significant flora, vegetation, and fauna habitat. • Protect intact black cockatoo foraging habitats and potential breeding trees in accordance with the retention plan. • Maintain vegetation that forms significant fauna habitat within areas proposed for retention and identified ecological linkages, riparian corridors (foreshore areas). **Rehabilitate** • Rehabilitation will aim to improve habitat values in the amendment area. The proposed rehabilitation in the form of streetscaping associated with road reserves and open space throughout the Amendment Area will utilise native species where possible. • Rehabilitate and revegetate those areas of riparian corridors within the Crumpet Creek foreshore area reserve that have been disturbed during the construction phase.

	• Structure planning will be implemented on a precinct basis to minimise the size of the clearing front and allow for progressive rehabilitation.
Residual impacts, including assessment of significance	• Implementation of the MRS amendment will result in clearing of up to 52.51 ha of fauna habitat. Fauna habitat condition varies across the Amendment Area, with the most of habitat types showing signs of existing disturbances from clearing, infrastructure and weeds. There are 5.89 ha of fauna habitat located within the existing Western Power easement and 2.78 ha within existing road reserves. • The majority of the Amendment Area (142.46 ha) is considered Completely Degraded/ Cleared fauna habitat. The remaining fauna habitats are highly fragmented particularly around existing infrastructure and completely degraded areas. These areas offer little habitat value for fauna and are considered to limit the movement of smaller animals to areas with dense understory. Clearing of 52.51 ha of fauna habitat is not expected to result in significant impacts on terrestrial fauna. • Direct loss of 5.66 ha of SRE habitat moderate suitability for SRE species including 1.95 ha located within the Western Power Easement. Given the degraded nature of the vegetation across the Amendment Area, it is considered that SRE species will likely persist in the good to excellent condition vegetation being retained. The Pseudodiploexochus sp. indet. was recorded in riparian vegetation that is within the City of Kalamunda's existing LOS for Crumpet Creek and is not proposed for development as part of the implementation of this amendment. • The proposal is estimated to result in the permanent loss of up to 257 potential black cockatoo breeding trees, including no trees containing potentially suitable for hollows and 25.23 ha of high-quality black cockatoo foraging habitat. • There are 33 potential breeding trees and 3.9 ha of high-quality black cockatoo foraging habitat located within the existing Western Power easement corridor including one with at least one suitable hollow for these species. While no development or clearing of this easement corridor is proposed, as the high voltage power lines will remain, the land is subject to Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment. The DBCA Database Search Results identified two black cockatoo roost sites occurring within the Amendment Area (Figure 15). One of these sites is located within a proposed retention area and the other on the edge of the Western Power Easement corridor. • It is unlikely that the MRS amendment will significantly increase fragmentation in the already degraded areas of the Amendment Area. • Degradation of fauna habitat and habitat modification from the introduction and increased spread of weeds and/or disease,

	altered surface water flows and edge effects are unlikely to occur as a result of the MRS amendment.
Proposed environmental outcomes	• The MRS amendment will result in the retention of at least 13.91 ha (21.0%) of fauna habitat including 5.83 ha of moderate suitability for SRE. • Retention of 17 (94%) recorded potential black cockatoo breeding trees with at least one suitable hollow across the MRS Amendment Area, of which six are located within areas of existing Local Open Space as reserved under the City of Kalamunda Local Planning Scheme. • One (6%) recorded potential black cockatoo breeding trees is located within the existing Western Power easement corridor. While no development or clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. • Retention of at least 284 (49.5%) recorded potential black cockatoo breeding trees across the Amendment Area, of which 47 (8.2%) are located within areas of existing Local Open Space as reserved under the City of Kalamunda Local Planning Scheme and 156 within proposed retention areas. An additional 33 (5.8%) potential black cockatoo breeding trees are within the existing Western Power Easement corridor. • Retention of up to 13.17 ha (52.2%) of vegetation providing high quality habitat for black cockatoos. An additional 3.9 ha (10%) overlaps the existing Western Power Easement corridor. • Indirect impacts from weeds, disease, edge effects and fire will be minimised through construction procedures including the preparation and implementation of a CEMP, BMP and FMP. Through the implementation of the mitigation measures and consideration of the scale and nature of the impacts, the location in the context of sensitive environmental areas, as well as the State planning approval process and offsets for black cockatoo, it is expected that the EPA objective to protect terrestrial fauna so that biological diversity and ecological integrity are maintained will be met.
Assessment of offsets (if relevant)	Subject to the outcomes of detailed structure planning, an offset may be required to address the clearing associated with the black cockatoo foraging habitat and potential breeding trees.
Preliminary Key Environmental Factor 3: Inland Waters	
Potential impacts	**Direct** • Permanent loss of foreshore area and values through vegetation clearing prior to the implementation of any mitigation measures • Alteration to natural hydrological regime from modified surface water drainage resulting in impacts to significant wetlands and water courses within and adjacent the amendment area

Mitigation hierarchy	• Changes to groundwater regime because of abstraction for construction and irrigation purposes from a fully allocated aquifer. **Indirect** • Contamination of surface and/or groundwater resulting in impacts to water quality • Erosion and sedimentation from clearing and modified surface water drainage.
	Avoid • The proposed foreshore area has been designed to avoid and protect environmental values, the function of the foreshore in the future is to manage the 1% Annual Exceedance Probability (AEP) storm event and provide an attractive area with ecological function. **Minimise** • A foreshore area and preliminary 30m buffer zone both sides for Crumpet Creek has been designated in accordance with the results of a biophysical assessment and Operational Policy 4.3: Identifying and Establishing Waterways Foreshore Areas (Department of Water, 2012) and Determining foreshore reserves (Waters and Rivers Commission, 2001). • Future detailed design will continue to consider the ecological function, environmental values, and impact of flooding along Crumpet Creek to maintain and protect the intended foreshore area in the Amendment Area. • In accordance with the Operational Policy 4.3 – identifying and establishing waterways foreshore areas, a Foreshore Management Plan (FMP) will be prepared and implemented at a subsequent planning approval stage when an appropriate level of design detail is available and a LWMS or UWMP has been prepared. • Runoff quantity control will be managed through the implementation of drainage POS and minor earthworks developed at subsequent planning approval stages when an appropriate level of design detail is available. • Quality management will be achieved by applications of Water Sensitive Urban Design (WSUD) elements. • Engineering controls will be implemented to ensure that the total nutrient loads to groundwater through the treatment of the first 15 mm runoff from the Amendment Area, prior to infiltrating to groundwater. Provision of separation distance of at least 1.2 m to maximum groundwater level achieved. • Stormwater retention and detention structures will be designed in accordance with the Stormwater Management Manual of Western Australia (DWER 2007) and Australian Rainfall and Runoff (Engineers Australia 2019). • Further hydrological investigations will occur during LSP, subdivision and development stages to understand water supply

Residual impacts, including assessment of significance	and drainage requirements in accordance with the Better Urban Water Management Framework. • Stormwater quality measures be implemented to minimise erosion and sediment mobilisation including the preparation and implementation of an Erosion and Sediment Control Plan following detailed design of the LSP. • Connection of the development to a Water Corporation sewerage system. **Rehabilitate** Improvement and rehabilitation of the foreshore area with management strategies that include: • Weed and erosion control. • Revegetation using locally endemic species. • Limiting access. • Progressive rehabilitation of the foreshore area disturbed during the construction phase wherever practicable.
	The significant residual impacts to Inland Waters have been assessed with consideration to the draft District Structure Plan (DSP) (DWMS Appendix B) rather than the Concept Plan (Figure 3). The draft DSP is considered the most appropriate plan for this factor as it provides an indication of the anticipated land uses where the Concept Plan informs the Flora and Vegetation and Terrestrial Fauna retention areas within the Amendment Area. • The implementation of the MRS amendment is not anticipated to result in the permanent loss of the Crumpet Creek foreshore area given that appropriate consideration has been applied in the development of the indicative foreshore area in accordance with the relevant statutory requirements, reservation under the existing City of Kalamunda Local Open Space and an additional proposed retention areas incorporating a 30m foreshore buffer. • The maximum flood depths within the Amendment Area in the 1% AEP event found that Crumpet Creek runs full and spills in several locations along the site. On the left bank, the maximum modelled flood depth is approximately 350mm downstream of Hawtin Road. Downstream of Brewer Road, the maximum flood depth is approximately 250mm on the right bank. In most locations within the floodplain, the flood depths do not exceed 100-150mm (360 Environmental, 2021). With further design during the LWMS and UWMP stages of the planning approval processes and implementation of recommended drainage structures, the proposed MRS amendment is not expected to impact natural hydrological regimes. • The use of existing licences in addition to POS areas that do not require irrigation and the setting of irrigation targets in line with the Water Corporation's Water efficiency targets the impact of abstraction on a fully allocated aquifer are not considered significant. • The results from the post development water balance for each cell of the Amendment in conjunction with the proposed surface

	water management measures, the implementation of the amendment is not expected to significantly alter the surface water regime within the Amendment Area. Implementation of the proposed stormwater quality measures and an Erosion and Sediment Control Plan, it is unlikely that the proposed MRS amendment will impact the water quality of the surrounding areas. • Implementation of the proposed MRS amendment may introduce new contamination including accidental spills during construction and chemical wastes depending on the possible end uses within the proposed neighbourhood shopping centre. However, a number of these potential groundwater contamination risks will be eliminated or significantly reduced through the connection of the development to the Water Corporation sewage system, primarily residential land uses and limited application of fertilizer and pesticide use in areas of POS coupled with the depth to groundwater levels across the Amendment Area in excess of 25 m below ground level the potential indirect impact to groundwater quality contamination resulting from implementation of the MRS amendment is expected to be low.
Proposed environmental outcomes	• Crumpet Creek will be maintained as a natural waterway with the proposed foreshore area and associated buffer will be designed to protect the remaining ecological values and manage the 1% AEP flood events. • Post development surface water flows into Poison Gully from the Amendment Area will be maintained to meet pre-development flows. • Post-development groundwater quality leaving the Amendment Area will be the same or better than the water quality entering the area. Pre-development peak flows and surface water quality are maintained in the post development environment. • Irrigation targets set in line with Water Corporation's Water efficiency targets to reduce impacts on the fully allocated aquifer. The first 15mm of rainfall will be retained onsite. The stormwater management strategy for the Amendment Area will ensure post development flows are restricted to pre-development conditions and water discharged from the Amendment Area is of a suitable quality. WSUD measures will be encouraged to manage water quality and quantity. After the mitigation hierarchy has been applied, no significant residual impacts to values associated with Inland Waters is anticipated. Implementation of the MRS amendment is expected to be managed to meet the EPA objective 'To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected' for Inland Waters.
Assessment of offsets (if relevant)	The proposed amendment is unlikely to have a significant residual impact on Inland Waters and therefore offsets for this factor are not proposed.

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1 Amendment

1.1 Amendment content

The EPA has determined that the proposed MRS amendment is to be assessed under Division 3 under Part IV of the EP Act. The proposed amendment (MRS 1344/57) seeks to rezone up to 178 ha of land from the 'Rural' zone to the 'Urban Deferred' zone. The WAPC resolved that the Amendment Area be zoned 'Urban Deferred' to enable resolution of the following items:

- The Transport Impact Assessment (TIA) being updated to the satisfaction of Main Roads WA (MRWA) and Department of Transport (dot);
- Confirmation on the location of the proposed Roe Highway overpass; and
- The completion of water and wastewater reviews for the subject land by the Water Corporation.

If the above items are addressed to the satisfaction of the WAPC the amendment could be modified to the Urban zone at the final determination stage.

The ERD has been prepared to fulfil the assessment requirements (Assessment Number 2175) under section 48A of the *Environment Protection Act 1986* (EP Act). It has been prepared in accordance with the EP Act Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016 (EPA 2021a), How to prepare an ERD Instructions (EPA 2018a) and to the requirements of the Instructions for ER (EPA 2018b).

The purpose of the ERD is to demonstrate how the preliminary key environmental factors and the associated required work shall be addressed as part of the MRS Amendment to minimise the potential impact on environmental values of the Amendment Area.

The preliminary key environmental factors are:

- Flora and Vegetation
- Terrestrial Fauna
- Inland Waters.

The ERD further details other environmental factors or matters, offsets, Matter of National Environmental Significance (MNES) and Holistic impact assessment applicable to the amendment.

1.1.1 Amendment proposal

The Maida Vale Urban Precinct (referred within as the Amendment Area) was referred to the EPA on the 27 June 2018 to rezone the site from 'Rural' to 'Urban Deferred'. Sufficient information was received on the 15 September 2018. All proposed amendments to a Region Planning Scheme are to be referred by the WAPC to the EPA.

A decision was made on the 10 September 2018 by the EPA to formally assess this proposed MRS amendment through an ER process (the ERD) for the preliminary factors: Flora and Vegetation, Terrestrial Fauna, and Inland Waters.

On the 24 October 2018, the EPA provided WAPC with the Instructions for the ER document issued under section 48A of the EP Act.

Since the MRS amendment referral to the EPA there has been no further modifications to the proposed amendment which will implicate the referral or instructions for this ERD.

The EPA has provided preliminary comments on the ERD and have requested modifications to the ERD and supporting annexures. These modifications have been undertaken and incorporate into the newly structured ERD in accordance with the ERD instruction requirements (October 2021).

Figure 1 provides the MRS amendment location and proposed Amendment Area.

The responsible authority for the MRS amendment is as follows:

Company:	Western Australian Planning Commission
Physical Address:	140 William Street PERTH WA
Postal Address:	Locked Bag 2506 PERTH WA 6001
Email	Info@dplh.wa.gov.au
ABN	35 482 341 493

1.1.2 Amendment Description

The existing zoning of the Amendment Area and surrounds is identified in Figure 2.

Land zoned under the MRS 'Urban Deferred' is for future urban uses following the extension of services, the progressive development of adjacent Urban areas, and resolution of any environmental and planning requirements relating to development (Department of Planning, Land and Heritage [DPLH] 2022). The proposed 'Urban Deferred' zone will allow for future residential development through a process that includes a LPS amendment, local structure planning and subdivision and development approval of the Amendment Area.

The surrounding land to the north, west and south is currently predominately zoned as 'Urban' under the MRS. Areas to the east are zoned 'Rural' and reserved for 'Parks and Recreation' further to the east (Figure 2). The rezoning of the Amendment Area will compliment surrounding land uses. The existing landform of the Amendment Area consists of mostly degraded vegetation with some fragmented patches of dense, diverse vegetation resulting from the previous rural development. Crumpet Creek occurs within the Amendment Area.

Future land uses proposed for the Amendment Area include the allocation of POS, conservation and foreshore areas, a Primary School site, a Neighbourhood Shopping Centre, road reserves, easements, and residential development. The proponent has prepared a Concept Plan to inform this MRS amendment. Detailed design of the Amendment Area during the LSP amendment and LSP planning approval processes will continue to ensure proposed retention areas are protected, managed and where possible expanded, to preserve and improve environmental values and outcomes across the Amendment Area.

Development within Amendment Area will provide POS strategically located to preserve as much native vegetation as possible. Protection of Crumpet Creek and the associated foreshore area within the Amendment Area is of high importance to the proposed rezoning. The Amendment Area will be designed to represent the best environmental outcome for the protection of native vegetation, fauna habitat values and waterways associated with the proposed MRS amendment providing long collection and controls that do not currently exist.

The characteristics of the MRS amendment are detailed in Table 3.

Table 3 MRS Amendment Description

Scheme Amendment	Metropolitan Region Scheme Amendment 1344/57
Responsible authority	WAPC
Location	Land in Maida Vale generally bounded by Hawtin Road, Sultana Road East, Roe Highway, Lot 104, Lot 102, Reserve 12564, Lot 33 and Lot 32 Oxford Court, Lot 101 Brewer Road, and Harold Road (Figure 1).
Short description	Rezoning of approximately 178 ha of land from the Rural zone to the 'Urban Deferred' zone to allow for future urban development which includes residential development, associated infrastructure, and areas of POS.

1.2 Amendment alternatives

The Amendment Area is identified within the Perth and Peel @3.5 million / North-East Sub-regional Planning Framework. The Strategy refers to "the future Urban expansion of land for residential development (including the Amendment Area), specifically representing a consolidation and 'rounding off' of existing Urban areas "(WAPC 2018a).

The Amendment Area has been identified as land for future residential development with a short-medium term timeframe (2015-2031), however is subject to the endorsement of the MRS amendment and subsequent planning and development approvals associated with the Amendment Area.

No amendment alternatives have been considered as this amendment is consistent with the intended land uses for the Amendment Area. Future local structure planning and subdivision and development stages for the Amendment Area will resolve to consider, manage, and mitigate the potential environmental impacts resultant from the intended land uses identified in the MRS amendment.

1.3 Local and regional context

The Amendment Area is located in Maida Vale within the City of Kalamunda. Figure 5 provides the local and regional context for the Amendment Area.

The nearest Conservation Category Wetland (CCW) is location 1.2 km southwest of the Amendment Area. There are no declared Ramsar wetlands present within the Amendment Area or within 10 km of the Amendment Area.

1.3.1 Existing Land Uses

The proposed MRS amendment comprises a range of residential, semi-rural and rural land uses. The proposed MRS amendment is surrounded by the following adjacent land uses (Figure 2):

- Roe Highway and semi-rural lifestyle blocks to the west.
- Hawtin Road and semi-rural lifestyle blocks to the east.
- High density residential development, school, and POS to the south and southeast.
- High density residential development and commercial development to the north.

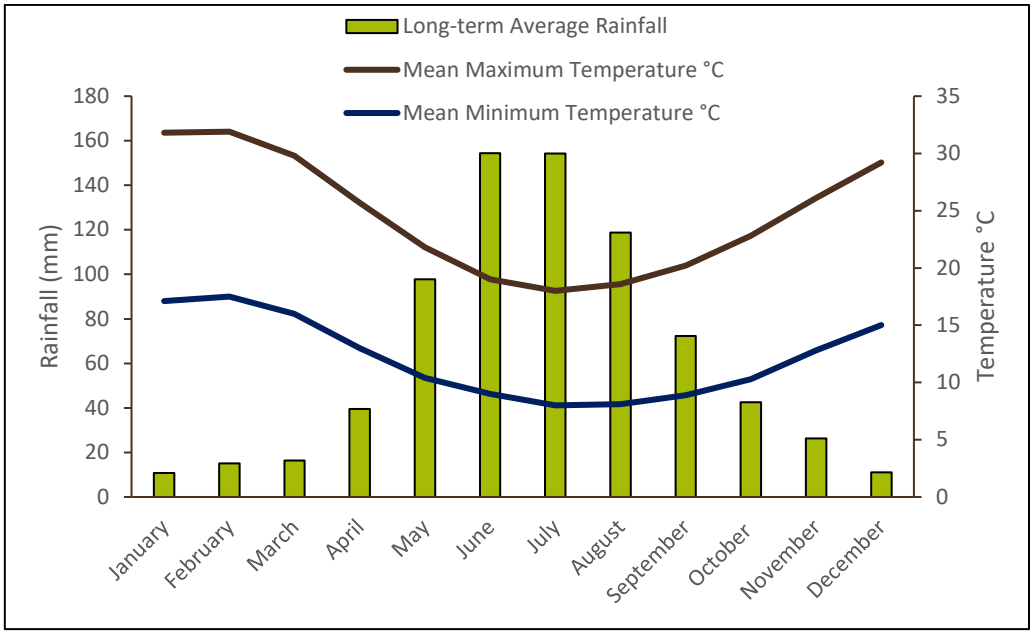
A power easement traverses the Amendment Area running parallel north to south along Brewer Road. Poison Gully is an open drain that is situated north of the Amendment Area. The main roads intersecting the Amendment Area include Hawtin and Brewer Roads to the east, Sultana Road East to the south, Roe Highway to the west and Harold Road to the north.

The proposed MRS amendment to 'Urban Deferred', and ultimately 'Urban' zone, provides for residential development, associated infrastructure and areas of POS and conservation including the protection of remnant vegetation and habitat protection (Figure 3). These proposed land uses are complimentary to the existing land uses surrounding the Amendment Area. Detailed design of the Amendment Area during the LSP amendment and LSP planning approval processes will continue to ensure proposed retention areas are protected, managed and where possible expanded, to preserve and improve environmental values and outcomes across the Amendment Area.

1.3.2 Climate

The closest official Bureau of Meteorology (BoM) weather station currently operating near to the Amendment Area is the Perth Airport Weather Station (Station number 009021), approximately 5 km west of the Amendment Area. The Perth Airport weather station provides a climate data set of approximately 73 years (BoM 2021). The climate for Maida Vale is described as warm Mediterranean (Mitchell et al. 2002), with mean minimum of approximately 12.2 ˚C and a mean maximum of 24.6˚C (1944-2021). Average annual rainfall is 760.4 mm (Graph 1) (BoM 2021).

The long-term average wind speed at 9 am is 14.2 km/h in May and typically blows from east (1944-2010) (Plate 1). The long-term average wind speed at 3 pm is 18.7 km/h in May and generally blows from the south-west (Plate 1).



Graph 1: Long-term and Monthly Total Rainfall, Maximum and Minimum Temperatures for Perth Airport.

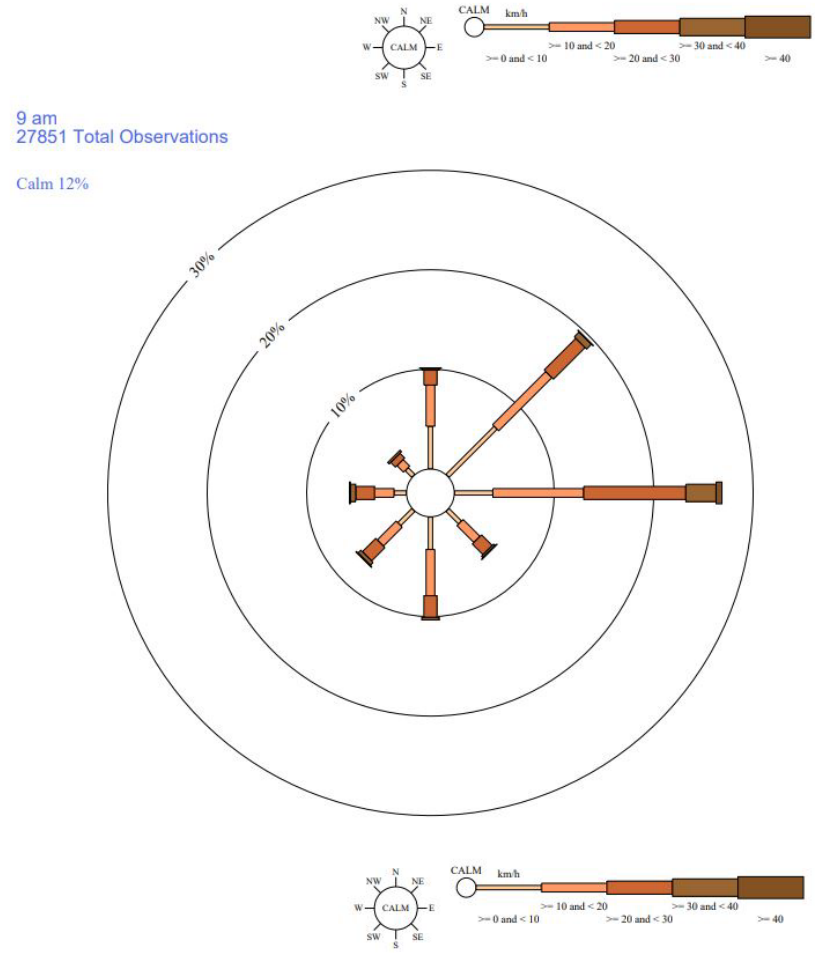


Plate 1: Wind Roses for Maida Vale Displaying 9 am and 3 pm Averages in May

2 Legislative context

2.1 Environmental Impact Assessment Process

Under Section 38 of the P&D Act *2005*, the WAPC is required to refer an amendment to a Region Planning Scheme to the EPA.

Under section 39 of the P&D Act, when the EPA has acted under section 48C(1)(a) of the *Environmental Protection Act 1986* (EP Act), the WAPC are to undertake an ER of the amendment in accordance with the relevant instructions.

The EPA has determined that the proposed MRS amendment will be assessed under Division 3 of Part IV of the EP Act. The reason for it being assessed is because the development permitted by the proposed 'Urban Deferred' zoning has the potential to have an impact on the environmental values within the Amendment Area, including:

- Poorly represented vegetation complexes (*Forrestfield and Southern River*).
- *Threatened Ecological Communities* (TECs) listed as *Critically Endangered* and *Endangered* under the BC Act (2016) and *Endangered* under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Conospermum undulatum* (listed as Vulnerable flora under the BC and EPBC Acts).
- Habitat for threatened species of fauna.
- Two waterways, known as Crumpet Creek and Poison Gully, that support some of the above vegetation.

The WAPC referred the MRS 1344/57 to the EPA on the 27 June 2018. The EPA issued the ERD instructions to the WAPC on the 24 October 2018.

The ERD is advertised via section 48C (4) of the EP Act and the proposed MRS amendment is advertised via section 84 of the P&D Act *2005*. The ERD will be made available for 60 days, during which time the public may make submissions regarding the MRS amendment.

The WAPC must consider all submissions on the amendment (and ERD), with all submissions relating to environmental issues to be referred to the EPA. The WAPC is required to advise the EPA of its opinion in relation to the environmental concerns raised in the submissions. The EPA then reports to the Minister for Environment on the environmental factors relevant to the MRS amendment, providing recommendations on conditions, environmental management measures if required. The EPA recommends environmental conditions which the Minister for Environment and the Minister for Planning must agree to (s. 48F of the EP Act). Once agreement has been determined, the environmental conditions will be incorporated into the MRS amendment.

The assessment milestones are depicted in Table 4.

Table 4: Assessment Milestones

Key Assessment Milestones
EPA issues instructions to the responsible authority (60 days after referral)
Responsible authority submits ER to EPA
EPA authorises advertising of ER and scheme for public review (30 days from responsible authorities (RA) submission of ERD)
Responsible authority advertises scheme and ER for public review in accordance with the P&D Act 2005
Close of public review period
Responsible authority provides copies of submissions related to environmental issues to the EPA (7 days from close of public review period)
Responsible authority provides Response to Submissions to EPA (42 days from close of public review period)
EPA reports to the Environment Minister on environmental factors and recommended scheme conditions (60 days after end of public review period or 30 days after receiving RA's Response to Submissions, whichever is longer

2.2 Other Approvals and Regulation

The proposed Amendment Area is currently zoned 'Rural' under the MRS and 'Special Rural' and 'Local Open Space' under the City of Kalamunda LPS. Table 5 provides a summary of other environment and planning approvals relevant to the amendment.

Table 5: Other Approvals Required for the Area

Decision-Making Authority	Legislation	Approval Required	Does the DMA process mitigate impacts on the environment	Details of how the DMA process mitigates impacts and how the EPA factors will be met
DCCEEW	*Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)*	Approved action for MNES	Yes	The potential impact of the amendment on MNES (Black Cockatoo and *Conospermum undulatum*) recorded within the or having potential to occur within the Amendment Area will be assessed under the EPBC Act. It is anticipated that any Decision Notice granting approval for the amendment will include conditions relevant to the MNES species. Compliance with these conditions align with meeting the EPA objective for Terrestrial Fauna, particularly the MNES species.
WAPC	*Planning and Development Act, 2005*	MRS amendment endorsement and change of use to Urban Deferred (or Urban zone if matters to be addressed have been considered)	Yes	An MRS amendment shall consider and have due regard to a range of State and Local Government statutory and strategic planning instruments, including: State Planning Policy (SPP) 2.0 – Environment and natural resources policy defines the principles and considerations that represent good and responsible planning in terms of environment and natural resource issues within the framework of the State Planning Strategy. Relevant to the EPA factor objectives, the SPP 2.0 provides policy context for: • Air Quality • Soil and Land Quality • Water Resources • Biodiversity • Greenhouse Gas Emissions. Alignment of an MRS amendment with the strategic planning instruments aligns with meeting the EPA objective for Inland Water, Flora and Vegetation, Greenhouse Gas, Air Quality and Terrestrial Environmental Quality.

Decision-Making Authority	Legislation	Approval Required	Does the DMA process mitigate impacts on the environment	Details of how the DMA process mitigates impacts and how the EPA factors will be met
WAPC	*Planning and Development Act, 2005*	Transfer of Urban Deferred zone to Urban zone (may not be required if amendment is approved to an urban zone)	Yes	The lifting of Urban Deferment shall consider and have due regard to a range of State and Local Government statutory and strategic planning instruments, including: • WAPC Guidelines for the Lifting of Urban Deferment • WAPC State Planning Policies • City of Kalamunda Local Planning Scheme No. 3 • City of Kalamunda Local Planning Strategy • City of Kalamunda Local Planning Policies.
City of Kalamunda	*Planning and Development Act, 2005*	LPS amendment to City of Kalamunda Local Planning Scheme No. 3	Yes	A LPS amendment shall consider and have due regard to a range of State and Local Government statutory and strategic planning instruments, including: • City of Kalamunda Local Planning Scheme No. 3 • City of Kalamunda Local Planning Strategy • City of Kalamunda Local Planning Policies A LPS amendment shall consider new provisions to cater for future residential development and associated infrastructure within the Amendment Area. The LSP amendment shall also consider the planning and development requirements and identify those specific environmental assessments, surveys or investigations that maybe required at the subdivision and development stages for the Amendment Area.
WAPC	*Planning and Development Act, 2005*	LSP approval	Yes	A LSP shall consider and have due regard to a range of State and Local Government statutory and strategic planning instruments, including: • City of Kalamunda Local Planning Scheme No. 3 • City of Kalamunda Local Planning Strategy • City of Kalamunda Local Planning Policies

Decision-Making Authority	Legislation	Approval Required	Does the DMA process mitigate impacts on the environment	Details of how the DMA process mitigates impacts and how the EPA factors will be met
				• WAPC State Planning Strategy 5050 • WAPC Perth and Peel @3.5million frameworks • WAPC State Planning Policies A LSP shall consider the intended land uses and associated infrastructure. The LSP will be supported by various environmental assessments, surveys and/or investigations to demonstrate how environmental issues (if any) will be managed during the formal planning and development approval process for the LSP area.
WAPC and City of Kalamunda	*Planning and Development Act, 2005*	Subdivision and Development approval	Yes	Subdivision and development approval shall consider and have due regard to intended land uses and their potential environmental impacts. Appropriate subdivision and/or development conditions shall be imposed by the relevant regulatory authorities resulting in future condition management including the implementation of environmental management plans and/or assessments, surveys, or investigations applicable to the intended land use to address any potential environmental impacts. TheWAPC Model Subdivision Conditions Schedule may also mitigate impacts and reflect how the EPA objectives may be met.
DPLH	*Aboriginal Heritage Act 1972* *Aboriginal Cultural Heritage Act 2021* *(transitional arrangements currently in place)*	Section 18 Consent Aboriginal Cultural Heritage Management Plan endorsement	Yes, partially	The Aboriginal Heritage Act 1972 (AH Act) allows for the protection of Aboriginal cultural heritage in Western Australia. No section 18 consents are anticipated for the amendment as implementation of the rezoning does not directly impact any known heritage sites within the Amendment Area. Compliance with section 18 conditions align with meeting the EPA objectives for Social Surrounds, particularly Aboriginal Heritage. The Aboriginal Cultural Heritage Act 2021 (ACH Act) is currently in a transitional period which commenced on 22 December 2021 and will last

Decision-Making Authority	Legislation	Approval Required	Does the DMA process mitigate impacts on the environment	Details of how the DMA process mitigates impacts and how the EPA factors will be met
				for at least 12 months. During the transitional period regulations, statutory guidelines and operational policies will be developed, as parts of the ACH Act are progressively proclaimed. When the ACH Act comes fully into operation, it will replace the Aboriginal Heritage Act.
DBCA	*Biodiversity Conservation Act 2016* (BC Act)	Ministerial authorisation to disturb, or take, native flora and fauna, including listed Threatened species and Threatened Ecological Communities.	Yes	The BC Act *(2016)* provides for the protection of threatened flora, fauna, and ecological communities in Western Australia. Should the amendment be required to take or disturb a threatened species, a Ministerial authorisation under s.40 of the BC Act will be sought. Ministerial authorisation under the BC Act aligns with meeting the EPA objectives for Terrestrial Fauna and Flora and Vegetation.
Department of Water and Environmental Regulation (DWER)	*Rights in Water and Irrigation Act 1914 (RIWI Act)*	Groundwater abstraction: Section 5C Licence to Take Water Section 26D Licence to Construct Wells	Yes	As part of the assessment and approval of the allocation, DWER considers the availability, use and protection of water in the resource area in accordance with the relevant water allocation plan. Operational Policy 5.12 developed under the RIWI Act requires proponents to completed hydrogeological assessment for proposed groundwater abstraction. Grant of 5C Licences, therefore, includes detailed consideration of the management of groundwater resources. The Groundwater Licence Operating Strategy describes the monitoring, management and reporting required to ensure that the groundwater abstraction can be managed. Compliance with groundwater licences and Groundwater Licence Operating Strategy ensures the management of groundwater aligns with the EPA objectives for Inland Waters.

2.2.1 Land Tenure, tenements, or leaseholds

The Amendment Area is land generally bound by Hawtin Road, Sultana Road East, Roe Highway, Lot 104, Lot 102, Reserve 12564, Lot 33 and 32 Oxford Court, Lot 101 Brewer Road and Harold Road, Maida Vale. There are 152 lots within the Amendment Area, landholdings tenure is detailed in Table 6. (Figure 1).

The areas of these lots have been calculated to take into consideration the proposed residential area, Crumpet Creek, road reserve and other areas applicable to the Amendment Area. Some of these lot areas have overlapping tenure.

The proponent does not have legal access to all the land in the Amendment Area. The land within the Amendment Area is owned separately by individual landholders.

Table 6: Land Descriptions

Lot No	Plan No	Approximate Lot area (ha)	Current zoning or reservation under MRS	Current Zoning Under LPS No.3
0	R 42914	0.16	Rural	Local Open Space
0	R 45989	0.06	Rural	Special Rural
0	R 37650	0.06	Rural	Special Rural
0	R 40245	0.06	Rural	Special Rural
0	R 37650	0.59	Rural	Special Rural
0	R 37650	1.87	Rural	Special Rural
0	R 37650	0.02	Rural	Special Rural
0	R 44874	0.05	Rural	Special Rural
0	R 40245	0.37	Rural	Special Rural
0	R 40275	0.30	Rural	Special Rural
0	R 37650	0.63	Rural	Special Rural
1	D079635 1	1.05	Rural	Special Rural
1	D087935 1	1.00	Rural	Special Rural
1	D066869 1	1.03	Rural	Special Rural
1	P065644 1	1.00	Rural	Special Rural
1	P016922 1	1.00	Rural	Special Rural
2	D079635 2	1.48	Rural	Special Rural
2	D087935 2	1.38	Rural	Special Rural
2	D012805 2	0.68	Rural	Special Rural
2	P065644 2	0.49	Rural	Special Rural
2	P016922 2	1.00	Rural	Special Rural
2	P013984 2	1.01	Rural	Special Rural

Lot No	Plan No	Approximate Lot area (ha)	Current zoning or reservation under MRS	Current Zoning Under LPS No.3
3	D079635 3	1.19	Rural	Special Rural
3	D087935 3	1.00	Rural	Special Rural
3	P016922 3	1.00	Rural	Special Rural
3	P013984 3	1.01	Rural	Special Rural
4	D087935 4	1.00	Rural	Special Rural
4	D066869 4	1.01	Rural	Special Rural
4	P016922 4	1.00	Rural	Special Rural
5	D087935 5	1.01	Rural	Special Rural
5	D020510 5	1.97	Rural	Special Rural
5	D066869 5	1.04	Rural	Special Rural
5	P016922 5	1.00	Rural	Special Rural
6	D087935 6	1.00	Rural	Special Rural
6	D022943 6	0.21	Rural	Special Rural
6	D016758 6	1.11	Rural	Special Rural
6	P016922 6	1.05	Rural	Special Rural
8	D073906 8	0.95	Rural	Special Rural
8	D066869 8	1.03	Rural	Special Rural
8	D016758 8	0.95	Rural	Special Rural
9	D016758 9	1.47	Rural	Special Rural
9	P013984 9	1.49	Rural	Special Rural
10	D086027 10	1.00	Rural	Special Rural
10	D016758 10	1.31	Rural	Special Rural
10	P013984 10	1.16	Rural	Special Rural
11	D086027 11	0.95	Rural	Special Rural
11	D068477 11	1.05	Rural	Special Rural
11	P029126 11	1.00	Rural	Special Rural
11	P016922 11	1.01	Rural	Special Rural
12	D068477 12	1.02	Rural	Special Rural
12	P016922 12	1.00	Rural	Special Rural
13	D068477 13	1.03	Rural	Special Rural
13	P016922 13	1.00	Rural	Special Rural
14	D068477 14	1.19	Rural	Special Rural
15	D068477 15	1.04	Rural	Special Rural

Lot No	Plan No	Approximate Lot area (ha)	Current zoning or reservation under MRS	Current Zoning Under LPS No.3
15	P016922 15	1.00	Rural	Special Rural
15	P013678 15	1.00	Rural	Special Rural
16	D093240 16	1.01	Rural	Special Rural
16	P013984 16	1.12	Rural	Special Rural
17	D093241 17	1.00	Rural	Special Rural
17	P013678 17	1.00	Rural	Special Rural
17	P013984 17	1.21	Rural	Special Rural
18	D067074 18	1.02	Rural	Special Rural
19	D067074 19	1.02	Rural	Special Rural
20	D067074 20	1.03	Rural	Special Rural
21	D067074 21	1.03	Rural	Special Rural
21	P013588 21	1.17	Rural	Special Rural
22	D027388 22	2.02	Rural	Special Rural
22	P013984 22	1.02	Rural	Special Rural
22	P013588 22	1.00	Rural	Special Rural
23	P013588 23	1.14	Rural	Special Rural
23	P013984 23	1.07	Rural	Special Rural
24	P013984 24	1.06	Rural	Special Rural
25	P027206 25	0.05	Rural	Special Rural
25	P013984 25	1.00	Rural	Special Rural
26	P027206 26	0.02	Rural	Special Rural
26	P013588 26	1.02	Rural	Special Rural
26	P013984 26	1.00	Rural	Special Rural
27	P013588 27	1.24	Rural	Special Rural
27	P013984 27	1.06	Rural	Special Rural
28	P013588 28	1.18	Rural	Special Rural
28	P013984 28	1.17	Rural	Special Rural
29	P013588 29	1.36	Rural	Special Rural
29	P013984 29	1.05	Rural	Special Rural
30	D070860 30	1.00	Rural	Special Rural
30	P013588 30	1.00	Rural	Special Rural
30	P013984 30	1.04	Rural	Special Rural
31	P013984 31	1.07	Rural	Special Rural

Lot No	Plan No	Approximate Lot area (ha)	Current zoning or reservation under MRS	Current Zoning Under LPS No.3
32	D073548 32	1.24	Rural	Special Rural
32	P013984 32	1.01	Rural	Special Rural
33	D073548 33	1.70	Rural	Special Rural
33	P013984 33	1.02	Rural	Special Rural
34	P013984 34	1.01	Rural	Special Rural
40	D067247 40	1.15	Rural	Special Rural
41	D067247 41	1.13	Rural	Special Rural
42	D067248 42	1.03	Rural	Special Rural
43	D068476 43	1.03	Rural	Special Rural
44	D068506 44	1.16	Rural	Special Rural
45	D068506 45	1.18	Rural	Special Rural
46	D068506 46	1.06	Rural	Special Rural
51	D068210 51	1.01	Rural	Special Rural
52	P015061 52	1.05	Rural	Special Rural
53	P015061 53	1.04	Rural	Special Rural
54	P015061 54	1.02	Rural	Special Rural
55	P015061 55	1.08	Rural	Special Rural
56	P015061 56	1.04	Rural	Special Rural
57	P015061 57	1.01	Rural	Special Rural
58	P015060 58	1.00	Rural	Special Rural
59	P015060 59	1.10	Rural	Special Rural
60	P015061 60	1.52	Rural	Local Open space
63	D074541 63	1.28	Rural	Special Rural
64	D074541 64	1.00	Rural	Special Rural
70	P023199 70	0.95	Rural	Special Rural
71	P023199 71	0.98	Rural	Special Rural
72	P023199 72	0.99	Rural	Special Rural
73	P023199 73	1.00	Rural	Special Rural
74	P023199 74	0.99	Rural	Special Rural
75	P023199 75	0.97	Rural	Special Rural
76	P023199 76	0.95	Rural	Special Rural
77	P023199 77	1.00	Rural	Special Rural
80	D071625 80	1.00	Rural	Special Rural

Lot No	Plan No	Approximate Lot area (ha)	Current zoning or reservation under MRS	Current Zoning Under LPS No.3
80	P036871 80	1.14	Rural	Special Rural
81	D071625 81	1.06	Rural	Special Rural
81	P036871 81	1.15	Rural	Special Rural
100	D090217 100	0.95	Rural	Special Rural
100	D065203 100	1.00	Rural	Special Rural
100	D077156 100	0.95	Rural	Special Rural
101	D090217 101	0.95	Rural	Special Rural
101	D071971 101	1.00	Rural	Special Rural
101	D065203 101	1.04	Rural	Special Rural
102	D090357 102	1.00	Rural	Special Rural
102	D071971 102	1.04	Rural	Special Rural
102	D065203 102	1.04	Rural	Special Rural
103	D090357 103	1.00	Rural	Special Rural
103	D071971 103	1.00	Rural	Special Rural
103	D065203 103	1.00	Rural	Special Rural
104	D090357 104	1.00	Rural	Special Rural
104	D071971 104	1.00	Rural	Special Rural
105	D084878 105	1.13	Rural	Special Rural
105	D090357 105	0.91	Rural	Special Rural
105	D066305 105	1.00	Rural	Special Rural
106	D084877 106	1.01	Rural	Special Rural
106	D076907 106	1.00	Rural	Special Rural
107	D076907 107	1.01	Rural	Special Rural
108	D076907 108	1.01	Rural	Special Rural
110	D071481 110	1.00	Rural	Special Rural
110	D069795 110	1.00	Rural	Special Rural
111	D071481 111	1.00	Rural	Special Rural
112	D071481 112	1.05	Rural	Special Rural
113	D085719 113	1.00	Rural	Special Rural
155	D090357 155	0.00	Rural	Special Rural
200	D095360 200	1.14	Rural	Special Rural
201	D095360 201	1.00	Rural	Special Rural
300	D084867 300	1.00	Rural	Special Rural

Lot No	Plan No	Approximate Lot area (ha)	Current zoning or reservation under MRS	Current Zoning Under LPS No.3
301	D086264 301	1.04	Rural	Special Rural
302	D094168 302	1.04	Rural	Special Rural
302	P037240 302	1.00	Rural	Special Rural
303	D094168 303	1.05	Rural	Special Rural
303	P037240 303	1.19	Rural	Special Rural
391	P023875 391	0.00	Rural	Special Rural
392	P023875 392	0.02	Rural	Special Rural
10271	P013588 10271	0.63	Rural	Local Open Space
10549	P013678 10549	0.59	Rural	Local Open Space
10549	P013678 10549	0.06	Rural	Local Open Space
10745	P015060 10745	1.87	Rural	Special Rural
11034	P013984 11034	0.30	Rural	Special Rural
11035	P013984 11035	0.37	Rural	Special Rural
11294	P016922 11294	0.06	Rural	Special Rural
11634	D079635 11634	0.02	Rural	Special Rural
11930	P013984 11930	0.16	Rural	Special Rural
12564	D088104 12564	0.05	Rural	Special Rural
13211	P022311 13211	0.06	Rural	Special Rural
Proposed Developable Area (Ha)			**120**	
Existing Road Reserves (Ha)			**20.8**	
Western Power Easement (Ha)			**14.10**	
Crumpet Creek/Reserves/Open Space (Ha)			**23.4**	
Total Area (Ha)			**178**	

2.2.2 Zoning and Reservation

2.2.2.1 Existing Zoning and Reserve Classification

The existing zoning for the Amendment Area is 'Rural' under the MRS.

The existing zoning for the Amendment Area is 'Special Rural' under the City of Kalamunda Local Planning Scheme No. 3 (LPS3).

The current LPS and MRS text and Scheme maps are available online at www.dplh.wa.gov.au.

2.2.2.2 Proposed Zoning

MRS 1344/57 proposes to rezone the land from 'Rural' to 'Urban Deferred' under the MRS. The MRS amendment once endorsed by WAPC (and following subsequent transfer to the 'Urban' zone), will enable the progression of a LPS amendment, LSP and subsequent subdivision and development approvals for the Amendment Area (Appendix A).

2.2.3 Statutory and Strategic Planning Context

An MRS amendment shall consider and have due regard to a range of State and Local Government statutory and strategic planning instruments, namely the following:

- State Planning Strategy
- Perth and Peel @ 3.5 Million Strategy
- Northeast Sub Regional Planning Framework
- MRS
- State Planning Policies
- SPP 2 Environment and Natural Resources
- SPP 2.7 Public Drinking Water Source
- SPP 2.8 Bushland Policy for the Perth Metropolitan Area
- SPP 2.9 Water Resources
- SPP 3.7 Planning in Bushfire Prone Areas
- SPP 7.0 Design of the Built Environment
- SPP 7.3 Residential Design Codes Volume 1
- City of Kalamunda LPS3
- City of Kalamunda LPS
- City of Kalamunda Strategic Community Plan – Kalamunda Advancing 2031.

The proposed MRS is consistent with the intent and principles as set out by these State and Local Government planning instruments.

3 Stakeholder engagement

3.1 Key Stakeholders

This section provides a summary of the consultation undertaken between the proponent and stakeholders in relation to the proposed MRS amendment.

A number of meetings and briefings have been held, in relation to the amendment, with the local community, Local, State and Federal government agencies, other industry participants and non-government organisations over a seven-year period. Key stakeholders included:

- City of Kalamunda
- DWER
- EPA
- Landowners in the Amendment Area (including individual meeting and community meeting updates)
- Department of Planning, Lands and Heritage (DPLH)
- Department of Transport (DoT)
- Department of Biodiversity, Conservation and Attractions (DBCA)
- Water Corporation
- Department of Water (DoW) (now DWER)
- Main Roads WA
- Department of Fire and Emergency Services (DFES)
- WAPC.

3.2 Stakeholder Engagement Process

The proposed MRS amendment has been prepared based on the initial consultation with relevant stakeholders and regulatory authorities. The WAPC has pre-referred the proposed MRS amendment to regulatory authorities to obtain feedback on the amendment. The request for the ERD was a direct result from the referral process from the EPA.

3.3 Stakeholder Consultation Outcomes

Table 7 presents a summary of the feedback, of relevance to the amendment, that has been collected over the course of the consultation between 2016 to current.

Table 7: Stakeholder Register

Stakeholder	Date(s)	Response Received	Incorporation of Response
DWER	25/05/2023	EPA Services Unit and DWER provided further clarification on EPA Comments received on the DWMS and Inland Waters factor	DWMS to incorporate DoW comments received 2018.
DWER	18/05/2023	EPA Services Unit provided further clarification on EPA Comments received on the Flora and Vegetation and Terrestrial Fauna factors	ERD to incorporate consideration of SRE habitat in the context of the proposed retention areas. The Crumpet Creek Foreshore Area to remain as open space rather than retention areas.
DWER	15/3/2023	EPA Services Unit provided further clarification on EPA Comments received on the Inland Waters factor	ERD to incorporate additional information regarding data availability and commitment to further studies when detailed design is available.
DWER/DPLH	1/3/2023	EPA Services Unit and DPLH provided further clarification on predicted outcomes and the use of retention areas the key factors	ERD to consider this additional response in the ERD including the focus of the ERD on the impact assessment on the implementation of the rezoning and identifying potential 'fatal flaws' in the Amendment Area.
DWER	16/2/2023	EPA Services Unit provides further clarification on EPA Comments received on the Other Factors and BMP	ERD to consider this additional response to Other Factors and the mitigation hierarchy.
DWER	15/1/2023	EPA Services Unit provided further clarification on EPA Comments on the ERD	ERD to consider this additional response in the ERD including the consideration of existing open space reservations, proposed retention areas as an avoidance strategy. In the absence of a 'formal' DSP or LSP to guide the amendment, the Concept Plan has been used as to guide the MRS amendment.

Stakeholder	Date(s)	Response Received	Incorporation of Response
DWER / DPLH	18/1/2023	Early discussion of the ERD submitted to DPLH in December.	Key environmental values located within the Western Power easement have been included as a subset to the impact calculations. The 10 ha discrepancy in the Amendment Area to be addressed throughout the document and on the figures on receipt of confirmation from DPLH and DWER.
Water Corporation	21/11/2022	Water Corporation provided advice on Poison Gully surface water modelling or modelling	ERD to consider this additional response in the ERD and DWMS.
City of Kalamunda	3/11/2022	City of Kalamunda advised that no surface water monitoring or modelling is undertaken on Poison Gully	ERD to consider this additional response in the ERD and DWMS.
DWER	20/9/2022	EPA Services Unit provides further clarification on EPA Comments on the ERD	ERD to consider the additional response in the ERD.
DBCA	25/8/2022	DBCA confirm the additional ecological assessments as defined in the EPA Comments response	Ecological surveys to be completed and results to be included in the ERD.
DWER	13/6/2022	Meeting held with EPA Services Unit and DPLH to confirm EPA Comments and response to the ERD	Amendments to the ERD to be undertaken to meet new template requirements, additional ecological assessments and further expansion on impacts and mitigation of impacts.
DWER	9/6/2022	EPA Comments provided on the ERD	Amendments to the ERD to be undertaken prior to advertising.
DWER	1/6/2022	EPA Services Units provides additional information on DWER comments on DWMS	Amendments to the ERD and DWMS to address the additional. information and support advice.
DPLH	14/1/2022	ERD referred to the EPA for advertising	DPLH supports the ERD in accordance with the MRS amendment requirements.

Stakeholder	Date(s)	Response Received	Incorporation of Response
DPLH	18/1/2022	Suggests amendments to the ERD prior to lodgement with the EPA	Amendments to ERD undertaken to reflect MRS amendment requirements.
EPA	13/9/2018	EPA determined scheme should be assessed under Part IV Division 3 of the EP Act.	ER prepared for EPA assessment.
Water Corporation	23/10/2017	Highlighting need for upgraded water infrastructure due to increase in number of dwellings. Preliminary consultation was undertaken with the Water Corporation to request information relating to flows within these catchments and this information was unable to be provided at this stage.	MRS amendment to incorporate these upgrades into MRS and subsequent LPS amendments and LSP (s). It is recommended that these matters are further addressed during the preparation of the LWMS for the Amendment Area. Water Corporation were contacted to provide information relating to flows within these catchments, however, given the high level of planning, Water Corporation were unwilling to provide this. It is proposed that at the LWMS stage further discussions are held with Water Corporation in this matter.
DBCA	18/9/2017	Discusses the need for an additional survey in late spring	MRS amendment to incorporate these additional surveys into the MRS and subsequent LPS amendments and LSP (s).
Department of Fire and Emergency Services	18/10/2017	Advises changes to current Bush Fire Management Plan (BMP)	A Bushfire Management Plan (Hazard Level Assessment) has been completed for the MRS amendment. Subsequent preparation of a BMP will be undertaken at the LPS amendment and LSP stage.
Department of Fire and Emergency Services	29/8/2016	Recommends that the proponent prepares a BMP	MRS amendment and subsequent LPS amendment and LSP (s) to incorporate BMP.
DoT	14/4/2016	Puts forward the requirement for a Transport Impact Assessment (TIA) to determine impact to surrounding local and regional roads.	MRS amendment and subsequent LPS amendment and LSP (s) to incorporate TIA.

Stakeholder	Date(s)	Response Received	Incorporation of Response
DWER	24/3/2016	DER register indicates one site is classified under the *Contaminated Sites Act 2003* as possibly contaminated. Puts forward requirement for remediation.	Section 8 of this document for the MRS amendment considers contamination. A Preliminary Site Investigation (PSI) shall be undertaken by the landowner prior to development of Lots 44, 45 and 46 Brewer Road, Maida Vale.
Main Roads WA	14/3/2016	Increase in number of dwellings will put additional strain on the local road network.	MRS amendment and subsequent LPS amendment and LSP (s) to address increased traffic volumes in the TIA.
EPA	4/2/2016	EPA recommends that interface between future development and these adjacent environmental assets is developed and managed so that there is no impact on the environmental assets.	MRS amendment and subsequent LPS amendment and LSP (s) to address interface issues associated with the development and environmental assets.
DoW	27/1/2016	Suggests amendment should be supported by a DWMS	MRS amendment to incorporate DWMS.

4 Object and principles of the EP Act

Part I, section 4A of the EP Act sets out five core principles by which protection of the environment is to be achieved in Western Australia. The principles are further elaborated on in the EPA's Statement of Environmental Principles, Factors, Objectives and aims of EIA (EPA 2021a).

These principles and the application to the Amendment Area is outlined in Table 8.

Table 8: EP Principles

Principle	Comments	Required Actions
The Precautionary Principle Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decision should be guided by: • Careful evaluation to avoid, where practicable, serious, or irreversible damage to the environment • An assessment of the risk-weighted consequences of various options.	Environmental studies have been undertaken in relation to flora and vegetation, fauna, and inland water. These studies are referenced under the relevant key environmental factor, within the receiving environment section.	The amendment has taken into the consideration of the findings of the environmental studies and addressed those issues identified by the relevant agencies during the initial consultation of the proposed amendment. The implications to the environment resulting from the amendment have been referenced to each environmental factor, followed by a description of the potential environmental impacts, mitigation measures, assessment of environmental impacts and residual impacts and environmental outcomes associated with the Amendment Area.
The principle of intergenerational equity The present generation should ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations.	Environmental impacts will be managed such that the risks of adverse impacts are minimised, and the quality of the environment is maintained or enhanced wherever possible.	The amendment has taken into the consideration this principle and further detailed the implications and environmental outcomes for these principles in the Holistic Impact Assessment of the report (refer to Section 10).

Principle	Comments	Required Actions
The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Impacts to terrestrial flora and vegetation and fauna are not expected to be significant or pose a risk to the biological diversity and ecological diversity of the amendment.	The amendment has taken this principle into consideration for the key environmental factors for both the flora and vegetation and terrestrial fauna. Section 5 and 6 of the report details the potential environmental impacts, mitigation measures, assessment of environmental impacts and residual impacts and environmental outcomes applicable to the biological diversity and ecological integrity of the amendment area. Section 10 provides a holistic assessment between these factors.
Principles relating to improved valuation, pricing, and incentive mechanisms Environmental factors should be included in the valuation of assets and services. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance, and abatement. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes. Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	Not applicable	Not applicable

Principle	Comments	Required Actions
The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	All reasonable and practicable measures to minimise the generation of waste and its discharge to the environment will be achieved where possible.	The amendment has taken this principle into consideration particularly with respect to the environmental factor – inland waters. The amendment details the potential environmental impacts to Crumpet Creek and identifies the mitigation measures, assessment of environmental impacts and residual impacts and environmental outcomes associated with these environmental factors. Other environmental factors of flora and vegetation and terrestrial fauna has also been considered within the DWMS and Foreshore Assessment Report (FAR)supporting the amendment.

5 Key Environmental Factor 1 – Flora and Vegetation

5.1.1 EPA Objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

5.1.2 Relevant Policy and Guidance

A summary of the policy and guidance relevant to flora and vegetation and how these have been considered for the Amendment is presented below (Table 9).

Table 9: Policy and Guidance Consideration

Policy/Guidance	Consideration for the Amendment
Statement of Environmental Principles, Factors Objectives and aims of Environmental Impact Assessment, EPA, October 2021	Referred to in the identification and assessment of Preliminary Key Environmental Factors.
Environmental Factor Guideline – Flora and vegetation, EPA, December 2016a	Referred to in the assessment of potential impacts as a result of the project.
Technical Guidance: Flora and vegetation surveys for environmental impact assessment, EPA, December 2016c	Referred to in the flora and vegetation survey design.
Guidance for planning and development: Protection of naturally vegetated areas in urban and per-urban areas, EPA, 2021c	Referred during development of the concept plan.
Waxy-leaved Smokebush (*Conospermum undulatum*) recovery plan, DCCEEW, 2008	Referred to in the assessment of impacts and management as a result of the project.
A guide to the assessment of applications to clear native vegetation, DER, 2014	Referred to in the assessment of impacts.

5.1.3 Receiving Environment

5.1.3.1 Studies and investigations

A site-specific Flora and Vegetation Survey was undertaken by 360 Environmental in September 2015 which covered a 168 ha survey area. The external road reservations (approximately 10 ha) associated with the Amendment Area are City of Kalamunda managed local road reserves that are not subject to development. These comprise the Sultana Road and Hawtin Road reserves, Reserve 40275 (adjoining Hawtin Road) and Reserve 44879 (northern tip of the Amendment Area). At the time of undertaking the surveys it was unclear that this section was included in the amendment area. This area is not subject to urban development as it is a road reserve under the City's local planning scheme. It is recognized that any future development proposed by the City of Kalamunda or other proponents would be subject to a separate assessment process.

A supplementary survey was undertaken in September 2022 by 360 Environmental. The sampling sites used for the 2022 survey are displayed in Figure 6. Due to access issues, some lots were not able to be surveyed as displayed in Figure 10. The 2022 survey was undertaken to address the inconsistencies between the 2015 survey and the current EPA requirements for environmental surveying and reporting for flora and vegetation in Western Australia, as set out in the following documents:

- *EPA Guidance for the Assessment of Environmental Factors – Flora and Vegetation, (EPA 2016a)*
- *Technical Guidance – Flora and Vegetation surveys for Environmental Impact Assessment (EPA 2016e)*
- *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental Impact Assessment (EPA 2020).*

Table 10: Referenced Studies

Survey date	Researcher/Consultant	Study Description or Title
September 2015	360 Environmental	Level 2 Flora and Vegetation and Fauna Report
September 2021	360 Environmental	Foreshore Assessment Report
September 2022	360 Environmental	Maida Vale Flora, Vegetation and Fauna and Black Cockatoo Technical Note

5.1.3.2 Regional Soil

The Interim Biogeographic Regionalisation for Australia (IBRA) divides Australia into 89 bioregions based on major biological and geographical/geological attributes. These bioregions are subdivided into 419 subregions, as part of a refinement of the IBRA framework (DCCEEW, 2014). The Amendment Area is located in the Swan Coastal Plain (SCP) (specifically SWA02). The SCP 2 is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia, and Jarrah Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials (Mitchell et al, 2002). This subregion comprises the entirety of the Amendment Area.

The central tile sheet of the 1: 50,000 surface geology mapping (Department of Primary Industries and Regional Development [DPIRD], 2022) indicates that the Amendment Area is located within the S8, S10, S12, Mgs1 and Mgs2 soil units (Figure 4a). These geological units are described as:

- S10: SAND – a S8 sand (white to pale grey at surface, yellow at depth, fine to medium-grained, moderately sorted, subtriangular to subrounded minor heavy minerals od eolian origin) over sandy clay to clayey sand of the Guildford Formation of eolian origin.
- S12: SAND – structureless yellow, fine-grained, sub-angular and medium to coarse-grained subrounded to rounded quartz feldspar and heavy minerals common minor silt and clay.

- Mgs1: PEBBLY SILT – strong brown silt with common, fine to occasionally coarse-grained, sub-rounded laterite quartz, heavily weathered granite pebble, some fine to medium-grained quartz sand, of alluvial origin.
- Mgs2: GRAVELLY SILT – strong brown, tough with common pebbles of fine to coarse-grained, sub-rounded granite, some dolerite and rare sandstone (SS) variable sand.

Most of the Amendment Area is underlain by S8 sand. The description of white to pale grey surface and yellow colour at depth is consistent with the aerial photos and field observation by 360 Environmental scientists.

The Amendment Area contains the following soil landscape subsystems (Figure 4b) (DPIRD, 2022):

- 213Fo_Ff1 - Foot and low slopes < 10% with deep rapidly drained siliceous yellow brown sands, and pale or bleached sands with yellow-brown subsoil. Shrubland of unidentified species.
- 213Pj__Gf1 - Very gently undulating plain. Moderately well drained yellow duplex or gradational soils with sand to sandy loam topsoil. Woodland of *E. wandoo* and *E. calophylla*.
- 213Fo__Ff2 - Foot and low slopes < 10%. Well drained gravelly yellow or brown duplex soils with sandy topsoil. Woodland of *E. marginata*, *E. calophylla* and some *B.grandis*.
- 213Pj_Gf5 - Incised drainage channels with poorly drained gradational mottled yellow earths. Shrubland of Melaleucas and other low shrubs.
- 213Pj__Gf7 - Minor rises with deep rapidly drained brownish, siliceous, or bleached sands underlain by mottled yellow clay. Low woodland of *B. prionotes* and some tall *E. calophylla* with *E. rudis* along streamlines.
- 213Pj__Gf9 - Minor sandy rises (aeolian deposits) with moderately deep well drained sands overlying gravelly mottled clay.

5.1.3.3 Regional Vegetation

Mapping of Pre-European vegetation within Western Australia was completed on broad scale (1:1,000,000) by Beard (1976) and later re-assessed by Shepherd et al. (2002) with some larger vegetation units divided into smaller units. Heddle et al. (1980) also undertook vegetation mapping for the region and therefore both these studies have been used to demonstrate the broad vegetation types in the Amendment Area.

The Shepherd et al. (2002) and Heddle et al. (1980) studies have been included to estimate how much vegetation is currently present in comparison to the pre-European extent of the same vegetation types. From these comparisons, it can be determined what vegetation types have been extensively cleared and therefore in need of protection. This is further discussed in Section 5.1.6.1.

The Vegetation Types within the Amendment Area along with their representation within the subregion, region and State are presented in Table 11.

- 3 (e2,3MC) – Bassendean; Medium Forest, Jarrah – Marri
- 1001 (e2Mb cbLi) – Bassendean; Medium very sparse woodland; *E. marginata* with low woodland, *Banksia sp*. and *Casuarina s*p.
- 1009 (e3, 18Mr) – Bassendean; Medium woodland; marri and river gum.

Table 11: Broad Vegetation Types within the Amendment Area and its State and Regional Representation (Government of Western Australia 2019).

System and Vegetation Association	Current Extent Remaining			Current Extent in All DBCA-Managed Land (%)
	Pre-European (ha)	Current (ha)	Remaining (%)	
Representation across Western Australia				
3	2,661,404.62	1,803,437.48	67.76	81.50
1001	57,410.23	12,660.76	22.05	14.19
1009	18,225.88	3,004.07	16.48	3.57
Representation across the Swan Coastal Bioregion.				
3	17,364.58	3,150.77	18.14	11.62
1001	57,410.23	12,660.76	22.05	14.19
1009	18,184.82	2,983.06	16.40	3.60
Representation across the Perth Subregion.				
3	16,754.96	2,789.47	16.65	13.12
1001	57,410.23	12,660.76	22.05	14.19
1009	18,183.22	2,982.33	16.40	3.60

Mapping by Heddle et al. (1980) based in relation to the landform-soil units determined by Churchward and McArthur (1980) identified two vegetation complexes occurring in the Amendment Area which are summarised in Table 12 and Figure 8. The delineation of vegetation complexes is based on the concept of series of plant communities forming regularly repeating complexes associated with a particular soil unit. The Heddle et al. (1980) vegetation complexes that occur across the Amendment Area are described below (Table 12).

Table 12: Vegetation Complexes within the Amendment Area

Vegetation Complex	Pre-European (ha)	Current Extent Remaining		Current percentage remaining within all DBCA managed land* (%)
		ha	%	
Forrestfield Complex	22,812.92	2,803.36	12.29	1.67
Southern River Complex	58,781.48	10,832.18	18.43	1.60

* Excludes Crown Freehold Department Managed Lands that are managed under Section 8A of the Conservation and Land Management Act (CALM Act).

5.1.3.4 Threatened Ecological Communities

The DBCA Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) database search identified four conservation significant vegetation types or their associated buffers occurring within the Amendment Area, SCP 20a, SCP 20b, SCP 20c and Banksia WL SCP. All of the intact vegetation within the Amendment Area (except ExWp which had no vegetation in good enough condition to confidently assign a Floristic Community Type [FCT]), was inferred as being analogous to one of three TECs, being SCP 20a, 20b and 3b. All three of the SCP FCTs identified within the Amendment Area are TECs pursuant to the BC Act and one is listed as a TEC under the EPBC Act. The three TECs cover a total of 14.25 ha and were inferred based on statistical analysis and consideration of flora sites and other diagnostic features (360 Environmental, 2022). Table 13 summarises of all three SCP FCTs. No DBCA listed PECs were recorded within the Amendment Area.

- **SCP20a *Banksia attenuata* woodlands over species rich dense shrublands**

  Vegetation identified as EmAh, EmNf, AhCd, and most of the vegetation identified as CcEm was inferred to be the TEC SCP 20a, based on statistical analysis and other diagnostic factors. This inference is supported by DBCA TEC mapping, which shows the entire Amendment Area (except a very small portion of the south-east corner) covered by SCP 20a, or associated buffers. Notes from DBCA personnel who visited, MVQ1, MVQ2, MVQ5, 22Q05 (previously MVR2), and 22Q08 (previously MVR5) also support this inference. DBCA noted MVQ6 was thought to be 20c with 20a influence, however the site was viewed from the road during the DBCA visit, and the two FCTs are similar. Further supporting the inference of SCP 20a, nearby SCP sites classified as 20a are located 1 km to the north in Maida Vale, and 1.2 km and 2.5 km to the south-east and

south, respectively, in Forrestfield and all situated on the eastern extent of the SCP at the base of the Darling Scarp.

- **SCP20b *Banksia attenuata* and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain**

  A small portion of the vegetation identified as CcEm, located in the north-east portion of the Amendment Area, was inferred to be the TEC SCP 20b based on statistical analysis and other diagnostic factors. This vegetation was consistent with the description for SCP 20b, which occurs at the base of the Darling Scarp on the Ridgehill Shelf. The vegetation also contains *Hakea stenocarpa*, a species typically used to differentiate 20b from other Banksia communities. This inference is strongly supported by DBCA TEC mapping, which shows these patches at the centre of a buffer for SCP 20b. Notes from DBCA personnel who visited site 22Q07 (previously MVR3) also support this inference.

- **SCP3b *Corymbia calophylla* - Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain**

  The intact vegetation identified as CcMp, surrounding Crumpet Creek, between Brewer Road and Sultana Road east was inferred to be the TEC SCP 3b. The results of statistical analysis leant towards SCP 3b but were not conclusive (360 Environmental, 2022). The FCT was ultimately inferred based on a number of factors, primarily the location of the vegetation on alluvial soils associated with Crumpet Creek, and the presence of key taxa: *Corymbia calophylla* and *Eucalyptus marginata* over sedges, grasses and herbs including *Bossiaea eriocarpa*, *Hibbertia hypericoides* subsp. *hypericoides*, *Chamaescilla corymbosa*, *Banksia dallanneyi* subsp. *dallanneyi*, *Desmocladus fasciculatus*, *Mesomelaena tetragona*, *Morelotia octandra*, *Babingtonia camphorosmae*, *Neurachne alopecuroidea, Philotheca spicata*, *Burchardia congesta, Drosera erythrorhiza* and *Caladenia flava*. The nearest SCP 3b site is located 6 km south in Maddington, and although it is some distance from the Amendment Area, they are each located in a similar position in the landscape, on the edge of the SCP near the base of the Darling Scarp.

  Statistical analysis undertaken in 2022 and/or field observations indicated influence from FCTs SCP 20a, 20b, 20c and 3a. Influence from SCP 20a, 20b, and 20c are unsurprising as all have been mapped by DBCA in the local area. Furthermore, DBCA TEC mapping shows the vegetation at the centre of buffers for SCP 20a and 20c. Notes from DBCA personnel assorted that the vegetation surrounding sites MVQ3 and MVQ4 were analogous to SCP 20c and SCP 20a respectively, however this was based on the statistical analysis provided in 360 Environmental (2016), which grouped quadrats of the same vegetation type for analysis, and observation made from the road in the case of MVQ3. Influence of SCP 3a is supported by the presence of two SCP 3a site located approximately 1600 m away, on the eastern side of Roe Highway, that may have been

hydrologically connected to the CcMp sites prior to 'Urban Deferred' development of the local area.

Although the final inference of this FCT assignment could be argued based on both statistical analysis and other diagnostic features, all of the likely alternatives (20a, 20b, 20c and 3a) are also TECs and therefore conservation significant.

- **SCP 20c Shrublands and woodlands of the eastern side of the Swan Coastal Plain**

  The SCP 20c TEC (and/or its associated buffers) was identified by the DBCA database searches as occurring within the Amendment Area, however none of the vegetation within the Amendment Area was inferred to be SCP 20c. Some sites (MVQ3, MVQ6 and 22Q06) were considered to be influenced by SCP 20c, however none were strongly aligned with SCP 20c sites in the statistical analysis and other diagnostic criteria pointed more strongly to other FCTs.

- **Banksia Woodlands of the Swan Coastal Plain ecological community**

  The Banksia WL SCP TEC (and/or its associated buffers) was identified by the DBCA database searches as occurring within the Amendment Area. SCP 20a and SCP 20b are regarded as sub-communities of the national ecological community, where they occur within the defined distribution of the TEC, however one of the key diagnostic criteria for the Banksia WL SCP TEC is that it must contain at least one of the following species: *Banksia menziesii*, *Banksia attenuata, Banksia prionotes* or *Banksia ilicifolia*. None of these species were recorded within the Amendment Area and therefore none of the vegetation patches within the Amendment Area meet the requirements to be considered Banksia WL SCP.

Table 13: TECs Identified as Occurring within the Amendment Area

TEC Community Code	State	EPBC Act	Amendment Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
SCP20a *Banksia attenuata* woodlands over species rich dense shrublands	TEC (EN)	-	8.99	0.04	0.01	1.43	10.47
SCP20b *Banksia attenuata* and/or Eucalyptus marginata woodlands of the eastern side of the SCP	TEC (EN)	TEC (EN)	1.19	0.02	0.00	0.00	1.21

TEC Community Code	State	EPBC Act	Amendment Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
SCP3b *Corymbia calophylla - Eucalyptus marginata* woodlands on sandy clay soils of the southern SCP	TEC (VU)	-	1.27	0.01	1.14	0.15	2.57
Total			**11.45**	**0.07**	**1.15**	**1.58**	**14.25**

5.1.3.5 Environmentally Sensitive Areas

One Threatened flora species, *Conospermum undulatum* (T), was recorded within the Amendment Area. All records of *Conospermum undulatum* were from vegetation in Very Good or Excellent condition (360 Environmental, 2022). The presence of *Conospermum undulatum* requires that the habitat and associated buffers surrounding these species should be protected. The vegetation within the buffers are considered critical habitat and therefore are regarded as ESAs (DWER, 2014). The locations of SCP20a - *Banksia attenuata* woodlands over species dense shrublands in the Amendment Area has also been identified as an ESA (Figure 5). ESAs are declared to prevent degradation of important environmental values such as Threatened, TECs or significant wetlands.

5.1.3.6 Vegetation Associations

The Amendment Area is highly fragmented due to urbanisation, historical orchards, grazing and roads. Due to historical and present land-use the quality and size of vegetation remnants varies greatly. The flora species richness recorded during the survey is below the average expected, when compared to the species richness recorded by Gibson et al. (1994) for the same FCTs represented in the Amendment Area. This result is likely to be a consequence of disturbance associated with historical land-use.

Six natural vegetation associations were described for the Amendment Area in 360 Environmental (2016). In addition to the associations, other mapping units were delineated, which included mature trees in isolation or over gardens and weeds and the highly degraded section of Crumpet Creek. Minor changes to the delineation of vegetation associations were made in 2022, however the description have not changed. The updated delineation of vegetation boundaries is provided in Figure 9, and associated changes to the total area of each is provided in Table 14.

Table 14: Vegetation Associations and Units and their Revised Extent in the Amendment Area

Vegetation Association (Quadrats)	Description	Condition	Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
Natural Vegetation Associations							
EmNf (MVQ1)	Low Open Woodland of *Eucalyptus marginata* and *Nuytsia floribunda* over *Adenanthos cygnorum*, *Daviesia angulata*, *Calothamnus sanguineus*, *Verticordia densiflora* var. *densiflora*, *Mesomelaena pseudostygia* and *Lyginia imberbis.*	Excellent	0.02	0.01	0.00	0.43	0.46
AhCd (MVQ6)	Shrubland of *Allocasuarina humilis, Caustis dioica, Mesomelaena pseudostygia, Verticordia densiflora* var. *densiflora, Lambertia multiflora* var. *darlingensis, Mesomelaena tetragona, Hibbertia hypericoides* and *Xanthorrhoea preissii*.	Excellent	0.00	0.00	0.00	0.28	0.28

Vegetation Association (Quadrats)	Description	Condition	Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
CcMp (MVQ3, 22Q01, 22Q02, 22Q03, MVQ4)	Open Forest of *Corymbia calophylla* over *Mesomelaena pseudostygia, Xanthorrhoea preissii, Hibbertia hypericoides, Tetraria octandra, Acacia pulchella, Hakea undulata, Banksia dallanneyi* var. *dallanneyi* and *Allocasuarina humilis*.	Excellent to Degraded	1.27	0.01	1.14	0.15	2.57
CcEm (MVQ2, MVQ5, 22Q04, 22Q06, 22Q07, 22Q08)	Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over *Xanthorrhoea preissii, Hibbertia hypericoides, Mesomelaena pseudostygia, Acacia pulchella, Allocasuarina humilis, Synaphea spinulosa* subsp. *spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana*.	Excellent to Degraded	10.10	0.05	0.01	0.72	10.88

Vegetation Association (Quadrats)	Description	Condition	Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
EmAh (22Q05)	Low Open Woodland of *Eucalyptus marginata* over *Xanthorrhoea preissii*, *Allocasuarina humilis, Kingia australis, Hibbertia hypericoides* and *Lambertia multiflora* var. *darlingensis*.	Excellent	0.05	0.00	0.00	0.00	0.05
EwXp (R1)	Open Forest of *Eucalyptus wandoo* and *Corymbia calophylla* over *Xanthorrhoea preissii, Hibbertia hypericoides, Phyllanthus calycinus* and *Banksia dallanneyi* var. *dallanneyi* dominated by weed species.	Degraded	0.38	0.00	0.01	0.00	0.39
Other Mapping Units (Completely Degraded / Cleared)							
Af / Cc / Em	Mature *Allocasuarina fraseriana, Corymbia calophylla* and *Eucalyptus marginata* trees in combination over garden and/or weeds.	Completely Degraded	0.14	0.16	0.00	0.00	0.30
Af	Mature *Allocasuarina fraseriana* over garden and/or weeds.	Completely Degraded	0.87	0.13	0.00	0.00	1.00

Vegetation Association (Quadrats)	Description	Condition	Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
Af / Em	Mature *Allocasuarina fraseriana* and *Eucalyptus marginata* in combination over garden and/or weeds.	Completely Degraded	0.66	0.01	0.00	0.00	0.67
Cc	Mature *Corymbia calophylla* over garden and/or weeds.	Completely Degraded	4.87	0.45	0.01	0.22	5.55
Cc / Em	Mature *Corymbia calophylla* and/or *Eucalyptus marginata* in combination over garden and/or weeds.	Completely Degraded	7.59	0.73	0.00	1.23	9.55
Cc/Af	Mature *Corymbia calophylla* and *Allocasuarina fraseriana* in combination over garden and/or weeds.	Completely Degraded	0.02	0.03	0.00	0.00	0.05
CcEwEr	Open Woodland of *Corymbia calophylla, Eucalyptus wandoo* and *Eucalyptus rudis* over *Xanthorrhoea preissii, Hakea lissocarpha* and *Hardenbergia comptoniana* along creek.	Completely Degraded	0.22	0.00	1.19	0.00	1.41

Vegetation Association (Quadrats)	Description	Condition	Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
CcEr	Mature *Corymbia calophylla* and *Eucalyptus rudis* over garden and/or weeds.	Completely Degraded	0.06	0.02	0.40	0.2	0.68
Eg	Mature *Eucalyptus gomphocephala* over garden and/or weeds.	Completely Degraded	0.59	0.03	0.00	0.00	0.62
Em	Mature *Eucalyptus marginata* over garden and/or weeds.	Completely Degraded	1.82	0.21	0.00	0.19	2.22
EmXp	Mature *Eucalyptus marginata* and *Xanthorrhoea preissii* over weeds.	Completely Degraded	0.00	0.00	0.00	0.27	0.27
Er	Mature *Eucalyptus rudis* over garden and/or weeds.	Completely Degraded	0.26	0.00	0.01	0.00	0.27
Ew	Mature *Eucalyptus wandoo* over garden and/or weeds.	Completely Degraded	0.75	0.01	0.01	0.21	0.98
NE	Non-endemic vegetation typically comprising gardens or orchards.	Completely Degraded	25.28	0.93	0.02	1.99	28.22
NA	No access	Unknown but likely Good or better	0.61	0.00	0.00	0.58	1.19

Vegetation Association (Quadrats)	Description	Condition	Area (ha)				
			Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement	Total
NS	Not surveyed	Unknown but likely Completely Degraded	8.60	9.98	0.03	0.63	19.24
Cleared	Cleared	Completely Degraded	76.69	7.03	0.08	6.88	90.68

5.1.3.7 Vegetation condition

Most of the Amendment Area had been historically cleared for housing, roads and agriculture and is now dominated by introduced weed species. Previous and existing land uses have caused heavy fragmentation of the native vegetation. Most remaining mature native trees have been integrated with gardens and non-endemic species. In these instances, the vegetation no longer has a natural structure and was mapped as Completely Degraded.

Native vegetation within the Amendment Area is highly fragmented, comprising small patches bushland across the Amendment Area. Most of the intact native vegetation with condition ratings of Good to Excellent is bound by Bruce Road, Brewer Road, and Sultana Road East. There are also pockets of intact native vegetation near Oxford Court and Kent Road. The vegetation along Crumpet Creek varies greatly. East of Brewer Road the structure of the creek vegetation has been significantly altered with few native species persisting (particularly in the mid and groundstoreys). West of Brewer Road the native vegetation structure along the creek is relatively intact and considered to be in Good to Excellent condition.

Vegetation condition mapping within the Amendment Area has been updated including minor changes to the delineation and classification of vegetation condition of natural vegetation where required. The updated vegetation condition mapping is provided in Figure 10.

Vegetation Condition within the Amendment Area was reassessed as per Technical Guidance: Flora and vegetation surveys for environmental impact assessment (EPA, 2016c) and ranged from Excellent to Completely Degraded/Cleared, with the majority considered to be Completely Degraded/Parkland Cleared.

- Excellent (4.06 ha / 2.3%)
- Very Good (4.58 ha / 2.6%)
- Good (3.62 ha / 2.0%)
- Degraded (2.39 ha / 1.3%)
- Completely Degraded/Parkland Cleared (142.46 ha / 80.0%).

The remainder of the Amendment Area either could not be accessed (1.19 ha / 0.7%) or was not surveyed (19.24 ha / 11.0%). The parts of the Amendment Area classified as Not Accessible likely contain native vegetation in Degraded or better condition. The parts of the Amendment Area classified as Not Surveyed are likely all Parkland Cleared, and therefore would be classified as Completely Degraded or external road reservations / local reserves (approximately 10 ha) that are not subject to development. These comprise the Sultana Road and Hawtin Road reserves, Reserve 40275 (adjoining Hawtin Road) and Reserve 44879 (northern tip of the Amendment Area). At the time of undertaking the surveys it was unclear that this section was included in the amendment area. This area is not subject to urban development as it is a road reserve under the City's local planning scheme. It is recognized that any future development proposed by the City of Kalamunda or other proponents would be subject to a separate assessment process.

5.1.3.8 Foreshore vegetation

The vegetation along Crumpet Creek is considered to have low diversity of endemic species, particularly those typical of drainage lines e.g. sedges, emergent plants and herbs (360 Environmental 2021b). Vegetation condition ranged from Excellent to Completely Degraded and is summarized in Table 15. The vegetation along the creek varies greatly, the vegetation along the creek east of Brewer Road has been altered severely and there is minimal native species. The creek west of Brewer Road consists of intact native vegetation considered to be in Good to Excellent condition.

Table 15: Vegetation Condition within Crumpet Creek Vegetation Area

Vegetation Condition	Extent within the Crumpet Creek vegetation area (ha)	Extent within the Survey Area (%)
Excellent	0.12	2.41
Very Good – Good	0.24	2.72
Good	0.01	2.15
Degraded - Completely Degraded	0.81	1.42
Completely Degraded/Parkland Cleared	0.02	84.71
Not accessed/Surveyed	-	6.59
Total	**1.21**	**100**

5.1.3.9 Flora

The flora surveys (360 Environmental, 2016; 360 Environmental 2022) identified a total of 198 taxa from 41 families across 117 genera. The dominant families were:

- Fabaceae (30 taxa)
- Proteaceae (23 taxa)
- Cyperaceae (18 taxa).

The dominant genera were:

- *Stylidium* (eight taxa)
- *Acacia* (seven taxa)
- *Lepidosperma* (seven taxa)
- *Hakea* (six taxa).

5.1.3.10 Conservation Significant Flora

The DBCA database search identified 96 conservation significant taxa as occurring within 10 km of the Amendment Area (360 Environmental 2022). The likelihood of occurrence assessment provides information on the known flowering periods and preferred habitat of each taxon identified. Prior to the survey and investigation of the existing habitat available:

- Three taxa, *Conospermum undulatum* (T), *Isopogon autumnalis* (P3), and *Banksia pteridifolia* subsp. *vernalis* (P3), had been previously recorded in the Amendment Area and were considered to have a high likelihood of occurrence in the Amendment Area
- 30 were considered to have a high likelihood of occurrence in the Amendment Area
- 61 were considered to have a medium likelihood of occurrence in the Amendment Area
- 49 had a low likelihood of occurrence in the Amendment Area.

Following the survey, the likelihood of occurrence across the Amendment Area was reassessed based on the availability of suitable habitat observed in the Amendment Area. Two taxa were recorded, *Conospermum undulatum* (T) and *Isopogon autumnalis* (P3), were recorded (Table 16). Two *Banksia pteridifolia* subsp. *vernalis* (P3) and *Haemodorum loratum* (P3) were considered to have a high likelihood of occurrence and three, *Banksia mimica* (T), *Macarthuria keigheryi* (T) and *Morelotia australiensis* (T), were considered to have a medium likelihood of occurrence.

The remaining 138 taxa identified by the database searches were considered to have a low likelihood of occurrence following the survey.

Conospermum undulatum is listed under the EPBC Act as Vulnerable and gazetted as Threatened pursuant to the BC Act. It was recorded in the Amendment Area in four patches of remnant vegetation (Figure 11). The vegetation within the buffers of these conservation significant plants is considered critical habitat and therefore are regarded as ESAs (Figure 5).

Isopogon autumnalis (P3), was found in two remnants of vegetation (Figure 11). The presence of this Priority Species does not form a statutory constraint for the Amendment Area.

Table 16: Conservation Significant Flora in the Amendment Area

Taxon (status)	Number of Individuals	Habitat within the Amendment Area
Conospermum undulatum (T)	10	Remnant patches of native vegetation in good or better condition. Vegetation either Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over *Xanthorrhoea preissii*, *Hibbertia hypericoides*, *Mesomelaena pseudostygia, Acacia pulchella, Allocasuarina humilis*, *Synaphea spinulosa subsp*. *spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana* or Low Open Woodland of *Eucalyptus marginata* and *Nuytsia floribunda* over *Adenanthos cygnorum*, *Daviesia angulata, Calothamnus sanguineus, Verticordia densiflora var. densiflora, Mesomelaena pseudostygia* and *Lyginia imberbis* or Low Open Woodland of Eucalyptus marginata over *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Kingia australis*, *Hibbertia hypericoides* and *Lambertia multiflora var. darlingensis*. Grey, sometimes brown sand, plain.
Isopogon autumnalis (P3)	15	Remnant patches of native vegetation in good or better condition. Vegetation either Woodland of *Corymbia calophylla* and Eucalyptus marginata over *Xanthorrhoea preissii, Hibbertia hypericoides, Mesomelaena pseudostygia, Acacia pulchella, Allocasuarina humilis, Synaphea spinulosa subsp. spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana*, or shrubland of *Allocasuarina humilis*, *Caustis dioica*, *Mesomelaena pseudostygia*, *Verticordia densiflora var. densiflora, Lambertia multiflora var*. *darlingensis, Mesomelaena tetragona*, *Hibbertia hypericoides* and *Xanthorrhoea preissii*. Grey sand.

5.1.3.11 Introduced Flora

Twenty-two (22) introduced flora taxa were recorded during the survey, representing 11.1% of the total taxa recorded (Table 17). One (1) of these, *Asparagus asparagoides* is listed as a Declared Pest under the *Biodiversity and Agriculture Management Act* (BAM Act) (DPIRD, 2018) and Weeds of National Significance (WONS) (DAWE, 2020). Most of the Amendment Area is covered by introduced weed species, including environmental weeds and a variety of garden plants. Only weeds that were present within intact native vegetation were recorded. Most of the weeds recorded during the surveys are common bushland and agricultural weeds (Hussey et al., 2007).

Table 17: Introduced Flora Species in the Amendment Area

Species	Common Name	Status under BAM Act	WONS
**Acacia iteaphylla*	Flinders Range Wattle	Permitted - s11	No
**Asparagus asparagoides*	Bridal Creeper	Declared Pest - s22(2)	Yes
**Briza maxima*	Blowfly Grass	Permitted - s11	No
**Briza minor*	Shivery grass	Permitted - s11	No
**Cenchrus clandestinus*	Kikuyu Grass	Permitted - s11	No
**Chamelaucium uncinatum*	Geraldton Wax	Permitted - s11	No

Species	Common Name	Status under BAM Act	WONS
**Ehrharta calycina*	Perennial Veldt Grass	Permitted - s11	No
**Eragrostis curvula*	African Lovegrass	Permitted - s11	No
**Freesia* sp.	Freesia	Permitted - s11	No
**Fumaria capreolata*	Whiteflower Fumitory	Permitted - s11	No
**Gladiolus caryophyllaceus*	Wild Gladiolus	Permitted - s11	No
**Hypochaeris glabra*	Smooth Catsear	Permitted - s11	No
**Lavandula stoechas*	Italian Lavender	Permitted - s11	No
**Leptospermum laevigatum*	Coast Teatree	Permitted - s11	No
**Lysimachia arvensis*	Pimpernel	Permitted - s11	No
**Oxalis? Glabra*	-	Permitted - s11	No
**Oxalis purpurea*	Largeflower Wood Sorrel	Permitted - s11	No
**Oxalis pes-caprae*	Soursob	Permitted - s11	No
**Romulea rosea*	Guildford Grass	Permitted - s11	No
**Tribolium uniolae*	Haas grass, Wheat grass	Permitted - s11	No
**Trifolium dubium*	Suckling Clover	Permitted - s11	No
**Ursinia anthemoides*	Ursinia	Permitted - s11	No

5.1.3.12 Unconfirmed Flora

Eighteen (18) flora taxa could not be identified to species level because the plants observed were sterile at the time of the survey. Sixteen (16) of these have been assigned a confirmed genus, and of these nine have been tentatively identified to species level. One of these, *Haemodorum* sp., could be significant flora as there was a Priority flora taxon from this genus identified in the desktop assessment. None of the remaining unconfirmed flora are considered potentially analogous to any Threatened or Priority flora species. It is likely that some of the unconfirmed flora taxa are duplicates of taxa confirmed within the Survey Area.

5.1.3.13 Matters of National Environmental Significance

The above section has detailed the local and regional environmental assets and attributes applicable to the Amendment Area. Those MNES applicable to the Amendment Area for flora and vegetation include:

- Shrublands and Woodlands of the eastern Swan Coastal Plain (EN) pursuant to the EPBC Act and BC Act
- *Conospermum undulatum* (T) pursuant to the EPBC Act and BC Act.

An EPBC Act self-assessment including assessment of the likely impacts will be undertaken following endorsement of the MRS amendment. Should the outcomes of the self-assessment determine that the proposed action needs to be referred for a ministerial decision under the

EPBC Act, a separate referral to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for EPBC Act referral on the relevant MNES.

5.1.4 Potential Environmental Impacts

5.1.4.1 Direct impact

- Permanent loss through clearing of native vegetation prior to the implementation mitigation measures (assuming clearing of the Western Power easement corridor) including:
  - Poorly represented vegetation complexes (including 2.34 ha of Forrestfield and 0.34 ha of Southern River).
  - Up to 3.95 ha of SCP20a (Endangered pursuant to BC Act), 0.87 ha of SCP20b (Endangered pursuant to BC Act and EPBC Act and Vulnerable in WA to Vulnerable pursuant to BC Act) of which 1.43 ha SCP 20a and 0.15 ha of SCP 3b has been recorded within the existing Western Power Easement.
  - Up to three individuals of *Conospermum undulatum* (Vulnerable flora under the BC and EPBC Acts) that have been recorded within the existing Western Power easement corridor.
  - Up to two individuals of *Isopogon autumnalis* (P3) that have been recorded within the existing Western Power easement corridor.

5.1.4.2 Indirect impact

- Fragmentation or isolation of vegetation and *Conospermum undulatum* or other conservation significant flora populations.
- Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to introduction and/or spread of weeds or plant disease including *Phytophthora* dieback, Marri Canker and *Quambalaria coyrecup.*
- Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to altered fire regime.
- Cumulative impacts associated with other reasonably foreseeable projects.

An assessment of the significance of these impacts of the proposed MRS amendment are further detailed in Section 5.1.6.

5.1.5 Mitigation

Guidance for planning and development: Protection of naturally vegetated areas in urban and peri-urban areas was developed by the EPA to provide guidance on the management and protection of naturally vegetated areas in the planning approval process (EPA, 2021c). Table 18 provides those considerations to avoid and minimise impacts to naturally vegetated areas, as well as measures to rehabilitate or accommodate offsets applicable to development proposals.

Table 18: Summary of proposed MRS amendment consideration of Guidance Policy

Guidance Policy	Amendment
Measures to avoid impacts to naturally vegetated areas	
Locate development to existing cleared land	Development within the proposed MRS Amendment Area will be located on existing cleared areas or those areas degraded or completely degraded with respect to condition of vegetation and habitat value.
Protect large blocks of naturally vegetated areas	Development within the proposed MRS Amendment Area shall protect large pockets of significant native vegetation of good to high quality condition for habitat protection and ecological value within the Amendment Area.
Infrastructure should not be located within retained naturally vegetated areas	Development within the proposed MRS Amendment Area shall ensure that infrastructure is situated in existing cleared areas, or those areas degraded or completely degraded with respect to condition of vegetation and habitat value.
Retain naturally vegetated areas in locations prone to degradation	Development within the proposed MRS Amendment Area shall ensure that naturally vegetated areas that are degraded such as portions of Crumpet Creek will be retained in areas of open space, revegetated, or rehabilitated to better establish the riparian corridor.
Avoid inappropriate development in bushfire-prone areas	Development within the proposed MRS Amendment Area shall ensure that appropriate bushfire guidelines and management measures are implemented to reduce risk in the Amendment Area.
Minimising impacts to naturally vegetated areas	
Locate and manage land uses and development around retained naturally vegetated areas to avoid or minimise adverse impacts	Development within the proposed MRS Amendment Area shall have regard to the management of specific land uses to enable the retention of naturally vegetated areas to minimize or avoid impacts on these areas at local and regional context.
Consider the impact of bushfire protection requirements on biodiversity	Development within the proposed MRS Amendment Area shall have regard to bushfire protection and management measures to minimize and/or avoid impact on the biodiversity of flora, fauna, and habitat values at a local and regional context.
Minimises impacts to naturally vegetated areas through site responsive design	Further detailed design through the local structure planning, subdivision and development approval processes shall have regard to development of an Amendment Area responsive design to minimize and/or avoid impacts on naturally vegetated areas associated with the proposed MRS amendment.

Guidance Policy	Amendment
Ensure retained naturally vegetated areas are connected to other naturally vegetated areas via ecological linkages	Further detailed design through the local structure planning, subdivision and development approval processes shall have regard to retaining naturally vegetated areas either through ecological linkages, riparian corridors, or areas of significance for biodiversity or habitat values within the proposed MRS Amendment Area.
Ensure clear and ongoing management responsibilities in retained naturally vegetated areas	Management responsibilities for the retention and management of naturally vegetated areas will be addressed at the subdivision and development approval stages for the Amendment Area.
Rehabilitation of naturally vegetated areas	
Restore the ecological function of impacted naturally vegetated areas	To maintain and restore the ecological function of any impacted naturally vegetated areas, rehabilitation to those areas will be further identified during the detailed design of the local structure planning, subdivision, and development approval processes. These naturally vegetation areas shall be protected through the provision of POS, riparian corridor, ecological linkages, within road reserves/verges, easements or within lots (if achievable).
Maximise ecosystem services	Development of a LSP and a supporting Landscaping Plan will address how the ecosystem can be maximized. This will include preparing a Landscape Plan and associated management plans to best demonstrate the use of local plant species, existing flora, and vegetation, integrating plant species into POS, ecological linkages, riparian corridors, drainage or other features of the development and protection of the existing environmental assets of this locality.
Enlarge or connect existing naturally vegetated areas	Development of the proposed MRS amendment area shall have consideration for connecting or enlarging areas of existing naturally vegetated areas to accommodate for habitat and biodiversity values within this locality. This shall occur during the local structure planning, subdivision, and development approval processes.
Offsetting impacts to naturally vegetated areas	
	Consideration of offsets associated with the clearing of naturally vegetated areas within the proposed MRS amendment shall occur at the detailed design stage of the LSP. The MRS amendment is proposing to retain as much of the significant flora and vegetation across the Amendment Area to limit the level of clearing required for the Amendment Area.

The purpose of the mitigation measures is to reduce the residual impact to flora and vegetation within the site resulting from the implementation of the proposal. The mitigation measures to address flora and vegetation impacts associated with the proposed MRS amendment include the following:

5.1.5.1 Avoid

The MRS amendment area includes 2.91 ha of land already under reservation by the City of Kalamunda for Local Open Space. The Concept Plan (Figure 3) which informs this MRS amendment includes an additional 16.43 ha (9.3%) to be set aside as retention areas (Figure 10). The total extent of native vegetation (38.7 ha) to be retained across both the proposed retention areas and City Kalamunda's reservation is 19.34 ha (50%).

The City of Kalamunda's reservation includes:

- 0.01 ha of TEC of SCP 20a and 1.14 ha of SCP 3b
- 1.14 ha of vegetation in good to excellent condition.

The proposed retention areas include:

- 6.51 ha of TEC SCP 20a, 0.34 ha of SCP 20b and 1.27 ha of SCP 3b
- 20 individuals of Threatened and Priority Species
- 7.48 ha of vegetation in good to excellent condition.

5.1.5.2 Minimise

Impacts of the MRS amendment on retained areas of flora and vegetation will be minimised through the implementation of the following measures:

- Manage and protect intact native vegetation that are analogous within the Forrestfield and Southern River vegetation complexes within areas of open space wherever practicable during the LPS amendment and Local Structure Plan approval processes Manage and protect a minimum of 8 ha of TEC, 7 individuals of *Conospermum undulatum* (T) and 13 individuals of *Isopogon autumnalis* (P3) recorded through the establishment of retention areas.
- A Bushfire Management Plan (BMP) has been prepared and will be implemented to minimize the risk of human sources of bushfire ignition by the MRS amendment.
- General hygiene measures will be implemented during construction and revegetation in accordance with DBCA Management Guidelines to minimise the spread of weed species, dieback and pathogens entering vegetated areas.
- The vegetation and riparian corridor will be rehabilitated and maintained. Appropriate management plans and strategies would be implemented to address these impacts.

Potential impacts from the clearing will be managed during civil construction management-based provisions to address flora and vegetation. These provisions will be included within a CEMP and are outlined in Table 19.

Table 19: Proposed flora and vegetation management provisions to be included in the CEMP

Management target	Management actions	Monitoring	Reporting
No clearing of vegetation outside the disturbance footprint during civil construction	Demarcate the retention areas through temporary fencing	Daily visual inspection during clearing of clearing areas and temporary fencing	Report any unauthorised clearing as an incident to DWER
Clearing of native vegetation within the Amendment Area will not exceed 25.05 ha and not include more than 4.98 ha of TEC attributable to civil construction.			
No introduction of new weed species into the Amendment Area attributable to construction.	Amendment Area inductions to include information on significance of retained vegetation and weed management practices.	Daily visual inspection for evidence of unauthorised access to retained vegetation areas. Monthly visual inspections for weeds along the clearing edge adjacent to native vegetation during construction activities.	Report to the DWER any increase in weed species, density and or numbers from preconstruction
No fires onsite attributable to construction.	All vehicles to be fitted with fire extinguisher. Prohibit clearing on extreme fire danger days	Daily inspection of cleared areas for evidence of smoke/smouldering vegetation	Report uncontrolled fires to DFES Maintain records of minor fires controlled by the Amendment Area.

5.1.5.3 Rehabilitate

In accordance with the Operational Policy 4.3 – identifying and establishing waterways foreshore areas, a Foreshore Management Plan (FMP) will be prepared and implemented at a subsequent planning approval stage when an appropriate level of design detail is available and a LWMS or UWMP has been prepared. The proposed provisions for management of flora and vegetation to be included in the FMP are outlined in Table 20.

In areas outside the foreshore management area, that have been cleared during civil construction works associated with implementation of the amendment, progressive rehabilitation and revegetation will be undertaken. Rehabilitation in the form of streetscaping associated with road reserves and open space throughout the Amendment Area will utilize native species where possible.

Subject to the outcomes from the detailed design process for the LSP, an offset may be required to address the clearing associated with TECs and habitat loss. This is further detailed in Section 9. Table 46 Residual Significance Assessment model is further detailed in Section 9. This table has been formulated to determine the extent of residual impacts and the likelihood of these impacts resulting in the requirement for an offset applicable to the proposed MRS amendment.

Table 20: Proposed flora and vegetation management provisions to be included in the Foreshore Management Plan

Management target	Management actions	Monitoring	Reporting
No clearing of native vegetation within the foreshore area	Clearly define and demarcate the foreshore area.	Visual inspection of foreshore area.	Reporting unauthorised clearing of native vegetation to DWER.
No introductions of new weed species within the foreshore area.	Weed management measures implemented for foreshore area.	Visual inspection of foreshore area	Reporting to DWER of increased weed species, densities and/or numbers from development. Weed management program to be established for foreshore area.
No controlled fires within the foreshore area.	Appropriate signage in place prohibiting fires within the foreshore area	Inspections of foreshore areas during drier months.	Report uncontrolled fires to DFES.
Limit access to foreshore areas	Appropriate signage implemented to restrict access to the foreshore areas	Visual observation of impacts resultant from unauthorised access to foreshore areas	Report any unauthorised access or impacts to the City of Kalamunda

5.1.6 Assessment and significance of residual impact

5.1.6.1 Direct

Permanent loss through clearing of poorly represented vegetation complexes (Forrestfield and Southern River).

The proposed amendment will result in clearing of up to 25.05 ha of native vegetation including vegetation within the Forrestfield and Southern River complexes. Noting that 77.9% of native vegetation recorded within the Amendment Area has been assessed as completely degraded. The Forrestfield and Southern River complexes are poorly represented with less than 30% of their pre-European extents within the SCP remaining and clearing may be considered regionally significant. Clearing of native vegetation will result in changes to the current extents of poorly represented vegetation complexes. Assuming implementation of the MRS amendment results in clearing of all developable areas then at the SCP scale, the estimated areas for clearing of vegetation mapped as Forrestfield Complex is 2.34 ha and Southern River Complexes is 0.34 ha. This represents a reduction of 0.08 % and <0.01 % of the current extents on the SCP (Table 21)

with neither of the vegetation complexes being reduced to <10% as a result of the MRS amendment and consistent with retention objectives for urban constrained areas (DER, 2014).

Table 21: Amount of Vegetation Complex Remaining vs Amount to be Cleared

Vegetation Complex	Pre-European (ha)	Current Extent Remaining		Extent within the Amendment Area (ha)	Current extent remaining after proposed clearing (ha)
		Ha	%		
Forrestfield Complex	22,812.92	2,803.36	12.29	9.29	2,801.02
Southern River Complex	58,781.48	10,832.18	18.43	4.84	10,831.84

Table 22 provides an assessment of vegetation condition within the Amendment Area (ha) and percentage of the total clearing assuming that complete clearing of the proposed developable areas (excluding retention areas), existing road reserve areas and the Western Power Easement.

Table 22: Proposed extent of clearing based on vegetation condition

Vegetation Condition	Extent within Amendment Area (ha)	Extent to be cleared (ha)			
		Proposed Developable Area (excluding retention areas)	Existing Road Reserves	Western Power Easement	% of Amendment Area
Excellent	4.06	0.22	0.01	0.71	0.53
Very Good	4.58	0.85	0.04	0.51	0.79
Good	3.62	0.98	0.02	0.30	0.73
Degraded	2.39	1.66	0.00	0.06	0.97
Completed Degraded / Parkland cleared	142.46	112.12	9.74	11.19	74.75
Not surveyed (assumes degraded)	19.24	8.07	9.99	0.63	10.50
No access (assumes good or better)	1.18	0.60	0.00	0.58	0.66

The reduction of 0.08% and <0.01% most of which is in a degraded or completed degraded condition of the current extents of the Forrestfield Complex and Southern River Complexes on the SCP as a result of the rezoning are not considered to be significant.

Permanent loss through clearing of TECs FCT SCP20a, SCP20b and SCP3b

All of the intact vegetation within the Amendment Area (except ExWp which had no vegetation in good enough condition to confidently assign a Floristic Community Type [FCT]), was inferred as being analogous to one of three TECs, being SCP 20a, 20b and 3b. The three TECs cover a total of 14.25 ha (8%) of the Amendment Area and were inferred based on statistical analysis and consideration of flora sites and other diagnostic features (360 Environmental, 2022).

Including the Western Power Easement corridor, implementation of the amendment will result in a permanent loss through clearing of the TECs of up to:

- 3.95 ha FCT SCP20a of which 1.43 ha is located within the Western Power Easement corridor
- 0.87 ha FCT SCP20b
- 0.16 ha FCT SCP3b of which 0.15 ha is located within the Western Power Easement corridor.

Table 23 provides an assessment of each TEC within the Amendment Area (ha) and percentage of the total clearing assuming that complete clearing of the proposed Developable Area (excluding retention areas), existing road reserve areas and the Western Power Easement.

There is 1.58 ha (11%) located within the existing Western Power Easement corridor. While no development or clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain, and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.

There is a high likelihood that additional intact patches of SCP20b could be present in the northeastern corner of the Amendment Area in the portion of the Hawtin Road that has not been surveyed. However, it is recognized that this area is associated with City of Kalamunda managed local road reserves and are not subject to development. Consultation with City of Kalamunda has identified an intent to retain a rural interface between the Amendment Area and existing rural zone to the east and no development or clearing of this road reserve is proposed.

Table 23: Proposed extent of TEC clearing.

TEC	Extent within Amendment Area (ha)	Proposed extent of clearing (ha)			
		Proposed Developable Area (excluding retention areas)	Existing Road Reserves	Western Power Easement	Extent remaining (%)
SCP 20a	10.47	2.48	0.04	1.43	62.27
SCP 20b	1.21	0.85	0.02	0.00	28.10
SCP 3b	2.57	0.00	0.01	0.15	93.77

As shown on Figure 7, there are patches of SCP20a, SCP20b and SCP3b within 5km of the Amendment Area. Approximately 765ha of SCP20a and 108 ha of SPC20b overlaps either Bush Forever or DPAW conservation estates within 5km of the Amendment Area. The proposed clearing of TEC within the Amendment Area avoids the patch cores with TEC loss limited to the edges.

Permanent loss of *Conospermum undulatum*

Conspermum undulatum is a Threatened species under Western Australian *Biodiversity Conservation Act 201* and is considered vulnerable under the EPBC Act. It was recorded in the Amendment Area with ten individual plants occurring at four locations (Figure 11). *Conospermum undulatum* was recorded in the Amendment Area from four patches of remnant vegetation (360 Environmental, 2022). Seven of the recorded individuals are located within proposed retention areas and will not be cleared as part of the amendment.

There are three individuals located within the existing Western Power easement corridor. While no development or clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.

There is a high likelihood that individuals of *Conospermum undulatum* could be present in the northeastern corner of the Amendment Area in the portion of the Hawtin Road that has not been surveyed, however it is recognized that this area is associated with City of Kalamunda managed local road reserves and are not subject to development. Consultation with City of Kalamunda has identified an intent to retain a rural interface between the Amendment Area and existing rural zone to the east and no development or clearing of this road reserve is proposed. As no clearing of the seven recorded *Conospermum undulatum* individuals recorded within the proposed Developable Area, a significant impact to the permanent loss of *Conospermum undulatum* is not expected. The areas of the Western Power Easement corridor containing instances of *Conspermum undulatum* are not proposed for development as the high voltage power lines will remain and it is anticipated that this corridor will be established as POS through subsequent Structure Plan processes.

Permanent loss of *Isopogon autumnalis* (P3) and other significant flora species or ecological communities

The survey of the Amendment Area confirmed the presence of 21 individuals of Priority three species, *Isopogon autumnalis* (360 Environmental 2022) of which 13 individuals are located within proposed for retention and City of Kalamunda reservation and will not be cleared as part of the amendment. *Isopogon autumnalis* is as a Priority 3 species which are 'known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of

apparently suitable habitat, much of it not under imminent threat' (DBCA, 2019) therefore does not form a statutory constraint for the Amendment Area.

There are two individuals located within the existing Western Power easement corridor. While no development or clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain, and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.

There is a high likelihood that individuals of *Isopogon autumnalis* could be present in the northeastern corner of the Amendment Area in the portion of the Hawtin Road that has not been surveyed, however it is recognized that this area is associated with City of Kalamunda managed local road reserves and are not subject to development. Consultation with City of Kalamunda has identified an intent to retain a rural interface between the Amendment Area and existing rural zone to the east and no development or clearing of this road reserve is proposed.

Of the 18 flora taxa that could not be identified to species level, *Haemodorum* sp., could represent *Haemodorum loratum* (P3), a Priority flora species identified in the desktop assessment as having a high likelihood of occurrence within the Survey Area. None of the remaining unconfirmed flora are considered potentially analogous to any Threatened or Priority flora species. *Haemodorum* sp was recorded in 9 quadrats (MVQ1, MVQ2, MVQ3, MVQ4, MVQ5, MVQ6, 22Q1, 22Q7 and 22Q8), of which 6 are located within proposed retention areas and 2 (MVQ6 and MWQ1) are located within the Western Power Easement.

The amendment to the MRS is unlikely to result in any significant impact to other significant flora or communities.

5.1.6.2 Indirect impact

Fragmentation or isolation of vegetation and *Conospermum undulatum* or other conservation significant flora populations

Habitat loss, fragmentation or isolation of populations and occurrences of terrestrial biodiversity is one of the main threats from the proposed MRS amendment.

Habitat fragmentation or isolation of populations and occurrences reduces the carrying capacity of ecosystems which in turn leads to population decline and ultimately species extinction. Habitat loss for conservation significant flora populations is unlikely to be significant as a result of the amendment as most of the vegetation communities associated with the conservation flora are located either in areas under reservation by the City of Kalamunda or in areas identified for retention.

Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to introduction and/or spread of weeds or plant disease including *Phytophthora* dieback and *Quambalaria coyrecup*

The condition of the vegetation within the Amendment Area was predominately rated as 'Completely Degraded' with 4.06 ha (2%) rated as 'Excellent' and showing little evidence of impact as a result of human activities or low levels of weeds. Twenty-two introduced species were recorded in the Amendment Area, representing 11.1% of the total taxa recorded (360 Environmental, 2022). One species, **Asparagus asparagoides,* is listed as Declared under the *Biodiversity and Agriculture Act 2007* (BAM Act) and is also listed as a WONS.

Degradation of vegetation and *Conospermum undulatum* or other conservation significant flora populations due to the introduction and/or spread of exotic weeds is unlikely to be significant as a result of the rezoning as there is already an extensive presence of weed infestations as a dominant feature of the survey area due to existing land uses and human activity.

Marri canker is stem and branch disease of marri (Corymbia calophylla) and red flowering gum (Corymbia ficifolia) caused by the native fungal pathogen Quambalaria coyrecup (DBCA, 2023a). Phytophthora dieback (dieback) is a plant disease of native ecosystems. It is caused by a plant pathogen from the genus Phytophthora, with Phytophthora cinnamomi being the main species responsible. Phytophthora spreads naturally by moving through soil and the roots it infects, as well as in run-off. Animals can also spread the disease when infected soil is caught in their fur or feet and then is deposited in uninfected areas. However, humans are the biggest spreader of the disease through activities which disturb and move infected soil, resulting in dieback spreading further and faster than it could naturally (DBCA, 2023b). The Amendment Area is located in the 'vulnerable zone' of WA, where the conditions allow the disease to persist and establish, causing dieback in natural ecosystems (DBCA, 2023b). Degradation of vegetation due to plant diseases including Phytophthora dieback are unlikely to be significant due to the implementation of the proposed management measures including general hygiene management measures during high-risk activities.

Degradation of vegetation Conospermum undulatum or other conservation significant flora populations due to altered fire regime.

Fires occur naturally as a result of lightning strikes and the flora and vegetation of the associated landscapes have evolved to recover rapidly from these occurrences. According to the EPA (2016a),

"Although fire is an important process for regeneration and renewal of many Australian species and ecosystems, some fire regimes can adversely impact flora and vegetation through alteration of the structure and composition of vegetation, increased soil erosion, and expansion of weed and feral animal populations".

The Amendment Area is identified within the DFES Bushfire Prone Area. A BMP has been developed by Bushfire Prone Planning (BPP) for the Amendment Area which addresses the

relevant guidelines applicable to an amendment of this nature (Appendix G). It will be implemented to minimize the risk of human sources of bushfire ignition.

There was no evidence of recent fire observed within the Amendment Area or surrounding the area during the inspection of the Amendment Area. The BMP identified that the Amendment Area and surrounding area is not considered a likely occurrent for bushfire. It is also unlikely to alter the frequency, intensity, or extent of fires in this location.

5.1.6.3 Cumulative impact

Potential cumulative impacts to flora and vegetation include clearing of vegetation and significant flora populations from reasonably foreseeable projects have been considered using publicly available information at the time of preparation of the report. Although the implementation of the amendment will impact the flora and vegetation values of the area, it has proposed significant areas for retention of high environmental value and improvement of the Crumpet Creek foreshore area. A desktop review of the DBCA purchased datasets identified over 150 ha of different vegetation communities within a 15 km radius of the site. The flora and vegetation database recorded 89 flora species as potentially occurring within the surveyed areas.

A summary of the impacts from other proposals in proximity to the current amendment is provided in Table 24 and includes the following cumulative impact to common flora and vegetation values from implementation of the amendment:

- Clearing of 61.4 ha of native vegetation in good to excellent condition
- Clearing of 7.92 ha of vegetation representative of a TEC Clearing of 553 individuals of *Conospernum undulatum* (T)
- Clearing of two individuals *Isopogon autumnalis (P3).*

Table 24: Cumulative impacts to flora and vegetation relevant to the amendment

Project	Flora and vegetation impact
Maida Vale MRS amendment	• Clearing of 2.34 ha in the Forrestfield Complex • Clearing of 0.34 ha in the Southern River Complex • Clearing of 3.95 ha FCT SCP20a • Clearing of 0.87 ha FCT SCP20b • Clearing of 0.16 ha FCT SCP3b • Clearing of 3.64 ha of native vegetation in good to excellent condition. • Clearing of 2 individuals *Isopogon autumnalis (P3)* • Clearing of 3 individuals of Conospernum undulatum (T)
Tonkin Highway Grade Separated Interchanges (Hale Road and Welshpool Road)	• Clearing 1.61 ha of SCP20a – *Banksia attenuata* woodlands • Loss of up to 62 individuals of *Conospermum undulatum* (T).
Thornlie-Cockburn Line	• Clearing 54.88 ha of native vegetation.
Forrestfield Airport Link	• Clearing 0.75 ha of SCP20c Eastern shrublands and woodlands • Clearing 1.72 ha of SCP20a/SCP20b *Banksia attenuata* woodlands

Project	Flora and vegetation impact
	• Clearing of 2.47 ha of remnant native vegetation in good or better condition • Loss of 25 individuals of *Conospermum undulatum* plants (VU).
Warehouse and transport depot, Welshpool	NA
Southern Link Road (Stage 3)	• 0.41 ha of native vegetation.
Forrestfield North District Structure Plan	• Five vegetation communities totalling approximately 23.8ha were mapped within the precinct which ranged from 'Degraded' to 'Excellent' condition. *Conospermum undulatum* was extensively recorded within the precinct. One Priority 3 species, *Isopogon drummondii,* was also recorded in the precinct. A total of 525, *Conospermum undulatum* individuals were recorded within the DSP. • Four communities listed as Threatened Ecological Communities (TECs) were considered to potentially occur within the vicinity of the Forrestfield North Area. The total area of native vegetation representing the Banksia Woodland TEC within the DSP area is 15.30ha of which 100% is located within the Residential Precinct and will be cleared. The project area is mapped within vegetation complex Southern River Complex, which is above the recommended clearing threshold of 10 % for the Swan Coastal Plain (SCP) areas.
Wattle Grove South MRS amendment	• The northern part of the project area is mapped within the Southern River Vegetation Complex; however it is mapped as completely degraded with trees in-between roads and constructed areas.
City of Gosnells Local Planning Scheme 6 Amendment 166 and 169 Known as Precincts 3B and 2 of the Maddington Kenwick Strategic Employment Area (MKSEA)	• Direct and indirect loss of significant flora and vegetation, including threatened and priority ecological communities, threatened and priority flora, and vegetation complexes poorly represented in existing conservation reserves (Guildford Complex and Forrestfield and Southern River Complex). • Native vegetation to be cleared is approximately 3.63 % of the area. 96% vegetation is in degraded condition. • Two TECs comprising of 1.22 ha of 'banksia woodlands of Swan Coastal Plain and 0.35 ha of 'Corymbia calophylla – Kingia australis woodlands on heavy soils of the Swan Coastal Plain'. • One priority flora species, *Lepyrodia curvescens*, also exists within the subject site.

5.1.7 Predicted Environmental Outcomes

The predicted environmental outcome of the MRS amendment in relation to flora and vegetation includes:

- The proposed clearing will not reduce the pre-European extent of Forrestfield and Southern River vegetation complexes to 10 % or less remaining.
- Retention of at least 20 individuals Threatened or Priority flora species recorded across the MRS Amendment Area, of which seven Threatened and 13 Priority flora species are located within areas proposed for retention. The remaining five individuals are recorded within the existing Western Power easement corridor. While no development or

clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain, and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.

- Retention of at least 9.27 ha of TECs.
- Retention of at least 8.62ha of vegetation in Good to Excellent condition.
- Indirect impacts from weeds and fire will be minimised through construction procedures including the preparation and implementation of a CEMP, BMP and FMP as a result of increased human activities from the rezoning.

Through the implementation of the mitigation measures and consideration of the scale and nature of the impacts, the location in the context of sensitive environmental areas, as well as the State planning process, the MRS amendment is not expected to result in significant impacts to flora and vegetation.

The amendment allows for the retention of the highest quality vegetation and TEC patches and involves the creation of a preliminary foreshore area associated with Crumpet Creek that has been ascertained based on consideration of the presence of native vegetation and is consistent with the existing City of Kalamunda LPS zoning and in accordance with Operational Policy 4.3 – identifying and establishing waterways foreshore areas (DoW, 2012). Further investigations to redefine and confirm the foreshore area will be required at the LSP stage and LWMS and UWMP stages once a detailed design for the Amendment Area has been completed.

On this basis, it is expected that the EPA objective to protect flora and vegetation so that biological diversity and ecological integrity are maintained will be met.

6 Key Environmental Factor 2 – Terrestrial Fauna

6.1.1 EPA Objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

6.1.2 Relevant Policy and Guidance

A summary of the policy and guidance relevant to fauna and how these have been considered for the amendment is presented below (Table 25).

Table 25: Policy and Guidance for Terrestrial Fauna

Policy/Guidance	Consideration for the Amendment
Statement of Environmental Principles, Factors, Objectives and aims of Environmental Impact Assessment, EPA 2021b	Referred to in the identification and assessment of Preliminary Key Environmental Factors
Environmental Factor Guideline – Terrestrial Fauna, EPA, December 2016d	Referred to in the assessment of potential impacts as a result of the amendment
Technical Guidance: Sampling methods for terrestrial vertebrate fauna, EPA, December 2016e	Referred to in the survey design which included a desktop study and Level 1 fauna assessment and Black Cockatoo assessment.
Technical Guidance: Terrestrial fauna surveys, EPA, December 2020	Referred to in the survey design
Technical Guidance: Sampling of short-range endemic invertebrate fauna, EPA, December 2016b	Referred to in the assessment of potential impacts as a result of the amendment
Guidance for planning and development: Protection of naturally vegetated areas in urban and pre-urban area, EPA, December 2021c	Referred to in the mitigation of the amendment
Referral guideline for 3 WA threatened black cockatoo species, DAWE, 2022	Referred to in the mitigation and outcomes of the amendment

The amendment has considered the relevant policy and guidelines available at the time of preparing the ERD and subsequent consultation with the relevant stakeholders.

6.1.3 Receiving Environment

6.1.3.1 Studies and investigations

The surveys completed for Terrestrial Fauna are described in Table 26 below. The external road reservations (approximately 10 ha) associated with the Amendment Area are City of Kalamunda managed local road reserves that are not subject to development. These comprise the Sultana Road and Hawtin Road reserves, Reserve 40275 (adjoining Hawtin Road) and Reserve 44879 (northern tip of the Amendment Area) these areas are not subject to urban development as it is a road reserve under the City's local planning scheme. These road reserves are depicted on Figure 3. It is recognized that any future development proposed by the City of Kalamunda or other proponents would be subject to a separate assessment process.

Table 26: Referenced Studies

Survey Date	Researcher/Consultant	Study Description or Title
September 2015	360 Environmental	Level 1 Fauna Survey and Black Cockatoo Habitat Assessment
June 2023	Invertebrate Solutions	SRE and Conservation Significant Invertebrate Survey for the LSP Maida Vale, Western Australia
June and September 2022	360 Environmental	Maida Vale Flora, Vegetation and Fauna and Black Cockatoo Technical Note

The SRE survey is consistent with the EPA requirements for the environmental survey and reporting of SRE's in Western Australia where practical and relevant, and as set out in the following documents:

- Technical Guidance – Sampling of Short-Range Endemic Invertebrate Fauna (EPA, 2016b).

A Fauna and Black Cockatoo hollow inspection was undertaken between July and September 2022. Previous fauna habitat assessments were re-assessed as part of the 2022 field survey alongside additional sampling sites (Figure 12). The combined data was used in association with vegetation types and distinctive features to identify the broad fauna habitats in the Amendment Area. The survey was also to confirm the presence of hollows in those potential breeding trees identified in the 2015 report. The hollow inspection has been undertaken in accordance with the relevant survey guidelines for black cockatoo assessments:

- Referral guideline for three WA threatened black cockatoo species (DAWE, 2022)
- Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020).

6.1.3.2 Fauna habitats

Six broad fauna habitats were identified and mapped throughout the Amendment Area (excluding Cleared and No Access). Habitat condition varied throughout the Amendment Area, with the most prolific disturbances being clearing, infrastructure and weeds. Descriptions, extents, and representative photos for fauna habitats within the Amendment Area are provided below in Table 27 and fauna habitat mapping is displayed in Figure 13.

Table 27: Fauna Habitats within the Amendment Area

Fauna Habitat	Amendment Area				Total	Amendment Area (%)
	Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement		
Eucalypt Remnant with Understorey	5.73	0.24	0.43	1.19	7.59	4.3
Eucalypt Remnant Lacking Understorey	4.46	0.21	0.02	0.55	5.24	2.9

Fauna Habitat	Amendment Area				Total	Amendment Area (%)
	Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement		
Marri woodland	18.58	1.25	0.23	1.90	21.96	12.3
Sheoak Woodland	0.87	0.13	0.00	0.00	1.00	0.6
Crumpet Creek	0.36	0.02	2.1	0.26	2.74	1.5
Garden Planted	24.95	0.93	0.02	1.99	27.89	15.7
Not surveyed	8.60	9.98	0.03	0.63	19.24	10.8
No Access	0.60	0.00	0.00	0.58	1.18	0.7
Cleared	76.68	7.03	0.08	6.88	90.67	50.9

6.1.3.3 Vertebrate Fauna

The database search identified 109 conservation significant species occurring within the Amendment Area. A likelihood of occurrence assessment for conservation significant fauna species found that:

- Five species have a high likelihood of occurrence:
  - Baudin's Black Cockatoo (*Zanda baudinii*) – EN (BC Act); EN (EPBC Act)
  - Carnaby's Black Cockatoo (*Zanda latirostris*) – EN (BC Act); EN (EPBC Act)
  - Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – VU (BC Act); VU (EPBC Act)
  - Wambenger Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – CD (DBCA)
  - Quenda (*Isoodon fusciventer*) – P4 (DBCA).
- Five species have a medium likelihood of occurrence:
  - Blue-billed Duck (*Oxyura australis*) – P4 (DBCA)
  - Black Bittern (*Ixobrychus flavicollis australis*) – P2 (DBCA)
  - Chuditch, Western Quoll (*Dasyurus geoffroii fortis*) – VU (BC Act); VU (EPBC Act)
  - Tammar Wallaby (*Notamacropus eugenii derbianus*) – P4 (DBCA)
  - Western Brush Wallaby (*Notamacropus irma*) – P4 (DBCA).
- The remaining 109 species have a low likelihood of occurrence.

These fauna searches are presented in Figure 14. Species of Medium to High likelihood are summarised in Table 28.

Four (4) species were recorded during both the 2016 and 2022 field assessment. The species recorded in both field surveys consisted of Carnaby's Black Cockatoo (*Zanda latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). A White-tailed Black Cockatoo call was heard during the 2022 survey which may have been either the Baudin's Cockatoo (*Zanda baudinii*) or the Carnaby's Black Cockatoo. The Rainbow Bee-eater (*Merops ornatus*) was recorded in the 2016 survey and the Quenda (*Isoodon fusciventer*) was recorded in the 2022 survey.

The Likelihood of each species is based on the following criteria:

Recorded: Recorded during the field assessment.

Likely: Suitable habitat is present in the Amendment Area and the Amendment Area is in the species' known distribution.

Possible: Limited or no suitable habitat is present in Amendment Area but is nearby. The species has good dispersal abilities and is known from the general area; and

Unlikely: No suitable habitat is present in Amendment Area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however the Amendment Area is outside of the species' known distribution.

EN = Listed as Endangered under the EPBC Act, **VU** = Listed as Vulnerable under the EPBC Act, **MI** = Listed as Migratory under the EPBC Act, **CD** = Species of special conservation interest (Conservation Dependent), **S** = Scheduled under the BC Act, and **P** = Listed as Priority by the DBCA.

Table 28: Conservation Significant Fauna Potentially Occurring in the Amendment Area

Taxa	Conservation Status		Likelihood
	State	EPBC Act	
Reptiles			
Black-striped Snake (*Neelaps calonotos)*	P3	-	Medium
Birds			
Blue-billed Duck (*Oxyura australis*)	P4	-	Medium
Black Bittern (*Ixobrychus flavicollis australis*)	P2	-	Medium
Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)	VU	VU	Recorded
Baudin's Cockatoo (*Zanda baudinii*)	EN	EN	High
Carnaby's Cockatoo (*Zanda latirostris*)	EN	EN	Recorded
Mammals			
Western Quoll, Chuditch (*Dasyurus geoffroii fortis*)	VU	VU	Medium
Wambenger Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*)	CD	-	High

Taxa	Conservation Status		Likelihood
	State	EPBC Act	
Western Brush Wallaby (*Notamacropus Irma)*	P4	-	Medium
Quenda (*Isoodon fusciventer*)	P4	-	Recorded

Black Cockatoo

The Amendment Area occurs within the modelled distributions of all three (3) black cockatoo species; Carnaby's Black Cockatoo, Forest Red-Tailed Black Cockatoo (FRTBC) and Baudin's Black Cockatoo (DAWE, 2022). The Amendment Area contains Marri, Jarrah, Wandoo, introduced Eucalypt, Flooded Gum and Stag trees which have reached a size that are considered to be potential future hollow bearing trees, therefore potential breeding trees (>500 mm DBH [>300 mm for Wandoo]). Based on the Black Cockatoo surveys completed (2016, 2022), in total, 578 trees have been recorded, of which four are located outside the Amendment Area which met the criteria to be classed as potential breeding trees. The four trees located outside the Amendment Area have not been considered further.

The DBCA and Great Cocky Count database search results identified an additional 55 confirmed White-tailed Black Cockatoo roost sites within a 20 km radius of the Amendment Area, the nearest of which occurs approximately 700 m to the west. A total of 65 confirmed Forest Red-tailed Black Cockatoo roost sites within a 20 km radius of the Amendment Area were also identified, with one confirmed Forest Red-tailed Black Cockatoo roost site occurring within the Amendment Area. The DBCA database search also identified 15 confirmed White-tailed Black Cockatoo breeding areas within a 20 km radius. The nearest of which occurs approximately 6.7 km to the northeast (Birdlife Australia, 2022; DBCA, 2022).

The Amendment Area contains 38.55 ha of high-quality foraging vegetation as a resource for black cockatoo species (Figure 15). This included Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*), Tuart (*Eucalyptus gomphocephala*) and *Allocasuarina sp*. Which are known dietary items of the three threatened black cockatoo species (DAWE, 2022). Evidence of the three threatened black cockatoo species was identified throughout the Amendment Area with foraging evidence of the Carnaby's Black Cockatoo and Forest Red-tailed Black Cockatoo and a White-tailed Black Cockatoo call which may have been either the Carnaby's Black Cockatoo or the Baudin's Black Cockatoo (360 Environmental, 2022).

The Black Cockatoo assessment identified suitable breeding habitat within the Amendment Area, contained primarily within the Eucalypt Remnant with Understorey, Eucalypt Remnant lacking Understorey and the Marri Woodland fauna habitats. These habitats were comprised mainly of Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and Tuart (*Eucalyptus gomphocephala*) species which have reached a size that are considered to be potential future hollow bearing trees (Department of Agriculture Water and the Environment, 2022b).

The supplementary Black Cockatoo hollow inspection identified forty (40) trees which contained hollows when observed from the ground and were further inspected via drone for their suitability for use by black cockatoos. Thirty-six (36) of these were considered potentially suitable for the black cockatoo breeding and were inspected by drone. Drone inspections found that:

- A total of 18 trees contains hollows that are suitable for black cockatoo breeding, of which seven show potential signs of previous use such as evidence of chewing around the entrance (DAWE, 2022; Johnstone et al., 2013)
- Five trees contain hollows that may potentially be suitable for black cockatoo breeding in the future but are currently occupied by bees.

No direct sightings of roosting black cockatoos were made during the survey. The Amendment Area contains approximately 38.55 ha of potential roosting habitat and all trees recorded as potential breeding trees may also be used for roosting (360 Environmental, 2023). The DBCA Database Search Results identified two black cockatoo roost sites occurring within the Survey Area (Figure 15). These locations provided in DBCA data do not directly correspond to trees visible in aerial imagery of the site, due to a lack of precision in DBCA data available. Vegetation around these points was visually inspected during the field survey and no roosting black cockatoos were observed. However, this does not rule out their use as dawn/dusk surveys were not conducted (360 Environmental, 2023).

Migratory birds

The Rainbow Bee-eater is listed as Migratory under the EPBC Act. This species is one of the most common and widespread birds in Australia with a distribution that covers the majority of Australia (Barrett et al., 2003). It occurs in lightly wooded, often sandy country, preferring areas near water. It feeds on airborne insects, and nests throughout its range in WA in burrows excavated in sandy ground or banks, often at the margins of roads and tracks. In WA, this species can occur as a 'resident, breeding visitor, postnuptial nomad, passage migrant and winter visitor' (Johnstone & Storr, 1998b).

The Amendment Area contains potential foraging habitat for this species. The Department of Parks, Attraction and Wildlife (DPAW) threatened fauna database returned twelve (12) records of the Rainbow Bee eater, including a record from Crumpet Creek Reserve – Sultana Road to Hawtin Roads, which is in the Amendment Area. The Rainbow Bee-eater was heard calling and was observed perching during the 2016 field survey. No other migratory birds were recorded in the area nor are they considered likely to occur.

6.1.3.4 Short Range Endemics

The Amendment Area is largely cleared or highly degraded with 68% of the Amendment Area considered to have Nil SRE habitat value, although pockets of higher value vegetation for SRE and conservation significant invertebrates remain (Invertebrate Solutions 2023). Figure 18 shows the SRE habitats and sampling sites and Table 29 summarises the SRE habitats in the

Amendment Area. The riparian vegetation along Crumpet Creek in the southeastern portion of the Amendment Area has some of better-quality habitat within the Amendment Area, although this is still degraded in large parts (Invertebrate Solutions 2023).

The Eucalyptus vegetation units, both with and without understorey vegetation, provide the only other potential SRE habitat within the Amendment Area, although these are generally disturbed and have limited value for SRE invertebrates (Invertebrate Solutions 2023).

Table 29: SRE Habitats within the Amendment Area

Habitat	SRE suitability	Amendment Area (ha)				Total (ha)	Amendment Area %
		Proposed Developable Area	Existing Road reserve	Existing LOS	Western Power Easement		
Eucalyptus remnant with native understorey	Moderate	9.27	0.24	0.54	1.69	11.74	6.6
Eucalyptus remnant lacking understorey	Low	17.57	1.21	3.73	1.62	20.58	11.6
Allocasuarina remnant	Low	0.83	0.15	0.00	0.00	0.98	0.6
Riparian Vegetation	Moderate	0.33	0.02	2.06	0.26	2.67	1.5
Cleared / Highly modified	Nil	104.19	7.96	0.1	8.87	121.12	68.0
Not surveyed	-	8.08	9.99	0.63	0.51	19.24	10.8
No Access	-	0.61	0.00	0.00	0.58	1.19	0.7

A desktop likelihood occurrence of SRE and Conservation Significant Invertebrates within the Amendment Area found the following species have a high likelihood of occurrence:

- Land snail *Bothriembryon serpentinus* – Confirmed SRE
- Millipede *Dinocambala ingens* – Likely SRE
- Katydid *Austrosaga spinifer* – Priority 2 (DBCA), Likely SRE.

Six species with moderate, four (4) low and four (4) very low likelihood of occurrence (Table 5, Invertebrate Solutions 2023).

The field surveys recorded 321 individual specimens representing 18 taxa of invertebrates from five (5) classes, 11 orders and 15 families that have the potential to contain SRE taxa or be of conservation significance (Appendix C). No Confirmed SRE species or conservation significant invertebrates were recorded during the survey. The survey recorded:

- Three Likely SRE species (*Pseudodiploexochus* sp. indet, *Armadillidae*? sp. indet., and *Styloniscus* sp. indet.)

- Four Possible SRE species (two terrestrial slaters: *Spherillo* sp. 2, *Buddelundia sp.*4; one pseudoscorpion, *Olpiidae* sp.; and one centipede *Cryptops* sp.).

The Likely and Possible SRE taxa are identified in Table 30 and Figure 19.

The isopods *Pseudodiploexochus* sp. indet. and *Armadillidae*? sp. indet. are undescribed edaphophilic (soil dwelling) species currently known only from the Amendment Area, although it should be noted that the taxonomic resolution for both these taxa is poor and designations may change with further taxonomic studies in the future. Soil dwelling taxa from numerous invertebrate groups often show an absence of eyes, and this does not in itself indicate the species has limited dispersal capabilities.

One of these species, *Pseudodiploexochus* sp. indet. was collected from site MVSRE06 in riparian vegetation associated with Crumpet Creek. The single specimen of Armadillidae? sp. indet. was collected from site MVSRE10 recorded on the eastern extremity of the Amendment Area in the relatively widespread habitat of *Eucalyptus* lacking understorey. The small and cryptic nature of this species may explain why it has not previously been recorded and its distribution is unknown although the habitat where it was recorded is not restricted. All other potential SRE species (one Likely and four Possible) are known to occur more widely in the region or were recorded at multiple locations and/or habitats that were laterally continuous during the survey indicating that their distributions are wider than the current survey could determine and are therefore not subject to significant impacts from the development.

The taxonomy of the Pseudoscorpion family Olpiidae is poorly known and, until further taxonomic resolution has been obtained, all species are considered to be Possible SRE species in Western Australia due to a deficiency in data (Invertebrate Solutions 2023).

Table 30: SRE and conservation significant invertebrates recorded during the Field Survey

Higher Order	Genus and species	Sites recorded	SRE Status
Gastropoda			
Charopidae	*Insullaoma predicta*	MVSRE15	Widespread
Crustacea			
Amphipoda: Talatridae	*Austrotroides occidentalis?*	MVSRE07	Widespread
Isopoda			
Armadillidae	*Armadillidae? sp. indet.*	MVSRE10	Likely
	Buddelundia sp. 4	MVSRE05	Possible (A)
	Buddelundia sp. 4? Juvenile	MVSRE10, MVSRE11	Possible (A)
	Pseudodiploexochus sp. indet.	MVSRE06	Likely

Higher Order	Genus and species	Sites recorded	SRE Status
	Spherillo sp. 2	MVSRE03, MVSRE05, MVSRE06, MVSRE08, MVSRE10	Possible (A)
Armadillidiidae	*Armadillidium vulgare*?	MVSRE06, MVSRE07, MVSRE08, MVSRE15	Widespread
Porcellionidae	*Porcellionides pruinosus*	MVSRE06, MVSRE07, MVSRE10	Widespread
Styloniscidae	*Styloniscus sp. indet.*	MVSRE06	Likely
Amphipoda			
Talatridae	*Austrotroides occidentalis?*	MVSRE07	Widespread
Arachnida			
Opilione: Triaenonychidae	*Nunciella aspera?*	MVSRE06, MVSRE08	Widespread
Pseudoscorpiones			
Chthoniidae	*Austrochthonius australis? juvenile*	MVSRE03	Widespread
Olpiidae	Olpiidae *sp.*	MVSRE04	Possible (A)
Chilopoda			
Geophilomorpha: Mecistocephalidae	*Mescitocephalus collinus*	MVSRE06, MVSRE08	Widespread
Lithobiomorpha: Henicopidae	*Lamyctes emarginatus*	MVSRE07, MVSRE11	Widespread
Scolopendridae: Cryptopidae	*Cryptops sp.*	MVSRE06, MVSRE08	Possible (A)
Diplopoda			
Julida: Julidae	*Ommatoiulus moreletii*	MVSRE01, MVSRE02, MVSRE03, MVSRE05, MVSRE06, MVSRE07, MVSRE08, MVSRE09, MVSRE10, MVSRE11, MVSRE12, MVSRE13,	Widespread

Higher Order	Genus and species	Sites recorded	SRE Status
		MVSRE14, MVSRE15, MVSRE16	
Polydesmida: Paradoxosomatidae	*Akamptogonus novarae*	MVSRE06, MVSRE08	Widespread
	Antichiropus variabilis	MVSRE14	Widespread
Polyxenidae	*Unixenus attemsi*	MVSRE11	Widespread

6.1.4 Potential Environmental Impacts

Future development of the Amendment Area has the potential to impact terrestrial fauna directly and indirectly, including:

6.1.4.1 Direct impact

- Permanent loss of fauna habitat, including black cockatoo foraging habitat and potential breeding trees (assuming clearing of the Western Power easement corridor) including up to:
  - 25.38 ha (65.8%) of vegetation providing high quality foraging habitat for black cockatoos including 3.9 ha located within the Western Power Easement corridor
  - 257 potential breeding trees providing potential roosting and breeding habitat for all three (3) black cockatoo species including 33 potential breeding trees located within the Western Power Easement corridor
  - 5.66 ha SRE habitat of moderate suitability of which 1.95 ha is located within the Western Power Easement corridor
  - 52.51 ha of fauna habitat 5.89 ha located within the Western Power Easement corridor.

6.1.4.2 Indirect impact

- Fragmentation of fauna habitat and loss of ecological connectivity
- Degradation of fauna habitat and habitat modification from the introduction and spread of weed and/or disease, altered surface water flows and edge effects
- Altered fauna behaviour due to noise, lighting and human presence
- Degradation of fauna habitat due to altered fire regime
- Cumulative impacts associated with other reasonably foreseeable projects.

An assessment of the significance of these impacts of the proposed MRS amendment are further detailed in Section 6.1.6.

6.1.5 Mitigation

The purpose of the mitigation measures is to reduce the residual impact to fauna within the Amendment Area resulting from the implementation of the amendment. The mitigation measures to fauna impacts associated with the proposed MRS amendment include the following:

6.1.5.1 Avoid

Significant retention of fauna habitat is proposed across the Amendment Area to protect the integrity and extent of fauna in this locality. The MRS amendment area includes 2.91 ha of land already under reservation by the City of Kalamunda for Local Open Space. The Concept Plan (Figure 3) which informs this MRS amendment includes an additional 16.43 ha to be set aside as retention areas (Figure 10). The total extent of fauna habitat to be retained across both the proposed retention areas and City Kalamunda's reservation is 13.91 ha (21%) and 114 potential breeding trees including seven with suitable hollows.

The City of Kalamunda's reservation includes:

- 2.78 ha of high-quality black cockatoo foraging habitat
- 47 potential breeding trees of which six have at least one suitable hollow
- 2.60 ha SRE habitat of moderate suitability including collection site MVSRE06 where Pseudodiploexochus sp. Indet was recorded
- 2.8 ha fauna habitat.

The proposed retention areas include:

- 10.39 ha of high-quality black cockatoo foraging habitat
- 156 potential breeding trees of which 10 have suitable hollows
- 6.15 ha SRE habitat of moderate suitability
- 11.11 ha fauna habitat.

In addition to the City of Kalamunda's reservation and proposed retention areas, the MRS amendment proposes to retain 81 potential breeding trees of which one has at least one suitable hollow within areas of open space, road reserves and residential lots.

6.1.5.2 Minimise

Impacts of the MRS amendment on terrestrial fauna will be minimised through the implementation of the following measures:

- Protect intact black cockatoo foraging habitats and potential breeding trees in accordance with the retention plan.
- Maintain vegetation that forms significant fauna habitat within areas proposed for retention and identified ecological linkages, riparian corridors (foreshore areas).
- Minimise clearing of SRE habitat with moderate habitat suitability.

- In accordance with the Operational Policy 4.3 – identifying and establishing waterways foreshore areas, a Foreshore Management Plan (FMP) will be prepared and implemented at a subsequent planning level when an appropriate level of design detail is available and a LWMS and UWMP are completed for the developable areas in the Amendment Area.
- A 30 m foreshore buffer along Crumpet Creek will be established that will retain a minimum of 0.37 ha of the vegetation within the foreshore buffer area in good to excellent condition. The 30 m buffer will protect against flooding and conserve significant flora, vegetation and fauna habitat and satisfy the statutory requirements for foreshore areas (Figure 8: Appendix D). A more defined foreshore area and buffer will be confirmed during the LWMS and UWMP and LSP stages for the Amendment Area.

Potential impacts from the clearing will be managed during civil construction management-based provisions to address terrestrial fauna and associated habitat. These provisions will be included within a CEMP and are outlined in Table 31.

Table 31: Proposed terrestrial fauna management provisions to be included in the CEMP

Management target	Management actions	Monitoring	Reporting
No clearing of fauna habitat outside the Amendment Area	Demarcate the Amendment Area through temporary fencing	Daily visual inspection during clearing of clearing areas and temporary fencing	Report any unauthorised clearing as an incident to DWER
No unavoidable death or injury of conservation significant fauna during vegetation clearing for construction.	A list of local wildlife carers and vets will be maintained on Amendment Area to use in the event of conservation significant fauna injury	Daily visual inspection during clearing of clearing areas for injured conservation significant fauna	Report any injury or death as an incident to DWER
	Trees identified as potential breeding trees will be inspected within 7 days of clearing by a suitably qualified person to confirm that there are no hollows being used by black cockatoos within the area to be cleared.	Survey undertaken by suitably qualified person using pole camera or drone.	Report any records of hollows by black cockatoo species

6.1.5.3 Rehabilitate

Rehabilitation will aim to improve habitat values in the Amendment Area. The proposed rehabilitation in the form of streetscaping associated with road reserves and open space throughout the Amendment Area will utilize native species where possible. Rehabilitate and revegetate those areas of riparian corridors within the Crumpet Creek foreshore area that have been disturbed during the construction phase. In accordance with the Operational Policy 4.3 –

identifying and establishing waterways foreshore areas, a Foreshore Management Plan (FMP) will be prepared and implemented at a subsequent planning approval stage when an appropriate level of design detail is available and a LWMS or UWMP has been prepared. The proposed provisions for management of Terrestrial Fauna to be included in the FMP are outlined in Table 32.

Table 32: Proposed terrestrial fauna management provisions to be included in the Foreshore Management Plan

Management target	Management actions	Monitoring	Reporting
No clearing of fauna habitat within the foreshore area.	Demarcate the foreshore area	Visual inspection of the foreshore area	Reporting unauthorised clearing of the foreshore area to the DWER.
No unavoidable death or injury to conservation significant fauna species within the foreshore area.	List of wildlife carers and vets to be maintained should an incident occur within the foreshore area.	Visual inspection of the foreshore area	Reporting any injury or death as an incident to the DWER within the foreshore area.
No uncontrolled fires within the foreshore area	Appropriate signage in place prohibiting fires within the foreshore area, Inspections of foreshore areas during drier months.	Inspections of foreshore areas during drier months.	Report uncontrolled fires to DFES.

Structure planning will be implemented on a precinct basis to minimize the size of the clearing front and allow for progressive rehabilitation.

Subject to the outcomes from the detailed structure planning, an offset may be required to address the clearing associated with black cockatoo foraging habitat and potential breeding trees. This is further detailed in section 9. Table 47 Residual Significance Assessment model is further detailed in section 9. This table has been formulated to determine the extent of residual impacts and the likelihood of these impacts resulting in the requirement for an offset applicable to the proposed MRS amendment.

6.1.6 Assessment and significance of residual impact

6.1.6.1 Direct impact

Permanent loss of fauna habitat, including black cockatoo foraging habitat and potential breeding trees

Including the Western Power Easement corridor, implementation of the amendment will result in a permanent loss through clearing of up to 52.51 ha of fauna habitat that is comprised of a mixture of woodlands, creeklines and landscaped vegetation. Fauna habitat condition varies across the Amendment Area, with the most of habitat types showing signs of existing disturbances from clearing, infrastructure and weeds.

There is 5.89 ha of fauna habitat located within the existing Western Power easement corridor and existing road reserves. The Amendment Area is surrounded by areas cleared for the development residential, industrial and recreation areas. Clearing of 52.51 ha of fauna habitat is not expected to result in significant impacts on terrestrial fauna.

Direct loss of 5.66 ha of SRE habitat moderate suitability for SRE species including 1.95 ha located within the Western Power Easement. Given the degraded nature of the vegetation across the Amendment Area, it is considered that SRE species will likely persist in the good to excellent condition vegetation being retained. The Pseudodiploexochus sp. indet. was recorded in riparian vegetation that is within the City of Kalamunda's existing LOS for Crumpet Creek and is not proposed for development as part of the implementation of this amendment. All five specimens collected were from collection site MVSRE06. Pseudodiploexochus sp. indet are considered to be a Likely SRE species. The taxonomic framework for this genus is poor and so definitive identification is not possible currently (Judd 2020) and designations may change in the future as more specimens are collected from similar habitats on the Swan Coastal Plain and the higher-level taxonomy can be resolved.

The single specimen of the small and cryptic Armadillidae? sp. indet. was recorded at a collection site outside the designated retention areas however it was located within an area of Eucalyptus lacking understorey habitat that occurs throughout the Swan Coastal Plain (Invertebrate Solutions, 2023). This taxa has not previously been recorded from the SCP, although due to its cryptic nature and extremely small size this is not unexpected, and further targeted collection of isopods using appropriate techniques will certainly record further specimens (Invertebrate Solutions, 2023).

The main conservation significant fauna species likely to be impacted by the permanent loss of habitat are the three black cockatoo species listed as Threatened Species under the EPBC Act. The Amendment Area provides 38.55 ha of high-quality foraging habitat, 574 potential breeding trees including 18 trees with at least one suitable hollow for these species. The high-quality foraging habitat comprises primarily of Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*), Tuart (*Eucalyptus gomphocephala*) and Allocasuarina sp. The Amendment Area also contains a total of 20.43 ha of unsurveyed vegetation which could not be classified according to the Foraging Habitat Scoring Tool. Pockets of various quality foraging habitat, including breeding trees and hollows are scattered across the Amendment Area.

Table 33 provides an assessment of the number of potential black cockatoo breeding trees within the Amendment Area. The proposal is estimated to result in the permanent loss of up to 257 potential black cockatoo breeding trees, including no trees containing potentially suitable for hollows and 21.33 ha of high-quality foraging habitat. However, 203 potential breeding trees will be retained within proposed retention areas and existing areas of Local Open Space. An additional 120 potential breeding trees are proposed to be retained within open space, road reserves and residential lots. It is estimated that up to 13.17 ha of high-quality black cockatoo foraging habitat will be retained in the proposed retention areas and existing Local Open Space reservations for protection of black cockatoo foraging habitat.

There are 33 potential breeding trees and 3.9 ha of high-quality black cockatoo foraging habitat located within the existing Western Power easement corridor including one with at least one suitable hollow for these species. While no development or clearing of this easement corridor is proposed, as the high voltage power lines will remain, the land is subject to Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.

Table 33: Impacts to potential Black Cockatoo breeding trees (DBH>500 mm)

	Proposed Developable Area	Proposed Retention Areas	Existing road reserves	Existing Local Open Space	Western Power Easement	Total
Proposed to be retained	73	156	8	47	33	317
Proposed to be cleared	218	0	39	0	0	257
Total	291	156	47	47	33	574

An additional four potential black cockatoo breeding trees occur were surveyed but are located outside the Amendment Area and have therefore not been included in the impact assessment.

As shown on Figure 17, there are confirmed roosting and breeding sites within 20km of the proposed MRS amendment including 55 confirmed White-tailed Black Cockatoo roost sites, 65 Forest Red-tailed Black Cockatoo roost sites. The closest occurs approximately 700 m to the west (360 Environmental, 2023). The DBCA database search also identified 15 confirmed White-tailed Black Cockatoo breeding areas within 20km of the Amendment Area of which the closest is 6.7 km to the northeast (360 Environmental, 2023).

The DBCA Database Search Results identified two black cockatoo roost sites occurring within the Amendment Area (Figure 15). One of these sites is located within a proposed retention area and the other on the edge of the Western Power Easement corridor. These locations provided in DBCA data do not directly correspond to trees visible in aerial imagery of the site, due to a lack of precision in DBCA data available. Vegetation around these points was visually inspected during the field survey and no roosting black cockatoos were observed.

There is a high likelihood that additional patches of moderate SRE habitat, high-quality foraging habitat and potential black cockatoo breeding trees present in the northeastern corner of the Amendment Area in the portion of Hawtin Road that has not been surveyed. However, it is recognized that this area is associated with City of Kalamunda managed local road reserves and are not subject to development. Consultation with City of Kalamunda has identified an intent to retain a rural interface between the Amendment Area and existing rural zone to the east and no development or clearing of this road reserve is proposed.

The design of LSPs will ensure that black cockatoo habitats and breeding trees are retained in accordance with Figure 16 and protected in the proposed retention areas, Crumpet Creek foreshore area, open space, road reserves, road verges, easements and within lot boundaries (if required) for the Amendment Area. The Amendment Area contains 38.55 ha of high-quality foraging habitat for all three species of black cockatoos with up to 13.17 ha proposed to be retained in the proposed retention areas and existing Local Open Space. Confirmed roosting and breeding sites located within 20km of the Amendment Area. It is not expected that the amendment will have significant impact on the conservation and integrity of the black cockatoo species foraging habitat and breeding sites.

6.1.6.2 Indirect Impact

Fragmentation of fauna habitat and loss of ecological connectivity

The Amendment Area forms part of the Perth Biodiversity Project's Draft Regional Ecological linkage network (Figure 5). The purpose of the Regional Ecological Linkages is to link protected natural areas with other areas of mapped native vegetation. One linkage intersects the Amendment Area, Linkage 135 includes the northern tip portion of the Amendment Area (Figure 5). The majority of the Amendment Area (142.45 ha) is considered Completely Degraded/ Cleared fauna habitat. The remaining fauna habitats are highly fragmented particularly around existing infrastructure and completely degraded areas. These areas offer little habitat value for fauna and are considered to limit the movement of smaller animals to areas with dense understory.

It is unlikely that the MRS amendment will significantly increase fragmentation in the already degraded areas of the Amendment Area. Detailed design of the Amendment Area during the LPS amendment and LSP planning approval processes will continue to ensure the proposed retention areas are protected and managed to preserve the ecological connectivity and loss of fragmented fauna habitats across the Amendment Area.

Degradation of fauna habitat and habitat modification from the introduction and spread of weed and/or disease, and edge effects

Vegetation condition across the Amendment Area ranges from Excellent to Completely Degraded with the majority of the Amendment Area being identified as a Completely Degraded condition (Figure 10). The vegetation occurs in a mosaic pattern across the Amendment Area with large portions having been historically cleared for housing, roads and agriculture and is dominated by introduced species.

Existing land uses in the Amendment Area has resulted in fragmentation of the native vegetation. Much of the remaining native vegetation is integrated with gardens and non-endemic species across the Amendment Area. Vegetation in these locations has no natural structure and is considered to be Completely Degraded.

Majority of the intact native vegetation has a condition rating of Good to Excellent and is bound by Bruce Road, Brewer Road, and Sultana Road East. There are also a few pockets of intact native vegetation near Oxford Court and Kent Road.

The vegetation along Crumpet Creek varies greatly, with the portion north of Brewer Road having been altered and there is minimal native species present. Crumpet Creek south of Brewer Road consists of intact native vegetation considered to be in Good to Excellent condition.

The proposed retention areas incorporate the areas with vegetation of Good to Excellent in foreshore and open space areas.

Weeds/disease

Twenty-two introduced species were recorded in the Amendment Area, representing 11.1% of the total taxa recorded (360 Environmental, 2022). One species, **Asparagus asparagoides*, is listed as Declared under the BAM Act and WoNS.

Most of the Amendment Area is covered by introduced weed species, including environmental weeds and a variety of garden plants. Due to the scale of the Amendment Area, a comprehensive weed list was not prepared; only weeds that were present within intact native vegetation were recorded. The majority of the weeds are common bushland and agricultural weeds (Hussey et al. 2007).

It is unlikely that rezoning of the Amendment Area will result in the introduction or increase new weed species.

Impact on Edge Effects

The Amendment Area is considered to be mostly Completely Degraded and highly fragmented in relation to the occurrence of flora and vegetation communities and fauna habitats within the Amendment Area.

Degradation of habitat and habitat modification from the introduction and increased spread of weeds and/or disease, altered surface water flows and edge effects are unlikely to occur as a result of the MRS amendment.

It is unlikely that the proposed MRS would increase edge effects in the Amendment Area.

Altered fauna behaviour due to noise, lighting, and human presence.

An increase in housing/population density in the Amendment Area will most likely result in increased noise, lighting, and human-fauna interactions. It is unlikely to alter fauna behaviors associated with existing and future land uses.

Degradation of fauna habitat due to altered fire regime

Similar to Section 5.1.6, the impact of fire risk on fauna habitat is likely resultant from the proposed MRS amendment. A BMP has been prepared to support and demonstrate how bushfire risks will be managed the proposed MRS amendment (refer to Appendix G).

Bushfire risks will be managed in accordance with the BMP and the likelihood of bushfire risks is limited in the Amendment Area due to a large portion of the area being cleared or in a completely degraded condition. Appropriate bushfire management of those areas of vegetation to be protected will minimise overall bushfire risks.

6.1.6.3 Cumulative impact

Potential cumulative impacts to terrestrial fauna include clearing of fauna habitat from reasonably foreseeable projects have been considered using publicly available information at the time of preparation of the report. Although the implementation of the amendment will impact the terrestrial fauna values of the area, it has proposed significant areas for retention of high environmental value and improvement of the Crumpet Creek foreshore area. A desktop review of the DBCA purchased datasets identified 86 conservation significant fauna with the Carnaby's Black cockatoo, Forest Red Tailed Black Cockatoo and Baudin's Black cockatoo occurring within the areas close to the Amendment Area. Fauna habitat consisting of remnant vegetation, foreshore areas and reserved areas was mapped within a 15 km radius of the Amendment Area.

A summary of the impacts from other proposals in proximity to the MRS amendment is provided in Table 34 and includes the following cumulative impact to the common terrestrial fauna values from implementation of the amendment:

- Clearing 509 potential breeding trees for black cockatoos
- Clearing 83.74 ha of high-quality foraging habitat for black cockatoo species and 4.35 ha valued quality foraging habitat
- Clearing of 74.73 ha of fauna habitat
- Clearing of 5.66 ha of habitat with moderate suitability for SRE.

Table 34: Cumulative impacts to terrestrial fauna

Project	Terrestrial fauna impact
Maida Vale MRS amendment	• Clearing 257 potential breeding trees for black cockatoos. None currently have potentially suitable hollow for black cockatoo nesting. • Clearing 25.38 ha of high-quality foraging habitat for black cockatoo species. • Clearing of 52.51 ha of fauna habitat. • Clearing of 5.66 ha of habitat with moderate suitability for SRE.
Tonkin Highway Grade Separated Interchanges (Hale Road and Welshpool Road)	• Clearing 141 potential breeding trees for black cockatoos, with no trees having a potentially suitable hollow for black cockatoo nesting. • Clearing 18.54 ha moderate to low value foraging habitat for Carnaby's Cockatoo.

Project	Terrestrial fauna impact
	• Clearing 7.88 ha of high to moderate value foraging habitat and 11.06 ha of moderate to low value foraging habitat for Baudin's Cockatoo and FRTBC. • Clearing 22.22 ha of fauna habitat.
Thornlie-Cockburn Line	• Clearing 27.64 ha of black cockatoo foraging habitat • Clearing 96 potential black cockatoo habitat trees.
Forrestfield Airport Link	• Clearing 15 potential black cockatoo habitat trees • Clearing 3.56 ha of potential black cockatoo foraging habitat.
Warehouse and transport depot, Welshpool	NA
Southern Link Road (Stage 3)	NA
Forrestfield North District Structure Plan	The structure plan was divided into three different vegetation types, all of which are considered to be utilised by two species of black cockatoos (Carnaby Cockatoo and Forrest Red-Tailed Black Cockatoo) for foraging. The habitat within the area is considered high quality due to the vegetation being near known roosting site, water, and other quality foraging habitat. The project will include a loss of: • 19.28 ha comprises of high-quality foraging habitat. • 4.35 ha comprises of valued quality foraging habitat.
Wattle Grove South MRS amendment	The Carnaby's Black Cockatoo and Baudin's Black Cockatoo were identified as occurring within the Wattle Grove amendment area. The Wattle Grove amendment is anticipated to impact on terrestrial fauna include: • Loss of significant fauna habitat including black cockatoo habitat (breeding, roosting, and foraging) • Direct or indirect impacts or loss of other significant fauna and fauna habitat found to be present during survey • Fragmentation of fauna habitat and loss of ecological connectivity • Degradation of fauna habitat and habitat modification from introduction and increased spread of weeds and/or disease, altered surface water flows, altered groundwater and edge effects.
City of Gosnells Local Planning Scheme 6 Amendment 166 and 169 Known as Precincts 3B and 2 of the Maddington Kenwick Strategic Employment Area (MKSEA)	Loss of significant fauna habitat including black cockatoo habitat (breeding, roosting, and foraging). Direct or indirect impacts or loss of other significant fauna and fauna habitat found to be present during survey.

6.1.7 Predicted Environmental Outcomes

The predicted environmental outcome of the MRS amendment in relation to terrestrial fauna includes:

- The MRS amendment will result in the retention of at least 13.91 ha (21.0%) of fauna habitat including 6.15 ha (43%) of moderate suitability for SRE.
- Retention of 17 (94%) recorded potential black cockatoo breeding trees with at least one suitable hollow across the MRS Amendment Area, of which six are located within areas of existing Local Open Space as reserved under the City of Kalamunda Local Planning Scheme. The remaining one (6%) recorded potential black cockatoo breeding trees are located within the existing Western Power easement corridor. While no development or clearing of this easement corridor is proposed for the purpose of the scheme amendment, as the high voltage power lines will remain and maintenance of the electricity infrastructure could involve clearing of the vegetation by Western Power. Western Power management under the easement and clearing by Western Power could occur regardless of the MRS zoning applied. It is anticipated that this corridor will be established as POS through the subsequent local structure planning process that follows this MRS amendment.
- Retention of at least 284 (49.5%) recorded potential black cockatoo breeding trees across the MRS Amendment Area, of which 47 (8.2%) are located within areas of existing Local Open Space as reserved under the City of Kalamunda Local Planning Scheme. An additional 33 (5.8%) potential black cockatoo breeding trees are within the existing Western Power Easement corridor.
- Retention of up to 13.17 ha (52.2%) of vegetation providing high quality habitat for black cockatoos. An additional 3.9 ha (10%) overlaps the existing Western Power Easement corridor.
- Indirect impacts from weeds, disease, edge effects and fire will be minimised through construction procedures including the preparation and implementation of a CEMP, BMP and FMP.

Through the implementation of the mitigation measures and consideration of the scale and nature of the impacts, the location in the context of sensitive environmental areas, as well as the State planning process, the MRS amendment is not expected to result in significant impacts to terrestrial fauna.

On this basis, it is expected that the EPA objective to protect terrestrial fauna so that biological diversity and ecological integrity are maintained will be met.

Table 43 Residual Significance Assessment model is further detailed in section 9. This table has been formulated to determine the extent of residual impacts and the likelihood of these impacts resulting in the requirement for an offset applicable to the proposed MRS amendment.

7 Key Environmental Factor 3 – Inland Waters

7.1.1 EPA Objective

To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

7.1.2 Relevant Policy and Guidance

A summary of the policy and guidance relevant to inland waters, and how these have been considered, is presented in Table 35.

Table 35: Policy and Guidance for Inland Waters

Policy/Guidance	Consideration for the Amendment
Statement of Environmental Principles, Factors, Objectives and aims of Environmental Impact Assessment EPA, October 2021b	Referred to in the identification and assessment of Preliminary Key Environmental Factors.
Environmental Factor Guideline – Inland Waters, EPA, June 2018c	Referred to in the assessment of potential impacts as a result of the amendment.
Guidelines for district water management strategies, Department of Water (DoW), December 2013	Referred to in the preparation of the DWMS (refer to Appendix E).
Identification and investigation of acid sulphate soils and acidic landscapes, Department of Environment Regulation (now DWER), June 2015a	Section 8 details the significance and presence of Acid Sulphate Soils (ASS) applicable to the Amendment Area. Further investigations in relation to ASS will form part of the DSP, LPS amendment and LSP (s) process for the Amendment Area.
Operational Policy 4.3: Identifying and establishing waterways foreshore areas, (DoW), September 2012.	Referred to in the preparation of the FAR (refer to Appendix D).
Treatment and management of soil and water in acid sulphate soil landscapes, Department of Environment Regulation, June 2015b	Section 8 details the significance and presence of Acid Sulphate Soils (ASS) applicable to the Amendment Area. Further investigations in relation to ASS will form part of the DSP, LPS amendment and Local Structure Plan(s) process for the Amendment Area.

7.1.3 Receiving environment

The Amendment Area is underlain by geological formations grouped into three distinct aquifers (DWER 2021a). These distinct aquifers include the following:

- Perth- Superficial Swan
- Perth-Leederville
- Perth- Yarragadee North.

The majority of the Amendment Area is Bassendean Sands (dunes) of the Perth Basin forms an unconfined aquifer beneath the Amendment Area providing fresh water supplies (360 Environmental 2021). A large portion of the Amendment Area is Bassendean Sand which overlies the low permeability clayey deposits of the Guildford Formation. Recharge to the aquifer system is by direct infiltration of rainfall.

The Amendment Area generally slopes east to west. Based on the topography the highest elevation of the Amendment Area is 64 meters Above Height Datum (mAHD) in the southeast corner and the lowest elevation is 42 mAHD in the mid-west boundary.

The Amendment Area is situated within a Sensitive Water Resource Areas by draft SPP 2.9. The Amendment Area is located within two sub-catchments of the Swan River; Perth Airport South and Perth Airport North (360 Environmental, 2021). As shown on Figure 20 there is one surface water course, Crumpet Creek that flows east to west through the Amendment Area within the Perth Airport South sub catchment. Poison Gully is an ephemeral creekline that flows in a westerly directly approximately 20m north of the amendment area with a small section of the Poison Gully catchment overlapping the northern portion of the Amendment Area (360 Environmental, 2021). An unnamed open drain exists between Arundel Court and Hawtin Road, crossing under Brewer Road. This open drain is a local government drain that discharges water to Reserve 42914.

There are no geomorphic wetlands present within the Amendment Area. The closest geomorphic wetlands are about 350 m west of the Amendment Area. This is a Resource Enhancement Wetland (REW) and Multiple Use Wetland (Figure 5). Crumpet Creek is not part of these wetland systems.

7.1.3.1 Studies and investigations

The following studies relating to Inland Waters have been undertaken by 360 Environmental (Table 36). All studies identified in Table 36 have been prepared based on data that was available at the time of preparing the reports.

Table 36: Referenced Studies

Survey date	Researcher/Consultant	Study Description or Title
August 2021	360 Environmental	Crumpet Creek Modelling
June 2023	360 Environmental	DWMS (update)
June 2023	360 Environmental	Foreshore Assessment Report

7.1.3.2 Surface water

Crumpet Creek is a naturally meandering system that flows east to western through the southern half of the Amendment Area. This ephemeral creek is the headwaters of the Perth Airport South Drain, directing water from the Darling Scarp to the Swan River. The creek is approximately 1.5 m wide and about 0.3 to 0.5 m deep (360 Environmental, 2021).

A flood model of Crumpet Creek was developed as part of the DWMS (360 Environmental, 2021) to support the MRS amendment for the Amendment Area based on the draft district structure plan and available information at the time of preparing the DWMS. The 10 ha difference between the Amendment Area and DWMS model are not anticipated to have a material impact on the flood modelling. The flood model for Crumpet Creek identifies the maximum flood depths within the Amendment Area in the 1% AEP event (Figure 12: Appendix E). The culverts at Hawtin Road and Brewer Road are of insufficient capacity, hence backing up water, overtopping the Creek's channel and flowing overland. Overland flow is identified between the Hawtin and Brewer Roads on the Creek's left bank and downstream of Brewer Road on the Creek's right side. The maximum modelled flood depth is approximately 350 mm just downstream of Hawtin Road on the Creek's left bank. Downstream of the Brewer Road, the maximum flood depth is approximately 250 mm on the Creek's right bank (360 Environmental, 2021).

The City of Kalamunda has monitored the water quality of Crumpet Creek between July 2011 and September 2012 at Dundas Road, approximately 2.5 km downstream of the Amendment Area. Results from the monitoring identified that water quality generally improved with nutrient levels all below trigger values/acceptance range in September 2012. Review of the DWER WIN database confirms no monitoring has been undertaken close to the site boundary on either Poison Gully or Crumpet Creek.

360 Environmental undertook water quality monitoring between July and October 2017 at locations immediately upstream and downstream of the Amendment Area (Figure 7: Appendix E). Table 37 shows the surface water field parameters and nutrients for Crumpet Creek.

Average surface water conditions at the Amendment Area were observed as fresh, aerobic, and neutral, although pH ranged from slightly acidic to slightly alkaline over the monitoring period. The concentrations for all other nutrients (except Nitrogen) were below the Australia and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) assessment criteria.

Table 37: Crumpet Creek Water Quality Results

Parameter	Mean		Min		Max	
	MV01	MV02	MV01	MV02	MV01	MV02
Temperature (°C)	14.18	15	11.5	11.9	18.2	20.8
pH	7.17	7.41	6.47	6.89	7.92	8.15
Dissolved Oxygen (%)	76.78	79.4	64.5	71.3	81	85
Dissolved Oxygen (mg/L)	7.54	7.82	7.01	7.55	7.88	8.16
Specific Conductivity (µS/cm)	444.3	378.2	299.8	293.7	548.5	493.2
Electrical Conductivity (µS/cm)	299.1	308.2	231.5	223.0	403.9	398.9

Parameter	Mean		Min		Max	
	MV01	MV02	MV01	MV02	MV01	MV02
Total Dissolved Solids (mg/L)	288.7	245.7	195.0	191.1	356.2	320.45
Salinity (ppt)	0.22	0.18	0.14	0.14	0.27	0.24
Redox (mV)	101.1	105.3	-59	-63.4	204.9	217.5
Total Suspended Solids (mg/L)	N/A	N/A	<5	<5	5	9
Total Nitrogen (TKN + NOx) (mg/L)	0.48	0.45	0.2	0.2	1.2	1.2
Total Oxidised Nitrogen (mg/L)	0.11	0.01	<0.01	<0.01	0.38	0.36
Ammoniacal Nitrogen (mg/L)	0.02	0.02	<0.01	<0.01	0.03	0.02
Total Phosphorus (mg/L)	0.03	N/A	<0.0	<0.01	0.04	0.05
Soluble Reactive Phosphorus (mg/L)	N/A	N/A	<0.01	<0.01	0.02	0.02

The City of Kalamunda has monitored the water quality of Poison Gully between July 2011 and September 2012 at Dundas Road, approximately 2.0 km downstream of the Amendment Area. Results from the monitoring identified that water quality generally improved with nutrient levels all below trigger values/acceptance range in September 2012 except total oxidised nitrogen, which exceed trigger values on all but one occasion.

Further consultation with the Water Corporation and City of Kalamunda (November 2022) identified that no further surface water quality data was available at the time in preparing this report.

7.1.3.3 Groundwater

The Amendment Area is not located within a Public Drinking Water Source Area (DWER 2021a) or Proclaimed Surface Water Areas (DWER 2021b).

There is no groundwater contour data available within the Amendment Area (DWER 2021a). Through extrapolation based on the DWER contour data in Perth, it is estimated that the minimum ground water levels in the Amendment Area is between 17 meters Australian Heights Datum (mAHD) and 18 mAHD (DWER 2021a). The maximum groundwater levels (MGL) are estimated to range between 20 to 22 m AHD. This equates to between 27 and 45 metre below ground level. Groundwater monitoring is not proposed across the Amendment Area. There are no active DWER monitoring boreholes. Groundwater is flowing in a westerly direction.

Groundwater salinity is less than 250-500 mg/L across the whole area (DWER 2021a). This implies groundwater has a low iron staining risk but is unsuitable for garden boreholes.

DWER's Water Information Reporting tool identified four boreholes having groundwater quality measurements approximately 0.2 to 1.9 km northwest of the site. The data from September 2011 is presented in Table 38.

Table 38: Groundwater Quality

Parameter	Borehole ID			
	61670927	61670929	61670930	61670932
pH	5.03	5.03	5.18	5.73
Conductivity (µS/cm)	150	530	910	345

An aquifer allocation report requested in November 2017 identified that all the aquifers have been fully allocated therefore no new allocations are available (360 Environmental 2021). Predicted water demand within the existing DWMS has identified a significant shortfall that will require to be supplemented by alternative sources. This is a particular issue for Poison Gully which is ephemeral (to the North of the Amendment Area) and requires supplementation. Preliminary investigations have suggested that a Managed Aquifer Recharge and Recovery Scheme could be a viable option, provided that a cost-effective source could be found, and the necessary approvals obtained during subsequent LWMS and UWMP stages of the planning approval processes to reduce the impact to the fully allocated aquifer.

The DWER Water Register (2021e) identifies the existing abstraction licenses located within the Amendment Area. A total of seven abstraction licenses, totaling an abstraction of 37,908 m^3 a year, were identified and the licence details are summarised in Table 39.

Table 39: Summary of Water Abstraction Licences within the Amendment Area

Licence Number	Licence Type	Issue Date	Expiry Date	Licence Allocation (m^3)	Aquifer	Licence Address
153231	Groundwater	19/03/2013	18/03/2023	7250	Perth – Superficial Swan	Lot 105 on Diagram 90357; Certificate of Title Volume 2114 Folio 155 Lot 105 Oxford Court Maida Vale
159397	Groundwater	25/01/2018	24/01/2028	12408	Perth – Superficial Swan	Lot 22 On Diagram 27388 Volume/Folio 1267/97 Lot 22 Bruce Rd Maida Vale

Licence Number	Licence Type	Issue Date	Expiry Date	Licence Allocation (m^3)	Aquifer	Licence Address
179013	Groundwater	26/03/2014	25/03/2024	4000	Perth – Superficial Swan	Lot 8 on Diagram 16758; Certificate of Title Volume 1865 Folio 502 Lot 8 Bruce Road Forrestfield
152817	Groundwater	8/7/2020	7/7/2030	4400	Perth – Superficial Swan	Lot 26 On Plan 13588 Volume/Folio 1597/415 Lot 26 Brewer Rd Maida Vale
204514	Groundwater	9/7/2020	8/7/2030	3600	Perth – Superficial Swan	Lot 5 on Plan 20510/ 308 Sultana Rd E Forrestfield WA 6058
56782	Groundwater	3/04/2014	2/04/2024	6250	Perth – Superficial Swan	Lot 113 on Diagram 85719; Certificate of Title Volume 1993 Folio 316 Lot 113 Sultana Road Forrestfield

7.1.3.4 Crumpet Creek Foreshore

A FAR has been prepared to support the proposed MRS amendment. The results of the foreshore assessment report (FAR) are provided in Section 5.1.3. The purpose of the FAR is to:

- To determine the significance and presence of flora and vegetation values, fauna habitats and extent of flooding along Crumpet Creek.

The foreshore boundary has been delineated based on consideration of the presence of native vegetation and the 1% AEP.

The FAR confirms that Crumpet Creek has little to no environmental value due to the degradation of parts of the creek with only 0.37 ha of native vegetation in good to excellent condition. A large portion of Crumpet Creek is severely degraded due to previous land uses, with limited high-quality flora and vegetation significance.

7.1.4 Potential environmental impacts

The potential impacts to Inland Waters is based on the draft DSP prepared to support the DWMS and a FAR which is considered relevant for the purpose of identifying potential impacts from the rezoning of the Amendment Area.

7.1.4.1 Direct impact

- Permanent loss of foreshore area and values through vegetation clearing
- Alteration to natural hydrological regime from modified surface water drainage resulting in impacts to significant wetlands and water courses within and adjacent the amendment area
- Changes to groundwater regime because of abstraction for construction and irrigation purposes from a fully allocated aquifer.

7.1.4.2 Indirect impact

- Contamination of surface and/or groundwater resulting in impacts to water quality
- Erosion and sedimentation from clearing and modified surface water drainage
- Cumulative impacts associated with other reasonably foreseeable projects.

An assessment of the significance of these impacts of the proposed MRS amendment are further detailed in Section 7.1.6.

7.1.5 Mitigation

The purpose of the mitigation measures is to reduce the residual impact to inland waters within the Amendment Area. The mitigation measures to inland waters impacts associated with the proposed MRS amendment include the following:

7.1.5.1 Avoid

The proposed foreshore area has been designed to avoid and protect the environmental values associated with Crumpet Creek (Appendix D; Figure 8). The function of the foreshore in the future is to manage the 1% AEP storm event and provide an attractive area with ecological function.

7.1.5.2 Minimise

A foreshore area and preliminary 30m buffer zone for Crumpet Creek has been designated in accordance with the results of a biophysical assessment and Operational Policy 4.3: Identifying and Establishing Waterways Foreshore Areas (DoW, 2012) and Determining foreshore reserves (Waters and Rivers Commission, 2001). Future detailed design will continue to consider the ecological function, environmental values, and impact of flooding along Crumpet Creek to maintain and protect the defined foreshore area in the Amendment Area.

The FAR acknowledges that future management, landscaping, and rehabilitation of Crumpet Creek will be necessary to manage the ecological biodiversity and integrity of the creek system.

To ensure the biodiversity and integrity of Crumpet Creek and in accordance with the Operational Policy 4.3 – identifying and establishing waterways foreshore areas, a Foreshore Management Plan (FMP) will be prepared and implemented at a subsequent planning and LWMS approval stage when an appropriate level of design detail is available.

The proposed 30m buffer protects against flooding and conserve significant flora, vegetation, and fauna habitat (Figure 8: Appendix D). Appropriate design measures will need to be implemented at the subdivision and development stages for the Amendment Area.

To address future management of the foreshore area at Crumpet Creek, a FMP will be prepared (360 Environmental 2023). The FMP will identify the Local Natural Area, extent of the creek and floodway applicable to the Amendment Area. The floodway is a representation of the area inundated during a 1% AEP rainfall event which is likely to contain the area of all smaller events. This is an acceptable extent of the foreshore as it protects the waterway from all smaller events and correlates to the area vegetated. The proposed provisions for management of inland waters to be included in the FMP are outlined in Table 40.

Table 40: Proposed inland water management provisions to be included in the Foreshore Management Plan

Phase	Management target	Management actions	Monitoring	Reporting
Construction	No disturbance to foreshore vegetation during civil construction.	Demarcate foreshore area through temporary fencing to prevent clearing of foreshore vegetation	Daily observation of drainage and sediment control structures to check operation	Report significant discharges as an incident to City of Kalamunda
Post construction	No disturbance to foreshore vegetation	Demarcate foreshore area	Visual observation of drainage and sediment control structures	Report significant discharges as an incident to the City of Kalamunda
Construction and post construction	No flooding or significant overtopping events to occur within the foreshore area.	Appropriate drainage controls and measures implemented to prevent flooding or significant overtopping events occurring within the foreshore area	Visual observation of drainage controls and measures	Report significant impacts as an incident to the City of Kalamunda
Construction and post construction	No erosion and sediment control to impact foreshore area	Appropriate erosion and sediment control measures implemented to prevent impact on the foreshore area.	Visual observation of erosion and sediment control measures	Report any erosion or sediment impacts as an incident to the City of Kalamunda

Phase	Management target	Management actions	Monitoring	Reporting
Post construction	No fertiliser or pesticide use during specific times of the year within the foreshore area.	Appropriate application of fertiliser or pesticides during specific times of the year within the foreshore area.	Visual observation of impacts resultant from fertiliser or pesticide use	Report any impacts as an incident to the City of Kalamunda
Construction and Post construction	Limit access to foreshore areas	Appropriate signage implemented to restrict access to the foreshore areas	Visual observation of impacts resultant from unauthorised access to foreshore areas	Report any unauthorised access or impacts to the City of Kalamunda

Runoff quantity control will be managed through the implementation of drainage POS and minor earthworks developed at subsequent planning approval stages when an appropriate level of design detail is available. Quality management will be achieved by applications of Water Sensitive Urban Design (WSUD) elements.

Due to the depth to groundwater and limited impact, mitigation measures for groundwater focus on groundwater quality and abstraction volumes. The principle behind the management strategy is to improve the quality leaving the Amendment Area. Provision of separation distance of at least 1.2 m to maximum groundwater level achieved.

Stormwater quality measures be implemented to minimise erosion and sediment mobilization including:

- Engineering controls will be implemented to ensure that the total nutrient loads to groundwater through the treatment of the first 15 mm runoff from the Amendment Area, prior to infiltrating to groundwater.
- Appropriate structural and non-structural measures to minimise the transportation of sediments offsite and reduce applied nutrient loads.
- Bio-retention systems are sized to a minimum of 2% of the connected impervious area, where possible.
- The preparation of an Erosion and Sediment Control Plan following detailed design of the LSP and will form a condition of subdivision and development of the Amendment Area
- Stormwater retention and detention structures will be designed in accordance with the Stormwater Management Manual of Western Australia (DWER 2007) and Australian Rainfall and Runoff (Engineers Australia 2019)
- Connection of the development to a Water Corporation sewerage system
- Spring sawing of native grasses on the western road side to prevent possible erosion
- Fertilizer and pesticide application will be limited to small areas of non-native POS.

The following operation controls will be implemented:

- Post development surface water monitoring program to be addressed in the local structure planning phase (Appendix E).
- Further investigation with Water Corporation to ensure that development of a suitable stormwater management strategy takes into consideration the outcomes from the Perth Airport North and South drainage strategies.
- Further detailed investigations and feasibility studies into alternative water supply opportunities to ensure proposed POS can be adequately maintained in the long term.
- As the Amendment Area is located within a Sensitive Water Resource Area, future design of the Amendment Area will need to consider the Sensitive Water Resource Areas and SPP 2.9 provisions. Future water management plans and strategies shall be undertaken at the Local Planning Scheme amendment and Local Structure Plan(s) stage for the Amendment Area.

Further hydrological assessments including the preparation and implementation of a LWMS during the LPS amendment and Local Structure Plan(s) stage for the Amendment Area when the appropriate level of design information is available.

- The flood modelling undertaken as part of the DWMS for Crumpet Creek and the need for flood modelling for Poison Gully will be revised and reconsidered during the preparation of a LWMS taking into consideration any new and more complete data that may be available and also when detailed design is available
- Consideration of surface monitoring for inclusion in a LWMS at the LPS amendment and Local Structure Plan(s) stages for the Amendment Area
- Hydrological investigations during the local structure planning process will ensure water from the unnamed open drain is adequately managed either through a piping system or attenuation to potential areas of open space.

Further proposed inland water management strategies to be included in the CEMP are listed in Table 41.

Table 41: Proposed inland water management provisions to be included in the CEMP

Management target	Management actions	Monitoring	Reporting
No observable dust, erosion or sediment leaving the Amendment Area during civil construction.	Implement drainage controls to prevent offsite discharge of runoff Implement sediment control measures to prevent offsite sedimentation	Daily observation of drainage and sediment control structures to check operation	Report significant discharges as an incident to City of Kalamunda

Management target	Management actions	Monitoring	Reporting
Flood management and associated treatments within the Amendment Area during all phases of development	Implement drainage controls and measures to prevent flooding associated with the development	Visual inspection of the drainage controls to control flooding associated with the development	Report significant flooding and associated impacts to the City of Kalamunda
Limit uses of fertilisers or pesticides within the Amendment Area.	Implement the use of fertiliser or pesticides at specific times of the year	Visual inspection of waterways to minimise risk of fertiliser or pesticide use associated with the development	Report any impacts to the City of Kalamunda
Limit access to Crumpet Creek during all phases of development	Demarcate foreshore areas to prevent access within these areas	Visual inspection of waterways to control unlimited access in these areas	Report any unauthorised access and/or impacts to the City of Kalamunda

DWMS

A DWMS (360 Environmental, 2021) prepared to support the proposed MRS amendment details the water management approach for the development (Appendix E). The DWMS details the water management approach proposed for the development to support the draft District Planning Scheme and MRS amendment. The DWMS has been developed in accordance with Better Urban Water Management Framework (WAPC 2008). Water will be managed using a total water cycle management approach, which has been developed using philosophies and design approaches described in the Stormwater Management Manual for Western Australia (DoW 2007).

The purpose of the DWMS is to:

- Assess the existing environmental hydrological and hydraulic conditions of the Amendment Area
- Develop a stormwater management strategy for the Amendment Area taking into consideration the downstream environment as required
- Identify potential drinking water and irrigation water source constraints and develop a strategy for sustainable water use in the Amendment Area
- Assess existing information sources and identify gaps to be addressed in the LWMS
- Develop a strategy for managing the 1% average exceedance probability (AEP), equivalent to the 100-year average recurrence interval (ARI) flood event through the Amendment Area, identifying retention volumes and overland flow paths
- Develop and document strategies for relevant hydrological conditions identified through the course of the investigation for the Amendment Area
- Gain in principle support from the Local Government for the proposed strategy to manage stormwater and potential impacts across the Amendment Area.

The DWMS proposes stormwater management strategies for various rainfall events to manage runoff generated from the introduction of impervious surfaces resulting from development including the following:

- The first 15 mm of rainfall is to be retained onsite wherever practical, or as close to source possible
- The incorporation of Water Sensitive Urban Design (WSUD) measures is encouraged to manage water quality and quantity
- 1% AEP shall be managed to limit the peak outflow to pre-development levels and maintain a minimum 500 mm freeboard to adjacent finished floor levels for community safety.

To limit the maximum peak discharge of 1% AEP from the Amendment Area to the same level of pre-development runoff, which is approximately 7.4 m^3/s, storage will be required to be developed across the Amendment Area. Due to the large size of the Amendment Area, for the purposes of the DWMS each catchment has been developed to manage its own runoff to pre-development flow rates only.

The introduction of new contaminants is likely to occur as a result of development. The DWMS identified the following mitigation measures to manage these risks:

- The development will need to be connected to a Water Corporation sewerage system.
- The development is primarily limited to residential land uses.
- The proposed POS will retain existing established vegetation, limiting fertiliser application initially and in the future to small areas of active recreation and residential homes.
- The smaller proposed lots will reduce the capacity for large scale vegetation management, reducing fertiliser application.
- The large depth to groundwater will allow for significant filtering through underground geology minimising groundwater contamination.
- Roads will be designed to minimise the likelihood of accidents, which may result in hydrocarbon spills.

These measures will be documented in a LWMS prepared for the LSP for the Amendment Area to refine the framework for water management of the Amendment Area, proposing treatment and retention of runoff close to the source.

7.1.5.3 Rehabilitate

Rehabilitation and revegetation of the foreshore area with management strategies that include:

- Weed and erosion control.
- Revegetation using locally endemic species.
- Limiting access.

Progressive rehabilitation of the foreshore area disturbed during the construction phase wherever practicable.

7.1.6 Assessment and Significance of Residual Impacts

The significant residual impacts to Inland Waters have been assessed with consideration to the draft District Structure Plan (DSP) (DWMS Appendix B) rather than the Concept Plan (Figure 3). The draft DSP is considered the most appropriate plan for this factor as it provides an indication of the anticipated land uses where the Concept Plan informs the Flora and Vegetation and Terrestrial Fauna retention areas for the Amendment.

7.1.6.1 Direct impact

Permanent loss of foreshore area and values through vegetation clearing

The vegetation associated with Crumpet Creek between Hawtin Road and Brewer Road is in a Degraded to Completely Degraded condition (360 Environmental 2023b). This area lacks vegetation structure with very limited native midstorey and understorey species present and is dominated by introduced species. This lack of vegetation structure limits the foraging and sheltering niches for fauna, particularly birds. The trees including Marri, Jarrah, Wandoo and Flooded Gum, provide foraging and potential breeding habitat for black cockatoos.

The southern section of Crumpet Creek, north of Sultana Road West, includes Marri, Jarrah, Wandoo and Flooded Gum trees. This section of Crumpet Creek has native vegetation both in the midstorey and understorey and is considered to be in Very Good to Excellent condition.

The fragmented and degraded nature of the vegetation within the majority of the creek's easement identified that it was difficult to accurately determine the foreshore area for Crumpet Creek. The lack of surface and subsurface water dependent flora species prompted the boundary of the foreshore area to be mapped based on topography, changes in vegetation structure and the floodway for Crumpet Creek.

The implementation of the MRS amendment will not result in the permanent loss of the foreshore area given that the appropriate consideration has been applied in the development of the indicative foreshore area in accordance with the relevant statutory requirements for water features (DoW, 2012); existing City of Kalamunda Local Open Space reservation for Crumpet Creek will not be developed; and an additional foreshore reserve area incorporating a 30m foreshore buffer have been proposed.

Alteration of the natural hydrological regime from modified surface water drainage resulting in impacts to significant wetlands and water courses within and adjacent the amendment area

Historically the Amendment Area has been developed for rural purposes, encompassing hobby farms and market garden land uses (360 Environmental 2023a). An increase in housing density will present impacts on both the quantity and quality of water runoff generated from the amendment. Change to land uses will also impact on local and downstream environments. The existing sandy ground conditions preclude runoff during short low-intensity rainfall events.

The DWMS developed a pre-development stormwater model for the 1% AEP only. A multi-storm analysis was conducted to determine the critical duration event that produces the largest peak discharge from the modelled catchments. The maximum runoff rate from the Amendment Area (not including flows through the Amendment Area from external catchments) is approximately 7.4 m^3/s. With insufficient measures taken during development, these volumes may increase due to the introduction of more impermeable surfaces.

A draft DSP provided by Burgess Design Group was utilised to develop a post development stormwater model (Appendix B in DWMS). The model used the draft DSP land uses and is considered relevant for the purpose of this environmental assessment. These are provided in Table 42.

Table 42: Breakdown of Anticipated Land Use, DSP

Residential (ha)	Primary School (ha)	Shopping Centre (ha)	Public Open Space (ha)	Active POS (ha)	Easement (ha)	Road reserve (ha)
91.95	4.13	1.06	21.10	9.20	15.61	34.27

The maximum flood depths within the Amendment Area in the 1% AEP event found that Crumpet Creek runs full and spills in several locations along the site. On the left bank, the maximum modelled flood depth is approximately 350mm downstream of Hawtin Road. Downstream of Brewer Road, the maximum flood depth is approximately 250mm on the right bank. In most locations within the floodplain, the flood depths do not exceed 100-150mm (360 Environmental, 2023a). Flood modelling developed as part of the DWMS identifies sufficient space during the 1% AEP events to manage the volume of water will be available within the POS areas identified across the Amendment Area.

Although, flood mapping of Poison Gully is currently not available from DWER, the DWMS anticipates that Poison Gully will be sufficient to manage flood flows at this point within the catchment due to the Amendment Area being 3m higher than the base of the creekline in addition to the densely wooded creekline habitat.

The DWMS has completed a water balance for each cell of the draft DSP which has been calculated based on the rates and methodology presented in the Water Corporation Spreadsheet H2Options. The average water consumption for implementation of the Amendment has been calculated at 50.4m^3/person/year which is based on the 100m^3/person/year target. The results of the water balance is outlined in Table 44 for the amendment area, assuming areas for retention do not require irrigation.

Table 43 Water consumption for the amendment area

Development Cell	Residential Demand (kL/year)	POS Demand kL/year)	Total Demand (kL/year)
Cell 1	53,222	11,373	64,596
Cell 2	26,611	10,995	37,607

Development Cell	Residential Demand (kL/year)	POS Demand kL/year)	Total Demand (kL/year)
Cell 3	35,532	4,243	39,775
Cell 4	24,192	0	24,192
Cell 5	17,993	17,881	35,874
Cell 6	36,137	17,470	53,607
TOTAL	193,687	61,962	255,651

Considering the results from the post development water balance for each cell of the Amendment Area in conjunction with the proposed surface water management measures, the implementation of the amendment is not expected to significantly alter the surface water regime within the Amendment Area.

Changes to groundwater regime because of abstraction for construction and irrigation purposes from a fully allocated aquifer.

While the aquifers beneath the site are fully allocated, existing abstraction licenses by land holders within the draft DSP area equates to a total abstraction of 37,908 m^3 per year across six abstraction licenses Table 39.

Assuming an irrigation rate of no more than 6,750 m^3/ha/year (DoW 2014), this allows the irrigation of 5.6 ha of POS. This is approximately 4 ha less active POS than is proposed across the development.

The use of existing licences in addition to POS areas that do not require irrigation and the setting of irrigation targets in line with the WaterCorp's Water efficiency targets the impact of abstraction on a fully allocated aquifer are not considered significant.

In accordance with the *Rights in Water and Irrigation Act 1914*, a licence to take water will be required prior to constructing any abstraction bores.

Alternative sources have been assessed in the DWMS including water trading supplemented by alternative source such as scheme water may prove an easy and cost-effective option. However, the irrigation demand for the proposed development area may be able to be achieved with the use of treated greywater, dependent on financial and feasibility studies and will be refined during the LSP.

Considering that the maximum groundwater level across the Amendment Area ranges between 20 to 22 m AHD and focus on the groundwater management measures on abstraction volumes, the implementation of the amendment is not expected to impact the natural groundwater regimes (360 Environmental, 2023a).

7.1.6.2 Indirect Impact

Contamination of surface and or groundwater resulting in impacts to water quality

Section 7.1.3 details the water quality monitoring undertaken for the Amendment Area. The water quality was monitored in-situ and using a NATA accredited laboratory. The creek was dry during November. Nutrients were detected at each sampled location. The reported maximum concentrations of total nitrogen were equal to the ANZECC and ARMCANZ (2000) criteria for Lowland rivers at MV01 and MV02. The concentrations for all other nutrients were below the assessment criteria (360 Environmental 2021a). The monitoring data used for the assessment of impacts from the implementation of the Amendment is the best available and considered appropriate and an accurate representation of the receiving environment.

Implementation of the MRS amendment during construction and ongoing residential use has the potential to introduce new contaminants to the natural system, which if intercepted by groundwater may impact the quality of the downstream Resource Enhanced Wetlands (REW) and Multiple Use Wetlands (MUW) habitats (360 Environmental 2021a).

Currently the Amendment Area has a number of potential groundwater contamination sources including:

- Hobby farms possibly with septic tank systems
- Small holdings with livestock with no animal waste facilities
- Market gardens and hobby farm developments which historically have high nutrient usage from fertiliser and/or pesticide application.

Implementation of the proposed MRS amendment may introduce new contamination risks such as:

- Accidental spills during construction
- Chemical wastes depending on the possible end uses within the proposed neighbourhood shopping centre.

A number of these potential groundwater contamination risks will be eliminated or significantly reduced through the connection of the development to the Water Corporation sewage system, primarily residential land uses and limited application of fertilizer and pesticide use in areas of POS coupled engineering controls implemented to ensure that the total nutrient loads to groundwater through the treatment of the first 15 mm runoff from the Amendment Area.Considering that the maximum groundwater level across the Amendment Area ranges between 20 to 22 m AHD the potential indirect impact to groundwater quality contamination resulting from implementation of the MRS amendment is expected to be low (360 Environmental, 2023a). Implementation of the DWMS will ensure that any potential impacts on the local and downstream environments from land use changes and subsequent development are minimised. Stormwater retention and detention structures must be designed in accordance with the Stormwater Management Manual of Western Australia (DWER 2007) and Australian Rainfall and Runoff (Engineers Australia 2019). In accordance with the BUWM water quantity

management principles pre-development surface water quality will be maintained in the post development environment.

Erosion and sedimentation in surrounding areas from vegetation clearing and altered surface water drainage

Clearing of vegetation and civil earthworks have the potential to destabilise soils and if management measures aren't implemented, result in erosion and sediment transport during rainfall events. Within the amendment area, sedimentation impacts are limited to clearing and earthworks close to Crumpet Creek which is already highly degraded.

The long-term stormwater quality management within the site will occur within the bio-retention areas. This can be achieved through design including erosion and sediment control features such as vegetation and rock armour.

The implementation of the proposed stormwater quality measures and an Erosion and Sediment Control Plan during development, it is unlikely that the proposed MRS amendment will impact the water quality outside the Amendment Area.

7.1.6.3 Cumulative Impact

Potential cumulative impacts to Inland Waters include clearing of foreshore vegetation from reasonable foreseeable projects have been considered using publicly available information at the time of preparation of the report. The implementation of the amendment is not anticipated to have a significant impact on the hydrological values of the area and therefore not contribute to the cumulative impact from projects within 15 km.

The Amendment Area and surroundings surface water features are characterised by wetlands and Poison Gully is a common feature within a 15 km radius of the site, neither of these surface water features will be significantly impacted by the MRS amendment. A summary of the impacts from other proposals in proximity to the current amendment is provided in Table 44.

Table 44: Cumulative impacts to Inland Waters

Project	Inland Waters impact
Maida Vale MRS amendment	NA
Tonkin Highway Grade Separated Interchanges (Hale Road and Welshpool Road)	• Clearing 9.34 ha of native vegetation associated with CCW • Clearing 10.62 ha of Resource Enhancement Wetlands (REW) • Clearing 1.94 ha of Multiple Use Wetlands (MUW) • Clearing 3.61 ha of the Greater Brixton Street Wetlands (Nationally Important Wetland).
Thornlie-Cockburn Line	• Impacting 0.40 ha of a CCW (UFI 7446) • Impacting 4.80 ha of two REWs (UFI 7447 and 13332).
Forrestfield Airport Link	• Clearing 3.28 ha of Resource Enhancement Wetland (UFI15876).
Warehouse and transport depot, Welshpool	• Clearing of 1.04 ha of CCW.
Southern Link Road (Stage 3)	NA

Project	Inland Waters impact
Forrestfield North District Structure Plan	13ha of POS of which 2.6ha estimated to require irrigation. Majority is to be rehabilitated and allow for conservation of environmentally significant values. The total volume of water required for irrigation is consequently estimated at 19,500 kL/yr, based on a standard irrigation rate of 7,500 kL/ha/yr.
Wattle Grove South MRS amendment	Alteration of hydrological regimes resulting in impacts to significant wetlands and waterways within and adjacent Wattle Grove amendment area. Impact water quality of significant wetlands and waterways within and adjacent Wattle Grove amendment area. Loss of foreshore functions and wetland dependent vegetation and impacts to other water dependent ecosystems.
City of Gosnells Local Planning Scheme 6 Amendment 166 and 169 Known as Precincts 3B and 2 of the Maddington Kenwick Strategic Employment Area (MKSEA)	Alteration of hydrological regimes resulting in impacts to significant wetlands and waterways within and nearby to the MKSEA, including the Yule Brook and Greater Brixton Street Wetlands.

7.1.7 Predicted Environmental Outcomes

The predicted environmental outcomes of the amendment to address Inland Water impacts and associated management within the Amendment Area include the following:

- Crumpet Creek will be maintained as a natural waterway with the proposed foreshore area and associated buffer will be designed to protect the remaining ecological values and manage the 1% AEP flood events.
- Post development surface water flows into Poison Gully from the Amendment Area will be maintained to meet pre-development flows.
- Post-development groundwater quality leaving the Amendment Area will be the same or better than the water quality entering the area.
- Pre-development peak flows and surface water quality are maintained in the post development environment.
- Irrigation targets set in line with the Water Corporation's water efficiency targets to reduce impacts on the fully allocated aquifer. The first 15mm of rainfall will be retained onsite. The stormwater management strategy for the Amendment Area will ensure post development flows are restricted to pre-development conditions and water discharged from the Amendment Area is of a suitable quality. WUD measures will be encouraged to manage water quality and quantity.

On this basis, it is expected that the EPA objective to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected will be met.

8 Other Environmental Factors or Matters

Table 45 and Table 46 describe the receiving environment, impacts, mitigations, and outcomes for the other environmental factors of:

- Terrestrial environmental quality
- Social surroundings.

Table 45: Terrestrial environmental quality

EPA objective	To maintain the quality of land and soils so that environmental values are protected.
Policy and guidance	EPA Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016)
Receiving environment	The DWER Acid Sulphate Soil (ASS) mapping indicates that part of the western and lower-mid area of the Amendment Area is classified as having 'Moderate to Low' risk of ASS within the first 3m of natural soil surface. The remainder of the Amendment Area is not classified as an ASS risk (360 Environmental 2021) (Figure 21). Two registered contaminated sites are located approximately 1.5 km west of the Amendment Area and are classified as 'Contaminated – Restricted Use' and 'Remediated for Restricted Use' Historical land use analysis of Lots 44, 45 and 46 Brewer Road, Maida Vale indicates that prior to 1965 these lots were used as a quarry for the extraction of gravels. From 1965 to 1972 the lots were used as a sanitary landfill by the City of Kalamunda and accepted all waste types, including asbestos. The lots have not been listed on the Contaminated Sites Database, as the Amendment Area is classified as Possibly Contaminated – Investigation required by former DER in 2007. The current extent and severity of contamination is unknown. Preliminary consultation of the proposed MRS amendment received acknowledgement of the previous land use by DWER.
Potential environmental impacts	• Identification and disturbance of a possibly contaminated Amendment Area. • The clearing of vegetation can result in loss of nutrients in soil. Organic matter is oxidised, and the removal of surface cover leaves the soil prone to erosion. • Stores and cycles of nutrients will adjust under the new land use, but in most cases the net loss of nutrients and leakage is greater than under natural conditions.
Mitigation	**Avoid** In accordance with DWER recommendation, further assessments will be undertaken at the future planning stages eg subdivision and development stages to confirm the presence and significance of contamination of Lots 44, 45 and 46 Brewer Road, Maida Vale. **Minimise** A Preliminary Site Investigation will be undertaken to assess the presence and extent of ASS in accordance with the DWER guidelines (DWER, 2021). Depending upon the results of the preliminary assessment, and whether ASS will be disturbed in the construction phase of the development, an ASS Assessment and Dewatering Management Plan will be undertaken as

	a condition of Development Approval associated with the proposed development if necessary. The Preliminary Site Investigation shall be undertaken by the landowner prior to development of Lots 44, 45 and 46 Brewer Road, Maida Vale. Prior to ground disturbing works a CEMP will be prepared to support subdivision or a development application. The CEMP shall be implemented on Amendment Area during development of these areas s and will include clearing procedures and soil management.
Assessment and significance of residual impacts	ASS and contaminated sites are not considered a constraint to the amendment.
Environmental outcomes	It is considered that there will be no associated impacts to terrestrial environmental quality and the amendment will be able to meet EPA's objective to maintain the quality of land and soils so that environmental values are protected.

Table 46: Social surroundings

EPA objective	To protect social surroundings from significant harm.
Policy and guidance	Environmental factor guideline – social surroundings (EPA, 2016) Guidance Statement No. 41 – assessment of Aboriginal Heritage (EPA, 2004) Aboriginal Due Diligence Guidelines (DAA & DPC, 2013)
Receiving environment	The City of Kalamunda covers an area of 324 km^2 representing 5.3% of the Perth Metropolitan area (City of Kalamunda 2020b). The City of Kalamunda comprises three main geographic districts, the Foothills, the Escarpment, and the Eastern Rural Districts. The Foothill's district is characterised by its rapidly growing urban areas and large housing subdivisions. In 2018, the City of Kalamunda had a population of 59,328 across 22,768 dwellings and is the 12th most populated Local Government Area (City of Kalamunda 2020b). The Amendment Area covers 178 ha of land currently zoned as 'Rural' by the MRS (Region Scheme 55) within the suburb of Maida Vale and is a part of the Foothills District. Local to the Amendment Area is a primary school (Maida Vale Primary School), a golf course, numerous parks and ovals and small shops (City of Kalamunda 2020b). **Aboriginal Heritage and Native Title** In Western Australia, the *Aboriginal Heritage Act 1972* protects places and objects customarily used by or traditional to the original habitants of Australia. A register of such places and objects are maintained under the Act, however, all sites are protected under the Act whether they are registered or not. The *Aboriginal Cultural Heritage Act 2021* (ACH Act) is currently in a transitional period which commenced on 22 December 2021 and will last for at least 12 months. During the transitional period regulations, statutory guidelines and operational policies will be developed, as parts of the ACH Act are progressively proclaimed. When the ACH Act comes fully into operation, it will replace the Aboriginal Heritage Act.

	The DPLH (2019) Aboriginal Heritage Inquiry System online database was searched for registered and other sites (Figure 11: 360 Environmental 2021a). The results indicate that there is one registered site which covers the northern portion of the Amendment Area. A registered site has been assessed as meeting Section 5 of the Aboriginal Heritage Act 1972.: • Poison Creek Gully (ID 25023) – Birthplace, Water Source. ○ Restrictions: Female Access Only ○ Type: Not Stated There are no other heritage areas located within the Amendment Area. One registered site and one lodged site are located to the east of the Amendment Area (Figure 11: 360 Environmental, 2021a). The Amendment Area is located within the Whadjuk People Indigenous Land Use Agreement (ILUA) area.
Potential environmental impacts	• Direct or indirect disturbance to registered Aboriginal sites.
Mitigation	Future design of the Amendment Area during the LSP process will consider the significance of Aboriginal heritage values within this locality including undertaking ethnographic/archaeological survey in consultation with the relevant traditional owners to determine the significance of the Amendment Area. It is recognised that impacts to the vegetation within the Amendment Area associated with the Poison Gully Creek will be avoided. If required, relevant approvals and their associated surveys and assessments will be undertaken at the LPS amendment and Local Structure Plan(s) stage for the Amendment Area. A Section 18 application and approval (or equivalent under the ACH Act from 1 July 2023) will be required for development within this locality. These surveys, assessment and approvals will be sought, separate to the MRS amendment process.
Assessment and significance of residual impacts	With mitigation measure, the impact to known registered Aboriginal sites are not considered a constraint to the amendment.
Environmental outcomes	The EPA's objective for the Social Surroundings factor is to protect social surrounding from significant harm. In consultation with the relevant traditional owners, the impacts to known registered heritage sites within the Amendment Area will be minimised and the implementation of the amendment will not result in significant harm to Social Surroundings and therefore the proposed rezoning will meet EPA's objective to protect social surroundings from significant harm.

9 Offsets

The Western Australian Government's Environmental Offsets Policy (Government of Western Australia [GoWA], 2011) seeks to protect and conserve environmental and biodiversity values for present and future generations. This policy ensures that economic and social development may occur while supporting long term environmental and conservation values.

Offsets are a component in the Western Australian Government's broader approach to the environment. Environmental offsets will only be applied where the residual impacts of a proposal are determined to be significant, after avoidance, minimization and rehabilitation have been pursued.

Environmental offsets are not appropriate in all circumstances. The applicability of offsets will be determined on a project-by-project basis. While environmental offsets may be appropriate for significant residual environmental impacts, they will not be applied to minor environmental impacts.

To ensure consistency and transparency of whether offsets should be applied to a proposal, the significance of residual impacts has been determined through the application of the residual impact significance model provided in the Offsets Guideline. This model outlines how significance is determined and when an offset is likely to be required, or may be required, in relation to relevant EPA environmental factors and the relevant clearing principles in Schedule 5 of the EP Act (GoWA, 2014).

In general, significant residual impacts include those that affect rare and endangered plants and animals (such as threatened species that are protected by statute), areas within the formal conservation reserve system, important environmental systems and species that are protected under international agreements (such as Ramsar listed wetlands) and areas that are already defined as being critically impacted in a cumulative context. Impacts may also be significant if, for example, they could cause plants or animals to become rare or endangered, or they affect vegetation which provides important ecological functions (GoWA, 2014).

The mitigation hierarchy of 'avoid, minimise, rehabilitate and offset' has been considered in the assessment of this amendment.

9.1 Significant Residual Impacts

The significant residual impacts of this amendment have been determined through the application of the residual impact significance model (RISM) as described in the WA Environmental Offsets Guideline (GoWA, 2014) (Table 47). Through the application of the RISM, it is anticipated the following significant residual environmental impacts may result due to the implementation of the amendment:

- Permanent loss of up to 3.64 ha of native vegetation in Good to Excellent condition including vegetation within the Forrestfield and Southern River complexes that are

poorly represented with less than 30% of their pre-European extents within the SCP remaining.

- Permanent loss of 257 potential breeding trees and 21.48 ha of high-quality foraging habitat (excluding 33 potential breeding trees and 3.9 ha of high-quality foraging habitat located within the Western Power Easement corridor).
- Permanent loss of 4.98 ha of TEC including SCP20a, SCP20b and SCP3b.

  Clearing of three individuals of *Conospermum undulatum* located within the Western Power Easement.

Table 47: Residual Impact Significance Model

Part IV Environmental Factors	Flora and vegetation		Terrestrial Fauna				
Part V Clearing Principals	**Rare flora**	**Threatened Ecological Communities**	**Remnant vegetation**	**Wetlands and waterways**	**Conservation areas**	**High biological diversity**	**Habitat for fauna**
Residual impact that is environmentally unacceptable and cannot be offset							
Significant residual impact that will require an offset	Clearing of 3 individuals of *Conospermum undulatum* (T) located within the Western Power Easement corridor.	Clearing of 4.98 ha TEC including 0.87 ha of EPBC listed SCP20b.					Clearing of 21.48 ha of high-quality foraging habitat for BC species excluding 3.9 ha located within the Western Power Easement corridor. Clearing of 257 potential breeding trees excluding 33 located within the Western Power Easement corridor.
Significant residual impacts			Clearing of 5.25 ha of native vegetation in Good to Excellent				

Part IV Environmental Factors	Flora and vegetation		Terrestrial Fauna				
Part V Clearing Principals	**Rare flora**	**Threatened Ecological Communities**	**Remnant vegetation**	**Wetlands and waterways**	**Conservation areas**	**High biological diversity**	**Habitat for fauna**
that may require an offset			condition including 2.68 ha of vegetation representative of the Forrestfield and Southern River complexes.				
Residual impacts that are not significant	Clearing of 2 individuals of *Isopogon autumnalis* (P3) within the Western Power Easement corridor.			No clearing of vegetation that is watercourse or wetland dependent along the Crumpet Creek preliminary foreshore.	No conservation areas identified within the amendment area.	The amendment area is located with the Swan Coastal Plain bioregion. This area is recognised as a biodiversity hotspot. However, the vegetation is largely degraded and does not comprise high biological diversity. Areas of TECs proposed to be cleared also contain reduced biodiversity when compared to the average.	Clearing of 52.51 ha native vegetation which could provide habitat values for native fauna including Quenda, of which 27.15 ha is Garden Planted. Clearing of 5.66 ha of vegetation with moderate suitability for SREs.

9.2 Offset Strategy

The assessment and potential application of offsets for the proposed amendment has been undertaken with consideration of the following:

- WA Environmental Offsets Policy (Government of WA, 2011)
- WA Environmental Offsets Guidelines (Government of WA, 2014)
- WA Environmental Offsets Metric Guideline (DWER, 2021).

To determine whether offsets were required, the potential environmental impacts, following the application of the nominated mitigation measures, were reviewed. The mitigation measures described in this document were developed and applied based on the mitigation hierarchy, which involves:

- Avoidance
- Minimization
- Rehabilitation
- Offsets.

Environmental offsets are only to be applied where the residual impacts of a proposal are determined to be significant, after avoidance, minimization and rehabilitation have been pursued.

To counterbalance significant residual impacts of the implementation of the amendment, an Environmental Offsets Strategy will be prepared in accordance with the WA Government's Environmental Offsets Policy (GoWA, 2011) and WA Environmental Offsets Metric Guideline (DWER, 2021c) during the preparation of the Local Structure Plan.

A Preliminary offset quantification has been undertaken as outlined in Table 48. It is anticipated that where there is a duplication in offset requirements for multiple environmental values the one offset site can address the significant residual impacts to each environmental value.

While an on-ground management approach, incorporating revegetation and rehabilitation is the preferred approach, a combination of on-ground management and land acquisition may be required to counterbalance the significant residual impacts. A key threat for the relevant matters that require an offset is vegetation clearing, which contributes to the decline in the remaining extent. Further consideration will be given to the offset requirement during the refinement of the LSP.

Each offset matter is known to occur in multiple locations across the amendment area. It is considered likely that prior to historical rural uses and associated clearing, additional occurrences of these values would have been present.

The Concept Plan provides for conservation retention areas for patches of TECs, *Conospermum undulatum*, high quality foraging habitat and potential breeding trees for black cockatoo species. A Foreshore Area reserve associated with Crumpet Creek and additional areas of POS also allow for the retention of potential breeding trees for black cockatoo species and habitat with moderate suitability for SRE. The proposed on-ground management approach includes the revegetation and rehabilitation of the Crumpet Creek Foreshore Area reserve that comprises degraded and cleared rural land through weed control, rubbish removal, infill planting and installation of artificial nesting hollows. The revegetation for TEC and *Conospermum undulatum* will use locally collected seeds and cultivation of existing plants (where required to be removed) to ensure the existing genetic diversity of the area is maintained within the Amendment Area and minimise the impact of existing vegetation.

The proposed offset approach will continue to be refined with further detailed provided as part of the developing the offset strategy for the LSP.

Table 48: Application of the WA Offsets template

Environmental Factor	Significant Residual Impact*	Offset Calculation Methodology				Offset Quantification
		Type[1]	Risk	Likely Offset Success	Time Lag	
Flora and Vegetation	Loss of 2.12 ha of native vegetation Good to Excellent condition Loss of 1.52 ha of native vegetation Good to Excellent condition within the Western Power Easement	Land acquisition On ground management	Low – land transferred to secure tenure	High – land transferred to secure tenure and managed by DBCA	None	5.45 ha native vegetation in at least Good condition 3.91 ha native vegetation in at least Good condition
	Loss of 3.4 ha of TECs Loss of 1.58 ha of TECs within the Western Power Easement	Land acquisition On ground management	Low – land transferred to secure tenure	High – land transferred to secure tenure and managed by DBCA	None	8.93 ha of TEC 4.15 ha of TEC
	Loss of 3 *Conospermum undulatum* individuals within the Western Power Easement	Translocation	Low – individual translocation has previously been successful	High – land transferred to secure tenure and managed by DBCA	2 years	3 individuals
Terrestrial Fauna	Loss of 257 potential breeding trees Loss of 33 potential breeding trees including 1 hollow within the Western Power Easement	Replanting	Low – land transferred to secure tenure Artificial nesting hollows have been used successfully	High – land transferred to secure tenure and managed by DBCA	30 years	514 tubestock Ratio of 2:1 tree planting has been applied. 66 tubestock 3 artificial hollows Ratio of 3:1 has been applied

[1] offset type and quantification are indicative only, subject to refinement of the LSP and approval by DWER.

Environmental Factor	Significant Residual Impact*	Offset Calculation Methodology				Offset Quantification
		Type[1]	Risk	Likely Offset Success	Time Lag	
	Loss of 21.48 ha of high-quality foraging habitat	Land acquisition On ground management	Low – land transferred to secure tenure	High – land transferred to secure tenure and managed by DBCA	None	24.61 ha of high quality foraging habitat
	Loss of 3.9 ha of high-quality foraging habitat within the Western Power Easement.					4.5 ha of high quality foraging habitat

10 Holistic Impact Assessment

EPA (2021) guidance suggests that the holistic impact assessment should provide a holistic assessment of the impacts of the amendment on the whole environment. The connections and interactions between the parts of the environment (environmental factors) and the predicted outcomes in relation to the environmental principles and the EPA's environmental objectives should be discussed.

A holistic impact assessment of the proposed amendment, considering the connections and interactions between the key environmental factors relevant to the MRS amendment:

- Flora and Vegetation
- Terrestrial Fauna
- Inland Waters.

These environmental factors are addressed separately in sections 5, 6 and 7. A holistic impact assessment of the implementation of the Amendment has been considered in relation to the environmental principles. It is acknowledged that there will be some residual impacts to the environment as a consequence of the clearing. It is considered that EPA objectives can be met through implementation of mitigation and management actions and an appropriate Environmental Offset Strategy.

Implementation of the Amendment will result in the direct loss of 25.05 ha native vegetation through clearing. This includes:

- 3.64 ha of native vegetation in good to excellent condition within poorly represented vegetation complexes (*Forrestfield and Southern River*)
- 4.98 ha native vegetation representative of a TEC
- 25.38 ha high quality foraging habitat for black cockatoo species
- 257 potential breeding trees for three black cockatoo species
- 5.66 ha of vegetation with moderate suitability for SREs.

The inherent links between these factors can be observed in the reliance of terrestrial fauna on flora and vegetation for habitat, shelter and food and flora and vegetation on terrestrial fauna in the form of pollination. The Inland Waters features of the Amendment Area are linked to flora and vegetation and fauna through the provision of hydrological conditions that support flora, vegetation, and fauna species. The relationship between these factors has been considered to determine whether the combined effect may cause a significant impact and require management. The Amendment Area has been extensively cleared with small pockets of highly fragmented vegetation remaining. Fauna habitat comprises 66.35 ha of the Amendment Area, through the clearing of native vegetation, implementation of the MRS amendment has the potential to impact terrestrial fauna through the loss and degradation of fauna habitats including 25.38 ha high quality foraging habitat and 257 of potential breeding trees for three black

cockatoo species. Clearing of vegetation may also result in the loss of foreshore vegetation and alteration of Crumpet Creek including increased erosion and sedimentation during construction and degradation of habitat for SRE species.

The proposed retention areas for the MRS amendment has considered the baseline surveys for flora and vegetation and fauna to identify areas in which clearing should be avoided. These areas contain excellent quality vegetation, patches of TEC. Where possible, these areas will be avoided to conserve the flora species and communities as well as the ecosystem services they provide to fauna. The MRS amendment will maintain the natural surface regime of Crumpet Creek with stormwater retention/detention structures and rehabilitation of the riparian corridor designed to protect the remaining ecological values whilst managing the 1% AEP flood events.

It is acknowledged that there will be some environmental impacts as a consequence of the clearing, however, it has been minimized and potential areas of high conservation significance will be avoided and improvement of the foreshore area.

The implementation of the proposed mitigation measures for clearing, weed control, retention and rehabilitation of the riparian corridor will also mitigate potential impacts the of terrestrial fauna and inland waters values.

11 Cumulative environmental impact assessment

Cumulative environmental impacts are the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and/ or reasonably foreseeable future activities (EPA, 2021). In determining the significance of an impact, it is important to consider the impacts at the regional scale.

The Amendment Area is located in the Perth Metropolitan region, an area that has historically been cleared and developed for residential purposes. Cumulative impacts resulting from the implementation of the Amendment as well as reasonably foreseeable projects within a 15 km buffer are summarised in Table 49 and Figure 22 relevant to the proposed amendment: Flora and Vegetation, Terrestrial Fauna, and Inland Waters.

Consideration was given to the MRS Amendment 1256/57 – Hazelmere Enterprise Area Structure Plan Precinct 9A - Bushmead, the Forrestfield/High Wycombe Industrial Area – Stage 1 Local Structure Plan, and the Hales Projects, however, these Projects were not included in the cumulative assessment due to the insignificance of the impacts.

A desktop review of the DBCA purchased datasets identified over 150 ha of different vegetation communities within a 15 km radius of the site. The flora and vegetation database recorded 89 flora species as potentially occurring within the surveyed areas.

A total of 86 conservation significant fauna was identified with the Carnaby's Black cockatoo, Forest Red Tailed Black Cockatoo and Baudin's Black cockatoo occurring within the project areas close to the Amendment Area. Fauna habitat consisting of remnant vegetation, foreshore areas and reserved areas was mapped as within a 15 km radius of the Amendment Area.

The Amendment Area and surroundings surface water features are characterised by wetlands and Poison Gully is a common feature within a 15 km radius of the site, neither of these surface water features will be significantly impacted by the MRS amendment.

Overall, impacts to the key environmental factors Flora and Vegetation, Terrestrial Fauna and Inland Waters are not considered to be cumulatively significant at both a regional and subregional scale.

Table 49: Reasonably foreseeable projects

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
Tonkin Highway Grade Separated Interchanges (Hale Road and Welshpool Road)	Assess - Referral Information	The Project is located within the City of Canning and the City of Kalamunda. The Project is 7 km south of the Amendment Area.	Main Roads proposes to upgrade and widen a 2 km section of Tonkin Highway from four lanes to six lanes from approximately 1 km north of Kelvin Road extending south to Maddington Road.	**Flora and Vegetation** • Clearing 1.61 ha of SCP20a – *Banksia attenuata woodlands* • Loss of up to 62 individuals of *Conospermum undulatum* (T). **Terrestrial Fauna** • Clearing 141 potential breeding trees for black cockatoos, with no trees having a potentially suitable hollow for black cockatoos • Clearing 18.54 ha moderate to low value foraging habitat for Carnaby's Cockatoo • Clearing 7.88 ha of high to moderate value foraging habitat and 11.06 ha of moderate to low value foraging habitat for Baudin's Cockatoo and FRTBC • Clearing 22.22 ha of fauna habitat including habitat suitable for Quenda (P4).
Thornlie-Cockburn Link	Assess - Referral Information	The Project is located within the City of Gosnells. The Project is 10 km southwest of the Amendment Area.	The Public Transport Authority (PTA) proposes to construct and operate a new 14.5 kilometre (km) dual railway track to extend the existing Thornlie passenger line to Cockburn Central Station on the Mandurah line	**Flora and Vegetation** • Clearing 54.88 ha of native vegetation. **Terrestrial Fauna** • Clearing 27.64 ha of black cockatoo foraging habitat • Clearing 96 potential black cockatoo habitat trees.

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
			and duplicate the existing 3 km of single track between Beckenham Junction and Thornlie Station.	
Forrestfield Airport Link	Assess – Assessment on Proponent Information	The Project is located within the City of Bayswater and the City of Kalamunda. The Project is located 10 km northwest of the Amendment Area.	The Public Transport Authority of Western Australia proposes the Forrestfield-Airport Link, a 9km extension of the Perth rail network from Bayswater to Forrestfield.	**Flora and Vegetation** • Clearing 1.72 ha of SCP20a/SCP20b *Banksia attenuata* woodlands • Clearing of 2.47 ha of remnant native vegetation in good or better condition • Loss of 25 individuals of *Conospermum undulatum* plants (VU). **Terrestrial Fauna** • Clearing 15 potential black cockatoo habitat trees • Clearing 3.56 ha of potential black cockatoo foraging habitat • Clearing 5.3 ha of potential Quenda habitat.
Construction of Warehouse and Transport Depot on Lot 46 Tomah Road, Welshpool	Assessment on referral information	The Project is located within the City of Canning. The Project is located 3.9 km southwest of the Amendment Area.	Merilla proposes the construction of a warehouse and transport depot.	• NA.

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
Southern Link Road (Stage 3)	The proposal action is a controlled action. The Project will require assessment and approval under the EPBC Act before it can proceed.	The Project is located within the City of Cannington. The Project is located 8.5 km southwest from the Amendment Area.	To construct 0.4 km of bidirectional single carriageway and associated infrastructure (median strip, dual-use paths, and fencing) between Grey Street and Gerard Street in Cannington.	**Flora and Vegetation** • Clearing of 0.41 ha of native vegetation.
Forrestfield North District Structure Plan	Advice only	Forrestfield North is located approximately 13 kilometres east of the Perth CBD.	Forrestfield North comprises an area of approximately 264.1 ha bounded generally by Poison Gully to the north, Roe Highway to the east, Berkshire Road to the south, and the Forrestfield Freight Yard and Mainline Freight Rail to the west.	**Flora and Vegetation** Five vegetation communities totalling approximately 23.8ha were mapped within the precinct which ranged from 'Degraded' to 'Excellent' condition. *Conospermum undulatum* was extensively recorded within the precinct. One Priority 3 species, *Isopogon drummondii*, was also recorded in the precinct. A total of 525, *Conospermum undulatum* individuals were recorded within the DSP. Four communities listed as Threatened Ecological Communities (TECs) were considered to potentially occur within the vicinity of the Forrestfield North Area. The total area of native vegetation representing the Banksia Woodland TEC within the DSP area is 15.30ha of which 100% is located within the Residential Precinct and will be cleared. The project area is mapped within vegetation complex Southern River Complex, which is above the recommended clearing threshold of 10 % for the Swan Coastal Plain (SCP) areas.

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
				Terrestrial Fauna The structure plan was divided into three different vegetation types, all of which are considered to be utilised by two species of black cockatoos (Carnaby Cockatoo and Forrest Red-Tailed Black Cockatoo) for foraging. The habitat within the area is considered high quality due to the vegetation being near known roosting site, water, and other quality foraging habitat. The project will include clearing of: • 19.28 ha comprises of high-quality foraging habitat • 4.35 ha comprises of valued quality foraging habitat. **Inland Waters** 2.6 ha of 13ha of POS is estimated to require irrigation. Majority is to be rehabilitated and allow for conservation of environmentally significant values. The total volume of water required for irrigation is consequently estimated at 19,500 kL/yr, based on a standard irrigation rate of 7,500 kL/ha/yr. Surface water management objective will be to maintain predevelopment flows off the DSP area and comply with the Water Corporation (2010) requirement of a maximum flow rate across the Poison Gully catchment of 7 L/s/ha in a 1 in 100-year ARI event. Ongoing groundwater quality monitoring has reported some elevated levels of certain pollutants above guideline values, and these are most likely due to historic land uses including landfill at the former Brand Road landfill site.

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
Wattle Grove South MRS amendment 1388/57	Assess – Environmental Review	Southeast of the intersection of Tonkin Highway and Welshpool Road East/Crystal Brook Road	Rezone approximately 123.5 ha from Rural zone to Urban zone.	**Flora and Vegetation** The northern part of the project area is mapped within the Southern River Vegetation Complex, however it is mapped as completely degraded with trees in-between roads and constructed areas. Loss of fauna habitat including trees that may be suitable for black cockatoo foraging and breeding habitat. **Terrestrial Fauna** The Carnaby's Black Cockatoo and Baudin's Black Cockatoo were identified as occurring within the Wattle Grove amendment area. The Wattle Grove amendment is anticipated to impact on terrestrial fauna include: • Loss of significant fauna habitat including black cockatoo habitat (breeding, roosting, and foraging) • Direct or indirect impacts or loss of other significant fauna and fauna habitat found to be present during survey • Fragmentation of fauna habitat and loss of ecological connectivity • Degradation of fauna habitat and habitat modification from introduction and increased spread of weeds and/or disease, altered surface water flows, altered groundwater and edge effects. **Inland Waters** • Alteration of hydrological regimes resulting in impacts to significant wetlands and waterways within and adjacent Wattle Grove amendment area

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
				• Impact water quality of significant wetlands and waterways within and adjacent Wattle Grove amendment area • Loss of foreshore functions and wetland dependent vegetation and impacts to other water dependent ecosystems.
City of Gosnells Local Planning Scheme 6 Amendment 166 and 169 Known as Precincts 3B and 2 of the Maddington Kenwick Strategic Employment Area (MKSEA)	Assess – Environmental Review	Amendment 166 Land generally bounded by Brook, Coldwell and Grove and Welshpool Roads, Kenwick Amendment 169 Land generally bounded by Brook, Boundary, Bickley, and Victoria Roads and Tonkin Highway, Kenwick	Amendment 166 seeks to rezone approximately 66.9 ha from General Rural to Business Development. The amendment area is known as Precinct 3B within the MKSEA. Amendment 169 seeks to rezone approximately 188 ha from General Rural to Business Development. The amendment area is known as Precinct 3B within the MKSEA.	**Flora and Vegetation** Direct and indirect loss of significant flora and vegetation, including threatened and priority ecological communities, threatened and priority flora, and vegetation complexes poorly represented in existing conservation reserves (Guildford Complex and Forrestfield and Southern River Complex) associated with the amendment proposal. Approximately 3.63 % of the area will be cleared of native vegetation. 96% vegetation within the amendment area is in degraded condition.The amendment proposal will result in the loss of: • Two TECs comprising of 1.22 ha of 'banksia woodlands of Swan Coastal Plain and 0.35 ha of '*Corymbia calophylla – Kingia australis* woodlands on heavy soils of the Swan Coastal Plain'. • One priority flora species, *Lepyrodia curvescens*, also exists within the subject site. **Terrestrial Fauna** The amendment proposal will result in the loss of significant fauna habitat including black cockatoo habitat (potential breeding, roosting and foraging). Direct or indirect impacts or loss of other significant fauna and fauna habitat found to be present during survey.

Project	Status / proposed commencement date	Location	Description	Key environmental outcomes relevant to Maida Vale
				Inland Waters Alteration of hydrological regimes resulting in impacts to significant wetlands and waterways within and nearby to the MKSEA, including the Yule Brook and Greater Brixton Street Wetlands.

12 Glossary, Terms and Acronyms

Acronym	
AEP	Average exceedance probability
ACH	Aboriginal Cultural Heritage Act
AH	Aboriginal Heritage Act
ANZECC	Australia and New Zealand Environment and Conservation Council
ARI	Average Recurrence Interval
ARMCANZ	Australia and Resource Management Council of Australia and New Zealand
ASS	Acid Sulfate Soils
BAM	Biodiversity and Agriculture Management Act
BEMP	Bushfire Emergency Management Plan
BMP	Bushfire Management Plan
BoM	Bureau of Meteorology
BC	Biodiversity Conservation Act
CALM	Conservation and Land Management Act
CCW	Conservation Category Wetland
CEMP	Construction Environmental Management Plan
Cth	Commonwealth
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEE	Department of Environment and Energy

Acronym	
DER	Department of Environmental Regulation
DFES	Department of Fire and Emergency Services
DMP	Department of Mines and Petroleum
DoEE	Department of Environment and Energy
DoT	Department of Transport
DoW	Department of Water
DPAW	Department of Parks, Attraction and Wildlife
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Land and Heritage
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities
DSP	District Structure Plan
DWER	Department of Water and Environmental Regulation
DWMS	District Water Management Strategy
EPA	Environmental Protection Authority
EN	Endangered
EPBC	Environment, Protection and Biodiversity Conservation Act
EP	Environmental Protection Act
ER	Environmental Review
ERD	Environmental Review Document
ESA	Environmentally Sensitive Area
ESD	Environmental Scoping Document

Acronym	
FAR	Foreshore Area Report
FCT	Floristic Community Type
FMP	Foreshore Management Plan
GoWA	Government of Western Australia
Ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
LPS	Local Planning Strategy
LPS3	Local Planning Scheme No. 3
LSP	Local Structure Plan
LWMS	Local Water Management Strategy
mAHD	Meters Australian Height Datum
MGL	Maximum Groundwater Level
MNES	Matters of National Environmental Significance
MRS	Metropolitan Region Scheme
MUW	Multi Use Wetlands
P&D	Planning and Development Act
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
POS	Public Open Space
RA	Responsible Authorities

Acronym	
REW	Resource Enhanced Wetland
RIWI	Rights in Water and Irrigation Act
SCP	Swan Coastal Plain
SRE	Short Range Endemic
TIA	Transport Impact Assessment
TEC	Threatened Ecological Community
UWMP	Urban Water Management Plan
WAPC	Western Australian Planning Commission
WONS	Weeds of National Significance
WSUD	Water Sensitive Urban Design

13 References

360 Environmental. (2016). *Flora and Fauna Report, Various Lots- Maida Vale*. Prepared for Burgess Design Group. Perth WA

360 Environmental. (2023a). *District Water Management Strategy – Maida Vale*. Prepared for M Group. Perth WA

360 Environmental. (2023b). *Foreshore Assessment Report – Maida Vale*. Prepared for M Group. Perth WA

360 Environmental. (2023c). Flora and Vegetation and Black Cockatoo Assessment Technical Note – Maida Vale. Prepared for M Group, Perth, WA.

Australian/New Zealand Standard. (2012). On-site domestic-wastewater management, AS/NZS 1547-2012. Standards Australia/Standards New Zealand.

Barrett, G., Silcocks, A., Barry, S., Cunningham, R., & Poulter, R. (2003). The New Atlas of Australian Birds. Hawthorn East, Victoria: Royal Australasian Ornithologists Union.

Beard, J. S. (1976). Vegetation survey of Western Australia. Western Australia 1: 1 000 000 vegetation series. Design and cartography by Dept. of Geography, University of W.A.

Bureau of Meteorology [BoM]. (2021). *Monthly Climate Data Statistics*. Retrieved from: www.bom.gov.au/climate/data

Churchward, H.M & McArthur, W.M (1978). Landforms and Soils of the Darling System, Western Australia in Atlas of Natural Resources, Darling System, Western Australia. Department of Conservation and Environment, Western Australia.

City of Kalamunda. (2020a). Kalamunda Advancing 2031 Strategic Community Plan. Perth WA.

City of Kalamunda. (2020b). *Community Profile.* Available at: https://profile.id.com.au/kalamunda

Department of Agriculture, Water, and the Environment [DAWE]. (2022). Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (*Zanda latirostris*), Baudin's cockatoo (*Zanda baudinii*), Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*). Government of Australia

Department of Biodiversity, Conservation and Attractions (DBCA). (2019). *Conservation Codes for Western Australian Flora and Fauna.* Government of Western Australia

Department of Biodiversity Conservation and Attractions (DBCA), 2023a. Marri canker and marri shoot blight – diseases of marri and red flowering gum. Available at: Marri canker and marri shoot blight | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au)

Department of Biodiversity Conservation and Attractions (DBCA), 2023b. Phytophthora Dieback (dieback) – one of the most significant threats to the unique biodiversity of south-west Western Australia. Available at: Phytophthora Dieback | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au)

Department of Climate Change, Energy, Environment and Water [DCCEEW]. (2008). *Waxy-leaved Smokebush (Conospermum undulatum) recovery plan*. Government of Australia.

Department of Climate Change, Energy, Environment and Water [DCCEEW]. (2014). Australia's Bioregions IBRA. Retrieved from: https://www.dcceew.gov.au/environment/land/nrs/science/ibra#:~:text=The%2089%20bioregions%20are%20further%20refined%20to%20form,a%20more%20detailed%20subset%20of%20the%20global%20ecoregions.

Department of Environment and Energy [DoEE]. (2021). *Protected Matters Search Tool*, Accessed from http://www.environment.gov.au/epbc/pmst/index.html, Commonwealth of Australia.

Department of Environmental Regulation {DER}. (2014). A guide to the assessment of applications to clear native vegetation. Government of Western Australia

Department of Environmental Regulation [DER]. (2015a). Identification and investigation of acid sulphate soils and acidic landscapes. Perth WA

Department of Environmental Regulation [DER]. (2015b). Treatment and management of soil and water in acid sulphate soil landscapes. Perth WA

Department of Planning, Land and Heritage [DPLH]. (2007). *Local Planning Scheme No. 3*. Perth WA.

Department of Planning, Land and Heritage [DPLH]. (2022). Metropolitan Region Scheme. Available at: https://www.wa.gov.au/organisation/department-of-planning-lands-and-heritage/metropolitan-region-scheme

Department of Primary Industries and Regional Development [DPIRD]. (2022). Soil Landscape Mapping - Systems (DPIRD-064) GIS Dataset, Government of Western Australia.

Department of Water [DoW]. (2007). *Stormwater Management Manual.* Government of Western Australia.

Department of Water [DoW]. (2012). Operational Policy 4.3: Identifying and establishing waterways foreshore areas. Perth WA.

Department of Water [DoW]. (2013). Guidelines for district water management strategies. Perth WA

Department of Water and Environmental Regulation [DWER]. (2014). Environmentally Sensitive Areas - Fact Sheet. Environmentally Sensitive Areas. Available at: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Fact_sheets/fs24-clearing-regs_ESAs.pdf

Department of Water and Environmental Regulation [DWER]. (2021). Guideline for the assessment and management of contaminated sites. Government of Western Australia.

Department of Water and Environmental Regulation [DWER]. (2021a). Perth Groundwater Map. Available at: https://maps.water.wa.gov.au/#/webmap/gwm

Department of Water and Environmental Regulation [DWER]. (2021b). Water Register. Available at: https://maps.water.wa.gov.au/#/webmap/register

Department of Water and Environmental Regulation [DWER] (2021c). *Environmental offsets metric: Quantifying environmental offsets in Western Australia*. Government of Western Australia

Engineers Australia. (2019). Australia Rainfall and Runoff.

Environmental Protection Authority [EPA]. (2016a). *Environmental Factor Guideline Flora and Vegetation.* Perth WA.

Environmental Protection Authority [EPA]. (2016b). *Sampling of short rangeshort-range endemic invertebrate fauna.* Perth WA.

Environmental Protection Authority [EPA]. (2016c). *Technical Guidance: Flora and Vegetation surveys for Environmental Impact Assessment*.Retrieved from http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA Technical Guidance - Flora and Vegetation survey_Dec13.pdf

Environmental Protection Authority [EPA]. (2016d). *Environmental Factor Guideline – Terrestrial Fauna.* Perth WA.

Environmental Protection Authority [EPA]. (2016e). Technical Guidance: Sampling methods for terrestrial vertebrate fauna. Perth WA.

Environmental Protection Authority [EPA]. (2018a). Instructions on how to prepare an environmental review document. Perth WA.

Environmental Protection Authority [EPA]. (2018b). *Instructions for Environmental Review.* Perth WA.

Environmental Protection Authority [EPA]. (2018c). *Environmental Factor Guideline – Inland Waters.* Perth WA.

Environmental Protection Authority [EPA]. (2020). Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment. Perth WA

Environmental Protection Authority [EPA]. (2021a). Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures. Perth, WA.

Environmental Protection Authority [EPA]. (2021b). Statement of Environmental Principles, Factors and Objectives and aims of Environmental Impact Assessment. Perth WA.

Environmental Protection Authority [EPA]. (2021c). Guidance for planning and development: Protection of naturally vegetated areas in urban and peri-urban areas, EPA, Western Australia.

Government of WA [GoWA] (2011). *WA Environmental Offsets Policy*. The Government of Western Australia, Perth, WA.

Government of WA [GoWA] (2014). *WA Environmental Offsets Guideline*. The Government of Western Australia, Perth, WA.

Government of Western Australia. [GoWA] (2019). *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis*. (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth.

Government of Western Australia. [GoWA]. (2019). *2018 South West Vegetation Complex Statistics. Current as of March 2019.* WA Department of Biodiversity, Conservation and Attractions, Perth, https://catalogue.data.wa.gov.au/dataset/dbca.

Heddle, E. M, Loneragan, O. W., & Havel, J.J. (1980). Vegetation of the Darling System in Atlas of Natural Resources, Darling System, Western Australia. Department of Conservation and Environment, Perth, Western Australia.

Hussey, B., Keighery, G., Cousens, R., Dodd, J. and Lloyd, S. (2007). *Western weeds*. 2nd ed. Victoria Park, Western Australia: The Weeds Society of Western Australia.

Invertebrate Solutions. (2020). Baseline Short Range Endemic and Conservation Significant Invertebrate Survey for the Local Structure Plan Maida Vale, Western Australia.

Johnstone, R. E. & Storr, G. M. (1998b). Handbook of Western Australian Birds. Volume 2 - Passerines (Blue-winged Pitta to Goldfinch). Oxford University Press.

Johnstone, R. E., Kirkby, T., & Sarti, K. (2013). The breeding biology of the Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso Gould in south-western Australia. Pacific Conservation Biology, 19(3), 121–142.

Mitchell, D., Williams, K., & Desmond, A. (2002). Swan Coastal Plan 2 (SWA2 – Perth subregion). In A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Perth: Department of Conservation and Land Management

Shepherd, D. P., Beeston, G. R., & Hopkins, A. J. M. (2002). *Native Vegetation in Western Australia Technical Report 249*. Perth, Australia.

City of Kalamunda. (2007). Local Planning Scheme No. 3. Perth WA.

City of Kalamunda. (2010). *Local Planning Strategy 2010*. Perth WA.

City of Kalamunda. (n.d.). Water Monitoring in the City of Kalamunda: Perth Airport South-Crumpet Creek. Waterways foreshore areas.

Western Australian Planning Commission [WAPC]. (2014). *State Planning Strategy 2050*. Perth WA: Western Australian Planning Commission.

Western Australian Planning Commission [WAPC]. (2018a). *Perth and Peel @3.5million*. Perth WA: Western Australian Planning Commission.

Western Australian Planning Commission [WAPC]. (2018b). *North-East Sub-regional Planning Framework*. Perth and Peel @3.5million. Perth WA: Western Australian Planning Commission.

14 Limitations

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In the preparation of this report, 360 Environmental has relied upon documents, information, data, and analyses ('client's information') provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive, or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness, and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive, and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions, and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the Amendment Area that is the subject of this report. However, due to the characteristics of the Amendment Area, including natural variations in conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that the Amendment Area conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions, and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the Amendment Area may be necessary.

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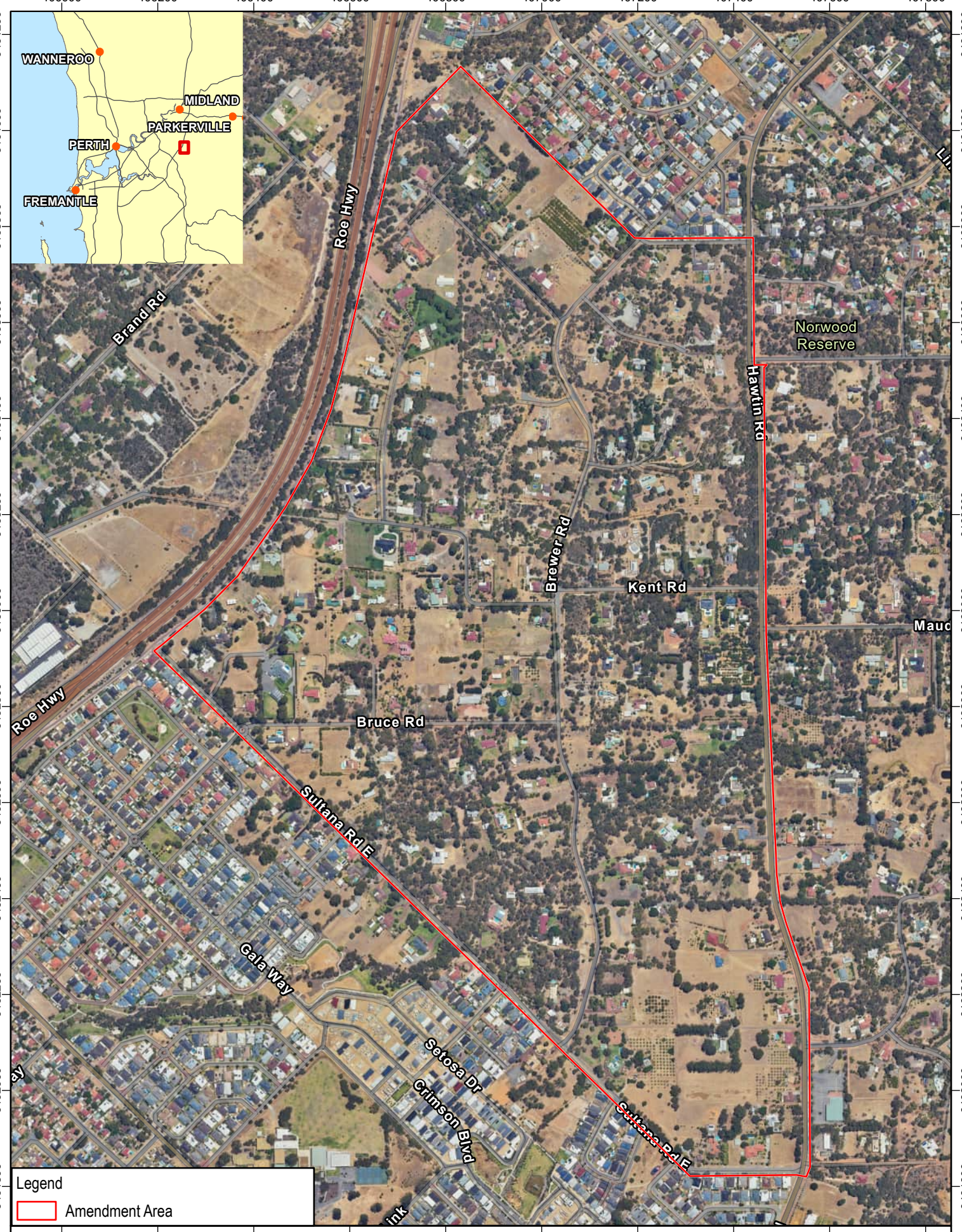
Figures



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Date Drawn:	31-May-2023
Drawn by:	EC
Reviewed by:	KF

0 150 300 Meters

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Site Location

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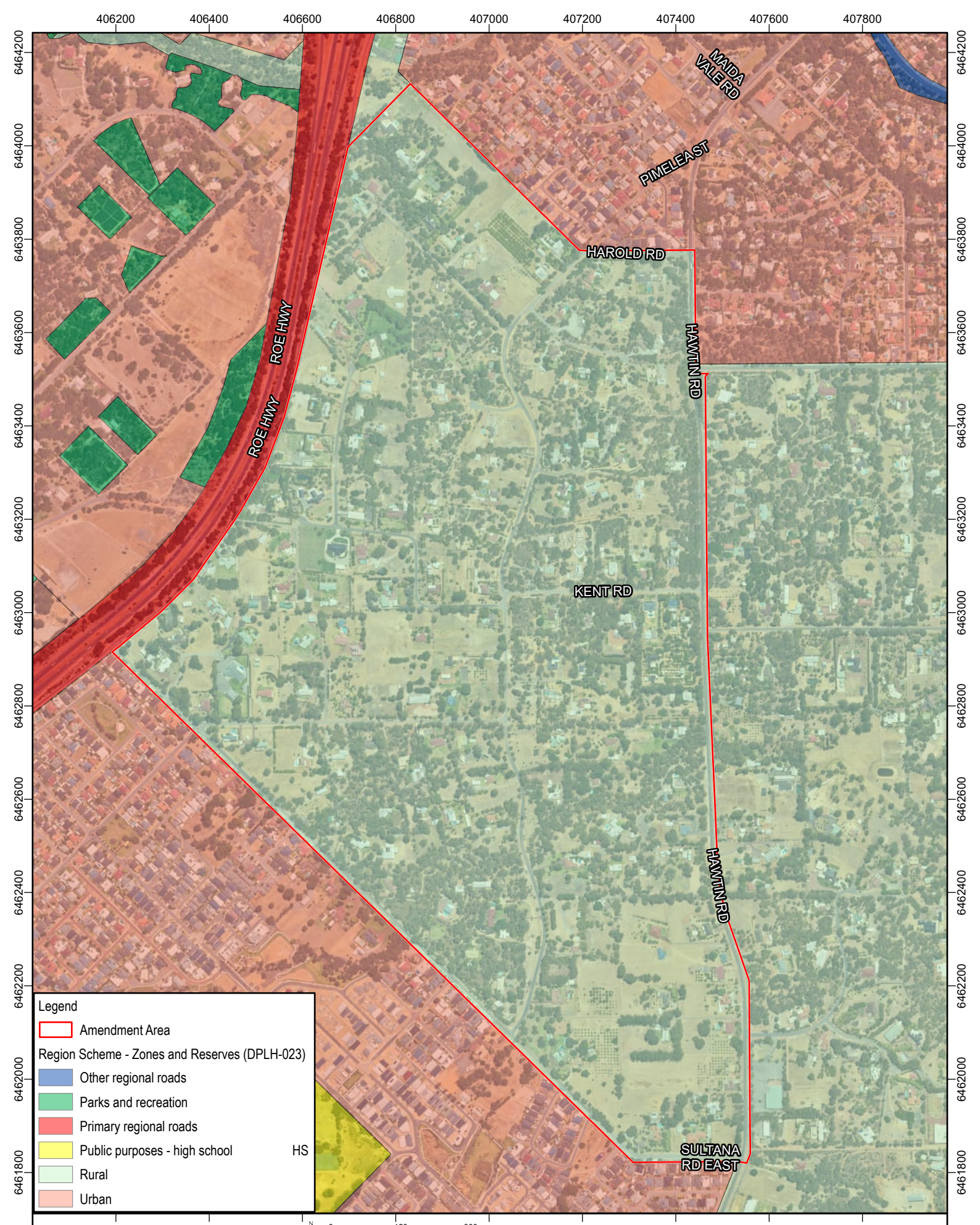

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Metropolitan Region Scheme Zoning

FIGURE 2

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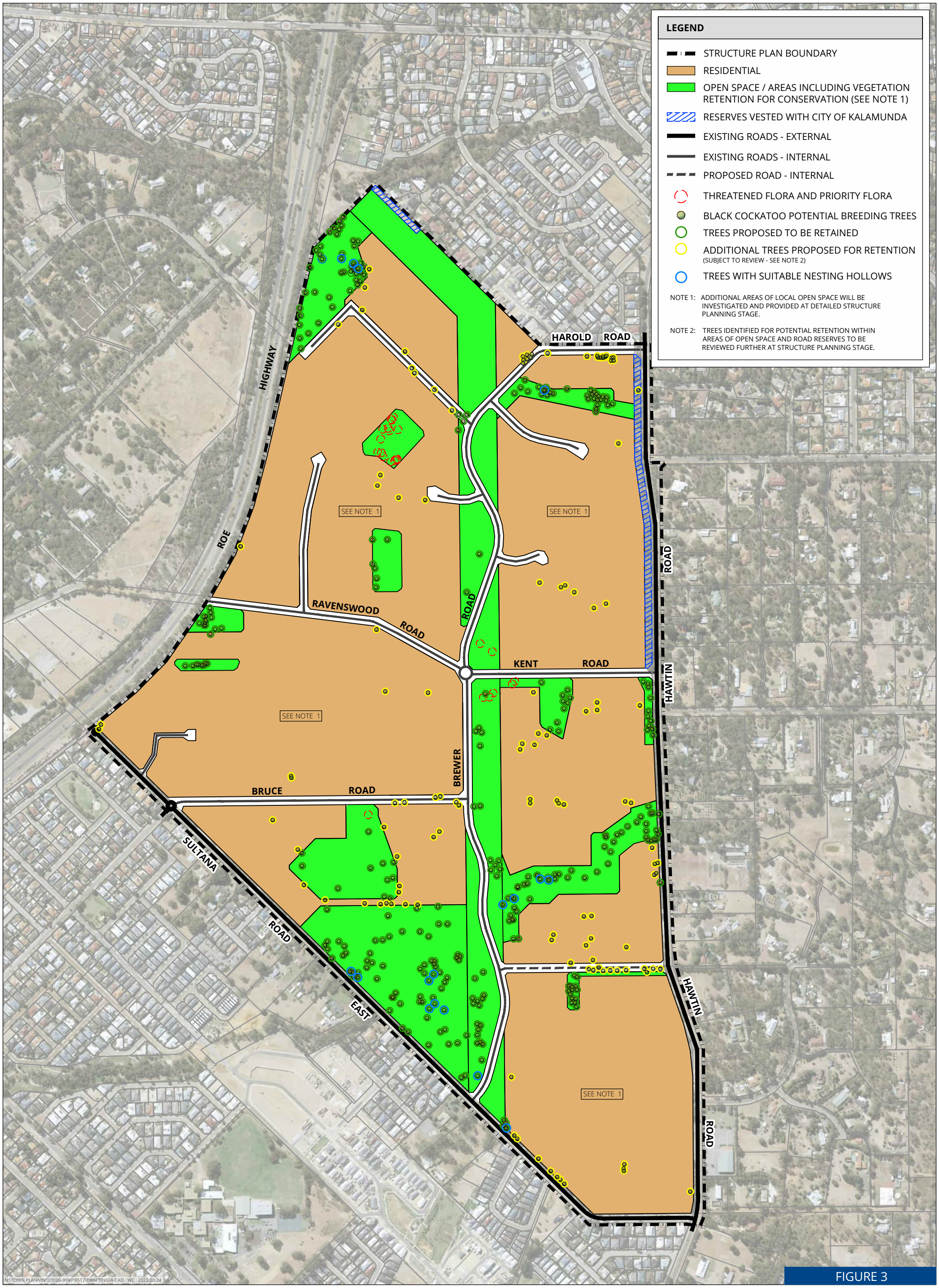

CONCEPT PLAN

URBAN EXPANSION AREA

MAIDA VALE

N

0 200 m

SCALE @ A3: 1:7500

9517-CON-03-M

DRAWN:	WC
DATE CREATED:	2023.03.24
PROJECTION:	MGA50 GDA94
CADASTRE:	LANDGATE
AERIAL:	METROMAP 2022

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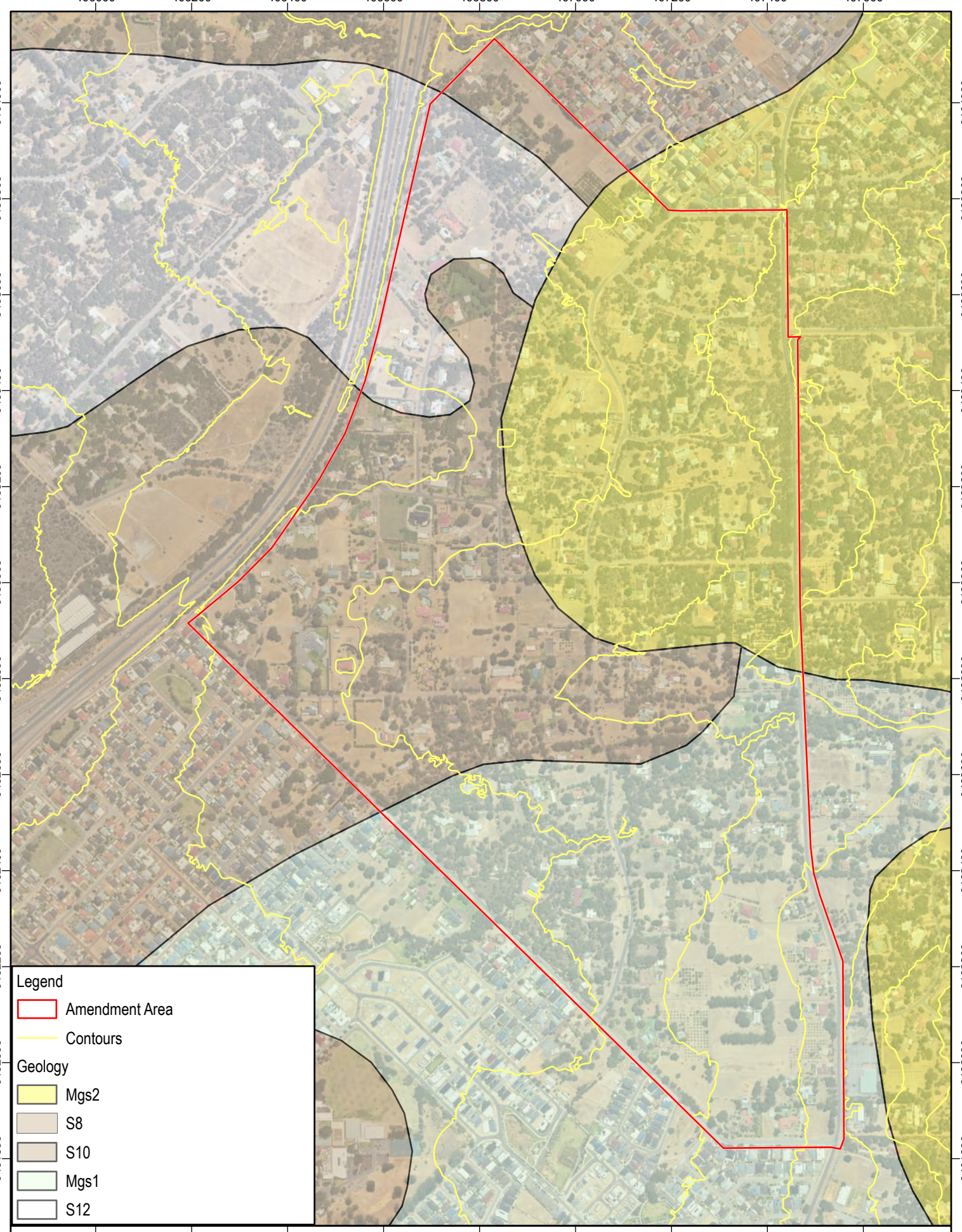

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Geology

FIGURE 4a

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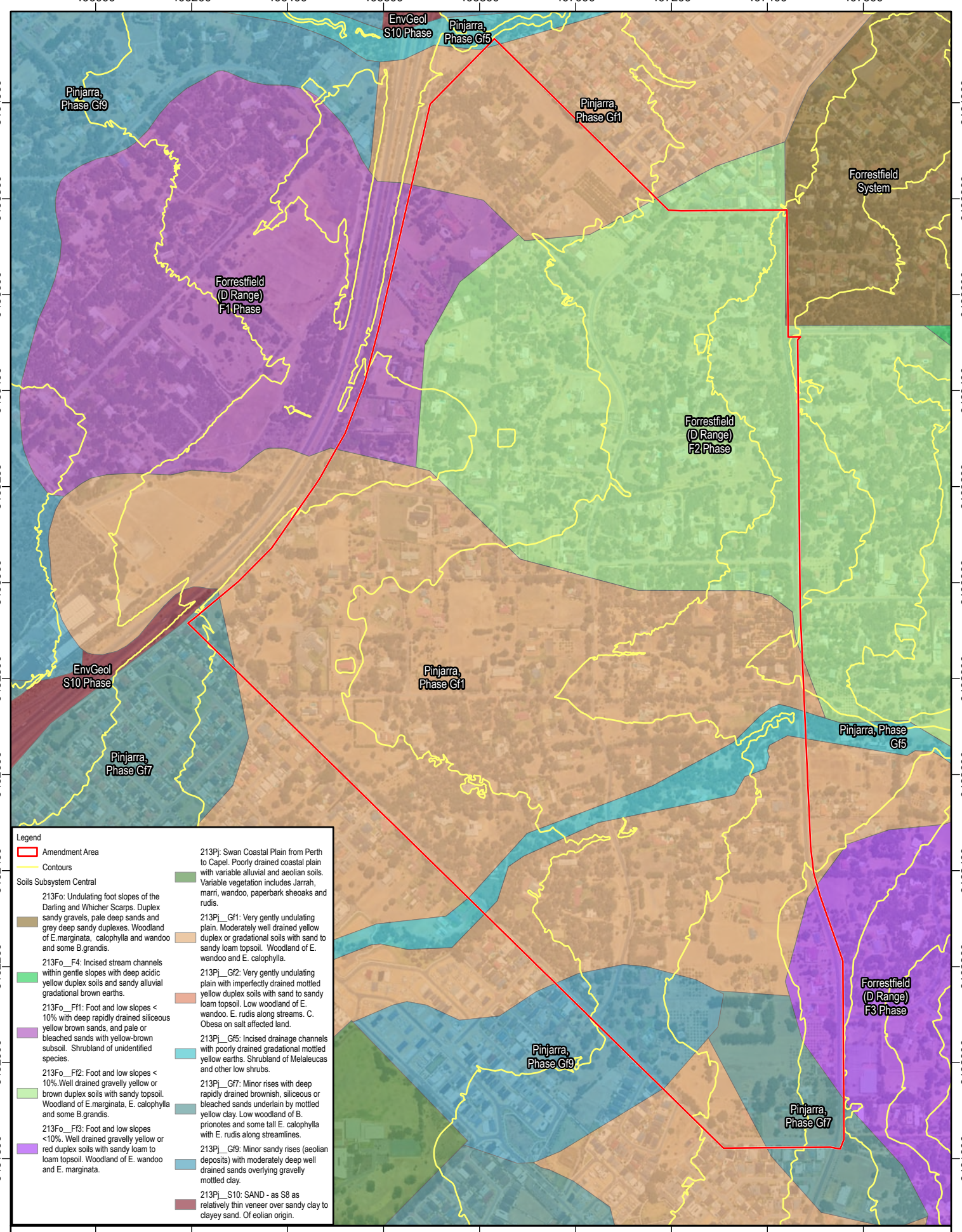

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Soil landscape and topography

FIGURE 4b

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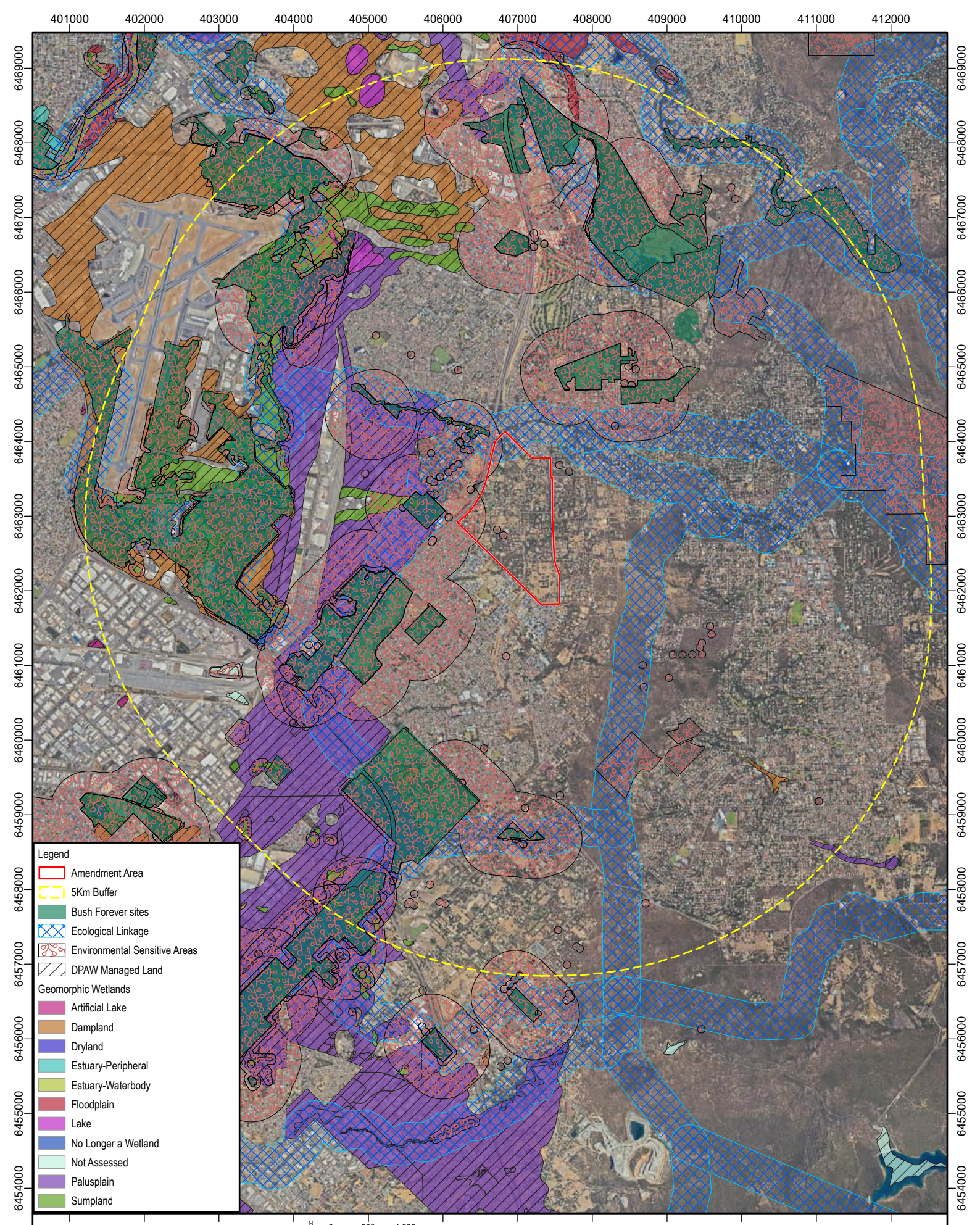

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Regional conservation and reserves

FIGURE 5

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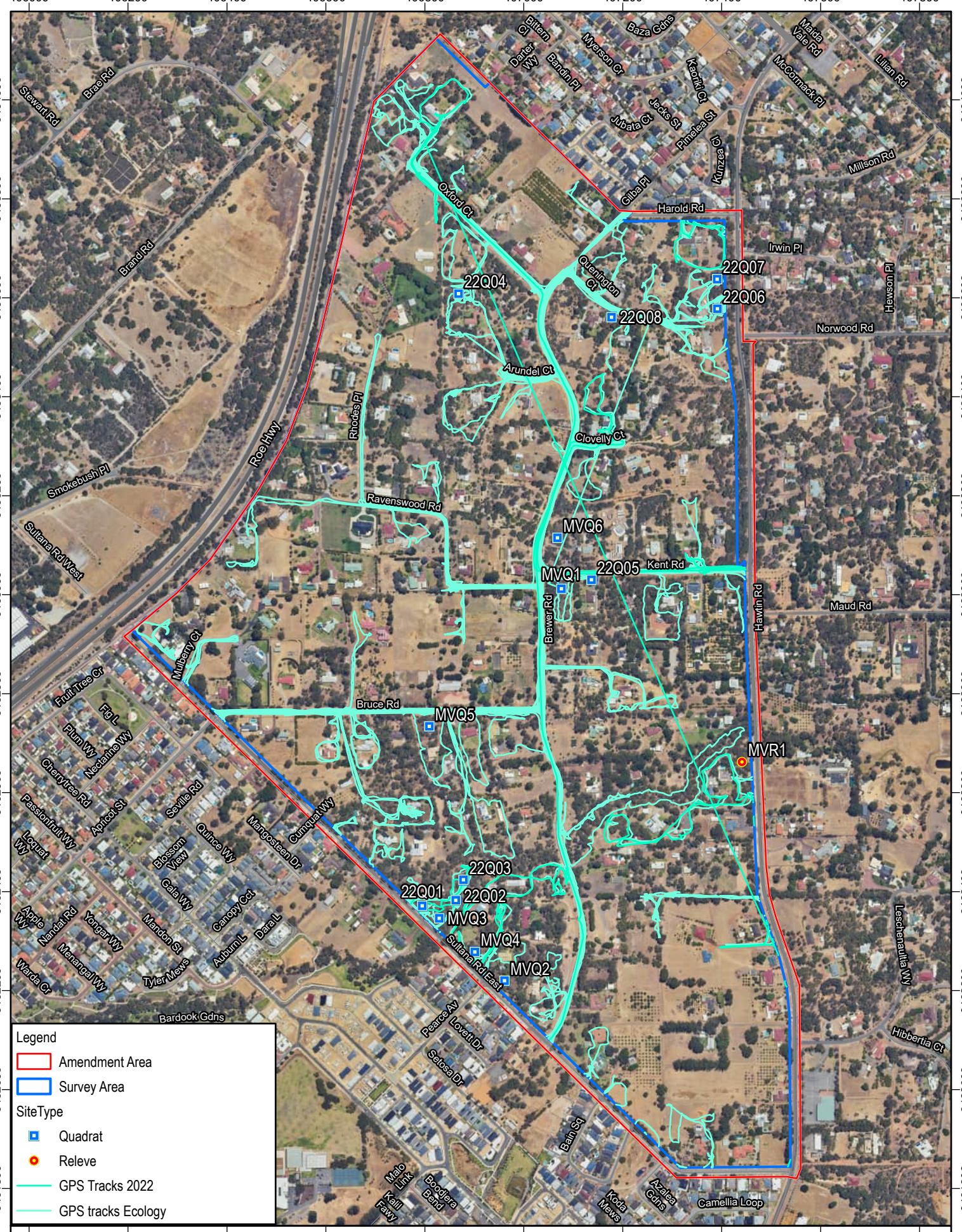

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Flora and vegetation study area and sampling sites

FIGURE 6

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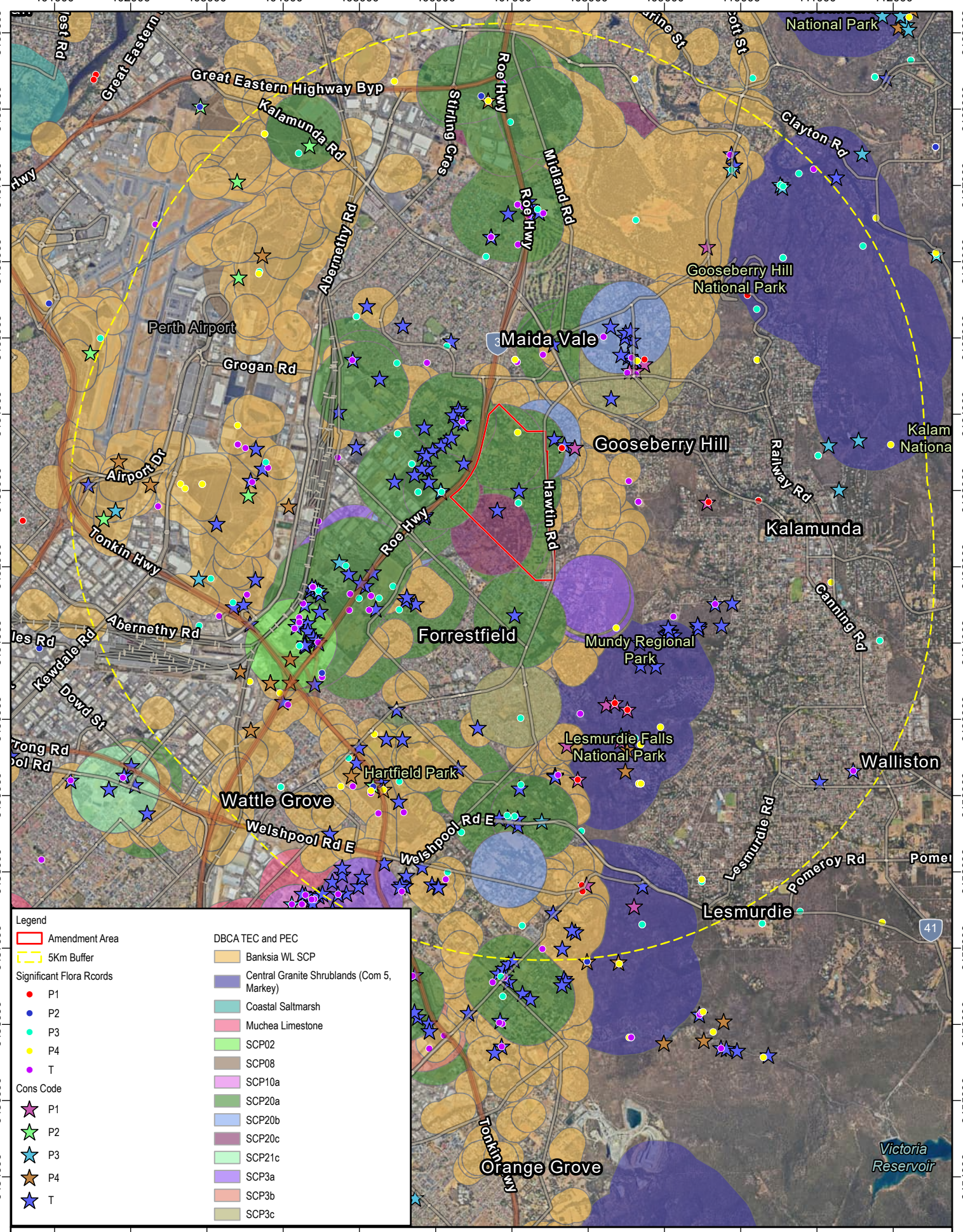

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Regional TEC and PEC and conservation significant flora

FIGURE 7

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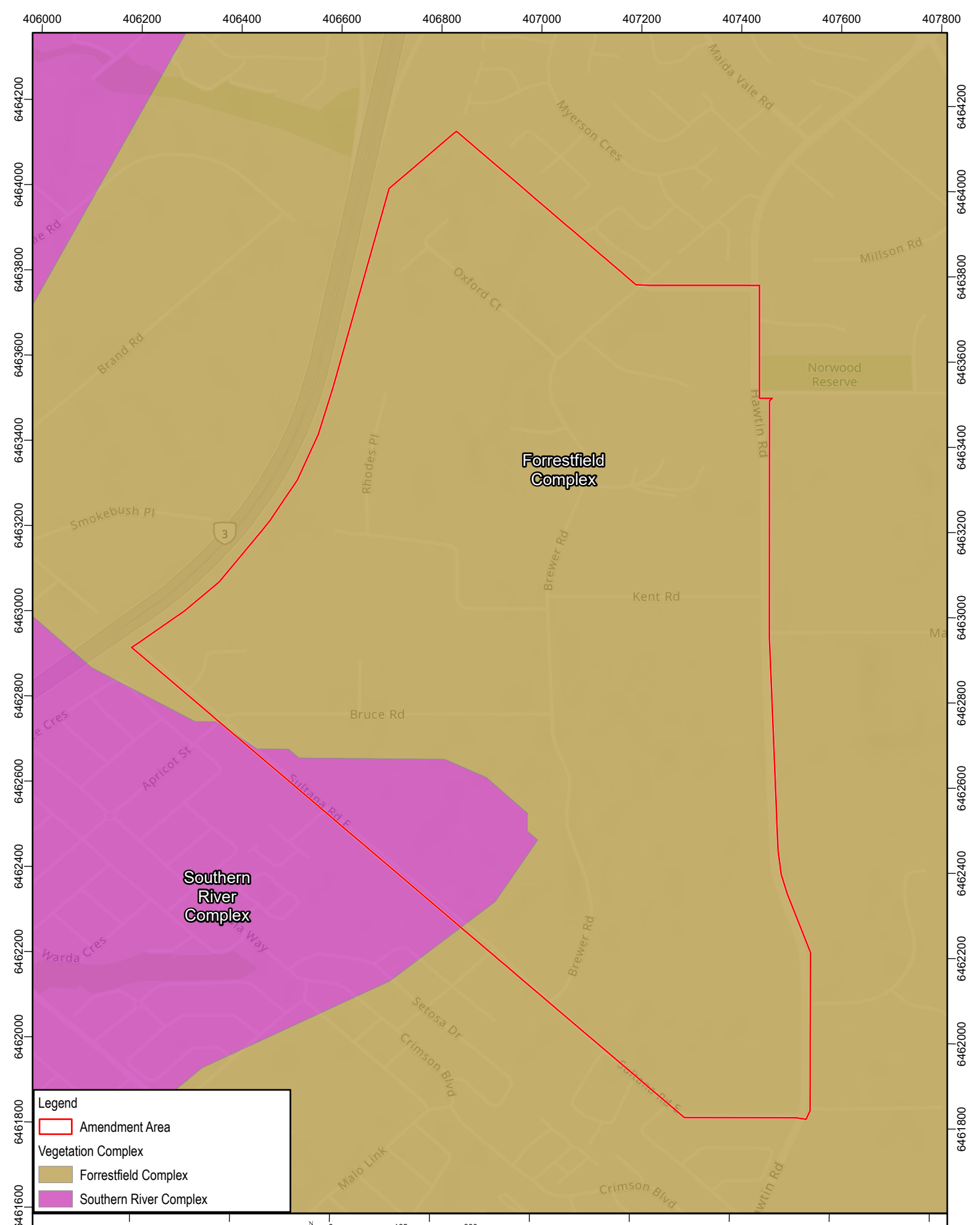

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N

0 165 330 Metres

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Vegetation complex

FIGURE 8

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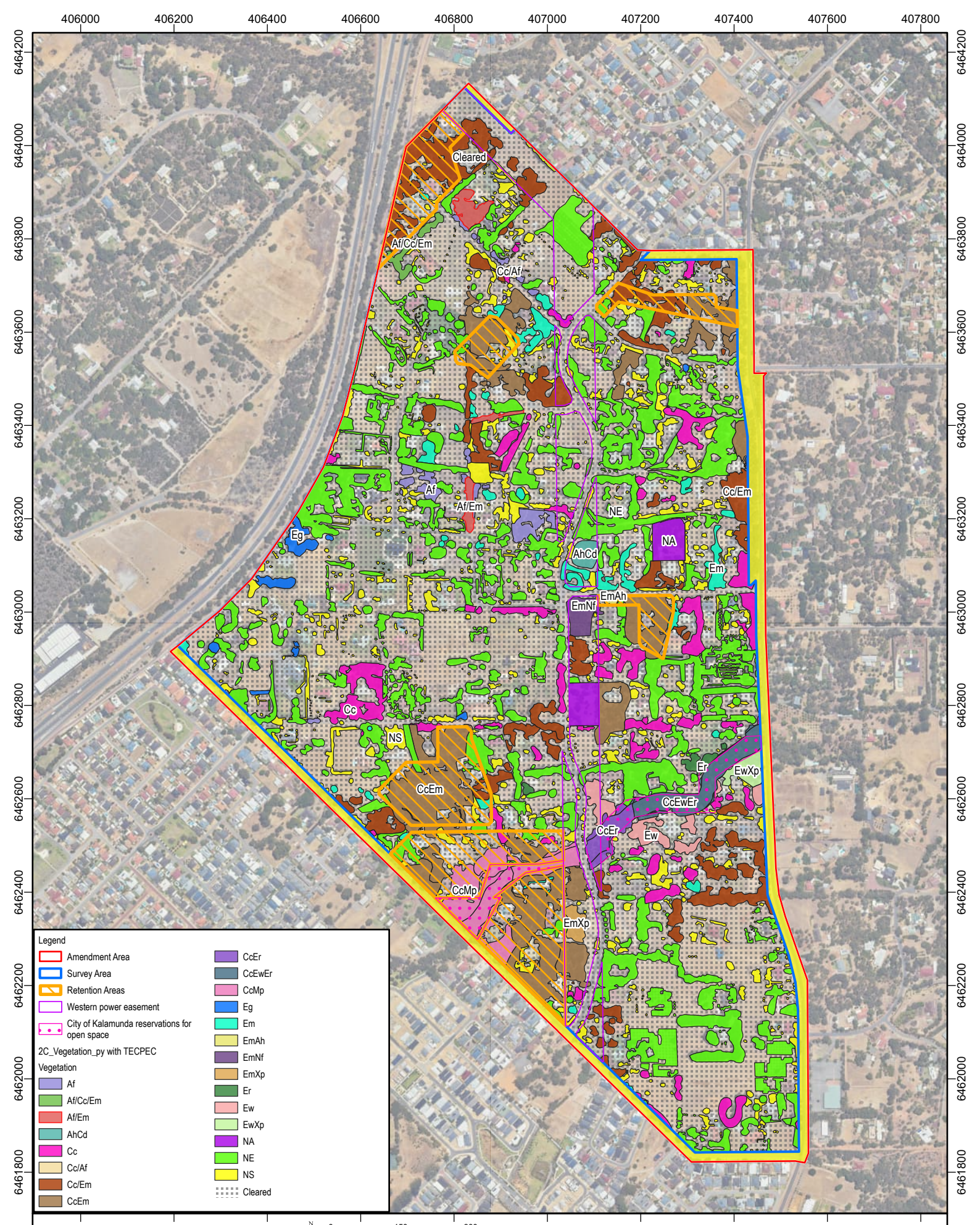

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Vegetation Association

FIGURE 9

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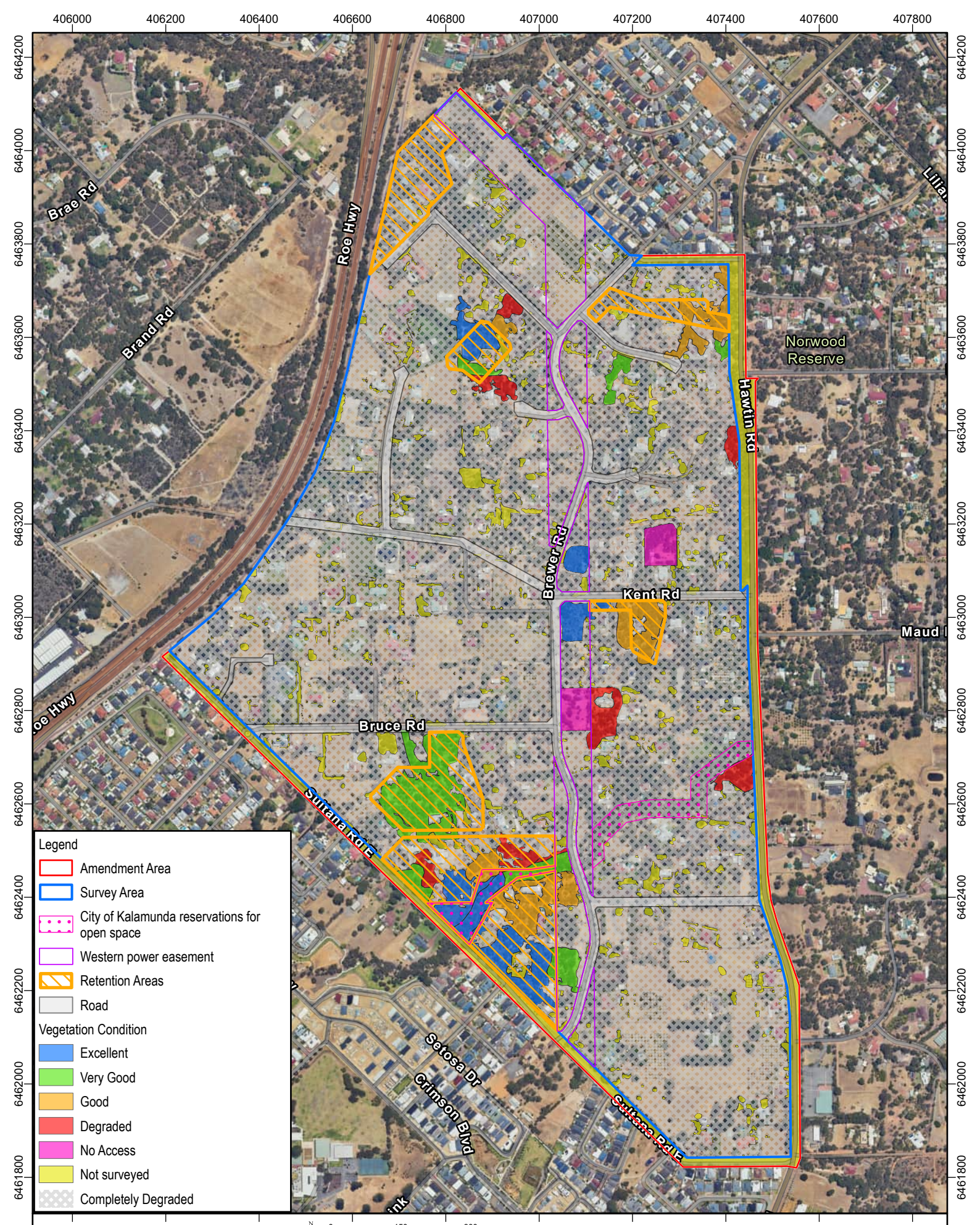

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N

0 150 300 Metres

Coordinate System:	GDA 1994 MGA Zone 50
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Vegetation condition

FIGURE 10

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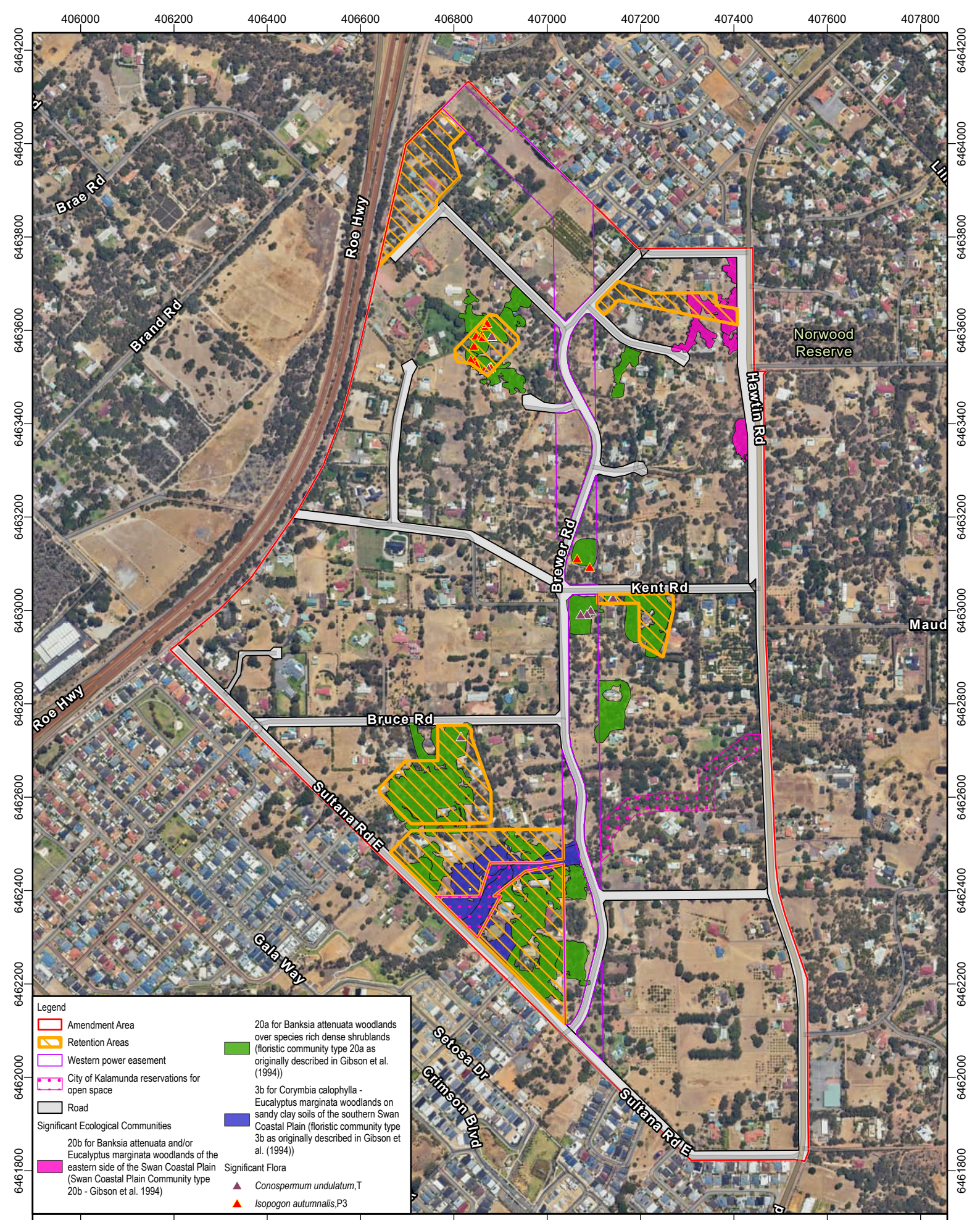

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Conservation Significant Flora and Vegetation

FIGURE 11

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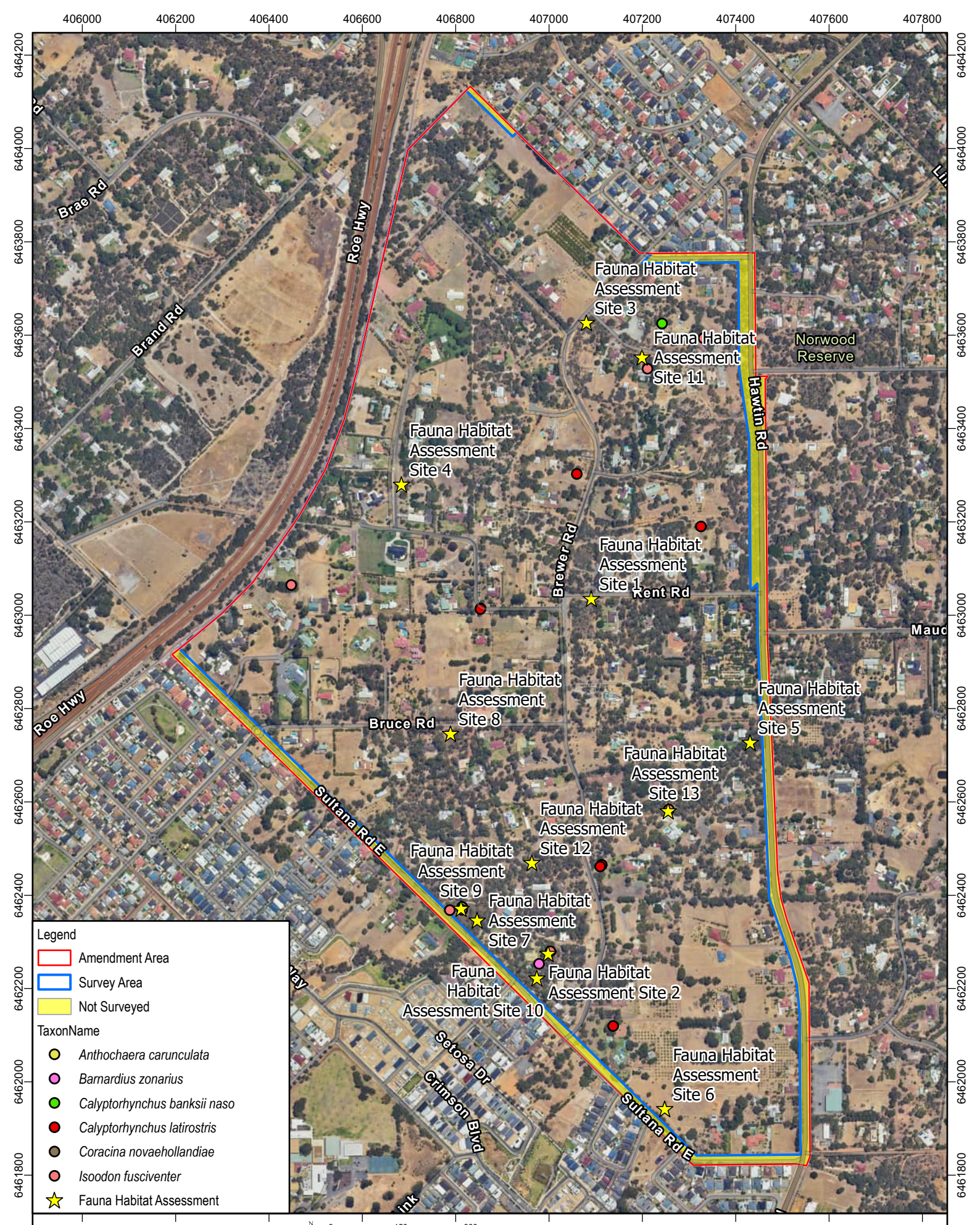

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Fauna Study Area and Sampling Sites

FIGURE 12

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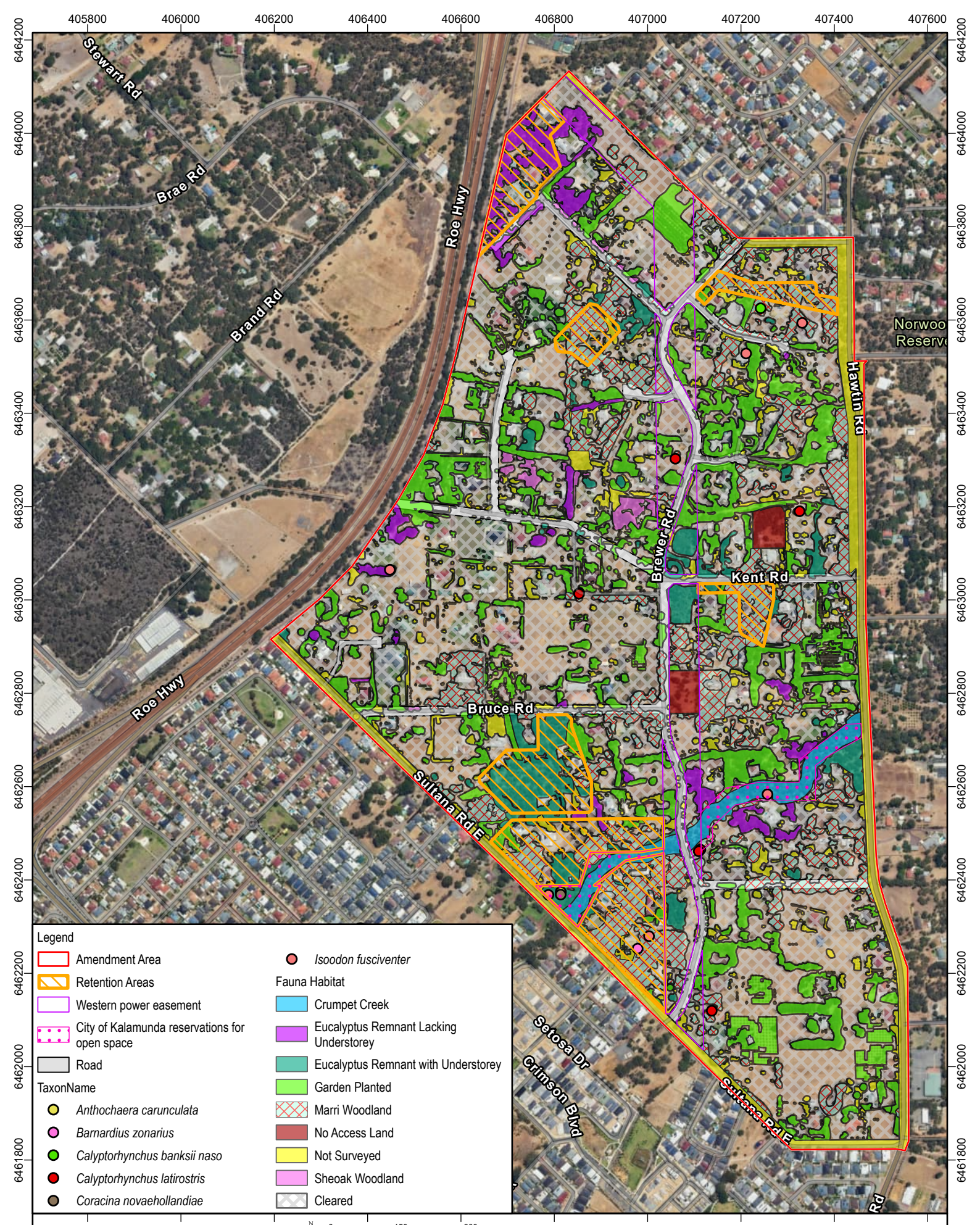

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Fauna habitat

FIGURE 13

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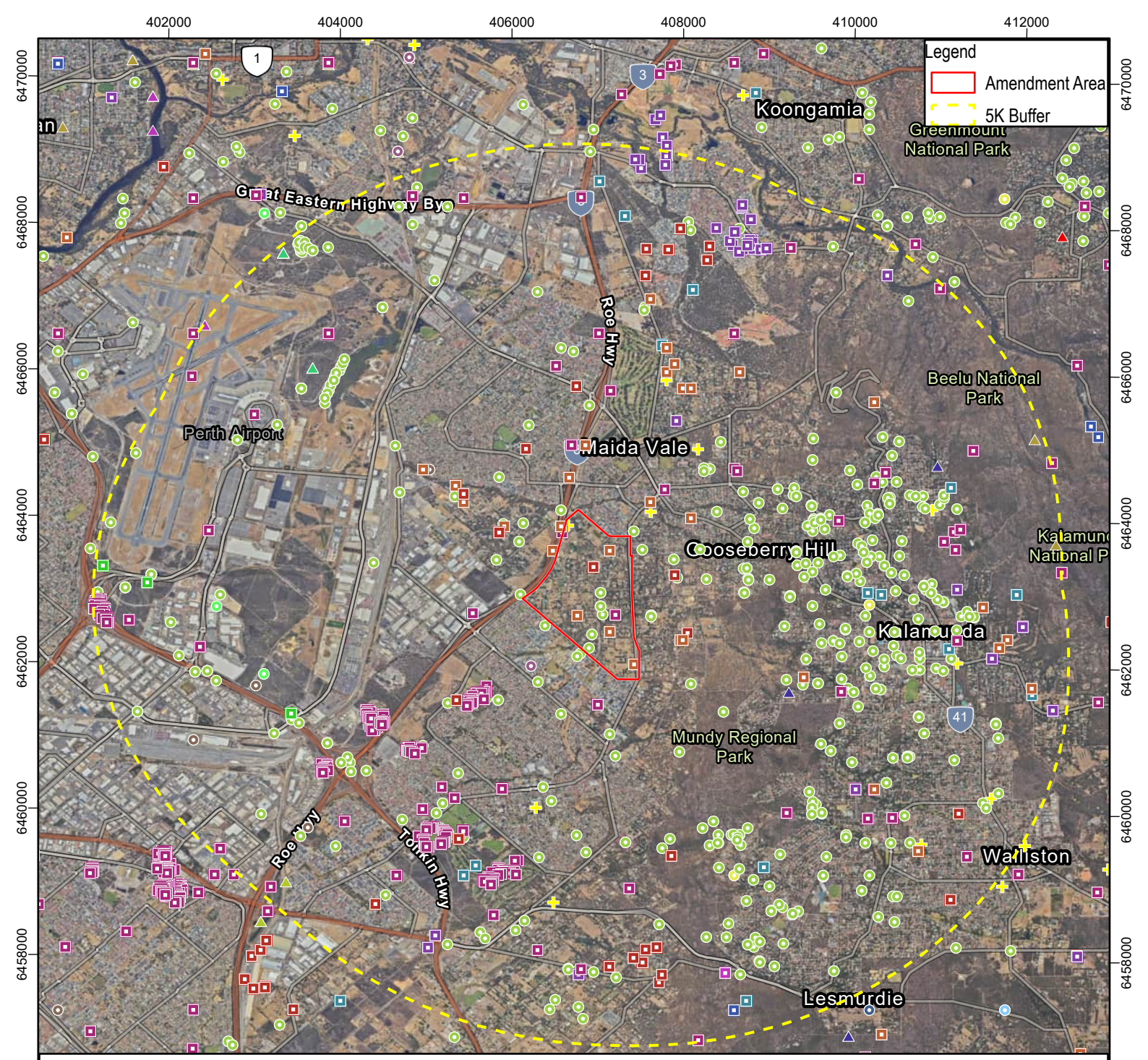

Fauna Searches

Fauna Searches V1

- CR,Western Swamp Tortoise
- CR,Woylie, Brush-tailed Bettong
- EN,A Short-tongued Bee
- EN,Baudin's Cockatoo
- EN,Carnaby's Cockatoo
- EN,Numbat, Walpurti
- EN,White-tailed Black Cockatoo
- VU,Carter's Freshwater Mussel
- VU,Chuditch, Western Quoll
- VU,Forest Red-tailed Black Cockatoo

Fauna Searches V2

- P1,Grey Vernal Katydid (Southwest)
- P2,A Short-tongued Bee (Southwest)
- P2,Black Bittern (Southwest subpop.)
- P3,Black-striped Snake, Black-striped Burrowing Snake
- P3,Cemetery Springtail, Guildford Springtail
- P3,Southern Death Adder
- P3,Swan Coastal Plain Shield-backed Trapdoor Spider
- P4,Blue-billed Duck
- P4,Quenda, Southwestern Brown Bandicoot
- P4,Water-rat, Rakali
- P4,Western Brush Wallaby

Fauna Searches V3

- CD,Muir's Corella
- CD,South-Western Brush-tailed Phascogale, Wambenger
- MI,Caspian Tern
- MI,Common Greenshank, Greenshank
- MI,Common Sandpiper
- MI,Crested Tern
- MI,Marsh Sandpiper, Little Greenshank
- MI,Osprey, Eastern Osprey
- MI,Wood Sandpiper
- OS,Peregrine Falcon

- White Tailed Black Cockatoo
- Black Cockatoo Roosting Sites

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N

0 1,000 2,000 Metres

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Service Layer Credits: Esri, HERE, Garmin, Foursquare, METI/NASA, USGSLangate

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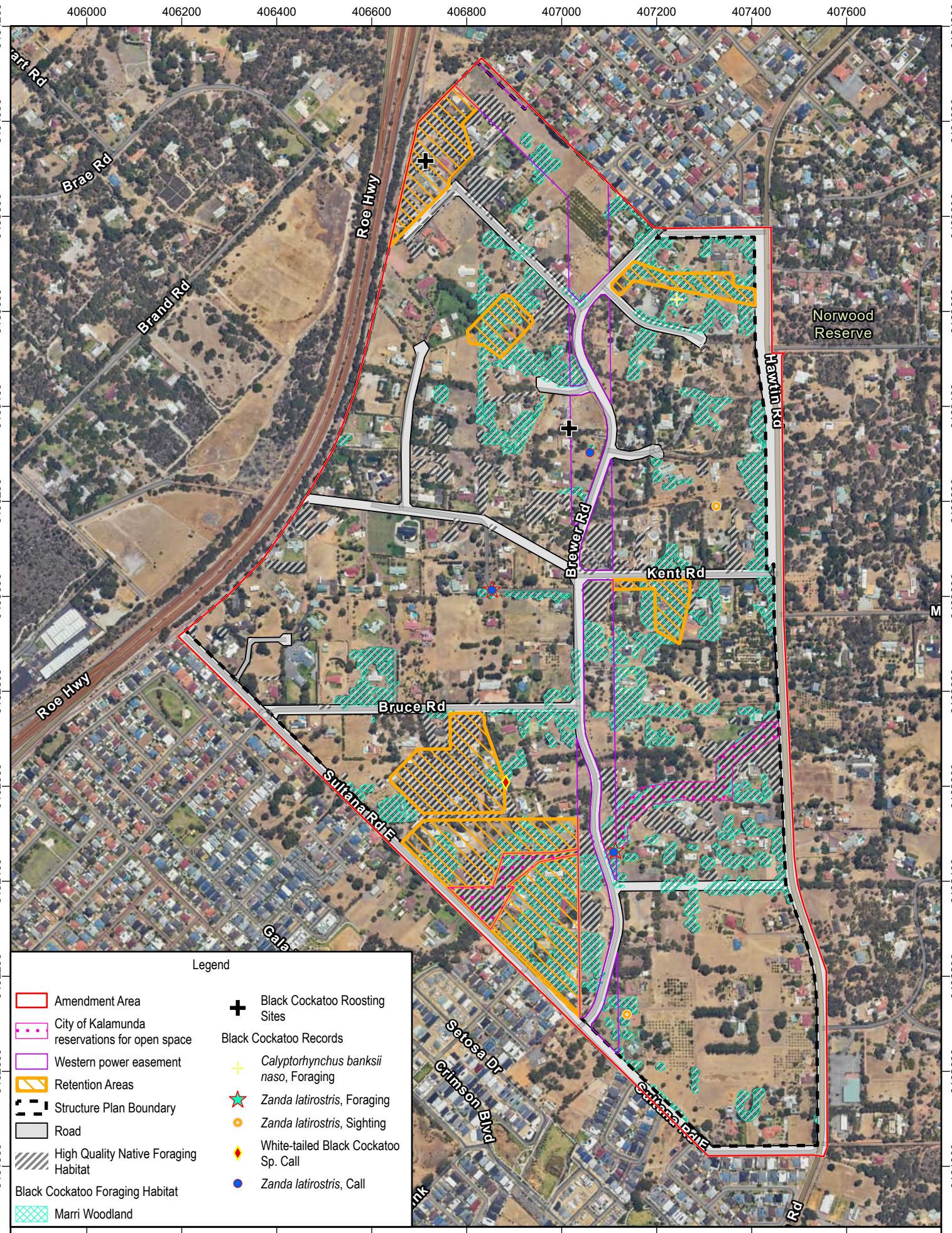
M Group

Environmental Review Document

Threatened and Priority Fauna
Locations identified by DBCA database searches

FIGURE 14

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



360 environmental | Part of SLR

N

0 150 300 Metres

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	1048
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	KF

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGSLangate

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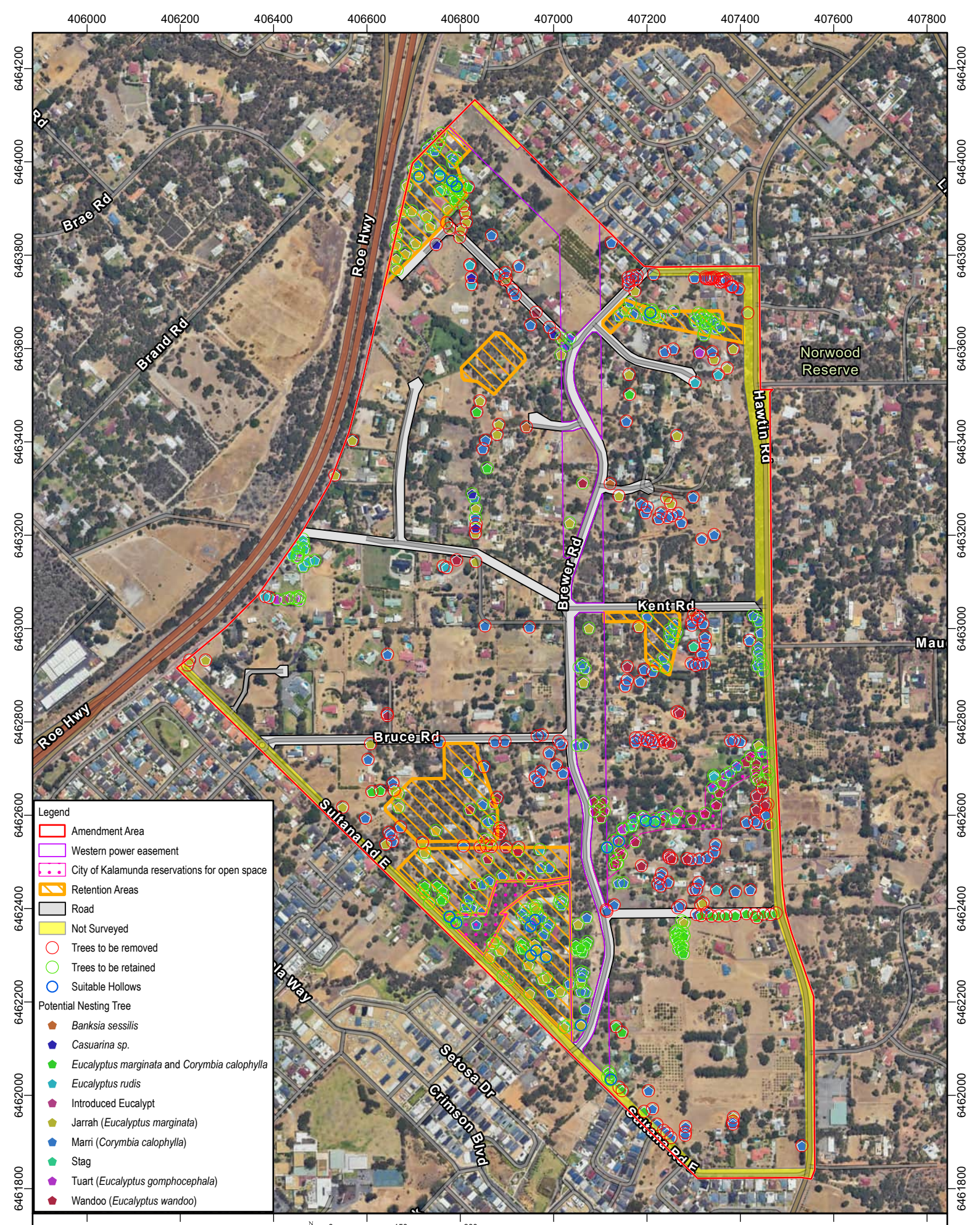
M Group
Environmental Review Document

Black cockatoo foraging habitat

FIGURE 15

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



360 environmental | Part of SLR

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	1048
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	KF

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGSLangate

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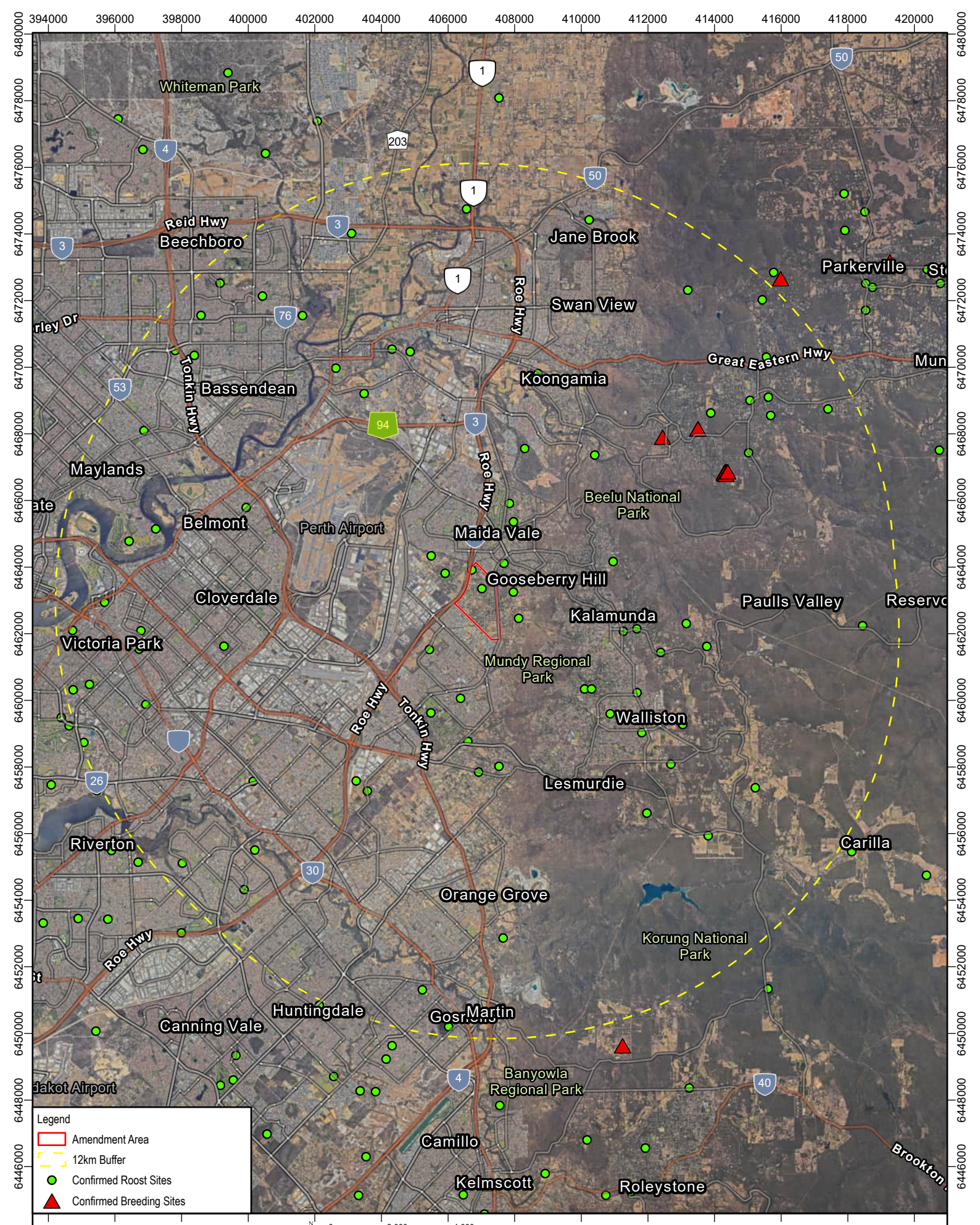
M Group

Environmental Review Document

Black cockatoo potential breeding trees

FIGURE 16

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



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Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:140,100 at A4
Project Number:	1048
Date Drawn:	31-May-2023
Drawn by:	EC
Reviewed by:	KF

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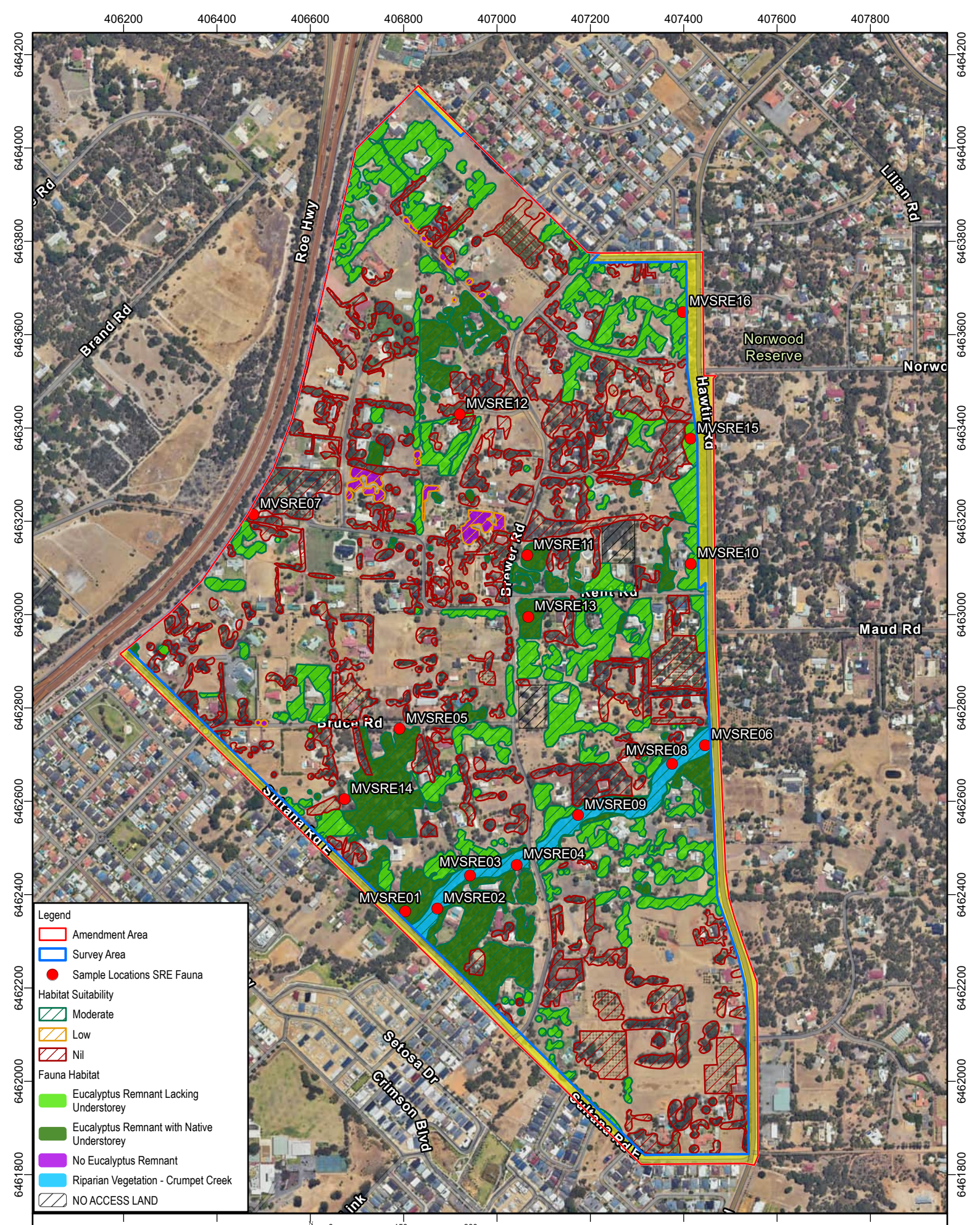
Environmental Review Document

Regional black cockatoo habitat

FIGURE 17

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	1048
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	KF

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, MaxarLangate

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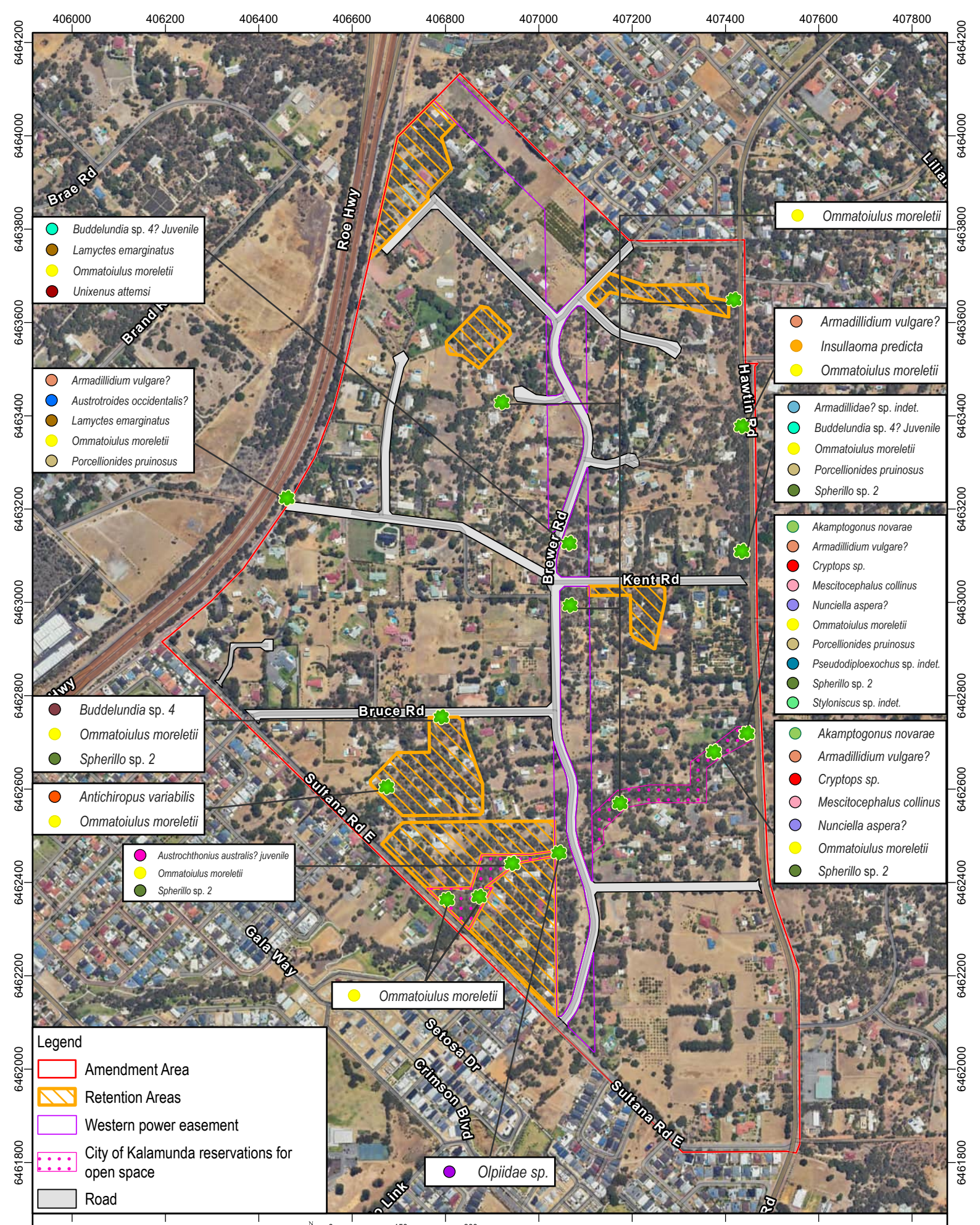
Environmental Review Document

SRE habitats and sample sites

FIGURE 18

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



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Scale:	1:10,000 at A4
Project Number:	1048
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	KF

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGSLangate

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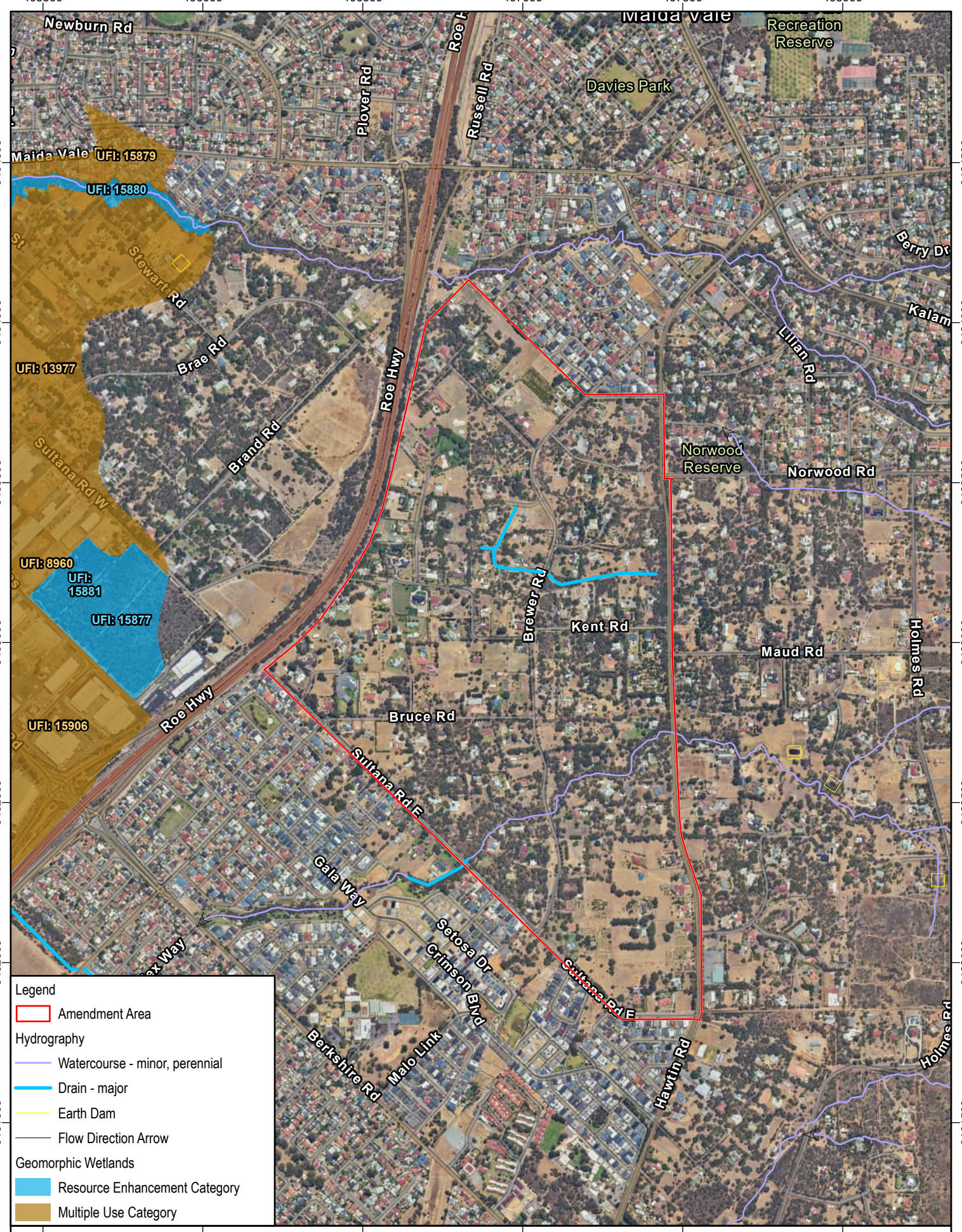
M Group
Environmental Review Document

Potential SRE species collected

FIGURE 19

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:15,000 at A4
Project Number:	1048
Date Drawn:	31-May-2023
Drawn by:	EC
Reviewed by:	KF

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGSLangate

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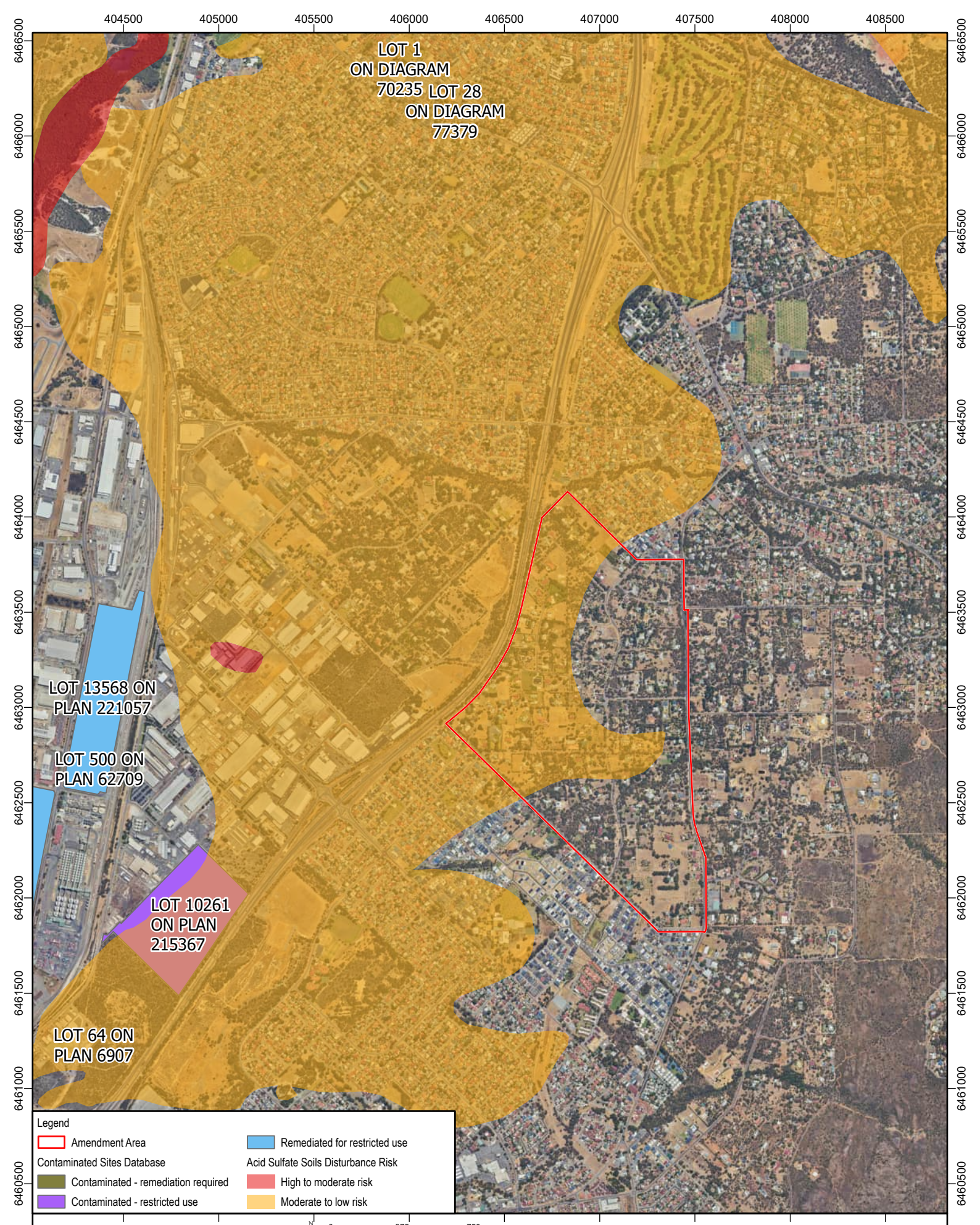
Environmental Review Document

Hydrology and catchments

FIGURE 20

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



360 environmental | Part of SLR

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0 375 750 Metres

Service Layer Credits: Langate

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:24,500 at A4
Project Number:	1048
Date Drawn:	31-May-2023
Drawn by:	EC
Reviewed by:	KF

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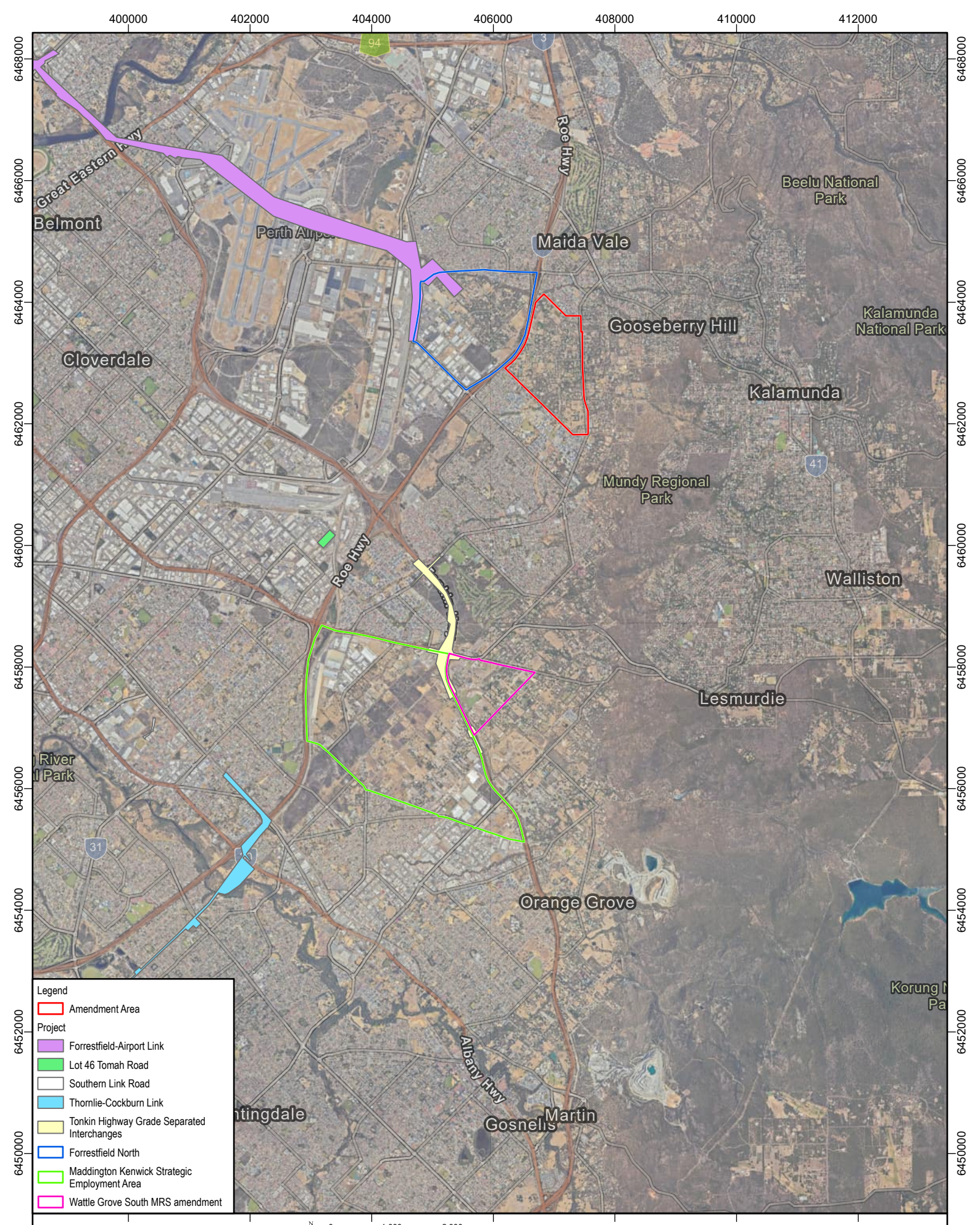
M Group
Environmental Review Document

ASS and contaminated sites

FIGURE 21

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx



Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:76,743 at A4
Project Number:	1048
Date Drawn:	31-May-2023
Drawn by:	EC
Reviewed by:	KF

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M Group

Environmental Review Document

Reasonably foreseeable projects

FIGURE 22

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx

Appendices

Appendix A
MRS Instructions

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

Ms Sam Fagan
Secretary
Western Australian Planning Commission
Locked Bag 2506
PERTH WA 6001

Our Ref: *CMS17412 DWERA-001293*
Enquiries: *Stephen Pavey, 6364 7259*
Email: *steve.pavey@dwer.wa.gov.au*

Dear Ms Fagan

Metropolitan Region Scheme Amendment 1344/57 – Assessment No: 2175

Please find attached the Instructions for the Environmental Review of the above scheme amendment. These Instructions specify the scope and content of the Environmental Review and provide for the preparation of the Environmental Review Document (ERD).

During the preparation of the ERD you are encouraged to consult with the Department of Water and Environmental Regulation assessment officer for the proposal, Stephen Pavey, who can be contacted on telephone number 6364 7259. Please quote the above "Our Ref" on any further correspondence.

Yours sincerely

Dr Tom Hatton
CHAIRMAN

24 October 2018

The Atrium Level 4, 168 St Georges Terrace, Perth, Western Australia 6000.
Postal Address: Locked Bag 33, Cloisters Square, Western Australia 6850.

Telephone: (08) 6364 7000 | Facsimile: (08) 6364 7001 | Email: info.epa@dwer.wa.gov.au
Website: www.epa.wa.gov.au

INSTRUCTIONS FOR ENVIRONMENTAL REVIEW

Proposed scheme amendment:	**Metropolitan Region Scheme Amendment 1344/57 – Maida Vale Urban Precinct**
Responsible Authority:	**Western Australian Planning Commission**
Assessment number:	**2175**
Location:	**Maida Vale – land generally bounded by Hawtin Road, Sultana Road East, Roe Highway, Lot 104, Lot 102, Reserve 12564, Lot 33 and Lot 32 Oxford Court, Lot 101 Brewer Road, and Harold Road.**
Local Government Area:	**City of Kalamunda**
Public review period:	**Environmental Review Document – timing and procedure in accordance with the *Planning and Development Act 2005***

Environmental Review Instructions (Instructions) are provided to the responsible authority (RA) to define the scope and content of the Environmental Review (ER) required by s.48C(1)(a) of the *Environmental Protection Act 1986* (EP Act). These instructions have been prepared by the Environmental Protection Authority (EPA) in consultation with interested agencies.

These instructions are available on the EPA website (www.epa.wa.gov.au)

1. Introduction

The EPA has determined that the above Metropolitan Region Scheme (MRS) amendment is to be assessed under Division 3 of Part IV of the EP Act.

This MRS amendment is being assessed because development permitted by the proposed urban zoning has the potential to have a significant effect on the environmental values known to exist within the amendment area, including:

- Poorly represented vegetation complexes (Forrestfield and Southern River);
- Threatened Ecological Communities (TECs) listed as Critically Endangered and Endangered under the *Wildlife Conservation Act 1950* (WC Act) and Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)*;*
- *Conospermum undulatum* (listed as Vulnerable flora under the WC and EPBC Acts);
- Habitat for threatened species of fauna; and
- Two waterways, known as Crumpet Creek and Poison Gully, that support some of the above vegetation.

Procedure

The EPA requires the responsible authority to undertake the environmental review according to these instructions.

Scope and Content

The scope and content of the environmental review is outlined in sections 2 to 6 of these instructions. The EPA requires that the attached Environmental Review Document template to be used to complete the report on the environmental review required under s. 48C(1)(a) of the EP Act.

Timing

Table 1 sets out the timeline for the assessment of the scheme amendment.

Table 1 Assessment timeline

Key assessment milestones
EPA issues instructions to the responsible authority (60 days after referral)
Responsible authority submits Environmental Review to EPA
EPA authorises advertising of Environmental Review and scheme for public review *(30 days from RA submission of ERD)*
Responsible authority advertises scheme and Environmental Review for public review in accordance with the *Planning and Development Act 2005*
Close of public review period
Responsible authority provides copies of submissions related to environmental issues to the EPA *(7 days from close of public review period)*
Responsible authority provides Response to Submissions to EPA *(42 days from close of public review period)*
EPA reports to the Environment Minister on environmental factors and recommended scheme conditions *(60 days after end of public review period or 30 days after receiving RA's Response to Submissions, whichever is longer)*

2. The scheme amendment

The subject of these instructions is the WAPC's proposed amendment to the MRS to rezone approximately 178 ha of land in Maida Vale from the Rural zone to the Urban Deferred zone. The land is currently developed for rural residential purposes. The proposed Urban Deferred zone will allow for future residential development and areas of public open space following the lifting of Urban Deferment, a local scheme amendment, structure planning and subdivision approval.

The location of the scheme amendment is shown in Figure 1 and a summary of the scheme amendment is set out in Table 2.

Table 2 Summary of the scheme amendment

Scheme amendment	Metropolitan Region Scheme Amendment 1344/57
Responsible authority	Western Australian Planning Commission
Location	Land in Maida Vale generally bounded by Hawtin Road, Sultana Road East, Roe Highway, Lot 104, Lot 102, Reserve 12564, Lot 33 and Lot 32 Oxford Court, Lot 101 Brewer Road, and Harold Road.
Short description	Rezoning of approximately 178 hectares of land from the Rural zone to the Urban Deferred zone to allow for future urban development which includes residential development, associated infrastructure and areas of public open space.

3. Preliminary key environmental factors and required work

The preliminary key environmental factors for the environmental review are:

1. Flora and Vegetation
2. Terrestrial Fauna
3. Inland Waters

Table 3 outlines the work required for each preliminary key environmental factor and contains the following elements for each factor:

- **EPA factor** and **EPA objective** for that factor.
- **Relevant activities** – the development activities that may have a significant impact on that factor.
- **Potential impacts and risks** to that factor.
- **Required work** for that factor.
- **Relevant policy and guidance** – EPA (and other) guidance and policy relevant to the assessment.

Table 3 Preliminary key environmental factors and required work

Flora and Vegetation	
EPA objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Relevant activities	Clearing of vegetation for urban development.
Potential impacts and risks	• Clearing of poorly represented vegetation complexes (Forrestfield and Southern River); • Clearing of TECs FCT20a and 20b (both Endangered on the list of TECs endorsed by the WA Minister for environment), TEC FCT20c (ranked Critically Endangered in WA and may also meet the description of the umbrella type 'Banksia woodlands of the Swan Coastal Plain', ranked Endangered under the EPBC Act);

	• Direct and indirect impacts to *Conospermum undulatum* (Vulnerable flora under the WC and EPBC Acts) including direct loss of individual plants; and • Direct and indirect impacts to other significant flora species or ecological communities found during survey to be present.
Required work	1. Identify and describe the vegetation and flora species present and likely to be present within the amendment area. Demonstrate how surveys are consistent with current EPA policy and guidance set out below. Include a summary of survey findings and an analysis of the significance of flora and vegetation in local and regional contexts as appropriate in accordance with relevant guidance set out below. **Note**: if surveys were undertaken at the referral stage, survey results and a demonstration of how the guidance has been followed are to be included in the environmental review. Ensure species database searches and taxonomic identifications are current. 2. Provide a map depicting the recorded locations of significant flora, ecological communities and vegetation in relation to the amendment area in accordance with the relevant guidelines set out below. Clearly show any areas/lots unable to be surveyed. 3. Provide a map depicting areas of vegetation and flora to be retained and protected from future urban development. Assess the potential direct and indirect impacts of future urban development on the identified environmental values. Include a quantitative assessment of levels of impact on significant flora, listed ecological communities and all vegetation units. Describe and assess the extent of any cumulative impacts within local and regional contexts as appropriate. 4. Describe any proposed avoidance, mitigation and management measures to reduce the potential impacts of urban development. Include any proposed management and/or monitoring plans that will be implemented pre- and post-construction to ensure residual impacts are not greater than predicted. 5. Identify, describe and quantify the potential residual impacts (direct, indirect and cumulative) that may occur following completion of urban development after considering and applying avoidance and minimisation measures.
Relevant policy and guidance	***EPA Policy and Guidance*** *Statement of Environmental Principles, Factors and Objectives,* EPA, 2016 *Environmental Factor Guideline – Flora and vegetation*, EPA, December 2016 *Technical Guidance: Flora and vegetation surveys for environmental impact assessment*, EPA, December 2016 *Instructions and Form: IBSA Data Packages*, EPA, June 2018

Terrestrial Fauna	
EPA objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Relevant activities	• Clearing of fauna habitat for future urban development, including for the construction of roads and other infrastructure; • Movement of machinery and vehicles; and • Increased presence of artificial light, noise and human activity.
Potential impacts and risks	• Permanent loss of fauna habitat, including up to 36 hectares of black cockatoo habitat and 485 potential black cockatoo breeding trees identified on site; • Fragmentation of fauna habitat and loss of ecological connectivity; • Degradation of habitat and habitat modification from the introduction and increased spread of weeds and/or disease, altered surface water flows and edge effects; and • Altered fauna behavior due to noise, lighting and human presence.
Required work	6. In accordance with the requirements of EPA Guidance: (a) conduct a Level 1 (basic)terrestrial fauna survey, including a desktop study that incorporates existing regional terrestrial fauna surveys and databases; and (b) as required based on the outcomes of the Level 1 (basic) survey undertake terrestrial fauna surveys, including targeted surveys for significant species, to identify and characterise terrestrial fauna and fauna habitat, at a local and regional scale, that may be impacted directly and indirectly by urban development. This should include sampling inside and outside the impact areas and consideration of cumulative impacts. For significant species, this must include information on: I. the abundance, distribution, ecology and habitat preferences, together with baseline information and mapping of local and regional occurrences. II. a population size and importance of the population from a local and regional perspective; and III. information on conservation value of each habitat type (e.g. breeding, migration, feeding, resting) from a local and regional perspective, including the percentage representation of each habitat site in relation to its local and regional extent. **Note**: Surveys should include both Terrestrial Vertebrate Fauna and Short-range Endemic (and/or other significant) Invertebrate Fauna. Survey results and a demonstration of how the requirements have been met are to be included in the ER. If multiple surveys have been undertaken to support the assessment, a consolidated report should be provided including the integrated results of the surveys. Where

	surveys were undertaken prior to scoping, justification should be provided to demonstrate that they are relevant and consistent with EPA Guidance. IBSA data packages should be provided in accordance with EPA guidance. Multiple surveys should be combined in one report. Separate reports are required for Short-range Endemic Invertebrate Fauna and Vertebrate Fauna. 7. Describe the values and significance of fauna and fauna habitat that maybe impacted directly and indirectly by urban development and describe the significance of these values in a local and regional context. Habitats that are important to significant species, and the reasons for their importance, should be identified. Discussions of habitats should quantify the absolute and relative areas of the habitats in question, and that these discussions should be supported by tables and figures that illustrate the extents of habitats. 8. Provide a map illustrating the known recorded locations of conservation significant species, other significant fauna and fauna habitat in relation to the amendment area. Clearly show any areas/lots unable to be surveyed. 9. Provide a map depicting areas of fauna habitat to be retained and protected from future urban development. Describe and assess the extent of direct and indirect impacts as a result of future urban development to terrestrial fauna taking into consideration cumulative impacts and the significance of fauna and fauna habitat. This should include an assessment of the risk posed to any significant species as a result of urban development. For significant species, this should be done on a species-by-species basis. Significant species discussed should include short-range endemic and other significant invertebrates. 10. Predict the residual impacts to terrestrial fauna after considering and applying avoidance and minimisation measures. 11. Discuss proposed management, monitoring and mitigation methods to be implemented to ensure residual impacts (direct and indirect) are not greater than predicted.
Relevant policy and guidance	***EPA Policy and Guidance*** *Statement of Environmental Principles, Factors and Objectives*, EPA, 2016 *Environmental Factor Guideline – Terrestrial Fauna*, EPA, December 2016 *Technical Guidance: Sampling methods for terrestrial vertebrate fauna*, EPA, December 2016 *Technical Guidance: Terrestrial fauna surveys*, EPA, December 2016 *Technical Guidance: Sampling of short range endemic invertebrate fauna*, EPA, December 2016 *Instructions and Form: IBSA Data Packages*, EPA, June 2018

	Other policy and guidance Relevant recovery plans, conservation advices and/or threat abatement plans for conservation significant species that are known to occur, or are likely to occur in the vicinity of the amendment area.

Inland Waters	
EPA objective	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Relevant activities	Clearing of vegetation and alteration of natural drainage regimes for urban development.
Potential impacts and risks	• Loss of foreshore vegetation; • Impacts to natural surface and groundwater regimes; and • Impacts to water quality.
Required work	12. Identify and assess the values and significance of hydrological and soil characteristics within the amendment area and immediate adjacent area and describe these values in a local and regional context. 13. Describe and assess the potential impacts (direct and indirect) as a result of future urban development on water quantity and quality in relation to ground water, surface water and waterways. 14. Predict the extent, severity and duration of potential impacts, including changes to local and regional groundwater flows and levels, drawdown, local water quality and impacts to other groundwater users as a result of urban development. 15. Prepare a foreshore area report to determine the extent of the waterway foreshore areas to be protected, in accordance with Operational policy 4.3: Identifying and establishing waterways foreshore areas (DoW, 2012). 16. Based on the outcomes of the above and taking into consideration the principles of avoidance and minimisation, identify an environmentally acceptable area for development. 17. Provide a summary of residual impacts of future urban development within the amendment area. 18. Describe any proposed avoidance, mitigation and management measures that demonstrate the EPA's objectives can be met. 19. Prepare a district water management strategy in accordance with the Guidelines for district water management strategies (DoW, 2013).

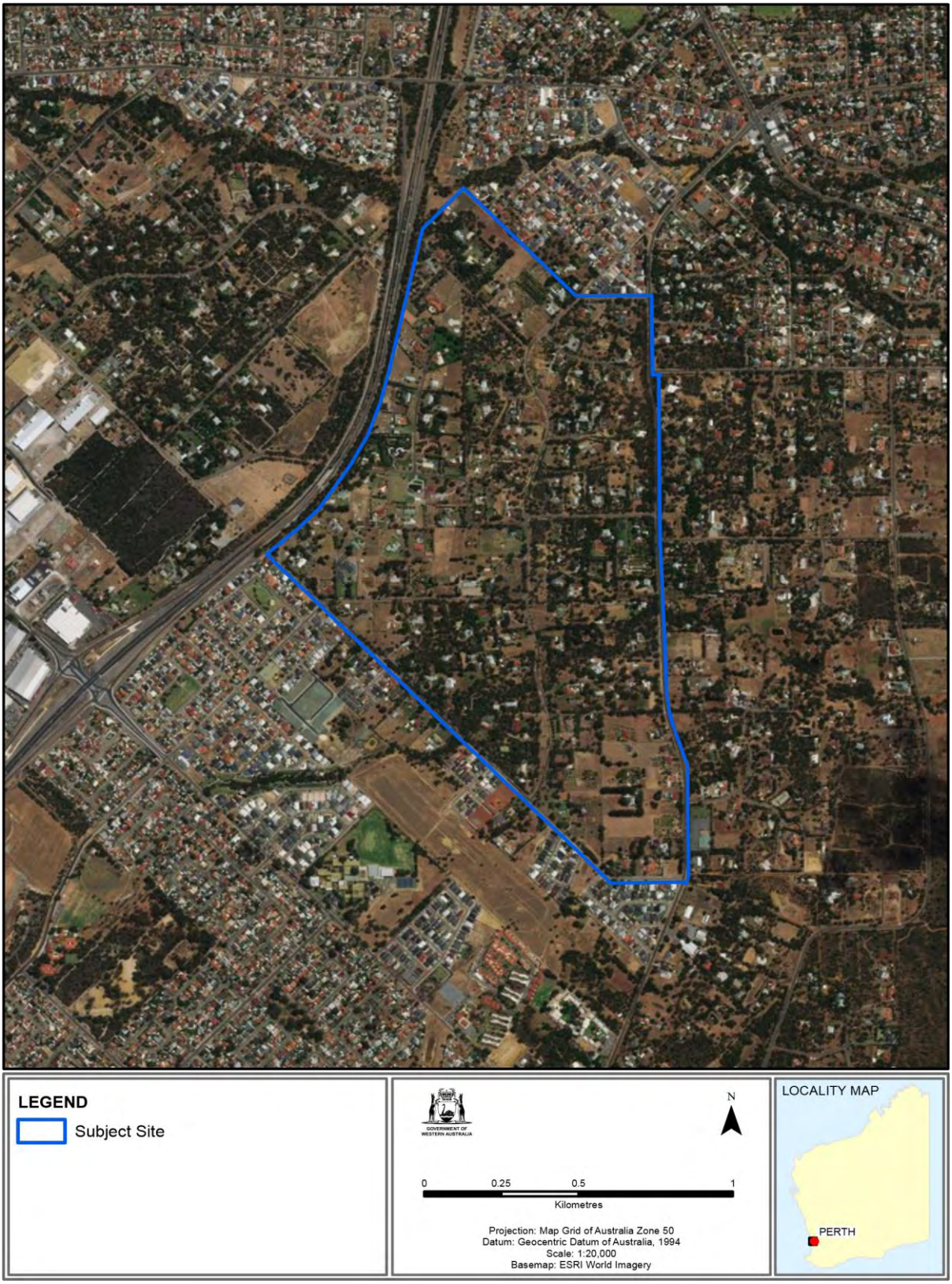
Relevant policy and guidance	***EPA Policy and Guidance*** *Statement of Environmental Principles, Factors and Objectives*, EPA, 2016 *Environmental Factor Guideline – Inland Waters*, EPA, June 2018 **Other policy and guidance** *Better Urban Water Management*, Western Australian Planning Commission, October 2008 *Guidelines for district water management strategies,* Department of Water, December 2013 *Identification and investigation of acid sulphate soils and acidic landscapes*, Department of Environment Regulation, June 2015 *Operational policy 4.3: Identifying and establishing waterways foreshore areas,* Department of Water, September 2012. *Treatment and management of soil and water in acid sulphate soil landscapes*, Department of Environment Regulation, June 2015

These preliminary key environmental factors must be addressed by the ER for the public to consider the impacts of future urban development resulting from the scheme amendment, and proposed management, and make comment to the EPA. All technical reports, modelling and referenced documents (not currently in the public domain) used in the preparation of the ER document should be included as appendices to the ER document. Documents used in the preparation of the ER must not contain disclaimers that preclude their public availability. The EPA anticipates addressing these factors in its report to the Minister for Environment.

4. Other environmental factors or matters

It is important that the responsible authority be aware that other factors or matters may be identified during the course of the environmental review that were not apparent at the time that these instructions were prepared. If this situation arises, the responsible authority must consult with the EPA to determine whether these factors and/or matters are to be addressed in the ER, and if so, to what extent.

Figure 1 – Location



GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

Instructions : Environmental Review Document – Schemes

Preparation of the Environmental Review Document - Schemes

Purpose of this document

To assist responsible authorities to prepare an Environmental Review Document (ERD), which is required where the Environmental Protection Authority (EPA) has decided that the responsible authority must undertake an environmental review under section 48A(1)(b) of the *Environmental Protection Act 1986* (EP Act).

Purpose of an Environmental Review Document

To provide a report on the environmental review to the EPA, to meet the requirements of section 48C(1)(a) of the EP Act.

How to prepare an Environmental Review Document

Template

The template provides the structure of the ERD and the minimum requirements for an ERD. The EPA expects that the ERD contains the content outlined in the template and the scheme amendment-specific requirements specified in the approved Instructions.

The EPA expects responsible authorities to follow the ERD template.

Advice

Responsible authorities may contact EPA Services, Department of Water and Environmental Regulation (DWER) if they need assistance to prepare an ERD.

October 2018

Content of an Environmental Review Document

General requirements

Content

- Provide information in plain English.
- Include the appropriate level of detail to demonstrate a robust and scientifically sound assessment of the impacts on the environment from the scheme amendment.
- Provide key information from the environmental review (including characterisation of the environment, predicted impacts, summary of proposed management measures, predicted outcomes and conclusions) in the ERD so that is a stand-alone document.
- Use consistent terminology and units, especially for study areas and boundaries.

Disclaimers

Any disclaimers included in the ERD should not prevent the EPA from using the ERD for its assessment. This includes providing copies to decision-making authorities and other agencies, and members of the public, and using and reproducing information to prepare the EPA's assessment report.

Spatial data and figures

Provide spatial data in GIS format, that is geo-referenced and conforms to the following parameters:

- Data type: closed polygons that represent the scheme or scheme amendment boundary and the extent of zones and reserves.
- Format: ESRI geodatabase or shapefile.
- Coordinate System: GDA94 (datum) and projected into the appropriate Map Grid of Australia (MGA) zone.

Provide maps and figures that are clear and readable, of appropriate scale, in either jpeg or pdf format and of good resolution (> 300 ppi). "Flatten" figures to reduce the size of the ERD.

Index of Biodiversity Surveys for Assessments (IBSA)

The IBSA project is a mechanism by which all biodiversity survey information collected for environmental impact assessment under the EP Act will be captured and integrated into a consolidated, indexed and publicly available repository. IBSA is administered by DWER on behalf of itself, the EPA and the Department of Mines, Industry Regulation and Safety.

Each time a biodiversity survey report is submitted (at any point in the assessment and compliance process under Part IV of the EP Act) it should be accompanied by an electronic appendix known as the IBSA data package.

The IBSA data package should be provided in accordance with the Instructions and Form: IBSA Data Packages.

Cover page

Include:

- Scheme amendment title
- Date
- Author
- Assessment Number.

Document control

Include a table at the front of the ERD with version, date and authorisation (name and signature).

If someone other than the Chief Executive Officer (CEO) (including a consultant) submits the ERD, provide evidence of authority to act on behalf of the CEO.

Scoping checklist

- Enter the tasks from the required work table in the approved ER.
- Provide section references and page numbers of the ERD where the ERD adequately addresses the required work.

Executive summary *[optional, depending on complexity of scheme amendment and number of preliminary key environmental factors – confirm with EPA Services, DWER if required]*

- Provide an overview of the scheme amendment, including a summary of the scheme amendment
- Provide a summary of the environmental review.

1. Introduction

1.1. Purpose and scope

Provide the purpose and scope of the ERD.

1.2. Responsible authority

- Provide the name and address of the responsible authority.
- Provide the key contact and details for the scheme amendment.

1.3. Environmental impact assessment process

Discuss key legislative requirements relating to the scheme amendment, including:

- Part IV of the *Environmental Protection Act 1986.*
- *Planning and Development Act 2005.*

2. The scheme amendment

2.1. Background

- State when the scheme amendment was referred, when the EPA decision to assess was made, and when the Instructions were sent.
- Describe any modifications to the scheme amendment since referral or INSTRUCTIONS.

2.2. Scheme amendment description

- Provide a comprehensive description of the scheme amendment, including land uses that the proposed zoning will permit, expected reserves (their purposes, sizes and locations), expected infrastructure, transport corridors and population increase.
- Discuss how the scheme amendment fits within the region in relation to other developments, the existing environment and environmental assets such as conservation reserves, RAMSAR wetlands etc.
- Refer to appropriate figures.

3. Environmental principles and factors

3.1. Principles

Complete the table showing how the EP Act principles have been considered in relation to the scheme amendment.

3.2. Key environmental factor 1

3.2.1. EPA objective

State the EPA objective for this factor (see the EPA's *Statement of environmental principles, factors and objectives*).

3.2.2. Policy and guidance

List the relevant policy and guidance for this factor (see the EPA's *Framework for environmental considerations in EIA*).

3.2.3. Existing environmental values

Required Work items 1 and 2 of the ER Instructions

Provide maps and information as required.

3.2.4. Areas to be retained and protected

Required Work item 3 of the ER Instructions

- Provide maps and information as required.

3.2.5. Mitigation

Required Work item 4 of the ER Instructions.

- Describe how the mitigation hierarchy (avoid, minimise, rehabilitate) has been applied against the environmental objective -
- Provide an Environmental Management Plan (EMP) (see *Instructions and Template: Part IV Environmental Management Plans*) as an appendix to the ERD if:
    - it is considered that management measures would need to be conditioned and/or
    - an EMP is a requirement of the INSTRUCTIONS.

3.2.6. Residual impacts and Predicted outcome

Required Work item 5 of the ER Instructions.

- Evaluate the significance of the potential impacts (direct, indirect and cumulative) of urban development on the environmental factor in a local and regional context.
- Provide a map showing the extent of the environmental value overlayed by the areas to be retained and protected from direct and indirect impacts.
- Discuss the application of the relevant policy, guidance and legislation and provide justification if it is not followed.
- Describe the predicted outcome against the environmental objective.
- Discuss whether there is likely to be a significant residual impact

3.3. Key environmental factor 2 etc

4. Other environmental factors or matters

Discuss other environmental factors or matters against the environmental objectives/s where identified:

- in the INSTRUCTIONS and/or
- during the course of undertaking the environmental review.

Other environmental factors or matters may be summarised in a tabular format.

5. Holistic impact assessment

Provide a holistic assessment of the impacts of the scheme amendment on the whole environment. Describe the connections and interactions between the parts of the environment (environmental factors) and discuss predicted outcomes in relation to the environmental principles and the EPA's environmental objectives.

References

- Use a recognised referencing style and use consistently.
- Use a consistent format when referencing material in the ERD e.g. (Smith 1995) or (Smith 1995; Jones and Sampson 1996).
- List references in alphabetical order.
- Include relevant policy and guidance.

Appendices

- Include all supporting documents (studies, investigations and reports) used to prepare the ERD.
- Where supporting documents are publicly available at no cost, a hyperlink to the document may be used rather than including a copy of the document (e.g. Ministerial Statement etc).
- If supporting documents recommend further work be undertaken, the ERD should state whether these recommendations are supported and if not, why not.

Submitting an Environmental Review Document

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or

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Email: info.epa@dwer.wa.gov.au

Website: www.epa.wa.gov.au

End of instructions. Environmental Review Document template is on next page.

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Tables (Including but not limited to)

Summary of the scheme amendment

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Maps as required by the ER instructions

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[Relevant technical studies and investigations]

[Environmental Management Plans]

[IBSA Data Package]

Scoping Checklist

Task No.	Required work	Section and Page No.
EPA factor 1		
1.		
2.		
3.		
4.		
5.		
EPA factor 2 etc		
10.		
11.		
12.		
13.		
14.		
15.		

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Table : EP Act principles

Principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by:* a) *careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* b) *an assessment of the risk-weighted consequences of various options.*	
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	
4. Principles relating to improved valuation, pricing and incentive mechanisms a) *Environmental factors should be included in the valuation of assets and services.* b) *The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* c) *The users of goods and services should pay prices based on the full*	

life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. d) *Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.*	
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	

Appendix B
360 Environmental
Flora and Fauna Survey 2016

360 environmental

Various Lots - Maida Vale

Flora and Fauna Report

Prepared for:

Burgess Design Group

February 2016

people • planet • professional

Document Reference	Revision	Prepared by	Reviewed by	Admin Review	Submitted to Client	
					Copies	Date
1283 AB	A INTERNAL DRAFT	NW/LS	RF	FB	1 Electronic (email)	19/02/16
1283 AB	B CLIENT DRAFT	NW/LS			1 Electronic (email)	02/03/16
1283 AB	C CLIENT FINAL				2 Hardcopies 1 Electronic (CD)	

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Executive Summary

360 Environmental Pty Ltd (360 Environmental) was commissioned by Burgess Design Group in September 2015 to undertake a Level 2 flora and vegetation assessment, a Level 1 fauna assessment and Black Cockatoo habitat assessment on a 100 ha site in Maida Vale (Survey Area). The purpose of the assessment is to provide flora and fauna information associated with the rezoning of a large number of lots.

On survey dates 16 and 21 September and 7 October 2015 a total of 135 taxa (including species, subspecies, varieties and forms) from 95 genera and 37 families were recorded in the Survey Area.

One conservation significant flora species, *Conospermum undulatum* was recorded in the Survey Area at four locations. *Conospermum undulatum* is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Vulnerable and gazetted as Declared Rare Flora (Threatened) pursuant to the *Wildlife Conservation Act 1950* (WC Act). Database searches identified seven State (WC Act) listed Threatened Ecological communities (TECs) as occurring within 5 km of the Survey Area, with three of these listed under the EPBC Act. One Priority community was also identified.

Results from the statistical analysis and data interpretation indicate that vegetation associations indicated by mapping codes CcEm, CcMp, AhDg, EmNf and EmAh are analogous to TEC FCT SCP20a *Banksia attenuata* woodlands over species rich dense shrublands (listed as Endangered [WC Act]) which cover 26.2% of the vegetation in the Survey Area.

The database searches indicated that 33 conservation significant vertebrate species from 19 families have been recorded in the vicinity of the Survey Area and could potentially occur. Of these two were reptiles from two families, 25 were birds from 12 families, and six were mammals from five families.

The fauna field assessment was undertaken on 16th, 17th and 23rd September 2015. Four species of conservation significance were recorded during the field assessment; the Rainbow Bee-eater, which was observed and heard throughout the Survey Area, Carnaby's Black Cockatoo and Forest Red-tailed Black Cockatoo were both observed feeding in the Survey Area and the Southern Brown Bandicoot, which was seen running across an area of open vegetation.

During the Black Cockatoo habitat assessment, 485 potential breeding trees were recorded. These were comprised of Marri, Jarrah, Wandoo and Flooded Gum. These trees also provided foraging habitat for Black Cockatoos.

Permits

This flora survey was conducted under the following licences issued by DPaW; Licence to take flora for scientific or other prescribed purposes SL011541 and Permit to take Declared Rare Flora 44-1516 issued to Narelle Whittington.

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1 Introduction

1.1 The Project

360 Environmental Pty Ltd (360 Environmental) was commissioned by Burgess Design Group in September 2015 to undertake a flora and fauna assessment in Maida Vale. The assessment consisted of a Level 2 flora and vegetation assessment, a Level 1 fauna assessment and Black Cockatoo habitat assessment on a 100 ha site in Maida Vale (Survey Area). The Survey Area consists of a number of lots bordered by Roe Highway to the west, Hawtin Road to the east and Sultana Road to the south. The Survey Area is located approximately 15 km east of Perth, Western Australia (WA) (Figure 1).

The purpose of the assessment is to provide flora and fauna information associated with the rezoning of a large number of lots.

1.1.1 Objectives

The objectives of the flora and vegetation assessment were to:

- Conduct a desktop assessment of relevant literature, databases and spatial datasets to determine the environmental values and any potential issues, such as Threatened/Rare and significant species, Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs), that may be present in the Survey Area and surrounds;
- Produce a list of plant species (including weed species);
- Document and map the location of any Declared Rare Flora (DRF), Priority flora and any other flora of local or taxonomic significance;
- Identify, map and discuss the significance of any TECs, PECs and any other areas of ecological importance (e.g. National Parks, wetlands and Environmentally Sensitive Areas [ESAs] etc.);
- Assess, map and photograph vegetation condition; and
- Document, describe and map the vegetation associations present.

The objectives of the fauna assessment were to:

- Conduct a desktop assessment of fauna databases and any relevant literature;
- Document, describe and map the vertebrate fauna habitats present;
- Identify fauna of conservation significance that may potentially occur in the Survey Area; and
- Record opportunistic fauna sightings.

The objective of the Black Cockatoo Survey was to:

- Identify and determine the type and extent of habitat (breeding and foraging) suitable for Black Cockatoos in the Survey Area with reference to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (now Department of the Environment [DotE]) Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) referral guidelines for three threatened Black Cockatoo species (DESEWPaC 2011).

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6464200 6464000 6463800 6463600 6463400 6463200 6463000 6462800 6462600 6462400 6462200 6462000 6461800

TEWART RD
BRAE RD
BRAND RD
ROE HWY
BAZA GDNS
DARTER WY
MAIDA VALE RD
MCCORMACK PL
LILIAN RD
JUBATA CT
GILBA PL
MILLSON ST
HAROLD RD
OXFORD CT
IRWIN PL
QUENINGTON CT
NORWOOD RD
RHODES PL
ARUNDEL CT
BREWER RD
SMOKEBUSH PL
RAVENSWOOD RD
ULTANA RD WEST
KENT RD
MAUD RD
MULBERRY CT
FRUIT TREE CR
BRUCE RD
HAVTIN RD
APRICOT ST
SEVILLE RD
GALA WY
MANDON ST
NANDAT RD
WARDA CR
SULTANA RD EAST
PEARCE AV
SETOSA DR
LESCHENAULTIA WY
BERKSHIRE RD
CAMELLIA LOOP

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MIDLAND

Legend

Project Area

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014

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CREATED	CHECKED	APPROVED	REVISION	DATE
CS	NW	TS	0	24/11/2015

HORIZONTAL DATUM	DRAWING ID
GDA 1994 MGA Zone 50	1283

0 50 100 200 300 400
Meters
1:7,000 @ A3

Burgess Design
Maida Vale

Figure 1
Site Location

K:\Projects\1.0 EBS\1283 Maida Vale\Figures\Flora and Fauna Report\1283 F1 FFR Site Location.mxd

1.2 Background to the Protection of Flora, Vegetation and Fauna

Western Australian (WA) flora and fauna is protected formally and informally by various legislative and non-legislative measures, which are as follows:

Legislative measures:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);
- Wildlife Conservation Act 1950 (WC Act);
- Environmental Protection Act 1986 (EP Act); and
- Biosecurity and Agriculture Management Act 2007 (BAM Act).

Non-legislative measures:

- Western Australian Department of Parks and Wildlife (DPaW) Priority lists for flora, ecological communities and fauna;
- Weeds of National Significance (WONS); and
- Recognition of locally significant populations by the DPaW.

A short description of each is given below. Other definitions, including species conservation categories, are provided in Appendix A. Conservation categories for ecological communities are provided in Appendix B.

1.2.1 EPBC Act

The EPBC Act aims to protect matters of national environmental significance (MNES). Under the EPBC Act, the Commonwealth Department of the Environment (DoE) lists threatened species and communities in categories determined by criteria set out in the Act (www.environment.gov.au/epbc/index.html) (Appendix A and B).

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is listed as Endangered under the EPBC Act. The Forest Red-tailed Black Cockatoo (FRTBC [*Calyptorhynchus banksii naso*]) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) are classified as Vulnerable.

Projects likely to cause a significant impact on MNES should be referred to the DoE for assessment under the EPBC Act.

1.2.2 WC Act

The WA DPaW lists flora and fauna under the provisions of the WC Act as protected according to their need for protection (Appendix A).

Flora is given Declared Rare status when populations are geographically restricted or are threatened by local processes. In addition, under the WC Act, by Notice in the WA Government Gazette of 9 October 1987, all native flora (spermatophytes, pteridophytes,

bryophytes and thallophytes) is protected throughout the State. Fauna are classified as Schedule 1 to Schedule 4 according to their need for protection.

Under the WC Act both Carnaby's Black Cockatoo and Baudin's Black Cockatoo are listed as Endangered and the FRTBC is listed as Vulnerable.

1.2.3 EP Act

Declared Rare Flora (DRF) and TECs are given special consideration in environmental impact assessments, and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Exemptions for a clearing permit do not apply in an ESA. In addition, habitat necessary for the maintenance of indigenous fauna is considered in the clearing principles and assessed during consideration of applications for a clearing permit.

1.2.4 BAM Act

Plants may be 'Declared' by the Agriculture Protection Board (APB) under the BAM Act 2007 (WA). Declared Plants are gazetted under three categories (C1-C3), which define the action required. Details of the definitions of these categories are provided in Appendix C. A declaration may apply to the whole State, to districts, individual properties or even to single paddocks. If a plant is 'Declared', landholders are obliged to control that plant on their properties (Department of Agriculture and Food Western Australia [DAFWA] 2014).

1.2.5 Weeds of National Significance

The Australian Government along with the State and Territory governments has endorsed 32 WONS. Four major criteria were used in determining WONS:

- The invasiveness of a weed species;
- A weed's impacts;
- The potential for spread of a weed; and
- Socio-economic and environmental values.

Each WONS has a national strategy and a national coordinator, responsible for implementing the strategy. WONS are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts (Thorp & Lynch 2000).

1.2.6 DPAW Priority Lists

The DPaW lists 'Priority' flora and fauna that have not been assigned statutory protection as Declared Rare or 'Scheduled' under the WC Act, but which are under consideration for declaration as DRF or 'Scheduled' fauna. Flora and fauna assessed as Priority 1-3 are considered to be in urgent need of further survey. Priority 4 flora and

fauna require monitoring every 5-10 years and Priority 5 flora and fauna are subject to a specific conservation programme (Appendix A).

The DPaW maintains a list of PECs which identifies ecologically valuable communities that need further investigation before possible nomination for TEC status. Once listed, a community is a PEC, and when endorsed by the WA Minister of Environment becomes a TEC, and protected as an ESA under *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Appendix B).

1.2.7 Informal Recognition of Flora and Fauna

Certain populations or communities of flora may be of local significance or interest because of their patterns of distribution and abundance. For example, specific locations of flora may be locally significant because they are range extensions to the previously known distribution, or are newly discovered taxa (and have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (e.g. land clearing, grazing and changed fire regimes), and relict populations of such species assume local importance for the DPaW. It is not uncommon for the DPaW to make comment on these species of interest.

1.3 Background to Black Cockatoos

Three species of Black Cockatoo are found in south-west WA; Carnaby's Black Cockatoo, FRTBC and Baudin's Black Cockatoo. All three Black Cockatoos have suffered a substantial decline in numbers and breeding distribution in the past 50 years (Johnstone & Storr 1998a). Direct causes of population decline include the large numbers shot by orchardists (mainly associated with Baudin's Black Cockatoo), clearing and fragmentation of habitat (especially the loss of breeding hollows), the impact of hollow competitors including the Galah (*Cacatua roseicapilla*), corellas including Butler's Corella (*Cacatua pastinator butleri*), Australian Shelduck (*Tadorna tadornoides*), Australian Wood Duck (*Chenonetta jubata*), the feral European honey bee (*Apis mellifera*), and also vehicle strikes. Around 60% of the original vegetation on the Swan Coastal Plain has been cleared and up to 85% in other parts of the south-west region for agriculture (crops), meat production, dairying, farms, orchards, vineyards, pine plantations, mining, timber and wood chipping, cities and towns. At present, extensive tracts of uncleared land only remain in State forest and conservation reserves and what is left of remnant vegetation (in roadside verges etc.) is often disturbed to a varying degree (Johnstone & Kirkby 2011).

The south-west region is now a severely fragmented landscape and the further loss of foraging habitat, the lack of suitable breeding sites, climate change, and alterations in the landscape led to significant changes in forest structure. Almost every part of the Jarrah-Marri forest has been logged in the past, and most present day trees are too young to form hollows, and competition with exotic species, exacerbate the future conservation of Carnaby's Black Cockatoo, FRTBC's and Baudin's Black Cockatoo

(Johnstone & Kirkby 2011). The Survey Area is within the known distribution of all three Black Cockatoo species and so each species will be considered in this report.

2 Biophysical Environment

2.1 Climate

The closest official Bureau of Meteorology (BoM) weather station currently operating near to the Survey Area is the Perth Airport Weather Station (Station number 009021), approximately 4.6 km west of the Survey Area. The climate for Maida Vale is described as warm Mediterranean (Mitchell *et al.* 2002), with mean minimum of approximately 12.1 °C and a mean maximum of 24.5°C. Average annual rainfall is 768.8 mm (Figure 2) (BoM 2015).

The Perth Airport weather station recorded 477.4 mm of rain in the eight months prior to the Spring survey (January 2015 – August 2015) which is 134.4 mm below the long term average rainfall of 611.8 mm for the same period (BoM 2016). The three months prior to survey (June 2015 – August 2015), Perth Airport recorded 301.8 mm of rainfall, 30.1 % below the 431.6 mm average rainfall for the same period (BoM 2016).

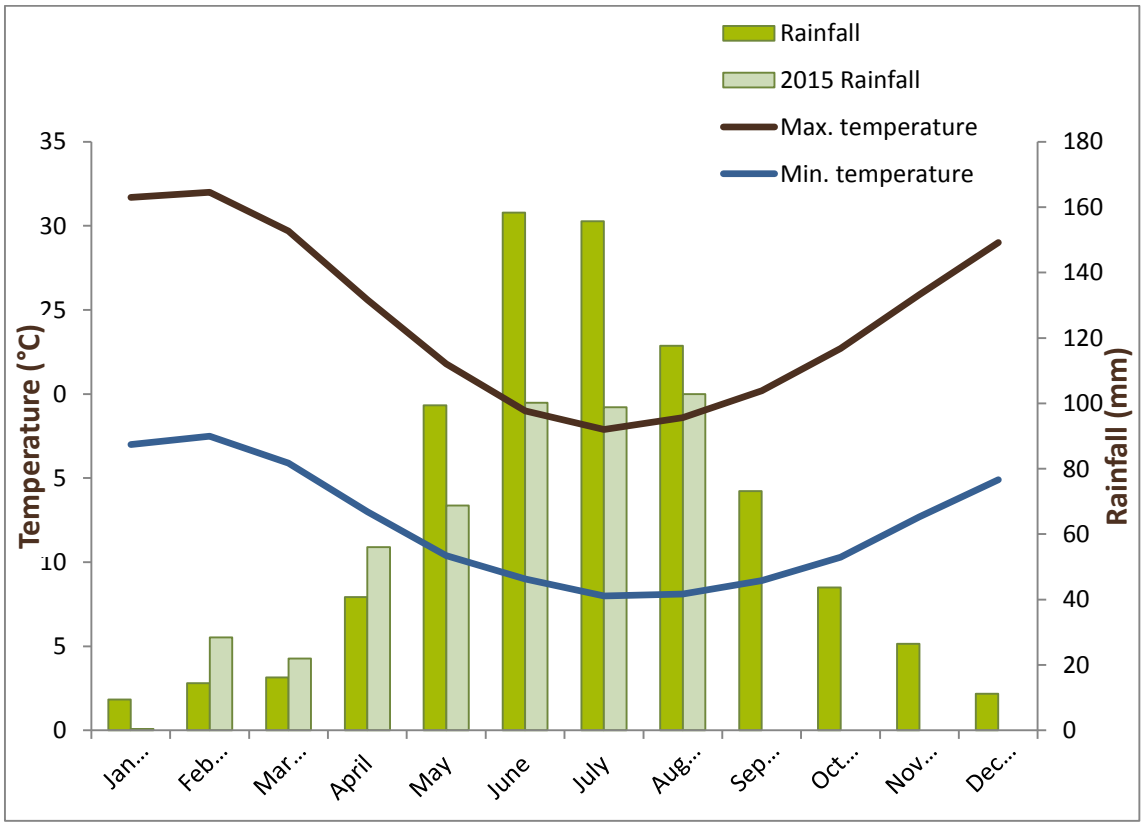

Figure 2: 2015 rainfall and mean rainfall for Perth Airport Weather Station (009021) from 1944 to 2015 (BoM 2016).

2.2 Geology and Soils

Soil-landscape mapping of south-west WA has been captured at scales ranging from 1:20 000 to 1:250 000 (DAFWA 2012). Soil-landscape mapping describes broad soil and landscape characteristics from regional to local scales.

The Survey Area contains the following geological units:

- 213Fo – Undulating foot slopes of the Darling and Whicher Scarps. Duplex sandy gravels, pale deep sands and grey deep sandy duplexs. Woodland of Eucalyptus marginata, Corymbia calophylla and E, wandoo with some Banksia grandis; and
- 213Pj – Swan Coastal Plain from Perth to Capel. Poorly drained coastal Plain with variable alluvial and Aeolian soils. Variable vegetation includes, Jarrah, Marri, Wandoo, Paperbark, Sheoaks and Rudis.

The Survey Area contains the following soil systems:

- Mgs1, Pebbly silt – Strong brown silt with common fine to occasionally coarse-grained, sub rounded laterite quartz, heavily weathered granite pebble, some fine to medium-grained quartz sand of alluvial origin;
- Mgs2, Gravelly Silt – strong brown, tough with common pebbles of fine to coarse – grained, sub-rounded, granite, some dolerite and rare sandstones variable sand content;
- S12, Sand – yellow fine to medium –grained, sub-angular to rounded quartz, with some feldspar, well sorted, variable silt content, of colluvial origin; and
- S10, Sand – very light grey at surface, yellow at depth, fine to medium – grained, sub rounded quartz, moderately well sorted of eolian origin.

2.3 Hydrology

The Geomorphic Wetlands dataset is identified and utilised by the EPA, Department of Environment Regulation (DER) and the Department of Planning as a basis for planning and decision making.

The closest Multiple-Use wetlands (UFI 8960 and 15906) (MUW) as mapped by DPaW Geomorphic Wetlands Dataset are 600 m to the west of the Survey Area, The closest Resource Enhancement Wetlands (REW) (UFI 15877 and 15881) are 350 m to the west of the Survey Area. The location is presented in Figure 3.

There are no geomorphic wetlands within the Survey Area, however, Crumpet creek dissects the southern section of the Survey Area. The portion of the creek that crosses the Survey Area is mapped as Local Open Space (Reserve ID R 37650).

2.4 Bush Forever

Bush Forever is a State Government Policy and programme that identifies 51,200 ha of regionally significant vegetation for protection, covering 26 vegetation complexes. This amounts to approximately 18% of the original vegetation on the SCP biogeographic region of the Perth metropolitan area.

Regionally significant vegetation has been identified based on criteria relating to its conservation value. Important criteria in the identification process include the achievement, where possible, of a comprehensive representation of all the ecological communities originally occurring in the region, principally through protecting a target of at least 10% of each vegetation complex in the Bush Forever project boundary (Government of WA 2000).

No Bush Forever Sites are within the Survey Area, the nearest occurrence is Bush Forever site 45 – Poison Gully Bushland, High Wycombe, which is 100m to the west.

2.5 Ecological Linkages

The Survey Area forms part of the Perth Biodiversity Project's Draft Regional Ecological linkage network presented in Figure 3. The purpose of the Regional Ecological Linkages identified by the Perth Biodiversity Project was to link protected natural areas with other areas of mapped native vegetation. Priority was given to identifying linkages through those areas having the greatest assumed protection and to those areas that maximised opportunities to form continuous corridors of native vegetation. One linkage intersects the Survey Area, Linkage 135 includes the northern tip portion of the Survey Area.

Ecological linkages are not legislatively protected, however, the EPA expects that in preparing plans and proposals for development, consideration will be given to both the site-specific biodiversity conservation values of patches of native vegetation, as well as the landscape function and core linkage significance of a patch in supporting the maintenance of an ecological linkage.

2.6 Broad Vegetation Types

Vegetation across the State has been mapped at different scales by various people. The Survey Area has been mapped by both Beard (1979) which was later reassessed by Shepherd *et al*. (2001). Heddle *et al.* (1980) also undertook vegetation mapping for the region and therefore both these studies have been used to demonstrate the broad vegetation types in the Survey Area (Tables 1 and 2).

The Shepherd *et al.* (2001) and Heddle *et al.* 1980) studies have been used to estimate how much vegetation is currently present in comparison to the pre-European extent of the same vegetation types. From these comparisons, it can be determined what vegetation types have been extensively cleared and therefore in need of protection. This is later discussed in Section 5.6.

Mapping of the vegetation of the Perth region of Western Australia was completed on a broad scale (1:250,000) by Beard (1978). These vegetation units were re-assessed by Shepherd et al. (2001) to account for clearing in the intensive land use zone, dividing some larger vegetation units into smaller units.

There are three Beard / Shepherd vegetation units in the Survey Area. The Shepherd *et al.* (2001) vegetation types (along with the corresponding Beard [1978] type in brackets), are described below, and their representation within the Survey Area, subregion, region and State is shown in Table 1.

- 3 (e2,3MC) – Bassendean; Medium forest, Jarrah – Marri
- 1001 (e2Mb cbLi) – Bassendean; Medium very sparse woodland; E. marginata with low woodland, Banksia sp. and Casuarina sp.; and
- 1009 (e3, 18Mr) – Bassendean; Medium woodland; marri and river gum.

Table 1: Broad Vegetation Types within the Survey Area and its State and Regional Representation (Government of Western Australia 2013).

	Pre-European area (ha)	Current extent (ha) 1	Remaining (%)	Current extent % in IUCN Class I-IV Reserves1
Vegetation Types (Beard 1979/ Shepherd et al. 2001) in the state				
3	2,661,405.07	1,830,128.04	68.13	26.74
1001	57,410.23	14,151.90	24.65	4.61
1009	18,225.88	3,007.98	16.50	0.11
Vegetation Types (Beard 1979/ Shepherd et al. 2001) in the Swan Coastal Bioregion				
3	17,364.58	3,180.18	18.31	1.22
1001	57,410.23	14,151.90	24.65	4.61
1009	18,184.82	2,986.98	16.43	3.24
Vegetation Types (Beard 1979/ Shepherd et al. 2001) in the Perth Subregion				
3	16,754.96	2,819.11	16.83	1.26
1001	57,410.23	14,151.90	24.65	4.61
1009	18,183.22	2,986.02	16.42	3.24

Mapping by Heddle *et al.* (1980) based in relation to the landform-soil units determined by Churchward and McArthur (1980) identified four vegetation complexes occurring in the Survey Area which are summarised in Table 2 and Figure 4. The delineation of vegetation complexes is based on the concept of series of plant communities forming regularly repeating complexes associated with a particular soil unit. The Heddle *et al.* (1980) vegetation complexes that occur across the Survey Area are described below:

- Forrestfield Complex – Open Forest and fringing woodland; and
- Southern River Complex – Open woodland.

Table 2: Vegetation Complexes within the Survey Area and its State and Regional Representation.

	Pre-European area (ha)	Current extent (ha)	Remaining (%)	Current extent % Secure Tenure Reserves
Vegetation Complex (Heddle *et al.*, 1980) in the System 6/part System 1 area (EPA 2006)				
Forrestfield Complex	20,052	3,518	17.5	0.3
Southern River Complex	57,979	11,501	19.8	1.5
Vegetation (Heddle et al., 1980) in the Swan Coastal Bioregion (PBP 2013)				
Forrestfield Complex	21210.56	2523.76	11.90	1.16
Southern River Complex	57171.55	11254.99	19.69	1.31

3 Methods

3.1 Background

The flora survey was consistent with a single season Level 2 survey as per the EPA requirements for environmental surveying and reporting for flora and vegetation in Western Australia where practical and relevant, as set out in the following documents:

- EPA Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia No. 51 (EPA 2004a); and
- EPA Guidance for the Level of Assessment for Proposals affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 region. Guidance Statement No. 10 (EPA 2006).

The Level 1 fauna survey was compliant with the EPA requirements for the environmental survey and reporting of fauna in Western Australia where practical and relevant, and as set out in the following documents:

- Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3 (EPA 2002);
- Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56 (EPA 2004b);
- Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA-DEC 2010); and
- Survey Guidelines for Australia's Threatened Birds. EPBC Act survey guidelines 6.2.

3.2 Flora and Vegetation Survey Methods

3.2.1 Flora and Vegetation Database Review

The desktop study provided background information on the flora and vegetation of the Survey Area. This involved a search of the following sources:

- DPaW Threatened and Priority Flora database (DPaW 2015);
- DPaW Threatened and Priority Ecological Communities database (DPaW 2015b); and
- DSEWPaC Protected Matters Search Tool (DoE 2015b).

A request for a database search was submitted to the DPaW on the 9th September 2015 (5 km radial search around the Survey Area) to obtain a list of Declared Rare Flora/Threatened or Priority flora, and TECs and PECs in and near the Survey Area (Figure 4). These sources were used to compile a list of expected DRF or Priority species and TECs and PECs that may occur based on the landforms in the Survey Area.

3.2.2 Flora and Vegetation Field assessment

The field assessment was conducted by one botanist, Narelle Whittington, on the 16 and 21 September and 7 October 2015. The Survey Area was found to be mostly cleared with isolated native trees, gardens and non-endemic species. There are pockets of intact native vegetation in several locations also.

The survey included the assessment of six quadrats, five relevés and vegetation mapping notes. Quadrats are vegetation survey plots which are accurately measured out as 10 x 10 m (or an area equivalent to 100 m^2) and marked at the NW corner using a handheld Garmin GPS unit.

The information recorded at each quadrat included landscape features, surface soil colour and texture, bare ground, litter cover, disturbance, fire age, aspect and vegetation condition (Government of Western Australia 2000). Each species of plant at each quadrat was recorded, including information on height and percentage cover. The information from each quadrat was recorded on a single occasion.

3.2.3 Systematic Searches

In addition to the information collected from the quadrats and relevés, traverses throughout the Survey Area were undertaken for significant flora. For each population of significant flora identified during the field assessment, the following was recorded:

- Co-ordinate locations (using handheld GPS units);
- Description of vegetation association present; and
- Estimation of population size.

3.2.4 Taxonomy and Nomenclature

Where field identification of plant taxa was not possible, specimens were collected systematically for later identification utilising resources of the Western Australian Herbarium (WAH).

The species list was checked against FloraBase (WAH 2015) to determine the species conservation status. Threatened and Priority Flora were verified against the EPBC Act listing of threatened species to determine Commonwealth listing.

Introduced species were checked against the DPaW Weed Prioritisation Process (WPP) (DPaW 2013), to determine their ranking in terms of environmental impact. The BAM Act Declared Plants list was consulted to determine if any are Declared Plants, and the WONS list to determine the presence of any WONS (Thorp & Lynch 2000).

3.2.5 Vegetation Mapping

The vegetation mapping units were described based on their structure and species composition, as defined by quadrat and relevé data and field observations. Vegetation was mapped in the field using handheld GPS (Garmin) units and high-resolution aerial photographs, which in the office were digitised using GIS software.

Vegetation condition was mapped in the field using handheld GPS (Garmin) units and high-resolution aerial photographs, which in the office were digitised using GIS software. Vegetation condition was assessed based on Keighery B.J (1994) from Bush Forever (Government of WA 2000) (Appendix D).

3.2.6 Statistical Analysis

All statistics were carried out using Primer-E version 6.1.5 (Clarke & Gorley 2006). Quadrats were classified on the basis of similarity in species composition. Using the results of the multivariate analysis and field observations, boundaries of the vegetation communities were finalised on aerial photographs, at a scale of 1:1,700 with the aid of GPS coordinates taken throughout the field assessment. The vegetation communities were digitised and produced as electronic mapping data using GIS software.

A Bray-Curtis similarity analysis was undertaken on the floristic composition of the quadrats recorded during the survey with weed and native flora quadrat data compiled between 1990 - 1996 for the Southern Swan Coastal Plain (Keighery *et al.* 2012). The Keighery *et al.* (2012) data set combines a total of 1098 sites from numerous studies on the swan coastal plain including Gibson *et al.* (1994), Griffin (1994), DEP (1996) and Keighery (1996).

The purpose of the similarity analysis was to help clarify the assignment of Floristic Community type (FCT) to the quadrat sites recorded during the current survey. The end assignment of FCTs to the survey quadrats was made by summarising the results of the nearest neighbour method. The nearest neighbour method inviolved determination of sites most similar from the Keighery *et al.* (2012) data set to quadrats recorded during this survey.

3.3 Fauna Survey Methods

3.3.1 Fauna Database Review

A 4 km radial search of the EPBC Protected Matters Search Tool (EPBC PMST), NatureMap and DPaW threatened fauna database were undertaken to identify fauna species of conservation significance potentially occurring in the Survey Area (DoE 2015; DPaW 2015d; DPaW 2015e).

Collectively, these sources were used to compile a list of species that have been previously recorded in the vicinity of the Survey Area (Appendix E). This list invariably includes some species that do not occur in the Survey Area, as some fauna have a limited or patchy distribution or a high level of habitat specificity for habitats which are not located in the Survey Area e.g. waders/shorebirds that require coastal shores for habitat. Some fauna may also have become locally extinct or were erroneously identified in previous surveys. These fauna were examined and then excluded from the list where relevant.

3.3.2 Field assessment

The field assessment was undertaken on 16th, 17th and 23rd September 2015 by two Zoologists. The survey was consistent with standard protocols for the region and relevant EPA Guidance Statements and EPBC Act Survey Guidelines as outlined above in section 3.1 (where relevant and practical).

The purpose of the field assessment was to verify the accuracy of the desktop assessment and to further delineate and characterise the fauna assemblages and fauna habitat in the Survey Area. The assessment consisted primarily of a fauna habitat assessment and opportunistic observations. The Survey Area was found to be mostly cleared with isolated native trees, gardens and non-endemic species, with pockets of intact native vegetation in several locations, particularly in the southern part of the Survey Area.

3.3.3 Opportunistic Observation

Fauna were opportunistically observed and recorded during the assessment. The assessment included looking through leaf litter, overturning rocks, looking under decorticating bark and searches for scats, tracks, burrows and other traces of animals throughout the Survey Area (when the habitat supported such features). If conservation significant species were located, the coordinates were recorded with a GPS.

3.3.4 Taxonomy

For species identified in the desktop assessment, where there is doubt as to their true taxonomy (through subsequent name changes or taxonomic reviews), an effort was made to determine the current scientific name for each taxon. In some cases, old scientific names may be presented where correct nomenclature could not be determined due to

name changes. Some taxon names may be followed by 'sp.', meaning that the species name was not given in the data source or the identification is in doubt. Where there are previously recorded taxa such as this that have the potential to be a conservation significant species, they are discussed specifically in the results and discussion section.

Taxonomy and nomenclature in this report follows the accepted listing of published terrestrial vertebrate species. The listing for amphibians and reptiles follows Cogger (2014), birds follows Christidis & Boles (2008) and mammals Van Dyck & Strahan (2008).

3.4 Black Cockatoo Survey Methods

The Black Cockatoo Assessment was undertaken on 16th, 17th and 23rd September 2015.

The Black Cockatoo assessment involved traversing the Survey Area by foot. Any trees meeting each of the following criteria for potential breeding were recorded, marked and electronically logged using a hand held Global Positioning System (GPS) unit:

- Native trees (e.g. Jarrah, Tuart, Marri etc.);
- Diameter at breast height (DBH) > 500 mm (300 mm for Wandoo and Salmon Gum) regardless of the presence or absence of hollows;
- Trees were placed in the following size class categories:
  - A = 500 – 1000 mm DBH
  - B = 1000 – 2000 mm DBH
  - C = >2000 mm DBH

The Black Cockatoo assessment involved assessing the habitat for tree and shrub species known to be important dietary items e.g. Marri and *Banksia sp.* It also included looking for:

- Evidence of feeding (chewed cones, seed and nut material); and
- Opportunistic observations of Black Cockatoos in the Survey Area.

4 Results

4.1 Flora, Vegetation and Fauna Survey Limitations and Constraints

Survey constraints are often difficult to predict, as is the extent to which they influence survey effort. Survey limitations and constraints of the flora, vegetation and fauna survey are detailed in Table 3.

Table 3: Limitations and Constraints Associated with the Survey Area.

VARIABLE	IMPACT ON SURVEY OUTCOMES
Access	Majority of the Survey Area was accessed and traversed. Access was denied for two properties and limited at some other properties due to locked gates. Particular focus was given to areas expected to be impacted that may have species of conservation significance and where there was relatively intact native vegetation present.
Experience	The personnel who executed these surveys were practitioners suitably qualified in their respective fields: ● Field Staff: Narelle Whittington (Botanist) and Dr Ron Firth and Laura Stevens (Zoologists); ● Data Interpretation and Reporting: Narelle Whittington and Laura Stevens ● Report Review: Dr Ron Firth.
Timing, weather, season	The survey was conducted during spring (see section 3.2) after three months of below average rainfall (refer to section 2.1). The climate for Maida Vale is described as warm Mediterranean (Mitchell *et al.* 2002), with a mean minimum of approximately 12.1 °C and a mean maximum of 24.5°C. Rainfall totals, on average, 768.8 mm per annum (Figure 2) (BoM 2015). Flora composition changes with time, particularly seasonally as a result of seasonal conditions. Therefore, botanical surveys completed at different times will have varying results. Fauna were opportunistically observed throughout the day, but especially in the first few hours following dawn, when birds in particular are most active.

Scope: Life forms sampled	The scope of this project included the detailed surveying of flora and vegetation and searching for conservation significant species or communities. As a Level 1 Fauna survey was carried out, many species that occur in the Survey Area would not have been observed, particularly small ground-dwelling fauna that are normally captured by methods such as trapping. All conservation significant species previously recorded in the area have been considered. Based on the habitat present, those species deemed to potentially occur in the Survey Area have been addressed in this report. The scope of this project included the surveying of potential Black Cockatoo habitat, with particular reference to potential breeding habitat.
Sources of information	The desktop analysis used several sources to produce a list of flora and fauna species previously recorded in the vicinity of the project area. This includes records from the EPBC Protected Matters Search Tool (DoE 2015), and DPaW Threatened flora DPaW 2015a), TECs and PECs (DPaW 2015b) NatureMap (DPaW 2015d) and NatureMap fauna search (DPaW 2015d) and DPaW Threatened Fauna Database search (DPaW 2015e) as well as field guides and other scientific literature.
Completeness	The majority of the Survey Area was accessible; however, access was restricted by owners not wanting to take part at two properties and in some instances locked gates prevented access. In these cases, notes were taken from the fence line. All vegetation associations were sufficiently surveyed; with six quadrats, five relevés and additional vegetation mapping notes recorded. Eight fauna habitat assessments were carried out and all trees considered to be potential breeding trees throughout the Survey Area were either measured or assessed from fence lines when access was not possible.
Disturbances	The Survey Area has been severely altered by urbanisation and infrastructure (primarily housing). Only a few pockets of intact native vegetation are present. The majority of the vegetation consists of mature native trees over weed species and garden variety species (including non-endemic trees such as Eucalypts).

4.2 Flora Results

4.2.1 Database Results

The review of the database searches identified 61 conservation significant flora potentially occurring in the vicinity of the Survey Area. Of these, 21 are classed as Threatened, six as Priority 1, two as Priority 2, 21 as Priority 3 and 11 as Priority 4.

The likelihood of these 61 conservation significant flora occurring in the Survey Area is shown in Appendix F.

A search of the DPaW TEC and PEC database and EPBC PMST identified seven State listed TECs as occurring within 5 km of the Survey Area, with three of these listed under the EPBC Act. One Priority community was also identified (Figure 4). These TEC and PEC communities are:

- FCT SCP3a – Corymbia calophylla – Kingia australis woodlands on heavy soils (Critically Endangered [DPaW], Endangered [EPBC]);
- FCT SCP3b – Corymbia calophylla – Eucalyptus marginata woodlands on sandy-clay soils of the Southern Swan Coastal Plain (Vulnerable [DPaW]);
- FCT SCP3c – Corymbia calophylla – Xanthorrhoea preissii woodlands and shrublands (Critically Endangered [DPaW], Endangered [EPBC]);
- FCT SCP2 – Southern wet shrublands (Endangered [DPaW]);
- FCT SCP20a – Banksia attenuata woodlands over species rich dense shrublands (Endangered [DPaW]);
- FCT SCP20b – Eastern Banksia attenuata and /or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (Endangered [DPaW]);
- FCT SCP20c – Eastern shrublands and woodlands (Critically Endangered [DPaW], Endangered [EPBC]); and
- Central Northern Darling Scarp Granite Shrubland Community (Com5 Markey) (Priority 4 [DPaW]).

4.2.2 Overview of Flora

A total of 135 taxa (including species, subspecies, varieties and forms) from 95 genera and 37 families were recorded in the Survey Area, of these 12 were introduced species. The commonly occurring families were; Proteaceae (19 taxa), Fabaceae (17 taxa), and Myrtaceae (14 taxa). The flora inventory is provided in Appendix G and the Survey Area data sheets in Appendix H.

4.2.3 Flora of Conservation Significance

One Threatened species, *Conospermum undulatum* (DRF/T) (Plate 1) was recorded within the Survey Area. *Conospermum undulatum* (DRF/T) is listed under the EPBC Act as Vulnerable and gazetted as Declared Rare Flora (Threatened) pursuant to the WC Act. It was recorded in the Survey Area in four locations (see Table 4 and Figure 5c for locations). The vegetation within the buffers of these conservation significant plants are considered critical habitat and therefore are regarded as ESAs.

One Priority species, *Isopogon drummondii* (P3) (Plate 2), was found in one remnant of vegetation on Brewer Road (See Table 4 and Figure 5a for locations).

Plate 1: *Conospermum undulatum*

Plate 2: *Isopogon drummondii*

Table 4: Locations of *Conospermum undulatum* and *Isopogon drummondii*

TAXA	NO. OF INDIVIDUALS	COORDINATES
Conospermum undulatum (DRF/T)	1	E 407086 N 6462995
	1	E 407092 N 6462003
	1	E 406816 N 6462733
	1	E 407142 N 6463030
Isopogon drummondii (P3)	1	E 407092 N 6463096
	2	E 407065 N 6463114

4.2.4 Introduced Flora

A total of 12 introduced species were recorded during the survey (Table 5). One species, **Asparagus asparagoides*, is listed as Declared under the BAM Act and is also listed as a WONS.

Table 5: Introduced Flora Recorded in the Survey Area and Their Ranking under the DPaW Weed Prioritisation Process (DPaW 2013a).

TAXON	(COMMON NAME)	DPAW WPP RANKING	DECLARED BAM ACT	WONS
**Acacia iteaphylla*	Flinders Range Wattle	High	No	No
**Asparagus asparagoides*	Bridal Creeper	Low	Yes	Yes
**Briza maxima*	Blowfly Grass	Low	No	No

Taxon	(Common Name)	DPaW WPP ranking	Declared BAM Act	WONS
**Briza minor*	Shivery grass	Low	No	No
**Ehrharta calycina*	Perennial Veldt Grass	Low	No	No
**Freesia sp.*	Freesia	Low	No	No
**Gladiolus caryophyllaceus*	Wild Gladiolus	Moderate	No	No
**Hypochaeris glabra*	Smooth Catsear	Low	No	No
**Leptospermum laevigatum*	Coast Teatree	High	No	No
**Oxalis pes-caprae*	Soursob	Low	No	No
**Tribolium uniolae*	Haas grass, Wheat grass	Unknown	No	No
**Ursinia anthemoides*	Ursinia	Negligible	No	No

4.2.5 Vegetation Associations

Six natural vegetation associations were described for the Survey Area. In addition to the associations, 15 vegetation units were also mapped, which included mature trees in isolation or over gardens and weeds. Descriptions of these are provided in Table 6 and Figures 5a – 5c.

Table 6: Vegetation Association and unit Descriptions and their Extent in the Survey Area.

Vegetation Association Code (and sites which represent this Association)	Description	Area (ha)
EmNf (Q1)	Low Open Woodland of *Eucalyptus marginata* and *Nuytsia floribunda* over *Adenanthos cygnorum*, *Daviesia angulata*, *Calothamnus sanguineus*, *Verticordia densiflora* var. *densiflora*, *Mesomelaena pseudostygia* and *Lyginia imberbis*.	0.43
AhDg (Q6)	Shrubland of *Allocasuarina humilis, Caustis dioica, Mesomelaena pseudostygia, Verticordia densiflora* var. *densiflora, Lambertia multiflora* var.	0.28

Vegetation Association Code (and sites which represent this Association)	Description	Area (ha)
	darlingensis, *Mesomelaena tetragona*, *Hibbertia hypericoides* and *Xanthorrhoea preissii*.	
CcMp (Q3)	Open Forest of *Corymbia calophylla* over *Mesomelaena pseudostygia*, *Xanthorrhoea preissii*, *Hibbertia hypericoides*, *Tetraria octandra*, *Acacia pulchella*, *Hakea undulata*, *Banksia dallanneyi* var. *dallanneyi* and *Allocasuarina humilis*.	1.85
CcEm (Q2, Q4, Q5, R3, R4 & R5)	Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over *Xanthorrhoea preissii*, *Hibbertia hypericoides*, *Mesomelaena pseudostygia*, *Acacia pulchella*, *Allocasuarina humilis*, *Synaphea spinulosa* subsp. *spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana*.	7.13
EmAh (R2)	Low Open Woodland of *Eucalyptus marginata* over *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Kingia australis*, *Hibbertia hypericoides* and *Lambertia multiflora* var. *darlingensis*.	0.05
EwXp (R1)	Open Forest of *Eucalyptus wandoo* and *Corymbia calophylla* over *Xanthorrhoea preissii*, *Hibbertia hypericoides*, *Phyllanthus calycinus* and *Banksia dallanneyi* var. *dallanneyi* dominated by weed species.	0.51
Af / Cc / Em	Mature *Allocasuarina fraseriana*, *Corymbia calophylla* and *Eucalyptus marginata* trees in combination over garden and/or weeds.	0.29
Af	Mature *Allocasuarina fraseriana* over garden and/or weeds.	0.98
Af / Em	Mature *Allocasuarina fraseriana* and *Eucalyptus marginata* in combination over garden and/or weeds.	0.58

Vegetation Association Code (and sites which represent this Association)	Description	Area (ha)
Cc	Mature *Corymbia calophylla* over garden and/or weeds.	5.72
Cc / Em	Mature *Corymbia calophylla* and/or *Eucalyptus marginata* in combination over garden and/or weeds.	12.04
Cc/Af	Mature *Corymbia calophylla* and *Allocasuarina fraseriana* in combination over garden and/or weeds.	0.05
CcEr	Mature *Corymbia calophylla* and *Eucalyptus rudis* over garden and/or weeds.	0.63
CcEwEr	Open Woodland of *Corymbia calophylla*, *Eucalyptus wandoo* and *Eucalyptus rudis* over *Xanthorrhoea preissii*, *Hakea lissocarpha* and *Hardenbergia comptoniana* along creek.	1.39
Eg	Mature *Eucalyptus gomphocephala* over garden and/or weeds.	0.66
Em	Mature *Eucalyptus marginata* over garden and/or weeds.	2.02
EmXp	Mature *Eucalyptus marginata* and *Xanthorrhoea preissii* over weeds.	0.22
Er	Mature *Eucalyptus rudis* over garden and/or weeds.	0.20
Ew	Mature *Eucalyptus wandoo* over garden and/or weeds.	0.73
Ew / Er	Mature *Eucalyptus wandoo* and *Eucalyptus rudis* in combination over garden and/or weeds	0.16
Pp	**Pinus pinaster* and/other pines.	1.16

4.2.6 Vegetation Condition

Vegetation condition ranged from Excellent to Completely Degraded with the majority of the Survey Area considered to be in a Completely Degraded (49.67 ha) condition (Table 7, Figures 6a-6c). The vegetation occurs in a mosaic pattern across the Survey Area with large portions having been historically cleared for housing, roads and agriculture and is now dominated by introduced species. Land use in the survey area has caused fragmentation of the native vegetation, with much of the remaining mature native trees having been integrated with gardens and non-endemic species. In these instances the vegetation no longer has a natural structure and is mapped as Completely Degraded. The majority of the intact native vegetation with condition ratings of Good to Excellent is bound by Bruce Road, Brewer Road and Sultana Road East. In addition to this area there are also a few pockets of intact native vegetation near Oxford Court and Kent Road. The vegetation along Crumpet Creek varies greatly, with the portion north of Brewer Road having been altered and there is minimal native species (particularly in the midstorey and groundstorey), while the creek south of Brewer Road consists of intact native vegetation considered to be in Good to Excellent condition.

Table 7: Vegetation Condition and Extent in the Survey Area.

Condition	Extent (Ha)
Excellent	2.79
Very Good	0.92
Very Good - Good	3.73
Good	2.32
Good-Degraded	0.32
Degraded	1.95
Degraded- Completely Degraded	3.88
Completely Degraded	49.67

4.2.7 Floristic Community Types

The FCTs represented by the vegetation in the Survey Area was determined by statistical analysis (multivariate analysis) and further data interpretation, as shown in Tables 8 and 9 below. Due to the inconclusive results of the statistical analysis there was a need to further analyse the data to clarify what FCTs are represented by the vegetation associations in the Survey Area. This involves reviewing site data for other factors that are diagnostic for FCTs, including the presence of indicator species, soil types and landform position.

Table 8: Floristic Community Type Statistical Analysis.

Vegetation Association	Floristic Community Types1	Similarity Based on Statistical Analysis	Comments	Inferred Floristic Community Type
EmNf	FCT SCP 20a - *Banksia attenuata* woodlands over species rich dense shrublands	25.2	This vegetation association was only found in one small remnant under the powerline easement. Regardless of the absence of *Banksia attenuata* in the Survey area, the analysis results showed the highest similarity with FCT SCP20a. Along with these results, the Survey Area's location, and understorey species present this vegetation association demonstrated most resemblance with FCT SCP20a	**FCT SCP 20a - *Banksia attenuata*** woodlands over species rich dense shrublands
	FCT SCP 20c - Eastern shrublands and woodlands	20.5		
	FCT SCP 20b - Eastern *Banksia attenuata* and /or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain	19.04		
CcEm	FCT SCP 20a - *Banksia attenuata* woodlands over species rich dense shrublands	34.92	The vegetation association was the largest represented in the Survey Area and had the highest diversity of native species with minimal weed infestation. Regardless of the absence of *Banksia attenuata* in the Survey area the analysis results showed the highest similarity with FCT	**FCT SCP 20a - *Banksia attenuata*** woodlands over species rich dense shrublands
	FCT SCP 20c - Eastern shrublands and woodlands	34.12		
	FCT SCP 20b - Eastern	33.45		

Vegetation Association	Floristic Community Types1	Similarity Based on Statistical Analysis	Comments	Inferred Floristic Community Type
	Banksia attenuata and /or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain		SCP20a. Along with these results, the Survey Area's location, and understorey species present this vegetation association demonstrated most resemblance with FCT SCP20a	
CcMp	FCT SCP 20c - Eastern shrublands and woodlands	22.01	This vegetation association was the second largest remnant and was inclusive of the riparian zone of the southern end of Crumpet creek in the Survey Area. Although some of the species present are a reflection of the presence of the creek, the data analysis resulted in the same three Banksia FCTs having the highest similarity with the association. Given the Survey Area's location, and understorey species present, this vegetation association demonstrated most resemblance with FCT SCP20a	FCT SCP 20a - *Banksia attenuata* woodlands over species rich dense shrublands
	FCT SCP 20b - Eastern *Banksia attenuata* and /or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain	19.57		
	FCT SCP 20a - *Banksia attenuata* woodlands over species rich dense shrublands	18.34		
AhDg	FCT SCP 20a - *Banksia attenuata* woodlands over	21.49	This vegetation association is void of any trees but did have a dense and diverse	FCT SCP 20a - *Banksia attenuata*

Vegetation Association	Floristic Community Types1	Similarity Based on Statistical Analysis	Comments	Inferred Floristic Community Type
	species rich dense shrublands		understorey. Historical information states that the site had been subject to several fires and has regenerated at its own accord. Despite these disturbances, the analysis results show that the association has the highest similarity with FCT SCP20a.	woodlands over species rich dense shrublands
	FCT SCP 20c - Eastern shrublands and woodlands	21.49		
	FCT SCP 20b - Eastern *Banksia attenuata* and /or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain	18.18		

The size and condition of several vegetation remnants meant establishing quadrats in these areas was not suitable, relevés were therefore established. Statistical analysis was not undertaken for these site and therefore FCTs were referred (Table 9).

Table 9: Floristic Community Type Analysis.

Vegetation Association	Comments	Inferred Floristic Community Type
EwXp	This vegetation association was very low in native species diversity and density and therefore a FCT cannot be inferred	Not applicable
EmAh	The presence of the *Kingia australis* gave this site an affinity with FCT SCP3a however, the absence of	**FCT SCP 20a** - *Banksia attenuata* woodlands over species rich dense shrublands

Vegetation Association	Comments	Inferred Floristic Community Type
	Corymbia calophylla and dominance of *Eucalyptus marginata* makes it more simular to FCT SCP20a	

4.2.8 Threatened and Priority Ecological Communities

Vegetation associations CcEm, CcMp, AhDg, EmNf and EmAh have been determined to have the highest similarity and features of FCT SCP20a. FCT SCP20a is described as '*Banksia attenuata* woodlands over species rich dense shrublands' and is listed as an Endangered TEC by the State. TECs and their associated buffers are regarded as ESAs.

4.2.9 Regional Representation

Vegetation mapping units described in the Survey Area were correlated with the Beard (1978) and Shepherd *et al*. (2001) broad vegetation types as much as possible by examining similarities in vegetation descriptions (Table 10). Differences exist with the terminology used in the descriptions as they are based on different methods of categorising and characterising vegetation types, and the different spatial scale of the analysis (i.e. region vs. local scale).

Table 10: Representation of broad vegetation types and corresponding vegetation associations.

Vegetation Type and Description (Shepherd *et al.* 2001/Beard 1978)	Corresponding Vegetation Association (Current Survey)	Vegetation Association Extent in Survey Area (ha)
3 (e2,3MC)	EmNf, AhDg, EmAh, CcEm	7.22
1001 (e2Mb cbLi)	CcMp, EwXp	2.36

4.3 Fauna Results

4.3.1 Database Searches

Database searches returned 211 vertebrate species from 77 families as potentially occurring in the vicinity of the Survey Area. Of these, nine species were amphibians from three families, 33 were reptiles from eight families, 144 were bird species from 49 families and 26 were mammals from 17 families.

A total of 33 conservation significant vertebrate species (including Priority species) from 19 families were identified during the desktop review of the database searches

(Appendix E and I). These were comprised of two reptile species from two families, 25 bird species from 12 families, and six mammals from five families.

4.3.2 Conservation Significant Fauna

The 4 km DPaW threatened fauna database, NatureMap and the EPBC PMST search returned a number of wetland species, in particular birds (i.e. marine birds and waders) that require specific habitats (i.e. shorelines) that do not occur in the Survey Area (Appendix I). The Survey Area is approximately 25 km from the coast.

Many of these marine and coastal species in the databases may occur nearby; however, given the absence of suitable habitat in the Survey Area, all marine species are unlikely to occur.

A number of species returned were also known to be historical records of species now extinct (e.g. Malleefowl, Western Ring-tail Possum and Quokka) in the local area and more broadly in the region. These species have been omitted from any further discussion.

It is important to note, that the EPBC PMST is not entirely based on point records, but also on broader information, for example bioclimatic distribution models. Whereas DPaWs NatureMap and threatened fauna database is, consequently, the results of the EPBC PMST are in some cases less accurate, particularly at a local scale. Consequently, the EPBC PMST will include species that do not occur in the search area because for example there is no habitat or they are now known to be locally extinct.

In addition, many fauna are not distributed evenly across the landscape, are more abundant in some places than others are, and consequently more detectable (Currie 2007). Furthermore, some small, common ground-dwelling reptile and mammal species tend to be habitat specific, and many bird species can occur as regular migrants, occasional visitors or vagrants. Therefore all these species have been omitted from any further discussion regarding fauna results.

With the afore mentioned marine species removed, a total of 12 conservation significant species (including Priority species) from the database searches are potentially considered to either be likely, possibly or unlikely to occur in the Survey Area (Appendix I). These 12 species comprised two reptiles, nine birds and four mammal species.

Of these 12 conservation significant species, four species were recorded during the field assessment, one species is considered as ‘Likely’ to occur, one species is considered ‘Possible’ and six species are considered ‘Unlikely’ to occur within the Survey Area (Table 11).

The Likelihood of each species is based on the following criteria:

- Recorded: Recorded during the field assessment;

- Likely: Suitable habitat is present in the Survey Area and the Survey Area is in the species' known distribution;
- Possible: Limited or no suitable habitat is present in Survey Area, but is nearby. The species has good dispersal abilities and is known from the general area; and
- Unlikely: No suitable habitat is present in Survey Area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however the Survey Area is outside of the species' known distribution.

Table 11: Conservation significant fauna potentially occurring in the Survey Area.
En = Listed as Endangered under the EBPC Act, Vu = Listed as Vulnerable under the EBPC Act, Mi = Listed as Migratory under the EBPC Act, Ma = Listed as Marine under the EBPC Act, S = Scheduled under the WC Act, and P = Listed as Priority by the DPaW.

TAXA	CONSERVATION STATUS	LIKELIHOOD
Reptiles		
Dell's Ctenotus (*Ctenotus delli*)	P4	Unlikely
Carpet Python (*Morelia spilota imbricata*)	S4	Unlikely
Birds		
Fork-tailed Swift (*Apus pacificus*)	MaMi	Unlikely
Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)	Vu	Recorded
Baudin's Black Cockatoo (*Calyptorhynchus baudinii*)	Vu	Likely
Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*)	En	Recorded
Rainbow Bee-eater (*Merops ornatus*)	MaMi	Recorded
Grey Wagtail (*Motacillia cinerea*)	MiMa	Unlikely
Mammals		
Western Quoll *(Dasyurus geoffroii)*	Vu, S1	Unlikely
Southern Brush-tailed Phascogale (*Phascogale tapoatafa)*	S1	Unlikely
Southern Brown Bandicoot (*Isoodon obesulus fusciventer*)	P5	Recorded
Water Rat (*Hydromys chrysogaster)*	P4	Possible

4.3.3 Field assessment Results

During the field assessment 34 species from 18 families were recorded. This consisted of one reptile species, 30 bird species from 14 families and one mammal species from one family.

4.3.3.1 Amphibians

From the database searches, nine amphibian species have been previously recorded from the following three families in the surrounding area: Limnodynastidae, Myobatrachidae and Hylidae (Appendix E). During the survey, no amphibians were recorded during the survey. However, Kalamunda Shire has erected warning signs for the Oblong Turtle (*Chelodina oblonga*) in areas near Crumpet Creek (which runs through the Survey Area). These signs are an indication that Oblong Turtles have been observed and are present in the area. Crumpet Creek provides suitable habitat for this species.

4.3.3.2 Reptiles

From the database searches, a total of 33 reptile species have been previously recorded from the following eight families in the surrounding area; Diplodactylidae, Pygopodidae, Gekkonidae, Scincidae, Agamidae, Varanidae, Elapidae and Boidae. One reptile species was recorded during the field assessment; Buchanans Snake-eyed Skink (*Cryptoblepharus buchananii*) from the Scincidae family (Appendix E).

4.3.3.3 Birds

From the database searches, a total of 144 bird species from 49 families have been previously recorded in the surrounding area. During the field assessment 30 bird species were recorded from the following 14 families: Anatidae, Columbidae, Threskiornithidae, Falconidae, Psittacidae, Meropidae, Acanthizidae, Pardalotidae, Meliphagidae, Pachycephalidae, Dicruridae, Cracticidae, Corvidae and Timaliidae (Appendix E).

4.3.3.4 Mammals

From the database searches, a total of 26 mammal species from 17 families have been previously recorded in the surrounding area. During the field assessment one mammal species was recorded; the Southern Brown Bandicoot (Appendix E).

4.3.4 Black Cockatoo Results

The EPBC PMST, NatureMap and DPaW searches identified all three Black Cockatoo species as occurring in the surrounding area; Carnaby's Black Cockatoo, FRTBC and Baudin's Black Cockatoo (Appendix E and I).

During the survey, a small group of Carnaby's Black Cockatoos were observed directly utilising the Survey Area. They were seen perched in a number of Marri trees along the north-west edge of the Survey Area. An adult Carnaby's Black Cockatoo was observed feeding a single young in a Marri tree in the same location.

A group of seven FRTBCs were also observed perched in a Marri tree, where habitat assessment number one was completed. The FRTBCs were seen feeding on Marri nuts. Further to this feeding evidence in the form of chewed Marri nuts was observed throughout the Survey Area.

4.3.4.1 Foraging Habitat

Four species of tree were recorded in the Survey Area, Marri, Jarrah, Wandoo and Flooded Gum are considered Black Cockatoo foraging habitat (Figure 7).

4.3.4.2 Potential Breeding Trees

Four species of tree, Marri, Jarrah, Wandoo and Flooded Gum recorded in the Survey Area are considered Black Cockatoo breeding habitat. The Survey Area contains 485 potential breeding trees with a DBH of more than 500 mm (Marri (242), Jarrah (90) Marri/Jarrah (73) and Flooded Gum (21) and Wandoo (59) with a DBH more than 300 mm. The dimensions and the locations of the potential breeding trees are displayed in Appendix J and Figure 8.

4.3.5 Fauna Habitat

Eight fauna habitat assessments were undertaken during the survey (Appendix K) and five fauna habitats were identified in the Survey Area (Figure 9). They are described as:

Eucalypt Remnant with Understorey

This habitat as an overstorey that includes Marri, Jarrah, Wandoo and Flooded Gum, a midstorey that comprises *Acacia*, *Allocasuarina*, *Banksia, Hakea* and *Xanthorrhoea*, over an understorey of mixed herbs.

The large Eucalypt trees provide potential breeding habitat for Black Cockatoos, while along with the *Allocasuarina, Banksia, Hakea* and *Xanthorrhoea* trees and shrubs are foraging habitat for Black Cockatoos. This habitat has vegetation in multiple strata (canopy, midstorey and understorey), woody debris and leaf litter that provides habitat for small reptile, bird and mammal species. However, as these patches are for the most part fragmented, fauna movement between them is limited, particularly for the less mobile groups such as small reptiles and mammals.

Eucalypt Remnants Lacking Understorey

This habitat is disturbed as a result of vegetation clearing, it therefore provides limited value to fauna species, particularly birds that use midstorey vegetation to forage, shelter and nest in. A lack of vegetation structure (cover), particularly in the midstorey, and limited litter (leaf and woody debris) means that there are few microhabitats for fauna. The trees are a mix of Marri, Jarrah, Wandoo and Flooded Gum, which provide foraging and potential breeding habitat for several bird species, but most importantly for the conservation significant Black Cockatoos.

Non-Eucalypt Remnants

This habitat consists of native Allocasuarina trees with little to no native vegetation in the midstorey and understorey. Consequently this habitat provides limited value to most fauna species. However, Allocasuarina trees are a dietary item for Black Cockatoos.

Crumpet Creek

Crumpet Creek runs through the southern section of the Survey Area (Figure 9). Trees along the edges of the creek include Marri, Jarrah, Wandoo and Flooded Gum. The southern section of Crumpet Creek has intact vegetation, both in the midstorey and understorey and is therefore considered to be in very good condition and of value to fauna. The northern section of Crumpet Creek is however, disturbed, lacks a midstorey and an understorey of native vegetation (has a weedy understorey). This lack of vegetation structure (cover), limits the foraging and sheltering niches for fauna, particularly birds. However, the trees, Marri, Jarrah, Wandoo and Flooded Gum provide foraging and potential breeding habitat for Black Cockatoos.

Non Endemic/Completely Degraded Area

Large parts of the Survey Area were gardens, roads, paths, and cleared paddocks. A lack of native vegetation and limited vegetation structure provides limited value to fauna.

Table 12: Habitat Extent (ha) in the Survey Area.

HABITAT	EXTENT IN STUDY AREA (HA)
Eucalypt Remnant with Understorey	11.74
Eucalypt Remnant Lacking Understorey	20.58
Non-Eucalypt Remnants (Allocasuarina)	0.98
Crumpet Creek	2.67
Non Endemic/Completely Degraded Area (including no access areas)	64.03
Total Habitat	100

5 Discussion

5.1 Flora Context

The Survey Area is highly fragmented due to urbanisation, historical orchids, grazing and roads. Due to the historical and present land-use the quality and size of vegetation remnants varies greatly across the Survey Area.

A total of 135 taxa (including species, subspecies, varieties and forms) from 95 genera and 37 families were recorded in the Survey Area, of these 12 were introduced species. The commonly occurring families were; Proteaceae (19 taxa), Fabaceae (17 taxa), and Myrtaceae (14 taxa). An average of 47 species was recorded within occurrences of intact vegetation considered to be in Very Good to Excellent Condition.

The flora species richness recorded during the survey is below the average expected, when compared to the species richness recorded by Gibson *et al.* (1994) for the same FCTs represented in the Survey Area. For example Gibson *et al.* (1994) recorded a mean species richness of 67.4 species in vegetation of FCT SCP20a – Banksia attenuata woodlands over species rich dense shrublands. This result is likely to be a consequence of disturbance associated with the historical land-use.

5.1 Flora of Conservation Significance

One Threatened species, *Conospermum undulatum* (DRF/T) (Plate 1) was recorded within the Survey Area. *Conospermum undulatum* (DRF/T) is listed under the EPBC Act as Vulnerable and gazetted as Declared Rare Flora (Threatened) pursuant to the WC Act. It was recorded in the Survey Area in four locations (see Table 4 and Figure 3c for locations). The vegetation within the buffers of the species are considered critical habitat and therefore are regarded as ESAs.

Of the remaining potential Threatened species, one (*Grevillea thelemanniana* subsp. *thelemanniana)* does not have information available to determine whether it could occur in the Survey Area, 16 are unlikely, one is possible and one is likely. One of these possible species, *Banksia mimica*, is perennial so would have been detectable the time of the survey. One species, *Thelymitra stellata*, is a tuberous perennial herb (orchid) and the survey was undertaken within the flowering period of this species, therefore if it was present it should have been recorded.

One Priority species, *Isopogon drummondii* (P3), was found in one remnant of vegetation on Brewer Road (See Table 4 and Figure 3a for locations). The presence of this Priority Species does not form a statutory constraint for the Survey Area. There is no written policy on how to respond to the presence of priority flora species within proposed development sites. The presence of the species is dealt with by DER on a case by case basis.

A further 39 priority flora taxa were identified as potentially occurring in the Survey Area based on database searches. Of the potential Priority species, six are considered likely to occur, one is considered possible, 27 as unlikely and five as unknown. These species considered unknown have very little information available on their ecology i.e. habitat type and preference and their distribution. Four of the potential species are perennial so would have detectable at the time of the survey. The remaining three species are annual; *Asteridea gracilis* and *Thelymitra variegata* would have been detectable during the survey based on the species flowering period. *Haemodorum loratum*, however, may not of been identifiable at the time of the survey based on the species November flowering period.

5.2 Vegetation of Conservation Significance

A search of the DPaW database and EPBC PMST for TECs and PECs identified seven State listed TECs as occurring within 5 km of the Survey Area, with three of these listed under the EPBC Act. One of these is thought to occur in the Survey Area, FCT SCP20a *Banksia attenuata* woodlands over species rich dense shrublands (listed as Endangered [WC Act]). One Priority community was also identified.

Results from the statistical analysis (multivariate analysis) and data interpretation indicate that the vegetation association CcEm, CcMp, AhDg, EmNf and EmAh are analogous to FCT SCP20a and covers 26.2% of the vegetation in the Survey Area. The location of the Survey Area in regards to the landform and soils in addition to the species present initially caused uncertainty with the delineation of the FCT. This was due to the statistical analysis determining that the Survey Area had the highest affiliations with 20a, 20b and 20c. All three, however, have in the past, been characterised by the dominance of *Banksia attenuata* and/or *Banksia menziesii* trees and are known to occur on Spearwood/Pinjarra and sometimes Ridge hill shelf landforms. A review of the understorey species revealed that the vegetation did have similarities with the FCT "20" group, but the presence of *Corymbia calophylla* and *Eucalyptus marginata* and the location of the Survey Area was still an impediment, consequently DPaW was consulted on the issue. Upon discussion, which involved a review of the information (species present, location, soils and landform) DPaW stated that the vegetation in the Survey area appears to align with FCT SCP20a. DPaW also stated that further DPaW research (Keighery *et al.* [2012], Griffin [1994], DEP [1996] and Keighery [1996]) to supplement the Gibson *et al. (1994)* study has resulted in additional structural units being identified for FCT SCP20a and that these examples do not necessarily include *Banksia attenuata*, and can include *Corymbia calophylla* as a dominant in the over-storey. Communications with DPaW specifically determined that "There are a number of sites where *Banksia attenuata* is not present within study plots of this community type in the Maida Vale area and some without *Eucalyptus marginata* (J. Pryde [DPaW] personal communication January 2016). The conclusion, therefore, is that regardless of the absence of *Banksia*

attenuata in the survey area, the FCT that the vegetation in the survey Area is most analogous to is FCT SCP20a.

Possible impacts to TECs are taken into account by DER and DPaW assessment bodies when applications to develop or clear land are evaluated. Under the EP Act, any clearing of native vegetation requires a permit unless done for an exempt purpose. These exemptions do not apply in ESAs. TECs have been defined under the regulations as ESAs so the exemptions from requiring a clearing permit do not apply. Any such clearing proposal, therefore, must be carried out under a specific permit and be assessed for any environmental impact.

5.3 ESAs

The presence of *Conospermum undulatum (DRF/T)* means the habitat and buffers that surround these species are protected. The vegetation within the buffers are considered critical habitat and therefore are regarded as ESAs.

The locations of TEC SCP20a - *Banksia attenuata* woodlands over species dense shrublands in the Survey Area has also been identified as an ESA.

ESAs are declared to prevent degradation of important environmental values such as T/DRF, TECs or significant wetlands. Exemptions contained in the Environmental Protection (Clearing of Native vegetation) Regulations 2004 for low impact land clearing do not apply in ESAs and a native vegetation clearing permit is required.

5.4 Vegetation Condition and Introduced Flora

Vegetation condition ranged from Excellent to Completely Degraded with the majority of the Survey Area considered to be in a Completely Degraded (49.67 ha) condition. The vegetation occurs in a mosaic pattern across the Survey Area with large portions having been historically cleared for housing, roads and agriculture and it is now dominated by introduced species. Land use in the survey area has caused fragmentation of the native vegetation, with much of the remaining mature native trees having been integrated with gardens and non-endemic species. In these instances the vegetation no longer has a natural structure and is mapped as Completely Degraded. The majority of the intact native vegetation has a condition rating of Good to Excellent and is bound by Bruce Road, Brewer Road and Sultana Road East. In addition to this area, there are also a few pockets of intact native vegetation near Oxford Court and Kent Road. The vegetation along Crumpet Creek varies greatly, with the portion north of Brewer Road having been altered and there is minimal native species, while the creek south of Brewer Road consists of intact native vegetation considered to be in Good to Excellent condition.

A total of 12 introduced species were recorded during the survey. One species, **Asparagus asparagoides*, is listed as Declared under the BAM Act and is also listed as a WONS. The land-use in the Survey Area has been a source of extensive weed infestations and therefore is a dominant feature of the Survey Area. Due to the scale of

weed cover, a comprehensive weed list was not produced. Instead only weeds that were present within intact native vegetation were recorded. The majority of these weeds are common bushland and agricultural weeds (Hussey *et al.* 2007).

5.5 Regional Representation

The Perth Biodiversity Project (PBP 2010) has mapped native vegetation extent by vegetation complex on the Swan Coastal Plain. It is estimated that Forrestfield Complex is estimated to have 11.90% native vegetation remaining based on the pre-European extent and the Southern River Complex has 19.69% remaining.

The EPA recognises vegetation complexes that are not well represented as being significant. Vegetation complexes which have 10%-30% remaining may be considered regionally significant. Proposals that would affect a vegetation complex with 10% or less remaining are likely to be formally assessed by the EPA (EPA 2006).

The extents remaining of the vegetation complexes in the Survey Area are within the range that may deem them regionally significant, this may be more readily applied to the vegetation in the Survey Area that is intact and considered to be in Very Good to Excellent condition. Consequently vegetation in the Survey Area could contribute value to each of the regional complexes.

5.6 Ecological Linkages

The Survey Area forms part of the Perth Biodiversity Project's Draft Regional Ecological linkage network. The Survey Area is part of a non-continuous linkage of bushland that connects parcels of bushland, undeveloped land and private properties. One linkage dissects the Survey Area, Linkage 135 includes the northern tip of the Survey Area. This linkage meets with Linkage 42 to the west and Linkage 136 to the east. The portion of the Survey Area that is within the Linkage consists of isolated Eucalypt trees with no native understorey. The associated understorey species included weeds and garden variety species and in considered to be in Degraded to Completely Degraded condition. For these reasons, the contribution of the survey area at this location, to the linkage network is negligible.

Recognised by the EPA, DPaW and local government, the retention of native vegetation and fauna habitat within the Regional Ecological Linkages aims to reduce the loss of biodiversity and key ecological functions across the south-west. Ecological linkages are not legislatively protected, however, The EPA expects that in preparing plans and proposals for development, consideration will be given to both the site-specific biodiversity conservation values of patches of native vegetation, as well as the landscape function and core linkage significance of a patch in supporting the maintenance of an ecological linkage.

5.7 Fauna Databases

A total of 211 vertebrate species, from 78 families have been recorded in the vicinity of the Survey Area. Of these, ten were amphibian species from four families, 33 were reptile species from eight families, 144 were bird species from 49 families and 26 were mammals from 17 families.

5.8 Fauna of Conservation Significance

5.8.1 Species Recorded

During the field assessment, four conservation significant species were recorded, the Rainbow Bee-eater, which is listed as Marine and Migratory under the EPBC Act, FRTBC, which is listed as Vulnerable under the EPBC Act, Carnaby's Black Cockatoo, which listed as is Endangered under the EPBC Act and the Southern Brown Bandicoot which is listed as Priority 5 under the DPaW Priority List.

As a Black Cockatoo Assessment forms part of this report, all three Black Cockatoo species will be discussed in detail in section 5.11.

Rainbow Bee-eater

The Rainbow Bee-eater is listed as Marine and Migratory under the EPBC Act. This species is one of the most common and widespread birds in Australia with a distribution that covers the majority of Australia (Barrett *et al.* 2003). It occurs in lightly wooded, often sandy country, preferring areas near water. It feeds on airborne insects, and nests throughout its range in WA in burrows excavated in sandy ground or banks, often at the margins of roads and tracks. In WA this species can occur as a 'resident, breeding visitor, postnuptial nomad, passage migrant and winter visitor' (Johnstone & Storr 1998b). The Survey Area contains potential foraging habitat for this species.

The DPaW threatened fauna database returned twelve records of the Rainbow Bee-eater, including a record from Crumpet Creek Reserve - Sultana to Hawtin Roads, which is in the Survey Area. The Rainbow Bee-eater was heard calling and was observed perching on numerous occasions throughout the Survey Area.

Southern Brown Bandicoot

The Southern Brown Bandicoot is listed as Priority 5 under the DPaW Priority List. It once occurred throughout south-west WA; it now occurs from Guilderton southwards on the SCP, including the Perth Metropolitan area, in Jarrah and Karri (*Eucalyptus diversicolor*) forests and adjacent coastal vegetation complexes. The species inhabits scrubby, often swampy, vegetation with dense cover up to about 1m high. It feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. The Southern Brown Bandicoot is patchily distributed in suitable habitat, with populations inhabiting Jarrah and Wandoo forests usually associated with watercourses. On the Swan Coastal Plain it is often associated

with wetlands with dense vegetation where they feed on fruit, seeds, insects and fungi (Woinarski *et al.* 2012).

The DPaW threatened fauna database returned 154 records from a four km radial search, 22 of which were from Maida Vale. During the survey, one Southern Brown Bandicoot was observed running across an open paddock towards a grassy area. Diggings were also observed throughout the Survey Area.

5.8.2 Species Considered Likely to Occur

One species is considered Likely to occur in the Survey Area; Baudin's Black Cockatoo. Baudin's Black Cockatoo is discussed in the Black Cockatoo Assessment in section 5.11.

5.8.3 Species Considered as Possibly Occurring

One species is considered as Possibly occurring in the Survey Area; the Water Rat.

Water Rat

The Water Rat is listed as Priority 4 under the DPaW Priority List. The species lives in the vicinity of permanent water bodies of fresh or brackish water and can travel a considerable distance overland. Dens are made at the end of tunnels in banks or occasionally in logs. The Water Rat hunts on land but takes much of its food from the water, searching among vegetation along the shoreline and diving around submerged roots and logs. It is an opportunistic hunter and scavenger of large aquatic insects, fish, crustaceans and mussels, also taking frogs, lizards, water birds, small mammals, turtles and their eggs, fresh carrion and a little plant material (Van Dyck 2008).

The DPaW threatened fauna database returned just two records of the Water Rat. This species is notoriously cryptic and not often detected during wildlife surveys. Suitable habitat (Crumpet Creek) is present in the Survey Area, therefore the Water Rat is considered as Possibly occurring in the Survey Area.

5.8.4 Species Considered as Unlikely to Occur

A total of six species of conservation significance are considered unlikely to occur in the Survey Area; Dell's Ctenotus, Carpet Python, Fork-tailed Swift, Grey Wagtail, Western Quoll and the Southern Brush-tailed Phascogale.

Dell's Ctenotus

Dell's Ctenotus is listed as a Priority 4 species by DPaW. Dell's Ctenotus inhabits areas of Jarrah and Marri woodland over a shrubby understorey on lateritic, sandy and clay soils and dry sclerophyll forest on stony hills and ranges (Cogger 2014). While the Survey Area contains Marri and Jarrah, with sandy soils, there is limited to no understorey throughout the majority of the Survey Area. As such there is limited habitat for Dell's Ctenotus in which to shelter and forage. Dell's Ctenotus is considered as

Unlikey to occur due to a lack of suitable habitat as well as just one historical DPaW record of the species in the vicinity of the Survey Area.

Carpet Python

The Carpet Python is listed as Schedule 4 under the WC Act. Large predators such as the Carpet Python play important ecological roles, but often are sensitive to habitat changes and thus are early casualties of habitat perturbation. Carpet Pythons are among the largest predators in many Australian environments, and have declined across much of south-western Australia presumably because of habitat clearance and degradation (Pearson *et al*. 2005).

The Carpet Python shelters in hollow trunks and limbs of trees, hollow logs, disused burrows, caves, rock crevices, beneath boulders and dense shrubs. It is now rarely recorded in most of the Swan Coastal Plain, which is impacted by urban development (Pearson *et al*. 2005). There are very limited logs and woody debris on the ground for shelter throughout much of the Survey Area, with the exception of small patches of habitat in some parts of the better quality Eucalypt Remnant habitat.

Limited suitable habitat as well as just one recent (2006) and three historical DPaW records of the species in the vicinity of the Survey Area; the Carpet Python is considered as Unlikey to occur in the Survey Area.

Fork-tailed Swift

The Fork-tailed Swift is listed as migratory under the EPBC Act and as S4 under the WC Act. It is a non-breeding visitor to all states and territories of Australia (Higgins 1999). The Fork-tailed Swift is a summer migrant to Australia usually during the months of October-April. The Fork-tailed Swift is an aerial species which forages high above the tree canopy and is independent of terrestrial habitats. It occurs in flocks of up to 2,000 birds and is often seen accompanying Tree Martins and Masked Wood swallows (Johnstone & Storr 1998).

The DPaW threatened fauna database returned no records of the Fork-tailed Swift occurring in a 4 km radius of the Survey Area, it was however present in the EPBC PMST. It is important to note, that the EPBC Protected Matters Search Tool is not entirely based on point records, but also on broader information, for example bioclimatic distribution models. Whereas DPaW's NatureMap and threatened fauna database are based on point records, consequently, the results of the EPBC Protected Matters Search Tool are in some cases less accurate, particularly at a local scale.

As such this species is considered as Unlikely to occur.

Grey Wagtail

The Grey Wagtail is listed as Marine Migratory under the EPBC Act. The Grey Wagtail inhabits mainly banks and rocks in fast flowing fresh water habitats; rivers, creeks, streams and around waterfalls, both in forest and open country; but occurs almost

anywhere during migration, in its distribution. It flits from rock to rocks, and often enters shallow water after insects (Johnstone & Storr 1998b).

The Grey Wagtail is a rare visitor, with only two confirmed records in Australia (Johnstone & Storr 1998b) and one more recently on Christmas Island (Barrett *et al*. 2003). The DPaW threatened fauna database search returned no records within 4km of the Survey Area. As discussed above (with regard to the Fork-tailed Swift), the Grey Wagtail was only present in the EPBC PMST, the results of which are in some cases less accurate, particularly at a local scale, than DPaW's NatureMap and threatened fauna database. The Grey Wagtail is therefore considered Unlikely to occur.

Western Quoll

The Western Quoll is listed as Vulnerable under the EPBC Act and Schedule 1 under the WC Act. Knowledge of the ecology of the Western Quoll is largely restricted to its distribution in mesic jarrah forests. Here, population densities are three times greater than in semi-arid zones where rainfall and consequently productivity are lower than mesic forests and home ranges are larger (Rayner *et al*. 2012).

The Western Quolls diet includes mammals, birds, reptiles, invertebrates, plants and rubbish, which is consistent with it being a generalist predator.

The Western Quoll was formerly distributed over nearly 70% of the continent, occurring in every Mainland State and Territory (Woinarski *et al*. 2012). Since European settlement, its range has contracted dramatically. Historically it was found in the vicinity of the Survey Area, but it is now restricted to the south-west of WA where it has a fragmented distribution. This species is now only found in sclerophyll forest, woodland and mallee shrubland (Van Dyck & Strahan 2008). It is highly mobile, and appears able to utilise bush remnants and corridors.

This species requires hollow logs or earth burrows in which to den (Van Dyck & Strahan 2008). During this assessment no large hollow logs or earth burrows were recorded. The DPaW threatened fauna database returned eight records of the Western Quoll, only two of which were recent (2003), consequently the Western Quoll is considered Unlikely to occur in the Survey Area.

Southern Brush-tailed Phascogale

The Southern Brush-tailed Phascogale is listed Schedule 1 under the WC Act. It is restricted to the extreme south-west, and its characteristic low population densities make it vulnerable to localised extinction (Van Dyck & Strahan 2008). This subspecies has been observed in dry sclerophyll forests and open woodlands containing hollow-bearing trees with a sparse ground cover.

There are just two records (one undated and one from 1979) of this species from within a 4 km radial search. The Southern Brush-tailed Phascogale is therefore considered Unlikely to occur in the Survey Area.

5.9 Black Cockatoo Assessment

Carnaby's Black Cockatoo

Carnaby's Black Cockatoo is listed as Endangered under the EPBC Act. It was returned from the EPBC PMST, NatureMap and DPaW searches and was observed during the field assessment. Carnaby's Black Cockatoo is endemic to south-west WA, and is distributed from the Murchison River to Esperance and inland to Coorow, Kellerberrin and Lake Cronin (Cale 2003). The species was once common, but the population has declined significantly in the last half century, and is now locally extinct in some areas (Johnstone and Storr 1998, Shah 2006). In the last 45 years the species has suffered a 50% reduction in its abundance (Cale 2003). This reduction is due to the clearing of core breeding habitat in the wheatbelt, the deterioration of nesting hollows, and clearing of food resources on the Swan Coastal Plain (Cale 2003). The total population of Carnaby's Black Cockatoo is currently estimated at 40,000 (Johnstone & Johnstone 2008).

Carnaby's Black Cockatoos feed on seeds, nuts and flowers of a variety of native and exotic plants. Food plants include Banksia (including those previously included in the genus Dryandra), Pine trees (*Pinus* sp.), Marri, Jarrah, Grevillea, Allocasuarina, and Hakea species (Shah 2006). Marri nuts that are damaged extensively, especially on the main body of the nut, are likely to have been chewed by Carnaby's Black Cockatoo or Forest Red-tailed Black Cockatoos. The severed new growth, developing flower heads and chewed seed pods of Banksia species are also a good indicator of Black Cockatoo feeding. Recent damage to bark is regarded as Black Cockatoo feeding activity along with the stripping of pine needles and cones (Cale 2003).

The seeds from seed pods of Banksia and the cones of Pine trees provide the highest energetic yield (Cooper *et al.* 2002). Carnaby's Black Cockatoo are less efficient at extracting Marri seeds than (the long-billed) Baudin's Black Cockatoo (Cooper *et al.* 2002).

Breeding has been recorded from early July to mid-December, and primarily occurs in the wheatbelt in the semi-arid and subhumid interior (Johnstone and Storr 1998).

The Survey Area is located within the known distribution of this species and the vegetation contains species, such as Marri and Jarrah which provide suitable foraging, roosting and breeding habitat. Carnaby's Black Cockatoo were recorded feeding (and feeding young) in the Survey Area during the assessment. Foraging evidence in the form of chewed Marri nuts was observed in the Survey Area.

Forest Red-tailed Black Cockatoo

The FRTBC is listed as Vulnerable under the EPBC Act. It was returned from the EPBC PMST, NatureMap and DPaW searches and was observed during the field assessment. The FRTBC is distributed through the humid and subhumid south-west of WA from

Gingin through the Darling Ranges to the south-west from Bunbury to Albany. It occasionally occurs in the southern Swan Coastal Plain, and rarely in the Perth metropolitan area. The FRTBC occurs in pairs or small flocks, or occasionally large flocks of up to 200 birds (Johnstone & Storr 1998). The FRBC inhabits dense Jarrah, Karri and Marri forests that receive more than 600 mm average annual rainfall.

The FRTBC feeds primarily on Marri and Jarrah fruit (Johnstone & Kirkby 1999) and to a lesser extent on Blackbutt (*Eucalyptus patens*), Albany Blackbutt (*Eucalyptus staeri*), Karri, Sheoak (*Allocasuarina fraseriana*) and Snottygobble (*Persoonia longifolia*). FRTBC can obtain energy faster when feeding on Marri and Jarrah than other food sources (Cooper *et al.* 2002) and these two plant species make up 90% of the diet of the FRTBC.

The Survey Area is located within the known distribution of this species and the vegetation contains species, such as Marri and Jarrah which provide suitable foraging, roosting and breeding habitat. Seven FRTBC were recorded in an area of bush in the power easement in the Survey Area during the assessment. They were recorded flying overhead and landing in a Marri tree, where they were observed feeding on Marri nuts.

Baudin's Black Cockatoo

Baudin's Black Cockatoo is listed as Vulnerable under the EPBC Act. It was returned from the EPBC PMST, NatureMap and DPaW searches, however it was not recorded during the field assessment. This species is distributed through the south-western humid and subhumid zones, from the northern Darling Range and adjacent far east of the SCP (south of the Swan River), south to Bunbury and across to Albany (Johnstone & Kirkby 2011). Baudin's Black Cockatoo rarely occurs near the coast north of Mandurah, and rarely occurs north of the Swan River (Johnstone & Kirkby 2008, Johnstone & Storr 1998a). Baudin's Black Cockatoo usually occur in small flocks of up to 30, or occasionally up to 50 and rarely in aggregations of up to 1200 (Johnstone & Kirkby 2008). Baudin's Black Cockatoo is distinguished from Carnaby's Black Cockatoo by its longer bill and slightly different call.

This species forages primarily in Eucalypt forest, where it feeds on Marri seeds, flowers, nectar and buds. They also feed on a wide range of seeds of Eucalypt, Banksia, Hakea and Pines (*Pinus* sp.) as well as fruiting apples and pears and beetle larvae from under the bark of trees (Johnstone & Kirkby 2008, Johnstone & Storr 1998a). Baudin's Black Cockatoo forages at all levels of the forest from the canopy to the ground, often feeding in the understorey on proteaceous trees and shrubs, especially Banksia, and in orchards both in trees and on dropped or fallen fruit on the ground.

The breeding biology of this species is poorly known. It has been recorded breeding in deep south-west, north to the Whicher Range and Lowden and also isolated records at Wungong Catchment, Serpentine (hills area) and east to Kojonup and near Albany (Johnstone & Kirkby 2008). They nest in large, mostly vertical, hollows of Karri (*E.*

diversicolor), Marri, Wandoo, and Bullich (*E. megacarpa*). Baudin's Black Cockatoos display strong pair bonds are monogamous and most likely mate for life (Johnstone & Kirkby 2008). The pair remain together all year round except when the female is incubating and brooding. Both adults play a part in selecting the nest hollow, but only the female is responsible for renovation and preparing the hollow for breeding. Preparation of the hollow consists of chewing around the entrance of the hollow and down one part of the interior wall. Pairs have also been recorded prospecting for hollows in most months and also outside the breeding range (Johnstone & Kirkby 2008).

5.9.1 Foraging Habitat

A total of 36 ha of foraging habitat was present in the Survey Area. This foraging habitat consisted primarily of Marri and Jarrah trees and to a lesser extent Wandoo and Flooded Gum, as well as *Allocasuarina*, which are known dietary items of all three Black Cockatoo species, (Johnstone & Kirkby 2011).

Throughout the Survey Area there was evidence of Black Cockatoo foraging, in the form of chewed Marri and Jarrah nuts.

5.9.2 Breeding Habitat

Black cockatoos breed in large hollow-bearing trees, generally within woodlands or forests (Johnstone *et al.* 2013). The size of the tree can be a useful indication of the hollow-bearing potential of the tree. Trees of suitable DBH are potentially important for maintaining breeding in the long-term, through maintaining the integrity of the habitat and allowing trees to provide future nest hollows. Maintaining the long-term supply of trees of a size to provide suitable nest hollows is particularly important in woodland stands that are known to support Black Cockatoo breeding (SEWPaC, 2012).

The Black Cockatoo Assessment revealed that the Survey Area contains Marri, Jarrah, Wandoo and Flooded Gum trees which have reached a size that are considered to be potential future hollow bearing trees, therefore potential breeding trees (>500 mm DBH [>300 mm for Wandoo]) according to the EPBC Act Black Cockatoo referral guidelines.

In total, 485 trees were recorded which met the criteria to be classed as a potential breeding trees. This suggests that these trees may develop hollows and have the potential to be use for breeding in the future. In order to be suitable for Black Cockatoos, the hollow entrances need to be greater than 120 mm diameter. Due to the size and complexity of the Survey Area, individual trees could not be assessed for presence of observable hollows.

There were many other Marri, Jarrah, Wandoo and Flooded Gum trees that have the potential to be foraging habitat, however, they were under the threshold of 500 mm (300 mm for Wandoo) to be considered as potential breeding trees.

The Survey Area contains 36 ha of vegetation that potentially provides breeding habitat for all three species of Black Cockatoo.

5.10 Fauna Habitat Types

Eucalypt Remnant with Understorey

This habitat represents 12% of the Survey Area and is a mix of Marri, Jarrah, Wandoo and Flooded Gum, which provide foraging and breeding habitat for Carnaby's Black Cockatoos, FRTBC and Baudin's Black Cockatoo (as made evident by the Black Cockatoos seen foraging during the survey). The midstorey consists of *Acacia*, *Allocasuarina*, *Banksia, Hakea* and *Xanthorrhoea*, and this also provides foraging habitat for all three species of Black Cockatoo. The understorey is comprised of mixed herbs and some areas have woody debris and leaf litter that provides microhabitat for some common reptile, bird and mammal species.

Eucalypt Remnant Lacking Understorey

This habitat represents 21% of the Survey Area and includes Eucalypt trees that provide important foraging and breeding habitat for Carnaby's Black Cockatoos, FRTBC and Baudin's Black Cockatoos. The habitat is considered disturbed, and a lack of vegetation in the mid and lower strata results in limited value to fauna.

Non-Eucalypt Remnant

This habitat represents 1% of the Survey Area and consists mainly of *Allocasuarina*. This habitat has limited vegetation strata and so provides limited value to fauna species. *Allocasuarina,* however is a known dietary item of Black Cockatoos and so does provide foraging habitat to all three species of Black Cockatoo.

Crumpet Creek

Crumpet Creek consists of riparian vegetation. It represents 3% of the Survey Area and provides habitat for a range of fauna, most importantly to wetland species. It is also good habitat for bird species, including the Pacific Black Duck which was recorded at the bottom end of the creek. The northern section of the creek lacks vegetation structure, so offers more limited value to wetland species. The southern section of the creek has relatively intact vegetation in all three strata providing cover and therefore offers more value to fauna species. This wetland habitat provides foraging and breeding habitat for wetland species including ducks and turtles and potentially for the Priority 4 listed Water Rat.

Under the current plan this section of the Survey Area is not due to be cleared.

Non Endemic/Completely Degraded Area

Non Endemic/Completely Degraded Area constitutes 64% of the Survey Area. This habitat is comprised of residential gardens, as well as roadways, paths and paddocks. A lack of native vegetation and limited vegetation structure means this habitat has limited value to fauna. This habitat is where the Domestic Dog (*Canis lupus familiaris*) and Horse (*Equus caballus*) were recorded.

6 Conclusions

The flora assessment was undertaken at times considered suitable for the majority of the species of conservation significance considered likely to occur (they would also be identifiable if they are present) and within the recommended season and flowering period for the South West botanical province.

The following conclusions can be drawn:

- One Threatened species, Conospermum undulatum was recorded within the Survey Area. The vegetation within the buffers of these species are considered critical habitat and therefore are regarded as ESAs;
- One Priority species, Isopogon drummondii, was found in one remnant of vegetation on Brewer Road. The presence of this Priority Species does not form a statutory constraint for the Survey Area;
- Results from the statistical analysis and data interpretation indicate that the vegetation association CcEm, CcMp, AhDg, EmNf and EmAh are analogous to FCT SCP20a Banksia attenuata woodlands over species rich dense shrublands (listed as Endangered [DPaW])and covers 26.2% of the vegetation in the Survey Area;
- TECs have been defined under the regulations as ESAs so the exemptions from requiring a clearing permit do not apply. Any such clearing proposal, therefore, must be carried out under a specific permit and be assessed for any environmental impact;
- It is estimated that Forrestfield Complex is estimated to have 11.90% native vegetation remaining based on the pre-European extent and the Southern River Complex has 19.69% remaining; and
- The extents remaining of the vegetation complexes in the Survey Area are within the range that may deem them regionally significant, this may be more readily applied to the vegetation in the Survey Area that is intact and considered to be in Very Good to Excellent condition.

The fauna assessment was undertaken at a time considered appropriate for the species of conservation significance considered likely to be present on site. The following conclusions can be made:

- During the desktop review of database searches, 12 conservation significant species were identified;
- Four species of conservation significance were recorded in the Survey Area:
  - (Carnaby's Black Cockatoo);

- Forest Red-tailed Black Cockatoo;
- Rainbow Bee-eater; and
- Southern Brown Bandicoot.

- 36 ha of Black Cockatoo foraging habitat was recorded in the Survey Area;
- 485 Black Cockatoo potential breeding trees were recorded; and
- Five fauna habitats were identified in the Survey Area.

7 References

Barrett, G., Silcocks, A., Barry, S., Cunningham, R., & Poulter, R. (2003). The New Atlas of Australian Birds. Hawthorn East, Victoria: Royal Australasian Ornithologists Union.

Beard, J. S. (1972-80). Vegetation Survey of Western Australia, 1:250 000 Series. 21 titles published by Vegmap Publications.

Bureau of Meteorology [BOM]. (2016). Daily Weather Observations, Commonwealth of Australia. Retrieved January, 2015, from http://www.bom.gov.au/climate

Cale, B. (2003). *Carnaby's Black-Cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Perth: Department of Conservation and Land Management.

Christidis, L., & Boles, W. E. (2008). Systematics and Taxonomy of Australian Birds. Victoria: CSIRO Publishing.

Churchward, H.M & McArthur, W.M (1978). Landforms and Soils of the darling System, Western Australia in Atlas of Natural resources, Darling System, Western Australia. Department of Conservation and Environment, Western Australia.

Cooper, C. E., Withers, P. C., Mawson, P. R., Bradshaw, S. D., Prince, J., & Robertson, H. (2002). *Metabolic ecology of cockatoos in the south-west of Western Australia*. *Australian Journal of Zoology* **50**, 67–76.

Cogger, H. (2013). Reptiles and Amphibians of Australia. CSIRO Publishing

Commonwealth of Australia (2001). National Targets and Objectives for Biodiversity Conservation 2001 – 2005. AGPS, Canberra.

Commonwealth of Australia. (2014). Weeds of National Significance. Retrieved January, 2016, from http://www.weeds.gov.au/weeds/lists/wons.html

Department of Agriculture and Food Western Australia [DAFWA]. (2012). Soil-landscape mapping. Shapefile.

Department of Agriculture and Food Western Australia [DAFWA]. (2016). Declared Plants in Western Australia. http://www.agric.wa.gov.au/PC_93088.html?s=270181382,Topic=PC_93079

Department of Conservation and Land Management [CALM]. (1999). Environmental Weed Strategy for Western Australia. Retrieved January, 2016, from http://www.dec.wa.gov.au/pdf/plants_animals/environmental_weed_strategy_wa.pdf

Department of Environment and Conservation (2013). *Clearing Regulations - Environmentally Sensitive Areas (ESA) Department of Environment and Conservation.* Accessed via SLIP portal: Slip Services.

Department of Environmental Protection [DEP] (1996). System 6 and Part System 1 Update Programme. Unpublished bushland plot and area records and analysis. Department of Environmental Protection, Perth, Western Australia.

Department of the Environment [DoE] (2015). *Protected Matters Search Tool*, Accessed from http://www.environment.gov.au/epbc/pmst/index.html, Commonwealth of Australia.

Department of Parks and Wildlife [DPaW]. (2013). Weeds Plant Prioritisation Process:. Available from http://www.dpaw.wa.gov.au/images/documents/plants-animals/plants/weeds/Weed_Prioritisation_Process_in_DPaW_Nov_2013.pdf

Department of Parks and Conservation [DPaW]. (2015a). Request for Rare Flora Information (custom search).

Department of Parks and Conservation [DPaW]. (2015b). Threatened and Priority Ecological Communities Information (custom search).

Department of the Environment [DoE]. (2015c & d). NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife and Western Australian Museum. http://naturemap.dec.wa.gov.au/

Department of the Environment, Water, Heritage and the Arts. (2010). Survey Guidelines for Australia's Threatened Birds. EPBC Act Survey Guidelines 6.2.

Department of Parks and Conservation [DPaW]. (2015e). Threatened and Priority Fauna Information (custom search).

Environmental Protection Authority [EPA]. (2002). Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3.

Environmental Protection Authority [EPA]. (2004a). Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, Guidance Statement No. 51.

Environmental Protection Authority [EPA]. (2004b). Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (Guidance Statement No. 56).

Environmental Protection Authority [EPA] (2006). Level of Assessment for Proposals affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 region in Western Australia. Guidance Statement No. 10, EPA, Perth, Western Australia.

Environmental Protection Authority [EPA] and Department of Environment and Conservation (DEC). (2010). Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.

Gibson, N., Keighery, B., Keighery, G., Burbidge, A., & Lyons, M. (1994). *A Floristic Survey of the Southern Swan Coastal Plain. Unpublished report for the Australian Heritage Commission. Western Australia*: Department of Conservation and Land Management and the Western Australian Conservation Council of Western Australia.

Government of Western Australia. (2000). Bush Forever: Volume 1: Policies, Principles and Processes. Perth: Department of Environmental Protection.

Government of Western Australia. (2013). 2013 State wide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Accessed [December 2013]. WA Department of Parks and Wildlife, Perth.

Griffin, E.A. (1994). Floristic Survey of Northern Sandplains between Perth and Geraldton. Unpublished Report to the Heritage Council of WA for the Australian Heritage Commision, Canberra, Australian Capital Territory.

Heddle, E. M, Loneragan, O. W., & Havel, J.J (1980). Vegetation of the Darling System in Atlas of Natural Resources, Darling System, Western Australia. Department of Conservation and Environment, Perth, Western Australia.

Higgins, P.J. (ed.) (1999). Handbook of Australian, New Zealand and Antarctic Birds. Volume Four - Parrots to Dollarbird. Melbourne: Oxford University Press.

Johnstone, R. E, & Kirkby, T. (2011). Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), Baudin's Black Cockatoo (Calyptorhynchus baudinii) and the Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) on the Swan Coastal Plain (Lancelin–Dunsborough), Western Australia. Studies on distribution, status, breeding, food, movements and historical changes. Perth: Department of Planning.

Johnstone, R. E., & Kirkby, T. (1999). Food of the forest red-tailed black cockatoo Calyptorhynchus banksii naso in south-west Western Australia. *Western Australian Naturalist* **22**, 167–177.

Johnstone, R. E. & Storr, G. M. (1998a). *Handbook of Western Australian Birds*. Volume 1 - Non-Passerines (Emu to Dollarbird). Oxford University Press.

Johnstone, R. E. & Storr, G. M. (1998b). *Handbook of Western Australian Birds*. Volume 2 - Passerines (Blue-winged Pitta to Goldfinch). Oxford University Press.

Keighery B. J. (1994). Bushland Plant Survey. A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc.) Nedlands, WA

Keighery, G. J. (1996). Progress Report: Conservation Status of Vascular Flora of the Southern Swan Coastal Plain. Unpublished report to the Australian Nature Conservation Agency, Canberra, Australian Capital Territory.

Keighery, B., Keighery, G., Longman, V.M., and Clarke, K.A. (2012). *Weed and native flora quadrat data compiled between 1990 - 1996 for the Southern Swan Coastal Plain*. Data compiled for the Departments of Environmental Protection and Conservation and Land Management.

Mitchell, D., Williams, K., & Desmond, A. (2002). Swan Coastal Plan 2 (SWA2 – Perth subregion). In A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Perth: Department of Conservation and Land Management

Pearson, D., Shine, R., & Williams, A. (2005). Spatial ecology of a threatened python (Morelia spilota imbricata) and the effects of anthropogenic habitat change. *Austral Ecology* **30**, 261–274.

Perth Biodiversity Project (2013) Native vegetation on the Swan coastal Plain. Western Australian Local Government Association. Perth. Western Australia.

Rayner, K., Chambers, B., Johnson, B., Morris, K.D., & Mills, H.R. (2012). Spatial and dietary requirements of the Chuditch (*Dasyurus geoffroii*) in a semiarid climatic zone. *Australian Mammalogy* **34**, 59–67.

Shah, B. (2006). *Conservation of Carnaby's Black Cockatoo on the Swan Coastal Plain, Western Australia.* Perth: Birds Australia.

Shepherd, D. P., Beeston, G. R., & Hopkins, A. J. M. (2001). Native Vegetation in Western Australia (Technical Report 249). Perth: Department of Agriculture.

Thorp, J R, & Lynch, R. (2000). The Determination of Weeds of National Significance. National Weeds Strategy Executive Committee, Launceston.

Van Dyck, S., & Strahan, R. (2008). The Mammals of Australia. New South Wales: New Holland Publishers.

Western Australian Herbarium [WAH]. (2015). Florabase - Information on the Western Australian Flora. Accessed from http://florabase.dpaw.wa.gov.au

Woinarski, J.C.Z., Burbidge, A.A., & Harrison, P.L. (2014). The action plan for Australian mammals 2012. CSIRO Publishing.

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MIDLAND
PERTH

Legend

- Project Area
- DPaW Managed Lands
- Environmentally Sensitive Areas
- Perth Regional Ecological Linkages

Geomorphic Wetlands

- Conservation
- Resource Enhancement
- Multiple Use
- Not Assessed

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- DPAW RESULTS SOURCED DPAW OCTOBER 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014

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Burgess Design
Maida Vale

Figure 3
Conservation

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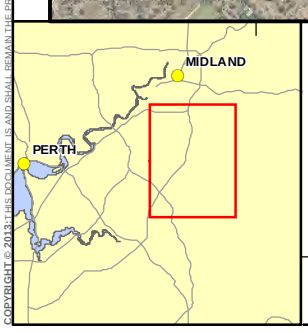

Legend

Project Area

Rare and Priority Flora
- Priority 4
- Priority 3
- Priority 2
- Priority 1
- Declared Rare

TECs/PECs
- Priority 4
- Priority 3
- Priority 2
- Priority 1
- Vulnerable
- Endangered
- Critically Endangered

DATA SOURCES
- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- DPAW RESULTS SOURCED DPAW OCTOBER 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014
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0 200 400 600 800 1,000
Meters
1:30,000 @ A3

Burgess Design
Maida Vale

Figure 4
DPAW Results - Rare and Priority Flora, TECs/PECs

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406600 406800 407000 407200 407400

6464200 6464000 6463800 6463600 6463400 6463200

TREE FERN GRN
WILLERIN MEWS
BAZA GDNS
MYERSON CR
MAIDA VALE RD
BITTERN CL
DARTER WY
BANDIN PL
KAORIKI CT
JECKS ST
JUBATA CT
PIMELEA ST
KUNZEA CL
ROE HWY
GILBA PL
HAROLD RD
OXFORD CT
IRWIN PL
QUENINGTON CT
NORWOOD RD
ARUNDEL CT
RHODES PL
BREWER RD
CLOVELLY CT
RAVENSWOOD RD
HAWTIN RD
KENT RD

Cc / Em
Af / Em
Af / Cc / Em
Pp Cc / Em
CcAf
CcEm
Ne
Ne / G
Af
Cc
Em
G
Pp
Eg
Cleared
nc
AhDg
EmNf
EmAh
R2
R3
R5
Q6
Isopogon drummondii (P3)
Conospermum undulatum (DRF/T)

N

A
B
C

Legend

- Project Area
- Quadrat
- Releve
- DRF/T
- Priority 3

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2015
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DRAWING ID: 1283

0 25 50 100 150 200
Meters
1:3,500 @ A3

Burgess Design
Maida Vale

Figure 5 A
Vegetation Association Mapping

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406000 406200 406400 406600

6463400 6463200 6463000 6462800 6462600 6462400

RHODES PL

RAVENSWOOD RD

R4

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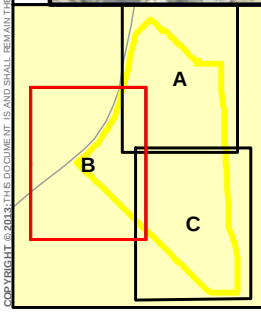

Legend

- Project Area
- Quadrat
- Releve
- DRF/T
- Priority 3

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014
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0 25 50 100 150 200
Meters
1:3,500 @ A3

N

Burgess Design
Maida Vale

Figure 5 B
Vegetation Association Mapping

K:\Projects\1.0 EBS\1283 Maida Vale\Figures\Flora and Fauna Report\1283 F3b FFR Vegetation Associations.mxd

406800 407000 407200 407400 407600

6463000 6462800 6462600 6462400 6462200 6462000 6461800

KENT RD MAUD RD BRUCE RD HAWTIN RD SULTANA RD EAST BREWER RD PEARCE AV LOVETT DR SETOSA DR LESCHENAULTIA WY AZALEA GDNS

Conospermum undulatum (DRF/T)

Q1 Q2 Q3 Q4 Q5 R1 R2 R4

nc

Cc / Em Cc Em Ne G Pp Eg CcEm CcMp CcEr EmXp EmAh EmNf Ew Er EwXp Ew / Er Ne / G

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Legend

- Project Area
- Quadrat
- Releve
- DRF/T
- Priority 3

DATA SOURCES

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- LOCALITY MAP SOURCED LANDGATE 2006
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DRAWING ID: 1283

0 25 50 100 150 200 Meters

1:3,500 @ A3

Burgess Design
Maida Vale

Figure 5 C
Vegetation Association Mapping

K:\Projects\1.0 EBS\1283 Maida Vale\Figures\Flora and Fauna Report\1283 F3c FFR Vegetation Associations.mxd

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6464200 6464000 6463800 6463600 6463400 6463200

TREE FERN GRN
WILLERIN MEWS
BAZA GDNS
MYERSON CR
MAIDA VALE RD
BITTERN CL
DARTER WY
BANDIN PL
KAORIKI CT
JECKS ST
JUBATA CT
PIMELEA ST
KUNZEA GL
ROE HWY
GILBA PL
HAROLD RD
IRWIN PL
OXFORD CT
CLEARED
QUENINGTON CT
NORWOOD RD
ARUNDEL CT
RHODES PL
CLOVELLY CT
BREWER RD
HAWTIN RD
RAVENSWOOD RD
NO ACCESS
KENT RD

D-CD CD G-D VG-G E D

N

A B C

Legend

Project Area

Vegetation Condition

- Excellent
- Very Good
- Very Good - Good
- Good
- Good - Degraded
- Degraded
- Degraded - Completely Degraded
- Completely Degraded
- Cleared
- No Access

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
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0 25 50 100 150 200
Meters
1:3,500 @ A3

Burgess Design
Maida Vale

Figure 6 A
Vegetation Condition Mapping

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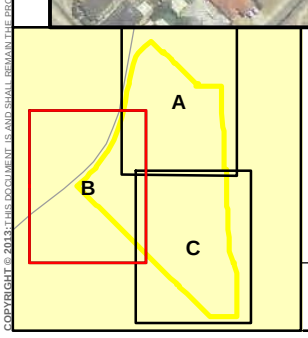
6463400 6463200 6463000 6462800 6462600 6462400

RHODES PL

RAVENSWOOD RD

CD VG-G VG D

N



Legend

Project Area

Vegetation Condition

- Excellent
- Very Good
- Very Good - Good
- Good
- Good - Degraded
- Degraded
- Degraded - Completely Degraded
- Completely Degraded
- Cleared
- No Access

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
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0 25 50 100 150 200
Meters
1:3,500 @ A3

Burgess Design
Maida Vale

Figure 6 B
Vegetation Condition Mapping

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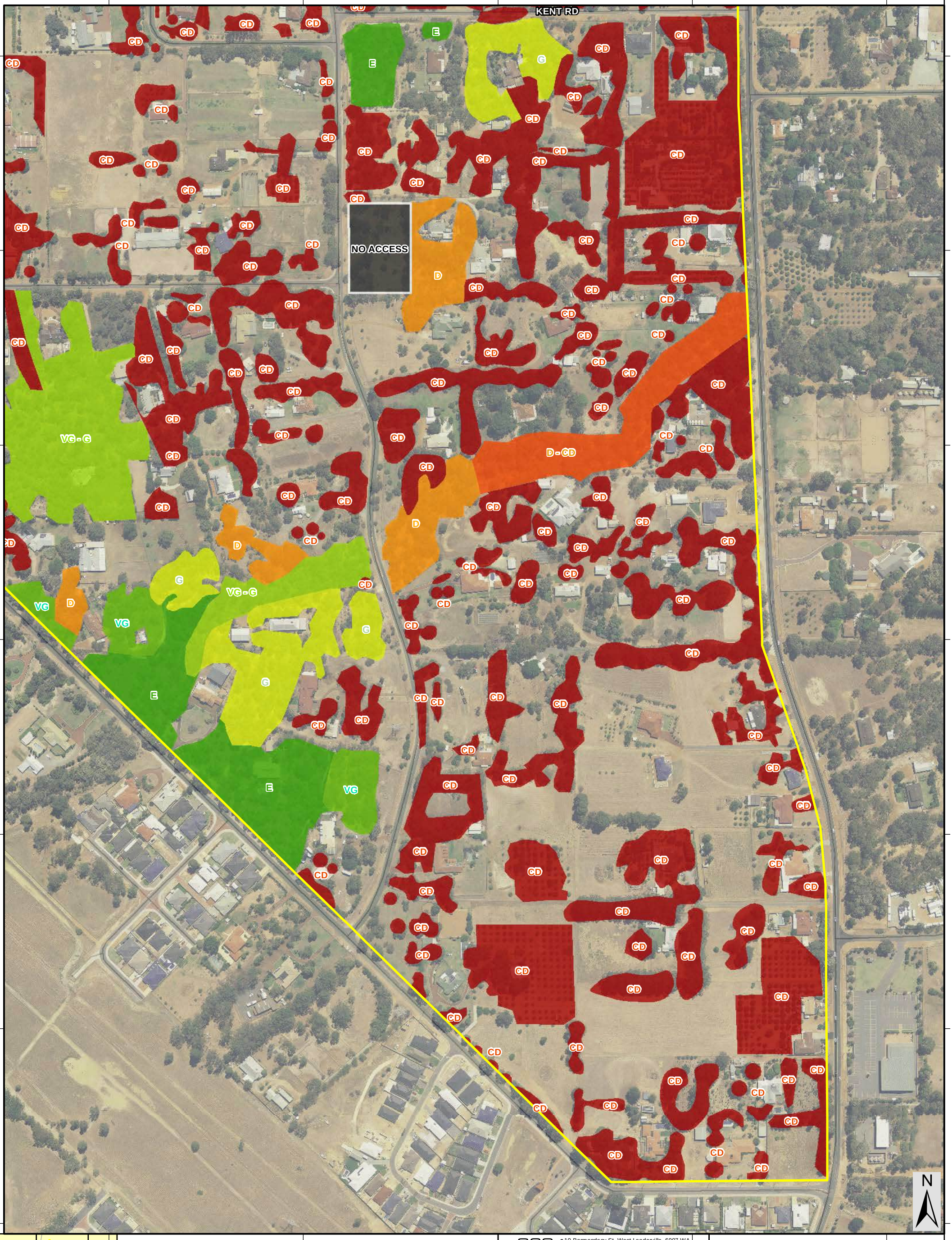
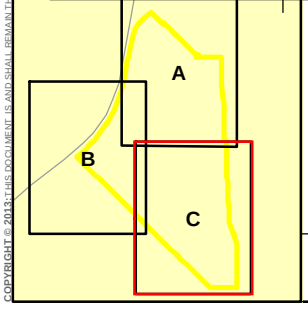
6463000 6462800 6462600 6462400 6462200 6462000 6461800

KENT RD

NO ACCESS





Legend

Project Area

Vegetation Condition

- Excellent
- Very Good
- Very Good - Good
- Good
- Good - Degraded
- Degraded
- Degraded - Completely Degraded
- Completely Degraded
- Cleared
- No Access

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014
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0 25 50 100 150 200
Meters
1:3,500 @ A3

Burgess Design
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Figure 6 C
Vegetation Condition Mapping

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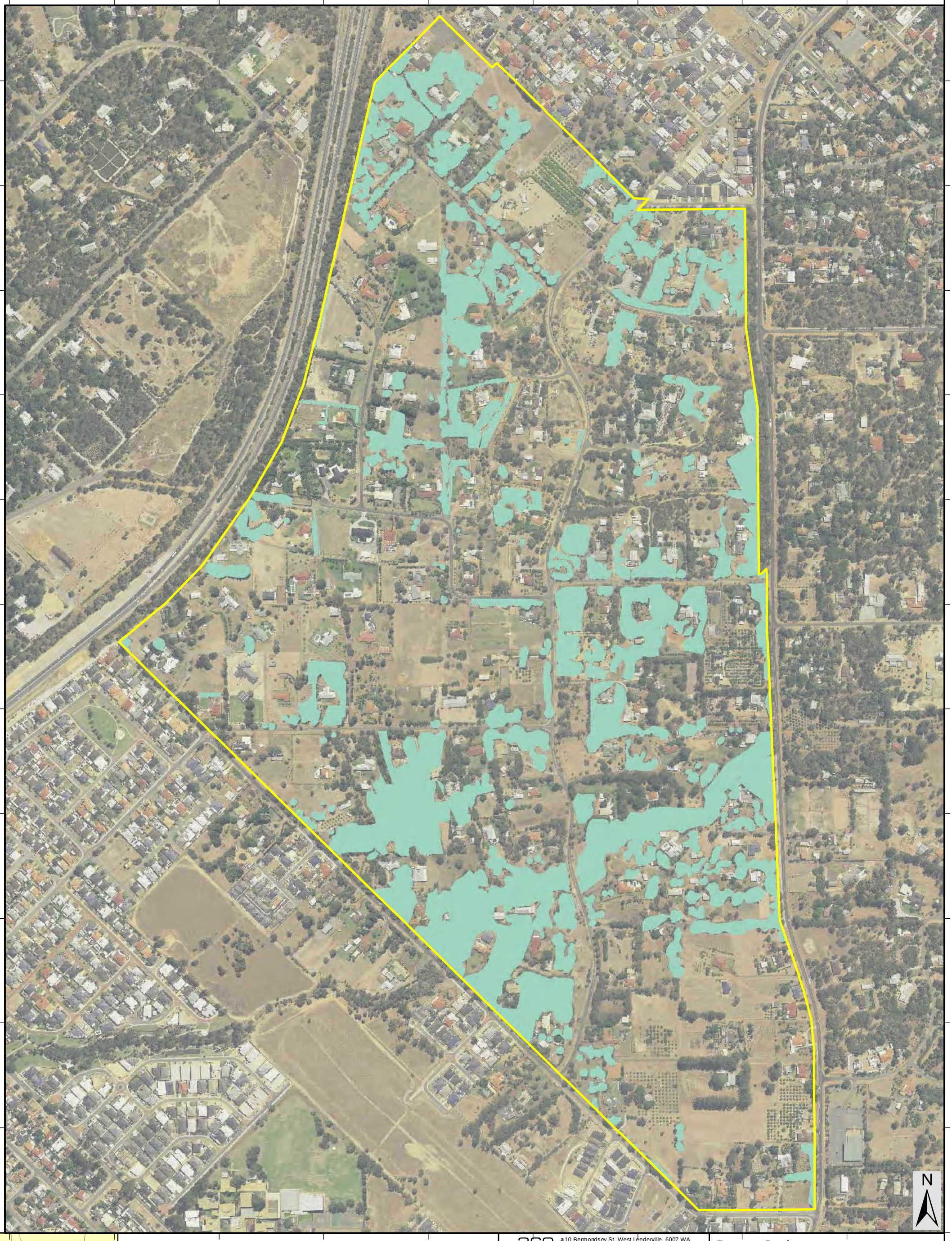

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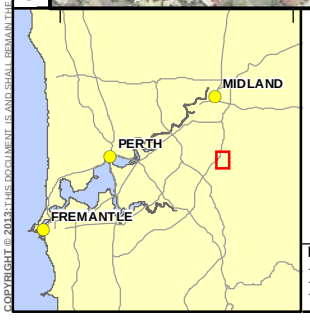

Legend

- Project Area
- Black Cockatoo Foraging Habitat

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014
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0 25 50 100 150 200 250 300
Meters
1:6,500 @ A3

Burgess Design
Maida Vale

Figure 7
Black Cockatoo Foraging Habitat

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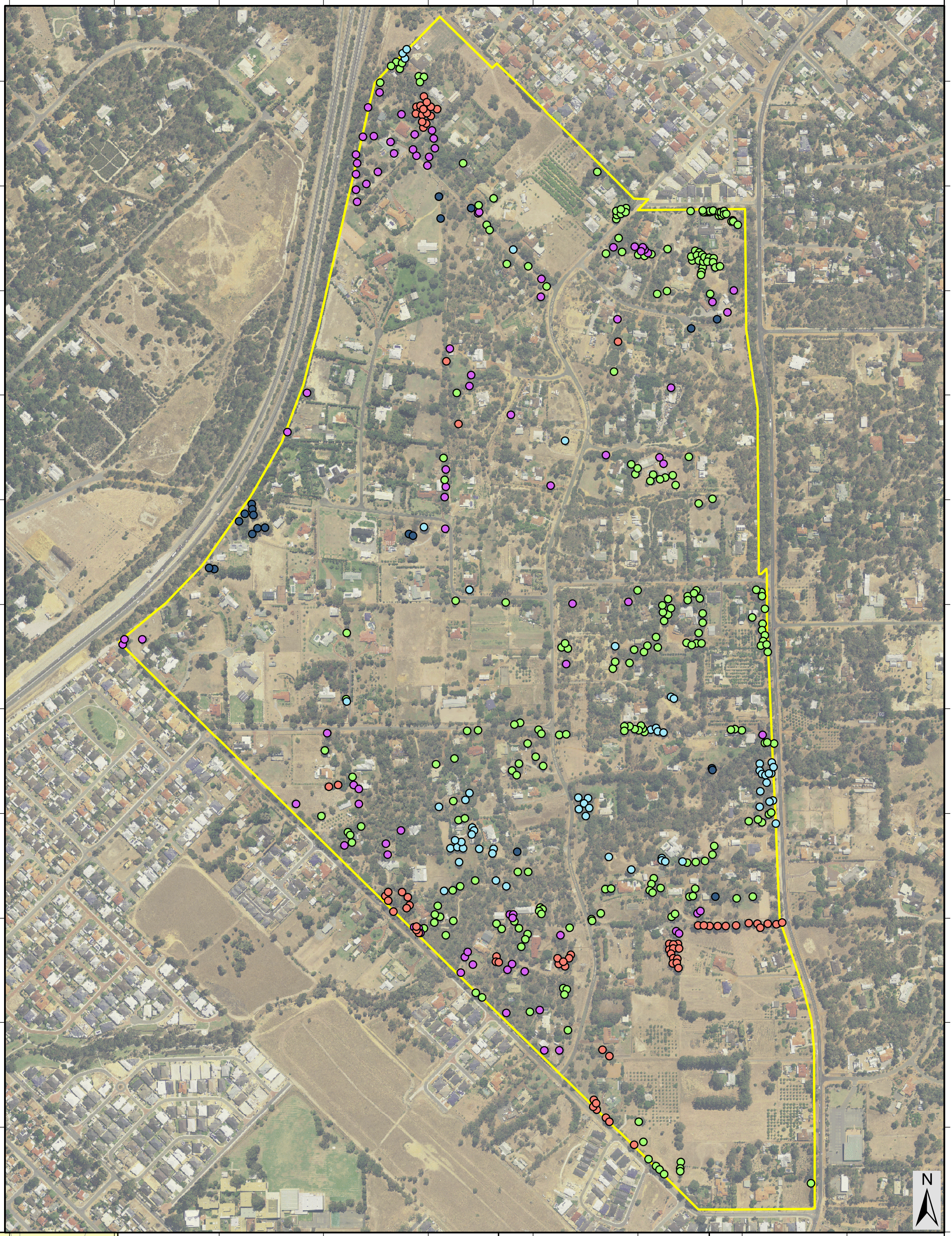
406000 406200 406400 406600 406800 407000 407200 407400 407600

6464000 6463800 6463600 6463400 6463200 6463000 6462800 6462600 6462400 6462200 6462000 6461800



Legend

Project Area

Black Cockatoo Potential Breeding Trees

- *Corymbia calophylla*
- *Eucalyptus marginata*
- *Eucalyptus marginata / Corymbia calophylla*
- *Eucalyptus rudis*
- *Eucalyptus wandoo*

DATA SOURCES

- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2009
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2014
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Meters
1:6,500 @ A3

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Figure 8
Black Cockatoo Potential Breeding Trees

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6464000 6463750 6463500 6463250 6463000 6462750 6462500 6462250 6462000

Fauna Habitat Assessment Site 3
Fauna Habitat Assessment Site 4
Fauna Habitat Assessment Site 1
Fauna Habitat Assessment Site 8
Fauna Habitat Assessment Site 5
Fauna Habitat Assessment Site 7
Fauna Habitat Assessment Site 2
Fauna Habitat Assessment Site 6

N

MIDLAND
PERTH
FREMANTLE

Legend

Project Area

Fauna Habitats

1. Eucalyptus Remnant with Understorey (11.74 ha)
2. Eucalyptus Remnant Lacking Understorey (20.58 ha)
3. No Eucalyptus Remnant (0.98 ha)
4. Crumpet Creek (2.67 ha)
5. Completely Degraded (31.9 ha)

No Access (1.2 ha)

Fauna Habitat Assessment Sites

DATA SOURCES
- CADASTRAL BOUNDARY SOURCED FROM LANDGATE 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2015
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0 50 100 200 300
Meters
1:6,500 @ A3

Burgess Design Group
Maida Vale

Figure 9
Fauna Habitats

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APPENDIX A

Definition of Declared Rare / Priority / Threatened Flora and Fauna Species

Categories of Declared Rare Flora (WC act) and Priority listings (DPaW)

Conservation Code	Description
X	**Presumed Extinct Flora (Declared Rare Flora – Extinct)** "Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the *Wildlife Conservation Act 1950*)."
T	**Threatened Flora (Declared Rare Flora – Extant)** "Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*)." "Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria: CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild; EN: Endangered – considered to be facing a very high risk of extinction in the wild; VU: Vulnerable – considered to be facing a high risk of extinction in the wild."
P1	**Priority One: Poorly-known taxa** "Taxa which are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes."
P2	**Priority Two: Poorly-known taxa** "Taxa which are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes."
P3	**Priority Three: Poorly-known taxa** "Taxa which are known from collections or sight records from several localities not under imminent threat, or few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them."

P4	Priority Four: Rare, Near Threatened and other taxa in need of monitoring a. Rare. "Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands." b. Near Threatened. "Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable." c. "Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy."
P5	Priority Five: Conservation Dependent taxa "Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years."

Source: Department of Parks and Wildlife (2013). Online: http://florabase.dpaw.wa.gov.au.

Western Australian Threatened Fauna Categories Wildlife Conservation Act 1950 (WA)

CATEGORY	CODE	DESCRIPTION
Schedule 1	S1	Rare or likely to become extinct.
Schedule 2	S2	Presumed extinct.
Schedule 3	S3	Birds subject to an agreement between the governments of Australia and Japan, the People's Republic of China & the Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.
Schedule 4	S4	Other specially protected fauna.

Department of Environment and Conservation Fauna Priority Codes

CATEGORY	CODE	DESCRIPTION
Priority 1	P1	Taxa with few, poorly known populations on threatened lands.
Priority 2	P2	Taxa with few, poorly known populations on conservation lands.
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands.
Priority 4	P4	Taxa in need of monitoring: not currently threatened or in need of special protection, but could become so. Usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring: not considered threatened, but the subject of a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of Threatened Flora and Fauna Species under the EPBC Act

CONSERVATION CODE	DESCRIPTION
Ex	**Extinct** Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Source: *Environment Protection and Biodiversity Conservation Act 1999*

APPENDIX B

Definition of Threatened and Priority Ecological Communities

Definitions of Threatened Ecological Communities as Endorsed by the Western Australian Minister for the Environment

Presumed Totally Destroyed (PD)

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B);

A) Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats or

B) All occurrences recorded within the last 50 years have since been destroyed.

Critically Endangered (CR)

An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii)

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 5 years)

ii) modification throughout its range is continuing such that in the immediate future (within approximately 5 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 5 years)

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes

C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately 5 years)

Endangered (EN)

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and either or both of the following apply (i or ii)

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within approximately 10 years)

ii) modification throughout its range is continuing such that in the short term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 10 years)

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes

C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the short term future (within approximately 10 years).

Vulnerable (VU)

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences which are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Source: Department of Environment and Conservation (2010). Definitions, Categories and Criteria for Threatened and Priority Ecological Communities. Department of Environment and Conservation, Perth, Western Australia. Online: www.naturebase.net/

Definitions of Priority Ecological Communities as listed DPaW

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly known ecological communities

Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly known ecological communities

Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.

Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;

(iii) Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened or that have been recently removed from the threatened list.

These communities require regular monitoring.

(a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(c) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities.

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Source: Department of Parks and Wildlife (2013). Definitions, Categories and Criteria for Threatened and Priority Ecological Communities. Department of Environment and Conservation, Perth, Western Australia. Online: www.naturebase.net/

APPENDIX C

Environmental Weeds and Declared Plant Categories

Criteria used for Ranking Environmental Weeds

The Weed Prioritisation Process for DPaW contains criteria for the assessment and ranking of weeds in terms of their environmental impact on biodiversity. These criteria are as follows:

- **Potential Distribution** – Area of potential habitat in the Region that could be occupied or the area at risk of invasion by the weed.
- **Current Distribution** - Area of habitat in the Region currently occupied by the weed, in relation to the habitat that it could invade.
- **Ecological Impact** - Impact of species within the Region, from low impact (causes minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems).
- **Invasiveness** – rate of spread of a weed in native vegetative, encompassing factors of establishment, reproduction and long distance dispersal (>100m).
- **Feasibility of Control** - The longer a coordinated control program takes to achieve its desired goal, the more expensive and less feasible it becomes. Is it feasible to eradicate or at least contain the infestation?

Source: DPaW (2013). Weed Prioritisation Process for DPaW (formerly DEC) – "An integrated approach to Weed Management on DPaW-managed lands in WA"

Standard Meanings of Declared Plant Categories

Under the Biosecurity and Agriculture Management Act 2007 (the BAM Act), all declared pests are placed in one of three categories, namely C1 (exclusion), C2 (eradication) or C3 (management).

C1 category (Exclusion) - Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.

C2 category (Eradication) – Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

C3 category (Management) – Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Source: Department of Agriculture and Food, Western Australia. Online: http://www.biosecurity.wa.gov.au/western-australian-organism-list-waol

APPENDIX D

Vegetation Condition Scale

CONDITION SCALE CODE	CONDITION SCALE
P	**Pristine (1)** Pristine or nearly so, no obvious signs of disturbance
E	**Excellent (2)** Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
VG	**Very Good (3)** Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
G	**Good (4)** Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
D	**Degraded (5)** Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
CD	**Completely Degraded (6)** The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Source: Bush Forever Vegetation Condition Scale as developed by Keighery (1994) and summarized in Bush Forever (Government of Western Australia (2000b)

APPENDIX E

Fauna Inventory

AMPHIBIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C = EPBC Protected Matters search, D= Current Survey;

Note: For Definitions of Conservation Codes see Appendix A.

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
LIMNODYNASTIDAE								
Heleioporus barycragus	Hooting Frog				X			
Heleioporus eyrei	Moaning Frog				X			
MYOBATRACHIDAE								
Crinia georgiana	Quacking Frog				X			
Crinia glauerti	Clicking Frog				X			
Crinia insignifera	Squelching Froglet				X			
Crinia pseudinsignifera	Bleating Frog				X			
Pseudophryne guentheri	Crawling Toadlet				X			
HYLIDAE								
Litoria adelaidensis	Slender Tree Frog				X			
Litoria moorei	Motorbike Frog				X			

REPTILIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C = EPBC Protected Matters search, D= Current Survey:

Note: For Definitions of Conservation Codes see Appendix A.

		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
DIPLODACTYLIDAE								
Crenadactylus ocellatus	Clawless Gecko				X			
Diplodactylus granariensis	Wheat-belt Stone Gecko				X			
Diplodactylus polyophthalmus	Speckled Stone Gecko				X			
Diplodactylus pulcher	Fine-faced Gecko				X			
Strophurus spinigerus inortatus	South-western Spint-tailed Gecko				X			
PYGOPODIDAE								
Aprasia pulchella	Granite Worm-lizard				X			
Aprasia rapens	Sand-plain Worm-lizard				X			
Delma grayii	Side-barred Delma				X			
Lialis burtonis	Burtons Snake Lizard				X			
Pygopus lepidopous	Common Scaly Foot				X			
GEKKONIDAE								
Christinus marmoratus	Marbled Gecko				X			
Gehyra variagata	Tree Dtella				X			
Underwoodisaurus milii	Barking Gecko				X			
SCINCIDAE								
Acritoscincus trilineatus	Western Three-lined Skink				X			
Cryptoblepharus buchananii	Buchanans Snake-eyed Skink				X			X
Cryptoblepharus plagiocephalus	Perons Snake-eyed Skink				X			
Ctenotus delli	Dells'Ctenotus		P4		X	X		
Ctenotus fallens	West-coast Laterite Ctenotus				X			
Ctenotus labillardieri	Common South-west Ctenotus				X			
Hemiergis initialis	South-western Earless Skink				X			
Lerista distinguenda	South-western Orange Tailed-Slider				X			
Morethia obscura	Shrubland Morethia Skink				X			

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
Tiliqua rugosa	Shingleback				X			
AGAMIDAE								
Pogona minor	DwarF Bearded Dragon				X			
VARANIDAE								
Varanus gouldii	Sand Monitor				X			
Varanus tristis	Racehorse Monitor				X			
BOIDAE								
Antaresia stimsoni	Stimsons Python				X			
Morelia spilota imbricata	Carpet Python	S4			X	X		
ELAPIDAE								
Brachyyrophis semifasciatus	Southern Shovel-nosed Snake				X			
Notechis scutatus	Tiger Snake				X			
Parasuta gouldii	Gouds Snake				X			
Pseudechis australis	Mulga Snake				X			
Pseudonaja affinis affinis	Dugite				X			

AVIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C= EPBC Protected Matters search, D= Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
MEGAPODIIDAE								
Leipoa ocellata	Malleefowl	Vu	S1				X	
ANATIDAE								
Anas castanea	Chestnut Teal				X			
Anas gracillis	Grey Teal				X			
Anas platyrhynchos	Mallard				X		X	
Anas rhynchotis	Australian Shoveler				X			
Anas superciliosa	Pacific Black Duck				X			X
Aythya australis	Hardhead				X			
Biziura lobata	Musk Duck				X			
Chenonetta jubata	Australian Wood Duck				X			
Cygnus atratus	Black Swan				X			
Tadorna tadornoides	Australian Shelduck				X			
PODICIPEDIDAE								
Tachybaptus novaehollandiae	Australian Grebe				X			
ANHINGIDAE								
Anhinga melanogaster	Oriental Darter				X			
Anhinga novaehollandiae	Australasian Darter				X			
PHALACROCORACIDAE								
Phalacrocorax carbo	Great Cormorant				X			
Phalacrocorax melanoleucos	Little Pied Cormorant				X			
Phalacrocorax sulcirostris	Little Black Cormorant				X			
Phalacrocorax varius	Pied Cormorant				X			
PELECANIDAE								
Pelecanus conspicillatus	Australian Pelican				X			
ARDEIDAE								
Ardea garzetta	Little Egret				X			
Ardea ibis	Cattle Egret	Mi			X		X	

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
Ardea modesta	Great Egret	Mi			X	X	X	
Ardea novaehollandiae	White-faced Heron				X			
Ardea pacifica	White-necked Heron				X			
Nycticorax caledonicus	Rufous Night Heron				X			
HAEMATOPODIDAE								
Haematopus longirostris	Australian Pied Oystercatcher				X			
RECURVIROSTRIDAE								
Himantopus himantopus	Black-winged Stilt				X			
Recurvirostra novaehollandiae	Red-necked Avocet				X			
Cladorhynchus leucocephalus	Banded Stilt				X			
CHARADRIIDAE								
Charadrius ruficapillus	Red-capped Plover				X			
Elseyornis melanops	Black-fronted Dotterel				X			
Pluvialis squatarola	Grey Plover	IA			X			
Thinornis rubricollis	Hooded Plover	Ma					X	
Vanellus tricolour	Banded Lapwing				X			
ROSTRATULIDAE								
Rostratula australis	Australian Painted Snipe	En, Ma					X	
SCOLOPACIDAE								
Arenaria interpres	Ruddy Turnstone	Mi			X			
Calidris acuminata	Sharp-tailed Sandpiper	Mi			X			
Calidris canutus	Red Knot	Mi			X			
Caliclris ferruginea	Curlew Snadpiper	Mi			X			
Calidris ruficollis	Red Necked Stint	Mi	S3		X			
Calidris subminuta	Long-toed Stint	Mi			X			
Calidris tenuirostris	Great Knot	Mi			X			
Limosa lapponica	Bar-tailed Godwit	Mi			X			
Limosa limosa	Black-tailed Godwit	Mi			X			
Tringa nebularia	Common Greenshank	Mi	S3		X			
TURNICIDAE								
Turnix velox	Little Button-quail				X			
COLUMBIDAE								
Columba livia	Domestic Pigeon				X		X	X
Ocyphaps lophotes	Crested Pigeon				X			X
Phaps chalcoptera	Common Bronzewing				X			X
Streptopelia chinensis	Spotted Turtle-Dove				X		X	
Streptopelia senegalensis senegalensis	Laughing Dove				X		X	
PODARGIDAE								
Podargus strigoides	Tawny Frogmouth				X			
EUROSTOPODIDAE								

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
Eurostopodus argus	Spotted Nightjar				X			
APODIDAE								
Apus pacificus	Fork-tailed Swift	MiMa					X	
THRESKIORNITHIDAE								
Plegadis flavipes	Yellow-billed Spoonbill				X			
Threskiornis molucca	Australian White Ibis				X			
Threskiornis spinicollis	Straw-necked Ibis				X			X
ACCIPITRIDAE								
Accipiter cirrocephalus cirrocephalus	Collared Sparrowhawk				X			
Accipiter fasciatus didimus	Brown Goshawk				X			
Aquila audax	Wedge-tailed Eagle				X			
Elanus axillaris	Black Souldered Kite				X			
Haliaeetus leucogaster	White-bellied Sea Eagle	Ma			X		X	
Haliastur sphenurus	Whistling Kite				X			
Lophoictinia isura	Square-tailed Kite				X			
Pandion haliaetus	Osprey	Ma			X		X	
FALCONIDAE								
Falco berigora	Brown Falcon							X
Falco cenchroides	Australian Kestrel				X			
Falco longipennis	Australian Hobby				X			
RALLIDAE								
Fulica atra	Eurasian Coot				X			
Gallinula tenebrosa	Dusky Moorhen				X			
Gallirallus philippensis	Buff-banded Rail				X			
Porphyrio porphyrio bellus	Purple Swamphen				X			
Porzana tabuensis	Spotless Crake				X			
LARIDAE								
Chroicocephalus novaehollandiae	Silver Gull				X			
Thalasseus bergii	Crested Tern				X			
Hydroprogne caspia	Caspian Tern	Al			X			
Sternula nereis	Fairy Tern				X			
PSITTACIDAE								
Cacatua roseicapilla assimilis	Galah				X			X
Cacatua galerita	Sulphur-crested cockatoo				X			
Cacatua pastinator	Western Long-billed Corella				X			
Cacatua sanguinea	Little Corella				X			
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	Vu	S1		X	X	X	X
Calyptorhynchus baudinii	Baudin's Cockatoo	Vu	S1		X	X	X	
Calyptorhynchus latirostris	Carnaby's Cockatoo	En	S1		X	X	X	X
Glossopsitta porphyrocephala	Purple-crowned Lorikeet				X			

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
Platycercus icterotis	Western Rosella				X			
Platycercus spurius	Red-capped Parrot							X
Platycercus zonarius	Australian Ringneck				X			X
Trichoglossus haematodus moluccanus	Rainbow Lorikeet				X			X
CUCULIDAE								
Cacomantis flabelliformis	Fan-tailed Cockoo				X			
Cacomantis pallidus	Pallid Cuckoo				X			
Chrysococcyx basalis	Horsfields Bronze Cuckoo				X			
Chrysococcyx lucidus plagosus	Shining Bronze Cockoo				X			
STRIGIDAE								
Ninox novaeseelandiae boobook	Boobook Owl				X			
HALCYONIDAE								
Dacelo novaeguineae	Laughing Kookaburra				X			
Todiramphus sanctus sanctus	Sacred Kingfisher				X			
MEROPIDAE								
Merops ornatus	Rainbow Bee-eater	Mi			X	X	X	X
CLIMACTERIDAE								
Climacteris rufa	Rufous Treecreeper				X			
MALURIDAE								
Malurus elegans	Red-winged Fairy-wren				X			
Malurus splendens	Splendid Fairy-wren				X			
ACANTHIZIDAE								
Acanthiza apicalis	Inland Thornbill				X			
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				X			X
Acanthiza inornata	Western Thornbill				X			
Gerygone fusca	Western Gerygone				X			
Sericrornis brevirostris	Weebill				X			
Sericornis frontalis	White-browed Scrubwren				X			
PARDALOTIDAE								
Pardalotus punctatus	Spotted Pardalote				X			
Pardalotus striatus	Striated Pardalote				X			X
MELIPHAGIDAE								
Anthochaera carunculata	Red Wattlebird				X			X
Anthochaera lunulata	Western Little Wattlebird				X			X
Acanthorhynchus superciliosus	Western Spinebill				X			
Lichmera indistincta	Brown Honeyeater				X			X
Melithreptus brevirostris	Brown-headed Honeyeater				X			
Phylidonyris novaehollandiae	New Holland Honeyeater				X			X
Phylidonyris niger	White-cheeked Honeyeater							X
PETROICIDAE								

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
Eopsaltria australis griseogularis	Western Yellow Robin				X			
NEOSITTIDAE								
Daphoenositta chyrstoptera	Varied Sittella				X			
CAMPEPHAGIDAE								
Coracina novaehollandiae	Black-faced Cuckoo-shrike				X			
Lalage tricolour	White-winged Triller				X			
PACHYCEPHALIDAE								
Colluricincla harmonica	Grey Shrike Thrush				X			
Pachycephala pectoralis	Golden Whistler				X			
Pachycephala rufiventris	Rufous Whistler				X			X
ARTAMIDAE								
Vanellus tricolor	Dusky Woodswallow				X			
DICRURIDAE								
Grallina cyanoleuca	Magpie-lark				X			X
Rhipidura albiscapa	Grey Fantail							X
Rhipidura leucophrys	Willie Wagtail				X			X
CRACTICIDAE								
Cracticus tibicen	Australian Magpie				X			X
Cracticus torquatus	Grey Butcherbird				X			X
Strepera versicolour	Grey Curranwong				X			X
CORVIDAE								
Corvus coronoides	Australian Raven				X			X
Corvus orru	Torresian Crow							X
DICAEIDAE								
Dicaeum hirundinaceum	Mistletoebird				X			
ACROCEPHALIDAE								
Acrocephalus australis	Australian Reed-Warbler				X			
MEGALURIDAE								
Megalurus gramineus	Little Grassbird				X			
TIMALIIDAE								
Zosterops lateralis	Silvereye				X			X
HIRUNDINIDAE								
Hirundo neoxena	Welcome Swallow				X			
Hirundo nigricans	Tree Martin				X			
STURINADAE								
Acridotheres tristis	Common Myna						X	
Sturnus vulgaris	Common Starling						X	
PASSERIDAE								
Passer domesticus	House Sparrow						X	
Passer montanus	Eurasian Tree Sparrow						X	

Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
MOTACILLIDAE								
Motacilla cinerea	Grey Wagtail	MiMa					X	
FRINGILLIDAE								
Carduelis carduelis	European Goldfinch						X	

MAMMALIAN SPECIES RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DPaW = Department of Parks and Wildlife Priority Code, A = Listed in Naturemap, B= DPaW Threatened and Priority fauna search, C = EPBC Protected Matters search, D= Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DPaW	A	B	C	D
DASYURIDAE								
Antechinus flavipes leucogaster	Yellow-footed Antechinus				X			
Dasyurus geoffroii Chuditch	Western Quoll	Vu	S1		X	X	X	
Phascogale tapoatafa	Southern Brush-tailed Phascogale		S1		X	X		
PERAMELIDAE								
Isoodon obesulus fusciventer	Southern Brown Bandicoot			P5	X	X		X
PSEUDOCHEIRIDAE								
Pseudocheirus occidentalis	Western Ringtail Possum	Vu	S1				X	
TARSIPEDIDAE								
Tarsipes rostratus	Honey Possum				X			
PHALANGERIDAE								
Trichosurus vulpecula	Common Brushtail Posusm				X			
MACROPODIDAE								
Setonix brachyurus	Quokka	Vu	S1				X	
VESPERTILIONIDAE								
Chalinolobus gouldii	Goulds Wattled Bat				X			
Nyctophilus geoffroyi	Lesser Long-eared Bat				X			
Vespadelus regulus	Southern Forest Bat				X			
MURIDAE								
Hydromys chrysogaster	Water Rat			P4	X	X		
Mus musculus	House Mouse						X	
Rattus norvegicus	Brown Rat						X	
Rattus rattus	Black Rat				X		X	
SCIURIDAE								
Funambulus pennantii	Northern Palm Squirrel				X		X	
CANIDAE								
Canis lupus	Dingo				X			

Scientific Name	Common Name	Conservation Codes						
		EPBC	WC	DPaW	A	B	C	D
Canis lupus familiaris	Domestic Dog				X		X	X
CARNIVORA								
Vulpes vulpes	Red Fox						X	
FELIDAE								
Felis catus	Cat				X		X	
LEPORIDAE								
Oryctolagus cuniculus	European Rabbit						X	
EQUIDAE								
Equus caballus	Horse							X
SUIDAE								
Sus scrofa	Pig						X	
BOVIDAE								
Bos taurus	Cattle						X	
Capra hircus	Goat						X	
CERVIDAE								
Dama dama	Fallow Deer						X	

APPENDIX F

Flora Likelihood Table

Table 5: Assessment of the Likelihood of Occurrence of Significant Flora identified from Database Searches.

[1]Closest record to Survey Area based on DPaW 2015.
Likely = Suitable habitat present and records less than 3 km from the Survey Area, Possible = Suitable habitat present and records between 3 km and 5 km from the Survey Area, and Unlikely = No suitable habitat present and/or records greater than 5 km from the Survey Area. En = Listed as Endangered under the EBPC Act, Vu = Listed as Vulnerable under the EBPC, Ce= Critically Endangered under the EBPC Act, P = Listed as Priority by the DPaW DRF = Declared Rare Flora as listed by the State.

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
DPaW Naturemap PMST	Vulnerable	T	*Acacia anomala*	Grass wattle grows on the western slopes of the darling range east of Perth, where it is confined to shallow grey sands over laterite. In a few locations it is entangled amongst other low shrubs in low open woodland of Jarrah, Wandoo and Marri over heath dominated by Grevilleas, Dryandras, Hakeas and Acacias (Brown et al. 1998).	No	1 km	Unlikely
PMST	Endangered	T	*Andersonia gracilis*	Andersonia gracilis is currently known from the Badgingarra, Dandaragan and Kenwick areas where it is found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils supporting low open heath vegetation with species such as Calothamnus hirsutus, Verticordia densiflora and Kunzea recurva over sedges (DEC 2006).	No	5.68 km	Unlikely
DPaW Naturemap PMST	Endangered	T	*Banksia mimica*	White or grey sand over laterite, sandy loam.	Yes	3 km	Possible

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
Naturemap PMST	Endangered	T	*Caladenia huegelii*	Caladenia huegelii occurs in areas of mixed woodland of Jarrah (Eucalyptus marginata), Candlestick Banksia (Banksia attenuata), Holly Banksia (B. ilicifolia) and Firewood Banksia (B. menziesii) with scattered Sheoak (Allocasuarina fraseriana) and Marri (Corymbia calophylla) over dense shrubs of Blueboy (Stirlingia latifolia), Swan River Myrtle (Hypocalymma robustum), Yellow Buttercups (Hibbertia hypericoides), Buttercups (H. subvaginata), Balga (Xanthorrhoea preissii), Coastal Jugflower (Adenanthos cuneatus) and Conostylis species, from just north of Perth to the Busselton area, usually within 20 km of the coast. Throughout its range the species tends to favour areas of dense undergrowth. Soil is usually deep grey-white sand usually associated with the Bassendean sand-dune system. However, rare plants have been known to extend into the Spearwood system (in which calcareous yellow sands dominate) in some areas (DEC 2009).	No	>5 km	Unlikely
Naturemap		T	*Calectasia cyanea*	Is not known to occur in region – data error	-	-	-
Naturemap	Endangered	T	*Calytrix breviseta*	Sandy clay. Swampy flats	No	>5 km	Unlikely

Source	Conservation Status EPBC	DPaW	Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
PMST			*subsp. breviseta*				
PMST	Endangered	T	*Chamelaucium sp. Gingin*	Chamelaucium sp. Gingin (N.G.Marchant 6) occurs on white/yellow sand supporting open low woodland with Eucalyptus todtiana, Banksia attenuata and Hibbertia sp. (Stack, G. & English, V., 2003a).	Not known to occur in region	-	-
DPaW Naturemap PMST	Vulnerable	T	*Conospermum undulatum*	Grey or yellow-orange clayey sand	Yes	Found in survey area	Found in survey area
DPaW Naturemap PMST	Endangered	T	*Darwinia apiculata*	Lateritic soils	No	1.5 km	Unlikely
PMST	Critically Endangered	T	*Darwinia foetida*	Darwinia foetida occurs in grey-white sand on swampy, seasonally wet sites. Plants are found alongside sump land, that is, land acting as a pit or well where water collects (CALM 2006).	No	34.87 km	Unlikely
PMST	Vulnerable	T	*Diuris micrantha*	Grows in seasonally wet flats amongst sedges and scattered shrubs (Brown et al. 2013).	No	31.12 km	Unlikely
Naturemap PMST	Endangered	T	*Diuris purdiei*	Grows under dense shrubs in seasonally-wet swamps and drainage lines (Brown et al. 2013).	No	3.99 km	Unlikely
Naturemap PMST	Endangered	T	*Drakaea elastica*	White or grey sand. Low-lying areas adjoining winter-wet swamps.	No	1.2 km	Unlikely

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
PMST	Vulnerable	T	*Drakaea micrantha*	White-grey sand.			
PMST	Endangered	T	*Eucalyptus x balanites*	Eucalyptus balanites is found on light coloured sandy soils over laterite. Habitat consists of gently sloping heathlands (DEC 2004).	No	24.24 km	Unlikely
PMST	Endangered	T	*Grevillea curviloba* subsp. *incurva*	Grows in open heath in winter-wet areas on sand over limestone, or over ironstone at sites with a high water table (CALM 2000a).	No	23.94	Unlikely
Naturemap	-	T	*Grevillea thelemanniana subsp. thelemanniana*	Data not available	Unknown	5.29 km	Unknown
PMST	Endangered	T	*Lasiopetalum pterocarpum*	Occurs in the only remaining fragment of flooded gum (eucalyptus rudis) and Swamp paperbark (Melaleuca rhaphiophylla) woodland on the Darling scarp and adjacent Swan Coastal Plain, Where the community is comparatively intact. The species is found along the edges of rivers and creeklines in moist, dark brown loam or clayey sand over granite (Brown et al., 1998).	No	36.55 km	Unlikely
PMST	Endangered	T	*Lepidosperma rostratum*	Is only known from the Perth metropolitan area, where it grows in sandy soil amongst low heath in a winter-wet swamp. Associated	No	6.39	Unlikely

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
				species include (Banksia telmatiaea) and hairy clawflower (Calothamnus hirsutus) (Brown et al., 1998).			
DPaW Naturemap PMST	Endangered	T	*Macarthuria keigheryi*	The species grows in low-lying winter damp sands under banksia and kingias (Kingia australis) (Brown et al., 1998).	No	2 km	Unlikely
PMST	Critically endangered	T	*Synaphea sp. Fairbridge farm*	Sandy with laterite pebbles. Near winter -wet flats, in low woodland with weedy grasses.	No	>30 km	Unlikely
DPaW Naturemap PMST	Endangered	T	*Thelymitra stellata*	The Star Sun-orchid grows among low heath and scrub in Jarrah (Eucalyptus marginata) and Wandoo (E. wandoo) woodland, both on ridges and slopes, flats, also on riverbanks and breakaways. Soil types are red, brown, yellow, or grey sandy loams clay or gravel over laterite or gravel (DotE 2015b).	Yes	1.5 km	Likely
PMST	Endangered	T	*Thelymitra dedmaniarum*	Granite.	No	18.38 km	Unlikely
DPaW Naturemap	-	P1	*Boronia humifusa*	Gravelly clay loam over laterite. Jarrah marri open forest.	Yes	2 km	Likely
Naturemap	-	P1	*Grevillea bipinnatifida subsp. pagna*	Grey sandy clay and loam, ironstone. Seasonally wetlands, swamps and roadsides.	No	1.69 km	Unlikely

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
DPaW Naturemap	-	P1	*Hydrocotyle striata*	Clay. Springs.	No	3.5 km	Unlikely
Naturemap	-	P1	*Rinzia crassifolia*	Lateritic sand or clay. Rises and outcrops.	No	5.02 km	Unlikely
DPaW Naturemap	-	P1	*Senecio gilbertii*	Peaty sand. Swamps and slopes.	No	2.03 km	Unlikely
DPaW Naturemap	-	P1	*Thelymitra magnifica*	Stoney ridges.	No	200 m	Unlikely
DPaW	-	P2	*Lepyrodia curvescens*	Sand, laterite. Seasonally inundated swampland.	No	3.5 km	Unlikely
DPaW Naturemap	-	P2	*Melaleuca viminalis*	Information not available.	Unknown	4.63 km	Unknown
DPaW	-	P3	*Acacia drummondii* subsp. *affinis*	Lateritic gravelly soils.	No	4 km	Unlikely
DPaW Naturemap	-	P3	*Acacia oncinophylla subsp. oncinophylla*	Granitic soils.	No	3.41 km	Unlikely
DPaW	-	P3	*Asteridea gracilis*	Sand, clay, gravelly soil.	Yes	3 km	Likely
DPaW Naturemap	-	P3	*Beaufortia purpurea*	Lateritic or granitic soils. Rocky slopes.	No	3.5 km	Unlikely
DPaW Naturemap	-	P3	*Byblis gigantea*	Sandy-peat swamps. Seasonally wet areas.	No	3 km	Unlikely
DPaW	-	P3	*Grevillea manglesii subsp. dissectifolia*	Lateritic or granitic soils. Rocky slopes.	No	4 km	Unlikely

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
DPaW Naturemap	-	P3	*Haemodorum loratum*	Grey or yellow sand, gravel.	Yes	100 m	Likely
DPaW Naturemap	-	P3	*Halgania corymbosa*	Gravelly soils, soils over granite.	No	2.5 km	Unlikely
DPaW Naturemap	-	P3	*Isopogon drummondii*	White, grey or yellow sand, often over laterite.	Yes	Found on site	Found on site
Naturemap	-	P3	*Isopogon formosus subsp. dasylepis*	Sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas.	No	4.56 km	Unlikely
DPaW	-	P3	*Jacksonia gracillima*	Information not available	Unknown	10.2 km	Unknown
DPaW Naturemap	-	P3	*Lasiopetalum glutinosum subsp. glutinosum*	Information not available	Unknown	2 km	Unknown
DPaW	-	P3	*Pithocarpa corymbulosa*	Gravelly or sandy loam. Amongst granite outcrops.	No	2 km	Unlikely
DPaW Naturemap	-	P3	*Platysace ramosissima*	Sandy soils.	Yes	1.5 km	Likely
DPaW	-	P3	*Schoenus griffinianus*	White sand.	No	3.5 km	Unlikely
DPaW Naturemap	-	P3	*Schoenus pennisetis*	Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.	No	2 km	Unlikely
DPaW	-	P3	*Stackhousia sp.*	Information not available	Unknown	3.5 km	Unknown

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
Naturemap			*Red-blotched corollla*				
DPaW Naturemap	-	P3	*Stylidium longitubum*	Sandy clay, clay. Seasonal wetlands.	No	3.5 km	Unlikely
DPaW Naturemap	-	P3	*Tetratheca sp. Granite*	Clay, moist loam, clayey sand. Granite boulders.	No	1 km	Unlikely
DPaW	-	P3	*Thelymitra variegata*	Sandy clay, sand, laterite.	Yes	4 km	Possible
DPaW Naturemap	-	P3	*Thysanotus anceps*	White or grey sand, lateritic gravel, laterite.	No	3.5 km	Unlikely
DPaW Naturemap	-	P4	*Acacia oncinophylla subsp. patulifolia*	Granitic soils, occasionally on laterite.	No	2 km	Unlikely
DPaW Naturemap	-	P4	*Boronia tenuis*	Laterite, stony soils, granite.	No	2.5 km	Unlikely
DPaW Naturemap	-	P4	*Calothamnus accedens*	Sandy soils over laterite. Road verges.	Yes	3 km	Likely
DPaW Naturemap	-	P4	*Hibbertia helianthemoides*	Clayey sand over sandstone or loam over quartzite. Hills and scree slopes.	No	5.49 km	Unlikely
DPaW Naturemap	-	P4	*Hibbertia montana*	Loam over granite, lateritic soils and gravel. Granite rocks, lateritic ridges and boulders and hills.	No	3.72 km	Unlikely
DPaW	-	P4	*Lasiopetalum*	Sandy clay, clay, lateritic gravel. Along	Yes	500 m	Likely

Source	Conservation Status		Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1]	Likelihood
	EPBC	DPaW					
			bracteatum	drainage lines, creeks, gullies, granite outcrops.			
DPaW Naturemap	-	P4	*Ornduffia submersa*	Information not available	Unknown	On site and/or 3.5 km	Unknown
DPaW	-	P4	*Pimelea rara*	Lateritic soils.	No	7.78 km	Unlikely
DPaW Naturemap	-	P4	*Senecio leucoglossus*	Gravelly lateritic or granitic soils. Granite outcrops, slopes.	No	2.5 km	Unlikely
DPaW Naturemap	-	P4	*Stylidium striatum*	Brown clay loam over laterite. Hillslopes. Jarrah/Marri Forest, Wandoo woodland.	No	1.5 km	Unlikely
DPaW Naturemap	-	P4	*Verticordia lindleyi* subsp. *lindleyi*	Habitat includes Sand, sandy clay. Winter-wet depressions (WAH 2015).	No	2 km	Unlikely

APPENDIX G

Flora Inventory

Family	Taxa
Anarthriaceae	*Lyginia imberbis*
Apiaceae	*Daucus glochidiatus*
	Pentapeltis peltigera
Araliaceae	*Trachymene pilosa*
Asparagaceae	**Asparagus asparagoides*
	Chamaescilla corymbosa
	Laxmannia sessiliflora subsp. *australis*
	Lomandra sericea
	Lomandra sonderi
	Sowerbaea laxiflora
	Thysanotus manglesianus
	Thysanotus thyrsoideus
Asteraceae	*Hyalosperma cotula*
	**Hypochaeris glabra*
	Trichocline spathulata
	**Ursinia anthemoides*
Casuarinaceae	*Allocasuarina humilis*
Colchicaceae	*Burchardia congesta*
Cyperaceae	*Caustis dioica*
	Lepidosperma leptostachyum
	Lepidosperma pubisquameum
	Lepidosperma ?pubisquameum
	Lepidosperma tenue
	Lepidosperma tetraquetrum
	Mesomelaena pseudostygia
	Mesomelaena tetragona
	Schoenus brevisetis

	Schoenus pleiostemoneus
	Tetraria octandra
	Tetraria ?octandra
	Tricostularia neesii
Dasypogonaceae	*Dasypogon obliquifolius*
	Kingia australis
Dilleniaceae	*Hibbertia huegelii*
	Hibbertia hypericoides
Droseraceae	*Drosera erythrogyne*
	Drosera erythrorhiza
	Drosera stolonifera
Elaeocarpaceae	*Tetratheca nuda*
Ericaceae	*Lysinema ciliatum*
Euphorbiaceae	*Monotaxis grandiflora* var. *grandiflora*
	Stachystemon vermicularis
Fabaceae	*Acacia applanata*
	**Acacia iteaphylla*
	Acacia pulchella
	Acacia restiacea
	Bossiaea eriocarpa
	Daviesia angulata
	Daviesia decurrens
	Daviesia nudiflora subsp. *nudiflora*
	Gastrolobium capitatum
	Gompholobium marginatum
	Gompholobium polymorphum
	Gompholobium tomentosum
	Hovea elliptica
	Hovea trisperma
	Jacksonia lehmannii

	Labichea punctata
	Sphaerolobium macranthum
Goodeniaceae	*Dampiera linearis*
	Lechenaultia biloba
	Scaevola canescens
	Scaevola repens
Haemodoraceae	*Anigozanthos manglesii*
	Conostylis setigera subsp. *setigera*
	Haemodorum laxum
	Haemodorum sp.
Haloragaceae	*Gonocarpus cordiger*
Hemerocallidaceae	*Caesia occidentalis*
	Johnsonia pubescens subsp. *pubescens*
Iridaceae	**Freesia* sp.
	**Gladiolus caryophyllaceus*
	Patersonia juncea
	Patersonia occidentalis
Lamiaceae	*Hemiphora bartlingii*
Loranthaceae	*Nuytsia floribunda*
Malvaceae	*Thomasia macrocarpa*
Myrtaceae	*Babingtonia camphorosmae*
	Calothamnus quadrifidus subsp. *quadrifidus*
	Calothamnus sanguineus
	Calytrix fraseri
	Chamelaucium uncinatum
	Corymbia calophylla
	Eremaea fimbriata
	Eucalyptus camaldulensis (non-endemic)
	Eucalyptus marginata
	Eucalyptus wandoo (non-endemic)

	Hypocalymma angustifolium
	**Leptospermum laevigatum*
	Melaleuca trichophylla
	Verticordia densiflora var. *densiflora*
Orchidaceae	*Caladenia arenicola*
	Caladenia flava
	Lyperanthus serratus
	Pyrorchis nigricans
	Thelymitra macrophylla
Oxalidaceae	**Oxalis pes-caprae*
Phyllanthaceae	*Phyllanthus calycinus*
Pittosporaceae	*Marianthus* sp.
Poaceae	*Austrostipa elegantissima*
	**Briza maxima*
	**Briza minor*
	**Ehrharta calycina*
	Neurachne alopecuroidea
	Rytidosperma sp. 1
	**Tribolium uniolae*
Proteaceae	*Adenanthos cygnorum*
	Banksia armata
	Banksia dallanneyi var. *dallanneyi*
	Banksia nivea
	Banksia sessilis
	Conospermum undulatum (T/DRF)
	Grevillea bipinnatifida
	Hakea incrassata
	Hakea lissocarpha
	Hakea stenocarpa
	Hakea undulata

	Isopogon drummondii (P3)
	Isopogon dubius
	Lambertia multiflora var. *darlingensis*
	Petrophile linearis
	Petrophile striata
	Stirlingia latifolia
	Synaphea gracillima
	Synaphea spinulosa subsp. *spinulosa*
Restionaceae	*Desmocladus fasciculatus*
Rhamnaceae	*Trymalium ledifolium*
Rutaceae	*Philotheca spicata*
Stylidiaceae	*Stylidium affine*
	Stylidium brunonianum
	Stylidium piliferum
	Stylidium preissii
	Stylidium pubigerum
	Stylidium repens
Thymelaeaceae	*Pimelea ?suaveolens*
Violaceae	*Hybanthus calycinus*
Xanthorrhoeaceae	*Xanthorrhoea preissii*

APPENDIX H

Flora Survey Area Data Sheets

Maida vale Lvl 2

Site MVQ1

Type: Q

MGA Zone: 50407076 **mE** 6463012 **mN**

116.016607 **E** -31.964976 **S**

Soil: grey fine sand

Vegetation open woodland of euc marg, nutsyia flor over diverse understorey. Weeds minor

Veg Condition: excellent

Fire Age : very old

Notes Aspect: NA
Disturbance:
Ground Cover: 8% Bareground, 1% Logs, 3% Twigs, 2% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Adenanthos cygnorum	7	130	nc
Allocasuarina humilis	1	95	nc
Anigozanthos manglesii	1	100	nc
Banksia nivea	+	30	nc
Briza maxima	3	15	nc
Burchardia congesta	+	45	nc
Calothamnus sanguineus	6	60	MQV1-5
Calytrix fraseri	1	200	nc
Caustis dioica	1	40	nc
Conostylis setigera subsp. setigera	+	15	MVQ1-10
Dasypogon obliquifolius	1	40	MVQ1-8
Daviesia angulata	3	110	MVQ1-1
Desmocladus fasciculatus	+	10	nc
Drosera erythrogyne	+	1	nc
Eucalyptus marginata	1.5	200	nc
Gladiolus caryophyllaceus	+	80	nc
Haemodorum sp.	+	40	nc
Hemiphora bartlingii	+	40	MVQ1-4
Hibbertia hypericoides	1.5	60	nc
Hypochaeris glabra	1	1	nc
Jacksonia lehmannii	+	40	MVQ1-2
Johnsonia pubescens subsp. pubescens	+	25	MVQ1-9
Labichea punctata	+	30	nc
Lechenaultia biloba	+	40	nc
Lepidosperma ?pubisquameum	+	30	MVQ1-12
Lomandra sericea			MVQ1-11
Lyginia imberbis	2	45	nc
Mesomelaena pseudostygia	2	45	nc
Neurachne alopecuroidea	+	35	nc
Nuytsia floribunda	1	450	nc
Philotheca spicata	+	80	nc
Scaevola repens	+	5	nc
Stylidium preissii	+	10	nc
Synaphea spinulosa	1.5	45	MVQ1-6
Tribolium uniolae	+	45	MVQ1-7
Ursinia anthemoides	+	15	nc
Verticordia densiflora var. densiflora	3	90	MVQ1-3

Maida vale Lvl 2

Site MVQ2

Type Q 10X10
MGA Zone 50 406961 **mE**6462220 **mN**
116.015314 **E**-31.972111 **S**
Soil:grey sand

Vegetation No peg, pink flagging on Euc Marg in SW corner
Woodland of Euc Marg

Veg Condition Excellent

Notes Aspect: NA
Disturbance:
Ground Cover: 1% Bareground, 0% Logs, 2% Twigs, 8% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Allocasuarina humilis	3	100	nc
Anigozanthos manglesii	+	120	nc
Banksia nivea	1	20	nc
Banksia sessilis	+	30	nc
Bossiaea eriocarpa	2	35	nc
Briza maxima	2	15	nc
Buchardia congesta	+	40	nc
Caladenia flava	+	15	nc
Conostylis setigera subsp. setigera	1	15	MVQ1-10
Daviesia nudiflora subsp. nudiflora	1	50	MVQ2-5
Desmocladus fasciculatus	+	10	nc
Drosera stolonifera	+	40	nc
Eucalyptus marginata	15	900	nc
Gladiolus caryophyllaceus	+	80	nc
Haemodorum sp.	+	45	nc
Hibbertia hypericoides	2	55	nc
Hyalosperma cotula	+	10	MVQ2-6
Hypochaeris glabra	+	1	nc
Jacksonia lehmannii	+	40	MVQ1-2
Johnsonia pubescens subsp. pubescens	+	20	MVQ1-9
Labichea punctata	5	35	nc
Laxmannia sessiliflora subsp. australis	+	5	MVQ2-7
Lechenaultia biloba	1.5	35	nc
Lepidosperma ?pubisquameum	+	25	MVQ1-12
Lepidosperma leptostachyum	+	55	mvQ2-3
Lomandra sericea	+	40	MVQ1-11
Mesomelaena pseudostygia	2	50	nc
Monotaxis grandiflora var. grandiflora	+	10	MVQ2-2
Patersonia occidentalis	1	45	nc
Philotheca spicata	1	50	nc
Rytidosperma sp. 1	+	7	MVQ2-1
Scaevola repens	+	10	nc
Schoenus brevisetis	+	40	MVQ2-8
Stirlingia latifolia	+	55	nc
Stylidium piliferum	+	20	nc
Synaphea spinulosa subsp. spinulosa	+	45	r2-2
Tetraria octandra	1	45	nc
Trachymene pilosa	+	5	nc
Tricostularia neesii	+	50	MVQ2-4
Ursinia anthemoides	+	15	nc
Xanthorrhoea preissii	4	110	nc

Maida vale Lvl 2

Site MVQ3

Type Q 10x10
Location
MGA Zone 50 406829 **mE** 6462346 **mN**
116.013930 **E**-31.970963 **S**
Soil: cream sand - some silty clay

Vegetation open woodland of corymbia calophy over diverse understorey
Banks of creek

Veg Condition : Excellent

Fire Age : Moderate 8-12

Notes Aspect: SW
Disturbance:
Ground Cover: 6% Bareground, 0% Logs, 4% Twigs, 8% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Acacia pulchella	3.5	90	nc
Allocasuarina humilis	1.5	110	nc
Banksia armata	2	90	nc
Banksia dallanneyi var. dallanneyi	2	35	MVQ3-5
Briza maxima	+	15	nc
Burchardia congesta	+	70	nc
Caesia occidentalis	+	100	MVQ3-12
Calothamnus quadrifidus subsp. quadrifidus	1.5	110	MVQ3-13
Chamaescilla corymbosa	+	3	nc
Conostylis setigera	+	10	nc
Corymbia calophylla	35	1000	nc
Daviesia decurrens	+	40	MVQ3-10
Desmocladus fasciculatus	+	10	nc
Drosera stolonifera	+	30	MVQ3-1
Ehrharta calycina	1	80	nc
Freesia sp.	+	20	nc
Gastrolobium capitatum	+	40	nc
Gladiolus caryophyllaceus	+	80	nc
Haemodorum sp.	+	45	nc
Hakea incrassata	2	55	MVQ3-6
Hakea stenocarpa	+	45	MVQ3-4
Hakea undulata	2	230	nc
Hibbertia hypericoides	10	45	nc
Hovea trisperma	+	40	nc
Hyalosperma cotula	+	10	MVQ3-15
Hypocalymma angustifolium	+	45	nc
Jacksonia lehmannii	+	30	MVQ3-9
Lechenaultia biloba	+	20	nc
Lyperanthus serratus	+	35	MVQ3-11
Mesomelaena pseudostygia	7	45	nc
Mesomelaena tetragona	1	110	nc
Monotaxis grandiflora var. grandiflora	+	15	MVQ3-2
Neurachne alopecuroidea	+	30	nc
Scaevola repens	1	10	nc
Stylidium affine	+	40	MVQ3-7
Tetraria octandra	3	60	nc
Thomasia macrocarpa	1	95	MVQ3-14
Thysanotus manglesianus	+	+	MVQ3-8
Trymalium ledifolium	1	115	nc
Xanthorrhoea preissii	3	120	nc

Maida vale Lvl 2

Site MVQ4

Type: Q 10x10
Location
MGA Zone: 50 406901 **mE** 6462278 **mN**
116.014685 **E**-31.971583 **S**

Vegetation woodland of Euc marginata, with scattered Cc over Xanthor preissii, Angozanthos mang, Acacia pulchella, labicha punctata Q4-1, mesomel tetragona

Veg Condition : excellent

Fire Age : very old >12 years

Notes Aspect: NA
Disturbance: minimal weeds
Ground Cover: 2% Bareground, 0% Logs, 4% Twigs, 6% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Acacia applanata	+	40	MVQ4-5
Acacia iteaphylla	1	140	nc
Acacia pulchella	6	110	nc
Anigozanthos manglesii	4	110	nc
Austrostipa elegantissima	+	70	MVQ4-9
Baeckea camphorosmae	+	35	nc
Bossiaea eriocarpa	+	35	nc
Briza maxima	2	25	nc
Briza minor	+	40	nc
Burchardia congesta	+	70	nc
Chamaescilla corymbosa	+	5	nc
Corymbia calophylla	5	1300	nc
Dampiera linearis	+	30	nc
Desmocladus fasciculatus	+	15	nc
Drosera stolonifera	+	35	MWV3-1
Dryandra sessilis	1.5	220	nc
Ehrharta calycina	4	100	nc
Eucalyptus marginata	15	700	nc
Freesia sp.	+	20	nc
Gastrolobium capitatum	1.5	45	nc
Gladiolus caryophyllaceus	+	80	nc
Gompholobium marginatum	+	20	nc
Gompholobium polymorphum	+	25	MVQ4-11
Gonocarpus cordiger	1	30	MVQ4-2
Haemodorum laxum	+	110	MVQ4-4
Haemodorum sp.	+	40	nc
Hibbertia hypericoides	+	40	nc
Hypocalymma angustifolium	+	55	nc
Labichea punctata	3	25	MVQ4-1
Lechenaultia biloba	+	30	nc
Lepidosperma leptostachyum	+	40	MVQ3-3
Lepidosperma pubisquameum	+	35	MVQ4-6
Lomandra sericea	+	30	MVQ4-3
Mesomelaena tetragona	3	80	nc
Monotaxis grandiflora var. grandiflora	+	20	MVQ3-2
Neurachne alopecuroidea	+	15	nc
Patersonia occidentalis	+	35	nc
Pyrorchis nigricans	+	1	nc
Synaphea gracillima	+	30	MVQ408
Tetraria octandra	1	35	nc
Thelymitra macrophylla	+	40	MVQ4-10
Thomasia macrocarpa	1.5	130	MVQ3-14

Thysanotus thyrsoideus	+	45	MVQ4-7
Ursinia anthemoides	1	20	nc
Xanthorrhoea preissii	5	120	nc

Maida vale Lvl 2

Site MVQ5

Type: Q 10x10
Location
MGA Zone 50 406809 **mE** 6462734 **mN**
116.013755 **E**-31.967462 **S**
Habitat flat
Soil grey sand

Vegetation Woodland of corynbia calophylla and euc marginata over Xanthoe preissii, hakea lissocarpa, mesomel psuedosty, tetraria octandra, hibbertia hyperccoides and savage hakea.

Notes Aspect: NA
Disturbance:
Ground Cover: 1% Bareground, 0% Logs, 5% Twigs, 7% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Austrostipa elegantissima	+	110	MVQ5-7
Banksia armata	1.5	90	nc
Banksia dallanneyi var dallanneyi	2.5	35	MVQ3-5
Bossiaea eriocarpa	+	30	nc
Briza maxima	+	30	nc
Burchardia congesta	+	60	nc
Caustis dioica	1.5	55	nc
Chamaescilla corymbosa	+	10	nc
Conospermum undulatum	+	100	MVQ5-1
Conostylis setigera	+	15	nc
Corymbia calophylla	20	1200	nc
Daviesia angulata	+	45	nc
Drosera erythrorhiza	+	1	nc
Drosera stolonifera	+	25	MVQ3-1
Ehrharta calycina	2	80	nc
Eucalyptus marginata	10	1000	nc
Freesia sp.	+	20	nc
Gastrolobium capitatum	1	55	nc
Gladiolus caryophyllaceus	+	70	nc
Grevillea bipinnatifida	1	50	nc
Haemodorum sp.	+	40	nc
Hakea incrassata	2	50	MVQ4
Hakea lissocarpha	1.5	60	nc
Hibbertia hypericoides	2	50	nc
Hovea elliptica	+	30	nc
Labichea punctata	1.5	35	MVQ4-1
Lomandra sericea	+	40	MVQ4-3
Marianthus sp.	+	+	MVQ5-5
Melaleuca trichophylla	1	45	MVQ5-6
Mesomelaena pseudostygia	3	45	nc
Mesomelaena tetragona	5	65	nc
Neurachne alopecuroidea	+	20	nc
Pentapeltis peltigera	+	10	nc
Petrophile linearis	+	45	nc
Petrophile striata	1	55	MVQ5-4
Pimelea ? suaveolens	+	55	MVQ5-2
Stachystemon vermicularis	+	65	MVQ5-8
Tetraria octandra	6.5	50	nc
Thelymitra macrophylla	+	70	MVQ4-10 +
Thysanotus thyrsoideus	+	60	MVQ4-7
Xanthorrhoea preissii	3	120	nc

Maida vale Lvl 2

Site MVQ6

Type Q 10X10

MGA Zone 50 407068 **mE** 6463115 **mN**

116.016533 **E**-31.964046 **S**

Soil: Plain/Flat

Vegetation Shrubland of Allocausarina hum, lambertia multi, Xanth pres, daucis glob

Veg Condition Excellent

Fire Age Moderate 4 -8

Notes Aspect: NA
Disturbance: Weeds, Clearing
Ground Cover: 3% Bareground, 0% Logs, 2% Twigs, 6% Leaves

No peg pink flagging tape in south western corner on verticordia

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Acacia pulchella	1.5	55	nc
Allocasuarina humilis	10	110	nc
Anigozanthos manglesii	+	60	nc
Baeckea camphorosmae	+	50	nc
Banksia dallanneyi var dallanneyi	1.5	35	
Bossiaea eriocarpa	+	40	
Conostylis setigera	+	15	
Daucus glochidiatus	8	40	nc
Eremaea fimbriata	1	60	MVQ6-1
Gladiolus caryophyllaceus	+	70	nc
Gompholobium marginatum	+	15	nc
Haemodorum sp.	+	40	nc
Hakea undulata	1	150	
Hemiphora bartlingii	+	45	MVQ6-2
Hibbertia huegelii	+	35	nc
Hibbertia hypericoides	2	50	nc
Isopogon dubius	+	45	
Jacksonia lehmannii	+	85	MVQ3-9
Labichea punctata	+	35	Q3
Lambertia multiflora	7	45	nc
Lepidosperma tetraquetrum	+	45	nc
Lomandra sericea	+	25	MVQ4-3
Lysinema ciliatum	+	130	nc
Mesomelaena pseudostygia	1.5	45	nc
Mesomelaena tetragona	3	55	nc
Neurachne alopecuroidea	+	5	nc
Patersonia occidentalis	+	35	nc
Scaevola repens	+	2	nc
Schoenus pleiostemoneus	+	20	MVNW7
Sphaerolobium macranthum	+	30	MVQ6-3
Stylidium brunonianum	+	10	nc
Stylidium piliferum	+	3	nc
Stylidium pubigerum	+	2	
Stylidium repens	+	3	+
Thysanotus manglesianus	+	t	
Ursinia anthemoides	+	20	nc
Verticordia densiflora var. densiflora	6	60	
Xanthorrhoea preissii	2	110	nc

Maida vale Lvl 2

Site MVR1

Type R 10x10
MGA Zone 50 407441**mE** 6462662**mN**
116.020436 **E**-31.968163 **S**
Habitat: mid slope
Soil: loam

Vegetation Woodland of Euc wandoo over Xan preis and weeds
Veg Condition Degraded

Fire Age : 12
Notes Aspect: NA
Disturbance: minimal weeds
Ground Cover: 0% Bareground, 0% Logs, 3% Twigs, 8% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Acacia pulchella	1	50	nc
Allocasuarina humilis	+	100	nc
Asparagus asparagoides	1.5	+	nc
Banksia nivea	2	15	nc
Briza maxima	2	35	nc
Corymbia calophylla	4	1200	nc
Ehrharta calycina	5	80	nc
Eucalyptus wandoo	35	1800	nc
Freesia sp.	80	25	nc
Hibbertia hypericoides	4	55	nc
Hovea trisperma	+	30	nc
Lepidosperma tenue	+	45	nc
Oxalis pes-caprae	4.5	15	nc
Phyllanthus calycinus	2	35	nc
Sowerbaea laxiflora	+	35	nc
Xanthorrhoea preissii	3	160	nc

Maida vale Lvl 2

Site MVR2

Type R 10x10
Location
MGA Zone 50407441 **mE** 6462662 **mN**
116.020436 **E**-31.968163 **S**
Habitat
Soil sandy gravel

Vegetation open woodland of euc marg over dense understorey
Notes Aspect: NA
Disturbance: minimal weeds
Ground Cover: 0% Bareground, 1% Logs, 4% Twigs, 6% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Allocasuarina humilis	7	100	nc
Banksia armata	+	55	nc
Banksia nivea	+	25	nc
Bossiaea eriocarpa	+	35	nc
Eucalyptus marginata	4	700	nc
Gompholobium tomentosum	+	40	nc
Hakea undulata	+	55	nc
Hibbertia hypericoides	7	60	nc
Kingia australis	1	230	nc
Labichea punctata	+	35	nc
Lambertia multiflora var. darlingensis	3	130	MVR2-1
Mesomelaena pseudostygia	+	50	nc
Philotheca spicata	+	45	nc
Stylidium brunonianum	+	5	nc
Tetraria octandra	+	45	nc
Xanthorrhoea preissii	5	120	nc

Maida vale Lvl 2

Site MVR3

Type R 10x10

MGA Zone 50 407415 **mE** 6463646 **mN**

116.020255 **E**-31.959285 **S**

Habitat: Flat

Soil: grey sand

Vegetation Woodland of Cory cal, Euca marg over Hibb hyp, Xanth preis, Lab punc, lechen bil

Veg Condition: Very Good

Fire Age: 8-12

Notes Aspect: NA
Disturbance:
Ground Cover: 1% Bareground, 0% Logs, 4% Twigs, 8% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Banksia armata	1	65	nc
Banksia nivea	1	25	nc
Bossiaea eriocarpa	1.5	35	nc
Briza maxima	1	35	nc
Chamaescilla corymbosa	+	15	nc
Corymbia calophylla	30	1200	nc
Ehrharta calycina	2	80	nc
Eucalyptus marginata	5	1200	nc
Freesia sp.	3	20	nc
Hibbertia hypericoides	3	55	nc
Labichea punctata	4	40	nc
Lechenaultia biloba	1	35	nc
Lomandra sonderi	+	45	nc
Mesomelaena pseudostygia	4	50	nc
Neurachne alopecuroidea	2	25	nc
Tetraria octandra	3	40	nc
Xanthorrhoea preissii	3	110	nc

Maida vale Lvl 2 **Site** MVR4

Type R 10x10

Location

MGA Zone 50 406762 **mE** 6462402 **mN**

116.013226 **E**-31.970453 **S**

Habitat flat

Vegetation woodland of cory cal over xan pre, hibbertia hypercoides, acacia pulchella, allocasuarina humillis

Notes Aspect: NA
Disturbance:
Ground Cover: 4% Bareground, 0% Logs, 5% Twigs, 4% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Acacia pulchella	3	80	nc
Allocasuarina humilis	4	70	nc
Anigozanthos manglesii	+	85	nc
Baeckea camphorosmae	+	40	nc
Banksia dallanneyi var. dallanneyi	3	5	MVQ3-5
Bossiaea eriocarpa	+	35	nc
Corymbia calophylla	45	1200	nc
Daviesia decurrens	+	45	MVQ3-10
Daviesia nudiflora subsp. nudiflora	1.5	55	nc
Ehrharta calycina	3	110	nc
Freesia sp.	+	20	
Hakea stenocarpa	2	45	MVQ3-4
Hibbertia hypericoides	4	75	nc
Hybanthus calycinus	+	25	nc
Mesomelaena pseudostygia	5	50	nc
Mesomelaena tetragona	2	90	nc
Neurachne alopecuroidea	1	50	nc
Scaevola canescens	+	35	MVR4-1
Sowerbaea laxiflora	+	60	nc
Stylidium brunonianum	+	40	nc
Stylidium piliferum	+	10	nc
Tetraria ? octandra	2	60	nc
Trichocline spathulata	+	35	MVR4-2
Ursinia anthemoides	1	20	nc

Maida vale Lvl 2

Site MVR5

Type R 10X10

MGA Zone 50 407185 **mE** 6463552 **mN**

116.017813 **E**-31.960114 **S**

Soil: orange gravelly sand

Vegetation Woodland of Euc marg over petrophile rosette, hakea urophylla, mesomelanaena tetragon, daviesa? Angulata

Veg Condition: Very Good

Fire Age: 8-12

Notes Aspect: NA
Disturbance:
Ground Cover: 3% Bareground, 0% Logs, 15% Twigs, 50% Leaves

SPECIES LIST:

Name	Cover	Height	Specimen Notes
Acacia pulchella	2	65	nc
Caustis dioica	2	45	nc
Chamelaucium uncinatum	4	230	nc
Daviesia angulata	1	50	nc
Eucalyptus marginata	35	800	nc
Hakea undulata	4	120	nc
Hibbertia hypericoides	1	60	nc
Isopogon dubius	10	110	nc
Lechenaultia biloba	+	45	nc
Leptospermum laevigatum	5	300	nc
Lomandra sericea	+	45	MVQ4-3
Mesomelaena tetragona	3	60	nc
Neurachne alopecuroidea	+	15	nc
Pentapeltis peltigera	+	10	nc
Sphaerolobium macranthum	+	40	MVQ6-3
Stylidium brunonianum	+	25	nc
Stylidium piliferum	+	20	nc

Maida vale Lvl 2

Site opportunist

SPECIES LIST:

Name	Cover	Specimen	Notes
Acacia restiacea		NW4	E407071 N6463470
Caladenia arenicola		NW2	E406996 N6462218
Conospermum undulatum		NC	E407092 N6463003
Conospermum undulatum		NC	E407086 N6462995
Eucalyptus camaldulensis		NW3	E407380 N6463415
Isopogon drummondii		NW9	E407065 N6463114
Isopogon drummondii		NW8	E407092 N6463096
Lambertia multiflora var. darlingensis		R2-1	
Patersonia juncea		NW5	
Schoenus pleiostemoneus		NW7	
Stachystemon vermicularis		MVQ5-7	
Stylidium affine		MVQ3-7	
Synaphea gracillima			
Tetratheca nuda		NW6	
Thomasia macrocarpa		NW1	

APPENDIX I

Desktop Searches

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

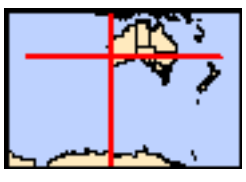
Report created: 16/11/15 18:03:02

Summary
Details
Matters of NES
Other Matters Protected by the EPBC Act
Extra Information
Caveat
Acknowledgements

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 4.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	29
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	7
Regional Forest Agreements:	1
Invasive Species:	42
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area
Shrublands and Woodlands of the eastern Swan Coastal Plain	Endangered	Community known to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii		
Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris		
Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir [25911]	Vulnerable	Species or species habitat may occur within area
Setonix brachyurus		
Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		
Acacia anomala		
Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat likely to occur within area
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [64649]	Endangered	Species or species habitat may occur within area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area
Darwinia apiculata Scarp Darwinia [8763]	Endangered	Species or species habitat likely to occur within area
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Lasiopetalum pterocarpum Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Thelymitra stellata		
Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - BUSHMEAD RIFLE RANGE
Defence - BUSHMEAD TRAINING AREA

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Gooseberry Hill	WA
Lesmurdie Falls	WA
Unnamed WA23076	WA
Unnamed WA24657	WA
Unnamed WA29815	WA
Unnamed WA37997	WA
Unnamed WA49079	WA

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf		Species or species habitat likely to occur

Name	Status	Type of Presence
Madeiravine, Potato Vine [2643] Asparagus asparagoides		within area
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering		Species or species habitat likely to occur

Name	Status	Type of Presence
Cypress, Salt Cedar [16018]		within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Perth Airport Woodland Swamps	WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.965 116.01619

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 16/11/2015

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116°00' 57" E,31°57' 34" S
Buffer 4km
Group By Family

Family	Species	Records
Acanthizidae	7	301
Accipitridae	9	27
Actinopodidae	2	13
Aeshnidae	2	2
Agamidae	1	2
Anatidae	10	117
Anhingidae	2	10
Apogonidae	1	1
Araneidae	5	5
Ardeidae	7	36
Artamidae	1	1
Austrocorduliidae	1	1
Barychelidae	2	9
Bittacidae	1	2
Boidae	3	11
Bothriuridae	2	4
Buprestidae	4	8
Cacatuidae	1	146
Campephagidae	2	76
Canidae	2	3
Caprimulgidae	1	1
Castniidae	1	10
Cerambycidae	1	1
Charadriidae	5	17
Climacteridae	1	1
Clupeidae	1	1
Colletidae	1	2
Columbidae	7	270
Corduliidae	3	3
Corvidae	1	164
Cracticidae	3	300
Cuculidae	4	17
Curculionidae	4	5
Dasyuridae	4	13
Diaspididae	2	2
Dicaeidae	1	95
Dicruridae	2	156
Diplodactylidae	5	10
Dytiscidae	1	1
Ecnomidae	1	1
Elapidae	6	44
Falconidae	3	13
Felidae	1	1
Formicidae	11	16
Galacticidae	1	2
Galaxiidae	2	3
Gekkonidae	3	14
Gelechiidae	1	2
Geometridae	2	8
Gnaphosidae	1	1
Gobiidae	2	3
Gomphidae	1	3
Haematopodidae	1	7
Halcyonidae	3	126
Halictidae	1	1
Hirundinidae	2	23
Hydrobiosidae	1	1
Hydropsychidae	1	1
Hydroptilidae	4	6
Hylidae	2	3
Hypsimetopodidae	1	1
Idiopidae	3	4
Iulomorphidae	1	9
Julidae	1	2
Lamponidae	1	1
Laridae	4	26
Leptoceridae	2	2
Lestidae	1	1
Libellulidae	1	1
Limnodynastidae	2	6
Lycosidae	4	15
Maluridae	2	11
Megapodagrionidae	2	2
Meliphagidae	6	508
Meropidae	1	12

Micropholcommatidae	1	1
Muridae	2	7
Myobatrachidae	5	8
Nemesiidae	2	7
Neosittidae	2	20
Nephilidae	1	1
Oecophoridae	6	12
Oxyopidae	1	1
Pachycephalidae	5	112
Pachygronthidae	1	4
Paradoxosomatidae	2	6
Pardalotidae	4	172
Pelecanidae	1	8
Peramelidae	2	176
Petroicidae	1	1
Phalacrocoracidae	5	40
Phalangeridae	2	3
Pholcidae	1	1
Platycephalidae	1	2
Podargidae	1	3
Podicipedidae	2	19
Pseudococcidae	3	3
Psittacidae	16	531
Pygopodidae	5	22
Rallidae	6	42
Recurvirostridae	3	18
Reduviidae	1	1
Rhinotermitidae	1	1
Salticidae	3	3
Scarabaeidae	1	2
Scincidae	10	21
Sciuridae	1	1
Scolopacidae	10	30
Scolopendridae	5	9
Scutigeridae	1	1
Sparassidae	3	11
Strigidae	2	38
Sylviidae	2	12
Synthemistidae	1	3
Tarsipedidae	1	2
Tenebrionidae	1	1
Terapontidae	1	1
Termitidae	3	4
Tettigoniidae	3	4
Theridiidae	1	4
Threskiornithidae	3	36
Tortricidae	1	2
Triaenonychidae	1	2
Turnicidae	1	2
Urodacidae	4	46
Varanidae	2	2
Vespertilionidae	3	8
Zodariidae	3	3
Zosteropidae	2	139
TOTAL	**347**	**4333**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.		*Acanthiza (Acanthiza) apicalis subsp. apicalis*			
2.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
3.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
4.	24262	*Acanthiza inornata (Western Thornbill)*			
5.	25530	*Gerygone fusca (Western Gerygone)*			
6.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
7.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
8.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
9.	25536	*Accipiter fasciatus (Brown Goshawk)*			
10.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
11.	24285	*Aquila audax (Wedge-tailed Eagle)*			
12.		*Elanus axillaris*			
13.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
14.	24295	*Haliastur sphenurus (Whistling Kite)*			
15.		*Lophoictinia isura*			
16.	25543	*Pandion haliaetus (Osprey)*			
Actinopodidae					
17.		*Missulena granulosa*			
18.		*Missulena occatoria*			
Aeshnidae					
19.		*Adversaeschna brevistyla*			
20.		*Anax papuensis*			
Agamidae					
21.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
Anatidae					
22.	24310	*Anas castanea (Chestnut Teal)*			
23.	24312	*Anas gracilis (Grey Teal)*			
24.	24313	*Anas platyrhynchos (Mallard)*			
25.	24315	*Anas rhynchotis (Australasian Shoveler)*			
26.	24316	*Anas superciliosa (Pacific Black Duck)*			
27.	24318	*Aythya australis (Hardhead)*			
28.	24319	*Biziura lobata (Musk Duck)*			
29.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
30.	24322	*Cygnus atratus (Black Swan)*			
31.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Anhingidae					
32.	25553	*Anhinga melanogaster (Darter)*			
33.		*Anhinga novaehollandiae*			
Apogonidae					
34.		*Ostorhinchus rueppellii*			
Araneidae					
35.		*Araneus cyphoxis*			
36.		*Backobourkia heroine*			
37.		*Celaenia excavata*			
38.		*Cyclosa trilobata*			
39.		*Eriophora biapicata*			
Ardeidae					
40.	24337	*Ardea garzetta subsp. nigripes (Little Egret)*			
41.	41324	*Ardea modesta (Eastern Great Egret)*		IA	
42.	24340	*Ardea novaehollandiae (White-faced Heron)*			
43.	24341	*Ardea pacifica (White-necked Heron)*			
44.		*Egretta garzetta*			
45.		*Egretta novaehollandiae*			
46.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
Artamidae					
47.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
Austrocorduliidae					
48.		*Hesperocordulia berthoudi*			
Barychelidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
49.		*Idiommata blackwalli*			
50.		*Synothele durokoppin*			
Bittacidae					
51.		*Harpobittacus similis*			
Boidae					
52.	25448	*Antaresia stimsoni (Stimson's Python)*			
53.	25241	*Antaresia stimsoni subsp. stimsoni (Stimson's Python)*			
54.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*		S	
Bothriuridae					
55.		*Cercophonius granulosus*			
56.		*Cercophonius sulcatus*			
Buprestidae					
57.		*Castiarina decemguttata*			
58.		*Ethonion roei*			
59.		*Stigmodera gratiosa*			
60.		*Stigmodera sp.*			
Cacatuidae					
61.		*Eolophus roseicapillus*			
Campephagidae					
62.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
63.	24367	*Lalage tricolor (White-winged Triller)*			
Canidae					
64.	25454	*Canis lupus (Dog, Dingo)*	Y		
65.	30883	*Canis lupus subsp. familiaris (Dog)*	Y		
Caprimulgidae					
66.		*Eurostopodus (Eurostopodus) argus*			
Castniidae					
67.		*Synemon sp.*			
Cerambycidae					
68.		*Phoracantha odewahnii*			
Charadriidae					
69.	24373	*Charadrius melanops (Black-fronted Dotterel)*			
70.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
71.		*Elseyornis melanops*			
72.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
73.	24386	*Vanellus tricolor (Banded Lapwing)*			
Climacteridae					
74.	24396	*Climacteris rufa (Rufous Treecreeper)*			
Clupeidae					
75.		*Nematalosa vlaminghi*			
Colletidae					
76.		*Trichocolletes erythrurus*			
Columbidae					
77.	24399	*Columba livia (Domestic Pigeon)*	Y		
78.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
79.	24409	*Phaps chalcoptera (Common Bronzewing)*			
80.		*Streptopelia (Spilopelia) chinensis*			
81.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
82.	30951	*Streptopelia chinensis subsp. tigrina (Spotted Turtle-Dove)*	Y		
83.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
Corduliidae					
84.		*Hemicordulia australiae*			
85.		*Hemicordulia tau*			
86.		*Procordulia affinis*			
Corvidae					
87.	25592	*Corvus coronoides (Australian Raven)*			
Cracticidae					
88.	25595	*Cracticus tibicen (Australian Magpie)*			
89.	25596	*Cracticus torquatus (Grey Butcherbird)*			
90.	25597	*Strepera versicolor (Grey Currawong)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Cuculidae					
91.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
92.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
93.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
94.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
Curculionidae					
95.		*Acantholophus amycteroides*			
96.		*Acantholophus suturalis*			
97.		*Oxyops sp.*			
98.		*Phlyctinus callosus*			
Dasyuridae					
99.	25449	*Antechinus flavipes (Yellow-footed Antechinus)*			
100.	24088	*Antechinus flavipes subsp. leucogaster (Yellow-footed Antechinus, Mardo)*			
101.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
102.	24099	*Phascogale tapoatafa subsp. tapoatafa (Southern Brush-tailed Phascogale, Wambenger)*		T	
Diaspididae					
103.		*Diaspidiotus loranthi*			Y
104.		*Pseudaulacaspis eugeniae*			Y
Dicaeidae					
105.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
Dicruridae					
106.	24443	*Grallina cyanoleuca (Magpie-lark)*			
107.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Diplodactylidae					
108.	24918	*Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)*			
109.	24929	*Diplodactylus granariensis subsp. granariensis*			
110.	24939	*Diplodactylus polyophthalmus*			
111.	24940	*Diplodactylus pulcher*			
112.	24943	*Strophurus spinigerus subsp. inornatus*			
Dytiscidae					
113.		*Antiporus hollingsworthi*			Y
Ecnomidae					
114.		*Ecnomus pansus*			
Elapidae					
115.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
116.	25252	*Notechis scutatus (Tiger Snake)*			
117.	25253	*Parasuta gouldii*			
118.	25261	*Pseudechis australis (Mulga Snake)*			
119.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
Falconidae					
120.	25622	*Falco cenchroides (Australian Kestrel)*			
121.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel)*			
122.	25623	*Falco longipennis (Australian Hobby)*			
Felidae					
123.	24041	*Felis catus (Cat)*	Y		
Formicidae					
124.		*Anisopheidole antipodum*			
125.		*Camponotus consobrinus*			
126.		*Camponotus terebrans*			
127.		*Dolichoderus parvus*			
128.		*Dolichoderus ypsilon*			
129.		*Iridomyrmex conifer*			
130.		*Iridomyrmex discors*			
131.		*Iridomyrmex purpureus*			
132.		*Myrmecia mandibularis*			
133.		*Myrmecia sp.*			
134.		*Rhytidoponera rufonigra*			
Galacticidae					
135.		*Homadaula poliodes*			Y
Galaxiidae					
136.	34028	*Galaxias occidentalis (Western Minnow)*			
137.		*Galaxias sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Gekkonidae					
138.	24980	*Christinus marmoratus (Marbled Gecko)*			
139.	24959	*Gehyra variegata*			
140.	24983	*Underwoodisaurus milii (Barking Gecko)*			
Gelechiidae					
141.		*Ardozyga dysclyta*			Y
Geometridae					
142.		*Anachloris tofocolorata*			Y
143.		*Dichromodes leptozona*			Y
Gnaphosidae					
144.		*Hemicloea sp.*			
Gobiidae					
145.		*Arenigobius bifrenatus*			
146.		*Pseudogobius olorum*			
Gomphidae					
147.		*Austrogomphus (Austrogomphus) collaris*			
Haematopodidae					
148.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
Halcyonidae					
149.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
150.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
151.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
Halictidae					
152.		*Lasioglossum (Chilalictus) seminitens*			
Hirundinidae					
153.	24491	*Hirundo neoxena (Welcome Swallow)*			
154.	24492	*Hirundo nigricans subsp. nigricans (Tree Martin)*			
Hydrobiosidae					
155.		*Apsilochorema urdalum*			
Hydropsychidae					
156.		*Smicrophylax australis*			
Hydroptilidae					
157.		*Hellyethira litua*			
158.		*Hellyethira malleoforma*			
159.		*Hydroptila losida*			
160.		*Oxyethira (Trichoglene) retracta*			
Hylidae					
161.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
162.	25388	*Litoria moorei (Motorbike Frog)*			
Hypsimetopodidae					
163.		*Hyperoedesipus plumosus*			
Idiopidae					
164.		*Eucyrtops latior*			
165.		*Euoplos inornatus*			
166.		*Idiosoma sigillatum*			
Iulomorphidae					
167.		*Dinocambala ingens*			
Julidae					
168.		*Ommatoiulus moreletii*			
Lamponidae					
169.		*Asadipus kunderang*			
Laridae					
170.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
171.	24522	*Sterna bergii (Crested Tern)*			
172.	24523	*Sterna caspia (Caspian Tern)*		IA	
173.	25644	*Sterna nereis (Fairy Tern)*			
Leptoceridae					
174.		*Hudsonema aptus*			
175.		*Oecetis pechana*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Lestidae					
176.		*Austrolestes io*			
Libellulidae					
177.		*Orthetrum caledonicum*			
Limnodynastidae					
178.	25409	*Heleioporus barycragus (Hooting Frog)*			
179.	25410	*Heleioporus eyrei (Moaning Frog)*			
Lycosidae					
180.		*Artoria linnaei*			
181.		*Tasmanicosa leuckartii*			
182.		*Venator immansueta*			
183.		*Venatrix pullastra*			
Maluridae					
184.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
185.	25654	*Malurus splendens (Splendid Fairy-wren)*			
Megapodagrionidae					
186.		*Archiargiolestes pusillus*			
187.		*Miniargiolestes minimus*			
Meliphagidae					
188.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
189.	24561	*Anthochaera carunculata (Red Wattlebird)*			
190.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
191.	25661	*Lichmera indistincta (Brown Honeyeater)*			
192.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
193.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Meropidae					
194.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
Micropholcommatidae					
195.		*Raveniella peckorum*			
Muridae					
196.	24215	*Hydromys chrysogaster (Water-rat)*		P4	
197.	24245	*Rattus rattus (Black Rat)*	Y		
Myobatrachidae					
198.	25398	*Crinia georgiana (Quacking Frog)*			
199.	25399	*Crinia glauerti (Clicking Frog)*			
200.	25400	*Crinia insignifera (Squelching Froglet)*			
201.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
202.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Nemesiidae					
203.		*Aname mainae*			
204.		*Aname sp.*			
Neosittidae					
205.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
206.	24606	*Daphoenositta chrysoptera subsp. pileata (Varied Sittella, Black-capped Sitella)*			
Nephilidae					
207.		*Nephila edulis*			
Oecophoridae					
208.		*Ereiconastes butyrea*			
209.		*Eulechria sp.*			
210.		*Garrha oncospila*			Y
211.		*Hesperenoeca leucostemma*			Y
212.		*Micramicta amolgaea*			Y
213.		*Phanerozancla sp.*			Y
Oxyopidae					
214.		*Oxyopes gracilipes*			
Pachycephalidae					
215.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
216.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
217.	25679	*Pachycephala pectoralis (Golden Whistler)*			
218.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
219.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Pachygronthidae					
220.		*Darwinocoris australicus*			
Paradoxosomatidae					
221.		*Akamptogonus novarae*			
222.		*Antichiropus variabilis*			
Pardalotidae					
223.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
224.	24625	*Pardalotus punctatus subsp. punctatus (Spotted Pardalote)*			
225.	25682	*Pardalotus striatus (Striated Pardalote)*			
226.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
Pelecanidae					
227.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Peramelidae					
228.	25478	*Isoodon obesulus (Southern Brown Bandicoot)*		P5	
229.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P5	
Petroicidae					
230.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
Phalacrocoracidae					
231.		*Microcarbo melanoleucos*			
232.	25697	*Phalacrocorax carbo (Great Cormorant)*			
233.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
234.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
235.	25699	*Phalacrocorax varius (Pied Cormorant)*			
Phalangeridae					
236.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
237.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
Pholcidae					
238.		*Trichocyclus nullarbor*			
Platycephalidae					
239.		*Platycephalus westraliae*			
Podargidae					
240.	25703	*Podargus strigoides (Tawny Frogmouth)*			
Podicipedidae					
241.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
242.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Pseudococcidae					
243.		*Cypericoccus sp.*			
244.		*Epicoccus acaciae*			
245.		*Maconellicoccus lanigerus*			
Psittacidae					
246.		*Barnardius zonarius*			
247.		*Cacatua (Cacatua) galerita*			
248.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
249.	25716	*Cacatua sanguinea (Little Corella)*			
250.		*Cacatua sp.*			
251.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
252.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)*		T	
253.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	
254.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
255.		*Calyptorhynchus sp.*			
256.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
257.	25720	*Platycercus icterotis (Western Rosella)*			
258.	24747	*Platycercus spurius (Red-capped Parrot)*			
259.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
260.		*Purpureicephalus spurius*			
261.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
Pygopodidae					
262.	24990	*Aprasia pulchella (Granite Worm-lizard)*			
263.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
264.	24999	*Delma grayii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
265.	25005	*Lialis burtonis*			
266.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
Rallidae					
267.	25727	*Fulica atra (Eurasian Coot)*			
268.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
269.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
270.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
271.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
272.		*Porzana (Porzana) tabuensis subsp. tabuensis*			
Recurvirostridae					
273.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
274.	25734	*Himantopus himantopus (Black-winged Stilt)*			
275.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
Reduviidae					
276.		*Smiliopus quadrinotatus*			Y
Rhinotermitidae					
277.		*Heterotermes platycephalus*			
Salticidae					
278.		*Lycidas chlorophthalmus*			
279.		*Lycidas michaelseni*			
280.		*Maratus pavonis*			
Scarabaeidae					
281.		*Onthophagus ferox*			
Scincidae					
282.	30893	*Cryptoblepharus buchananii*			
283.	25020	*Cryptoblepharus plagiocephalus*			
284.	25035	*Ctenotus delli (Dell's Ctenotus, Darling Range Heath Ctenotus)*		P4	
285.	25039	*Ctenotus fallens*			
286.	25049	*Ctenotus labillardieri*			
287.	25115	*Hemiergis initialis subsp. initialis*			
288.	25131	*Lerista distinguenda*			
289.	25192	*Morethia obscura*			
290.	25204	*Tiliqua rugosa subsp. aspera*			
291.	25207	*Tiliqua rugosa subsp. rugosa*			
Sciuridae					
292.	30916	*Funambulus pennanti (Indian Palm Squirrel)*	Y		
Scolopacidae					
293.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
294.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
295.	25738	*Calidris canutus (Red Knot)*		IA	
296.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
297.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
298.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
299.	24790	*Calidris tenuirostris (Great Knot)*		T	
300.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
301.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
302.	24808	*Tringa nebularia (Common Greenshank)*		IA	
Scolopendridae					
303.		*Cormocephalus aurantiipes*			
304.		*Cormocephalus rubriceps*			
305.		*Cormocephalus strigosus*			
306.		*Cormocephalus turneri*			
307.		*Scolopendra laeta*			
Scutigeridae					
308.		*Allothereua maculata*			
Sparassidae					
309.		*Holconia westralia*			
310.		*Isopeda leishmanni*			
311.		*Isopeda magna*			
Strigidae					
312.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
313.	24820	*Ninox novaeseelandiae subsp. boobook (Boobook Owl)*			
Sylviidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
314.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
315.	25758	*Megalurus gramineus (Little Grassbird)*			
Synthemistidae					
316.		*Archaeosynthemis occidentalis*			
Tarsipedidae					
317.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
Tenebrionidae					
318.		*Adelium breviusculum*			
Terapontidae					
319.		*Amniataba caudavittata*			
Termitidae					
320.		*Amitermes obeuntis*			
321.		*Tumulitermes apiocephalus*			
322.		*Tumulitermes westraliensis*			
Tettigoniidae					
323.		*Kawanaphila nartee*			
324.		*Pachysaga australis*			
325.		*Tympanophora similis*			
Theridiidae					
326.		*Latrodectus hasseltii*			
Threskiornithidae					
327.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
328.	24844	*Threskiornis molucca (Australian White Ibis)*			
329.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Tortricidae					
330.		*Ancylis acromochla*			Y
Triaenonychidae					
331.		*Nunciella aspera*			
Turnicidae					
332.	24851	*Turnix velox (Little Button-quail)*			
Urodacidae					
333.		*Urodacus manicatus*			
334.		*Urodacus novaehollandiae*			
335.		*Urodacus planimanus*			
336.		*Urodacus sp.*			
Varanidae					
337.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
338.	25526	*Varanus tristis (Racehorse Monitor)*			
Vespertilionidae					
339.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
340.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
341.	24206	*Vespadelus regulus (Southern Forest Bat)*			
Zodariidae					
342.		*Masasteron maini*			
343.		*Storena formosa*			
344.		*Storena sinuosa*			
Zosteropidae					
345.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
346.	24856	*Zosterops lateralis subsp. gouldi (Grey-breasted White-eye)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NAME	SOURCE_COD	SOURCE_ID	NAME_ID	FAMILY	GENUS	SPECIES	INFRANAME	AUTHOR	VERNACULAR	KINGDOM	CONSV_CODE	CLASS	METHOD	COUNT	LOCALITY	SITE_NAME	ACCURACY_M	GDA_LONG	GDA_LAT	DAY	MONTH	YEAR
Calyptorhynchus baudi	BIRDATLAS2	122022|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	7.000000	7.000000	2000.000000
Calyptorhynchus baudi	BIRDATLAS2	122023|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	8.000000	2000.000000
Calyptorhynchus baudi	BIRDATLAS2	122025|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	10.000000	2000.000000
Calyptorhynchus baudi	BIRDATLAS2	172729|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		KALAMUNDA	9 Marie Way, Kalamunda	100.000000	116.041946	-31.975555	17.000000	7.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	172730|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		KALAMUNDA	9 Marie Way, Kalamunda	100.000000	116.041946	-31.975555	28.000000	4.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267920|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	1.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267921|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	28.000000	2.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267925|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	6.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267927|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	8.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267928|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	9.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	270998|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Rd	100.000000	116.046191	-31.956280	31.000000	3.000000	2002.000000
Calyptorhynchus baudi	BIRDATLAS2	294891|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	7.000000	2003.000000
Calyptorhynchus baudi	BIRDATLAS2	295115|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Lanoor Rd	100.000000	116.046191	-31.956280	31.000000	8.000000	2003.000000
Calyptorhynchus baudi	WAM_BIRDS	urn:lsid:taxonomy.org.a	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Specimen		HAZELMERE	Helena Valley; CSIRO Aviary, Clayton Road	10000.000000	116.033333	-31.933333	1.000000	2.000000	1981.000000
Calyptorhynchus latiro	TFAUNA	12206	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Dead	1	HAZELMERE	Gooseberry Hill	10000.000000	116.033334	-31.933331	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	21309	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day sighting	3	MAIDA VALE	Roe Hwy, Maidavale. 50m south of the maidava	1000.000000	116.012138	-31.957742	17.000000	9.000000	2012.000000
Calyptorhynchus latiro	TFAUNA	23570	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day sighting	15	HIGH WYCOMBE	26 Murray Drive, high Wycombe	1000.000000	116.011384	-31.937222	12.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30285	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	20.000000	5.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30286	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	22.000000	3.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30287	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	25.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30288	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	18.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30289	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	28.000000	1.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30290	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	10.000000	8.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30291	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	27.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30292	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	20.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30293	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	20.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30294	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	7	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	1.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30295	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	14.000000	2.000000	2002.000000
Calyptorhynchus latiro	TFAUNA	30282	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	MAIDA VALE	Maida Vale	300.000000	116.024765	-31.952454	29.000000	4.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30283	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	MAIDA VALE	Maida Vale	300.000000	116.024765	-31.952454	20.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30284	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	MAIDA VALE	Maida Vale	300.000000	116.024765	-31.952454	20.000000	1.000000	2005.000000
Calyptorhynchus latiro	TFAUNA	30842	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	HIGH WYCOMBE	Kooka Road, Wungong Catchment, Gleneagle	1000.000000	116.013301	-31.946989	13.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30843	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	HIGH WYCOMBE	Kooka Road, Wungong catchment	1000.000000	116.013301	-31.946989	2.000000	10.000000	2007.000000
Calyptorhynchus latiro	TFAUNA	32130	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	High Wycombe	300.000000	116.016674	-31.933222	10.000000	10.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32133	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993173	-31.984224	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32134	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993310	-31.984252	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32135	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.994834	-31.984309	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32136	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993010	-31.984583	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32137	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993116	-31.984611	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32138	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993337	-31.984721	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32139	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993252	-31.984721	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32140	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993643	-31.984778	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32141	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993474	-31.984777	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32142	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993979	-31.984997	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32281	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	2	FORRESTFIELD	Hale Road Nursery	1000.000000	115.998894	-31.990485	26.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	32282	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	2	FORRESTFIELD	Hale Road Nursery	1000.000000	115.998894	-31.990485	26.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	32867	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001121	-31.967697	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32868	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.016536	-31.978976	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32869	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Heard	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002731	-31.977335	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32870	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002561	-31.977388	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32871	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001724	-31.977471	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32872	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001946	-31.977527	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32873	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002369	-31.977558	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32874	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001649	-31.977552	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32875	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001564	-31.977587	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32876	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002199	-31.977610	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32877	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001085	-31.977890	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32878	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001144	-31.978252	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32879	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000816	-31.978249	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32880	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002509	-31.978307	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32881	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001006	-31.978305	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32882	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000592	-31.978446	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32883	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000390	-31.978498	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32884	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000697	-31.978528	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32885	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001141	-31.978558	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32886	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001033	-31.978720	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32887	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000195	-31.978894	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32888	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000587	-31.978915	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32889	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000225	-31.979056	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32890	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000447	-31.979085	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32891	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000394	-31.979085	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32892	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000394	-31.979112	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32928	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	50	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	32929	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	2	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	32930	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	50	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	32931	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	2	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	33072	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988424	-31.980975	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33073	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988255	-31.980973	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33074	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988286	-31.981055	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33075	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.990201	-31.981115	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33076	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988316	-31.981199	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33077	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988506	-31.981219	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33078	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988284	-31.981226	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33079	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988336	-31.981281	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33080	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988473	-31.981363	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33081	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988282	-31.981388	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33082	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988695	-31.981419	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33083	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988927	-31.981448	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33084	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988472	-31.981444	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33085	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989922	-31.981474	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33086	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989000	-31.981584	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33087	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988502	-31.981616	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33088	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycomb

Calyptorhynchus latiro	TFAUNA	33121	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989702	-31.981246	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33122	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989922	-31.981419	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32561	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	30.000000	4.000000	2007.000000
Calyptorhynchus latiro	TFAUNA	32562	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	17.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	32563	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	7.000000	2.000000	2005.000000
Calyptorhynchus latiro	TFAUNA	32564	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	5.000000	2.000000	2005.000000
Calyptorhynchus latiro	TFAUNA	32565	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	1.000000	10.000000	2004.000000
Calyptorhynchus latiro	TFAUNA	32566	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	29.000000	12.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32567	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	19.000000	8.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32568	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32569	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32570	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	17.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32571	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32572	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	200	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	17.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32573	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	16.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32574	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32575	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	9.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32576	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	4	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	1.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32577	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	27.000000	4.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32578	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	4.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32579	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	18	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	23.000000	4.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32580	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32581	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	23.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32582	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	16.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32583	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32584	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	12.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32585	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	7.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32586	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	5.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32587	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	4.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32588	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	3.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32590	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	1.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32591	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	27.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32592	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	27.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32593	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	26.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32594	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	22.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32595	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	18.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32596	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	16.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32597	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	14.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32598	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32599	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	9.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32600	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	8.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32601	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	7.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32602	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	6.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32603	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	5.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32604	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	4.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32559	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HAZELMERE	Gooseberry Hill	1000.000000	116.033335	-31.933223	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32560	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HAZELMERE	Gooseberry Hill	1000.000000	116.033335	-31.933223	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	75831	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	50	KALAMUNDA	Alpine rd area in Kalamunda/ Perth hills W.Aa	1000.000000	116.046524	-31.977497	18.000000	1.000000	2014.000000
Calyptorhynchus latiro	BIRDATLAS2	122021| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	6.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	218979| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		MAIDA VALE	Crumpet Creek Reserve - Sultana to Hawtin Roa	100.000000	116.018687	-31.967946	15.000000	9.000000	2005.000000
Calyptorhynchus latiro	BIRDATLAS2	240358| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	7.000000	1.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240359| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	14.000000	1.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240368| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	18.000000	3.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240371| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	8.000000	4.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240372| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	15.000000	4.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	267920| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	1.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267924| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	5.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267925| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	6.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267926| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	7.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267932| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	1.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	270998| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Rd	100.000000	116.046191	-31.956280	31.000000	3.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	270999| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Rd	100.000000	116.046191	-31.956280	30.000000	4.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	289404| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	30.000000	6.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	289409| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	31.000000	12.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	289454| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	31.000000	3.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290816| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	30.000000	6.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	290817| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	7.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	290822| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	12.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	290823| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	1.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290824| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	28.000000	2.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290825| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	3.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290827| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	5.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	294891| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	7.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	5022382| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		MAIDA VALE	Hillbiew Golf Course, Maida Vale	100.000000	116.018051	-31.940281	14.000000	1.000000	2008.000000
Calyptorhynchus latiro	BIRDATLAS2	5109748| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Kalamunda NP	100.000000	116.033686	-31.950169	13.000000	7.000000	2012.000000
Calyptorhynchus latiro	BIRDATLAS2	761039| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		FORRESTFIELD	Forrestfield	100.000000	115.997302	-31.989059	13.000000	6.000000	2009.000000
Calyptorhynchus latiro	BIRDATLAS2	63351| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	5.000000	1999.000000
Calyptorhynchus latiro	BIRDATLAS2	63352| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	25.000000	6.000000	1999.000000
Calyptorhynchus latiro	BIRDATLAS2	63358| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	12.000000	1999.000000
Calyptorhynchus latiro	BIRDATLAS2	67849| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	3.000000	2000.000000
Calyptorhynchus latiro	BIRDATLAS2	80879| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	5.000000	2000.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		MAIDA VALE	High Wycombe	10000.000000	116.016667	-31.950000	5.000000	7.000000	2003.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		MAIDA VALE	Seaview Terrace Kalamunda	10000.000000	116.033333	-31.966667	9.000000	1.000000	2007.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		GOOSEBERRY HILL	Gooseberry Hill	50.000000	116.050000	-31.950000	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		KALAMUNDA	Kalamunda	10000.000000	116.050000	-31.966667	5.000000	11.000000	1973.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		HAZELMERE	Helena Valley; CSIRO Clayton Road	10000.000000	116.033333	-31.933333	9.000000	2.000000	1981.000000
Morelia spilota imbric	TFAUNA	12405	0.000000	Boidae	Morelia	spilota	imbricata	Lacepede 1804	Carpet Python	Animalia	S	Reptiles	Day sighting	1	GOOSEBERRY HILL	2 Currawong Drive, Gooseberry Hill	1000.000000	116.044999	-31.961304	1.000000	3.000000	2006.000000
Morelia spilota subsp	WAM_REPTILES	um:lsid:taxonomy.org.:	25240.000000	Boidae	Morelia	spilota	imbricata	(Smith)	Carpet Python	Animalia	S	REPTILE	Specimen		MAIDA VALE	MAIDA VALE	50000.000000	116.016667	-31.950000	0.000000	0.000000	0.000000
Morelia spilota subsp	WAM_REPTILES	um:lsid:taxonomy.org.:	25240.000000	Boidae	Morelia	spilota	imbricata	(Smith)	Carpet Python	Animalia	S	REPTILE	Specimen		GOOSEBERRY HILL	KALAMUNDA	50000.000000	116.050000	-31.950000	0.000000	0.000000	0.000000
Morelia spilota subsp	WAM_REPTILES	um:lsid:taxonomy.org.:	25240.000000	Boidae	Morelia	spilota	imbricata	(Smith)	Carpet Python	Animalia	S	REPTILE	Specimen		HAZELMERE	GOOSEBERRY HILL	50000.000000	116.033333	-31.933333	0.000000	0.000000	0.000000
Dasyurus geoffroii	TFAUNA	924	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals	Dead	1	KALAMUNDA	Kalamunda townsite, on Kalamunda Rd. near th	1000.000000	116.051475	-31.965440	25.000000	2.000000	1990.000000
Dasyurus geoffroii	TFAUNA	670	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals		1	HAZELMERE	Bushmead Rifle Range	1000.000000	116.028251	-31.927862	1.000000	12.000000	1991.000000
Dasyurus geoffroii	TFAUNA	12276	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals	Day sighting	1	MAIDA VALE	cnr Midland Rd & Sadler Drive at Maida Vale/Hi	1000.000000	116.024403	-31.934598	20.000000	11.000000	2003.000000
Dasyurus geoffroii	TFAUNA	12592	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals	Dead	1

Isoodon obesulus fusc	TFAUNA	22162	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	Corner of Sundew Road and Hobbs road	1000.000000	116.043027	-31.957564	30.000000	8.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	22701	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	18 Dale drive, Gooseberry Hill	300.000000	116.043983	-31.956182	28.000000	1.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	22838	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	84 Heath Road, Kalamunda	1000.000000	116.045553	-31.971115	13.000000	2.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	24941	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	1	FORRESTFIELD	Close to Perth International Airport (Dundas Rd	10000.000000	115.988903	-31.961484	23.000000	12.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	24952	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	3	FORRESTFIELD	9 Peach Road, Forrestfield and Sultana Rd east	1000.000000	116.014370	-31.972672	1.000000	12.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	24979	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	1	FORRESTFIELD	332 Holmes Rd, Forrestfield	1000.000000	116.018702	-31.985281	13.000000	3.000000	2014.000000
Isoodon obesulus fusc	TFAUNA	24958	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	24 Temby Avenue, Kalamunda	1000.000000	116.047060	-31.969719	22.000000	11.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	67787	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	HIGH WYCOMBE	52 Brand Rd, High Wycombe	1000.000000	116.006835	-31.958865	22.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68004	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	12	HIGH WYCOMBE	9 Raven St, High Wycombe	1000.000000	115.998907	-31.953299	23.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68133	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	HIGH WYCOMBE	Dundas Rd near Soransen Rd nearrailway, Form	1000.000000	115.991579	-31.947053	17.000000	1.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68148	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	HIGH WYCOMBE	174 Maida Vale Rd, High Wycombe	1000.000000	116.004371	-31.950925	18.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68184	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	1	HIGH WYCOMBE	Roe Hwy heading down from High Wycombe	1000.000000	116.015490	-31.942080	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68252	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	5	HIGH WYCOMBE	12 Brand Road, High Wycombe	1000.000000	116.004038	-31.961125	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68310	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	2	HIGH WYCOMBE	10 Sutton Rd, High Wycombe	1000.000000	116.008026	-31.944530	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68413	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	3	HIGH WYCOMBE	60 Brae Road, High Wycombe	1000.000000	116.004890	-31.956702	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68449	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	HIGH WYCOMBE	63 Brae Road, High Wycombe	1000.000000	116.007346	-31.956604	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68544	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	HIGH WYCOMBE	High Wycombe -Only Suburb Given	10000.000000	116.014013	-31.939696	20.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67799	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	20	MAIDA VALE	20 Casuarina Rd, Maida Vale	1000.000000	116.030357	-31.949917	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67834	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	10	MAIDA VALE	32 Maud Rd, Maida Vale	1000.000000	116.023098	-31.967976	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67956	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	5	MAIDA VALE	143 Brewer Rd, Maida Vale	1000.000000	116.018877	-31.966845	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68014	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	2	MAIDA VALE	33 Holmes Rd, Maida Vale	1000.000000	116.029928	-31.963491	7.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68015	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	6	MAIDA VALE	21 Casuarina Rd, Maida Vale	1000.000000	116.029607	-31.949821	7.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68029	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	125 Watsonia Rd, Maida Vale	1000.000000	116.031683	-31.964589	26.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68086	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	MAIDA VALE	28 Kent Rd, Maida Vale	1000.000000	116.016884	-31.965167	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68166	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	17 Casuarina Road, Maida Vale	1000.000000	116.029613	-31.950200	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68358	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	6	MAIDA VALE	11 Terrigal Place, Maida Vale	1000.000000	116.031201	-31.955183	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68374	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	Block bordering Poison Gully, Maida Vale	1000.000000	116.020964	-31.957603	30.000000	5.000000	2007.000000
Isoodon obesulus fusc	TFAUNA	68375	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	Norwood Reserve, Maida Vale	1000.000000	116.022020	-31.959867	30.000000	4.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68411	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	MAIDA VALE	40 Holmes Rd, Maida Vale	1000.000000	116.026332	-31.963319	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68451	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	MAIDA VALE	176 Brewer Road, Maida Vale	1000.000000	116.015813	-31.970310	4.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68582	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	MAIDA VALE	51 Norwood Road, Maida Vale	1000.000000	116.025901	-31.961060	20.000000	8.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67652	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	117 Berkshire Road	1000.000000	116.009147	-31.976158	12.000000	12.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	67785	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	234 Sultana Rd, Forrestfield	1000.000000	116.010026	-31.969219	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67791	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	Cedar Way, Forrestfield	1000.000000	115.999320	-31.987403	1.000000	1.000000	1980.000000
Isoodon obesulus fusc	TFAUNA	67948	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	FORRESTFIELD	25 Coronilla Way, Forrestfield	1000.000000	116.004254	-31.978393	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67961	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	100 Bougainvillea Avenue, Forrestfield	1000.000000	116.002870	-31.978139	20.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68162	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	12	FORRESTFIELD	273 Lewis Rd, Forrestfield	1000.000000	116.026582	-31.984773	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68275	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	FORRESTFIELD	Between Hicks St, & Old tip site, Forrestfield	1000.000000	115.994985	-31.984022	15.000000	8.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	68385	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	Dawson Ave, Forrestfield	1000.000000	115.998038	-31.978759	14.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68410	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	6 Gilmore Place, Forrestfield	1000.000000	116.013908	-31.995059	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68480	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	FORRESTFIELD	9 Pearce Ave, Forrestfield	1000.000000	116.013996	-31.973003	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68543	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	FORRESTFIELD	Forrestfield -Only Suburb Given	10000.000000	116.009791	-31.989109	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67591	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	18 The Getaway	1000.000000	116.040980	-31.960065	28.000000	3.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67592	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	8-12 Landor Road.	1000.000000	116.049736	-31.954439	1.000000	2.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67648	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	Gray Road	1000.000000	116.035804	-31.957220	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67660	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	6 Gooseberry Hill Road	1000.000000	116.050033	-31.955397	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67713	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	61 Gooseberry Hill Road	1000.000000	116.042869	-31.954405	13.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67715	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	2B Noel Road	1000.000000	116.051259	-31.960702	13.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67726	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	GOOSEBERRY HILL	56 Watsonia road	1000.000000	116.034443	-31.952727	13.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67730	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	47 Girrawheen Drive	1000.000000	116.048525	-31.951850	18.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67758	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	43 Noel Road Gooseberry Hill	1000.000000	116.046403	-31.960566	4.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67769	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	47 Goosberry Hill Road, Gooseberry Hill	1000.000000	116.045090	-31.955586	30.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67773	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	Dale Drive didn't want to give street number, c	1000.000000	116.043125	-31.956293	14.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67864	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	3	GOOSEBERRY HILL	7 Robertson Rd, Gooseberry Hill	1000.000000	116.040650	-31.953125	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67901	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	1	GOOSEBERRY HILL	Cm Gooseberry Hill Rd & Hermes Rd	1000.000000	116.040733	-31.952278	28.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67902	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	1	GOOSEBERRY HILL	south west side of the roundabout corner of Go	1000.000000	116.051059	-31.955459	1.000000	12.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	67903	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	Darling Range Regional Park	1000.000000	116.043012	-31.948813	28.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67923	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	GOOSEBERRY HILL	4 Currawong Drive, Gooseberry Hill	1000.000000	116.045587	-31.960704	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67967	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	4 Sundew Rd, Gooseberry Hill	1000.000000	116.042378	-31.956936	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67998	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	GOOSEBERRY HILL	66 Davies Cresent, Gooseberry Hill	1000.000000	116.050380	-31.958702	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68031	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	GOOSEBERRY HILL	15 Robertson Rd, Gooseberry Hill	1000.000000	116.040998	-31.953263	27.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68038	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	8	GOOSEBERRY HILL	10 College Rd, Gooseberry Hill	1000.000000	116.048391	-31.962809	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68063	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	15	GOOSEBERRY HILL	7-9 Gooseberry Hill Rd, Gooseberry Hill	1000.000000	116.049471	-31.956521	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68090	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	5	GOOSEBERRY HILL	The Boulevard, Gooseberry Hill	1000.000000	116.039300	-31.954793	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68094	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	4	GOOSEBERRY HILL	36 Watsonia Rd, Gooseberry Hill	1000.000000	116.036365	-31.954103	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68115	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	GOOSEBERRY HILL	10 Faye Cresent, Gooseberry Hill	1000.000000	116.043674	-31.961475	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68131	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	12	GOOSEBERRY HILL	2 Healey Place, Gooseberry Hill	1000.000000	116.050715	-31.955980	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68134	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	GOOSEBERRY HILL	46 Davies Cresent, Gooseberry Hill	1000.000000	116.049707	-31.961340	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68138	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	100	GOOSEBERRY HILL	26 Sundew Rd, Gooseberry Hill	1000.000000	116.044500	-31.957331	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68141	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	GOOSEBERRY HILL	20 Watsonia Rd, Gooseberry Hill	1000.000000	116.035276	-31.956107	25.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68199	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	10	GOOSEBERRY HILL	17 Noel Rd, Gooseberry Hill	1000.000000	116.050201	-31.960712	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68360	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	133 Railway Rd, Gooseberry Hill	1000.000000	116.051861	-31.961834	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68424	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	5	GOOSEBERRY HILL	6 Landsdowne Rd, Gooseberry Hill	1000.000000	116.048609	-31.959076	8.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68437	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	18 Dale Drive, Gooseberry Hill	1000.000000	116.043995	-31.956074	14.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68459	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	59 Davies Cresent, Gooseberry Hill	1000.000000	116.049060	-31.959431	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68493	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	12	GOOSEBERRY HILL	1 Sundew Road, Gooseberry Hill	1000.000000	116.043249	-31.956555	2.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68519	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	GOOSEBERRY HILL	10 Jaraba Avenue, Gooseberry Hill	1000.000000	116.047276	-31.963117	5.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67554	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	15 Carramar Drive, Kalamunda	1000.000000	116.034503	-31.962190	25.000000	10.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	67801	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	KALAMUNDA	53 Snowball Rd, Kalamunda	1000.000000	116.043850	-31.969018	22.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67937	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	9 Josephine Cresent, Kalamuna	1000.000000	116.043669	-31.976333	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68022	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	KALAMUNDA	27 Brie Brie Cresent, Kalamunda	1000.000000	116.034567	-31.965132	7.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68040	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	KALAMUNDA	Given Coordinates	1000.000000	116.035003	-31.958892	14.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68062	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	4	KALAMUNDA	13 Carramar Drive, Kalamunda. Near Mundy Reg	1000.000000	116.034895	-31.962148	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68096	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	KALAMUNDA	14 Nangana Way, Kalamunda	1000.000000	116.035082	-31.963449	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68100	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	KALAMUNDA	24 Temby Avenue, Kalamunda	1000.000000	116.047061	-31.969601	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68101	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	123 Kalamunda Rd, Kalamunda	1000.000000	116.042160	-31.961563	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68229	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	12	KALAMUNDA	7 Persimmon Place, Kalamunda	1000.000000	116.041963	-31.963212	9.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68231	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	54 Heath Rd, Kalamunda	1000.000000	116.048770	-31.971202	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68263	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	KALAMUNDA	3 Bird St, Kalamunda	1000.000000	116.047345	-31.976974	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68273	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	2	KALAMUNDA	17 Chesnew Cresent, Kalmunda	1000.000000	116.046603	-31.973035	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68347	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	KALAMUNDA	44 Brine Rd, Kalamunda	1000.000000	116.040246	-31.965563	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68376	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	98 Heath Rd, Kalamunda	1000.000000	116.044101	-31.971374	30.000000	4.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68443	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	KALAMUNDA	35 East Terrace, Kalamunda	1000.000000	116.049512	-31.968014	7.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68521	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	Going W to E on Alpine Rd btw Trayten & Bird Re	1000.000000	116.046563	-31.975795	6.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68522	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	KALAMUNDA	Nature Reserve #29013 next to 10 Marie Way, ka	1000.000000	116.039778	-31.975898	18.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67824	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841

Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		GOOSEBERRY HILL	GOOSEBERRY HILL ROAD,POST OFFICE	10000.000000	116.050000	-31.950000	28.000000	1.000000	1961.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		GOOSEBERRY HILL	GOOSEBERRY HILL	10000.000000	116.050000	-31.950000	21.000000	2.000000	1972.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	29.000000	3.000000	1962.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	11.000000	11.000000	1962.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		KALAMUNDA	DARLING RANGES	50000.000000	116.050000	-31.966667	0.000000	0.000000	0.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		HAZELMERE		10000.000000	116.033333	-31.933333	29.000000	6.000000	1966.000000
Merops ornatus	BIRDATLAS2	199337|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		HIGH WYCOMBE	Ollie Worrell Reserve, High Wycombe	100.000000	115.993960	-31.933779	27.000000	11.000000	2001.000000
Merops ornatus	BIRDATLAS2	218755|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		HIGH WYCOMBE	Markham St Reserve	100.000000	116.005915	-31.939057	16.000000	12.000000	2005.000000
Merops ornatus	BIRDATLAS2	218982|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		MAIDA VALE	Crumpet Creek Reserve - Sultana to Hawtin Roa	100.000000	116.018687	-31.967946	19.000000	1.000000	2006.000000
Merops ornatus	BIRDATLAS2	2524|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	10.000000	1998.000000
Merops ornatus	BIRDATLAS2	267928|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	9.000000	2001.000000
Merops ornatus	BIRDATLAS2	267929|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	10.000000	2001.000000
Merops ornatus	BIRDATLAS2	289454|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	31.000000	3.000000	2003.000000
Merops ornatus	BIRDATLAS2	290823|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	1.000000	2003.000000
Merops ornatus	BIRDATLAS2	67994|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		MAIDA VALE	Hillview Golf Course	500.000000	116.020279	-31.939167	24.000000	1.000000	2000.000000
Merops ornatus	BIRDATLAS2	63357|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	11.000000	1999.000000
Merops ornatus	BIRDATLAS2	8941|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		HIGH WYCOMBE	Ollie Worrell Res.	100.000000	115.993960	-31.933779	14.000000	2.000000	1999.000000
Merops ornatus	WAM_BIRDS	um:lsid:taxonomy.org.a	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Specimen		KALAMUNDA	Kalamunda Foothills	10000.000000	116.050000	-31.966944	6.000000	11.000000	1962.000000
Isoodon obesulus fusc	FAUNASURVEY	727066	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Southern Brown Bandi	Animalia	P5	Mammals	Survey	3	GOOSEBERRY HILL	GooseberryHill	10000.000000	116.051100	-31.955550	19.000000	9.000000	2013.000000
Isoodon obesulus	FAUNASURVEY	911196	25478.000000	Peramelidae	Isoodon	obesulus		(Shaw)	Southern Brown Bandi	Animalia	P5	Mammals	Survey	1	GOOSEBERRY HILL	GooseberryHill	3000.000000	116.038700	-31.952440	18.000000	8.000000	2014.000000
Isoodon obesulus	FAUNASURVEY	911197	25478.000000	Peramelidae	Isoodon	obesulus		(Shaw)	Southern Brown Bandi	Animalia	P5	Mammals	Survey	1	GOOSEBERRY HILL	GooseberryHill	3000.000000	116.038700	-31.952440	18.000000	8.000000	2014.000000
Phascogale tapoatafa	WAM_MAMMALS	um:lsid:taxonomy.org.a	24099.000000	Dasyuridae	Phascogale	tapoatafa	tapoatafa	(Meyer)	Southern Brush-tailed	Animalia	T	MAMMAL	Specimen		KALAMUNDA		50.000000	116.036111	-31.973611	6.000000	12.000000	1979.000000
Phascogale tapoatafa	WAM_MAMMALS	um:lsid:taxonomy.org.a	24099.000000	Dasyuridae	Phascogale	tapoatafa	tapoatafa	(Meyer)	Southern Brush-tailed	Animalia	T	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	0.000000	0.000000	0.000000
Hydromys chrysogaster	WAM_MAMMALS	um:lsid:taxonomy.org.a	24215.000000	Muridae	Hydromys	chrysogaster		Geoffroy	Water-rat	Animalia	4	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	0.000000	0.000000	0.000000
Hydromys chrysogaster	TFAUNA	10621	0.000000	Muridae	Hydromys	chrysogaster		Geoffroy 1804	Water-rat, Rakali	Animalia	P4	Mammals		1	KALAMUNDA	Kalamunda	10000.000000	116.050002	-31.966665	1.000000	1.000000	1927.000000

APPENDIX J

Black Cockatoo Significant Trees

Potential Breeding Tree Species	Easting	Northing
Eucalyptus marginata	407439	6462750
Corymbia calophylla	407462	6462733
Corymbia calophylla	407444	6462734
Corymbia calophylla	407448	6462735
Corymbia calophylla	407400	6462758
Corymbia calophylla	407387	6462761
Corymbia calophylla	407379	6462760
Eucalyptus rudis	407343	6462686
Eucalyptus rudis	407344	6462682
Eucalyptus wandoo	407457	6462697
Eucalyptus wandoo	407434	6462695
Eucalyptus wandoo	407434	6462681
Eucalyptus wandoo	407438	6462675
Eucalyptus wandoo	407445	6462673
Eucalyptus wandoo	407456	6462676
Eucalyptus wandoo	407452	6462676
Eucalyptus wandoo	407460	6462688
Eucalyptus wandoo	407447	6462658
Eucalyptus wandoo	407435	6462642
Eucalyptus wandoo	407434	6462612
Eucalyptus wandoo	407459	6462624
Eucalyptus wandoo	407453	6462622
Corymbia calophylla	407452	6462598
Corymbia calophylla	407456	6462601
Eucalyptus wandoo	407465	6462580
Corymbia calophylla	407438	6462582
Corymbia calophylla	407431	6462588
Corymbia calophylla	407413	6462585
Corymbia calophylla	407347	6462537
Corymbia calophylla	407344	6462521
Corymbia calophylla	407329	6462509
Corymbia calophylla	407312	6462506
Corymbia calophylla	407295	6462505
Eucalyptus wandoo	407286	6462507
Eucalyptus wandoo	407247	6462514
Eucalyptus wandoo	407247	6462510
Eucalyptus wandoo	407253	6462507
Eucalyptus wandoo	407188	6462492
Eucalyptus wandoo	407145	6462516
Eucalyptus marginata	406216	6462922
Eucalyptus marginata	406220	6462932
Eucalyptus marginata	406254	6462933
Eucalyptus rudis	406391	6463067
Eucalyptus rudis	406382	6463069
Eucalyptus rudis	406464	6463134
Eucalyptus rudis	406474	6463145
Eucalyptus rudis	406488	6463146
Eucalyptus rudis	406463	6463192
Eucalyptus rudis	406464	6463181

Eucalyptus rudis	406466	6463171
Eucalyptus rudis	406449	6463172
Eucalyptus rudis	406439	6463158
Eucalyptus marginata	406531	6463329
Eucalyptus marginata	406569	6463403
Eucalyptus marginata	406662	6463822
Eucalyptus marginata	406682	6463803
Eucalyptus marginata	406662	6463793
Eucalyptus marginata	406665	6463769
Eucalyptus marginata	406704	6463826
Eucalyptus marginata	406664	6463843
Eucalyptus marginata	406662	6463859
Eucalyptus marginata	406707	6463979
Eucalyptus marginata	406685	6463950
Eucalyptus marginata	406696	6463895
Eucalyptus marginata	406675	6463894
Corymbia calophylla	406709	6463997
Eucalyptus marginata	406728	6463884
Eucalyptus marginata	406735	6463862
Eucalyptus marginata	406749	6463937
Corymbia calophylla	406739	6464037
Corymbia calophylla	406729	6464029
Corymbia calophylla	406745	6464024
Corymbia calophylla	406750	6464034
Eucalyptus wandoo	406756	6464044
Eucalyptus wandoo	406752	6464053
Eucalyptus wandoo	406759	6464062
Corymbia calophylla	406782	6464010
Corymbia calophylla	406792	6464008
Corymbia calophylla	406784	6463998
Eucalyptus marginata	406774	6463898
Eucalyptus marginata	406811	6463890
Eucalyptus marginata	406807	6463906
Eucalyptus marginata	406813	6463871
Eucalyptus marginata	406802	6463855
Eucalyptus marginata	406799	6463839
Eucalyptus marginata	406777	6463858
Eucalyptus marginata	406771	6463869
Eucalyptus marginata / Corymbia calophylla	406778	6463951
Eucalyptus marginata / Corymbia calophylla	406785	6463944
Eucalyptus marginata / Corymbia calophylla	406791	6463912
Eucalyptus marginata / Corymbia calophylla	406777	6463938
Eucalyptus marginata / Corymbia calophylla	406788	6463936
Eucalyptus marginata / Corymbia calophylla	406797	6463919
Eucalyptus marginata / Corymbia calophylla	406786	6463953
Eucalyptus marginata / Corymbia calophylla	406805	6463933
Eucalyptus marginata / Corymbia calophylla	406798	6463939
Eucalyptus marginata / Corymbia calophylla	406791	6463946
Eucalyptus marginata / Corymbia calophylla	406788	6463922
Eucalyptus marginata / Corymbia calophylla	406792	6463971

Eucalyptus marginata / Corymbia calophylla	406817	6463946
Eucalyptus marginata / Corymbia calophylla	406805	6463952
Eucalyptus marginata / Corymbia calophylla	406798	6463960
Corymbia calophylla	407124	6463827
Corymbia calophylla	407160	6463736
Corymbia calophylla	407161	6463744
Corymbia calophylla	407159	6463752
Corymbia calophylla	407169	6463746
Corymbia calophylla	407179	6463757
Corymbia calophylla	407177	6463749
Corymbia calophylla	407169	6463756
Corymbia calophylla	407302	6463752
Corymbia calophylla	407330	6463750
Corymbia calophylla	407333	6463749
Corymbia calophylla	407342	6463751
Corymbia calophylla	407338	6463749
Corymbia calophylla	407338	6463752
Corymbia calophylla	407326	6463750
Corymbia calophylla	407325	6463753
Corymbia calophylla	407345	6463753
Corymbia calophylla	407356	6463743
Corymbia calophylla	407357	6463749
Corymbia calophylla	407361	6463743
Corymbia calophylla	407361	6463750
Corymbia calophylla	407365	6463751
Corymbia calophylla	407366	6463745
Corymbia calophylla	407370	6463746
Corymbia calophylla	407382	6463734
Corymbia calophylla	407380	6463732
Corymbia calophylla	407383	6463732
Corymbia calophylla	407392	6463725
Corymbia calophylla	407305	6463657
Corymbia calophylla	407303	6463665
Corymbia calophylla	407310	6463676
Corymbia calophylla	407318	6463672
Corymbia calophylla	407314	6463667
Corymbia calophylla	407323	6463668
Corymbia calophylla	407318	6463657
Corymbia calophylla	407325	6463644
Corymbia calophylla	407323	6463635
Corymbia calophylla	407322	6463629
Corymbia calophylla	407326	6463654
Corymbia calophylla	407328	6463664
Corymbia calophylla	407337	6463662
Corymbia calophylla	407333	6463655
Corymbia calophylla	407346	6463661
Corymbia calophylla	407345	6463654
Corymbia calophylla	407349	6463643
Corymbia calophylla	407358	6463647
Corymbia calophylla	407257	6463679

Corymbia calophylla	407170	6463674
Corymbia calophylla	407140	6463670
Corymbia calophylla	407164	6463699
Corymbia calophylla	407201	6463668
Corymbia calophylla	407213	6463666
Corymbia calophylla	407227	6463669
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Eucalyptus marginata	407214	6463677
Eucalyptus marginata	407210	6463683
Eucalyptus marginata	407195	6463684
Eucalyptus marginata	407207	6463675
Eucalyptus marginata	407154	6463682
Eucalyptus marginata	406895	6463747
Eucalyptus marginata	406898	6463750
Corymbia calophylla	406897	6463763
Eucalyptus rudis	406882	6463757
Corymbia calophylla	406926	6463776
Corymbia calophylla	406912	6463726
Corymbia calophylla	406918	6463715
Eucalyptus wandoo	406962	6463678
Corymbia calophylla	406867	6463843
Eucalyptus marginata	406820	6463780
Eucalyptus rudis	406824	6463737
Eucalyptus rudis	406821	6463779
Corymbia calophylla	406950	6463651
Corymbia calophylla	406991	6463646
Eucalyptus marginata	407016	6463622
Corymbia calophylla	407026	6463607
Eucalyptus marginata	406842	6463488
Eucalyptus marginata	406883	6463438
Corymbia calophylla	406854	6463404
Eucalyptus marginata	406958	6463362
Eucalyptus marginata / Corymbia calophylla	406858	6463344
Eucalyptus marginata / Corymbia calophylla	406835	6463464
Eucalyptus marginata	406879	6463416
Eucalyptus marginata	406832	6463204
Eucalyptus marginata	406834	6463224
Eucalyptus marginata	406833	6463257
Corymbia calophylla	406830	6463280
Corymbia calophylla	406832	6463238
Eucalyptus rudis	406763	6463134
Eucalyptus rudis	406771	6463131
Eucalyptus marginata	407034	6463227
Eucalyptus wandoo	407062	6463312
Eucalyptus marginata	407264	6463414
Corymbia calophylla	407156	6463444
Eucalyptus marginata / Corymbia calophylla	407163	6463502
Eucalyptus marginata	407162	6463545
Eucalyptus rudis	407303	6463527
Eucalyptus rudis	407353	6463544

Eucalyptus marginata	407372	6463558
Eucalyptus marginata	407344	6463577
Corymbia calophylla	407339	6463593
Corymbia calophylla	407256	6463599
Corymbia calophylla	407238	6463593
Eucalyptus marginata	407385	6463600
Corymbia calophylla	407344	6463201
Corymbia calophylla	407317	6463192
Corymbia calophylla	407274	6463227
Corymbia calophylla	407267	6463247
Corymbia calophylla	407253	6463242
Corymbia calophylla	407244	6463238
Corymbia calophylla	407230	6463248
Corymbia calophylla	407225	6463235
Eucalyptus marginata	407250	6463268
Eucalyptus marginata	407242	6463280
Corymbia calophylla	407299	6463282
Corymbia calophylla	407196	6463248
Corymbia calophylla	407201	6463260
Corymbia calophylla	407188	6463267
Eucalyptus marginata	407183	6463004
Corymbia calophylla	407201	6463026
Corymbia calophylla	407185	6462887
Eucalyptus wandoo	407158	6462919
Corymbia calophylla	407153	6462877
Corymbia calophylla	407158	6462890
Corymbia calophylla	407194	6462912
Corymbia calophylla	407212	6462908
Corymbia calophylla	407219	6462921
Corymbia calophylla	407239	6462917
Corymbia calophylla	407236	6462937
Corymbia calophylla	407295	6462926
Corymbia calophylla	407312	6462924
Corymbia calophylla	407318	6462945
Corymbia calophylla	407325	6462965
Corymbia calophylla	407325	6462982
Corymbia calophylla	407304	6462921
Corymbia calophylla	407323	6462925
Corymbia calophylla	407438	6463023
Corymbia calophylla	407439	6463016
Corymbia calophylla	407444	6462991
Corymbia calophylla	407439	6462963
Corymbia calophylla	407438	6462950
Corymbia calophylla	407444	6462940
Corymbia calophylla	407440	6462929
Corymbia calophylla	407436	6462920
Corymbia calophylla	407419	6462975
Corymbia calophylla	407427	6463028
Corymbia calophylla	407449	6462909
Corymbia calophylla	407448	6462922

Corymbia calophylla	407296	6463015
Corymbia calophylla	407296	6463007
Corymbia calophylla	407313	6463026
Corymbia calophylla	407320	6463010
Corymbia calophylla	407308	6463021
Corymbia calophylla	407251	6462968
Corymbia calophylla	407259	6462980
Corymbia calophylla	407249	6462984
Corymbia calophylla	407264	6462992
Corymbia calophylla	407248	6462997
Corymbia calophylla	407259	6463009
Eucalyptus wandoo	407264	6462822
Eucalyptus wandoo	407270	6462819
Eucalyptus wandoo	407226	6462760
Eucalyptus wandoo	407235	6462763
Eucalyptus wandoo	407239	6462757
Eucalyptus wandoo	407250	6462754
Corymbia calophylla	407214	6462755
Corymbia calophylla	407211	6462762
Corymbia calophylla	407207	6462768
Corymbia calophylla	407202	6462758
Corymbia calophylla	407195	6462761
Corymbia calophylla	407186	6462766
Corymbia calophylla	407176	6462766
Corymbia calophylla	407176	6462757
Corymbia calophylla	407055	6462917
Corymbia calophylla	407067	6462915
Corymbia calophylla	407062	6462925
Eucalyptus marginata	407064	6462885
Eucalyptus marginata	407076	6463001
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Corymbia calophylla	406853	6463006
Eucalyptus wandoo	406879	6463027
Eucalyptus marginata	406833	6463144
Corymbia calophylla	406816	6462694
Corymbia calophylla	406850	6462704
Corymbia calophylla	406960	6462682
Corymbia calophylla	406969	6462672
Corymbia calophylla	406973	6462694
Corymbia calophylla	407006	6462708
Corymbia calophylla	406991	6462734
Corymbia calophylla	407020	6462690
Corymbia calophylla	407011	6462759
Corymbia calophylla	407017	6462752
Corymbia calophylla	406975	6462772
Corymbia calophylla	406965	6462770
Corymbia calophylla	407050	6462750
Corymbia calophylla	407064	6462751
Corymbia calophylla	406848	6462623
Corymbia calophylla	406858	6462586

Corymbia calophylla	406870	6462590
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Eucalyptus wandoo	406887	6462566
Eucalyptus wandoo	406883	6462559
Eucalyptus wandoo	406820	6462612
Eucalyptus wandoo	406872	6462626
Eucalyptus wandoo	406879	6462638
Corymbia calophylla	406874	6462757
Corymbia calophylla	406895	6462759
Eucalyptus wandoo	407087	6462630
Eucalyptus wandoo	407106	6462629
Eucalyptus wandoo	407098	6462619
Eucalyptus wandoo	407108	6462610
Eucalyptus wandoo	407088	6462608
Eucalyptus wandoo	407101	6462595
Eucalyptus wandoo	406831	6462451
Corymbia calophylla	406847	6462452
Eucalyptus wandoo	406842	6462532
Eucalyptus wandoo	406856	6462535
Eucalyptus wandoo	406866	6462533
Eucalyptus wandoo	406863	6462545
Eucalyptus wandoo	406851	6462549
Eucalyptus wandoo	406898	6462532
Eucalyptus wandoo	406925	6462531
Eucalyptus wandoo	406923	6462523
Eucalyptus rudis	406970	6462527
Eucalyptus wandoo	406930	6462471
Eucalyptus wandoo	406949	6462460
Corymbia calophylla	406991	6462488
Corymbia calophylla	406972	6462488
Corymbia calophylla	406890	6462471
Corymbia calophylla	406862	6462460
Corymbia calophylla	406848	6462395
Corymbia calophylla	406834	6462366
Corymbia calophylla	406792	6462380
Corymbia calophylla	406811	6462391
Corymbia calophylla	406823	6462402
Corymbia calophylla	406813	6462406
Corymbia calophylla	406819	6462423
Corymbia calophylla	406931	6462388
Corymbia calophylla	406940	6462378
Eucalyptus marginata	406774	6462382
Eucalyptus marginata	406782	6462380
Eucalyptus marginata	406786	6462371
Eucalyptus marginata / Corymbia calophylla	406782	6462371
Eucalyptus marginata / Corymbia calophylla	406777	6462377
Eucalyptus marginata / Corymbia calophylla	406777	6462383
Eucalyptus marginata	406863	6462295
Eucalyptus marginata	406886	6462310
Eucalyptus marginata	406870	6462325

Eucalyptus marginata	406876	6462334
Eucalyptus marginata / Corymbia calophylla	406931	6462326
Eucalyptus marginata / Corymbia calophylla	406929	6462315
Eucalyptus marginata / Corymbia calophylla	406935	6462315
Eucalyptus marginata	406961	6462312
Eucalyptus marginata	406952	6462300
Eucalyptus marginata	406985	6462297
Eucalyptus marginata	406949	6462218
Corymbia calophylla	406892	6462256
Corymbia calophylla	406904	6462248
Corymbia calophylla	407068	6462185
Corymbia calophylla	407058	6462265
Corymbia calophylla	407065	6462262
Corymbia calophylla	407060	6462253
Eucalyptus marginata / Corymbia calophylla	407072	6462329
Eucalyptus marginata / Corymbia calophylla	407069	6462322
Eucalyptus marginata / Corymbia calophylla	407062	6462307
Eucalyptus marginata / Corymbia calophylla	407049	6462311
Eucalyptus marginata / Corymbia calophylla	407047	6462323
Eucalyptus marginata / Corymbia calophylla	407058	6462316
Eucalyptus marginata / Corymbia calophylla	407134	6462147
Eucalyptus marginata / Corymbia calophylla	407146	6462135
Eucalyptus marginata	407050	6462146
Eucalyptus marginata	407023	6462146
Corymbia calophylla	406965	6462393
Corymbia calophylla	406974	6462380
Corymbia calophylla	406991	6462368
Corymbia calophylla	406985	6462358
Corymbia calophylla	406978	6462344
Eucalyptus marginata	406956	6462406
Eucalyptus marginata	406963	6462406
Corymbia calophylla	407014	6462419
Corymbia calophylla	407019	6462416
Corymbia calophylla	407012	6462413
Corymbia calophylla	407017	6462408
Eucalyptus marginata	406962	6462400
Corymbia calophylla	407139	6462455
Corymbia calophylla	407149	6462455
Corymbia calophylla	407231	6462475
Corymbia calophylla	407227	6462464
Corymbia calophylla	407223	6462453
Corymbia calophylla	407229	6462448
Corymbia calophylla	407245	6462457
Corymbia calophylla	407300	6462441
Corymbia calophylla	407306	6462441
Corymbia calophylla	407311	6462456
Corymbia calophylla	407266	6462402
Corymbia calophylla	407272	6462407
Eucalyptus marginata	407315	6462408
Eucalyptus rudis	407349	6462440

Corymbia calophylla	407390	6462437
Eucalyptus marginata	407274	6462374
Eucalyptus marginata	407280	6462370
Eucalyptus marginata / Corymbia calophylla	407261	6462350
Eucalyptus marginata / Corymbia calophylla	407277	6462350
Eucalyptus marginata / Corymbia calophylla	407269	6462349
Eucalyptus marginata / Corymbia calophylla	407261	6462339
Eucalyptus marginata / Corymbia calophylla	407269	6462341
Eucalyptus marginata / Corymbia calophylla	407280	6462341
Eucalyptus marginata / Corymbia calophylla	407265	6462331
Eucalyptus marginata / Corymbia calophylla	407269	6462323
Eucalyptus marginata / Corymbia calophylla	407268	6462313
Eucalyptus marginata / Corymbia calophylla	407277	6462321
Eucalyptus marginata / Corymbia calophylla	407275	6462313
Eucalyptus marginata / Corymbia calophylla	407278	6462304
Eucalyptus marginata / Corymbia calophylla	407316	6462385
Eucalyptus marginata / Corymbia calophylla	407354	6462384
Eucalyptus marginata / Corymbia calophylla	407369	6462384
Eucalyptus marginata / Corymbia calophylla	407389	6462385
Eucalyptus marginata / Corymbia calophylla	407413	6462389
Eucalyptus marginata / Corymbia calophylla	407429	6462388
Eucalyptus marginata / Corymbia calophylla	407449	6462388
Eucalyptus marginata / Corymbia calophylla	407465	6462388
Eucalyptus marginata / Corymbia calophylla	407476	6462391
Eucalyptus marginata / Corymbia calophylla	407338	6462384
Eucalyptus marginata / Corymbia calophylla	407327	6462385
Eucalyptus marginata / Corymbia calophylla	407435	6462381
Eucalyptus marginata	407320	6462412
Eucalyptus marginata / Corymbia calophylla	407117	6462051
Eucalyptus marginata / Corymbia calophylla	407122	6462033
Eucalyptus marginata / Corymbia calophylla	407116	6462039
Eucalyptus marginata / Corymbia calophylla	407121	6462045
Eucalyptus marginata / Corymbia calophylla	407140	6462017
Eucalyptus marginata / Corymbia calophylla	407147	6462010
Eucalyptus marginata / Corymbia calophylla	407194	6461966
Corymbia calophylla	407212	6461971
Corymbia calophylla	407203	6462010
Corymbia calophylla	407221	6461938
Corymbia calophylla	407236	6461925
Corymbia calophylla	407243	6461919
Corymbia calophylla	407251	6461909
Corymbia calophylla	407283	6461933
Corymbia calophylla	407282	6461921
Corymbia calophylla	407282	6461915
Corymbia calophylla	407532	6461892
Corymbia calophylla	407421	6462441
Corymbia calophylla	407130	6462408
Corymbia calophylla	407113	6462397
Corymbia calophylla	407114	6462394
Eucalyptus marginata	407052	6462367

Corymbia calophylla	407071	6462381
Eucalyptus wandoo	406859	6462507
Corymbia calophylla	406994	6462220
Eucalyptus marginata	407014	6462223
Eucalyptus marginata	407140	6463284
Eucalyptus marginata	407016	6463588
Eucalyptus wandoo	406792	6463147
Corymbia calophylla	406644	6462945
Corymbia calophylla	406643	6462818
Eucalyptus wandoo	406644	6462814
Eucalyptus marginata	406607	6462753
Corymbia calophylla	406602	6462720
Corymbia calophylla	406656	6462669
Eucalyptus marginata	406658	6462654
Eucalyptus marginata	406667	6462646
Eucalyptus marginata / Corymbia calophylla	406610	6462651
Eucalyptus marginata / Corymbia calophylla	406628	6462653
Eucalyptus marginata	406668	6462617
Eucalyptus marginata	406548	6462617
Corymbia calophylla	406596	6462594
Corymbia calophylla	406647	6462563
Corymbia calophylla	406651	6462558
Corymbia calophylla	406655	6462544
Eucalyptus marginata	406640	6462538
Corymbia calophylla	406672	6462575
Eucalyptus marginata	406723	6462520
Eucalyptus marginata	406719	6462542
Eucalyptus marginata	406747	6462567
Eucalyptus marginata / Corymbia calophylla	406719	6462441
Eucalyptus marginata / Corymbia calophylla	406724	6462432
Eucalyptus marginata / Corymbia calophylla	406724	6462449
Eucalyptus marginata / Corymbia calophylla	406750	6462449
Eucalyptus marginata / Corymbia calophylla	406762	6462439
Eucalyptus marginata / Corymbia calophylla	406765	6462423
Eucalyptus marginata / Corymbia calophylla	406759	6462418
Eucalyptus marginata / Corymbia calophylla	406734	6462412

APPENDIX K

Fauna Habitat Sheets

Habitat Assessment – 1

Date: 16/09/2015

Broad Fauna Habitat:
Eucalypt Remnant with Understorey

UTM Co-ordinates 50
Easting: 0407083 Northing: 6463034

Condition Scale: Excellent

Last Fire: Long unburnt

Disturbance: Mild (Fire breaks only)

Aspect: N/A

Soils: Grey sand

Landform: Sandy plain

Rock Type: N/A

Vegetation Description: Low Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Jarrah	8 m	-	<20%	-	-
Midstorey	*Banksia grandis, Banksia attenuata* Victorian Tea Tree, Woollybush	3 m	<5%	-	20-60%	-
Understorey	Mixed heath, Kangaroo paw	1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<20%		
Rock:	<5%	Logs:	<5%
Leaf Litter:	<5%	Grasses:	<20%

Microhabitats

Burrowing Suitability:	Sand	Peeling Bark:	None
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	None
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	Open
Suitability for Bats:	No	Woody Debris:	

Black Cockatoo Foraging Habitat

Species:
Jarrah, Banksia

Fauna Species

Australian Ringneck	Willie Wagtail	Southern Brown Bandicoot (diggings)
Brown Honeyeater		

Habitat Assessment – 2

Date: 16/09/2015

Broad Fauna Habitat:
Eucalypt Remnant with Understorey

UTM Co-ordinates 50
Easting: 0406974 Northing: 6462222

Condition Scale: Very Good

Last Fire: Long unburnt

Disturbance: None

Aspect: SE

Soils: Grey sand

Landform: Sandy Plain

Rock Type: N/A

Vegetation Description: Low Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Jarrah, Marri	10 m	-	<20%	-	-
Midstorey	*Allocasuarina humilius, Banksia sessilis* Kangaroo paw, Acacia	3 m		<20%	-	-
Understorey	Xanthorrhoea, Hibbertia, Lambertia	1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<20%		
Rock:	<5%	Logs:	<5%
Leaf Litter:	<20%	Grasses:	<20%
		Herbs	20-60%

Microhabitats

Burrowing Suitability:	Sand	Peeling Bark:	None
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	None
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	Open
Suitability for Bats:	No	Woody Debris:	

Black Cockatoo Foraging Habitat

Species:
Jarrah, Marri, Banksia, Allocasuarina

Fauna Species

Australian Ringneck	Brown Honeyeater	New Holland Honeyeater
Common Bronzewing	Southern Brown Bandicoot (diggings)	
Magpie Lark		

Habitat Assessment – 3

Date: 23/09/2015

Broad Fauna Habitat:
Completely degraded

UTM Co-ordinates 50
Easting: 0477050 Northing: 6463581

Condition Scale: Degraded

Last Fire: Long unburnt

Disturbance: Heavy

Aspect: N/A

Soils: Grey sand

Landform: Sandy Plain

Rock Type: Laterite

Vegetation Description: Other – Introduced Victorian Tea-tree and palms

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Palms	4 m	-	<20%	-	-
Midstorey	Victorian Tea-tree, Banksia sessilis	2.5 m		<20%	-	-
Understorey	Introduced grasses and weeds	<1 m	-	-	20-60%	-

Ground Cover

Bare Ground:	60-100%	Logs:	<5%
Rock:	<5%	Grasses:	<20%
Leaf Litter:	<5%	Herbs	20-60%

Microhabitats

Burrowing Suitability:	Stony	Peeling Bark:	None
Rocks/Stones (0-200mm):	0-30%	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	None
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	None
Suitability for Bats:	No	Woody Debris:	

Black Cockatoo Foraging Habitat

Species:
Banksia sessilis

Fauna Species

-

Habitat Assessment – 4

Date: 23/09/2015

Broad Fauna Habitat:
Non-Eucalypt Remnants

UTM Co-ordinates 50
Easting: 046675 Northing: 6463294

Condition Scale: Degraded

Last Fire: Long unburnt

Disturbance: Medium

Aspect: N/A

Soils: Grey sand

Landform: Sandy Plain

Rock Type: Laterite

Vegetation Description: Other – Allocasuarina Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Allocasuarina	4 m	-	<20%	-	-
Midstorey	-	-		-	-	-
Understorey	Introduced weeds	<1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<20%	Logs:	<5%
Rock:	<5%	Grasses:	60-1000%
Leaf Litter:	<20%	Herbs	<5%

Microhabitats

Burrowing Suitability:	Sandy loam	Peeling Bark:	Rare
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	None
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	None
Suitability for Bats:	No	Woody Debris:	

Black Cockatoo Foraging Habitat

Species:
Allocasuarina fraseriana

Fauna Species

Rufous Whistler

Australian Ringneck

Habitat Assessment – 5

Date: 23/09/2015

Broad Fauna Habitat:
Crumpet Creek

UTM Co-ordinates 50
Easting: 0477431 Northing: 6462727

Condition Scale: Good

Last Fire: Long unburnt

Disturbance: Medium

Aspect: N/A

Soils: Grey sand

Landform: Creek

Rock Type: N/A

Vegetation Description: Eucalypt / Corymbia Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Wandoo, Rudis, Marri	10 m	-	-	20-60%	-
Midstorey	Grass trees	2 m		<20%	-	-
Understorey	Grassy weeds, other weeds	<1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<5%	Logs:	<5%
Rock:	<5%	Grasses:	60-100%
Leaf Litter:	20-60%	Herbs	<20%

Microhabitats

Burrowing Suitability:	Sandy loam	Peeling Bark:	Rare
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	Rare
Exfoliating Slabs:	None	Water Presence:	Common
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	None
Suitability for Bats:	No	Woody Debris:	<20%

Black Cockatoo Foraging Habitat

Species:
Wandoo, Rudis, Marri

Fauna Species

Red Wattlebird, Common Bronzewing, Grey Butcherbird, Crow, Grey Fantail

Habitat Assessment – 6

Date: 23/09/2015

Broad Fauna Habitat:
Eucalypt Remnants Lacking Understorey

UTM Co-ordinates 50
Easting: 047248 Northing: 6461942

Condition Scale: Degraded

Last Fire: Long unburnt

Disturbance: Medium

Aspect: N/A

Soils: Grey sand

Landform: Plain

Rock Type: N/A

Vegetation Description: Eucalypt / Corymbia Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Marri, Pine	10 m	-	-	20-60%	-
Midstorey				-	-	-
Understorey	Grassy weeds, other weeds	<1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<20%	Logs:	<5%
Rock:	<5%	Grasses:	60-100%
Leaf Litter:	<5%	Herbs	<20%

Microhabitats

Burrowing Suitability:	Sandy loam	Peeling Bark:	None
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	None
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	None
Suitability for Bats:	No	Woody Debris:	<5%

Black Cockatoo Foraging Habitat

Species:
Marri

Fauna Species

Rainbow Lorikeet, Rock Dove

Habitat Assessment – 7

Date: 23/09/2015

Broad Fauna Habitat:
Crumpet Creek

UTM Co-ordinates 50
Easting: 046789 Northing: 6462746

Condition Scale: Very Good

Last Fire: Long unburnt

Disturbance: Mild

Aspect: N/A

Soils: Black sand

Landform: Creek

Rock Type: N/A

Vegetation Description: Eucalypt / Corymbia Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Marri, Jarrah	16 m	-	-	20-60%	-
Midstorey	Grasstrees	3 m		-	20-60%	-
Understorey	Mixed heath and weeds	1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<5%	Logs:	<5%
Rock:	<5%	Grasses:	<20%
Leaf Litter:	20-60%	Woody Debris	<20%

Microhabitats

Burrowing Suitability:	Sandy loam	Peeling Bark:	Rare
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	Rare
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	Common
Caves:	Absent	Tree Connectivity	Closed
Suitability for Bats:	No		

Black Cockatoo Foraging Habitat

Species:
Marri, Jarrah

Fauna Species

Rainbow Lorikeet, Red wattlebird, Australian Magpie, Common Bronzewing, Pacific Black Duck

Habitat Assessment – 8

Date: 23/09/2015

Broad Fauna Habitat:
Eucalypt remnants with Understorey

UTM Co-ordinates 50
Easting: 0406789 Northing: 6462746

Condition Scale: Very Good

Last Fire: Long unburnt

Disturbance: Mild

Aspect: N/A

Soils: Black sand

Landform: Plain

Rock Type: N/A

Vegetation Description: Eucalypt / Corymbia Woodland

Stratum	Vegetation Species	Average Height	Cover			
			Scattered Plants	Sparse	Moderate	Thick
Overstorey	Jarrah, Marri	15 m	-	-	20-60%	-
Midstorey	Grass trees	3 m		-	20-60%	-
Understorey	Heath	1 m	-	-	-	60-100%

Ground Cover

Bare Ground:	<5%	Logs:	<5%
Rock:	<5%	Grasses:	<20%
Leaf Litter:	20-60%	Woody Debris:	<20%

Microhabitats

Burrowing Suitability:	Sandy loam	Peeling Bark:	Rare
Rocks/Stones (0-200mm):	None	Large Tree Hollows (> 120 mm diameter)	None
		Small Tree Hollows (< 120 mm diameter)	None
Exfoliating Slabs:	None	Water Presence:	None
Rock Crevices:	None	Distance to Water:	<0.5 km
Caves:	Absent	Tree Connectivity	Closed
Suitability for Bats:	No		

Black Cockatoo Foraging Habitat

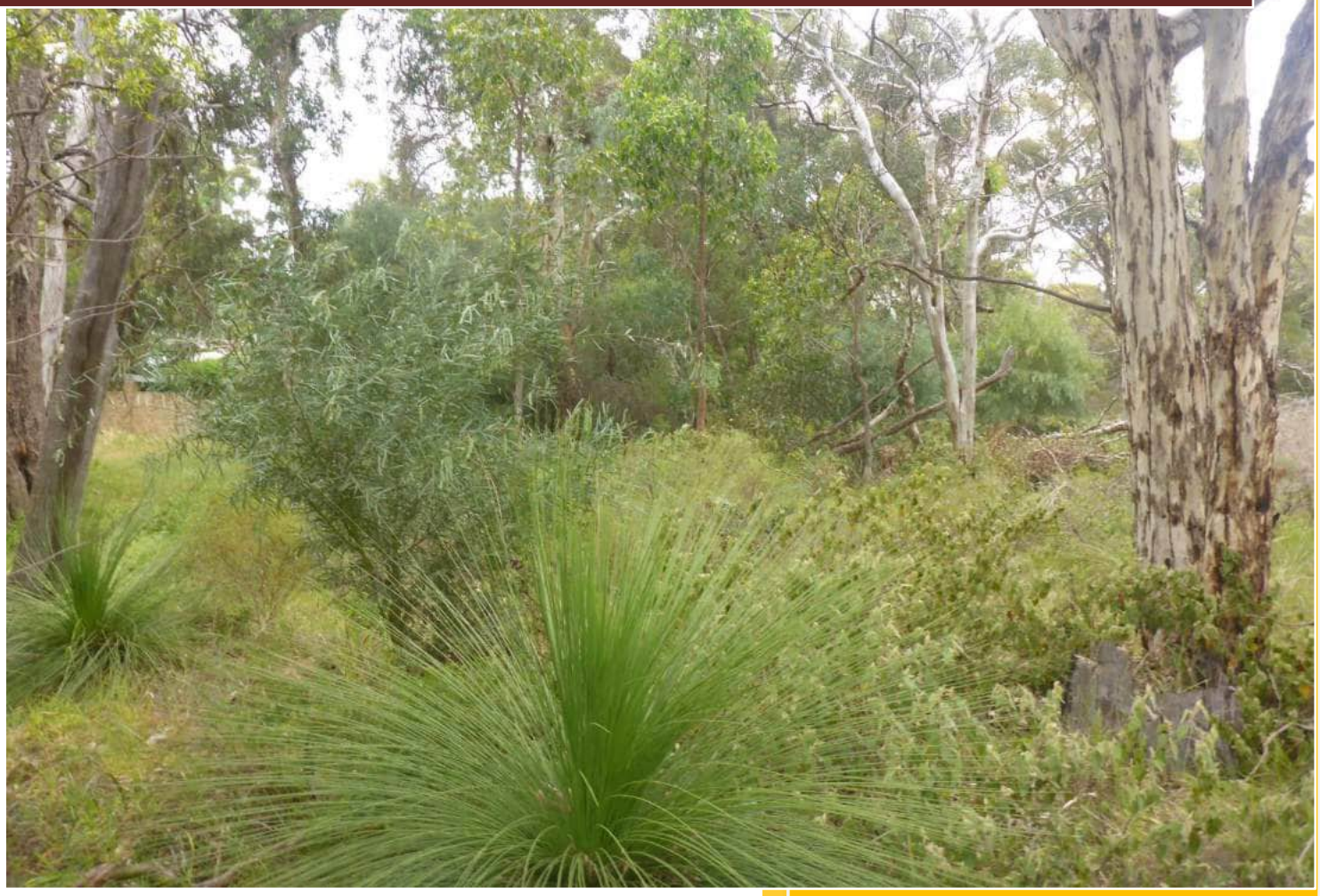
Species:
Marri , Jarrah

Fauna Species

Grey Fantail, Brown Honeyeater, Rufous Whistler

Appendix C
Invertebrate Solutions SRE Survey

Baseline Short Range Endemic and Conservation Significant Invertebrate Survey for the Local Structure Plan Maida Vale, Western Australia



Report by *Invertebrate Solutions Pty Ltd*
for SLR Pty Ltd

June 2023

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Report Version		Date
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2019ISJ13_F02_20230621	Final F02, Updated for EPA comments	21st June 2023

Prepared for: SLR Pty Ltd (360 Environmental Pty Ltd)

Frontispiece: Native vegetation in Maida Vale.

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Executive Summary

The Western Australian Planning Commission is proposing an amendment to the MRS to rezone approximately 178 ha of land in Maida Vale from the Rural zone to the Urban Deferred zone. The land is currently developed for rural residential purposes The proposed Urban Deferred zone will allow for future residential development and areas of public open space following the lifting of Urban Deferment, a local scheme amendment, structure planning and subdivision approval.

In accordance with the Environmental Protection Authority (EPA) Environmental Review Document (ERD) requirements a technical study was undertaken of short range endemic (SRE) and conservation significant invertebrate fauna for the Maida Vale MRS Amendment project (the Project).

360 Environmental (now SLR Pty Ltd) commissioned Invertebrate Solutions to undertake a desktop assessment and field survey for SRE invertebrates and conservation significant invertebrates. Short range endemic invertebrates are species with restricted distributions, typically isolated in specific habitats or bioregions. Conservation significant invertebrates are species of invertebrates listed under State or Commonwealth legislation or as Priority fauna by the DBCA. A small number of SRE invertebrates are listed as conservation significant, however the vast majority do not have a conservation significant listing due to poor knowledge of individual species' distribution and habitat requirements.

The Desktop Study Area contains:

- Six Confirmed SRE species (four mygalomorph trapdoor spiders, one land snail, and one native bee),
- Four Likely SRE species (two terrestrial slaters, one tree cricket, and one millipede),
- two Possible SRE species (one springtail, and one midge).

The remainder of the species were not SRE species and have widespread distributions.

Within the Project area, three SRE and conservation significant invertebrate species have a High Likelihood of occurrence:

- The land snail *Bothriembryon serpentinus* – Confirmed SRE,
- The millipede *Dinocambala ingens* – Likely SRE,
- the katydid *Austrosaga spinifer* – Priority 2 (DBCA), Likely SRE.

All other species are considered to have a Moderate to Very Low likelihood of occurrence due to the limited extent and quality of native vegetation remaining within the survey area.

An additional six conservation significant invertebrates (widespread, non-SRE species) were identified in the desktop assessment:

- One moth - Graceful Sunmoth (*Synemon gratiosa*) – DBCA Priority 4
- Five native bee species:

- Douglas's broad-headed bee *(Hesperocolletes douglasi*) – Critically Endangered (BC Act), Critically Endangered (EPBC Act)
- *Hylaeus globuliferus* – DBCA Priority 1
- *Leioproctus contrarius* – DBCA Priority 1
- Short-tongued bee (*Leioproctus douglasiellus*) Endangered (BC Act), Critically Endangered (EPBC Act),
- Short-tongued bee (Neopasiphae simplicior) Endangered (BC Act), Critically Endangered (EPBC Act)

The field surveys recorded 321 individual specimens representing 18 taxa of invertebrates from five classes, 11 orders and 15 families that have the potential to contain SRE taxa or be of conservation significance (Appendix 4).

No Confirmed SRE species or conservation significant invertebrates were recorded during the survey. The survey recorded:

- Three Likely SRE species (*Pseudodiploexochus* sp. indet, Armadillidae? sp. indet., and *Styloniscus* sp. indet.)
- Four Possible SRE species (two terrestrial slaters: *Spherillo* sp. 2, *Buddelundia* sp. 4; one pseudoscorpion, Olpiidae sp.; and one centipede *Cryptops* sp.)

None of the species identified during the desktop assessment of SRE and conservation significant invertebrates were recorded during the field survey.

The isopods *Pseudodiploexochus* sp. indet. and Armadillidae? sp. indet. are undescribed edaphophilic (soil dwelling) species currently known only from the Project area, although it should be noted that the taxonomic resolution for both these taxa is poor and designations may change with further taxonomic studies in the future. Soil dwelling taxa from numerous invertebrate groups often show an absence of eyes, and this does not in itself indicate the species has limited dispersal capabilities. One of the undescribed edaphophiles, *Pseudodiploexochus* sp. indet. was recorded in riparian vegetation associated with Crumpet Creek and impacts to this habitat should be avoided where possible to minimise potential impacts to this species and other potential SRE species. The single specimen of the small and cryptic Armadillidae? sp. indet. was recorded on the eastern extremity of the Project area in the *Eucalyptus lacking understorey* habitat that occurs throughout the Swan Coastal Plain.

All the other potential SRE species (one Likely and four Possible) are known to occur more widely in the region or were recorded at multiple locations and/or habitats that were laterally continuous during the survey indicating that their distributions are wider than the current survey could determine and are therefore not subject to significant impacts from the development.

The following recommendations are made with regard to the development of the Project:

- Implement appropriate management and mitigation measures to reduce the clearing of riparian vegetation and other potential SRE habitat within the Project area.

1. Introduction

The Western Australian Planning Commission is proposing an amendment to the MRS to rezone approximately 178 ha of land in Maida Vale from the Rural zone to the Urban Deferred zone. The land is currently developed for rural residential purposes The proposed Urban Deferred zone will allow for future residential development and areas of public open space following the lifting of Urban Deferment, a local scheme amendment, structure planning and subdivision approval.

In accordance with the Environmental Protection Authority (EPA) Environmental Review Document (ERD) requirements a technical study was undertaken of short range endemic (SRE) and conservation significant invertebrate fauna for the Maida Vale MRS Amendment project (the Project).

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1.1. Purpose of this report

Invertebrate Solutions has been requested by 360 Environmental to undertake a desktop assessment and field survey for SRE and conservation significant invertebrates for the proposed Maida Vale MRS Amendment and specifically address the following:

- Undertake a baseline field survey for SRE invertebrates to enable a thorough understanding of the local distribution of previously identified and any newly recorded taxa with potential to be considered SREs.
- Identification of all specimens to the lowest practical taxonomic unit.
- Provide recommendations and any suggested requirements for further work to comply with relevant State and Commonwealth legislation.
- Identify any other gaps in the information
- Provide a written report containing the above items.

1.2. Desktop Study Area and Field Survey Area

The Maida Vale MRS Amendment Project is located in the outer eastern metropolitan area of Perth, Western Australia and is shown in Figure 1.

The Desktop Study Area for the desktop report is defined by an approximate 20 km x 25 km rectangle bounded by the northwest corner (31.878858°S 115.908019°E) and the southeast corner

(32.054414°S 116.128457°E) centred on the Maida Vale MRS Amendment Project Area and was used for the purposes of database searches and relevant literature. The Desktop Study Area boundary and the Maida Vale MRS Amendment Project Area are shown in Figure 1

The survey area for the SRE and conservation significant invertebrate field survey replicates the development envelope and is shown in Figure 2.

1.3. Documents examined

The following documents have been examined in the compilation of this report, along with other referenced scientific papers used to provide general background:

- Invertebrate Solutions (2019a). Desktop review and risk assessment of short range endemic invertebrates for the Morley-Ellenbrook Rail Project, Part 1, Western Australia. Unpublished report to Public Transport Authority, August 2019, 75p.
- Invertebrate Solutions. (2018). Short Range Endemic invertebrate desktop assessment for Lot 102 Farrall Rd, Midvale, Western Australia. Unpublished report to Emerge Associates on behalf of Peet Stratton Pty Ltd, March 2019. 53p.

1.4. Introduction to SRE invertebrate fauna

Short range endemic invertebrates are species with restricted distributions. The isolation of invertebrates in specific habitats or bioregions leads to endemism at various spatial scales. The vast majority of invertebrates are capable of dispersing substantial distances at some phase of their life cycle. Some groups, however, are susceptible to short-range endemism which describes endemic species with restricted ranges, arbitrarily defined in Western Australia as less than 10,000 km^2 (100 km x 100 km) (Harvey, 2002). Taxa that have been more commonly found to contain SRE invertebrate representatives include:

- Onychophorans (velvet worms);
- Crustaceans (Isopoda);
- Arachnids (mygalomorph spiders, pseudoscorpions, opiliones, scorpions, schizomids);
- Myriapods (millipedes and centipedes);
- Molluscs (land snails); and
- Insects (hemipterans, grasshoppers, bees and butterflies).

Short range endemic invertebrate fauna taxa are generally found in sheltered, relatively mesic environments such as isolated habitats (e.g. boulder piles, isolated hills, dense patches of vegetation, gullies) and can include microhabitats within these environments such as deep leaf litter accumulation, large logs, under bark, cave areas, springs and permanent water bodies. Many processes contribute to taxa being susceptible to short range endemism. Generally, these factors are related to the isolation of a species which can include the ability and opportunity to disperse, life history, physiology, habitat requirements, and habitat availability. Taxa that exhibit short range endemism generally exhibit poor dispersal, low growth rates, low fecundity and reliance on habitat types that are discontinuous (Harvey, 2002). Taxa that reside within easily isolated habitats surrounded by physical barriers such as islands, mountains, aquifers, lakes and caves are also more

susceptible to becoming SRE species often including additional taxa not otherwise generally forming SREs.

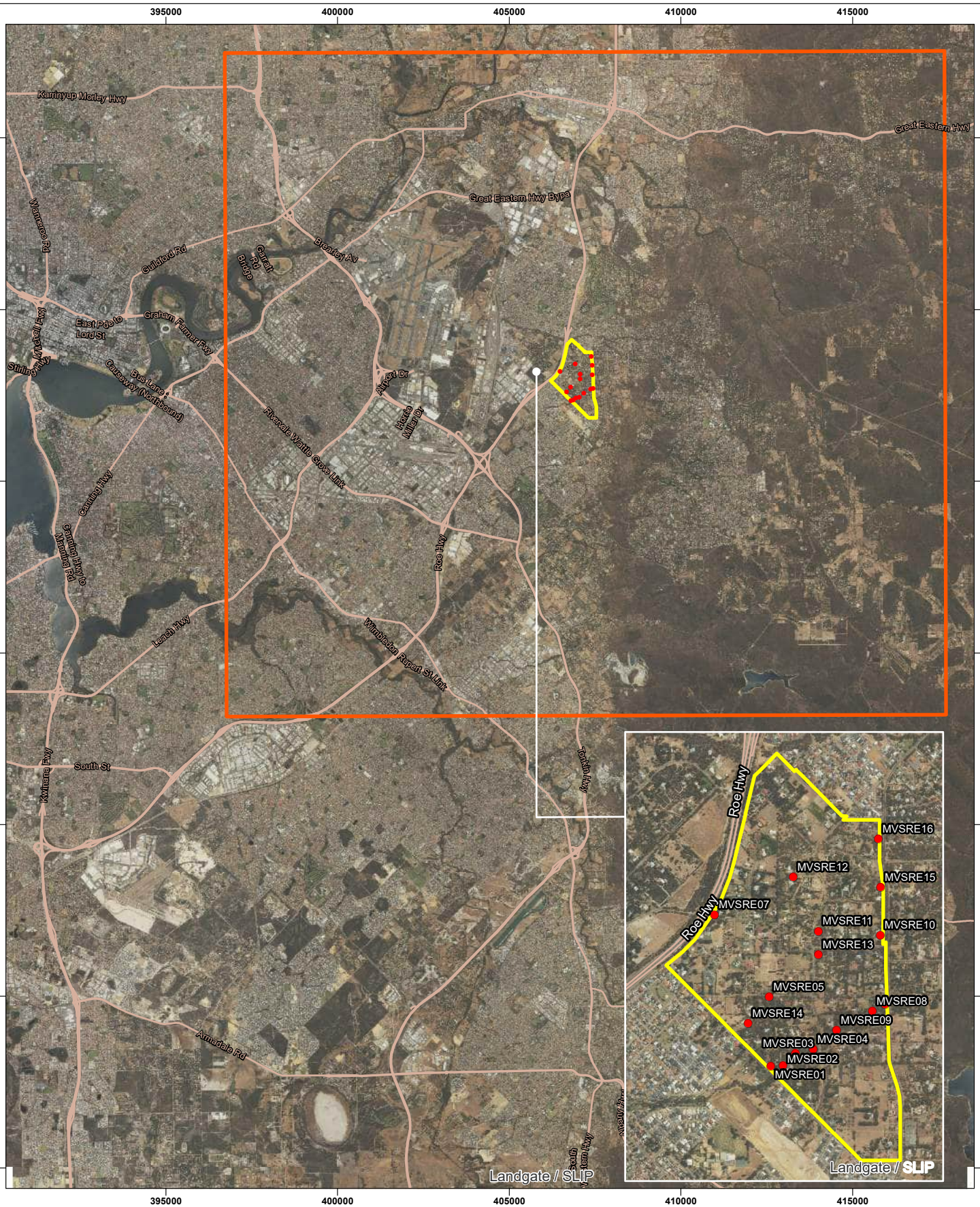
Taxa that exhibit short range endemism are particularly vulnerable to disturbance, either natural or anthropogenic, as they are reliant upon specialised and often restricted habitats (often moist) (Framenau, *et al*., 2008). Short range endemic taxa are unable to disperse to *refugia* when their habitats are threatened or destroyed, thus making them a priority for conservation efforts.

The allocation of short range endemism status can be difficult due to the often incomplete taxonomic framework of many invertebrate groups and the often frequent need for substantial revision to enable accurate identification. Short Range Endemic status is assigned using the categories described in Table 1, based upon the available information from the Western Australian Museum (WAM) database and discussion with appropriate taxonomic authorities for various invertebrate groups. Insufficient information exists for many invertebrate species due to specimens being juvenile, the wrong sex to allow identification, damaged, or inadequate taxonomic frameworks, precluding the assignment of SRE status.

It should be noted that only WAM records from the Arachnida/Myriapoda, Crustacean and Mollusc databases are available to determine SRE status and does not include records of Insects as the WAM Insect database is unavailable for database searches. For insects to be determined as SREs, records from the *Atlas of Living Australia* (www.ala.org.au) were examined along with original literature where available.

Table 1 Short Range Endemic Status of Species

SRE Status	Definition
Confirmed	A confirmed SRE species. A known distribution of < 10,000 km^2 (after Harvey 2002). Taxonomy of the group is well known. The group is well represented in collections, or via comprehensive sampling.
Likely	Likely to be a SRE species based upon knowledge of the family/genus, where other closely related species show evidence of short range endemism. Where habitats containing the specimens show discontinuity within the landscape.
Possible	Based upon existing knowledge of the genus / family there is a possibility that the species may have a restricted range. Where habitats containing the specimens may show discontinuity within the landscape. Possible SRE species may be assigned one of the sub categories below: A. Data deficient i.e. new species, lack of distribution, taxonomic or collecting knowledge, juvenile specimens, wrong sex for identification B. Habitat indicators C. Morphology indicators D. Molecular evidence E. Research and expertise of WAM staff/taxonomic specialists
Widespread	Not a SRE, a wide ranging distribution of > 10,000 km^2



Legend

- Desktop Study Area
- Project Area
- State Road
- Sample Locations SRE Fauna

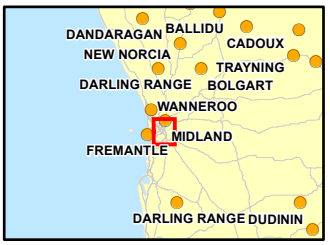
0 1,500 3,000 4,500 Meters

1:150,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



Powered by SLIP ENABLER

- LOCALITY MAP SOURCED FROM LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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PROJECT ID	DATE
3249	05/05/2020

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	TM	CM	0

Burgess Design Group
Various Lots, Maida Vale

Short Range Endemic Report

Figure 1
Site Location

K:\Projects\1.0 EBS\3622 Maida Vale SRE\3622 F1 Site Location.mxd

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1.5. Conservation Legislation and Guidance Statements

Terrestrial SRE species are protected under state legislation via the newly enacted Biodiversity Conservation (BC) Act (2016) which came into force on 1st January 2019, replacing the outdated Wildlife Conservation (WC) Act (1950). The new BC Act is aligned with the federal Environment EPBC Act (1999). The assessment of SRE fauna for environmental impact assessment (EIA) is undertaken in Western Australia with regard to Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).

At the State level, the BC Act provides a list of threatened species that have special protection as species listed under Part 2 of BC Act. This notice is updated periodically by the Department of Biodiversity, Conservation and Attractions (DBCA) (formerly the Department of Parks and Wildlife (DPaW) and the current list (October 2022) includes numerous threatened SRE species from the Wheatbelt, South Coast, Murchison and Pilbara regions. Included in the list are crustaceans, arachnids and myriapods that are considered to be "rare or likely to become extinct, as critically endangered fauna, or are declared to be fauna that is in need of special protection" (DBCA 2022).

In addition to the specially protected fauna, DBCA also maintains a list of Priority fauna that are considered to be of conservation significance but do not meet the criteria for formal listing under the BC Act. Priority is not a listing category under the BC Act, however, all fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (DBCA 2022). Species that may possibly be threatened but do not meet the criteria for formal listing under the BC Act because of data deficiencies, are added to the Priority Fauna List under Priorities 1, 2 or 3, in order of prioritisation for evaluation of conservation status so that consideration can be given to potential listing as threatened DBCA (2022). Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. The Priority fauna list is irregularly updated by DBCA. The Swan Coastal Plain bioregion contains numerous conservation significant bees, spiders and crickets along with various land snails.

The BC Act provides the ability for the state government of Western Australia to formally list Threatened Ecological Communities (TECs), and Priority Ecological Communities (PECs) along with threatening processes.

The federal EPBC Act protects both species and ecological communities. Sixteen invertebrates are listed in Western Australia with five of these species being from the Swan Coastal Plain.

1.6. Report Limitations and Exclusions

This study was limited to the written scopes provided to the client by Invertebrate Solutions (3rd September 2019) and in Section 1.1. This study was limited to the extent of information made available to Invertebrate Solutions at the time of undertaking the work. Information not made available to this study, or which subsequently becomes available may alter the conclusions made herein. Assessment of potential impacts to SRE fauna was based on proposed development plans provided by the client.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Invertebrate Solutions has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Invertebrate Solutions described in this report (this section and throughout this report). Invertebrate Solutions disclaims liability arising from any of the assumptions being incorrect.

Invertebrate Solutions has prepared this report on the basis of information provided by 360 Environment and others (including Government authorities), which Invertebrate Solutions has not independently verified or checked beyond the agreed scope of work. Invertebrate Solutions does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Site conditions may change after the date of this report. Invertebrate Solutions does not accept responsibility arising from, or in connection with, any change to the site conditions. Invertebrate Solutions is also not responsible for updating this report if the site conditions change.

Species were identified to the lowest practical taxonomic level, taking into consideration that the taxonomic framework of many invertebrate groups is incomplete and often in need of substantial revision to enable accurate identification. Short Range Endemic status was assigned using the available information from the WAM database and discussion with appropriate taxonomic authorities for various invertebrate groups. Insufficient information exists for many invertebrate species due to specimens being juvenile, the wrong sex to allow identification, damaged, or inadequate taxonomic frameworks, precluding the assignment of SRE status.

Field surveys for invertebrates require multiple seasonal surveys to fully record all species that may be present in an area, and in varying weather conditions. The current survey was undertaken in a single seasons and additional surveys at different times of the year may record additional species, however, the combination of collection techniques and the intensity of the survey provides a high degree of certainty that majority of potential SRE or conservation significant invertebrates present within the survey area were recorded.

2. Methods

Invertebrate Solutions undertook the following tasks for the single season SRE and conservation significant survey of the MRS Amendment Project Area :

- SRE and conservation significant invertebrate desktop assessment based upon WAM Records and previous survey s
- SRE and conservation significant invertebrate survey of the MRS Amendment Project Area (16 sites – 60 mins active searching and leaf litter samples).

The survey program was undertaken with regard to the Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).

2.1 Desktop Methods

The SRE invertebrate desktop review comprises an assessment of the likelihood that SRE and conservation significant invertebrate species are present in the habitats located within the Study Area.

2.1.1 Likelihood of SRE invertebrate occurrence

The likelihood of SRE invertebrate species occurring in the Desktop Study Area (Table 2) was assessed using a combination of regional and local botanical and landform information and database searches including:

- Analysis of published and unpublished reports concerning SRE invertebrate from the region.
- Botanical and vegetation mapping and other information available for the Study Area.
- DBCA Priority species list.
- Results of a Protected Matters Search from the Commonwealth Department of Agriculture Water and the Environment (DAWE) website.
- Records of fauna held by the WAM.

When considering the likelihood of SRE invertebrates at the local scale the MRS amendment boundary for the Project was specifically investigated whilst assessments at the regional scale included the entire Swan Coastal Plain.

Based on the analysis of all available information the Desktop Study Area was assigned a level of likelihood to support SRE invertebrates of either ‘Very Low’, ‘Low’, ‘Moderate’, ‘High’, or ‘Definite’.

Table 2 SRE species likelihood of occurrence definitions

SRE Species Likelihood of occurrence	Definition
Definite	The species is confirmed to occur within the Project area.
High	Habitat for the species is known to occur within the Project area and known records of the species are within 20 km.
Moderate	Habitat for the species is known to occur within the Project area and known records of the species are within 50 km.
Low	The species has been recorded from within 50 km, however, no habitat is present for the species within the Project area.
Very low	No habitat exists for the species within the Project area and no records of the species are within 50 km or the distribution of the species is known well enough to exclude its presence within the Project area.

2.2 SRE Survey Methodology

The SRE survey was undertaken using a combination of sampling techniques (described below in sections 2.2.1 – 2.2.3) and employed both systematic (timed active searching) and opportunistic (litter collection and transect) sampling. Sites were chosen from within vegetated areas of the Survey area that were considered most likely to contain SRE habitat including south-facing slopes, gullies, rocky outcrops, dense patches of trees and permanent water bodies if present. The SRE survey sites were also chosen to maximise sampling of all available vegetation types (as mapped by 360 Environmental 2016) and to provide spatial distribution throughout the entire Survey area as much as possible.

2.2.1 Active searching

Active searching was undertaken at 16 sites within and adjacent to the proposed survey area, focusing on areas more likely to contain SRE fauna (Section 1.4, Appendix 3). Active searching consisted of sifting of soil and/or leaf litter from suitable habitat areas within each site (millipedes and land snails); the raking of leaf litter (millipedes, land snails, centipedes, mygalomorph burrows); examination of vegetative material below logs and bark (pseudoscorpions, centipedes, millipedes), and an examination of (if present) areas of rock outcrops and associated rock piles.

A minimum of 60 minutes of active searching per site was undertaken.

2.2.2 Leaf Litter collection

Leaf litter was collected from each site surveyed and processed in Tullgren funnels for potential SRE fauna. Approximately 3L of leaf litter was collected from each site and stored in sealed plastic garbage bags to be analysed in the Invertebrate Solutions laboratory.

2.2.3 Opportunistic collection

Various areas that may provide habitat for SRE invertebrates were also opportunistically sampled whilst undertaking other surveys in the survey area. This included searching for burrows of mygalomorph spiders and searching under tree bark and logs for potential SRE species.

2.3 Survey Effort and Timing

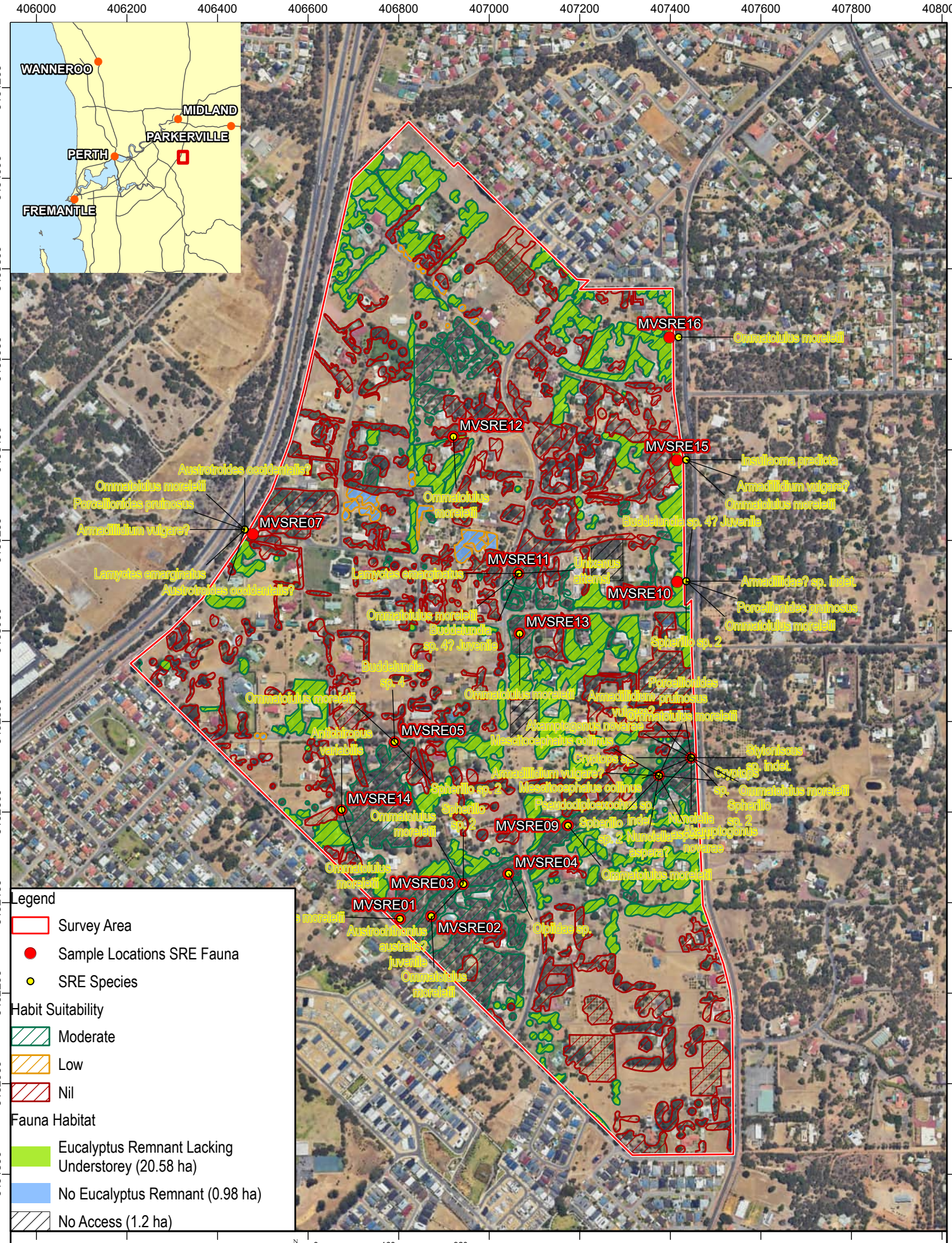
Invertebrate Solutions completed a single season SRE and conservation significant invertebrate survey within the MRS amendment Project area in October (30th – 31st) 2019. This comprised 16 SRE survey sites throughout the MRS Amendment Project Area that were actively sampled for SRE invertebrates including leaf litter sifting and hand searching of appropriate microhabitats, and collection of leaf litter from each locality for extraction in tullgren funnels as described in Section 2.2. The SRE sample site locations are detailed in Table 3, shown on **Error! Reference source not found.** and photos provided in Appendix 3. All coordinates in UTM are using datum GDA and located in Zone 50J.

Table 3 Locations actively searched for SRE invertebrates

Sample Site	Easting	Northing	Habitat	Active search date
MVSRE01	406803	6462364	Eucalyptus remnant with understorey	30 October 2019
MVSRE02	406872	6462370	Riparian vegetation (Crumpet Creek)	30 October 2019
MVSRE03	406943	6462441	Riparian vegetation (Crumpet Creek)	30 October 2019
MVSRE04	407043	6462464	Riparian vegetation (Crumpet Creek)	30 October 2019
MVSRE05	406791	6462755	Eucalyptus remnant with understorey	30 October 2019
MVSRE06	407446	6462720	Riparian vegetation (Crumpet Creek)	30 October 2019
MVSRE07	406460	6463224	Completely degraded	30 October 2019
MVSRE08	407375	6462680	Riparian vegetation (Crumpet Creek)	30 October 2019
MVSRE09	407174	6462570	Riparian vegetation (Crumpet Creek)	30 October 2019
MVSRE10	407435	6463110	Eucalyptus remnant no understorey	31 October 2019
MVSRE11	407065	6463127	Eucalyptus remnant with understorey	31 October 2019
MVSRE12	406921	6463429	Eucalyptus remnant no understorey	31 October 2019
MVSRE13	407067	6462994	Eucalyptus remnant with understorey	31 October 2019
MVSRE14	406674	6462605	Eucalyptus remnant with understorey	31 October 2019
MVSRE15	407435	6463378	Eucalyptus remnant no understorey	31 October 2019
MVSRE16	407418	6463649	Eucalyptus remnant no understorey	31 October 2019

2.4 Sorting and curation

Sorting for all SRE samples occurred in the Invertebrate Solutions laboratory using an Amscope 45x dissecting microscope and was undertaken by Dr Timothy Moulds. In the laboratory, fauna was extracted from SRE leaf litter samples using Tullgren funnels and preserved in 70% ethanol. Each taxon was identified to the lowest practical taxonomic rank using published keys and descriptions, and the numbers of each taxon recorded. Each identified taxon was kept in a separate labelled vial and assigned a specimen tracking code. Specimen and site collection data were recorded in an Excel spreadsheet. At the conclusion of the study, all specimens will be lodged at the WAM.



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Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,550 at A4
Project Number:	3622
Date Drawn:	20-Jun-2023
Drawn by:	JH
Reviewed by:	LG

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

M Group

Short Range Endemic Report

Vegetation and SRE Habitat Mapping

FIGURE 2

Path: K:\Projects\1.0 EBS\5525 003 007 Maida Vale F,F & V Amendment Work\5525_003_007_MV_Amendment_Work_Eco_Maps_V2\5525_003_007_Maida_Vale_Amendment_work.aprx

2.5 Taxonomy and Nomenclature

Identification of collected invertebrate material was undertaken by Dr Timothy Moulds. Invertebrate groups collected that have no SRE representatives such as ants and flying insects were not identified or reported. The presence of winged adults in most insect groups suggests that they are more capable dispersers and, therefore, less likely to have a restricted range.

The level of specimen identification achievable is dependent on the level of taxonomic knowledge and expertise available. The majority of the taxonomic expertise relating to SRE taxa resides with the staff of the WAM, while some groups are also worked on by researchers within other government departments and academic institutions. Taxonomic treatments are available for some invertebrate groups, but not all. The EPA expects that invertebrates collected for identification will be identified to the lowest taxonomic level possible. Ideally, this is to the species level, but there will be limits due to the nature of specimens and the availability of taxonomic keys.

2.6 Survey Specific Potential Limitations

The following specific comments are made with regard to potential specific limitations for the survey:

- **Sampling effort** – The single phase survey included 16 hours of active searching for both SRE and conservation significant invertebrates, and 16 leaf litter samples extracted in Tullgren funnels that provides a high degree of certainty that the majority of potential SRE invertebrates present at the time of survey were recorded from the Survey area.
- **Timing** – The survey was undertaken in October, which is within the suggested timing for the SCP region (May – October) according to the EPA Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA 2016).
- **Methods** – a wide variety of collecting techniques were used including active searching, leaf litter sieving, leaf litter extracted in Tullgren funnels, and bark peeling providing a high degree of certainty that the majority of potential SRE and conservation significant invertebrates present at the time of the survey were recorded from the Survey area.
- **Habitats sampled** – All significant potential SRE habitats were sampled using a combination of techniques.
- **Access to areas** – Minor access issues were encountered to some private property (noted on Figure 2), although all major habitats were able to be adequately sampled.

3. SRE and Conservation Significant Invertebrate Desktop Review

3.1 SRE and conservation significant invertebrates of Swan Coastal Plain

Terrestrial invertebrate species on the SCP that are of conservation interest to government and researchers are predominately insects that have been assigned a conservation significance by DBCA. The majority of the conservation significant terrestrial invertebrates on the SCP are insects, with native bees, Katydids (tree crickets) and the Graceful Sun-moth (*Synemon gratiosa*) being the most regularly encountered taxa. Many of these species are also considered SREs under the *sensu stricto* definition of Harvey (2002).

Some conservation significant invertebrates are also considered to be SRE species and some invertebrates are SRE species but have no formal conservation significance. SRE species more commonly encountered on the SCP include mygalomorph spiders, slaters, and millipedes. The SCP has a limited occurrence of invertebrate species considered to be SREs, due to urban sprawl and associated land clearance, much of the habitat for SRE and conservation significant invertebrates that once occurred on the SCP has been lost or is now highly fragmented.

Mygalomorph spiders

Idiosoma sigillatum is the dominant idiopid trapdoor spider on the SCP, where it occurs from Dalyellup north to at least Ledge Point (including Rottnest Island and Garden Island) with the eastern limit of its range along the sandy foothills of the Darling Escarpment, from Boyanup north to at least Gingin (refer WAM 2018b, Rix *et al.* 2018). Many of these records are historical in nature and occur within the Perth metropolitan area. It is highly likely that much of the habitat for this species within the Perth metropolitan area has been cleared for urban development and the species is unlikely to occur through much of its historical distribution in urban areas except in remnant habitats (e.g. Kings Park, Bold Park, and Shenton Park bushland) (Rix et al 2018).

Several other mygalomorph spiders that are Likely or Potential SRE species are also found on the SCP including the species from the family Barychelidae, *Synothele michaelseni* and *S. taurus and S. lowei* from the northern and north eastern SCP (Raven 1994). There are also several undescribed species of Nemesiid trapdoor spiders from the genus *Teyl* that occur within remnant bushland along the coastal fringe of the SCP that exhibit short range endemism (Invertebrate Solutions 2018).

Millipedes

Millipedes from the genus *Antichiropus* all have limited powers of dispersal and conservative ecological requirements (Car et al. 2013). In addition, the above-ground activity of most *Antichiropus* species are limited to a very small window of opportunity when there is sufficient moisture for them to forage and mate during wetter winter months (Car et al. 2013). *Antichiropus* species are, consequently, short-range endemics with very small distributions *sensu* Harvey 2002. The millipede *Antichiropus whistleri* is a confirmed SRE species that occurs north of the Swan River, although much of its original habitat has now been cleared for urban development. There are a few disjunct records of the species near Cataby, although following a recent re-examination of these specimens by Dr Cathy Car it is likely that these records represent a distinct and different species (Dr Cathy Car, WAM

pers. comm. 2018) and that *Antichiropus whistleri* is restricted to the northern fringe of the SCP. The genus is currently undoing a major revision and it is expected that this taxonomic issue will be resolved in the coming years.

Katydids (Tree crickets)

The tree cricket *Throscodectes xiphos* is known only from its type locality in the southern Perth suburb of Jandakot where it was originally collected in the axial leaf bases of grass trees (X*anthorrhoea preissei*) and is a Confirmed SRE species and is currently classified by DBCA as a Priority 1 species (Rentz.1993). Other conservation significant tree crickets include *Autrosaga spinifer* known from the Darling scarp and also a record from Melaleuca, east of Pinjar that is currently a Priority 2 species and *Kawaniphila pachomai* that occurs in the Perth Hills and to the south of Perth.

Moths

Graceful Sun-moths (GSM) are diurnal, and active on warm bright sunny days with low wind. GSM are generally restricted to the SCP but has also been recorded from the Geraldton sandplains and is known from 49 locations (Bishop *et al.* 2010). Extensive survey and genetic work undertaken throughout the SCP between 2010 – 2013 eventually saw their removal from the WC Act and the EPBC fauna list, however due to their limited distribution, small populations and rarity in nature the GSM is listed on the DBCA Priority fauna listing (Priority 4).

Plate 1 The P4 listed Graceful Sun-moth from the Wanneroo Region (Photo by G. Owen).

Native Bees

Native bees are extremely diverse and often poorly known taxonomically, however, many species are present on the SCP (Houston 2019). Native bees often exhibit close floristic associations and are pollinators of individual plant species genera. Three native bees, *Hesperocolletes douglasi, Leioproctus douglasiellus and Neopasiphae simplicior* that occur on the SCP are currently listed as Critically Endangered under the Commonwealth EPBC Act. These species are poorly known from very few records.

Snails

Historical records of land snails in Perth record some potential SRE species, however, much of their habitat has now been developed and they are unlikely to persist throughout the metropolitan region. The confirmed SRE species *Bothriembryon serpentinus* occurs along the Darling scarp from near Serpentine south of the Perth metropolitan area.

3.2 SRE Habitat in the Project area.

The survey area is largely cleared or highly degraded (360 Environmental 2016) with 64% of the entire site considered to have Nil SRE habitat value, although pockets of higher value vegetation for SRE and conservation significant invertebrates remain (Figure 2, Table 4). The riparian vegetation along Crumpet Creek in the south eastern portion of the survey area is some of better quality habitat within the survey area, although this is still degraded in large parts (360 Environmental 2016).

The *Eucalyptus* vegetation units, both with and without understorey vegetation, provide the only other potential SRE habitat within the Project area, although these are generally disturbed and have limited value for SRE invertebrates.

Table 4 Vegetation units (after 360 Environmental 2016) and habitat suitability for SRE and conservation significant invertebrates

Vegetation unit	Description (after 360 Environmental 2016, Fauna habitat types)	Percent of survey area	Survey Methods		SRE Habitat suitability
			Active Searching	Tullgren funnels	
Eucalyptus remnant with native understorey	Mixed Marri, Jarrah, Wandoo and Flooded Gum, midstorey consists of *Acacia*, *Allocasuarina*, *Banksia, Hakea* and *Xanthorrhoea*, understorey of mixed herbs and some areas of woody debris and leaf litter	**12%**	+	+	Moderate
Eucalyptus remnant lacking understorey	Eucalyptus trees in a disturbed setting, and a lack of vegetation in the mid and lower strata	**21%**	+	+	Low
Allocasuarina remnant	Allocasuarina with understorey of mixed herbs and some areas of woody debris and leaf litter	**<1%**			Low
Riparian vegetation	mix of Marri, Jarrah, , midstorey consists of *Acacia*, *Allocasuarina*, *Banksia, Hakea* and *Xanthorrhoea*, understorey of mixed herbs	**3%**	+	+	Moderate
Cleared / Highly Modified	Cleared land or residential gardens - Completely cleared or modified. Includes private lots and infrastructure (roads, carparks, buildings) – some remnant trees but no intact native vegetation	**64%**	+	+	Nil

3.3 Likelihood of occurrence of SRE and Conservation Significant Invertebrates within the Survey Area.

A list of conservation significant fauna for the Desktop Study Area was compiled from the DBCA Wildlife Conservation (Specially Protected Fauna) Notice 2022 (DBCA 2022) and the DAWE's Protected Matters Search Tool (PMST). SRE species that are listed under the BC Act and/or the EPBC Act and are likely to occur or have known habitat within the Desktop Study Area are shown in Table 5 along with their conservation code. The PMST results listed three native bee species (*Hesperocolletes douglasi, Leioproctus douglasiellus* and *Neopasiphae simplicior*) as having the potential for habitat based upon bioclimatic modelling to occur within the Desktop Study Area. A full description of the BC Act and DBCA conservation codes are shown in Appendix 1. The full list of species obtained from the PMST search is shown in Appendix 2.

A search was undertaken of the WAM databases for Crustaceans (WAM 2019a), Arachnids /Myriapods (WAM 2019b) and Molluscs (WAM 2019c). The searches were undertaken within the Desktop Study Area and the results of these were filtered for groups that potentially contain SRE species as shown in Table 5. Definitions for SRE status are found in Table 1.

The Desktop Study Area contains:

- Six Confirmed SRE species (four mygalomorph trapdoor spiders, one land snail, and one native bee),
- Four Likely SRE species (two terrestrial slaters, one tree cricket, and one millipede),
- two Possible SRE species (one springtail, and one midge).

The remainder of the species were found to be widespread.

Within the Project area, three SRE and conservation significant invertebrate species have a High Likelihood of occurrence:

- The land snail *Bothriembryon serpentinus* – Confirmed SRE*,*
- The millipede *Dinocambala ingens* – Likely SRE*,*
- the katydid *Austrosaga spinifer* – Priority 2 (DBCA), Likely SRE.

All other species are considered to have a Moderate to Very Low likelihood of occurrence due to the limited extent and quality of native vegetation remaining within the survey area.

Table 5 SRE Invertebrates in WAM databases and Conservation Significant invertebrates recorded from within the Desktop Study area

Higher Classification	Genus and Species	SRE status	DBCA / BC Act Conservation Status	EPBC Conservation Status	Likely habitat present in survey area	Desktop likelihood of species within the Survey Area
Gastropoda: Pulmonata:						
Bothriembryontidae	*Bothriembryon serpentinus*	Confirmed	-	-	Present	High
Crustacea: Isopoda:						
Armadillidae	*Buddelundia opaca*	Likely	-	-	Not present	Moderate
	Buddelundia cinerascens/inaequalis	Likely	-	-	Not present	Low
Arachnida: Araneae: Mygalomorphae						
Idiopidae	*Bungulla harrisonae*	Confirmed	-	-	Not present	Very Low
	Euoplos inornatus	Confirmed	-	-	Not present	Very Low
	Idiosoma jarrah	Confirmed	-	-	Present	Moderate
	Idiosoma sigillatum	Confirmed	P3	-	Present	Moderate
Diplopoda						
Iulomorphidae	*Dinocambala ingens*	Likely	-	-	Present	High
Hexapoda						
Collembola	*Australotomurus morbidus*	Possible (A)	P3	-	Not present	Low
Insecta						
Orthoptera	*Austrosaga spinifer*	Likely	P2	-	Present	High
Diptera	*Austroconops mcmillani*	Possible (A)	P2	-	Not present	Very Low
Lepidoptera	*Synemon gratiosa*	Widespread	P4	-	Not present	Moderate
Hymenoptera	*Hesperocolletes douglasi*	Widespread	Critically Endangered	Critically Endangered	Not present	Low
	Hylaeus globuliferus	Widespread	P3	-	Present	Moderate
	Leioproctus (Glossurocolletes) bilobatus	Confirmed	P2	-	Not present	Low
	Leioproctus contrarius	Widespread	P3	-	Present	Moderate
	Leioproctus douglasiellus	Widespread	Endangered	Critically Endangered	Not present	Low
	Neopasiphae simplicior	Widespread	Endangered	Critically Endangered	Not present	Very Low

4. Field Survey for SRE and Conservation Significant Invertebrates

The field surveys recorded 321 individual specimens representing 18 taxa of invertebrates from five classes, 11 orders and 15 families that have the potential to contain SRE taxa or be of conservation significance (Appendix 4).

No Confirmed SRE species or conservation significant invertebrates were recorded during the survey. The survey recorded:

- Three Likely SRE species (*Pseudodiploexochus* sp. indet, Armadillidae? sp. indet., and *Styloniscus* sp. indet.)
- Four Possible SRE species (two terrestrial slaters: *Spherillo* sp. 2, *Buddelundia sp.* 4; one pseudoscorpion, Olpiidae sp.; and one centipede *Cryptops* sp.)

These three Likely and four Possible SRE taxa are show in Table 6.

The taxonomy of the Pseudoscorpion family Olpiidae is poorly known and, until further taxonomic resolution has been obtained, all species are considered to be Possible SRE species in Western Australia due to a deficiency in data. Molecular sequencing of Pilbara and other Western Australian specimens is currently being undertaken by the WAM and these data will be used in the future to determine if species are widespread or restricted in distribution. It must be stated, however, there is considerable difference between molecular and morphological data, with generic and species boundaries highly uncertain making meaningful results unlikely, except in the medium to long term. Due to the unreliable existing taxonomic framework olpiid specimens are not identified beyond family level.

The remainder of the species determined to be Possible SRE taxa is due to incomplete taxonomy and unknown species distributions. All the Possible SRE species are known to occur more widely in the region or were recorded at multiple locations or habitats that were laterally continuous during the survey indicating that their distributions are wider than the current survey could determine.

Table 6 SRE and conservation significant invertebrates recorded during the field survey.

Higher Order	Genus and species	Sites recorded	SRE Status
Gastropoda			
Charopidae	*Insullaoma predicta*	MVSRE15	Widespread
Crustacea:			
Amphipoda: Talatridae	*Austrotroides occidentalis?*	MVSRE07	Widespread
Isopoda:			
Armadillidae	*Armadillidae? sp. indet.*	MVSRE10	Likely
	Buddelundia sp. 4	MVSRE05	Possible (A)
	Buddelundia sp. 4? juvenile	MVSRE10, MVSRE11	Possible (A)
	Pseudodiploexochus sp. indet.	MVSRE06	Likely
	Spherillo sp. 2	MVSRE03, MVSRE05, MVSRE06, MVSRE08, MVSRE10	Possible (A)
Armadillidiidae	*Armadillidium vulgare*?	MVSRE06, MVSRE07, MVSRE08, MVSRE15	Widespread
Porcellionidae	*Porcellionides pruinosus*	MVSRE06, MVSRE07, MVSRE10	Widespread
Styloniscidae	*Styloniscus sp. indet.*	MVSRE06	Likely
Amphipoda			
Talatridae	*Austrotroides occidentalis?*	MVSRE07	Widespread
Arachnida:			
Opilione: Triaenonychidae	*Nunciella aspera?*	MVSRE06, MVSRE08	Widespread
Pseudoscorpiones:			
Chthoniidae	*Austrochthonius australis? juvenile*	MVSRE03	Widespread
Olpiidae	Olpiidae *sp.*	MVSRE04	Possible (A)
Chilopoda:			
Geophilomorpha: Mecistocephalidae	*Mescitocephalus collinus*	MVSRE06, MVSRE08	Widespread
Lithobiomorpha: Henicopidae	*Lamyctes emarginatus*	MVSRE07, MVSRE11	Widespread
Scolopendridae: Cryptopidae	*Cryptops sp.*	MVSRE06, MVSRE08	Possible (A)
Diplopoda:			
Julida: Julidae	*Ommatoiulus moreletii*	MVSRE01, MVSRE02, MVSRE03, MVSRE05, MVSRE06, MVSRE07, MVSRE08, MVSRE09, MVSRE10, MVSRE11, MVSRE12, MVSRE13, MVSRE14, MVSRE15, MVSRE16	Widespread
Polydesmida: Paradoxosomatidae	*Akamptogonus novarae*	MVSRE06, MVSRE08	Widespread
	Antichiropus variabilis	MVSRE14	Widespread
Polyxenidae	*Unixenus attemsi*	MVSRE11	Widespread

5. Discussion

5.1 SRE and Conservation Significant Invertebrate Assessment

The SRE field survey recorded seven potential SRE invertebrate species from within the Project area consisting of no Confirmed SRE species, three Likely SRE species and four Possible SRE species (Table 6, Appendix 4). The results of the field survey and desktop assessment are summarised below:

- The desktop assessment identified three SRE and conservation significant invertebrate species have a High Likelihood of occurrence within the Project area:
    - The land snail *Bothriembryon serpentinus* – Confirmed SRE,
    - The millipede *Dinocambala ingens* – Likely SRE,
    - the katydid *Austrosaga spinifer* – Priority 2 (DBCA), Likely SRE.
- None of the species identified during the desktop assessment of SRE and conservation significant invertebrates were recorded during the field survey.
- The field survey recorded three Likely SRE species (*Pseudodiploexochus* sp. indet, Armadillidae? sp. indet., and *Styloniscus* sp. indet.), and four Possible SRE species, however, all Likely and Possible SRE species are known to occur more widely in the region.

All the potential SRE species (three Likely and four Possible) are known to occur more widely in the region or were recorded at multiple locations and/or habitats that were laterally continuous during the survey indicating that their distributions are wider than the current survey could determine and are therefore not subject to significant impacts from the development.

Detailed discussion of all SRE and conservation significant species identified during the desktop assessment and field survey is presented in Sections 5.2 – 5.4.

5.2 Confirmed and Likely SRE species recorded in the Project Area

Crustacea: Isopoda: Armadillidae:

Pseudodiploexochus sp. indet.

This genus contains pale, very small, primitive Armadillidae and the entire genus is considered to be Likely SRE species. *Pseudodiploexochus* are rarely collected on the SCP, predominately due to an absence of collecting effort and use of appropriate techniques (tullgren funnel sampling) and all five specimens collected in this study were recorded using tullgren funnel extraction of leaf litter samples from a single site, MVSRE06, located within the Riparian zone of Crumpet Creek. They are considered to be a Likely SRE species, and an edaphophile (soil dwelling species). The taxonomic framework for this genus is poor and so definitive identification is not possible currently (Judd 2020) and designations may change in the future as more specimens are collected from similar habitats on the Swan Coastal Plain and the higher level taxonomy can be resolved. Impacts to Crumpet Creek should be avoided where possible to minimise potential impacts to this species.

Armadillidae? sp. indet.

A single very small specimens was recorded from leaf litter extraction from a tullgren funnel at site MVSRE10. The specimen has been placed within the Armadillidae, however this designation may change with further taxonomic investigation as the specimen has no eyes, very unusual antennae and distinct scale-setae that are also associated with the edaphophilic genera *Pseudodiploexochus* (Judd 2020). This taxa has not previously been recorded from the SCP, although due to its cryptic nature and extremely small size this is not unexpected, and further targeted collection of isopods using appropriate techniques will certainly record further specimens. The species is a likely SRE species based on the limited taxonomic information currently available.

Family Styloniscidae

Styloniscus sp. indet.

One very small female specimen was collected from leaf litter extracted in a tullgren funnel at Site MVSRE06 within Riparian vegetation on Crumpet Creek. *Styloniscus* are rarely collected on the SCP and the specimen is a morphological form known to contain SRE species that are most commonly associated with wetter forest areas and so the species is considered a Likely SRE species (Judd 2020). The species is, however, known to occur more widely on the SCP with records of the species from the Gnangara region (Invertebrate Solutions 2020).

5.3 Confirmed and Likely SRE species within the Desktop Study Area

5.3.1 Gastropoda (Snails)

Bothriembryon serpentinus – Confirmed SRE

The land snail *Bothriembryon serpentinus* occurs on the Darling Scarp from Perth south to near Dwellingup (refer Figure 3 and Figure 4, WAM 2019c). There are records of the species from adjacent to the survey area, albeit at higher altitudes associated with the Darling Scarp, so although the species has a High probability of occurring within the survey area, there is an absence of habitat within the Project area. This species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

5.3.2 Crustacea: Isopoda (Slaters)

Armadillidae:

Buddelundia opaca – Likely SRE

This species is known principally from rocky areas of the Northern Jarrah Forest Sub Bioregion (Invertebrate Solutions 2019b) Within the Desktop Study Area the species is known from the Darling scarp from Bindoon south to Swan view near Midland and does not appear to recorded further west in the sandier habitats of the Swan Coastal Plain (refer Figure 5 and Figure 6, WAM 2019a, Invertebrate Solutions 2019b). There no records of this species within or immediately adjacent to the survey area. This species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

Buddelundia cinerascens/inaequalis – Likely SRE

The species is known from the Perth area of the Swan Coastal Plain (refer Figure 3 and Figure 4). Two species of *Buddelundia* described by Budde-Lund (*B. cinerascens & B. inaequalis*) from near coastal parts of the Swan Coastal Plain are indistinguishable from both the descriptions (which are incomplete) and from the type material (Budde-Lund 1912, Invertebrate Solutions 2019). It is likely that they are the same species. *Buddelundia cinercascens* exhibits a restricted distribution and much of its natural habitat has been urbanised and as such, combined with the degree of taxonomic uncertainty, the species is a likely SRE species (Invertebrate Solutions 2019).

The species has recently been recorded near Neerabup National Park during late spring 2018 at four locations spread throughout a variety of habitats indicating that the species is locally widespread and relatively abundant (Invertebrate Solutions 2019b). This species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

5.3.3 Arachnida (Mygalomorph Spiders)

Idiosoma jarrah – Confirmed SRE

The trapdoor spider *Idiosoma jarrah* is endemic to the Jarrah Forest bioregion, where it occurs east of the Darling Escarpment, from Bullsbrook south to at least Boddington and Arthur River (refer Figure 3 and Figure 4) (Rix *et al.* 2018). There are no records of the species from within or adjacent to the survey area. *Idiosoma jarrah* has a known range of 3,907 km^2, making the species a short range endemic accordingly to the definition by Harvey (2002), although the known range is likely to be an underestimate due to the paucity of records throughout the south of its range (Rix *et al.* 2018). *Idiosoma jarrah* is known to occur in at least two conservation estates; Walyunga National Park and John Forrest National Park (**Error! Reference source not found.**). This species has a oderate probability of occurring within the Survey area as its distribution is reasonably well known and restricted to the Jarrah forest bioregion. This species was not recorded during the 2019 survey and so no significant impacts are anticipated to occur to this species.

Idiosoma sigillatum – Priority 3/Confirmed SRE

Idiosoma sigillatum is the dominant idiopid trapdoor spider on the Swan Coastal Plain, where it occurs from Dalyellup north to at least Ledge Point (including Rottnest Island and Garden Island) with the eastern limit of its range along the sandy foothills of the Darling Escarpment, from Boyanup north to at least Gingin (refer Figure 3 and Figure 4) (Rix *et al.* 2018). Many of these records are historical in nature and occur within the Perth metropolitan area. It is highly likely that much of the habitat for this species within the Perth metropolitan area has been cleared for urban development and the species is unlikely to occur through much of its historical distribution in urban areas except in remnant habitats (e.g. Kings Park, Bold Park, and Shenton Park bushland) (Rix et al 2018).

Idiosoma sigillatum was assessed as Vulnerable according to IUCN criteria (Rix *et al.* 2017). It has a known range of 7,100 km^2, and an area of occupancy within that range of < 3,000 km^2 (Rix *et al.* 2017). It is considered to be locally extinct throughout most of its range due to extensive land clearing (Rix *et al.* 2018).

Burrows of *Idiosoma sigillatum* usually occur in *Banksia* woodland and heathland on sandy soils (Rix *et al.* 2018), that are not present in the Survey area giving the species a Low likelihood of occurrence. This species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

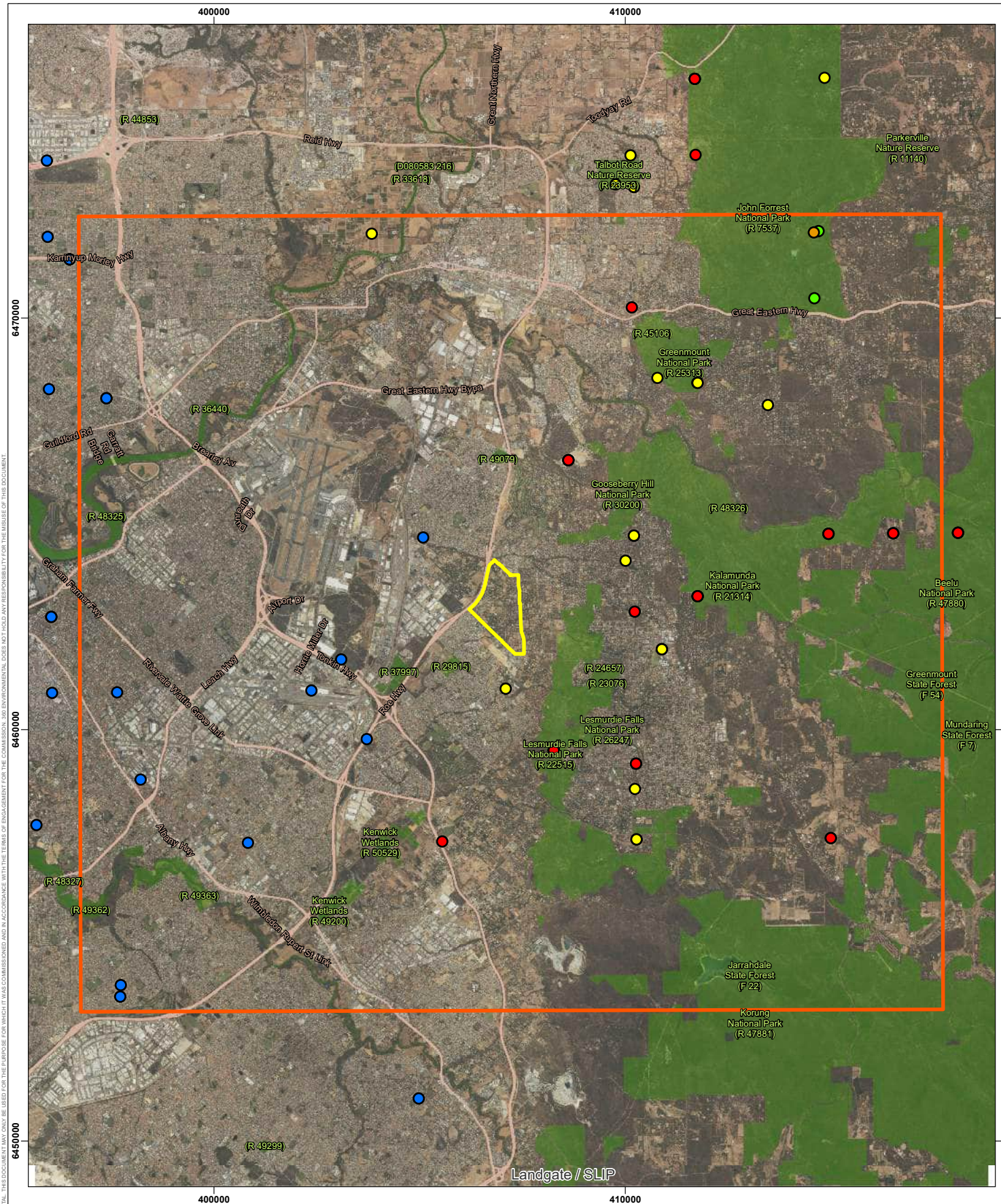
Plate 2 Habitus of *Idiosoma sigillatum* from the Swan Coastal Plain.

Bungulla harrisonae – Confirmed SRE

Bungulla harrisonae is an extremely rare species known only from a single locality within John Forrest National Park, in the northern jarrah forest due east of Perth (Rix et al 2018b). Little is known of the biology of this species (Rix et al 2018). The species has a Very Low probability of occurring within the Survey area. This species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

Euoplos inornatus – Confirmed SRE

The trapdoor spider *Euoplos inornatus* occurs on the eastern edge of the SCP, although most records are from the Darling Scarp and the jarrah forest to the east (refer Figure 3 and Figure 4) and does not occur on the SCP. There are no records of the species from within or adjacent to the survey area and the species has a Very Low probability of occurring within the survey area. This species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.



Legend

- Project Area
- Desktop Study Area
- DBCA Managed Land

Confirmed SRE Species Distribution

- Mygalomorphae: Idiopidae: *Bungulla harrisonae*
- Mygalomorphae: Idiopidae: *Euoplos inornatus*
- Mygalomorphae: Idiopidae: *Idiosoma jarrah*
- Mygalomorphae: Idiopidae: *Idiosoma sigillatum*
- Pulmonata: Bothriembryontidae: *Bothriembryon serpentinus*

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- LOCALITY MAP SOURCED FROM LANDGATE 2017
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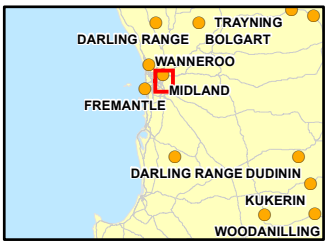
LOCALITY MAP



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Burgess Design Group
Various Lots, Maida Vale

Short Range Endemic Report

Figure 3 Local Distribution of the Confirmed SRE Species

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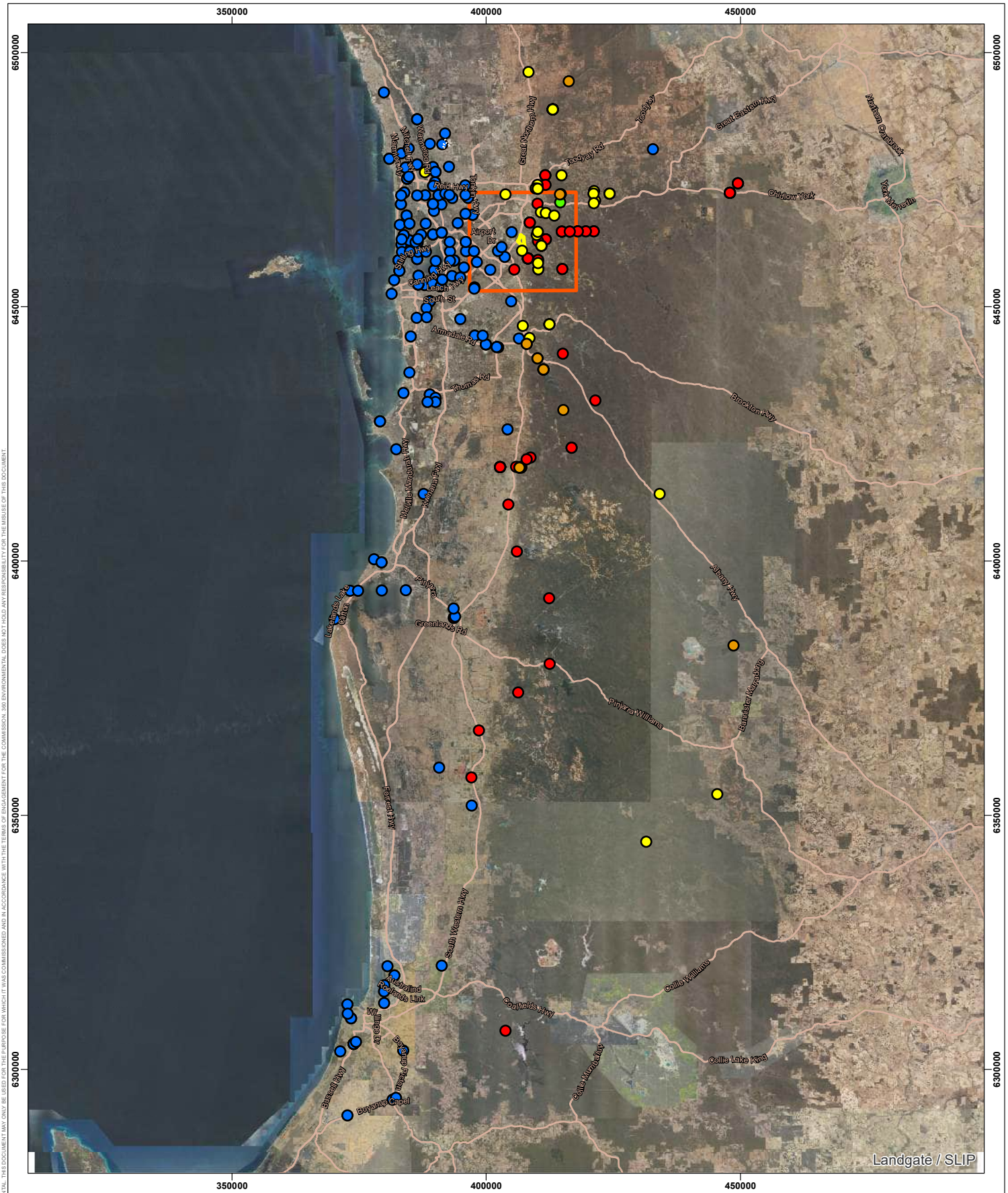

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Project Area

Desktop Study Area

Confirmed SRE Species Distribution

- Mygalomorphae: Idiopidae: *Bungulla harrisonae*
- Mygalomorphae: Idiopidae: *Euoplos inornatus*
- Mygalomorphae: Idiopidae: *Idiosoma jarrah*
- Mygalomorphae: Idiopidae: *Idiosoma sigillatum*
- Pulmonata: Bothriembryontidae: *Bothriembryon serpentinus*

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LOCALITY MAP

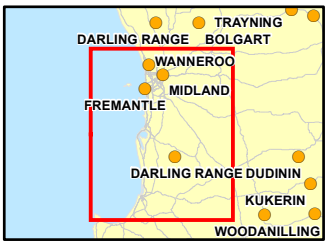

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Figure 4 Regional Distribution of the Confirmed SRE Species

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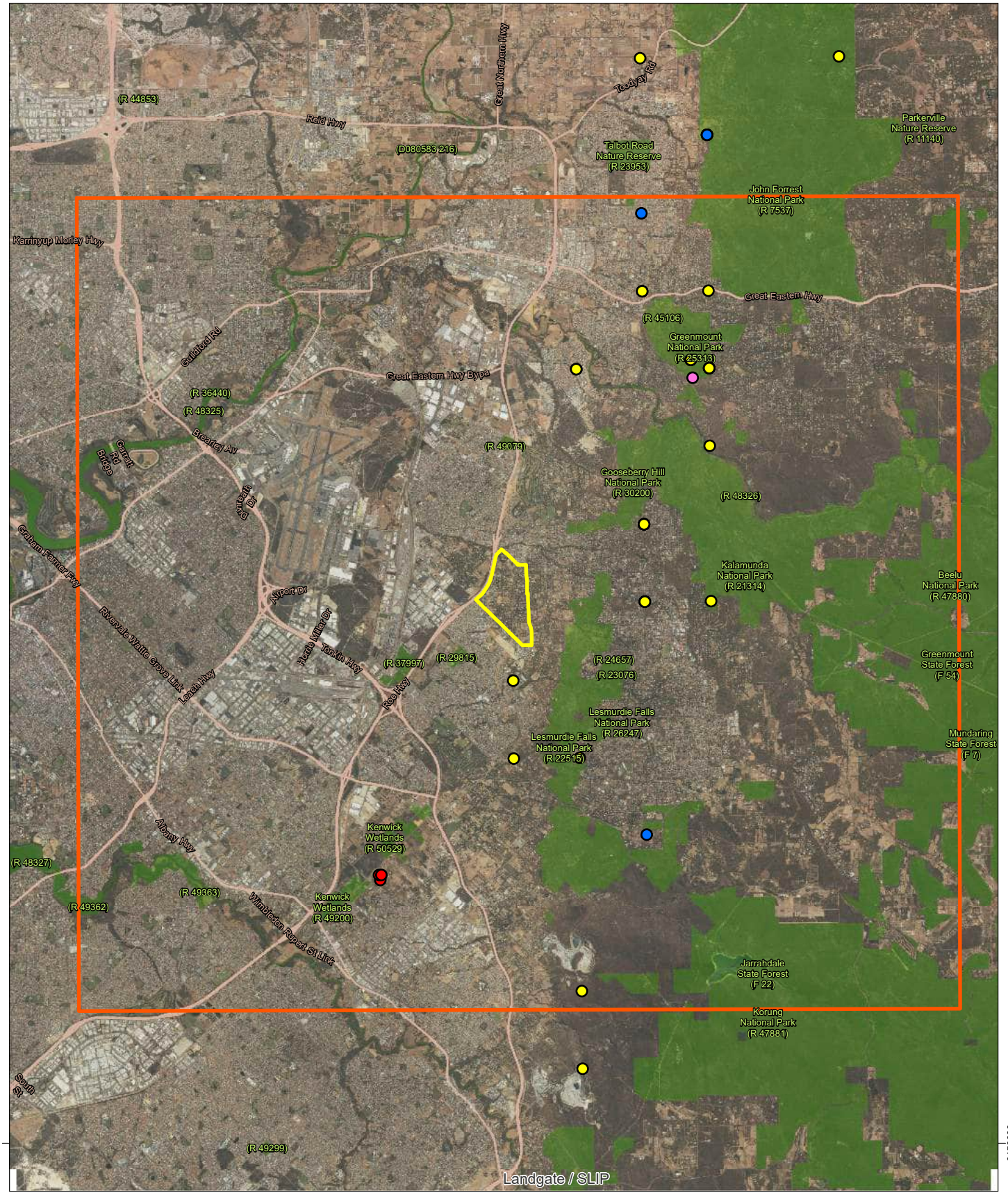

Legend

Zones

- Project Area
- Desktop Study Area
- State Road
- DBCA Managed Land

Likely SRE Species Distribution

- Isopoda: Armadillidae: *Buddelundia cinerascens*
- Isopoda: Armadillidae: *Buddelundia opaca*
- Spirostreptida: Lulomorphidae: *Dinocambala ingens*
- Orthoptera: Tettiogonidae: *Austrosaga spinifer*

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LOCALITY MAP

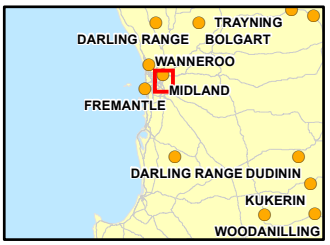

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Figure 5 Local Distribution of Likely SRE Species

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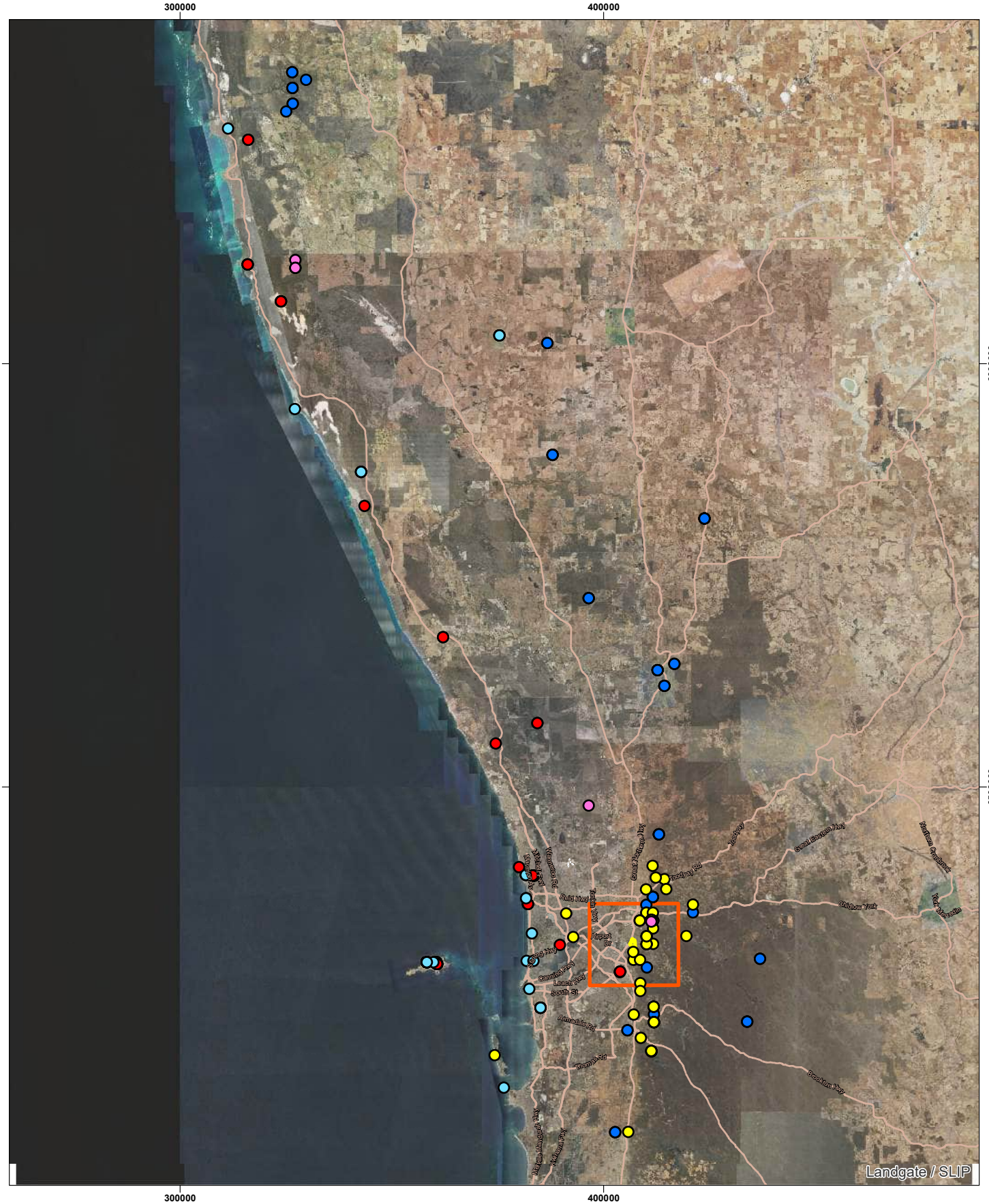

Legend

- Project Area
- Desktop Study Area
- State Road

Likely SRE Species Distribution

- Isopoda: Armadillidae: *Buddelundia cinerascens*
- Isopoda: Armadillidae: *Buddelundia inaequalis*
- Isopoda: Armadillidae: *Buddelundia opaca*
- Spirostreptida: Lulomorphidae: *Dinocambala ingens*
- Orthoptera: Tettiogonidae: *Austrosaga spinifer*

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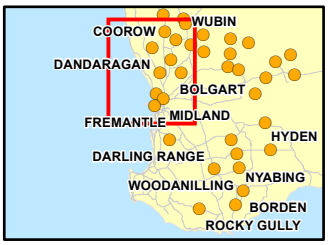

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Figure 6 Regional Distribution of the Likely SRE Species

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5.3.4 Diplopoda: (Millipedes)

Dinocambala ingens – Likely SRE

The millipede *Dinocambala ingens* occurs mainly in the Darling Scarp and adjacent jarrah forests, although its historical distribution does encompass some central Perth suburbs and Garden Island (refer Figure 5 and Figure 6 and WAM 2019b). There are records of the species from near the Maida Vale MRS Amendment Project area both to the north and south. There are numerous records of this species from conservation areas on the Darling Scarp including John Forrest and Walyunga National Parks. The species has a High probability of occurring within the Survey area, however, this species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

5.3.5 Insecta (Insects)

Austrosaga spinifer – Priority 2/Likely SRE

Very few records exist for this spiny tree cricket, but it has been recorded from Boya on the edge of the Perth Scarp approximately 5 km from the survey area and also in bushland near Melaleuca, east of Pinjar (refer Figure 5 and Figure 6). The species is known to hide in shrubs and sing at night (Rent 1993). The absence of other habitat data and the distance of the closet record of this species would suggest that *A. spinifer* has High likelihood of being present within the survey area, however, this species was not recorded during the 2019 survey and so considering the generally degraded nature of the habitat within the Project area, no significant impacts are anticipated to occur to this species.

Leioproctus (Glossurocolletes) bilobatus – Priority 1/Confirmed SRE

The native bee *Leioproctus* (*Glossurocolletes*) *bilobatus*, is associated with Jarrah/Wandoo Forest nominally to the east of the Swan Coastal Plain (Houston 2018), and the species has a distribution from as far east as Christmas Tree Well off Brookton Highway and on the South Coast within the Stirling Ranges (Phoenix 2010). *Leioproctus* (*Glossurocolletes*) *bilobatus* has so far been collected solely from the yellow flowering pea, *Gompholobium aristatum* which does not occur within the survey area (360 Environmental 2016). It is therefore a Low probability that *Leioproctus* (*Glossurocolletes*) *bilobatus* is present within the Project area and therefore no significant impacts are anticipated to occur to this species.

5.4 Distribution of Conservation Significant Invertebrate species within the Survey area

5.4.1 Insecta: Lepidoptera (moths)

Synemon gratiosa – Priority 4

Graceful Sun-moths (GSM) are diurnal, and active on warm bright sunny days in Autumn with low wind. GSM are generally restricted to the SCP but has also been recorded from the Geraldton sandplains and is known from 49 locations (Bishop *et al.* 2010). Extensive survey and genetic work undertaken throughout the SCP between 2010 – 2013 eventually saw their removal from the previous Wildlife Conservation Act Schedule 1 category and the EPBC fauna list, however due to their limited distribution, small populations and rarity in nature the GSM is listed on the DBCA Priority fauna listing (Priority 4).

No habitat for the moth occurs within the Project area (360 Environmental 2016) with the absence of the species' preferred foodplant *Lomandra hermaphrodita* giving the species a Low likelihood of occurrence. It should however, be noted that GSM have a patchy distribution and natural rarity in nature (Bishop et al. 2010), however, given the generally highly degraded nature of the Project area no significant impacts are anticipated to occur to GSM.

5.4.2 Insecta: Hymenoptera (Bees)

Hesperocolletes douglasi – Critically Endangered/Critically Endangered

This enigmatic native bee was previously known only from Rottnest Island where it was presumed extinct until 2015 when an extant specimen was recorded from near Pinjar on the northern SCP during a general insect research project (Houston 2018, WA Government, 2018). Very little is known of this species and floristic associations are still being determined with the currently known list including *Philotheca spicata, Patersonia occidentalis*, two species of *Stylidium*, a species of *Scaevola* and species from Fabaceae and Myrtaceae. The species has a Low probability of being present within the Survey area due to its restricted distribution and the generally highly degraded nature of the Project area and so no significant impacts are anticipated to occur to this species.

Hylaeus globuliferus – Priority 3

This native bee has distribution in Western Australia from north of Eneabba, through the southern Wheatbelt and the SCP, and east along the south coast to the Fitzgerald National Park (ALA 2019). All available records from the SCP are historical in nature and its current status in the Perth metropolitan area is unknown. *Hylaeus globuliferus* is known to be associated with *Adenanthos cygnorum* and *Banksia attenuata* amongst other native plants (Houston 2018). The species has a Moderate probability of being present within the Project area due to the presence of its associated plants, however given the generally highly degraded nature of the Project area no significant impacts are anticipated to occur to *Hylaeus globuliferus*.

Leioproctus contrarius – Priority 3

The native bee species *Leioproctus contrarius* specifically uses the native species *Scaevola sp repens* var. *repens* and *Lechenaultia* spp. (Houston 2000). Both these plants are present within parts of the Project area (360 Environmental 2016) and it is considered to have a Moderate likelihood of occurrence, however given the generally highly degraded nature of the Project area no significant impacts are anticipated to occur to *Leioproctus contrarius.*

Leioproctus douglasiellus – Critically Endangered /Critically Endangered

The native bee species *Leioproctus douglasiellus*, is known from the SCP where it has been recorded from Kenwick wetlands, Cannington and Forrestdale Lake and near Lithgow in the Blue Mountains of NSW (ALA 2019). The bee is associated with *Goodenia filiformis* and *Anthotium junctiforme* (Cardno 2005, Houston 2000, Houston 2018). Due to the absence of both these species within the Project area (360 Environmental 2016) it is considered to have a Low likelihood of occurrence, and given the generally highly degraded nature of the Project area no significant impacts are anticipated to occur to this species.

Neopasiphae simplicior – Critically Endangered /Critically Endangered

This native bee has distribution in Western Australia from north of Geraldton, through the coastal fringe and along the southern coast to Cape Arid National Park (ALA 2019). Most available records from the SCP are historical in nature and its current status in the Perth metropolitan area is unknown. This species along with others in the genus are known to use annual plants such as daisies (Asteraceae and Goodenieceae, Houston 2018). Due to *Neopasiphae simplicior*'s preference for coastal vegetation and the absence of any recent records within the metropolitan SCP it is considered to have a Low likelihood of occurrence and so no significant impacts are anticipated to occur to this species.

6. Conclusions

The likelihood of SRE invertebrate species occurring in the Desktop Study Area was assessed using a combination of regional and local botanical and landform information and database searches. The Desktop Study Area contains:

- Six Confirmed SRE species (four mygalomorph trapdoor spiders, one land snail, and one native bee),
- Four Likely SRE species (two terrestrial slaters, one tree cricket, and one millipede),
- two Possible SRE species (one springtail, and one midge).

The remainder of the species were found to be widespread.

Within the Project area, three SRE and conservation significant invertebrate species have a High Likelihood of occurrence:

- The land snail *Bothriembryon serpentinus* – Confirmed SRE,
- The millipede *Dinocambala ingens* – Likely SRE,
- the katydid *Austrosaga spinifer* – Priority 2 (DBCA), Likely SRE.

All other species are considered to have a Moderate to Very Low likelihood of occurrence due to the limited extent and quality of native vegetation remaining within the survey area.

Invertebrate Solutions completed a single season SRE and conservation significant invertebrate survey within the MRS amendment Project area in October (30^{th} – 31^{st}) 2019. The field survey recorded 321 individual specimens representing 18 taxa of invertebrates from five classes, 11 orders and 15 families that have the potential to contain SRE taxa or be of conservation significance.

No Confirmed SRE species or conservation significant invertebrates were recorded during the survey. The survey recorded:

- Three Likely SRE species (*Pseudodiploexochus* sp. indet, Armadillidae? sp. indet., and *Styloniscus* sp. indet.)
- Four Possible SRE species (two terrestrial slaters: *Spherillo* sp. 2, *Buddelundia* sp. 4; one pseudoscorpion, Olpiidae sp.; and one centipede *Cryptops* sp.)

None of the species identified during the desktop assessment of SRE and conservation significant invertebrates were recorded during the field survey.

The isopods *Pseudodiploexochus* sp. indet. and Armadillidae? sp. indet. are undescribed edaphophilic (soil dwelling) species currently known only from the Project area, although it should be noted that the taxonomic resolution for both these taxa is poor and designations may change with further taxonomic studies in the future. Soil dwelling taxa from numerous invertebrate groups often show an absence of eyes, and this does not in itself indicate the species has limited dispersal capabilities. One of the undescribed edaphophiles, *Pseudodiploexochus* sp. indet. was recorded in riparian vegetation associated with Crumpet Creek and impacts to this habitat should be avoided where possible to minimise potential impacts to this species and other potential SRE species. The single specimen of Armadillidae? sp. indet. was recorded on the eastern extremity of the Project

area in the *Eucalyptus lacking understorey* habitat that occurs throughout the Swan Coastal Plain. The small and cryptic nature of this species may explain why it has not previously been recorded and its distribution is unknown although the habitat where it was recorded is not restricted.

All the other potential SRE species (one Likely and four Possible) are known to occur more widely in the region or were recorded at multiple locations and/or habitats that were laterally continuous during the survey indicating that their distributions are wider than the current survey could determine and are therefore not subject to significant impacts from the development.

The following recommendations are made with regard to the development of the Project:

- Implement appropriate management and mitigation measures to reduce the clearing of riparian vegetation and other potential SRE habitat within the Project area.

7. References

360 Environmental (2016). Flora and fauna report, various lots, Maida Vale. Unpublished report to Burgess Design Group, February 2016, 173p.

Atlas of Living Australia (2019). *Leioproctus douglasiellus*. Accessed December 2019. https://biocache.ala.org.au/occurrences/search?q=lsid:urn:lsid:biodiversity.org.au:afd.taxon:e0eeb6db-72ef-4012-a796-93d71ce4c967#tab_mapView

Bishop C., Williams M., Mitchell D., Williams A., Fissioli J. & Gamblin T. (2010). Conservation of the Graceful Sun-moth: Findings from the 2010 Graceful Sun-moth surveys and habitat assessments across the Swan, South West and southern Midwest Regions. Interim report, Department of Environment and Conservation, Kensington WA.

Budde-Lund, G. (1912). Oniscoidea, nachglassenes fragment. In W. Michaelsen & R. Hartmeyer (Eds.), Die fauna Sudwest-Australiens (Vol. 4, pp. 17-44). Jena: Fischer.

Davis, J. and Christidis, F. (1997). A guide to the wetland invertebrates of southwestern Australia. Urban Water Research Association of Australia, Waters and Rivers Commission. Perth P177.

Department of Agriculture, Water and the Environment (DAWE). (2020). Protected matters search tool. Accessed February 2020. http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

Department of Biodiversity, Conservation and Attractions (DBCA). (2022). Threatened and Priority Faun list October 2022. Accessed 13th June 2023 from: https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals

EPA (2016). Technical guidance. Sampling of short range endemic invertebrate fauna. Environmental Protection Authority: Perth. 35 pp.

Framenau, V.W., Moir, M.L. & Harvey, M.S. (2008) Terrestrial Invertebrates of the south coast NRM region of Western Australia: short-range endemics in Gondwanan relictual habitats. Unpublished Report to the Southcoast Natural Resource Management Inc.

Harvey, M.S. (2002). Short-range endemism in the Australian fauna: some examples from non-marine environments. Invertebrate Systematics. 16: 555–570.

Houston, T.F. (2000). Native bees on wildflowers in Western Australia. Special publication No.2 of the Western Australian Insect Study Society Inc., 235p.

Houston, T.F. (2018). A guide to native bees of Australia. CSIRO Publishing, Clayton South Victoria, 272p.

Invertebrate Solutions. (2018). Short Range Endemic invertebrate desktop assessment for Lot 102 Farrall Rd, Midvale, Western Australia. Unpublished report to Emerge Associates on behalf of Peet Stratton Pty Ltd, March 2019. 53p.

Invertebrate Solutions (2019a). Desktop review and risk assessment of short range endemic invertebrates for the Morley-Ellenbrook Rail Project, Part 1, Western Australia. Unpublished report to Public Transport Authority, August 2019, 75p.

Invertebrate Solutions (2019b). Short Range Endemic invertebrate assessment for the Mitchell Freeway Extension and Wanneroo Road Duplication, Western Australia. Unpublished report to GHD Pty Ltd on behalf of Main Roads Western Australia, May 2019.

Invertebrate Solutions (2020). Baseline Short Range Endemic and Conservation Significant Invertebrate Survey for the Malaga to Ellenbrook Rail Works, Western Australia. Unpublished report to Public Transport Authority, April 2020. Unpublished report to Public Transport Authority, April 2020, 114p.

Judd, S. (2020). Isopods from the Maida Vale MRS Amendment Works. Unpublished report to Invertebrate Solutions April 2020, 2p.

Phoenix Environmental Sciences. (2010). Short-range Endemic and Targeted Invertebrate Baseline Surveys for the Roe Highway Extension Project. Unpublished report prepared for South Metro Connect, Perth, WA.

Raven, R.J. (1994). Mygalomorph spiders of the Barychelidae in Australia and the Western Pacific. Memoirs of the Queensland Museum 35(2):291-706

Rentz, D.C.F.(1993). Tettigoniidae of Australia 2. The Austrosaginae, Zaprochilinae and Phasmodinae. Australia : CSIRO Vol. 2 386 pp.

Rix, M.G., Huey J.A., Cooper S.J.B., Austin A.D., Harvey M.S. (2018) Conservation systematics of the shield-backed trapdoor spiders of the nigrum-group (Mygalomorphae, Idiopidae, *Idiosoma*): integrative taxonomy reveals a diverse and threatened fauna from south-western Australia. ZooKeys 756: 1–121. https://doi.org/10.3897/zookeys.756.24397

Rix, M.G., Huey J.A., Main B.Y., Waldock J.M., Harrison S.E., Comer S., Austin A.D., Harvey M.S. (2017) Where have all the spiders gone? The decline of a poorly known invertebrate fauna in the agricultural and arid zones of southern Australia. Austral Entomology 56: 14–22. https://doi.org/10.1111/aen.12258

Stanisic, J., Shea, M., Potter, D. and Griffiths, O. (2017). Australian Land Snails. Volume 2. A field guide to southern, central and western species. Bioculture Press, Mauritius. 594p.

Western Australian Government (2018). Presumed extinct native species rediscovered. Media statement by Hon Stephen Dawson MLC Minister for Environment; Disability Services, 13th September 2018. Accessed 10th August 2019. https://www.mediastatements.wa.gov.au/Pages/McGowan/2018/09/Presumed-extinct-native-species-rediscovered.aspx

Western Australian Museum (WAM). (2019a). Crustacean database search, November 2019.

Western Australian Museum (WAM). (2019b). Arachnida and Myriapoda database search, November 2019.

Western Australian Museum (WAM). (2019c). Mollusc database search, November 2019.

Appendix 1

Department of Biodiversity, Conservation and Attractions Conservation Codes

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016.*

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1] The definition of flora includes algae, fungi and lichens
[2]Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix 2

Protected Matters Search Tool results

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 06/04/20 11:26:57

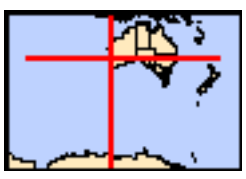
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 20.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	77
Listed Migratory Species:	48

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	8
Commonwealth Heritage Places:	4
Listed Marine Species:	57
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	37
Regional Forest Agreements:	1
Invasive Species:	46
Nationally Important Wetlands:	5
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Historic		
Goldfields Water Supply Scheme, Western Australia	WA	Listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Forrestdale and thomsons lakes	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area
Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	Endangered	Community known to occur within area
Shrublands and Woodlands of the eastern Swan Coastal Plain	Endangered	Community known to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area

Name	Status	Type of Presence
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche cauta cauta Shy Albatross [82345]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Insects		
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Leioproctus douglasiellus a short-tongued bee [66756]	Critically Endangered	Species or species habitat known to occur within area
Neopasiphae simplicior A native bee [66821]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia anomala Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat known to occur within area
Acacia aphylla Leafless Rock Wattle [13553]	Vulnerable	Species or species habitat known to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat known to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Austrostipa bronwenae [87808]	Endangered	Species or species habitat known to occur within area
Austrostipa jacobsiana [87809]	Critically Endangered	Species or species habitat known to occur within area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat known to occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [88881]	Endangered	Species or species habitat may occur within area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area
Darwinia apiculata Scarp Darwinia [8763]	Endangered	Species or species habitat known to occur within area
Diplolaena andrewsii [6601]	Endangered	Species or species habitat known to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat known to occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat likely to occur within area
Goodenia arthrotricha [12448]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat likely to occur within area
Grevillea curviloba subsp. curviloba Curved-leaf Grevillea [64908]	Endangered	Species or species habitat likely to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area
Grevillea flexuosa Zig Zag Grevillea [2957]	Vulnerable	Species or species habitat likely to occur within area
Grevillea thelemanniana Spider Net Grevillea [32835]	Critically Endangered	Species or species habitat known to occur within area
Lasiopetalum pterocarpum Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Ptilotus pyramidatus Pyramid Mulla-mulla [18216]	Critically Endangered	Species or species habitat known to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat known to occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area
Trithuria occidentalis Swan Hydatella [42224]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Listed Migratory Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Migratory Marine Species		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Numenius minutus		
Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus		
Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus		
Osprey [952]		Breeding known to occur within area
Phalaropus lobatus		
Red-necked Phalarope [838]		Roosting known to occur within area
Pluvialis fulva		
Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola		
Grey Plover [865]		Roosting known to occur within area
Tringa brevipes		
Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus		
Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - AIRTC CANNINGTON
Defence - BUSHMEAD RIFLE RANGE
Defence - BUSHMEAD TRAINING AREA
Defence - HOLDFAST BARRACKS
Defence - PALMER BARRACKS - SOUTH GUILDFORD
Defence - RAAF CAVERSHAM
Defence - SWAN BARRACKS

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Inglewood Post Office	WA	Listed place
Perth General Post Office	WA	Listed place
South Perth Post Office	WA	Listed place
Victoria Park Post Office	WA	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Mammals		
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Balannup Lake	WA
Beelu	WA
Canning River	WA
Dundas Road	WA
Gooseberry Hill	WA
Greenmount	WA
Helena River	WA
John Forrest	WA
Kalamunda	WA
Kenwick Wetlands	WA

Name	State
Kings Park	WA
Korung	WA
Lesmurdie Falls	WA
Midgegooroo	WA
Milyu	WA
NTWA Bushland covenant (0074)	WA
NTWA Bushland covenant (0157)	WA
Parkerville	WA
Perth Zoo	WA
Stinton Cascades	WA
Swan River	WA
Talbot Road	WA
Unnamed WA1919/893	WA
Unnamed WA21569	WA
Unnamed WA23076	WA
Unnamed WA24657	WA
Unnamed WA29815	WA
Unnamed WA33618	WA
Unnamed WA36440	WA
Unnamed WA37997	WA
Unnamed WA44853	WA
Unnamed WA45106	WA
Unnamed WA49079	WA
Unnamed WA49299	WA
Unnamed WA49362	WA
Unnamed WA49363	WA
Unnamed WA50069	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands

[Resource Information]

Name	State
Brixton Street Swamps	WA
Gibbs Road Swamp System	WA
Perth Airport Woodland Swamps	WA
RAAF Caversham	WA
Swan-Canning Estuary	WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.9666 116.01315

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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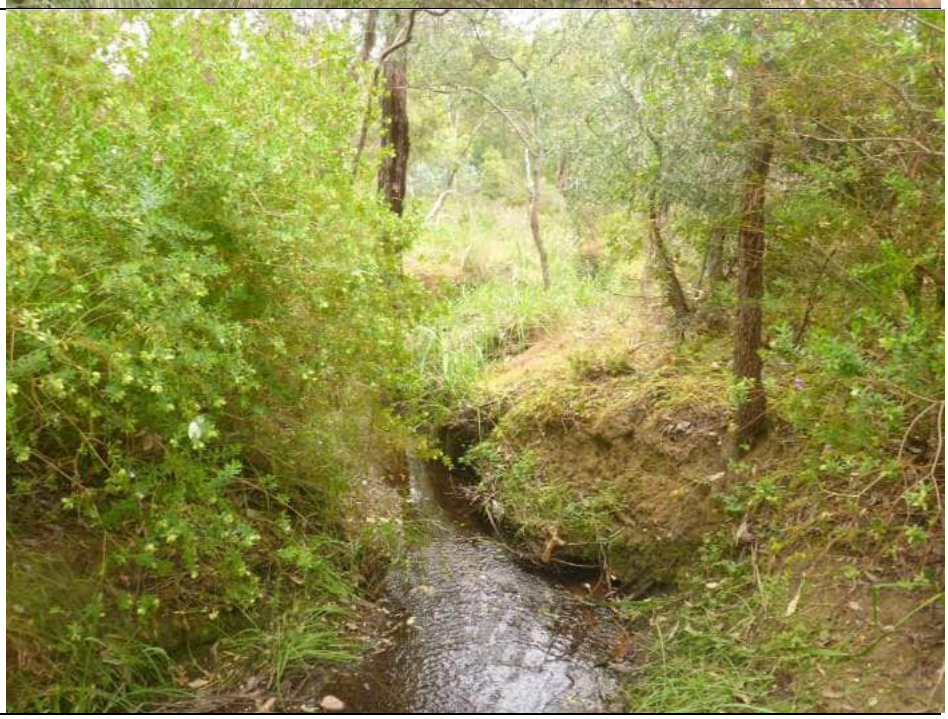
Appendix 3

SRE Site locations and habitats

MVSRE01 50 J 406803 6462364 Eucalyptus remnant with understorey	
MVSRE02 50 J 406872 6462370 Riparian vegetation (Crumpet Creek)	

MVSRE03 50 J 406943 6462441 Riparian vegetation (Crumpet Creek)	
MVSRE04 50 J 407043 6462464 Riparian vegetation (Crumpet Creek)	

MVSRE05 50 J 406791 6462755 Eucalyptus remnant with understorey	
MVSRE06 50 J 407446 6462720 Riparian vegetation (Crumpet Creek)	

MVSRE07 50 J 406460 6463224 Completely degraded	
MVSRE08 50 J 407375 6462680 Riparian vegetation (Crumpet Creek)	

MVSRE09 50 J 407174 6462570 Riparian vegetation (Crumpet Creek)	
MVSRE10 50 J 407435 6463110 Marri Woodland	

MVSRE11 50 J 400702 6475672 Eucalyptus remnant with understorey	
MVSRE12 50 J 406921 6463429 Eucalyptus remnant no understorey	

MVSRE13 50 J 407067 6462994 Eucalyptus remnant with understorey	
MVSRE14 50 J 406674 6462605 Eucalyptus remnant with understorey	

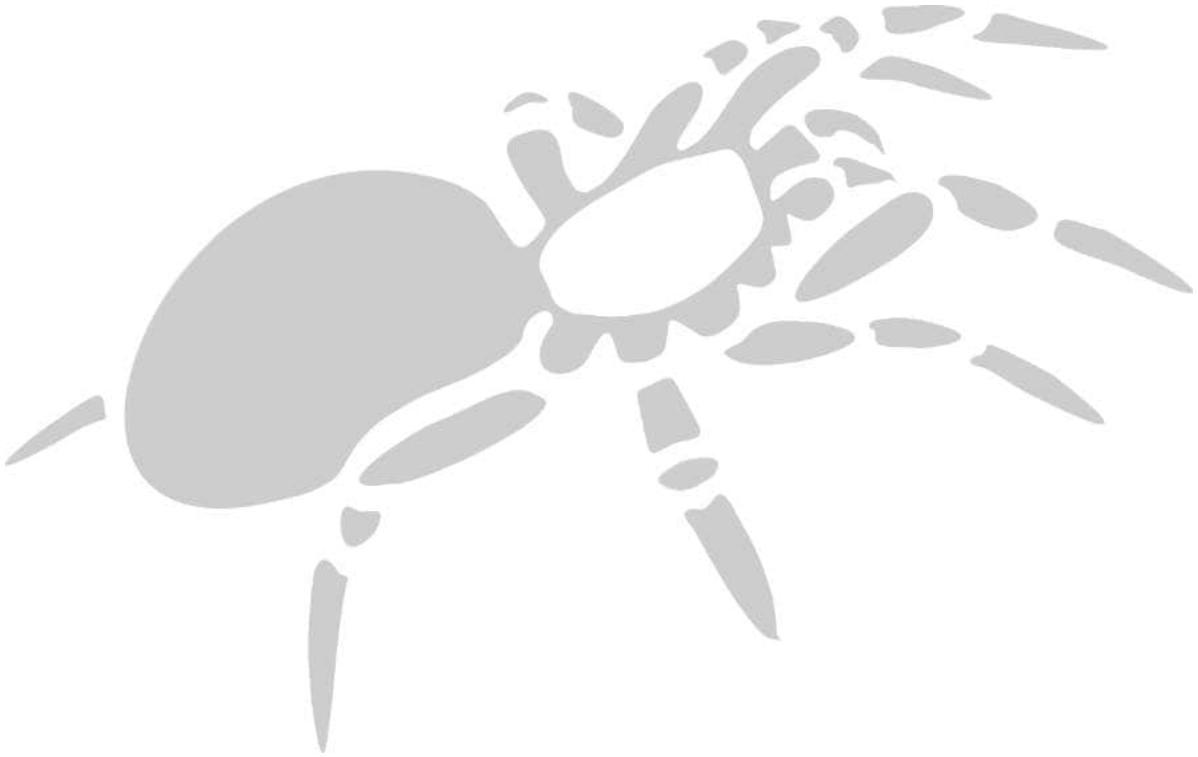
MVSRE15 50 J 407435 6463378 Eucalyptus remnant no understorey	
MVSRE16 50 J 407418 6463649 Eucalyptus remnant no understorey	

Appendix 4

Specimen abundance and tracking codes

Phylum/ Subphylum	Class	Order	Family	Genus and sp	SRE Status	Abundance	Site	Date	Collection Method	Tracking number	Identified by
Mollusca	Gastropoda	Systellomatomorpha	Charopidae	*Insullaoma predicta*	Widespread	1	MVSRE15	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1806	Tim Moulds
Crustacea	Malacostraca	Isopoda	Armadillidae	*Armadillidae? sp. indet*	Likely	1	MVSRE10	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1403	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Buddelundia 4*	Possible A	3	MVSRE05	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1435	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Buddelundia 4? Juv.*	Possible A	1	MVSRE11	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1802	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Buddelundia 4? Juv.*	Possible A	1	MVSRE10	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1403C	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Pseudodiploexochus sp. indet.*	Likely	5	MVSRE06	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1406D	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Spherillo sp. 2*	Possible A	1	MVSRE03	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1803	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Spherillo sp. 2*	Possible A	3	MVSRE05	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1435B	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Spherillo sp. 2*	Possible A	1	MVSRE06	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1406B	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Spherillo sp. 2*	Possible A	4	MVSRE08	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1799	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Spherillo sp. 2*	Possible A	1	MVSRE08	30/10/2019	Active searching and leaf litter sifting	ISTN1807	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidae	*Spherillo sp. 2*	Possible A	1	MVSRE10	30/10/2019	Active searching and leaf litter sifting	ISTN1815	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare?*	Widespread	4	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1811	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare?*	Widespread	8	MVSRE07	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1795	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare?*	Widespread	6	MVSRE07	30/10/2019	Active searching and leaf litter sifting	ISTN1818	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare?*	Widespread	1	MVSRE08	30/10/2019	Active searching and leaf litter sifting	ISTN1807B	Simon Judd
Crustacea	Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare?*	Widespread	1	MVSRE15	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1805	Simon Judd
Crustacea	Malacostraca	Isopoda	Porcellionidae	*Porcellionides pruinosus*	Widespread	1	MVSRE06	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1791	Simon Judd
Crustacea	Malacostraca	Isopoda	Porcellionidae	*Porcellionides pruinosus*	Widespread	2	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1821	Simon Judd
Crustacea	Malacostraca	Isopoda	Porcellionidae	*Porcellionides pruinosus*	Widespread	1	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1812	Simon Judd
Crustacea	Malacostraca	Isopoda	Porcellionidae	*Porcellionides pruinosus*	Widespread	11	MVSRE07	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1794	Simon Judd
Crustacea	Malacostraca	Isopoda	Porcellionidae	*Porcellionides pruinosus*	Widespread	1	MVSRE10	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1403B	Simon Judd
Crustacea	Malacostraca	Isopoda	Styloniscidae	*Styloniscus sp. indet.*	Likely	1	MVSRE06	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1406	Simon Judd
Crustacea	Malacostraca	Amphipoda	Talitridae	*Austrotroides occidentalis?*	Widespread	28	MVSRE07	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1796	T Moulds
Crustacea	Malacostraca	Amphipoda	Talitridae	*Austrotroides occidentalis?*	Widespread	4	MVSRE07	30/10/2019	Active searching and leaf litter sifting	ISTN1817	T Moulds
Chelicerata	Arachnida	Opilione	Triaenonychidae	*Nunciella aspera?*	Widespread	4	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1813	T Moulds
Chelicerata	Arachnida	Opilione	Triaenonychidae	*Nunciella aspera?*	Widespread	1	MVSRE08	30/10/2019	Active searching and leaf litter sifting	ISTN1809	T Moulds
Chelicerata	Arachnida	Pseudoscorpionida	Chthoniidae	*Austrochthonius australis? (juv.)*	Widespread	1	MVSRE03	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1804	T Moulds
Chelicerata	Arachnida	Pseudoscorpionida	Olpiidae	*in det.*	Possible A	1	MVSRE04	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1410	T Moulds
Myriapoda	Chilopoda	Geophilomorpha	Mecistocephalidae	*Mecistocephalus collinus*	Widespread	1	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1822	T Moulds
Myriapoda	Chilopoda	Geophilomorpha	Mecistocephalidae	*Mecistocephalus collinus*	Widespread	1	MVSRE08	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1797	T Moulds
Myriapoda	Chilopoda	Geophilomorpha	Mecistocephalidae	*Mecistocephalus collinus*	Widespread	3	MVSRE08	30/10/2019	Active searching and leaf litter sifting	ISTN1808	T Moulds
Myriapoda	Chilopoda	Lithobiomorpha	Henicopidae	*Lamyctes emarginatus*	Widespread	5	MVSRE07	30/10/2019	Active searching and leaf litter sifting	ISTN1816	T Moulds
Myriapoda	Chilopoda	Lithobiomorpha	Henicopidae	*Lamyctes emarginatus*	Widespread	1	MVSRE11	31/10/2019	Active searching and leaf litter sifting	ISTN1810	T Moulds
Myriapoda	Chilopoda	Lithobiomorpha?		*juvenile*	Widespread	2	MVSRE12	31/10/2019	Active searching and leaf litter sifting	ISTN1824	T Moulds
Myriapoda	Chilopoda	Lithobiomorpha?		*juvenile*	Widespread	1	MVSRE16	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1800	T Moulds
Myriapoda	Chilopoda	Scolopendromorpha	Cryptopidae	*Cryptops sp.*	Possible A	2	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1823	T Moulds
Myriapoda	Chilopoda	Scolopendromorpha	Cryptopidae	*Cryptops sp.*	Possible A	3	MVSRE10	30/10/2019	Active searching and leaf litter sifting	ISTN1814	T Moulds

Phylum/ Subphylum	Class	Order	Family	Genus and sp	SRE Status	Abundance	Site	Date	Collection Method	Tracking number	Identified by
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	1	MVSRE01	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1407	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	3	MVSRE01	30/10/2019	Active searching and leaf litter sifting	ISTN1416	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	1	MVSRE02	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1411	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	2	MVSRE02	30/10/2019	Active searching and leaf litter sifting	ISTN1415	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	3	MVSRE03	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1409	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	5	MVSRE03	30/10/2019	Active searching and leaf litter sifting	ISTN1414	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	7	MVSRE05	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1793	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	9	MVSRE06	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1792	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	6	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1427	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	4	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1418	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	8	MVSRE07	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1405	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	3	MVSRE07	30/10/2019	Active searching and leaf litter sifting	ISTN1420	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	32	MVSRE08	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1404	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	5	MVSRE08	30/10/2019	Active searching and leaf litter sifting	ISTN1419	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	3	MVSRE08	30/10/2019	Active searching and leaf litter sifting	ISTN1428	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	11	MVSRE09	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1408	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	3	MVSRE09	30/10/2019	Active searching and leaf litter sifting	ISTN1417	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	6	MVSRE10	30/10/2019	Active searching and leaf litter sifting	ISTN1422	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	2	MVSRE11	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1434	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	2	MVSRE11	31/10/2019	Active searching and leaf litter sifting	ISTN1426	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	15	MVSRE12	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1432	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	5	MVSRE12	31/10/2019	Active searching and leaf litter sifting	ISTN1429	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	8	MVSRE13	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1402	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	2	MVSRE13	30/10/2019	Active searching and leaf litter sifting	ISTN1421	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	4	MVSRE14	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1430	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	3	MVSRE14	31/10/2019	Active searching and leaf litter sifting	ISTN1425	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	10	MVSRE15	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1433	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	10	MVSRE15	31/10/2019	Active searching and leaf litter sifting	ISTN1423	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	12	MVSRE16	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1431	T Moulds
Myriapoda	Diplopoda	Julida	Julidae	*Ommatoiulus moreletii*	Widespread	8	MVSRE16	31/10/2019	Active searching and leaf litter sifting	ISTN1424	T Moulds
Myriapoda	Diplopoda	Polydesmida	Paradoxosomatidae	*Akamptogonus novarae*	Widespread	4	MVSRE06	30/10/2019	Active searching and leaf litter sifting	ISTN1820	T Moulds
Myriapoda	Diplopoda	Polydesmida	Paradoxosomatidae	*Akamptogonus novarae*	Widespread	1	MVSRE08	30/10/2019	Tullgren funnel extraction from leaf litter	ISTN1798	T Moulds
Myriapoda	Diplopoda	Polydesmida	Paradoxosomatidae	*Antichiropus variabilis*	Widespread	1	MVSRE14	31/10/2019	Active searching and leaf litter sifting	ISTN1819	T Moulds
Myriapoda	Diplopoda	Polyxenida	Polyxenidae	*Unixenus attemsi*	Widespread	4	MVSRE11	31/10/2019	Tullgren funnel extraction from leaf litter	ISTN1801	T Moulds



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Appendix D
360 Environmental
Foreshore Assessment Report 2023

360 environmental | Part of SLR

MRS Amendment 1344/57 Maida Vale

Foreshore Assessment Report

Prepared for

M Group

June 2023

people • planet • professional

Document Reference	Revision	Prepared by	Reviewed by	Admin Review	Submitted to Client	
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Appendix B Flora Inventory
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1 Introduction

360 Environmental was commissioned by M Group to prepare a Foreshore Area Report (FAR) for the Crumpet Creek Catchment, located in the proposed Maida Vale Urban Precinct (Amendment Area) (Figure 1). This FAR is to support the proposed Metropolitan Region Scheme (MRS) amendment (MRS 1344/57) and inform M Group of a suitable Foreshore Area.

The Amendment Area was referred to the Western Australian Planning Commission (WAPC) on the 5 September 2018 for an amendment to the Metropolitan Region Scheme (MRS) to rezone the site from Rural to Urban Deferred. Under the proposed amendment, 178 ha of land will be rezoned to Urban Deferred to allow for future urban residential development.

The Environmental Protection Authority (EPA) determined that the proposed MRS Amendment is to be assessed under Division 3 of Part IV of the EP Act. The EPA issued Instructions for Environmental Review and the specific instruction which applies to this report is as follows:

15. Prepare a foreshore area report to determine the extent of the waterway foreshore areas to be protected, in accordance with Operational Policy 4.3: Identifying and establishing waterways foreshore areas (DoW, 2012).

Crumpet Creek runs through the southern sector of the Amendment Area and is the only significant waterway in the Amendment Area. The site has been extensively cleared, with most of the area comprising of rural development and highly fragmented areas of native vegetation (360 Environmental, 2016).

This report includes an assessment of the riparian characteristics of Crumpet Creek to determine a suitable Foreshore Area. It also includes an assessment of the site, and foreshore's biophysical features.

This report has excluded Poison Gully, which is located outside of the Amendment Area, immediately north of Amendment Area. The main reason for exclusion of Poison Gully from this assessment is primarily due to the proximity of the waterway (including foreshore buffers) to the Amendment Area.

Consideration of the Poison Gully catchment has been addressed in the District Water Management Strategy (DWMS) (360 Environmental 2021) which identifies that the Amendment Area will have limited impact to this waterway with respect to flooding or degradation to this waterway. However, the DWMS acknowledges that due to the lack of data available from Water Corporation and/or the Department of Water and Environmental Regulation (DWER), it is recommended that further investigations and/or modelling of Poison Gully may be necessary at the Local Water Management Strategy (LWMS) stage to address any localized impacts on the functionality and integrity of Poison Gully with respect to proposed amendment.

1.1 Purpose of the Report

The purpose of this report is to undertake a Foreshore Area assessment of the Crumpet Creek Catchment to determine a suitable Foreshore Area.

The Foreshore Area has been defined in accordance with the results of the biophysical assessment and the (then) Department of Water (DoW)'s Operational Policy 4.3: Identifying and Establishing Waterways Foreshore Areas (Department of Water, 2012) and Determining foreshore reserves (Waters and Rivers Commission, 2001).

The Foreshore Area has also been defined in accordance with the Local Open Space zone as defined by the City of Kalamunda Local Planning Scheme No. 3 (refer to Appendix A).

This report addresses the requirement for a Foreshore Area Report as specified in the EPA Instructions for Environmental Review (item no. 15).

2 Biophysical Factors

2.1 Topography

The Amendment Area (approximately 178 ha) generally slopes east to west. The highest elevation of the site is 64 meters Above Height Datum (mAHD) in the south east corner and the lowest elevation is 42 mAHD in the mid-west boundary.

2.2 Soils

Soil Landscape and Land System mapping has identified that Crumpet Creek is within the undulating plain of the Pinjarra System (Department of Primary Industries and Regional Development, 2018b).

Soil subsystem mapping has identified Crumpet Creek to be within the following soil subsystem:

- 213PJ_Gf5 - Incised drainage channels with poorly drained gradational mottled yellow earths. Shrubland of Melaleucas and other low shrubs.

2.3 Hydrology

2.3.1 Surface Hydrology

The Amendment Area is located within two sub-catchments of the Swan River: Perth Airport South and Perth Airport North. Crumpet Creek flows within Perth Airport South.

The regional mapping of the waterways/drainage lines, as shown in Figure 2 were included in a flood model of Crumpet Creek which was recently undertaken as part of the DWMS (360 Environmental, 2021) prepared to support the MRS amendment and comply with the Inland Water directives from the EPA environmental review instructions.

Figure 3 illustrates the maximum flood depths within the site in the 1% AEP event. On the Crumpet Creek true left bank, the maximum modelled flood depth is approximately 350 mm just downstream of Hawtin Road. Downstream of the Brewer Road, the maximum flood depth is approximately 250 mm, on the Crumpet Creek's true right bank. In most locations within the floodplain, the flood depths do not exceed 100 – 150 mm.

2.3.2 Wetlands

Wetlands of the Swan Coastal Plain have been described and mapped by Hill et al. (1996) and assigned a management category which reflects their condition and environmental value. There are three categories that wetlands are assigned, 'Conservation Category' (CCW), 'Resource Enhancement' (REW) and 'Multiple Use' (MUW) depending on their condition and environmental values. CCWs are those with the highest level of ecological attributes and functions, followed by REWs then MUWs.

Review of available mapping indicates Crumpet Creek is not a part of any Wetland nor do any wetlands occur within the Amendment Area (Figure 2).

2.4 Groundwater Hydrology

The site is underlain by geological formations grouped into three distinct aquifers DWER, 2021). In descending order from the natural surface these are:

- Perth - Superficial Swan;
- Perth - Leederville; and
- Perth - Yarragadee North.

For the majority of the site the Bassendean Sands (dunes) of the Perth Basin forms an unconfined aquifer beneath providing fresh water supplies. For a large portion of the site, the Bassendean Sand overlies the low permeability clayey deposits of the Guildford Formation. Recharge to the aquifer system is by direct infiltration of rainfall.

Crumpet Creek is not within a Public Drinking Water Source Area (PDWSA) or Proclaimed Surface Water Areas (Department of Water and Environmental Regulation, 2021).

There is no groundwater contour data available within the Amendment Area (Department of Water and Environmental Regulation, 2021). Through extrapolation based on the data from DWER, it is estimated that the minimum ground water levels in the site to be between 17 mAHD and 18 mAHD. The maximum groundwater levels (MGL) are estimated to range between 20 to 22 mAHD. This equates to between 27 and 45 metres below ground level. Groundwater monitoring is not proposed across the site, nor are there any active DWER monitoring boreholes. Groundwater is flowing in a westerly direction.

2.5 Flora and Vegetation

2.5.1 Desktop

Database searches were undertaken to identify potential conservation significant flora taxa and ecological communities within or surrounding Crumpet Creek. Full database search results are provided in Appendix B and database search particulars are outlined Table 1. The search area for each parameter was around a central co-ordinate of - 31.964764335769548, 116.01593397267733, with the buffer varied to reflect distances recommended by DBCA. In addition, a Protected Matters Search (PMST) was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within or surrounding the Survey Area.

Table 1: Database Searches

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Ecological Communities database search (Department of Biodiversity Conservation and Attractions, 2022c)	26 July 2022	Listed TECs and PECs	20 km buffer around the Survey Area
DBCA Threatened and Priority Flora List (Department of Biodiversity Conservation and Attractions, 2022e)	26 July 2022	Threatened and Priority Flora	10 km search buffer of the Survey Areas
Western Australia Herbarium flora (Western Australian Herbarium, 2022)	26 July 2022		10 km search buffer of the Survey Areas
NatureMap (Department of Biodiversity Conservation and Attractions, 2022b)	15 August 2022	Threatened Priority Flora inventory of potential flora	20 km search buffer of the Survey Areas
Protected Matters Search Tool (Department of Agriculture Water and the Environment, 2022a)	30 August 2022	Commonwealth listed Threatened flora and TECs	40 km buffer around central co-ordinate

The updated database searches identified 145 conservation significant taxa, comprising Threatened flora pursuant to the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the WA *Biodiversity Conservation Act 2016* (BC Act), or Department of Biodiversity, Conservation and Attractions (DBCA) listed Priority flora species. Of these 96 were identified by DBCA databases as occurring within 10 km of the Survey Area (Figure 2; Appendix A). The likelihood of occurrence assessment (see Appendix B) provides information on the known flowering periods and preferred habitat of each taxon identified. Prior to the survey and investigation of the existing habitat available:

- Three taxa, *Conospermum undulatum* (T), *Isopogon autumnalis* (P3), and *Banksia pteridifolia* subsp. *vernalis* (P3), had been previously recorded in the Survey Area and were considered to have a high likelihood of occurrence in the Survey Area
- 30 were considered to have a high likelihood of occurrence
- 61 were considered to have a medium likelihood of occurrence
- 49 had a low likelihood of occurrence.

Following the survey, the likelihood of occurrence of each of these taxa was reassessed based on the availability of suitable habitat observed in the Survey Area:

- Two taxa were recorded, *Conospermum undulatum* (T) and *Isopogon autumnalis* (P3), were recorded
- Two, *Banksia pteridifolia* subsp. *vernalis* (P3) and *Haemodorum loratum* (P3) were considered to have a high likelihood of occurrence
- Three, *Banksia mimica* (T), *Macarthuria keigheryi* (T) and *Morelotia australiensis* (T), were considered to have a medium likelihood of occurrence.

The remaining 138 taxa identified by the database searches were considered to have a low likelihood of occurrence following the survey.

Some taxa that met the criteria of proximity and available habitat for a high or medium likelihood of occurrence following the survey were downgraded to a low likelihood of occurrence for other reasons. In these cases, a reason for the assignment has been provided in the likelihood of occurrence table (Appendix B).

The DBCA Threatened and Priority Ecological Community database search identified fifteen significant ecological communities occurring within 20 km of the Survey Area (Figure 2, Table 4). The communities identified comprised 11 State listed TECs, and four PECs. Twelve of the communities identified are listed as Threatened under the EPBC Act.

Table 2: Threatened and Priority Ecological Communities Identified by the DBCA Database Search

Community Code	Community Name	State	EPBC
Banksia WL SCP	*Banksia* Woodlands of the Swan Coastal Plain ecological community	P3	TEC (EN)
Central Granite Shrublands	Central Northern Darling Scarp Granite Shrubland Community (Com 5, Markey)	P4	-
Coastal Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	P3	TEC (VU)
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	TEC (EN)	TEC (EN)
SCP02	Southern wet shrublands, Swan Coastal Plain (floristic community type 2 as originally described in Gibson et al. (1994))	TEC (EN)	-
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	TEC (VU)	TEC (CR)
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	TEC (VU)	TEC (CR)

Community Code	Community Name	State	EPBC
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	TEC (EN)	TEC (CR)
SCP20a	*Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	TEC (EN)	TEC (EN)
SCP20b	*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	TEC (EN)	TEC (EN)
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	TEC (CR)	TEC (EN)
SCP21c	Low lying *Banksia attenuata* woodlands or shrublands	P3	TEC (EN)
SCP3a	*Corymbia calophylla - Kingia australis* woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	TEC (CR)	TEC (EN)
SCP3b	*Corymbia calophylla - Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson et al. (1994))	TEC (VU)	-
SCP3c	*Corymbia calophylla - Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in in Gibson et al. (1994))	TEC (CR)	TEC (EN)

2.5.2 Site Assessment

The distribution of riparian vegetation is an important factor in the definition of the Foreshore Area. A site visit was undertaken by 360 Environmental Principal Botanist Narelle Whittington on 10 August 2021 to assess the riparian vegetation along Crumpet Creek.

Flora

The survey recorded a total of 40 taxa from 30 genera across 19 families. A full species inventory is detailed in Appendix C. Of the 40 taxa, 18 are considered introduced species. The vegetation along the creek is considered to have low diversity of endemic species, particularly those typical of drainage lines e.g. sedges, emergent plants and herbs.

Condition

Vegetation condition ranged from Excellent to Completely Degraded. The vegetation along Crumpet Creek varies greatly, the vegetation along the creek north of Brewer Road has been altered severely and there is minimal native species. The creek south of Brewer Road consists of intact native vegetation considered to be in Good to Excellent condition.

Vegetation condition within the Foreshore Area is summarised below in Table 2 and illustrated in Figure 4 and in a comprehensive photo catalogue provided in Appendix D and photo location points in Figure 5.

Table 3: Vegetation Condition within the Survey Area

Vegetation Condition	Extent within the Survey Area (ha)	Extent within the Survey Area (%)
Excellent	0.12	2.41
Very Good – Good	0.24	2.72
Good	0.01	2.15
Degraded - Completely Degraded	0.81	1.42
Completely Degraded/Parkland Cleared	0.02	84.71
Not accessed/Surveyed	-	6.59
Total	**1.21**	**100**

Introduced Species

While introduced species were not extensively searched for during the site visit, 19 weeds were recorded (Table 3). Two species, **Asparagus asparagoides* (Bridal Creeper) and **Zantedeschia aethiopica* (Arum Lily) are listed as Declared Pests under the Biosecurity and Agriculture Management Act 2007 (BAM Act) (Department of Primary Industries and Regional Development, 2018a). One species, **Asparagus asparagoides* is also listed as a WoNS.

Table 4: Introduced Flora Species within the Survey Area

Species	Common Name	Status under BAM Act	WoNS
**Acacia iteaphylla*	Flinders Range wattle	Permitted - s11	-
**Acacia podalyriifolia*	Queensland silver wattle	Permitted - s11	-
**Arctotheca calendula*	Cape Weed	Permitted - s11	-
**Asparagus asparagoides*	Bridal Creeper	Declared Pest - s22(2)	WoNS
**Cenchrus clandestinus*	Kikuyu Grass	Permitted - s11	-
**Chamaecytisus palmensis*	Tagasaste	Permitted - s11	-
8Ehrharta calycina	Perennial Veldt Grass	Permitted - s11	-
**Eragrostis curvula*	African Lovegrass	Permitted - s11	-

Species	Common Name	Status under BAM Act	WoNS
**Freesia alba × leichtlinii*	Freesia	Permitted - s11	-
**Fumaria capreolata*	White flower Fumitory	Permitted - s11	-
**Hypochaeris glabra*	Smooth Cats-ear	Permitted - s11	-
**Olea europaea*	Olive	Permitted - s11	-
**Oxalis pes-caprae*	Soursob	Permitted - s11	-
**Oxalis purpurea*	Large flower Wood Sorrel	Permitted - s11	-
8Passiflora filamentosa	Passion flower	Permitted - s11	-
**Schinus terebinthifolia*	Japanese pepper	Permitted - s11	-
**Watsonia meriana var. bulbillifera*	Bugle Lily	Permitted - s11	-
**Zantedeschia aethiopica*	Arum Lily	Declared Pest - s22(2)	-

Vegetation Units

Six vegetation units were mapped within Crumpet Creek (Table 4, Figure 6).

Table 5: Mapped Vegetation Units

Vegetation Code	Description	Area within the Survey Area (ha)	Proportion of the Survey Area (%)
Cc	Mature *Corymbia calophylla* over garden and/or weeds.	0.001	0.12
CcEm	Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over *Xanthorrhoea preissii, Hibbertia hypericoides, Mesomelaena pseudostygia, Acacia pulchella, Allocasuarina humilis, Synaphea spinulosa* subsp. *spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana.*	0.01	1.19
CcEr	Mature *Corymbia calophylla* and *Eucalyptus rudis* over garden and/or weeds.	0.28	22.99
CCEwEr	Open Woodland of *Corymbia calophylla, Eucalyptus wandoo* and *Eucalyptus rudis* over *Xanthorrhoea preissii, Hakea lissocarpha* and *Hardenbergia comptoniana* along creek.	0.53	44.12

Vegetation Code	Description	Area within the Survey Area (ha)	Proportion of the Survey Area (%)
CcMp	Open Forest of *Corymbia calophylla* over *Mesomelaena pseudostygia, Xanthorrhoea preissii, Hibbertia hypericoides, Tetraria octandra, Acacia pulchella, Hakea undulata, Banksia dallanneyi* var. *dallanneyi* and *Allocasuarina humilis*.	0.36	29.93
Er	Mature *Eucalyptus rudis* over garden and/or weeds.	0.001	0.10
Ew / Er	Mature *Eucalyptus wandoo* and *Eucalyptus rudis* in combination over garden and/or weeds.	0.02	1.54
Total		**1.21**	100

Conservation Significant Flora

No conservation significant flora species were recorded within the Crumpet Creek foreshore area at the time of the survey.

Threatened Ecological Communities

From the Flora, Vegetation and Fauna Technical Notice (360 Environmental), Vegetation types identified as CcEm was inferred to be the TEC SCP 20a, based on statistical analysis and other diagnostic factors. FCT SCP20a is described as *Banksia attenuata woodlands over species rich dense shrublands* and is listed as an Endangered TEC by the State. It should be noted, however, the statistical analysis of the 2022 data was performed on quadrats that are outside of the foreshore survey boundary and were positioned in vegetation with higher native species diversity and of better quality.

The vegetation within the foreshore boundary is not believed to be analogous to FCT SCP 20a *Banksia attenuata* woodlands over species rich dense shrublands based on species present, low native species diversity and hydrological attributes.

2.6 Fauna

2.6.1 Vertebrate Fauna

2.6.1.1 Desktop

Database searches were undertaken to identify potential conservation significant fauna taxa within, or surrounding Crumpet Creek full database search results are provided in Appendix A and database search particulars are outlined Table 5.

Table 6: Database Searches

Database Name	Date Received	Search Target	Search Area
DBCA Threatened and Priority Fauna List (Department of Biodiversity Conservation and Attractions, 2015c)	6 October 2015	Threatened Priority Fauna	4 km search buffer of the Survey Areas
NatureMap (Department of Biodiversity Conservation and Attractions, 2015a)	16 November 2015	Threatened Priority Fauna	4 km search buffer of the Survey Areas
EPBC PMST (Department of Agriculture Water and the Environment, 2015)	16 November 2015	Threatened Priority Fauna	4 km search buffer of the Survey Areas
Birdlife Great Cocky Count Data (Birdlife Australia, 2022)	22 September 2022	Black Cockatoo Data	10 km buffer
DBCA Threatened and Priority Fauna List and Black Cockatoo custom search (Department of Biodiversity Conservation and Attractions, 2021)	26 July 2022	Threatened Priority Fauna and Black Cockatoo	20 km search buffer of the Survey Area

The 2022 desktop assessment identified 109 conservation significant species occurring within the Amendment Area. The potential species comprise of:

- 72 bird species
- 25 mammal species
- 12 reptile species.

The likelihood of occurrence assessment within the Amendment Area for conservation significant fauna species found that:

- Five species have a high likelihood of occurrence:
  - Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) – EN (DBCA); EN (EPBC)
  - Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) – EN (DBCA); EN (EPBC Act)
  - Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – VU (DBCA); VU (EPBC Act)
  - Wambenger Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – CD (DBCA)
  - Quenda (*Isoodon fusciventer*) – P4 (DBCA).

- Five species have a medium likelihood of occurrence:
  - Blue-billed Duck (*Oxyura australis*) – P4 (DBCA)
  - Black Bittern (*Ixobrychus flavicollis australis*) – P2 (DBCA)
  - Chuditch, Western Quoll (*Dasyurus geoffroii fortis*) – VU (DBCA); VU (EPBC)
  - Tammar Wallaby (*Notamacropus eugenii derbianus*) – P4 (DBCA)
  - Western Brush Wallaby (*Notamacropus irma*) – P4 (DBCA).
- The remaining 109 species have a low likelihood of occurrence.

Conservation Significant Fauna

The 2022 field survey recorded sightings and foraging evidence of Carnaby's Black Cockatoos, Forest Red-tailed Black Cockatoos and Quendas. A White-tailed Black Cockatoo call was heard which may have been either the Baudin's Black Cockatoo or the Carnaby's Black Cockatoo.

2.6.1.2 Site Assessment

The 2021 Foreshore Area Survey recorded Forest Red-tailed Black Cockatoo and Quenda foraging evidence.

Habitat

Trees along the creeks edge includes Marri, Jarrah, Wandoo and Flooded Gum. The southern section of Crumpet Creek has intact vegetation, both in the midstory and understory and is therefore considered to be in very good condition and of value to fauna. The northern section of Crumpet Creek is, however, disturbed and lacks a midstory and understory of native vegetation. This lack of vegetation structure (cover) limits the foraging and sheltering niches for fauna, particularly birds. The trees, however, Marri, Jarrah, Wandoo and Flooded Gum, provide foraging and potential breeding habitat for black cockatoos.

2.6.2 Short Range Endemics

The Baseline Short Range Endemic (SRE) and Conservation Significant Invertebrate Survey completed in 2019 for the Amendment Area included the Crumpet Creek foreshore area. The desktop study identified 3 SRE and conservation significant invertebrate species that have a high likelihood of occurrence within the SRE survey area:

- land snail *Bothriembryon serpentinus* – Confirmed SRE
- millipede *Dinocambala ingens* – Likely SRE
- katydid *Austrosaga spinifer* – Priority 2 (DBCA), Likely SRE.

The SRE survey area is largely cleared or highly degraded (360 Environmental 2016) with 64% of the SRE survey area considered to have Nil SRE habitat value, with pockets of low to moderate habitat value for SRE and conservation significant invertebrates.

The riparian vegetation along Crumpet Creek in the south eastern portion of the survey area is some of better quality habitat within the survey area, although this is still degraded in large parts and provides moderate habitat value for SRE invertebrates (Invertebrate Solutions, 2023)

The Eucalyptus vegetation units, both with and without understorey vegetation, provide the only other potential SRE habitat within the Project area, although these are generally disturbed and have limited value for SRE invertebrates.

The field surveys recorded 321 individual specimens representing 18 taxa of invertebrates from 5 classes, 11 orders and 15 families that have the potential to contain SRE taxa or be of conservation significance (Invertebrate Solutions 2023).

No Confirmed SRE species or conservation significant invertebrate were recorded during the survey. The survey recorded:

- 3 Likely SRE species (*Pseudodiploexochus* sp. *indet, Armadillidae*? sp. *indet*., and *Styloniscus* sp. *indet*.)
- 4 Possible SRE species (two terrestrial slaters: *Spherillo* sp. 2, *Buddelundia* sp. 4; one pseudoscorpion, Olpiidae sp.; and one centipede Cryptops sp.)

One of the undescribed edaphophiles*, Pseudodiploexochus* sp. *indet*. was recorded in riparian vegetation associated with Crumpet Creek.

2.7 Conservation Areas and Ecological Linkages

No Ecological Linkages or Environmentally Sensitive Areas occur within the Crumpet Creek Survey Boundary.

2.8 Aboriginal and European Heritage

2.8.1 Aboriginal Heritage

In Western Australia, the *Aboriginal Cultural Act 2021*protects places and objects customarily used by or traditional to the original habitants of Australia. A register of such places and objects are maintained under the Act, however, all sites are protected under the Act whether they are registered or not.

The DPLH (2019) Aboriginal Heritage Inquiry System was searched for registered and other sites. The results indicate that there is one registered site which covers the majority of Crumpet Creek:

- Poison Creek Gully (ID 25023) – Birthplace, Water Source.

There are no other heritage areas located within the site. One registered site and one lodged site are located to the east of the Amendment Area (Figure 7).

2.8.2 European Heritage

Crumpet Creek is not listed as a site of European Heritage.

2.9 Social and Economic Services

2.9.1 Recreational Land Uses

The area in which Crumpet Creek is within is currently zoned for Rural purposes and is bound by large rural style lots. The creek is not being used for recreation purposes.

2.9.2 Development Context

The Amendment Area that Crumpet Creek is within is proposed to be rezoned from Rural to Urban Deferred under the MRS.

2.9.3 Adjacent Land Use Pressures

The surrounding land uses are:

- Large rural style lots
- The portion of Crumpet Creek within the Amendment Area is dissected by three roads which include culverts to direct water under the roads
- There is a garden nursery adjacent to the Hawtin Road end of the creek.

3 Proposed Foreshore Area Determination and its Management

The (then) Department of Water (DoW)'s *Operational Policy 4.3: Identifying and Establishing Waterways Foreshore Areas* (Department of Water, 2012) identifies the biophysical criteria to be considered in evaluating foreshores as:

- Biological – vegetation and habitat
- Hydrological – flood prone land subject to waterway channel changes
- Geological and soils – soils, geology
- Topographic – land slope and shape
- Social – heritage, archaeological and ethnographic sites and land use
- Function- e.g. flood protection, recreation or habitat conservation.

The proposed foreshore area, which has been derived based on the site assessment, the above criteria and the following site attributes:

- Extent of riparian vegetation and its condition, and the identification of such vegetation as a Local Natural Area
- The location of the 1% AEP floodway
- The location of the Local Open Space zone by the City of Kalamunda Local Planning Scheme No.3
- General evaluation of the site and conditions, historical works, including clearing
- The area that will allow for the protection of environment and values.

3.1 Definition of the Proposed Foreshore Area

Given the proposed development is currently at the district level of land planning, indicative foreshore area boundaries have been provided to guide more detailed investigation and planning at later stages of the planning process. Exact foreshore boundary areas will be identified and defined at the local planning level, unless there are high risk (such as potential polluting), land uses, significant site constraints and/or when detailed district structure planning is undertaken. This approach is in accordance with the former Department of Water *Operational Policy 4.3 - Identifying and establishing waterways foreshore areas.*

The proposed foreshore area has been designed to protect the remaining environmental values currently associated with Crumpet Creek. The function of the foreshore in the future is to manage the 1% AEP flood and provide an attractive area with ecological balance (Figure 8).

The vegetation associated with Crumpet Creek between Hawtin Road and Brewer Road is in a Degraded to Completely Degraded condition (Figure 4). This area lacks community structure with very limited native midstorey and understorey species present and is dominated by introduced species. This lack of vegetation structure limits the foraging and sheltering niches for fauna, particularly birds. The trees, however, Marri, Jarrah, Wandoo and Flooded Gum, provide foraging and potential breeding habitat for black cockatoos.

The southern section of Crumpet Creek, north of Sultana Road West, includes Marri, Jarrah, Wandoo and Flooded Gum trees. This section of Crumpet Creek has native vegetation both in the midstorey and understorey and is considered to be in Very Good to Excellent condition.

The fragmented and degraded nature of the vegetation within the majority of the creek's easement (lot boundary) made it problematic to accurately determine the foreshore area. However, in accordance with the DoW Operational Policy 4.3, the foreshore area will be more precisely defined as more detailed design is available during the planning process.

The lack of surface and subsurface water dependant flora species prompted the boundary of the foreshore area to be mapped based on topography, changes in vegetation structure and the floodway.

It is recommended that a foreshore area be developed for Crumpet Creek that includes the mapped boundary in Figure 8. This will recognise the status of the vegetation as a Local Natural Area, the meandering nature of the creek and the floodway. The floodway is a representation of the area inundated on average once every 100 years, or the 1% AEP and will contain the area of all smaller events. This is an acceptable extent of the foreshore as it protects the waterway from all smaller events and correlates to the area vegetated. The intended foreshore area is consistent with the zoned Local Open Space as defined by the City of Kalamunda LPS3. However, in accordance with the DoW Operational Policy 4.3, the foreshore area will be more precisely defined during the next stage of the planning process.

3.2 Foreshore Area Buffer

As a consequence of the varying condition of the foreshore and lack of native vegetation along parts of the creek, a modest preliminary foreshore buffer has been recommended based on the scattered and fragmentated vegetation beyond the mapped foreshore area and topography (Figure 8). The buffer distance will also provide allowance for future rehabilitation work such as fencing and revegetation. However, to satisfy the provisions of SPP 2.9 and other DWER policies (Operational Policy 4.3), the foreshore area buffer has subsequently been adjusted to be consistent with the zoned Local Open Space as defined by the City of Kalamunda LPS3 and to satisfy the minimum 30 metres setbacks by the DoW Operational Policy 4.3 (Figure 1). However as stated above, the foreshore area will be more precisely defined during the next stages of the planning process.

Adequacy of the buffer distance will be further investigated at the Local Structure Planning stage.

3.3 Foreshore Management Recommendations

It is recommended that to enable the protection of Crumpet Creek, particularly with respect to vegetation and fauna habitat protection, rehabilitation/restoration, flooding and stormwater management associated with development within close proximity to the waterways eg POS, residential development, that a Foreshore Management Plan (FMP) shall be prepared and lodged with a Local Scheme Amendment and/or Local Structure Plan for the Amendment Area. The FMP would address the landscaping and ongoing management of the foreshore area and be implemented as a condition of subdivision or development for those lots adjacent to the proposed foreshore area. The FMP will also provide a defined foreshore boundary at this stage of the planning process.

It is recommended the site be rehabilitated and restored to its existing natural condition. The rehabilitation should include:

- Limiting access to the vegetation and creek through appropriate barriers and signage
- Weed control
- Erosion control
- Revegetation using locally endemic species.

4 References

360 Environmental (2016) *Various Lots - Maida Vale Flora and Fauna Report*. Perth, Western Australia.

360 Environmental (2021) *Maida Vale District Water Management Strategy*. Perth, Western Australia.

Department of Agriculture Water and the Environment (2020) *Protected Matters Search Tool*. Camberra, Australia. Available at: http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf.

Department of Biodiversity Conservation and Attractions (2020a) *NatureMap*. Perth, Australia. Available at: https://naturemap.dpaw.wa.gov.au/.

Department of Biodiversity Conservation and Attractions (2020b) *Threatened and Priority Ecological Communities database request (custom search)*. Perth, Western Australia.

Department of Biodiversity Conservation and Attractions (2020c) *Threatened and Priority Fauna database request (custom search)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2020d) *Threatened and Priority Flora database (TPFL) request (custom search)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2020e) *Western Australia Herbarium Flora Database (custom search)*. Perth, Western Australia.

Department of Primary Industries and Regional Development (2018a) *Declared Plants List*. Available at: https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/declared-plants.

Department of Primary Industries and Regional Development (2018b) *Soil landscape Mapping - Systems (GIS Dataset)*.

Department of Water (2012) *Operational Policy 4.3 Identifying and establishing waterways foreshore areas*.

Department of Water and Environmental Regulation (2021) *Perth Groundwater Map*. Available at: https://maps.water.wa.gov.au/#/webmap/gwm.

Hill, A. L. *et al.* (1996) *Wetlands of the Swan Coastal Plain Volume 2b Wetland mapping, classification and evaluation*. Perth, Australia: Water and Rivers Commision, Department of Environmental Protection.

Waters and Rivers Commission (2001) *Determining foreshore reserves*.

Woinarski, J., Burbidge, A. and Harrison, P. (2014) *The action plan for Australian mammals 2012*. CSIRO Publishing.

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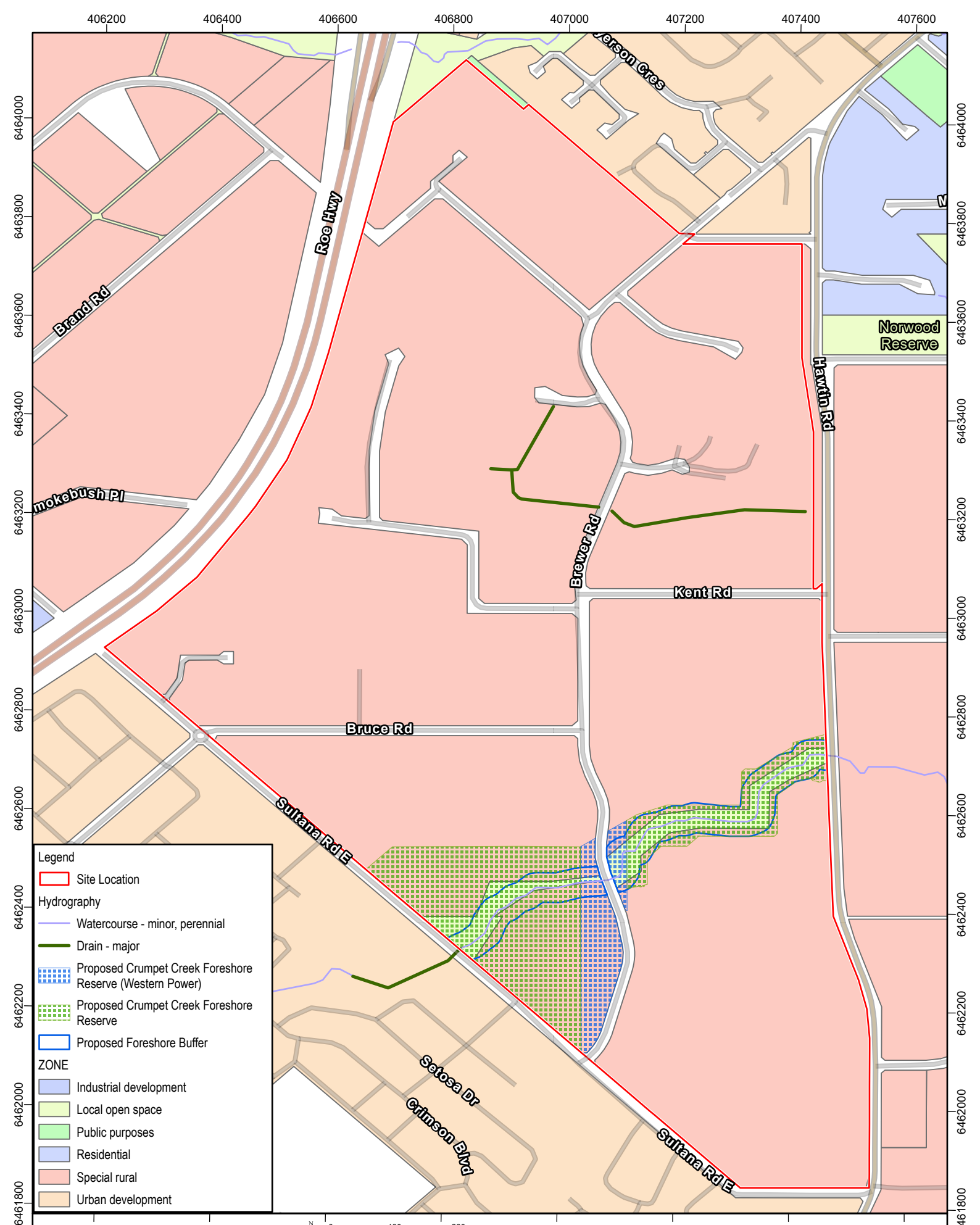
Figures



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Coordinate System:	GCS GDA 1994
Scale:	1:9,500 at A4
Project Number:	4844
Date Drawn:	20-Jun-2023
Drawn by:	EC
Reviewed by:	KF

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M Group

Foreshore Assessment Report

Shire of Kalamunda
Local Planning Scheme Zoning

FIGURE 1

Path: K:\Projects\9.0 APP\1048 Maida Vale\1048 ERD V02 2023\1048_ERD_V02_2023_Mapping\1048_ERD_V02_2023_Mapping.aprx

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6465000 6464500 6464000 6463500 6463000 6462500 6462000 6461500 6461000

ufi: 15879
ufi: 15880
ufi: 13977
ufi: 8960
ufi: 15881
ufi: 15877
ufi: 15906
ufi: 15072
ufi: 15077
Poison Gully
Crumpet Creek
Crumpet Creek
Woodlupine Brook
Whistlepipe Gully
Woodlupine Brook
Woodlupine Brook
Landgate / SLIP

Legend

Site Location

Hydrography
- Watercourse - minor
- Drain - major
- Lake

Geomorphic Wetlands
- Conservation Category
- Resource Enhancement Category
- Multiple Use Category

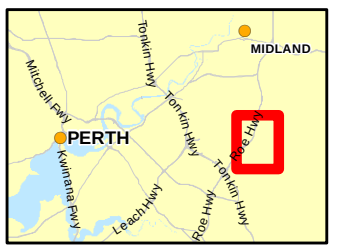
Powered By SLIP ENABLER

- LOCALITY MAP SOURCED FROM LANDGATE 2021
- OTHER DATA SOURCED LANDGATE 2021
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2021
(© Western Australian Land Information Authority 2021)

0 130 260 390 Meters
1:12,500 @ A4

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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PROJECT ID	DATE
4848	03/09/2021

HORIZONTAL DATUM AND PROJECTION
GDA2020 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	NW	NW	0

M Group
Maida Vale, WA

Foreshore Assessment

Figure 2
Surface Hydrology and Wetlands

K:\Projects\1.0 EBS\4848 007 MRS Amendment Maida Vale Foreshore Assessment Report\4848 F02 Surface Hydrology and Wetlands.mxd

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407000 407500

6463000

KENT RD

HAWTIN RD

6462500

HAWTIN RD

6462000

SULTANA RD EAST

Landgate / SLIP

407000 407500

Legend

Site Location

1%AEP Flood Depth

- 0 - 0.5m
- 0.5 - 1.0m
- 1.0 - 1.5m
- 1.5 - 2.0m
- 2.0 - 2.5m
- 2.5 - 3.0m
- 3.0 - 3.5m

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0 40 80 120 Meters

1:4,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP

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f (08) 9381 2360
w www.360environmental.com.au

PROJECT ID	DATE
4848	03/09/2021

HORIZONTAL DATUM AND PROJECTION
GDA2020 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	NW	NW	0

M Group
Maida Vale, WA
Foreshore Management

Figure 3
Crumpet Creek
1% AEP Flood Mapping

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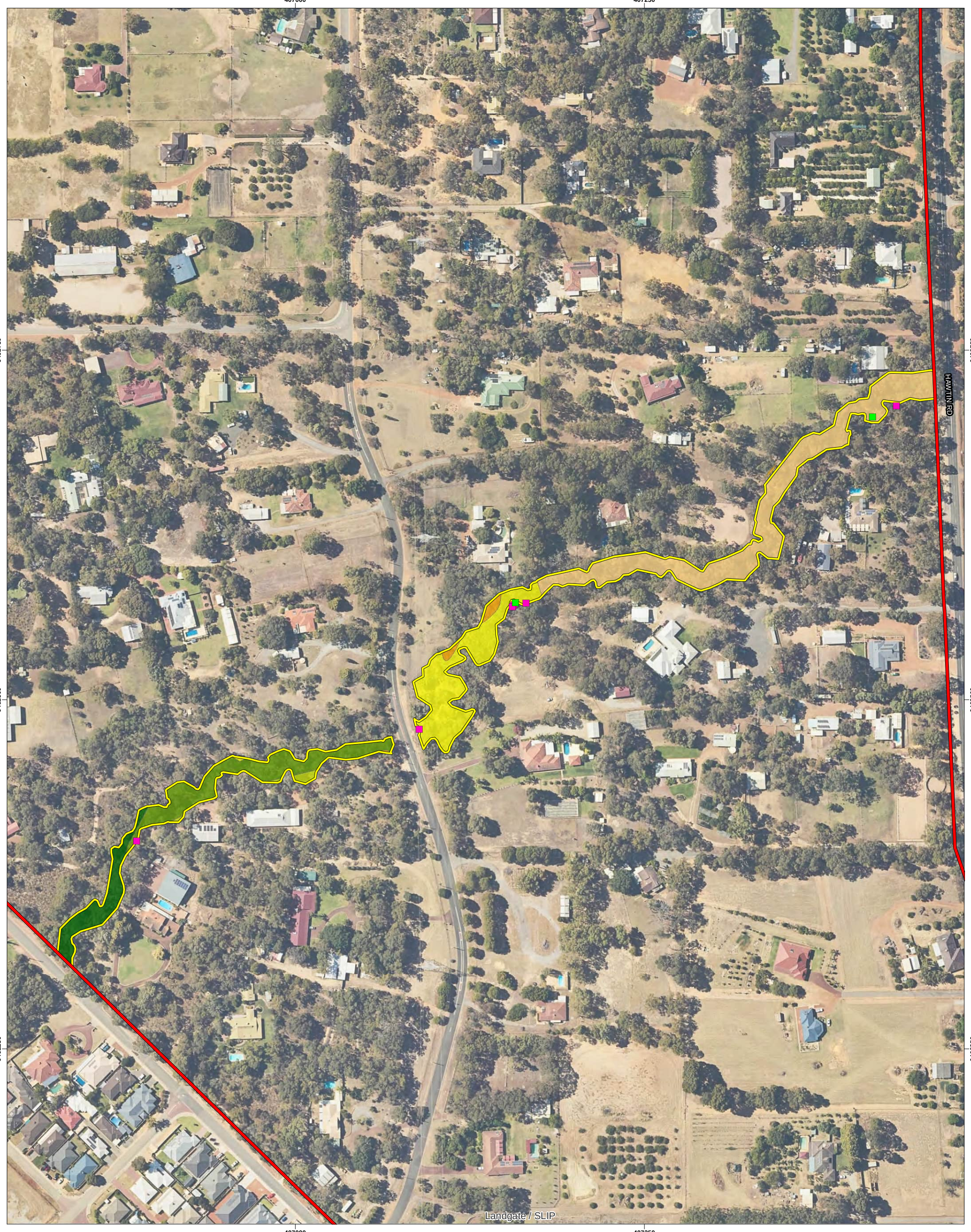

Legend

- Site Location
- Survey Boundary

Introduced Flora

- **Asparagus asparagoides*
- **Zantedeschia aethiopica*

Vegetation Condition

- Excellent
- Very Good - Good
- Good
- Degraded
- Degraded - Completely Degraded
- Completely Degraded

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GDA2020 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	NW	NW	0

M Group
Maida Vale, WA

Foreshore Assessment

Figure 4
Vegetation Condition

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Legend

- Site Location
- Survey Boundary
- Photo Point Locations

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LF	NW	NW	0

M Group
Maida Vale, WA

Foreshore Assessment

Figure 5
Photo Locations

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407000
407250
6462750
6462500
6462250
HAWTIN RD
Landgate / SLIP

Legend

- Site Location
- Survey Boundary

Vegetation Types

- Cc
- CcEm
- CcEr
- CcEwEr
- CcMp
- Er
- Ew / Er

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Meters
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GDA2020 MGA Zone 50

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LF	NW	NW	0

M Group
Maida Vale, WA

Foreshore Assessment

Figure 6
Vegetation Types

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Legend

- Site Location
- Survey Boundary

Aboriginal Heritage

- Registered Sites
- Lodged Sites

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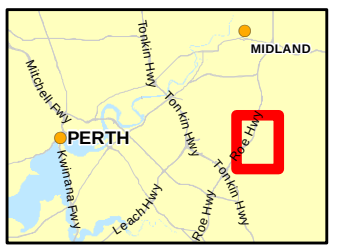
LOCALITY MAP



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GDA2020 MGA Zone 50

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LF	NW	NW	0

M Group
Maida Vale, WA

Foreshore Assessment

Figure 7
Aboriginal Heritage

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6463250 6463000 6462750 6462500 6462250 6462000

KENT RD

HAWTIN RD

HAWTIN RD

Landgate / SLIP

406750 407000 407250 407500

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Legend

- Site Location
- Preliminary Foreshore
- Foreshore Buffer

1%AEP Flood Depth

- 0 - 0.5m
- 0.5 - 1.0m
- 1.0 - 1.5m
- 1.5 - 2.0m
- 2.0 - 2.5m
- 2.5 - 3.0m
- 3.0 - 3.5m

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0 40 80 120 Meters

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GDA2020 MGA Zone 50

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EC	KF	KF	0

M Group
Maida Vale, WA

Foreshore Assessment

Figure 8
Foreshore Area

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Appendices

Appendix A
Database Searches

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 16/11/15 18:03:02

Summary
Details
Matters of NES
Other Matters Protected by the EPBC Act
Extra Information
Caveat
Acknowledgements

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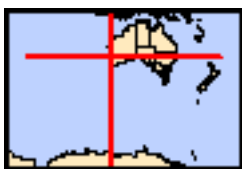
Coordinates

Buffer: 4.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	29
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	7
Regional Forest Agreements:	1
Invasive Species:	42
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area
Shrublands and Woodlands of the eastern Swan Coastal Plain	Endangered	Community known to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii		
Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris		
Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir [25911]	Vulnerable	Species or species habitat may occur within area
Setonix brachyurus		
Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		
Acacia anomala		
Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat likely to occur within area
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [64649]	Endangered	Species or species habitat may occur within area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area
Darwinia apiculata Scarp Darwinia [8763]	Endangered	Species or species habitat likely to occur within area
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Lasiopetalum pterocarpum Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Thelymitra stellata		
Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - BUSHMEAD RIFLE RANGE
Defence - BUSHMEAD TRAINING AREA

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Gooseberry Hill	WA
Lesmurdie Falls	WA
Unnamed WA23076	WA
Unnamed WA24657	WA
Unnamed WA29815	WA
Unnamed WA37997	WA
Unnamed WA49079	WA

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf		Species or species habitat likely to occur

Name	Status	Type of Presence
Madeiravine, Potato Vine [2643] Asparagus asparagoides		within area
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering		Species or species habitat likely to occur

Name	Status	Type of Presence
Cypress, Salt Cedar [16018]		within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Perth Airport Woodland Swamps	WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.965 116.01619

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 16/11/2015

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116°00' 57" E,31°57' 34" S
Buffer 4km
Group By Family

Family	Species	Records
Acanthizidae	7	301
Accipitridae	9	27
Actinopodidae	2	13
Aeshnidae	2	2
Agamidae	1	2
Anatidae	10	117
Anhingidae	2	10
Apogonidae	1	1
Araneidae	5	5
Ardeidae	7	36
Artamidae	1	1
Austrocorduliidae	1	1
Barychelidae	2	9
Bittacidae	1	2
Boidae	3	11
Bothriuridae	2	4
Buprestidae	4	8
Cacatuidae	1	146
Campephagidae	2	76
Canidae	2	3
Caprimulgidae	1	1
Castniidae	1	10
Cerambycidae	1	1
Charadriidae	5	17
Climacteridae	1	1
Clupeidae	1	1
Colletidae	1	2
Columbidae	7	270
Corduliidae	3	3
Corvidae	1	164
Cracticidae	3	300
Cuculidae	4	17
Curculionidae	4	5
Dasyuridae	4	13
Diaspididae	2	2
Dicaeidae	1	95
Dicruridae	2	156
Diplodactylidae	5	10
Dytiscidae	1	1
Ecnomidae	1	1
Elapidae	6	44
Falconidae	3	13
Felidae	1	1
Formicidae	11	16
Galacticidae	1	2
Galaxiidae	2	3
Gekkonidae	3	14
Gelechiidae	1	2
Geometridae	2	8
Gnaphosidae	1	1
Gobiidae	2	3
Gomphidae	1	3
Haematopodidae	1	7
Halcyonidae	3	126
Halictidae	1	1
Hirundinidae	2	23
Hydrobiosidae	1	1
Hydropsychidae	1	1
Hydroptilidae	4	6
Hylidae	2	3
Hypsimetopodidae	1	1
Idiopidae	3	4
Iulomorphidae	1	9
Julidae	1	2
Lamponidae	1	1
Laridae	4	26
Leptoceridae	2	2
Lestidae	1	1
Libellulidae	1	1
Limnodynastidae	2	6
Lycosidae	4	15
Maluridae	2	11
Megapodagrionidae	2	2
Meliphagidae	6	508
Meropidae	1	12

Micropholcommatidae	1	1
Muridae	2	7
Myobatrachidae	5	8
Nemesiidae	2	7
Neosittidae	2	20
Nephilidae	1	1
Oecophoridae	6	12
Oxyopidae	1	1
Pachycephalidae	5	112
Pachygronthidae	1	4
Paradoxosomatidae	2	6
Pardalotidae	4	172
Pelecanidae	1	8
Peramelidae	2	176
Petroicidae	1	1
Phalacrocoracidae	5	40
Phalangeridae	2	3
Pholcidae	1	1
Platycephalidae	1	2
Podargidae	1	3
Podicipedidae	2	19
Pseudococcidae	3	3
Psittacidae	16	531
Pygopodidae	5	22
Rallidae	6	42
Recurvirostridae	3	18
Reduviidae	1	1
Rhinotermitidae	1	1
Salticidae	3	3
Scarabaeidae	1	2
Scincidae	10	21
Sciuridae	1	1
Scolopacidae	10	30
Scolopendridae	5	9
Scutigeridae	1	1
Sparassidae	3	11
Strigidae	2	38
Sylviidae	2	12
Synthemistidae	1	3
Tarsipedidae	1	2
Tenebrionidae	1	1
Terapontidae	1	1
Termitidae	3	4
Tettigoniidae	3	4
Theridiidae	1	4
Threskiornithidae	3	36
Tortricidae	1	2
Triaenonychidae	1	2
Turnicidae	1	2
Urodacidae	4	46
Varanidae	2	2
Vespertilionidae	3	8
Zodariidae	3	3
Zosteropidae	2	139
TOTAL	**347**	**4333**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.		*Acanthiza (Acanthiza) apicalis subsp. apicalis*			
2.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
3.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
4.	24262	*Acanthiza inornata (Western Thornbill)*			
5.	25530	*Gerygone fusca (Western Gerygone)*			
6.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
7.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
8.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
9.	25536	*Accipiter fasciatus (Brown Goshawk)*			
10.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
11.	24285	*Aquila audax (Wedge-tailed Eagle)*			
12.		*Elanus axillaris*			
13.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
14.	24295	*Haliastur sphenurus (Whistling Kite)*			
15.		*Lophoictinia isura*			
16.	25543	*Pandion haliaetus (Osprey)*			
Actinopodidae					
17.		*Missulena granulosa*			
18.		*Missulena occatoria*			
Aeshnidae					
19.		*Adversaeschna brevistyla*			
20.		*Anax papuensis*			
Agamidae					
21.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
Anatidae					
22.	24310	*Anas castanea (Chestnut Teal)*			
23.	24312	*Anas gracilis (Grey Teal)*			
24.	24313	*Anas platyrhynchos (Mallard)*			
25.	24315	*Anas rhynchotis (Australasian Shoveler)*			
26.	24316	*Anas superciliosa (Pacific Black Duck)*			
27.	24318	*Aythya australis (Hardhead)*			
28.	24319	*Biziura lobata (Musk Duck)*			
29.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
30.	24322	*Cygnus atratus (Black Swan)*			
31.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Anhingidae					
32.	25553	*Anhinga melanogaster (Darter)*			
33.		*Anhinga novaehollandiae*			
Apogonidae					
34.		*Ostorhinchus rueppellii*			
Araneidae					
35.		*Araneus cyphoxis*			
36.		*Backobourkia heroine*			
37.		*Celaenia excavata*			
38.		*Cyclosa trilobata*			
39.		*Eriophora biapicata*			
Ardeidae					
40.	24337	*Ardea garzetta subsp. nigripes (Little Egret)*			
41.	41324	*Ardea modesta (Eastern Great Egret)*		IA	
42.	24340	*Ardea novaehollandiae (White-faced Heron)*			
43.	24341	*Ardea pacifica (White-necked Heron)*			
44.		*Egretta garzetta*			
45.		*Egretta novaehollandiae*			
46.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
Artamidae					
47.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
Austrocorduliidae					
48.		*Hesperocordulia berthoudi*			
Barychelidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
49.		*Idiommata blackwalli*			
50.		*Synothele durokoppin*			
Bittacidae					
51.		*Harpobittacus similis*			
Boidae					
52.	25448	*Antaresia stimsoni (Stimson's Python)*			
53.	25241	*Antaresia stimsoni subsp. stimsoni (Stimson's Python)*			
54.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*		S	
Bothriuridae					
55.		*Cercophonius granulosus*			
56.		*Cercophonius sulcatus*			
Buprestidae					
57.		*Castiarina decemguttata*			
58.		*Ethonion roei*			
59.		*Stigmodera gratiosa*			
60.		*Stigmodera sp.*			
Cacatuidae					
61.		*Eolophus roseicapillus*			
Campephagidae					
62.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
63.	24367	*Lalage tricolor (White-winged Triller)*			
Canidae					
64.	25454	*Canis lupus (Dog, Dingo)*	Y		
65.	30883	*Canis lupus subsp. familiaris (Dog)*	Y		
Caprimulgidae					
66.		*Eurostopodus (Eurostopodus) argus*			
Castniidae					
67.		*Synemon sp.*			
Cerambycidae					
68.		*Phoracantha odewahnii*			
Charadriidae					
69.	24373	*Charadrius melanops (Black-fronted Dotterel)*			
70.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
71.		*Elseyornis melanops*			
72.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
73.	24386	*Vanellus tricolor (Banded Lapwing)*			
Climacteridae					
74.	24396	*Climacteris rufa (Rufous Treecreeper)*			
Clupeidae					
75.		*Nematalosa vlaminghi*			
Colletidae					
76.		*Trichocolletes erythrurus*			
Columbidae					
77.	24399	*Columba livia (Domestic Pigeon)*	Y		
78.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
79.	24409	*Phaps chalcoptera (Common Bronzewing)*			
80.		*Streptopelia (Spilopelia) chinensis*			
81.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
82.	30951	*Streptopelia chinensis subsp. tigrina (Spotted Turtle-Dove)*	Y		
83.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
Corduliidae					
84.		*Hemicordulia australiae*			
85.		*Hemicordulia tau*			
86.		*Procordulia affinis*			
Corvidae					
87.	25592	*Corvus coronoides (Australian Raven)*			
Cracticidae					
88.	25595	*Cracticus tibicen (Australian Magpie)*			
89.	25596	*Cracticus torquatus (Grey Butcherbird)*			
90.	25597	*Strepera versicolor (Grey Currawong)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Cuculidae					
91.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
92.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
93.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
94.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
Curculionidae					
95.		*Acantholophus amycteroides*			
96.		*Acantholophus suturalis*			
97.		*Oxyops sp.*			
98.		*Phlyctinus callosus*			
Dasyuridae					
99.	25449	*Antechinus flavipes (Yellow-footed Antechinus)*			
100.	24088	*Antechinus flavipes subsp. leucogaster (Yellow-footed Antechinus, Mardo)*			
101.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
102.	24099	*Phascogale tapoatafa subsp. tapoatafa (Southern Brush-tailed Phascogale, Wambenger)*		T	
Diaspididae					
103.		*Diaspidiotus loranthi*			Y
104.		*Pseudaulacaspis eugeniae*			Y
Dicaeidae					
105.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
Dicruridae					
106.	24443	*Grallina cyanoleuca (Magpie-lark)*			
107.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Diplodactylidae					
108.	24918	*Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)*			
109.	24929	*Diplodactylus granariensis subsp. granariensis*			
110.	24939	*Diplodactylus polyophthalmus*			
111.	24940	*Diplodactylus pulcher*			
112.	24943	*Strophurus spinigerus subsp. inornatus*			
Dytiscidae					
113.		*Antiporus hollingsworthi*			Y
Ecnomidae					
114.		*Ecnomus pansus*			
Elapidae					
115.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
116.	25252	*Notechis scutatus (Tiger Snake)*			
117.	25253	*Parasuta gouldii*			
118.	25261	*Pseudechis australis (Mulga Snake)*			
119.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
Falconidae					
120.	25622	*Falco cenchroides (Australian Kestrel)*			
121.	24472	*Falco cenchroides subsp. cenchroides (Australian Kestrel)*			
122.	25623	*Falco longipennis (Australian Hobby)*			
Felidae					
123.	24041	*Felis catus (Cat)*	Y		
Formicidae					
124.		*Anisopheidole antipodum*			
125.		*Camponotus consobrinus*			
126.		*Camponotus terebrans*			
127.		*Dolichoderus parvus*			
128.		*Dolichoderus ypsilon*			
129.		*Iridomyrmex conifer*			
130.		*Iridomyrmex discors*			
131.		*Iridomyrmex purpureus*			
132.		*Myrmecia mandibularis*			
133.		*Myrmecia sp.*			
134.		*Rhytidoponera rufonigra*			
Galacticidae					
135.		*Homadaula poliodes*			Y
Galaxiidae					
136.	34028	*Galaxias occidentalis (Western Minnow)*			
137.		*Galaxias sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Gekkonidae					
138.	24980	*Christinus marmoratus (Marbled Gecko)*			
139.	24959	*Gehyra variegata*			
140.	24983	*Underwoodisaurus milii (Barking Gecko)*			
Gelechiidae					
141.		*Ardozyga dysclyta*			Y
Geometridae					
142.		*Anachloris tofocolorata*			Y
143.		*Dichromodes leptozona*			Y
Gnaphosidae					
144.		*Hemicloea sp.*			
Gobiidae					
145.		*Arenigobius bifrenatus*			
146.		*Pseudogobius olorum*			
Gomphidae					
147.		*Austrogomphus (Austrogomphus) collaris*			
Haematopodidae					
148.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
Halcyonidae					
149.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
150.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
151.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
Halictidae					
152.		*Lasioglossum (Chilalictus) seminitens*			
Hirundinidae					
153.	24491	*Hirundo neoxena (Welcome Swallow)*			
154.	24492	*Hirundo nigricans subsp. nigricans (Tree Martin)*			
Hydrobiosidae					
155.		*Apsilochorema urdalum*			
Hydropsychidae					
156.		*Smicrophylax australis*			
Hydroptilidae					
157.		*Hellyethira litua*			
158.		*Hellyethira malleoforma*			
159.		*Hydroptila losida*			
160.		*Oxyethira (Trichoglene) retracta*			
Hylidae					
161.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
162.	25388	*Litoria moorei (Motorbike Frog)*			
Hypsimetopodidae					
163.		*Hyperoedesipus plumosus*			
Idiopidae					
164.		*Eucyrtops latior*			
165.		*Euoplos inornatus*			
166.		*Idiosoma sigillatum*			
Iulomorphidae					
167.		*Dinocambala ingens*			
Julidae					
168.		*Ommatoiulus moreletii*			
Lamponidae					
169.		*Asadipus kunderang*			
Laridae					
170.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
171.	24522	*Sterna bergii (Crested Tern)*			
172.	24523	*Sterna caspia (Caspian Tern)*		IA	
173.	25644	*Sterna nereis (Fairy Tern)*			
Leptoceridae					
174.		*Hudsonema aptus*			
175.		*Oecetis pechana*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Lestidae					
176.		*Austrolestes io*			
Libellulidae					
177.		*Orthetrum caledonicum*			
Limnodynastidae					
178.	25409	*Heleioporus barycragus (Hooting Frog)*			
179.	25410	*Heleioporus eyrei (Moaning Frog)*			
Lycosidae					
180.		*Artoria linnaei*			
181.		*Tasmanicosa leuckartii*			
182.		*Venator immansueta*			
183.		*Venatrix pullastra*			
Maluridae					
184.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
185.	25654	*Malurus splendens (Splendid Fairy-wren)*			
Megapodagrionidae					
186.		*Archiargiolestes pusillus*			
187.		*Miniargiolestes minimus*			
Meliphagidae					
188.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
189.	24561	*Anthochaera carunculata (Red Wattlebird)*			
190.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
191.	25661	*Lichmera indistincta (Brown Honeyeater)*			
192.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
193.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Meropidae					
194.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
Micropholcommatidae					
195.		*Raveniella peckorum*			
Muridae					
196.	24215	*Hydromys chrysogaster (Water-rat)*		P4	
197.	24245	*Rattus rattus (Black Rat)*	Y		
Myobatrachidae					
198.	25398	*Crinia georgiana (Quacking Frog)*			
199.	25399	*Crinia glauerti (Clicking Frog)*			
200.	25400	*Crinia insignifera (Squelching Froglet)*			
201.	25401	*Crinia pseudinsignifera (Bleating Froglet)*			
202.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Nemesiidae					
203.		*Aname mainae*			
204.		*Aname sp.*			
Neosittidae					
205.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
206.	24606	*Daphoenositta chrysoptera subsp. pileata (Varied Sittella, Black-capped Sitella)*			
Nephilidae					
207.		*Nephila edulis*			
Oecophoridae					
208.		*Ereiconastes butyrea*			
209.		*Eulechria sp.*			
210.		*Garrha oncospila*			Y
211.		*Hesperenoeca leucostemma*			Y
212.		*Micramicta amolgaea*			Y
213.		*Phanerozancla sp.*			Y
Oxyopidae					
214.		*Oxyopes gracilipes*			
Pachycephalidae					
215.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
216.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
217.	25679	*Pachycephala pectoralis (Golden Whistler)*			
218.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
219.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Pachygronthidae					
220.		*Darwinocoris australicus*			
Paradoxosomatidae					
221.		*Akamptogonus novarae*			
222.		*Antichiropus variabilis*			
Pardalotidae					
223.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
224.	24625	*Pardalotus punctatus subsp. punctatus (Spotted Pardalote)*			
225.	25682	*Pardalotus striatus (Striated Pardalote)*			
226.	24630	*Pardalotus striatus subsp. westraliensis (Striated Pardalote)*			
Pelecanidae					
227.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Peramelidae					
228.	25478	*Isoodon obesulus (Southern Brown Bandicoot)*		P5	
229.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P5	
Petroicidae					
230.	24651	*Eopsaltria australis subsp. griseogularis (Western Yellow Robin)*			
Phalacrocoracidae					
231.		*Microcarbo melanoleucos*			
232.	25697	*Phalacrocorax carbo (Great Cormorant)*			
233.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
234.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
235.	25699	*Phalacrocorax varius (Pied Cormorant)*			
Phalangeridae					
236.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
237.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
Pholcidae					
238.		*Trichocyclus nullarbor*			
Platycephalidae					
239.		*Platycephalus westraliae*			
Podargidae					
240.	25703	*Podargus strigoides (Tawny Frogmouth)*			
Podicipedidae					
241.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
242.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Pseudococcidae					
243.		*Cypericoccus sp.*			
244.		*Epicoccus acaciae*			
245.		*Maconellicoccus lanigerus*			
Psittacidae					
246.		*Barnardius zonarius*			
247.		*Cacatua (Cacatua) galerita*			
248.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
249.	25716	*Cacatua sanguinea (Little Corella)*			
250.		*Cacatua sp.*			
251.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
252.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)*		T	
253.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	
254.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
255.		*Calyptorhynchus sp.*			
256.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
257.	25720	*Platycercus icterotis (Western Rosella)*			
258.	24747	*Platycercus spurius (Red-capped Parrot)*			
259.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
260.		*Purpureicephalus spurius*			
261.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
Pygopodidae					
262.	24990	*Aprasia pulchella (Granite Worm-lizard)*			
263.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
264.	24999	*Delma grayii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
265.	25005	*Lialis burtonis*			
266.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
Rallidae					
267.	25727	*Fulica atra (Eurasian Coot)*			
268.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
269.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
270.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
271.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
272.		*Porzana (Porzana) tabuensis subsp. tabuensis*			
Recurvirostridae					
273.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
274.	25734	*Himantopus himantopus (Black-winged Stilt)*			
275.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
Reduviidae					
276.		*Smiliopus quadrinotatus*			Y
Rhinotermitidae					
277.		*Heterotermes platycephalus*			
Salticidae					
278.		*Lycidas chlorophthalmus*			
279.		*Lycidas michaelseni*			
280.		*Maratus pavonis*			
Scarabaeidae					
281.		*Onthophagus ferox*			
Scincidae					
282.	30893	*Cryptoblepharus buchananii*			
283.	25020	*Cryptoblepharus plagiocephalus*			
284.	25035	*Ctenotus delli (Dell's Ctenotus, Darling Range Heath Ctenotus)*		P4	
285.	25039	*Ctenotus fallens*			
286.	25049	*Ctenotus labillardieri*			
287.	25115	*Hemiergis initialis subsp. initialis*			
288.	25131	*Lerista distinguenda*			
289.	25192	*Morethia obscura*			
290.	25204	*Tiliqua rugosa subsp. aspera*			
291.	25207	*Tiliqua rugosa subsp. rugosa*			
Sciuridae					
292.	30916	*Funambulus pennanti (Indian Palm Squirrel)*	Y		
Scolopacidae					
293.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
294.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
295.	25738	*Calidris canutus (Red Knot)*		IA	
296.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
297.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
298.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
299.	24790	*Calidris tenuirostris (Great Knot)*		T	
300.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
301.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
302.	24808	*Tringa nebularia (Common Greenshank)*		IA	
Scolopendridae					
303.		*Cormocephalus aurantiipes*			
304.		*Cormocephalus rubriceps*			
305.		*Cormocephalus strigosus*			
306.		*Cormocephalus turneri*			
307.		*Scolopendra laeta*			
Scutigeridae					
308.		*Allothereua maculata*			
Sparassidae					
309.		*Holconia westralia*			
310.		*Isopeda leishmanni*			
311.		*Isopeda magna*			
Strigidae					
312.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
313.	24820	*Ninox novaeseelandiae subsp. boobook (Boobook Owl)*			
Sylviidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
314.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
315.	25758	*Megalurus gramineus (Little Grassbird)*			
Synthemistidae					
316.		*Archaeosynthemis occidentalis*			
Tarsipedidae					
317.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
Tenebrionidae					
318.		*Adelium breviusculum*			
Terapontidae					
319.		*Amniataba caudavittata*			
Termitidae					
320.		*Amitermes obeuntis*			
321.		*Tumulitermes apiocephalus*			
322.		*Tumulitermes westraliensis*			
Tettigoniidae					
323.		*Kawanaphila nartee*			
324.		*Pachysaga australis*			
325.		*Tympanophora similis*			
Theridiidae					
326.		*Latrodectus hasseltii*			
Threskiornithidae					
327.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
328.	24844	*Threskiornis molucca (Australian White Ibis)*			
329.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Tortricidae					
330.		*Ancylis acromochla*			Y
Triaenonychidae					
331.		*Nunciella aspera*			
Turnicidae					
332.	24851	*Turnix velox (Little Button-quail)*			
Urodacidae					
333.		*Urodacus manicatus*			
334.		*Urodacus novaehollandiae*			
335.		*Urodacus planimanus*			
336.		*Urodacus sp.*			
Varanidae					
337.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
338.	25526	*Varanus tristis (Racehorse Monitor)*			
Vespertilionidae					
339.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
340.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
341.	24206	*Vespadelus regulus (Southern Forest Bat)*			
Zodariidae					
342.		*Masasteron maini*			
343.		*Storena formosa*			
344.		*Storena sinuosa*			
Zosteropidae					
345.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
346.	24856	*Zosterops lateralis subsp. gouldi (Grey-breasted White-eye)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NAME	SOURCE_COD	SOURCE_ID	NAME_ID	FAMILY	GENUS	SPECIES	INFRANAME	AUTHOR	VERNACULAR	KINGDOM	CONSV_CODE	CLASS	METHOD	COUNT	LOCALITY	SITE_NAME	ACCURACY_M	GDA_LONG	GDA_LAT	DAY	MONTH	YEAR
Calyptorhynchus baudi	BIRDATLAS2	122022|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	7.000000	7.000000	2000.000000
Calyptorhynchus baudi	BIRDATLAS2	122023|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	8.000000	2000.000000
Calyptorhynchus baudi	BIRDATLAS2	122025|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	10.000000	2000.000000
Calyptorhynchus baudi	BIRDATLAS2	172729|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		KALAMUNDA	9 Marie Way, Kalamunda	100.000000	116.041946	-31.975555	17.000000	7.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	172730|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		KALAMUNDA	9 Marie Way, Kalamunda	100.000000	116.041946	-31.975555	28.000000	4.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267920|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	1.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267921|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	28.000000	2.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267925|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	6.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267927|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	8.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	267928|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	9.000000	2001.000000
Calyptorhynchus baudi	BIRDATLAS2	270998|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Rd	100.000000	116.046191	-31.956280	31.000000	3.000000	2002.000000
Calyptorhynchus baudi	BIRDATLAS2	294891|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	7.000000	2003.000000
Calyptorhynchus baudi	BIRDATLAS2	295115|266	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Lanoor Rd	100.000000	116.046191	-31.956280	31.000000	8.000000	2003.000000
Calyptorhynchus baudi	WAM_BIRDS	urn:lsid:taxonomy.org.a	24733.000000	Psittacidae	Calyptorhynchus	baudinii		Lear	Baudin's Cockatoo (lor	Animalia	T	BIRD	Specimen		HAZELMERE	Helena Valley; CSIRO Aviary, Clayton Road	10000.000000	116.033333	-31.933333	1.000000	2.000000	1981.000000
Calyptorhynchus latiro	TFAUNA	12206	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Dead	1	HAZELMERE	Gooseberry Hill	10000.000000	116.033334	-31.933331	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	21309	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day sighting	3	MAIDA VALE	Roe Hwy, Maidavale. 50m south of the maidava	1000.000000	116.012138	-31.957742	17.000000	9.000000	2012.000000
Calyptorhynchus latiro	TFAUNA	23570	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day sighting	15	HIGH WYCOMBE	26 Murray Drive, high Wycombe	1000.000000	116.011384	-31.937222	12.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30285	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	20.000000	5.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30286	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	22.000000	3.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30287	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	25.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30288	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	18.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30289	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	28.000000	1.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30290	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	10.000000	8.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30291	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	27.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30292	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	20.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30293	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	20.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30294	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	7	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	1.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	30295	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	Maida Vale	300.000000	116.016674	-31.933222	14.000000	2.000000	2002.000000
Calyptorhynchus latiro	TFAUNA	30282	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	MAIDA VALE	Maida Vale	300.000000	116.024765	-31.952454	29.000000	4.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30283	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	MAIDA VALE	Maida Vale	300.000000	116.024765	-31.952454	20.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30284	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	MAIDA VALE	Maida Vale	300.000000	116.024765	-31.952454	20.000000	1.000000	2005.000000
Calyptorhynchus latiro	TFAUNA	30842	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	HIGH WYCOMBE	Kooka Road, Wungong Catchment, Gleneagle	1000.000000	116.013301	-31.946989	13.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	30843	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	HIGH WYCOMBE	Kooka Road, Wungong catchment	1000.000000	116.013301	-31.946989	2.000000	10.000000	2007.000000
Calyptorhynchus latiro	TFAUNA	32130	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HIGH WYCOMBE	High Wycombe	300.000000	116.016674	-31.933222	10.000000	10.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32133	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993173	-31.984224	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32134	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993310	-31.984252	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32135	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.994834	-31.984309	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32136	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993010	-31.984583	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32137	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993116	-31.984611	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32138	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993337	-31.984721	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32139	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993252	-31.984721	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32140	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993643	-31.984778	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32141	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993474	-31.984777	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32142	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Hicks Street, Forrestfield	1000.000000	115.993979	-31.984997	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32281	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	2	FORRESTFIELD	Hale Road Nursery	1000.000000	115.998894	-31.990485	26.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	32282	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	2	FORRESTFIELD	Hale Road Nursery	1000.000000	115.998894	-31.990485	26.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	32867	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001121	-31.967697	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32868	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.016536	-31.978976	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32869	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Heard	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002731	-31.977335	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32870	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002561	-31.977388	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32871	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001724	-31.977471	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32872	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001946	-31.977527	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32873	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002369	-31.977558	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32874	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001649	-31.977552	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32875	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001564	-31.977587	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32876	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002199	-31.977610	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32877	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001085	-31.977890	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32878	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001144	-31.978252	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32879	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000816	-31.978249	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32880	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.002509	-31.978307	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32881	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001006	-31.978305	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32882	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000592	-31.978446	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32883	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000390	-31.978498	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32884	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000697	-31.978528	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32885	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001141	-31.978558	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32886	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.001033	-31.978720	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32887	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000195	-31.978894	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32888	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000587	-31.978915	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32889	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000225	-31.979056	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32890	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000447	-31.979085	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32891	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000394	-31.979085	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32892	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Forrestfield, Dept of Agriculture Land	1000.000000	116.000394	-31.979112	25.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32928	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	50	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	32929	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	2	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	32930	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	50	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	32931	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	2	FORRESTFIELD	Forrestfield	1000.000000	116.004729	-31.989331	20.000000	8.000000	2009.000000
Calyptorhynchus latiro	TFAUNA	33072	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988424	-31.980975	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33073	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988255	-31.980973	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33074	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988286	-31.981055	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33075	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.990201	-31.981115	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33076	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988316	-31.981199	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33077	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988506	-31.981219	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33078	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988284	-31.981226	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33079	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988336	-31.981281	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33080	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988473	-31.981363	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33081	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988282	-31.981388	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33082	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988695	-31.981419	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33083	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988927	-31.981448	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33084	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988472	-31.981444	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33085	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989922	-31.981474	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33086	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989000	-31.981584	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33087	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.988502	-31.981616	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33088	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycomb

Calyptorhynchus latiro	TFAUNA	33121	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989702	-31.981246	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	33122	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Definite signs	1	FORRESTFIELD	Dundas Road area, High Wycombe	1000.000000	115.989922	-31.981419	30.000000	10.000000	2010.000000
Calyptorhynchus latiro	TFAUNA	32561	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	30.000000	4.000000	2007.000000
Calyptorhynchus latiro	TFAUNA	32562	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	17.000000	2.000000	2006.000000
Calyptorhynchus latiro	TFAUNA	32563	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	7.000000	2.000000	2005.000000
Calyptorhynchus latiro	TFAUNA	32564	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	5.000000	2.000000	2005.000000
Calyptorhynchus latiro	TFAUNA	32565	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	1.000000	10.000000	2004.000000
Calyptorhynchus latiro	TFAUNA	32566	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	29.000000	12.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32567	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	19.000000	8.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32568	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32569	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32570	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	17.000000	7.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32571	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32572	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	200	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	17.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32573	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	16.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32574	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32575	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	9.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32576	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	4	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	1.000000	5.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32577	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	27.000000	4.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32578	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	4.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32579	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	18	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	23.000000	4.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32580	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	25.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32581	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	23.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32582	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	16.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32583	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32584	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	12.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32585	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	7.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32586	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	5.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32587	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	4.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32588	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	3.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32590	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	1.000000	3.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32591	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	27.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32592	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	27.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32593	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	26.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32594	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	22.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32595	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	18.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32596	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	16.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32597	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	3	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	14.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32598	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	13.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32599	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	9.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32600	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	8.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32601	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	7.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32602	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	6.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32603	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	5.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32604	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	GOOSEBERRY HILL	Gooseberry Hill	300.000000	116.033341	-31.949886	4.000000	2.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32559	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HAZELMERE	Gooseberry Hill	1000.000000	116.033335	-31.933223	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	32560	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	1	HAZELMERE	Gooseberry Hill	1000.000000	116.033335	-31.933223	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	TFAUNA	75831	0.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby 1948	Carnaby's Cockatoo	Animalia	T	Birds	Day Sighting	50	KALAMUNDA	Alpine rd area in Kalamunda/ Perth hills W.Aa	1000.000000	116.046524	-31.977497	18.000000	1.000000	2014.000000
Calyptorhynchus latiro	BIRDATLAS2	122021| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	6.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	218979| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		MAIDA VALE	Crumpet Creek Reserve - Sultana to Hawtin Roa	100.000000	116.018687	-31.967946	15.000000	9.000000	2005.000000
Calyptorhynchus latiro	BIRDATLAS2	240358| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	7.000000	1.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240359| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	14.000000	1.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240368| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	18.000000	3.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240371| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	8.000000	4.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	240372| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Marion Way (garden)	500.000000	116.050552	-31.951666	15.000000	4.000000	2006.000000
Calyptorhynchus latiro	BIRDATLAS2	267920| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	1.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267924| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	5.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267925| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	6.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267926| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	7.000000	2001.000000
Calyptorhynchus latiro	BIRDATLAS2	267932| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	1.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	270998| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Rd	100.000000	116.046191	-31.956280	31.000000	3.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	270999| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Rd	100.000000	116.046191	-31.956280	30.000000	4.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	289404| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	30.000000	6.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	289409| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	31.000000	12.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	289454| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	31.000000	3.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290816| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	30.000000	6.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	290817| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	7.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	290822| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	12.000000	2002.000000
Calyptorhynchus latiro	BIRDATLAS2	290823| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	1.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290824| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	28.000000	2.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290825| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	3.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	290827| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	5.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	294891| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	7.000000	2003.000000
Calyptorhynchus latiro	BIRDATLAS2	5022382| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		MAIDA VALE	Hillbiew Golf Course, Maida Vale	100.000000	116.018051	-31.940281	14.000000	1.000000	2008.000000
Calyptorhynchus latiro	BIRDATLAS2	5109748| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Kalamunda NP	100.000000	116.033686	-31.950169	13.000000	7.000000	2012.000000
Calyptorhynchus latiro	BIRDATLAS2	761039| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		FORRESTFIELD	Forrestfield	100.000000	115.997302	-31.989059	13.000000	6.000000	2009.000000
Calyptorhynchus latiro	BIRDATLAS2	63351| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	5.000000	1999.000000
Calyptorhynchus latiro	BIRDATLAS2	63352| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	25.000000	6.000000	1999.000000
Calyptorhynchus latiro	BIRDATLAS2	63358| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	12.000000	1999.000000
Calyptorhynchus latiro	BIRDATLAS2	67849| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	3.000000	2000.000000
Calyptorhynchus latiro	BIRDATLAS2	80879| 794	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Observational		GOOSEBERRY HILL	Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	5.000000	2000.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		MAIDA VALE	High Wycombe	10000.000000	116.016667	-31.950000	5.000000	7.000000	2003.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		MAIDA VALE	Seaview Terrace Kalamunda	10000.000000	116.033333	-31.966667	9.000000	1.000000	2007.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		GOOSEBERRY HILL	Gooseberry Hill	50.000000	116.050000	-31.950000	2.000000	6.000000	2003.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		KALAMUNDA	Kalamunda	10000.000000	116.050000	-31.966667	5.000000	11.000000	1973.000000
Calyptorhynchus latiro	WAM_BIRDS	um:lsid:taxonomy.org.:	24734.000000	Psittacidae	Calyptorhynchus	latirostris		Carnaby	Carnaby's Cockatoo (sh	Animalia	T	BIRD	Specimen		HAZELMERE	Helena Valley; CSIRO Clayton Road	10000.000000	116.033333	-31.933333	9.000000	2.000000	1981.000000
Morelia spilota imbric	TFAUNA	12405	0.000000	Boidae	Morelia	spilota	imbricata	Lacepede 1804	Carpet Python	Animalia	S	Reptiles	Day sighting	1	GOOSEBERRY HILL	2 Currawong Drive, Gooseberry Hill	1000.000000	116.044999	-31.961304	1.000000	3.000000	2006.000000
Morelia spilota subsp	WAM_REPTILES	um:lsid:taxonomy.org.:	25240.000000	Boidae	Morelia	spilota	imbricata	(Smith)	Carpet Python	Animalia	S	REPTILE	Specimen		MAIDA VALE	MAIDA VALE	50000.000000	116.016667	-31.950000	0.000000	0.000000	0.000000
Morelia spilota subsp	WAM_REPTILES	um:lsid:taxonomy.org.:	25240.000000	Boidae	Morelia	spilota	imbricata	(Smith)	Carpet Python	Animalia	S	REPTILE	Specimen		GOOSEBERRY HILL	KALAMUNDA	50000.000000	116.050000	-31.950000	0.000000	0.000000	0.000000
Morelia spilota subsp	WAM_REPTILES	um:lsid:taxonomy.org.:	25240.000000	Boidae	Morelia	spilota	imbricata	(Smith)	Carpet Python	Animalia	S	REPTILE	Specimen		HAZELMERE	GOOSEBERRY HILL	50000.000000	116.033333	-31.933333	0.000000	0.000000	0.000000
Dasyurus geoffroii	TFAUNA	924	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals	Dead	1	KALAMUNDA	Kalamunda townsite, on Kalamunda Rd. near th	1000.000000	116.051475	-31.965440	25.000000	2.000000	1990.000000
Dasyurus geoffroii	TFAUNA	670	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals		1	HAZELMERE	Bushmead Rifle Range	1000.000000	116.028251	-31.927862	1.000000	12.000000	1991.000000
Dasyurus geoffroii	TFAUNA	12276	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals	Day sighting	1	MAIDA VALE	cnr Midland Rd & Sadler Drive at Maida Vale/Hi	1000.000000	116.024403	-31.934598	20.000000	11.000000	2003.000000
Dasyurus geoffroii	TFAUNA	12592	0.000000	Dasyuridae	Dasyurus	geoffroii		Gould 1841	Chuditch	Animalia	T	Mammals	Dead	1

Isoodon obesulus fusc	TFAUNA	22162	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	Corner of Sundew Road and Hobbs road	1000.000000	116.043027	-31.957564	30.000000	8.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	22701	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	18 Dale drive, Gooseberry Hill	300.000000	116.043983	-31.956182	28.000000	1.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	22838	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	84 Heath Road, Kalamunda	1000.000000	116.045553	-31.971115	13.000000	2.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	24941	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	1	FORRESTFIELD	Close to Perth International Airport (Dundas Rd	10000.000000	115.988903	-31.961484	23.000000	12.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	24952	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	3	FORRESTFIELD	9 Peach Road, Forrestfield and Sultana Rd east	1000.000000	116.014370	-31.972672	1.000000	12.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	24979	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	1	FORRESTFIELD	332 Holmes Rd, Forrestfield	1000.000000	116.018702	-31.985281	13.000000	3.000000	2014.000000
Isoodon obesulus fusc	TFAUNA	24958	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	24 Temby Avenue, Kalamunda	1000.000000	116.047060	-31.969719	22.000000	11.000000	2013.000000
Isoodon obesulus fusc	TFAUNA	67787	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	HIGH WYCOMBE	52 Brand Rd, High Wycombe	1000.000000	116.006835	-31.958865	22.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68004	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	12	HIGH WYCOMBE	9 Raven St, High Wycombe	1000.000000	115.998907	-31.953299	23.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68133	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	HIGH WYCOMBE	Dundas Rd near Soransen Rd nearrailway, Form	1000.000000	115.991579	-31.947053	17.000000	1.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68148	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	HIGH WYCOMBE	174 Maida Vale Rd, High Wycombe	1000.000000	116.004371	-31.950925	18.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68184	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	1	HIGH WYCOMBE	Roe Hwy heading down from High Wycombe	1000.000000	116.015490	-31.942080	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68252	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	5	HIGH WYCOMBE	12 Brand Road, High Wycombe	1000.000000	116.004038	-31.961125	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68310	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	2	HIGH WYCOMBE	10 Sutton Rd, High Wycombe	1000.000000	116.008026	-31.944530	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68413	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	3	HIGH WYCOMBE	60 Brae Road, High Wycombe	1000.000000	116.004890	-31.956702	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68449	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	HIGH WYCOMBE	63 Brae Road, High Wycombe	1000.000000	116.007346	-31.956604	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68544	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	HIGH WYCOMBE	High Wycombe -Only Suburb Given	10000.000000	116.014013	-31.939696	20.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67799	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	20	MAIDA VALE	20 Casuarina Rd, Maida Vale	1000.000000	116.030357	-31.949917	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67834	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	10	MAIDA VALE	32 Maud Rd, Maida Vale	1000.000000	116.023098	-31.967976	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67956	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	5	MAIDA VALE	143 Brewer Rd, Maida Vale	1000.000000	116.018877	-31.966845	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68014	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	2	MAIDA VALE	33 Holmes Rd, Maida Vale	1000.000000	116.029928	-31.963491	7.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68015	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	6	MAIDA VALE	21 Casuarina Rd, Maida Vale	1000.000000	116.029607	-31.949821	7.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68029	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	125 Watsonia Rd, Maida Vale	1000.000000	116.031683	-31.964589	26.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68086	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	MAIDA VALE	28 Kent Rd, Maida Vale	1000.000000	116.016884	-31.965167	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68166	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	17 Casuarina Road, Maida Vale	1000.000000	116.029613	-31.950200	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68358	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	6	MAIDA VALE	11 Terrigal Place, Maida Vale	1000.000000	116.031201	-31.955183	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68374	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	Block bordering Poison Gully, Maida Vale	1000.000000	116.020964	-31.957603	30.000000	5.000000	2007.000000
Isoodon obesulus fusc	TFAUNA	68375	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	MAIDA VALE	Norwood Reserve, Maida Vale	1000.000000	116.022020	-31.959867	30.000000	4.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68411	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	MAIDA VALE	40 Holmes Rd, Maida Vale	1000.000000	116.026332	-31.963319	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68451	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	MAIDA VALE	176 Brewer Road, Maida Vale	1000.000000	116.015813	-31.970310	4.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68582	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	MAIDA VALE	51 Norwood Road, Maida Vale	1000.000000	116.025901	-31.961060	20.000000	8.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67652	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	117 Berkshire Road	1000.000000	116.009147	-31.976158	12.000000	12.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	67785	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	234 Sultana Rd, Forrestfield	1000.000000	116.010026	-31.969219	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67791	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	Cedar Way, Forrestfield	1000.000000	115.999320	-31.987403	1.000000	1.000000	1980.000000
Isoodon obesulus fusc	TFAUNA	67948	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	FORRESTFIELD	25 Coronilla Way, Forrestfield	1000.000000	116.004254	-31.978393	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67961	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	100 Bougainvillea Avenue, Forrestfield	1000.000000	116.002870	-31.978139	20.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68162	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	12	FORRESTFIELD	273 Lewis Rd, Forrestfield	1000.000000	116.026582	-31.984773	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68275	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	FORRESTFIELD	Between Hicks St, & Old tip site, Forrestfield	1000.000000	115.994985	-31.984022	15.000000	8.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	68385	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	Dawson Ave, Forrestfield	1000.000000	115.998038	-31.978759	14.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68410	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	FORRESTFIELD	6 Gilmore Place, Forrestfield	1000.000000	116.013908	-31.995059	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68480	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	FORRESTFIELD	9 Pearce Ave, Forrestfield	1000.000000	116.013996	-31.973003	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68543	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	FORRESTFIELD	Forrestfield -Only Suburb Given	10000.000000	116.009791	-31.989109	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67591	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	18 The Getaway	1000.000000	116.040980	-31.960065	28.000000	3.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67592	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	8-12 Landor Road.	1000.000000	116.049736	-31.954439	1.000000	2.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67648	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	Gray Road	1000.000000	116.035804	-31.957220	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67660	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	6 Gooseberry Hill Road	1000.000000	116.050033	-31.955397	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67713	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	61 Gooseberry Hill Road	1000.000000	116.042869	-31.954405	13.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67715	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	2B Noel Road	1000.000000	116.051259	-31.960702	13.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67726	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	GOOSEBERRY HILL	56 Watsonia road	1000.000000	116.034443	-31.952727	13.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67730	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	47 Girrawheen Drive	1000.000000	116.048525	-31.951850	18.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67758	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	43 Noel Road Gooseberry Hill	1000.000000	116.046403	-31.960566	4.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67769	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	47 Goosberry Hill Road, Gooseberry Hill	1000.000000	116.045090	-31.955586	30.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67773	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	GOOSEBERRY HILL	Dale Drive didn't want to give street number, c	1000.000000	116.043125	-31.956293	14.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67864	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	3	GOOSEBERRY HILL	7 Robertson Rd, Gooseberry Hill	1000.000000	116.040650	-31.953125	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67901	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	1	GOOSEBERRY HILL	Cm Gooseberry Hill Rd & Hermes Rd	1000.000000	116.040733	-31.952278	28.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67902	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	1	GOOSEBERRY HILL	south west side of the roundabout corner of Go	1000.000000	116.051059	-31.955459	1.000000	12.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	67903	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	Darling Range Regional Park	1000.000000	116.043012	-31.948813	28.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67923	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	GOOSEBERRY HILL	4 Currawong Drive, Gooseberry Hill	1000.000000	116.045587	-31.960704	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67967	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	GOOSEBERRY HILL	4 Sundew Rd, Gooseberry Hill	1000.000000	116.042378	-31.956936	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67998	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	GOOSEBERRY HILL	66 Davies Cresent, Gooseberry Hill	1000.000000	116.050380	-31.958702	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68031	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	GOOSEBERRY HILL	15 Robertson Rd, Gooseberry Hill	1000.000000	116.040998	-31.953263	27.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68038	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	8	GOOSEBERRY HILL	10 College Rd, Gooseberry Hill	1000.000000	116.048391	-31.962809	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68063	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	15	GOOSEBERRY HILL	7-9 Gooseberry Hill Rd, Gooseberry Hill	1000.000000	116.049471	-31.956521	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68090	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	5	GOOSEBERRY HILL	The Boulevard, Gooseberry Hill	1000.000000	116.039300	-31.954793	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68094	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	4	GOOSEBERRY HILL	36 Watsonia Rd, Gooseberry Hill	1000.000000	116.036365	-31.954103	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68115	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	GOOSEBERRY HILL	10 Faye Cresent, Gooseberry Hill	1000.000000	116.043674	-31.961475	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68131	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	12	GOOSEBERRY HILL	2 Healey Place, Gooseberry Hill	1000.000000	116.050715	-31.955980	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68134	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	6	GOOSEBERRY HILL	46 Davies Cresent, Gooseberry Hill	1000.000000	116.049707	-31.961340	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68138	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	100	GOOSEBERRY HILL	26 Sundew Rd, Gooseberry Hill	1000.000000	116.044500	-31.957331	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68141	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	GOOSEBERRY HILL	20 Watsonia Rd, Gooseberry Hill	1000.000000	116.035276	-31.956107	25.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68199	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	10	GOOSEBERRY HILL	17 Noel Rd, Gooseberry Hill	1000.000000	116.050201	-31.960712	18.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68360	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	133 Railway Rd, Gooseberry Hill	1000.000000	116.051861	-31.961834	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68424	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	5	GOOSEBERRY HILL	6 Landsdowne Rd, Gooseberry Hill	1000.000000	116.048609	-31.959076	8.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68437	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	18 Dale Drive, Gooseberry Hill	1000.000000	116.043995	-31.956074	14.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68459	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	GOOSEBERRY HILL	59 Davies Cresent, Gooseberry Hill	1000.000000	116.049060	-31.959431	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68493	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	12	GOOSEBERRY HILL	1 Sundew Road, Gooseberry Hill	1000.000000	116.043249	-31.956555	2.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68519	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	GOOSEBERRY HILL	10 Jaraba Avenue, Gooseberry Hill	1000.000000	116.047276	-31.963117	5.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67554	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	15 Carramar Drive, Kalamunda	1000.000000	116.034503	-31.962190	25.000000	10.000000	2011.000000
Isoodon obesulus fusc	TFAUNA	67801	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	KALAMUNDA	53 Snowball Rd, Kalamunda	1000.000000	116.043850	-31.969018	22.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67937	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	9 Josephine Cresent, Kalamuna	1000.000000	116.043669	-31.976333	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68022	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	2	KALAMUNDA	27 Brie Brie Cresent, Kalamunda	1000.000000	116.034567	-31.965132	7.000000	6.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68040	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	KALAMUNDA	Given Coordinates	1000.000000	116.035003	-31.958892	14.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68062	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	4	KALAMUNDA	13 Carramar Drive, Kalamunda. Near Mundy Reg	1000.000000	116.034895	-31.962148	16.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68096	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	4	KALAMUNDA	14 Nangana Way, Kalamunda	1000.000000	116.035082	-31.963449	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68100	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Dead	2	KALAMUNDA	24 Temby Avenue, Kalamunda	1000.000000	116.047061	-31.969601	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68101	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	123 Kalamunda Rd, Kalamunda	1000.000000	116.042160	-31.961563	17.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68229	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	12	KALAMUNDA	7 Persimmon Place, Kalamunda	1000.000000	116.041963	-31.963212	9.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68231	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	54 Heath Rd, Kalamunda	1000.000000	116.048770	-31.971202	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68263	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	KALAMUNDA	3 Bird St, Kalamunda	1000.000000	116.047345	-31.976974	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68273	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Night sighting	2	KALAMUNDA	17 Chesnew Cresent, Kalmunda	1000.000000	116.046603	-31.973035	15.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68347	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	7	KALAMUNDA	44 Brine Rd, Kalamunda	1000.000000	116.040246	-31.965563	21.000000	5.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68376	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	98 Heath Rd, Kalamunda	1000.000000	116.044101	-31.971374	30.000000	4.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68443	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	3	KALAMUNDA	35 East Terrace, Kalamunda	1000.000000	116.049512	-31.968014	7.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68521	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Day sighting	1	KALAMUNDA	Going W to E on Alpine Rd btw Trayten & Bird Re	1000.000000	116.046563	-31.975795	6.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	68522	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841	Quenda	Animalia	PS	Mammals	Diggings	1	KALAMUNDA	Nature Reserve #29013 next to 10 Marie Way, ka	1000.000000	116.039778	-31.975898	18.000000	7.000000	2012.000000
Isoodon obesulus fusc	TFAUNA	67824	0.000000	Peramelidae	Isoodon	obesulus	fusciventer	Gray 1841

Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		GOOSEBERRY HILL	GOOSEBERRY HILL ROAD,POST OFFICE	10000.000000	116.050000	-31.950000	28.000000	1.000000	1961.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		GOOSEBERRY HILL	GOOSEBERRY HILL	10000.000000	116.050000	-31.950000	21.000000	2.000000	1972.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	29.000000	3.000000	1962.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	11.000000	11.000000	1962.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		KALAMUNDA	DARLING RANGES	50000.000000	116.050000	-31.966667	0.000000	0.000000	0.000000
Isoodon obesulus sub	WAM_MAMMALS	um:lsid:taxonomy.org.a	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Quenda, Southern Bro	Animalia	5	MAMMAL	Specimen		HAZELMERE		10000.000000	116.033333	-31.933333	29.000000	6.000000	1966.000000
Merops ornatus	BIRDATLAS2	199337|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		HIGH WYCOMBE	Ollie Worrell Reserve, High Wycombe	100.000000	115.993960	-31.933779	27.000000	11.000000	2001.000000
Merops ornatus	BIRDATLAS2	218755|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		HIGH WYCOMBE	Markham St Reserve	100.000000	116.005915	-31.939057	16.000000	12.000000	2005.000000
Merops ornatus	BIRDATLAS2	218982|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		MAIDA VALE	Crumpet Creek Reserve - Sultana to Hawtin Roa	100.000000	116.018687	-31.967946	19.000000	1.000000	2006.000000
Merops ornatus	BIRDATLAS2	2524|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	10.000000	1998.000000
Merops ornatus	BIRDATLAS2	267928|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	9.000000	2001.000000
Merops ornatus	BIRDATLAS2	267929|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	31.000000	10.000000	2001.000000
Merops ornatus	BIRDATLAS2	289454|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	Landor Road	100.000000	116.046191	-31.956280	31.000000	3.000000	2003.000000
Merops ornatus	BIRDATLAS2	290823|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road	100.000000	116.046191	-31.956280	31.000000	1.000000	2003.000000
Merops ornatus	BIRDATLAS2	67994|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		MAIDA VALE	Hillview Golf Course	500.000000	116.020279	-31.939167	24.000000	1.000000	2000.000000
Merops ornatus	BIRDATLAS2	63357|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		GOOSEBERRY HILL	8 Landor Road, Gooseberry Hill	100.000000	116.046191	-31.956280	30.000000	11.000000	1999.000000
Merops ornatus	BIRDATLAS2	8941|329	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Observational		HIGH WYCOMBE	Ollie Worrell Res.	100.000000	115.993960	-31.933779	14.000000	2.000000	1999.000000
Merops ornatus	WAM_BIRDS	um:lsid:taxonomy.org.a	24598.000000	Meropidae	Merops	ornatus		Latham	Rainbow Bee-eater	Animalia	IA	BIRD	Specimen		KALAMUNDA	Kalamunda Foothills	10000.000000	116.050000	-31.966944	6.000000	11.000000	1962.000000
Isoodon obesulus fusc	FAUNASURVEY	727066	24153.000000	Peramelidae	Isoodon	obesulus	fusciventer	(Gray)	Southern Brown Bandi	Animalia	P5	Mammals	Survey	3	GOOSEBERRY HILL	GooseberryHill	10000.000000	116.051100	-31.955550	19.000000	9.000000	2013.000000
Isoodon obesulus	FAUNASURVEY	911196	25478.000000	Peramelidae	Isoodon	obesulus		(Shaw)	Southern Brown Bandi	Animalia	P5	Mammals	Survey	1	GOOSEBERRY HILL	GooseberryHill	3000.000000	116.038700	-31.952440	18.000000	8.000000	2014.000000
Isoodon obesulus	FAUNASURVEY	911197	25478.000000	Peramelidae	Isoodon	obesulus		(Shaw)	Southern Brown Bandi	Animalia	P5	Mammals	Survey	1	GOOSEBERRY HILL	GooseberryHill	3000.000000	116.038700	-31.952440	18.000000	8.000000	2014.000000
Phascogale tapoatafa	WAM_MAMMALS	um:lsid:taxonomy.org.a	24099.000000	Dasyuridae	Phascogale	tapoatafa	tapoatafa	(Meyer)	Southern Brush-tailed	Animalia	T	MAMMAL	Specimen		KALAMUNDA		50.000000	116.036111	-31.973611	6.000000	12.000000	1979.000000
Phascogale tapoatafa	WAM_MAMMALS	um:lsid:taxonomy.org.a	24099.000000	Dasyuridae	Phascogale	tapoatafa	tapoatafa	(Meyer)	Southern Brush-tailed	Animalia	T	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	0.000000	0.000000	0.000000
Hydromys chrysogaster	WAM_MAMMALS	um:lsid:taxonomy.org.a	24215.000000	Muridae	Hydromys	chrysogaster		Geoffroy	Water-rat	Animalia	4	MAMMAL	Specimen		KALAMUNDA		10000.000000	116.050000	-31.966667	0.000000	0.000000	0.000000
Hydromys chrysogaster	TFAUNA	10621	0.000000	Muridae	Hydromys	chrysogaster		Geoffroy 1804	Water-rat, Rakali	Animalia	P4	Mammals		1	KALAMUNDA	Kalamunda	10000.000000	116.050002	-31.966665	1.000000	1.000000	1927.000000

Appendix B
Flora Inventory

Family	Taxa
Anacardiaceae	**Schinus terebinthifolia*
Araceae	**Zantedeschia aethiopica*
Asparagaceae	**Asparagus asparagoides*
	Chamaescilla corymbosa
	Lomandra sonderi
Asteraceae	**Hypochaeris glabra*
Casuarinaceae	*Allocasuarina humilis*
Cyperaceae	*Mesomelaena pseudostygia*
	Mesomelaena tetragona
Dilleniaceae	*Hibbertia hypericoides*
Fabaceae	**Acacia iteaphylla*
	**Acacia podalyriifolia*
	Acacia pulchella
	**Acacia saligna*
	**Chamaecytisus palmensis*
	Hardenbergia comptoniana
Iridaceae	**Freesia alba × leichtlinii*
	**Watsonia meriana* var. *bulbillifera*
Malvaceae	*Thomasia macrocarpa*
Myrtaceae	*Calothamnus quadrifidus* subsp. *quadrifidus*
	Calothamnus sanguineus
	Corymbia calophylla
	Eucalyptus camandulensis
	Eucalyptus marginata
	Eucalyptus rudis
	Eucalyptus wandoo
	Hypocalymma angustifolium
Oleaceae	**Olea europaea*
Oxalidaceae	**Oxalis pes-caprae*
	**Oxalis purpurea*
Papaveraceae	**Fumaria capreolata*
Passifloraceae	**Passiflora filamentosa*
Poaceae	**Cenchrus clandestinus*
	**Ehrharta calycina*
	**Eragrostis curvula*
Proteaceae	*Banksia dallanneyi* var. *dallanneyi*
	Hakea lissocarpha
	Hakea undulata
Xanthorrhoeaceae	*Xanthorrhoea preissii*
Zamiaceae	*Macrozamia riedlei*

Appendix C
Survey Area Photos

Maida Vale Crumpet Creek Photo Points

Photo point 1: North

Photo point 1: East

Photo point 1: South

Photo point 1: West

Photo point 2: North

Photo point 2: East

Photo point 2: South

Photo point 2: West

Photo point 3: North

Photo point 3: East

Photo point 3: South

Photo point 3: West

Photo point 4: North

Photo point 4: East

Photo point 4: South

Photo point 4: West

Photo point 5: North

Photo point 5: East

Photo point 5: South

Photo point 5: West

Photo point 6: North

Photo point 6: East

Photo point 6: South

Photo point 6: West

Photo point 7: North

Photo point 7: East

Photo point 7: South

Photo point 7: West

Photo point 8: North

Photo point 8: East

Photo point 8: South

Photo point 8: West

Photo point 9: North

Photo point 9: East

Photo point 9: South

Photo point 9: West

Photo point 10: North

Photo point 10: East

Photo point 10: South

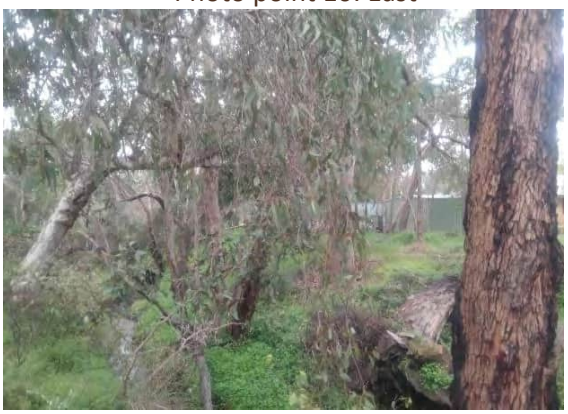

Photo point 10: West

Photo point 11: North

Photo point 11: East

Photo point 11: South

Photo point 11: West

Photo point 12: North

Photo point 12: East

Photo point 12: South

Photo point 12: West

Photo point 13: North

Photo point 13: East

Photo point 13: South

Photo point 13: West

Photo point 14: North

Photo point 14: East

Photo point 14: South

Photo point 14: West

Photo point 15: North

Photo point 15: East

Photo point 15: South

Photo point 15: West

Photo point 16: North

Photo point 16: East

Photo point 16: South

Photo point 16: West

Photo point 17: North

Photo point 17: East

Photo point 17: South

Photo point 17: West

Photo point 18: North

Photo point 18: East

Photo point 18: South

Photo point 18: West

Photo point 19: North

Photo point 19: East

Photo point 19: South

Photo point 19: West

Photo point 20: North

Photo point 20: East

Photo point 20: South

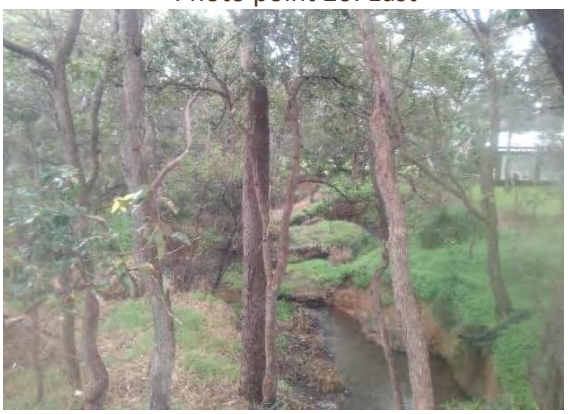

Photo point 20: West

Photo point 21: North

Photo point 21: East

Photo point 21: South

Photo point 21: West

Photo point 22: North

Photo point 22: East

Photo point 22: South

Photo point 22: West

Photo point 23: North

Photo point 23: East

Photo point 23: South

Photo point 23: West

Photo point 24: North

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Photo point 41: West

Photo point 42: North

Photo point 42: East

Photo point 42: South

Photo point 42: West

Photo point 43: North

Photo point 43: East

Photo point 43: South

Photo point 43: West

Photo point 44: North

Photo point 44: East

Photo point 44: South

Photo point 44: West

Photo point 45: North

Photo point 45: East

Photo point 45: South

Photo point 45: West

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Appendix E
360 Environmental
District Water Management Strategy 2021

360 environmental | Part of SLR

Maida Vale

District Water Management Strategy

Prepared for:

M Group

June 2023

people planet professional

Document Reference	Revision	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
2317 AA	Internal Draft	SB & LZ	-	-	N/A
2317 AB	Draft Issued to Client for Comment	SB & LZ	JJ	Electronic	13/12/17
2317 AC	Draft Issued to Stakeholders	SB & LZ	JJ	Electronic	18/12/17
2317 AD	Final Issue Addressing DWER Comments	SB & LZ	JJ	Electronic	30/04/18
2317 AE	Revised to address DWER comments	SB & LZ	KL	Electronic	12/06/18
4709 AF	DWMS sections amendment	PD & SL	DT	Electronic	07/09/21
4709 AG	EPA Comments for client review	GA	AP	Electronic	26/06/23

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Executive Summary

M Group proposes to develop various lots in Maida Vale (the site) for predominately residential purposes. The site is approximately 168 ha (survey area), located approximately 14 km east of the Perth Central Business District in the City of Kalamunda (the City). Primarily surrounded by residential development, the site is bound by Sultana Road East to the south, Harold Road to the north, Hawtin Road to the east and Roe Highway to the west. To the north-west and south-west are densely developed residential areas. The proposed development is residential lots, a primary school complex, small neighbourhood shopping centre and Public Open Space (POS).

This District Water Management Strategy (DWMS) details the water management approach proposed for the development to support the District Planning Scheme and MRS Amendment. The DWMS has been developed in accordance with Better Urban Water Management (WAPC 2008). Water will be managed using a total water cycle management approach, which has been developed using philosophies and design approaches described in the Stormwater Management Manual for Western Australia (DoW 2007).

A review of the existing environment identified the following key constraints to development:

- Flooding associated with Crumpet Creek
- Wetland habitats located downstream of the development
- Underlying aquifers being fully allocated.

Crumpet Creek Flood and Foreshore Management

A site inspection undertaken in 2017 by 360 Environmental showed the creek to be approximately 1.5 m wide and about 0.3 to 0.5 m deep. It is culverted at Hawtin Road, Brewer Road and Sultana East Road where it discharges outside of the proposed development areas. The creek is a naturally meandering system.

A more recent site visit was undertaken by 360 Environmental on 10 August 2021 to assess the riparian vegetation along Crumpet Creek. The results of the survey along with other biophysical criteria formed the basis of a Foreshore Assessment Report (360 Environmental, 2021). A foreshore area and buffer zone were proposed for Crumpet Creek (Figure 13).

Flood modelling was undertaken for a 1% Average Exceedance Probability (AEP) storm event. The model setup is of high resolution, thus can be further used as part of the Local Water Management Strategy (LWMS) to simulate more frequent events.

1% AEP modelling results show the channel runs full and spills in several locations along within site. The culverts at Hawtin road and Brewer Road are of insufficient capacity, hence backing up water, overtopping the Creek's channel and flowing overland. Overland flow is identified between the Hawtin and Brewer Roads on the Creek's left bank and downstream of Brewer Road on the Creek's right side. The maximum modelled flood depth is approximately 350 mm just downstream of Hawtin Road on the Creek's left bank. Downstream of the Brewer Road, the maximum flood depth is approximately 250 mm on the Creek's right bank.

Wetland Risk Management

Management of the potential risk to the wetlands is managed through appropriate stormwater and groundwater management strategies.

Stormwater management focuses on runoff quantity and quality. The principle behind the management strategy for the site is to ensure post development flows are restricted to pre-development conditions and water discharged from the site is of a suitable quality. Runoff quantity control will be done by the implementation of POS and minor earthworks. Quality management will be achieved by applications of Water Sensitive Urban Design elements.

Groundwater management focuses on groundwater quality. The principle behind the management strategy is to improve the quality leaving the site. Quality control will be achieved by reducing the total nutrient loads to groundwater through the treatment of the 15 mm runoff from the site, prior to infiltrating to groundwater.

Irrigation Water Availability

While the aquifers beneath the site are fully allocated, existing abstraction licenses by land holders within the DSP area equates to a total abstraction of 39,932 KL per year.

Assuming an irrigation rate of no more than 6,750 m^3/ha/year (DoW 2014), this allows the irrigation of 5.6 ha of POS. This is approximately 4 ha less active POS than is proposed across the development.

Alternative sources have been assessed and are described in section 7.1.1. Water trading supplemented by alternative source such as scheme water may prove an easy and cost-effective option. However, the irrigation demand for the proposed development area may be able to be achieved with the use of treated greywater, dependent on financial and feasibility studies. This source should be further investigated at the LWMS stage, and detailed information produced to determine its feasibility.

In addition, opportunities to minimise the proposed irrigation area or through alternative landscaping should also be considered.

Abbreviations

A	
AEP	Average Exceedance Probability
ARI	Average Recurrence Interval
AR&R	Australian Rainfall and Runoff
ASS	Acid Sulfate Soil
B	
BoM	Bureau of Meteorology
BUWM	Better Urban Water Management
C	
City	City of Kalamunda
Client	M Group
D	
DBCA	Department of Biodiversity, Conservation and Attractions
DEM	Digital Elevation Model
DMP	Department of Mining and Petroleum
DoH	Department of Health
DoW	Department of Water
DPaW	Department of Parks and Wildlife
DPLH	Department of Planning, Lands and Heritage
DSP	Draft District Structure Plan
DWER	Department of Water and Environmental Regulation
DWMS	District Water Management Strategy
H	
Ha	Hectares
L	
LOR	Limit of Reporting
LSP	Local Structure Plan
LWMS	Local Water Management Strategy
M	
mAHD	metres Australian Height Datum
MGL	Maximum Groundwater Levels
MRS	Metropolitan Regional
MUW	Scheme
	Multiple Use Wetlands

P	
POS	Public Open Space
R	
REW	Resource Enhancement Wetland
U	
UWMP	Urban Water Management Plan
W	
WSUD	Water Sensitive Urban Design

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Appendix A XP-SWMM Hydraulic Modelling
Appendix B District Structure Plan

1 Introduction

M Group (the client) has commissioned 360 Environmental Pty Ltd (360 Environmental) to undertake a District Water Management Strategy (DWMS) for a proposed urban residential development with Public Open Space (POS) across various lots in Maida Vale, City of Kalamunda (the site).

The survey area assessed under this DWMS is approximately 168 hectares (ha). The amendment area is approximately 178 ha.

The site is located approximately 14 km east of the Perth Central Business District. A site location plan is presented in Figure 1.

The preparation of this DWMS is consistent with the Better Urban Water Management (BUWM, West Australian Planning Commission (WAPC) 2008) and has been prepared in consultation with relevant government agencies.

1.1 DWMS Objectives

The DWMS for the site has been developed to address the following objectives:

- Assess the existing environmental hydrological and hydraulic conditions
- Develop a stormwater management strategy for the site taking into account the downstream environment as required
- Identify potential drinking water and irrigation water source constraints and develop a strategy for sustainable water use in the development
- Assess existing information sources and identify gaps to be addressed later in the planning process
- Develop a strategy for managing the 1% average exceedance probability (AEP, equivalent to the 100-year average recurrence interval (ARI)) flood event through the site, identifying retention volumes and overland flow paths
- Develop and document strategies for relevant hydrological conditions identified through the course of the investigation
- Gain support from the city for the proposed strategy to manage stormwater and potential impacts across the site.

1.2 Planning Context

This DWMS has been prepared to support a proposed Metropolitan Regional Scheme (MRS) amendment (MRS 1344/57) for the site as outlined in Section 1.2.2.

The EPA determined that the proposed MRS amendment is to be assessed under Division 3 of Part IV of the EP Act. The EPA Instructions for Environmental Review identified the requirement for the preparation of a DWMS to support the MRS amendment (instruction number 19).

1.2.1 Land Use Zoning

The site is currently zoned as "Rural" under the Metropolitan Region Scheme and "Special Rural" under the City of Kalamunda Local Planning Scheme No. 3.

1.2.2 Strategic Planning Context

The site is designated as urban expansion (northern and southern portions) and rural (central section, crossing the centre of Sultana Road through the centre of Hawtin Road) in the Perth and Peel@3.5 million sub-regional planning frameworks (WAPC 2018).

M Group is currently seeking an MRS amendment to transfer the central section (which contains Crumpet Creek) to urban expansion.

1.3 Policy Framework

There are a number of State Government documents that relate to the site. These include:

- State Water Plan (Government of Western Australia 2007)
- Acid Sulfate Risk Mapping (DWER 2021a)
- Guidance Statement 33: Environmental Guidance for Planning and Development (Environment Protection Authority 2008)
- State Planning Policy No 3: Urban Growth and Settlement (Western Australian Planning Commission (WAPC) 2006)
- Liveable neighbourhoods (WAPC 2007)
- Guidelines for District Water Management Strategies (dow 2013a).

In addition to the above documents, there are a number of published guidelines and standards available that provide direction regarding the objectives which stormwater management should aim to achieve. These are key inputs and include:

- Decision Process for Stormwater Management in Western Australia (Department of Water and Environmental Regulation (DWER) 2017c)
- National Water Quality Management Strategy (Australian and New Zealand Environment and Conservation Council 2000)
- Stormwater Management Manual of Western Australia (Department of Water (dow) 2007)
- Better urban water management (wapc 2008).

These guidance documents, together with information from the City and DWER, were reviewed to determine the likely data requirements for the site. Where applicable the requirements and/or suggestions for best practice management of the water environment outlined in these documents have been incorporated into this document.

1.4 Sources of Information

1.4.1 Site Specific Information Sources

A number of broad level information sources that describe the site have provided a regional context to the DWMS. These were reviewed in order to gather suitable background information for the site, and also to provide an indication of the issues requiring further and more detailed investigation. The background information was sourced from a variety of references, including:

- Water Register Database Search (DWER 2021e)
- Perth Groundwater Database Search (DWER 2021d)
- Contaminated Site Database Search (DWER 2021b).

1.4.2 Water Corporation

The site is found to be included in Water Corporation's Perth Airport Southern Main Drain drainage report (Water Corporation, 2006). Extracts from this report were provided by Water Corporation for investigation as a regional drainage study.

2 Existing Environment

The pre-development existing environmental conditions provide opportunities and constraints for water management on the site. A summary of the environmental characteristics is provided below.

2.1 Land Use

2.1.1 Current

The site, located in Maida Vale, is approximately 168 ha (survey area) of moderately vegetated land and low-density residential developments (see Figure 1). Primarily surrounded by residential development, the site is bound by Sultana Road East to the south, Harold Road to the north, Hawtin Road to the east and Roe Highway to the west. To the north-west and south-west are densely developed residential areas.

2.1.2 Historical

Historical aerial photographs of the site are available from 1995 to 2017 (see Plate 1). These show that in 1995, the west of the site has been mainly used for agricultural purposes, while the remaining of the site consisted of low-density residential development. The images from 2000 onwards show that there has been more residential development throughout the site.

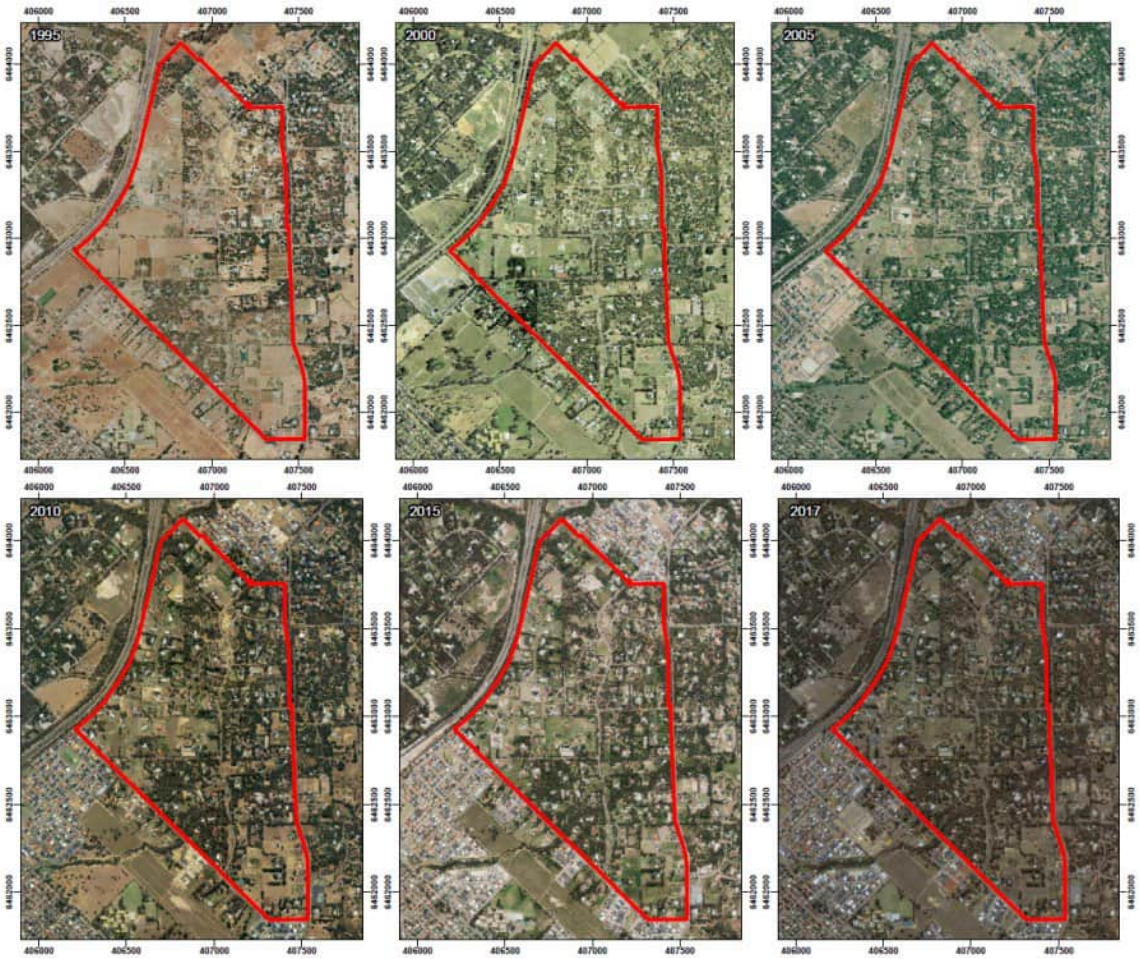

Plate 1: Historical Imagery 1995 to 2017

2.2 Climate

Long term climatic averages indicate that the site is located in an area of low to moderate rainfall with the majority of rainfall received between May and September (Bureau of Meteorology (BoM) 2021). The closest weather station is in Perth Airport weather station (009021), approximately 5 km south-east from the site, that provides a climate data set of approximately 73 years (BoM, 2021). The average precipitation since 1945 is calculated to be 766.1 mm per annum.

Plate 2 summarises the climate data between 1945 and 2016. There is a significant fluctuation in the total annual rainfalls, ranging between 479.6 mm in 2007 to 1,164.7 mm in 1955. There is no major variation in the mean maximum temperature, between 23.3˚C in 1964 and 26.1˚C in 2011.

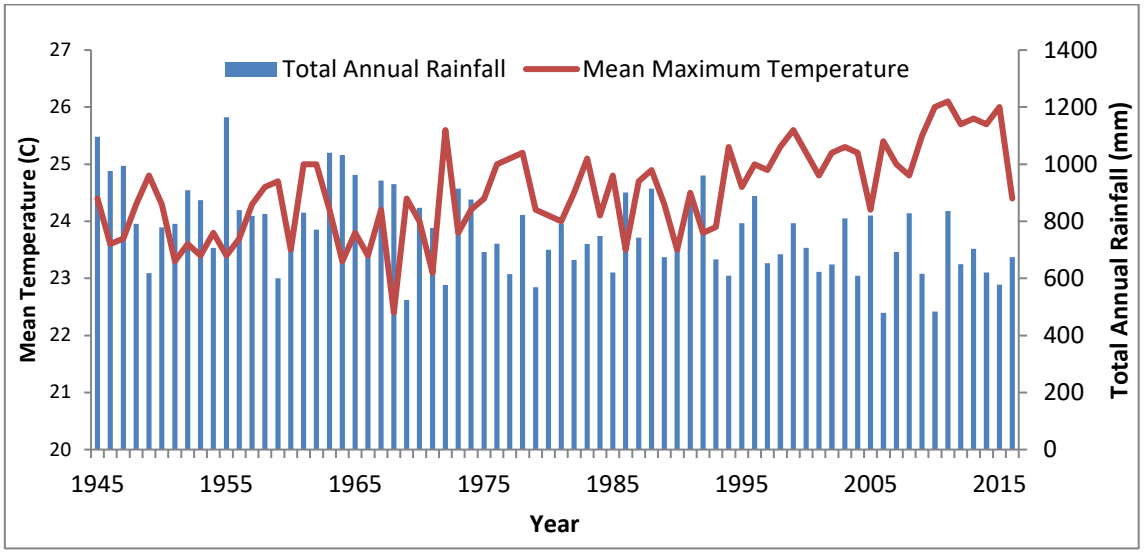

Plate 2: Perth Weather Station Climate Data

2.3 Topography

The site (survey area of approximately 168 ha) generally slopes east to west. Based on the topography in Figure 2 (DoW 2015) the highest elevation of the site is 64 meters Above Height Datum (mAHD) in the southeast corner and the lowest elevation is 42 mAHD in the mid-west boundary.

2.4 Geotechnical

2.4.1 Regional

The central tile sheet of the 1: 50,000 surface geology mapping (Department of Mining and Petroleum (DMP) 2010) indicates that the site is located within the S8, S10, Mgs1 and Mgs 2 soil units (Figure 3). These geological units are described as:

- S10: SAND – very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin
- S12: SAND – yellow, fine to medium-grained, sub-angular to rounded quartz, with some feldspar, well sorted, variable silt content, of colluvial origin
- Mgs1: PEBBLY SILT – strong brown silt with common, fine to occasionally coarse-grained, sub-rounded laterite quartz, heavily weathered granite pebble, some fine to medium-grained quartz sand, of alluvial origin
- Mgs2: GRAVELLY SILT – strong brown, tough with common pebbles of fine to coarse-grained, sub-rounded granite, some dolerite and rare sandstone (SS) variable sand.

Most of the site has been underlain by S8 sand. The description of white to pale grey surface and yellow colour at depth is consistent with the aerial photos and field observation by 360 Environmental scientists.

2.4.2 Acid Sulfate Soils

2.4.2.1 What is ASS?

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals. If disturbed by dewatering, drainage or soil excavation, the pyrites can oxidise thereby releasing iron compounds and sulphuric acid. These soils can result in environmental harm and damage to infrastructure. ASS that has been oxidised and resulted in the creation of acidic conditions are termed Actual ASS, and those that have acid generating potential but remain in naturally anaerobic conditions are termed Potential ASS.

ASS is predominantly found in WA's coastal regions in low-lying wetlands and tidal flats and have also been identified inland within WA's South West Region. The potential for ASS to occur within the site may be assessed by examining the type of soil present and the depth to groundwater. These soils may occur in a variety of waterlogged soils such as dark organic rich soils and muds, peaty wetland soils, some pale grey sands, "coffee rock" (cemented iron and/or organic rich sands) found below the water table and pyritic soils.

Potential ASS has:

- A ph close to neutral (6.5-7.5)
- Contain un-oxidised iron sulphides
- Are usually soft, sticky, and saturated with water
- Are usually gel-like muds but can include wet sands and gravels which have the potential to produce acid if exposed to oxygen.

Actual ASSES are characterised by soils that:

- Have a ph of less than four
- Contain oxidised iron sulphides
- Vary in texture
- Often contain jarosite (a yellow mottle produced as a by-product of the oxidation process).

2.4.2.2 Regional ASS

The DWER provides broad-scale risk maps for several coastal regions of WA where a high, moderate, or low probability of ASS occurrence (3 m from surface) are identified. The data provided by DWER classifies the western and lower-mid area of the site as moderate to low risk of ASS. However, there is no ASS risk in the remainder of the site (Figure 4).

2.5 Hydrology

2.5.1 Regional Context

The site is located within two sub-catchments of the Swan River; Perth Airport South and Perth Airport North.

Crumpet Creek flows within Perth Airport South sub-catchment, which contains the majority of the site. Poison Gully, immediately north of the site boundary is part of Perth Airport North and contains the remaining northern area of the site. Reporting has been undertaken by Water Corporation in relation to both the Perth Airport North and Perth Airport South catchments. Water Corporation were contacted to provide information relating to flows within these catchments, however, given the high level of planning, Water Corporation were unwilling to provide this. The Water Corporation did provide modelled peak flow rates of the upper catchment for Crumpet Creek and predicts that Crumpet Creek has a 10% ARI and 100% ARI flow of 4.8 m^3/s and 7.1 m^3/s respectively between Berkshire and Sultana Roads.

2.5.2 Site Context

A desktop review of available hydrological and topographic information was undertaken to assess the existing hydrological environment. The objectives of this review were to:

- Develop an understanding of how stormwater is currently accommodated onsite
- Identify impacts of flooding on potential development given current ground elevations
- Determine if the site acts as a drainage sump to surrounding land
- Ensure that sufficient space is set aside for stormwater in the final master plan if the site acts as a sump to surrounding land.

The results of the desktop review are as follows:

- Crumpet Creek, an ephemeral stream, flows westwards through the southern half of the site. Poison Gully (also flowing in a westerly direction) is located approximately 20 m north of the site boundary (Figure 5).
- An unnamed open drain exists between Arundel Court and Hawtin Road, crossing under Brewer Road. Water Corporation has confirmed that there are no existing Water Corporation drains/drainage assets within the site. The open drain is a local government drain and discharges water to Reserve 42914 (Figure 5). A pipe from the Reserves leads towards Roe Highway.
- Culverts have been installed to allow the flow of Crumpet Creek under several roads which bisect the site.
- Existing ground conditions of sand will preclude runoff during a low-intensity short duration.

2.5.3 Unnamed open drain

Reserve 42914 (Lot 119930 on Plan 13984) is land owned by the Western Australian State Government. It is vested in the City of Kalamunda. Discussions with the City held on 5 August 2021 (pers comms. Regan Travers) confirmed the site is used for drainage purposes. The site compensates flows from two open drains from Arundel Court to the north and Hawtin Road to the east. The drains from one at Lot 22 on P013984 and water discharges into Reserve 42914. A

350mm inlet pipe from the Reserve discharges water to the east towards Roe Highway, at around Lot 15 on P016922 (Figure 5).

The City is impartial as to whether to keep the Reserve and open drains or relinquishes the land and pipe the open drains to allow for development. However, more detailed hydrological investigations will need to be undertaken in line with the local structure plan to ensure the water from these drains is adequately managed either through a piping system or through attenuation to potential and wider POS area.

2.5.4 Crumpet Creek

Crumpet Creek is a naturally meandering system that flows through the southern half of the Amendment Area. This ephemeral creek is the headwaters of the Perth Airport South Drain, directing water from the Darling Scarp to the Swan River. The creek is approximately 1.5 m wide and about 0.3 to 0.5 m deep (360 Environmental, 2021).

City of Kalamunda Water Quality Monitoring

The City has monitored the water quality of Crumpet Creek between July 2011 and September 2012 at Dundas Road, approximately 2.5 km downstream of the site (City of Kalamunda, undated[1]). These results showed that between the monitoring starting and finishing water quality generally improved with nutrient levels all below trigger values/acceptance range in September 2012.

DWER Water Quality Monitoring

Review of the DWER WIN database confirms no monitoring has been undertaken close to the site boundary on either Poison Gully or Crumpet Creek.

360 Environmental Water Quality Monitoring

360 Environmental undertook water quality monitoring between July and October 2017 at locations immediately upstream and downstream of the site boundary (Figure 7). The water quality was monitored in-situ and using a NATA accredited laboratory. The creek was dry during November. Table 1 shows the average parameters for the two sampling locations.

Table 1: Crumpet Creek Water Quality Results

Parameter	Mean		Min		Max	
	MV01	MV02	MV01	MV02	MV01	MV02
Temperature (°C)	14.18	15	11.5	11.9	18.2	20.8
pH	7.17	7.41	6.47	6.89	7.92	8.15
Dissolved Oxygen (%)	76.78	79.4	64.5	71.3	81	85
Dissolved Oxygen (mg/L)	7.54	7.82	7.01	7.55	7.88	8.16
Specific Conductivity (µS/cm)	444.3	378.2	299.8	293.7	548.5	493.2
Electrical Conductivity (µS/cm)	299.1	308.2	231.5	223.0	403.9	398.9

Parameter	Mean		Min		Max	
	MV01	MV02	MV01	MV02	MV01	MV02
Total Dissolved Solids (mg/L)	288.7	245.7	195.0	191.1	356.2	320.45
Salinity (ppt)	0.22	0.18	0.14	0.14	0.27	0.24
Redox (mV)	101.1	105.3	-59	-63.4	204.9	217.5
Total Suspended Solids (mg/L)	N/A	N/A	<5	<5	5	9
Total Nitrogen (TKN + NOx) (mg/L)	0.48	0.45	0.2	0.2	1.2	1.2
Total Oxidised Nitrogen (mg/L)	0.11	0.01	<0.01	<0.01	0.38	0.36
Ammoniacal Nitrogen (mg/L)	0.02	0.02	<0.01	<0.01	0.03	0.02
Total Phosphorus (mg/L)	0.03	N/A	<0.0	<0.01	0.04	0.05
Soluble Reactive Phosphorus (mg/L)	N/A	N/A	<0.01	<0.01	0.02	0.02

Surface water field parameters and nutrients are presented in Table 1. Over the monitoring period the surface water ranged between 11.5 and 20.8 °C, with a mean surface water temperature between 14.18 and 15.00 °C. The highest temperatures were reported at MV02, located in the south-west portion of the site. Average surface water conditions at the site were observed as fresh, aerobic, and neutral, although pH ranged from slightly acidic to slightly alkaline over the monitoring period. Oxidation reduction potential at both monitoring locations ranged from reducing to oxidising over the monitoring period.

Nutrients were detected at each sampled location. The reported maximum concentrations of total nitrogen were equal to the ANZECC and ARMCANZ (2000) criteria for Lowland rivers at MV01 and MV02. The concentrations for all other nutrients were below the assessment criteria.

2.5.4.1 Water Quantity

DWER did not have available flood information of the site Crumpet Creek and so 360 Environmental undertook flood modelling for this waterline. Figure 12 shows the Crumpet Creek's flood extent in the 1% AEP storm event. Detailed information around the model is presented in Section 5.

2.5.5 Poison Gully

Poison Gully is an ephemeral creek line which flows in a westerly direction adjacent to the northern site boundary.

2.5.5.1 Water Quality

2.5.5.2 City of Kalamunda Water Quality Monitoring

The City has monitored the water quality of Poison Gully between July 2011 and September 2012 at Dundas Road, approximately 2.0 km downstream of the site (City of Kalamunda, undated2). These results showed that between the monitoring starting and finishing water quality generally improved with nutrient levels all below trigger values/acceptance range in September 2012 except total oxidised nitrogen, which exceed trigger values on all but one occasion.

2.5.5.3 360 Environmental Water Quality Monitoring

360 Environmental have not undertaken water quality monitoring of this water course.

2.5.5.4 Water Quantity

Flood mapping of Poison Gully is not available from DWER. It is anticipated that flooding of this creekline is likely to have minimal impact on development of the site. This is because the site is noted to be 3 m higher than the base of the creekline which coupled with the densely wooded creekline habitat is considered sufficient to manage flood flows at this point within the catchment.

2.5.6 Pre-Development Surface Water Flows

An initial and continuing loss infiltration model was adopted to generate stormwater runoff hydrographs in an XPSWMM model. Values for both the initial and continuing losses were adopted based on engineering judgement.

The site was split into four catchments as outlined in Figure 6. These are based on natural surface elevation. There is one external catchment which discharges stormwater through the site (catchment B external).

The catchment breakup is presented in Table 2. Appendix A provides an outline of the catchment characteristics used in the model.

Table 2: Pre-development Catchment Breakup

Catchment	Area (Ha)
Catchment A	21.61
Catchment B	75.67
Catchment B external	33.29
Catchment C	10.12
Catchment D	60.83

The XPSWMM model was executed for the 1% AEP storm event only. A multi-storm analysis was conducted to determine the critical duration event that produces the largest peak discharge from the modelled catchments. This identified the 1% AEP three-hour event as the critical rainfall duration. The maximum runoff rate from the site (not including flows through the site

from external catchments) is approximately 7.4 m^3/s. The pre-development peak flows and volumes discharging from each catchment are provided in Table 3. With insufficient measures taken during development, these volumes could increase due to the introduction of more impermeable surfaces.

Table 3: 1% AEP 3 Hour Pre-development Runoff Volumes

Catchment	Runoff Volume (m^3)	Peak Flow (m^3/s)
Catchment A	5,407	0.84
Catchment B	18,953	2.77
Catchment C	2,323	0.42
Catchment D	16,278	2.35
Catchment B external	7,015	2.10

Water Corporation have reported they have modelled flows in Crumpet Creek between Sultana Rd East and Berkshire Rd, (immediately downstream of the site) but have no monitoring data for this location. The Water Corporation modelling of the upper catchment predicts that Crumpet Creek has a 10% ARI and 100% ARI flow of 4.8 m^3/s and 7.1 m^3/s respectively between Berkshire and Sultana Roads. This increases to a 10% ARI and 100% ARI flow of 7.5m3/s and 10.4m3/s respectively at the Perth Airport boundary near Dubs Close where Crumpet Creek enters the Airport Southern Drain (pers. comms Michael Hoglin, Water Corporation,20 June 2023).

The XPSTORM modelled peak flow rate of Catchment D (Figure 6), which drains into Crumpet Creek, is 2.35 m^3/s as per Table 3. This indicates that Catchment D contributes a significant portion of the Water Corporation's modelled peak flow of 7.1 m^3/s.

2.6 Groundwater

2.6.1 Hydrogeology

The site is underlain by geological formations grouped into three distinct aquifers (DWER 2021d). In descending order from the natural surface these are:

- Perth- superficial swan
- Perth-Leederville
- Perth- yarragadee north.

For the majority of the site the Bassendean Sands (dunes) of the Perth Basin forms an unconfined aquifer beneath the site providing fresh water supplies. For a large portion of the site, the Bassendean Sand overlies the low permeability clayey deposits of the Guildford Formation. Recharge to the aquifer system is by direct infiltration of rainfall.

2.6.2 Groundwater Source Protection Areas

The site is not within Public Drinking Water Source Areas (DWER 2021d) or Proclaimed Surface Water Areas (DWER 2021d).

2.6.3 Groundwater Levels

2.6.3.1 Regional Interpretation

DWER 2021c has data that represents the minimum and maximum groundwater contours in Perth. However, there is no data available within the site. Through extrapolation based on the data from DWER, it is estimated that the minimum ground water levels in the site to be between 17 mAHD and 18 mAHD. The maximum groundwater levels (MGL) are estimated to range between 20 to 22 mAHD. This equates to between 27 and 45 metre below ground level. Groundwater monitoring is not proposed across the site.

There are no DWER monitored boreholes on the site.

Groundwater is flowing in a westerly direction.

2.6.4 Groundwater Quality

2.6.4.1 Regional Interpretation

Groundwater salinity is less than 250-500 mg/L across the whole area (DWER 2021c). This implies groundwater has a low iron staining risk but is unsuitable for garden boreholes.

DWER's Water Information Reporting tool identified four boreholes having groundwater quality measurements approximately 0.2 to 1.9 km northwest of the site. The data from September 2011 is presented in Table 4.

Table 4: Groundwater Quality

Parameter	Borehole ID			
	61670927	61670929	61670930	61670932
pH	5.03	5.03	5.18	5.73
Conductivity (µS/cm)	150	530	910	345

2.6.5 Water Resources

An aquifer allocation report requested in November 2017 shows all the aquifers have been fully allocated therefore there is no water available for abstraction.

The DWER Water Register (2021e) was used to identify existing abstraction licenses located within the site boundary. A total of seven abstraction licenses, totalling an abstraction of 37,908 m^3 a year, were identified and the licence details are summarised in Table 5.

Table 5: Summary of Water Abstraction Licenses within the Site Boundary

Licence Number	Licence Type	Issue Date	Expiry Date	Licence Allocation (m^3)	Aquifer	Licence Address
153231	Groundwater	19/03/2013	18/03/2023	7250	Perth - Superficial Swan	Lot 105 on Diagram 90357; Certificate of Title Volume 2114 Folio 155 Lot 105 Oxford Court Maida Vale
159397	Groundwater	25/01/2018	24/01/2028	12408	Perth - Superficial Swan	Lot 22 On Diagram 27388 Volume/Folio 1267/97 Lot 22 Bruce Rd Maida Vale
179013	Groundwater	26/03/2014	25/03/2024	4000	Perth - Superficial Swan	Lot 8 on Diagram 16758; Certificate of Title Volume 1865 Folio 502 Lot 8 Bruce Road Forrestfield
152817	Groundwater	8/7/2020	7/7/2030	4400	Perth - Superficial Swan	Lot 26 On Plan 13588 Volume/Folio 1597/415 Lot 26 Brewer Rd Maida Vale
204514	Groundwater	9/7/2020	8/7/2030	3600	Perth - Superficial Swan	Lot 5 on Plan 20510/ 308 Sultana Rd E Forrestfield WA 6058
56782	Groundwater	3/04/2014	2/04/2024	6250	Perth - Superficial Swan	Lot 113 on Diagram 85719; Certificate of Title Volume 1993 Folio 316 Lot 113 Sultana Road Forrestfield

2.7 Environmental

Several environmental features either influence or are dependent on the total water cycle for this site. A brief summary of these is provided below.

2.7.1 Wetlands

There are no geomorphic wetlands present on the site (Figure 8). The closest geomorphic wetlands are about 350 m west of the site. This is a Resource Enhancement Wetland (REW) and Multiple Use Wetland (Figure 8).

2.7.2 Environmentally Sensitive Areas

The site is within the extent of three Environmentally Sensitive Areas (ESAs), occurring along the western boundary and within the southern portion of the site. The ESAs across the western boundary refer to SCP20a *Banksia attenuata* woodlands over species rich dense shrublands which is listed as a sub-community of the Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (TEC) and associated buffers (DPaW 2016a). The two ESAs within the site refer to two occurrences of Declared Rare Flora (DRF), *Conospermum undulatum* (DPaW 2016b) (Figure 9).

2.7.3 Contaminated Sites

Two registered contaminated sites are located approximately 1.5 km to the west of the site and are classified as “Contaminated – Restricted Use” and “Remediated for Restricted Use” (Figure 10).

Historical land use analysis of Lots 44, 45 and 46 Brewer Road, Maida Vale indicate a potential for asbestos contamination. The site has since been removed from the Contaminated Sites Register. The extent and severity of contamination (if any) is unknown. Further assessments may need to be undertaken at a later stage in the planning process.

2.7.4 Flora and Fauna

The draft Green Growth Plan for 3.5 million (GGP) is a whole-of-government initiative to provide an unprecedented degree of certainty in relation to future environmental protection and approvals. The site has been identified under the plan as having areas mapped as Broad or Specific Commitments and Values (DCP 2016).

Broad commitments across the site include patches of remnant vegetation of more than 10% but less than 30% remaining regionally, associated with Crumpet Creek and patches of potential Carnaby’s Cockatoo foraging habitat (DCP 2016).

The remnant vegetation associated with Crumpet Creek and surrounding area has been identified as ‘Area not within Urban, Industrial or Rural Classes of Action’ identified as remaining rural.

360 Environmental undertook a Level 2 Flora and Vegetation Assessment and a Level 1 Fauna Assessment and Black Cockatoo habitat assessment in September and October 2015 (360 Environmental, 2016). A total of 198 taxa (including species, subspecies, varieties, and forms) from 41 families across 117 genera were recorded in the area.

One conservation significant flora species, *Conospermum undulatum,* listed under the EPBC Act as Vulnerable, was recorded in four patches of remnant vegetation (Figure 8). Isopogon autumnalis (P3), was found in two remnants of vegetation (360 Environmental, 2023).

Three TECs, being SCP 20a, 20b and 3b all three of the SCP FCTs identified within the site area are TECs pursuant to the BC Act and one is listed as a TEC under the EPBC Act. The three TECs cover a total of 14.25 ha and were inferred based on statistical analysis and consideration of flora sites and other diagnostic features (360 Environmental, 2023).

574 potential Black Cockatoo breeding trees were identified within the site comprised of Marri, Jarrah, Wandoo and Flooded Gum. These trees also provide foraging habitat for the Black Cockatoos. The site contains 38.55 ha of high-quality foraging vegetation as a resource for black cockatoo species (360 Environmental, 2023).

2.7.5 Aboriginal Heritage

A search of the Department of Planning, Lands and Heritage (DPLH), Aboriginal Heritage Inquiry System (AHIS) identified that the part of the site is within a registered aboriginal sites area (DPLH 2021) (Figure 11).

2.8 Water Servicing

2.8.1 Potable

The site Servicing Report (KCTT 2016) considers that Water Corporation has sufficient existing potable water services throughout the site to allow the development to proceed.

2.8.2 Sewerge

KCTT (2016) reviewed Water Corporation serviceability across the site and confirmed it is split into three catchments:

- Northern Precinct; serviced via a 450 mm diameter sewer towards Forrestfield North.
- Central Precinct; development would require extension of major assets (600 mm diameter sewer) from the intersection of Dundas Road/Milner Road/Berk City Road. This may be reliant on the progress of the development of Forrestfield North.
- Southern Precinct; requires the extension of the existing 300 mm diameter infrastructure, approximately 370 m south of Sultana Road East.

Where sewer extensions may be dependent on future expansion outside the control of the client KCTT will work with Water Corporation to develop a strategy which will allow the development to proceed.

2.9 Identified Critical Issues

Section 2 has reviewed the environment pertaining to this site and identified that the key issues relating to the water environment which are assessed as part of the DWMS are:

- The protection and management of Crumpet Creek and its foreshore area
- Flooding associated with Crumpet Creek and culvert sizing
- Wetland habitats located downstream of the development
- Water availability for irrigation with underlying aquifers being fully allocated.

These issues will be outlined in more detail in Sections 5, 6.1 and 7, respectively.

3 Proposed Development

The site is proposed to be residential with POS, a primary school, and a local shopping centre. The draft district structure plan (DSP) (provided in Appendix B) shows the site is proposed to be split into roughly seven parts; the eastern and western sections are proposed to be developed as residential with POS. A primary school is proposed in the central-eastern section of the site and a shopping centre is proposed to be developed in the north-western portion of the site. An easement associated with high power powerlines is proposed to run through the centre of the site and long the northern boundary.

Access to the development is proposed via Harold Road in the north, Hawtin Road in the east and Sultana Road East in the south. Four major roads are proposed to run through the development, Ravenswood Road, Kent Road and Bruce Road, running east to west, and Brewer Road running north to south, through the high voltage powerline easement.

Table 6 provides a summary of the land area devoted to each type of land use.

Table 6: Breakdown of Anticipated Land Use

RESIDENTIAL (ha)	Primary School (ha)	Shopping Centre (ha)	Public Open Space (ha)	ACTIVE POS AREA (ha)	Easement (ha)	Road Reserve (ha)
91.95	4.13	1.06	21.10	9.2	15.61	34.27

4 Design Criteria and Objectives

4.1 Total Water Cycle Management

Total water cycle management recognises the finite limit to a region's water resources and the inter-relationships between the uses of water and its role in the natural environment. The State Water Plan (Government of Western Australia 2007) endorses the promotion of total water cycle management and application of water sensitive urban design (WSUD) principles to provide improvement in the management of stormwater and to increase the efficient use of existing water supplies. Total water cycle management addresses not only physical and environmental aspects of water resource use and planning, but also integrates other social and economic concerns. Stormwater management design objectives should therefore seek to deliver better outcomes in terms of:

- Non-potable and potable water consumption
- Stormwater quality management
- Flood mitigation.

The overall objective for preparing a total water cycle management plan is to mitigate flooding, minimise sediment transport and maintain an appropriate water balance.

4.2 Water Conservation

The overall aim of total water cycle management includes the sustainable consumption of potable water and consideration of all water sources. Therefore, the use of water within the development will be minimised wherever possible.

Historically the site has had low density development, therefore development of the site will require the sustainable use of water resources to ensure unnecessary pressure is not placed on this site.

Design criteria are presented in Table 7.

4.3 Stormwater Management

The overall guiding document for the development of stormwater management strategies is the Stormwater Management Manual of Western Australia (DoW 2007). The Decision Process for Stormwater Management in Western Australia (DWER 2021c) provides guidance on how urban development can achieve compliance with the objectives, principles and delivery approach outlined in the Stormwater Management Manual of Western Australia.

Historically the site has been developed for hobby farm and market garden land uses. Changing land use to predominantly residential can have implications for both the quantity and quality of stormwater runoff generated on the site. Changes to these aspects of stormwater can have impacts on local and downstream environments that require consideration. The overall aim of

the DWMS is to ensure that any potential impacts on the local and downstream environments from land use changes and subsequent development are minimised.

Stormwater retention and detention structures must be designed in accordance with the Stormwater Management Manual of Western Australia (DWER 2007) and Australian Rainfall and Runoff (Engineers Australia 2019). BUWM advocates a water quantity management principle where pre-development peak flows and surface water quality are maintained in the post development environment. Design criteria are presented in Table 7.

4.4 Groundwater Management

The overall objectives for groundwater management are to minimise changes to the underlying groundwater level and quality as a result of development. BUWM (WAPC 2008) advocates a water quality management principle where existing groundwater quality is maintained as a minimum, and preferably improved prior to discharge offsite. Design criteria are presented in Table 7.

Table 7: Proposed Design Criteria

Design Criteria	
Water Conservation	Minimise the net use of water within households to meet the target of 100 m3/person/year (Government of Western Australia 2007).
	Minimise the use of potable water within households to meet the aspirational target of 40-60 m3/person/year (Government of Western Australia 2007).
	Minimise water requirements for the establishment and long-term irrigation of POS.
	Achieve a target of 6,750 m3/ha/year of water for irrigation of POS, as recommended by the DWER (DoW 2014).
Stormwater Flow	Retaining the first 15 mm of rainfall onsite as close to source as practical for all lots greater than 300 m2.
	Ensuring the 1% AEP event can be contained within the road reserve with a minimum 300 mm freeboard to adjacent properties finished floor level.
	Ensuring properties have a finished floor level of 500 mm above the 1% AEP flood level within the adjacent basins.
	Detention of the 20% through to 1% AEP events so that the post development peak discharge is comparable to the pre-development peak discharge.
	Promotion of pipeless, disconnected systems wherever practicable.
Stormwater Quality	Treatment of runoff prior to discharge by detaining and/or infiltrating the first 15 mm of stormwater on site as close to source as possible.
	Apply appropriate structural and non-structural measures to minimise the transportation of sediments offsite and reduce applied nutrient loads.
	Bio-retention systems are to be sized at a minimum of 2% of the connected impervious area, where possible.

Design Criteria	
Groundwater Management	Provide separation distance of at least 1.2 m to MGL.
	Minimise risk of nutrient enrichment of downstream receiving water bodies from groundwater sources.
	Ensure that groundwater quality leaving the site is at least the same, or better, than the water entering the site through a prescriptive post development groundwater quality monitoring programme.
Environmental Management	Crumpet Creek should be maintained as a natural waterway, as it is currently, including preservation (or improvement) of the foreshore area and promotion of appropriate management of this natural environment.

5 Crumpet Creek

As outlined in Section 2.5.4, Crumpet Creek flows through the southern half of the site. This ephemeral creek is the headwaters of the Perth Airport South Drain, directing water from the Darling Scarp to the Swan River. A site inspection of the creek undertaken as part of surface water monitoring completed along the watercourse in 2017 showed the stream to be approximately 1.5 m wide and about 0.3 to 0.5 m deep. It was culverted in three locations where roads cross the stream:

- Hawtin Road culvert upstream of the site, 1.4 m diameter circular culvert
- Brewer Road culvert in the middle of the site, 1.05 m diameter circular culvert
- Sultana Road East downstream of the site, 1.25 m diameter circular culvert.

It is a naturally meandering system. **Plate 3** shows Crumpet Creek near Sultana Road East.

Plate 3: Crumpet Creek

5.1 Crumpet Creek Flood Modelling

Flood modelling was undertaken for a 1% AEP storm event. The model setup is high resolution, thus can further be used as part of the Local Water Management Strategy (LWMS) to simulate more frequent events.

5.1.1 Hydrological Catchments

The study area catchments were delineated using the Hydrologic Engineering Centre Hydrological Modelling System (HEC-HMS) software. The topography used as an input to delineate the catchment was obtained from the Elevation and Depth database on Foundation Spatial Data Framework (Geoscience Australia, 2020). The topography data source is the SRTM-derived Hydrological 1 Second DEM Version 1.0.

A 5 m and a 30 m DEMs were used for catchment delineation because the higher resolution 5 m DEM did not cover the entire catchment.

HEC-HMS delineated eight sub-catchments upstream of the Sultana Road East: seven sub-catchments using a 5 m DEM (green outline, Plate 5) and one sub-catchment using a courser 30 m DEM (red outline, Plate 4). The sub-catchment areas are shown in Table 8.

Table 8: Delineated Catchment Areas

Catchment	Area (km^2)
S_1	0.13
S_2	0.13
S_3	0.26
S_4	0.12
S_5	0.14
S_6	0.16
S_7	0.35
C_1	3.47
Total	4.76

The modelled sub-catchments, including the site (black hashed area) and the Crumpet Creek (blue line), is shown in **Plate 4**.

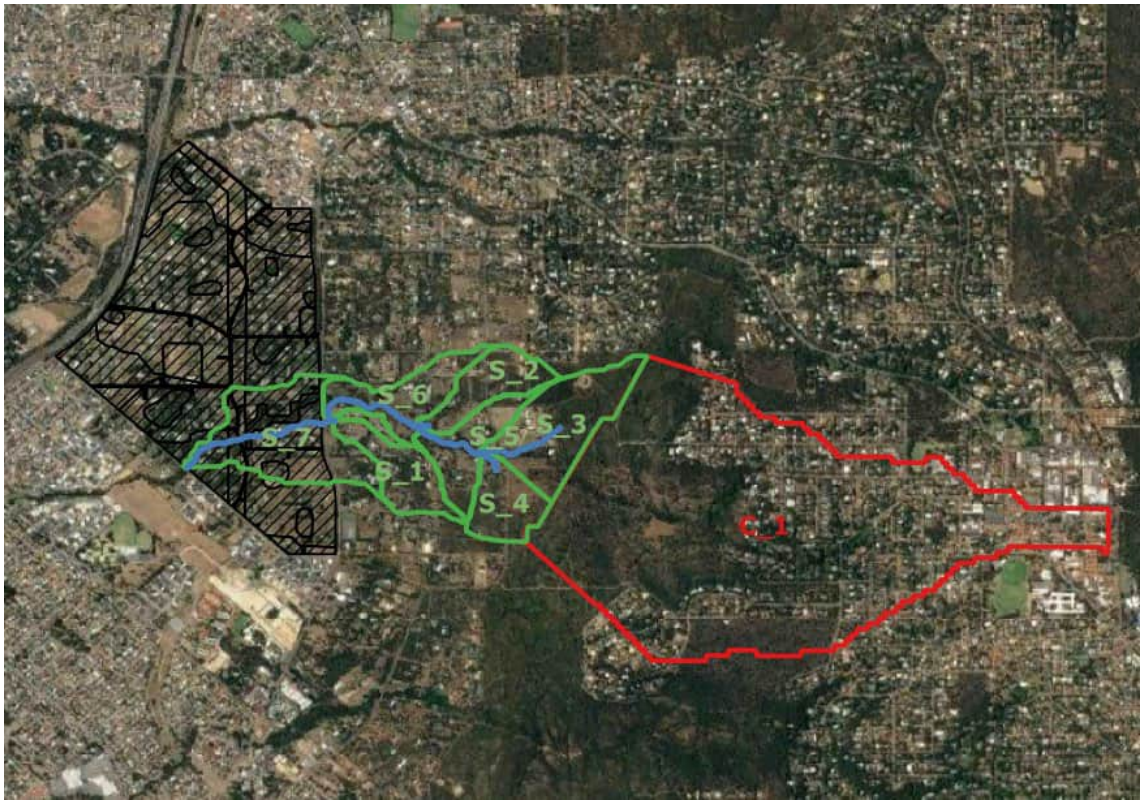

Plate 4: Model Sub-Catchments, Crumpet Creek, and the Site

5.1.2 Runoff Estimation Method – RORB

The runoff routing model RORB (Laurenson and Mein, 1983) was used to estimate catchment runoff for several design rainfall events. RORB is widely used in Australia and is a well-known rainfall-runoff and streamflow routing model.

A RORB model was built to include all the catchments upstream of the proposed 2D model domain.

The calculated runoff from all four sub-catchments was used as the upstream inflow boundary for the 2D flood model. The details of the 2D flood model are described in Section 5.1.3.

Initial infiltration loss (IL) and continuing infiltration loss (CL) were adopted using ARR Book 5 (Geoscience Australia, 2019). The infiltration losses should be re-assessed at the LWMS stage, based on the local infiltration tests. ARR provides a relatively good guideline, however, the infiltration losses, for WA in particular, can differ significantly. The adopted values here will give a reasonably conservative assessment. **Table 9** below summarises the hydrological parameters used for the three catchments.

Table 9: Catchment Characteristics and RORB Model Parameters

Parameter/Catchment	Lewis
Initial Loss (mm)	26.0
Continuing Loss (mm/hr)	6.0

5.1.3 Design Rainfall

Design rainfall used for runoff estimation is based on the Bureau of Meteorology (BoM) Design Rainfall Data System 2016 (BoM, 2021). The database provides rainfall depths and intensities for a wide range of various events rainfall. In the RORB model, a 1% AEP rainfall event was modelled.

The ARR 2019 guidelines recommend that multiple temporal patterns are to be considered when conducting runoff analysis. The Design Areal Temporal Patterns have been used for runoff and flow estimation, as obtained from the ARR Datahub (ARR, 2021).

The modelling confirmed the critical storm duration for the site to be a 9-hour storm, with the temporal profile 10.

5.1.4 Hydraulic Modelling

Hydraulic modelling was carried out to estimate the flood extent within the site and identify the overland flow paths and flood hazards.

HEC-RAS software, release 6.0 of the Hydrologic Engineering Centre – a division of the Institute for Water Resources, US Army Corp of Engineers, was selected to carry out this work. It is a fully dynamic 2D software package.

The model extent was adopted to extend beyond the site boundaries and therefore not influence the flood propagation within site. The model domain includes the inflow from the upstream catchments simulated using RORB and added to the 2D Model as an upstream boundary condition.

Plate 5 shows the 2D model domain. The modelled grid comprises a squared mesh with computational cells resolution of 5 m x 5 m at an outer perimeter and a higher resolution of 1 m x 1 m within the inner perimeter.

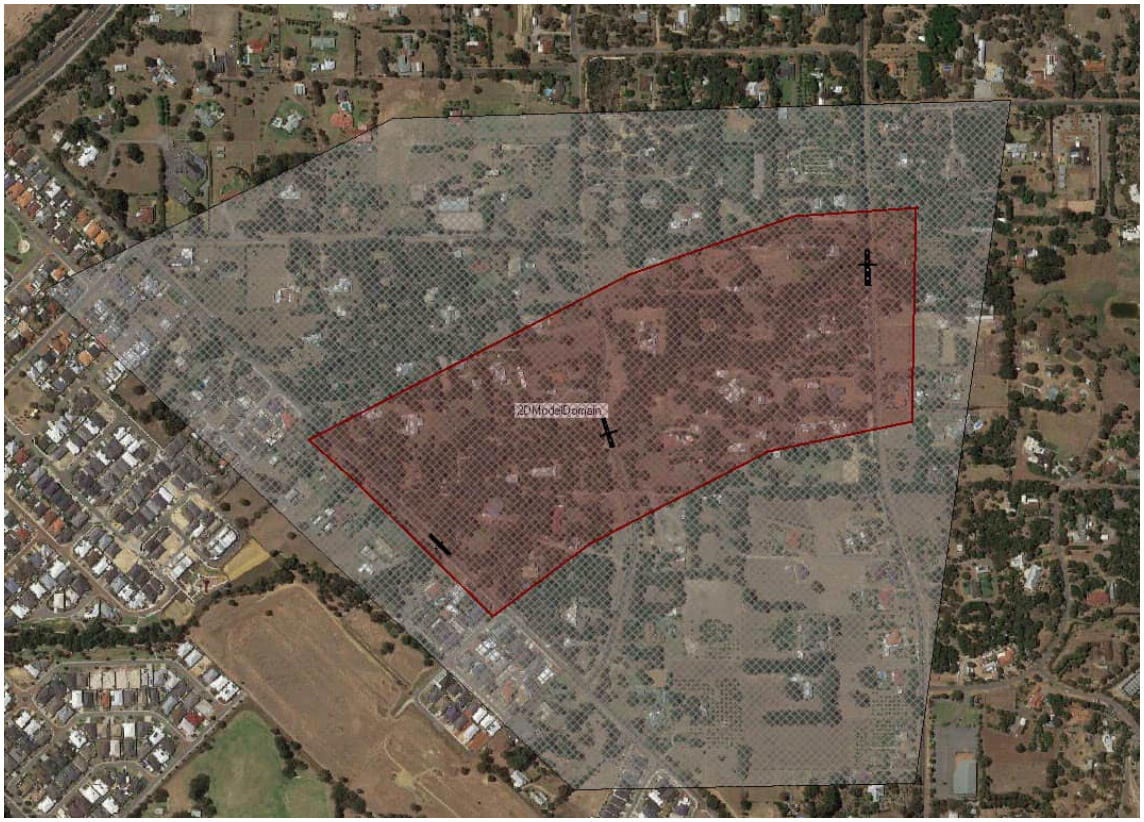

Plate 5: 2D Model Domain

The computational mesh resolution was chosen to consider the resolution of the available terrain information and to enable a detailed representation of the overland flow paths and the creek itself.

5.1.4.1 Topography

All available topographies, assessable free of charge, were too coarse to enable a detailed representation of the overland terrain and the creek itself. Thus, 360 Environmental purchased a high-resolution 1 m DEM from DWER, which then was used to build a high-resolution hydraulic model. The provided terrain information uses the Projection MGA Zone 50 in HEC-RAS and is presented in **Plate 6.**

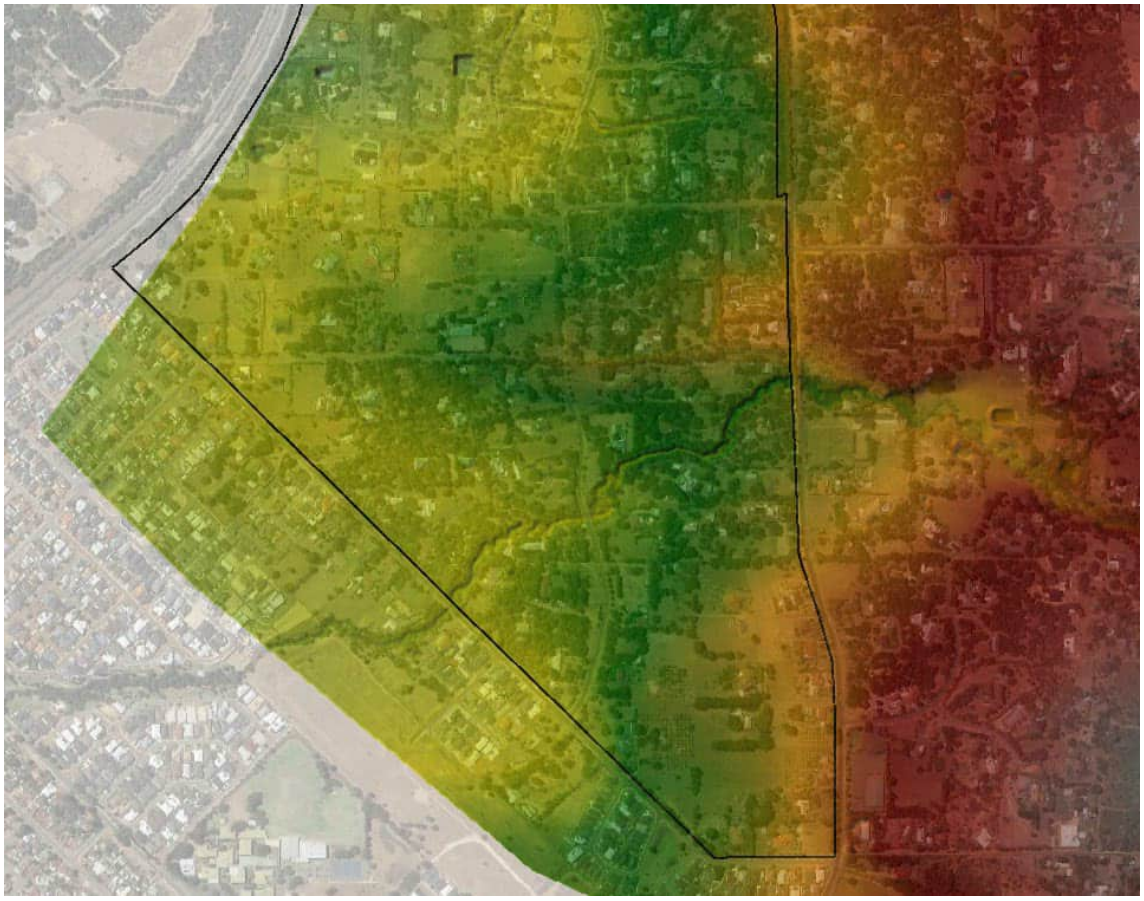

Plate 6: DEM

5.1.4.2 Boundary Inflows

One boundary inflow was included in the 2D hydraulic model where Crumpet Creek enters the site. It represents the runoff from the RORB hydrological model. The hydrograph conveys the accumulated runoff from the upstream catchments, which have a total area of approximately 4.67 km^2.

5.1.4.3 Downstream Boundary Conditions

The downstream boundary condition was set as 'normal depth' because there are unlikely to be significant tailwater effects in the broad unobstructed floodplain.

The 'normal depth' boundary condition allows water to freely 'leave' the model area.

5.1.4.4 2D Model Surface Roughness

ARR 2019 Guidelines provide valid Manning's *n* ranges for different land-use types. Typical land use types and associated Manning's *n* roughness value ranges are summarised in **Table 10.**

Table 10: Manning's n Ranges

Land Use Type	Manning's *n*
Open pervious areas, minimal vegetation (grassed)	0.03 – 0.05
Open pervious areas, moderate vegetation (shrubs)	0.05 – 0.07

Manning's n value of 0.06 was adopted within the 2D model domain based on the site visit and aerial imagery. Manning's roughness used provides a conservative estimate of flood depths. In addition, it indirectly accounts for any local obstructions that may not be well captured within the 2D model terrain information.

A more detailed, spatially distributed Manning's roughness map may better represent the variability of the roughness within the model domain. However, following the site visit and the desktop investigation of the aerial images, it was concluded that using a constant Manning's roughness value is warranted.

5.1.5 Flood Modelling Result

Figure 12 shows the maximum flood depths within site in the 1% AEP event.

The Crumpet Creek channel runs full and spills in several locations along the site. Critically, the flood water backs up upstream of Hawtin Road because the culvert is not large enough to convey the flow. Thus, most of the flooding on the true left bank of Crumpet creek, between the Hawtin and Brewer Roads, comes from flood flows overtopping Hawtin Road in locations separated from the main channel.

The same occurs at Brewer Road and Sultana Rd East where a combination of spilling from the Crumpet Creek true right bank and overtopping of these roads due to insufficient capacity of the culverts, causes backing up and flooding outside of the main channel.

On the Crumpet Creek true left bank, the maximum modelled flood depth is approximately 350 mm just downstream of Hawtin Road. Downstream of Brewer Road, the maximum flood depth is approximately 250 mm, on the Crumpet Creek's true right bank. In most locations within the floodplain, the flood depths do not exceed 100 – 150 mm.

More detailed analysis of the flood depths, including flood velocities and hazard may be carried out at the LWMS stage of the project.

5.2 Crumpet Creek Foreshore Assessment

5.2.1 Current State

360 Environmental undertook a site visit on 10 August 2021 to assess the riparian vegetation condition along Crumpet Creek.

Vegetation conditions ranged from Excellent to Completely Degraded. Although the vegetation along Crumpet Creek varies greatly, the vegetation along the creek north of Brewer Road has

been altered severely, and there are minimal native species. Conversely, the creek south of Brewer Road consists of intact native vegetation considered good to excellent.

No conservation significant flora species were recorded within the Crumpet Creek foreshore area at the time of the survey.

No Ecological Linkages or Environmentally Sensitive Areas occur within the Crumpet Creek Survey Boundary.

The survey recorded Forest Red-tailed Black Cockatoo and Quenda foraging evidence. Trees along the creek's edge include Marri, Jarrah, Wandoo and Flooded Gum. The southern section of Crumpet Creek has intact vegetation, both in the midstory and understory and is therefore considered to be in very good condition and of value to fauna. However, the northern section of Crumpet Creek is disturbed and lacks a midstory and understory of native vegetation. This lack of vegetation structure (cover) limits the foraging and sheltering niches for fauna, particularly birds. However, the trees, Marri, Jarrah, Wandoo and Flooded Gum, provide foraging and potential breeding habitat for black cockatoos.

5.2.2 Foreshore area

A Foreshore Assessment Report was prepared by 360 Environmental in September 2021 (360 Environmental, 2021). The report includes an assessment of the riparian characteristics of Crumpet Creek to determine a suitable Foreshore Area. It also has an evaluation of the site and foreshore's biophysical features.

A Foreshore Area was defined in accordance with the results of a biophysical assessment and the (then) Department of Water (DoW)'s *Operational Policy 4.3: Identifying and Establishing Waterways Foreshore Areas* (Department of Water, 2012) and *Determining foreshore reserves* (Waters and Rivers Commission, 2001).

The proposed foreshore area was designed to protect the remaining environmental values associated with Crumpet Creek. The function of the foreshore in the future is to manage the 1% AEP storm event and provide an attractive area with ecological function.

The area to be recommended as a foreshore area is shown in **Figure 13**. This will recognise the status of the vegetation as a Local Natural Area, the meandering nature of the creek and the floodway. The floodway represents the area inundated due to a 1% AEP rainfall event. It will, therefore, contain the area of all smaller events. This is a permissible extent of the foreshore. It protects the waterway for all smaller events and correlates to the area vegetated.

Due to the varying condition of the foreshore and lack of native vegetation along sections of Crumpet Creek, a modest preliminary foreshore buffer has been recommended based on the scattered and fragmented vegetation beyond the mapped foreshore area and topography (**Figure 13**). The buffer distance will also allow future rehabilitation work such as fencing and revegetation (360 Environmental, 2021).

Adequacy of the buffer distance will be undertaken at the Local Structure Planning stage.

5.2.3 Recommendations

As identified in 360 Environmental (2021), it is recommended that a Foreshore Management Plan (FMP) is undertaken at the Local Structure Plan stage. The FMP will address the landscaping requirements and ongoing management of the foreshore area. It is recommended that the foreshore area is rehabilitated with management strategies that include:

- Limiting access to the vegetation and creek by closing access points and fencing along its perimeter
- Weed control
- Erosion control
- Revegetation using locally endemic species.

6 Groundwater Environment

6.1 Downstream Wetland Habitats

Redevelopment of the site from existing uses has the potential to introduce new contaminants to the natural system, which if intercepted by groundwater could impact the quality of the downstream REW and MUW habitats.

Currently the site has a number of potential groundwater contamination sources including:

- Hobby farms possibly with septic tank systems;
- Small holdings with livestock with no animal waste facilities; and
- Market gardens and hobby farm developments which historically have high nutrient usage from fertiliser and/or pesticide application.

Through development of the site a number of these risks will be eliminated or significantly reduced, however, development may introduce new contamination risks such as:

- Accidental fuels spills; and
- Chemical wastes depending on the possible end uses within the proposed neighbourhood shopping centre.

6.1.1 How the Development Proposes to Manage These Risks

The development will be connected to a Water Corporation sewerage system and the proposed development is limited to primarily residential land uses. The POS proposed will be primarily retention of existing established vegetation which will limit fertiliser application both initially and into the future to small areas of active recreation and residential homes. This limits the principal contamination risks to:

- Water Corporation sewerage assets and associated pipe network;
- Fertilisers and pesticides application in small areas of non-native POS; and
- Possible fuel spills.

6.1.2 Sewerage Asset Risk Management

A wastewater pumping station in environmentally sensitive areas has an emergency overflow storage sized to hold 6 hours of peak flow. In addition, pump stations are designed with a series of alarms and alerts which alert Water Corporation prior to the overflow coming online.

In the event of a power cut it is assumed that the 6 hours of overflow storage provides sufficient time to provide alternative sources of power to return the system to a functioning ‘normal’ state.

6.1.3 Fertiliser Application Risk Management

While larger residential lots are proposed across the development, these will be smaller than the existing lots on the whole, which will reduce the capacity for larger scale vegetation management which may require more fertiliser/pesticide application.

This coupled with the depth to groundwater, which allows significant filtering of water through underground geology, is proposed to minimise the potential for groundwater contamination which could impact downstream wetland habitats.

6.1.4 Fuel Spill Risk Management

It is proposed that road design will be utilised to minimise the likelihood of road traffic accidents which could result in fuel spillage.

7 Irrigation Water Availability

7.1 Minimising Land Requiring Irrigation

A total of 21.1 ha of POS is proposed across the development area. Based on the DSP, it is anticipated that 9.2 ha of this will be active POS which will require irrigation (approximately 61,962 kL/year – Table 13). The majority of the remainder of the POS will be the retention of native vegetation and the easement will not be irrigated.

To reduce irrigation demands for POS, where possible, existing vegetation will be retained. This will, in turn, eliminate the need for irrigation. Opportunities to minimise irrigation through alternative landscaping should also be considered, including the possibility to reduce the proposed irrigated area (6.6 ha) and utilise natural parklands and foreshore areas to meet parklands requirements.

Alternative landscaping may include:

- Limiting natural turf by using synthetic playing surfaces for active POS;
- Utilising regional sporting facilities and limiting active POS areas within the development to be landscaped with native vegetation;
- Eliminating non-essential turf;
- Long-term irrigation of turf only; and
- Providing irrigation of native vegetation, trees, and streetscapes for establishment only.

7.1.1 Irrigation Water

Alternative sources are outlined and described in the sections below. Water trading supplemented by an alternative source such as scheme water may prove an easy and cost-effective option. However, greywater or sewer mining may be a good source of irrigation to meet the expected water demand for the proposed development area, dependent on financial and feasibility studies. A combination of multiple sources may be required. These sources should be further investigated at the LWMS stage, and detailed information produced to determine their feasibility.

7.1.1.1 Water trading

While the aquifers beneath the site are fully allocated, existing abstraction licenses by land holders within the DSP area equates to a total abstraction of 37,908 kL per year. It is proposed that these licences are traded as development progresses to manage POS.

An irrigation rate of 6,750 m^3/ha/year (DoW 2014), allows the irrigation of 5.6 ha of POS. This is approximately 4 ha less active POS than is proposed across the development.

It is noted that the transfer of licenses is at the discretion of the DWER and may not be possible or that license abstraction transfers may not align with development staging.

Nevertheless, a range of alternative water supply options were considered, assessed, and described below.

Water trading of existing water entitlements in the same groundwater sub-area is feasible. This option will need to follow *Water entitlement transactions for Western Australia Policy* (DWER, 2020). There is currently no water allocation plan covering the site. DWER will consider applications on a case-by-case basis in light of the objectives of the *Rights in Water and Irrigation (RIWI) Act 1914.* Water trading negotiations are recommended to initiate at the next planning stage or as soon as possible rather than wait for development staging to trigger this process. If development staging occurs based on factors such as the sewer strategy suggested by KCTT (2016), the central portion would be the last to be completed and almost half of the water licenced (approximately 16,400 kL) would be at risk of being lost, recouped, or committed by Department of Water and Environmental Regulation (DWER) for another use.

A trading agreement with current water licence holders will be necessary to enter in to secure the source. The water entitlements transaction will need to remain within the Perth Groundwater Source Areas, as the abstraction point(s) might change development. Physical limitations and groundwater-dependent ecosystems (GDE) may be required to be assessed at the local planning stage.

Applications for water entitlement transactions are to be submitted to DWER. The application will have to be supported by any additional documentation that DWER requires, including a trading agreement between the landowners and the land development proponents and any studies undertaken to provide evidence that the resource or GDE ecosystems will not be impacted. Finally, the transaction will need to be undertaken by the land developer to transfer the licence(s) to the City at development completion.

7.1.1.2 Crumpet Creek and Poison Gully

Poison Gully borders the site to the north and Crumpet Creek to the south. Both Crumpet Creek and Poison Gully are not within a proclaimed surface water area.

Poison Gully is a natural waterline bordering the site. The Gully then converts into a drain downstream of the proposed development area to the east of Abernethy Rd and at the City's boundary. The Water Corporation also confirms the drain, and the Gully upstream generally dries during summer.

A gauging station is located at Littlefield Rd, High Wycombe, approximately 1 km to the east of the proposed development area. The Water Corporation records yearly data. In the last ten (10) years, peak volumes as high as 50,000 kL have been recorded during winter (generally between April and October), with an average of less than 10,000 kL for the ten years and no flow recorded during summer. These volumes are not sufficient to meet irrigation demands.

Should this be identified as an option in the local structure planning stage, further analysis would need to be carried out. The analysis needs to identify actual water volumes after ecological and

environmental requirements have been provided for, climate change has been considered, and other factors (such as future catchment characteristics) have also been accounted for. An impact assessment may be required to be undertaken for Poison Gully.

No volumetric information was available for Crumpet Creek at or near the proposed development area. Given that both these creeks are dry in the summer months when irrigation water is required, it is unlikely that accessing water from these creeks for irrigation will be viable.

Another potential source of stormwater was identified south of Dubs close and to the east of Water Corporation's wastewater pump station, being a drainage detention basin owned by the City. Dubs Close stormwater basin is located approximately 2 Km to the east of the proposed development site. As with the waterlines, volumes and availability of water will need to be further quantified for use in in any irrigation scheme.

A broad-scale assessment was done to investigate whether stormwater from these waterlines could be sourced for irrigation. Discussions with DWER (pers. comms Glen Simmons, Swan Avon Region) on 28 July 2021 suggest these waterlines are seasonal and dry completely during summer, making the sources unreliable when they are needed the most.

7.1.1.3 Aquifer recharge, storage, and recovery

Managed aquifer recharge and recovery (MAR) is the intentional recharge of an aquifer under controlled conditions for later recovery, environmental benefit, or to mitigate the impacts of abstraction. Water for MAR can be taken from a variety of sources, provided approvals are obtained from relevant agencies. Potential sources include natural ones such as watercourses or aquifers, and alternative sources such as stormwater and treated wastewater, which can be recycled and used for MAR. In Western Australia, DWER's policy "Policy: Managed aquifer recharge in Western Australia (DWER, 2021g)" requires a new source of water for MAR, which does not include stormwater.

An approval process and key supporting information for managed aquifer recharge and recovery (MAR) schemes will need to be provided in accordance with the Guideline: Managed aquifer recharge operations in Western Australia and DWER, 2021g.

Critical supporting information that will generally be required in all managed aquifer recharge and recovery applications includes:

- A hydrogeological assessment that assesses the viability and potential impacts of sourcing, recharging, and recovering water on the environment, water users and public health. It will be required to undertake groundwater modelling, infiltration/injection tests or test pumping for recharge and recovery rates, and water quality tests of source water and aquifer water.
- A risk assessment should be undertaken using the DWER's MAR Guideline and Policy, and the processes outlined in the Australian Guidelines for Water Recycling: Managing

Health and Environmental risks, Phase 1 (NRMMC, EPHC, AHMC, 2006) and Managed Aquifer Recharge, Phase 2 (NRMMC, EPHC, NHMRC 2009).

- An operating strategy that includes information relevant to the ongoing management, monitoring and reporting of the MAR scheme. This may be referred and assessed under the EP Act.

Construction of injection and recovery bores require a licence to construct or alter a well under Section 26D of the RIWI Act. Additionally, a licence to take water will be required from the department under Section 5C of the RIWI Act. Construction of infrastructure approval from the City would also be required. A summary of approval requirements is found in appendix B of the Guideline (DWER 2021g).

The City supports a MAR scheme, should a reliable source be found (pers. comms. Regan Travers 5 August 2021). MAR assessments tailored to meet the project objectives will need to be undertaken in the local planning stage if the source(s) prove reliable for POS irrigation in the development area. Additional capital, maintenance and operational costs associated with the MAR scheme will need to be considered. High infrastructure costs will be required to treat the water, transport it and inject it on-site for later use.

7.1.1.4 Sewer Mining

Sewer mining was assessed as a source for POS irrigation. The Water Corporation was contacted in July 2021 for information relating to sewer mains of a size and with volumes suitable for a proposed sewer mining scheme for the proposed Maida Vale development area. The closest sewer mains to the development area are located at:

- 450 Gooseberry Hill Branch Sewer Main. This sewer main is located approximately 1 km to the northwest of the site.
- Wastewater pump station (WWPS) at Dubs Close, High Wycombe. The pump station is located approximately 2km to the southwest of the proposed development. A suitable sewer mining offtake location at this site was identified upstream of the Dubs Close WWPS.

The Corporation has not provided volumes for these sites at this time. Still, they believe Dubs Close WWPS may be a viable option for a third-party sewer mining proposal. In addition, taking up to around 3 L/s from the access chamber upstream of the WWPS may be feasible at some point in the future when land development increases within the catchment.

The Corporation supports sewer mining and is endorsed under their guiding policy Sewer Mining Guideline (Water Corporation, 2019). The City also supports a sewer mining scheme (pers. comms. Regan Travers 5 August 2021).

Development timing and volume abstracted will dictate whether this source option is viable and operationally acceptable at the above locations.

For the WWPS option, the Corporation believes that as the land around the new Forrestfield train station begins to develop, the sewer flows into this WWPS will steadily increase.

A sewer mining application will need to be assessed by the Corporation as to volumes to be extracted as a large amount of sewage from a sewer during the summer months, when sewer flows are usually much lower, would potentially cause issues with lower flows in the sewers and therefore clog up the network.

The Department of Health requirements under the Guidelines for Non-Potable Uses of Recycled Water in Western Australia (DoH, 2013) when a 5000 L/day of treated effluent will be produced will also need to guide the development of the scheme. Assessment criteria include how close infrastructure is to housing, environmentally sensitive areas studies, proximity to the end-use: a site that is located sufficiently close to the proposed end-use is preferred to minimise the environmental impacts from constructing pipelines and potentially pumping the recycled water, as well as to improve the financial viability of the project.

Financial feasibility and recycled water quality management studies will need to be undertaken. The scheme provider must have a Recycled Water Supply Agreement with their end-users. A water service licence issued by the Economic Regulation Authority will be required to be issued to the ultimate non-potable water supplier.

7.1.1.5 Greywater

Greywater reuse for irrigation will require the development to be staged so that greywater produced can irrigate newly built POS. Staging will also have to tie in with stormwater management infrastructure construction such as basins (likely used for POS too), so they are built so that stormwater attenuation is accounted for while enough greywater volume is available for irrigating.

The average house (based on three persons per house) uses 825L of water every day. This equates to approximately 120L of greywater per person per day. Of this, 40 litres is produced in the laundry and 60 litres from the bathroom (ANZS 1547:2012). Assuming the DSP will have 1,162 new houses built within each lot and 3 people occupy a house, very high-level calculations presented in Table 8 suggest that approximately 168,323 kL/yr would be available for irrigation once the site is fully developed. This would be sufficient to irrigate the proposed development.

Table 11: Preliminary greywater volumes

DSP Development CELLS	Total Lots	Greywater (kL/yr)
1	352	46,252.8
2	176	23,126.4
3	235	30,879
4	160	21,024
5	119	15,636.6

DSP Development CELLS	Total Lots	Greywater (kL/yr)
6	239	31,404.6
TOTAL	**1,281**	**168,323.4**

The greywater scheme from the proposed development also needs to consider the scheme's infrastructure construction timing to ensure it supports development. It would likely be required to be built before development initiating. Connections will need to be provided for each household as development progresses. This will guarantee a reliable source for the City, the non-potable water supplier, to capture greywater, treat it on-site and later use in irrigating POS. As with sewer mining and MAR schemes, the scheme brings heavy capital, maintenance, and operational costs. These will need to be assessed against other source options financial and feasibility studies, such as groundwater (using water trading) and/or scheme water.

At the local planning stage, with a more detailed plan, detailed calculations regarding the volumes of greywater would be required to be estimated for the proposed development area. At this time, this information is high level.

7.1.1.6 Scheme water

Scheme water is a reliable source, although generally the last option being considered for POS irrigation.

Scheme water could be used to supplement water obtained through water trading, and this can be a cost-effective solution not requiring massive capital, maintenance and operational costs driven by recycling and reuse schemes (sections 7.1.1.2 – 7.1.1.4).

A reduction of water use can be achieved with hydro-zoning, maximising shade with mature vegetation, drip irrigation, the use of native and drought-tolerant planting, irrigating schedules to minimise the use of water in the hot hours of the day.

7.1.2 Irrigation Water Quality

Irrigation water is proposed to be sourced from groundwater sources and supplemented from ab alternative source (dependent on financial and viability studies). As an alternative source would be required to be utilised, it will be necessary to meet water quality criteria for safe irrigation. The water quality requirements will depend on the nature of the POS, and the degree of human interaction encouraged. As such, it is recommended that once POS areas and uses have been confirmed, discussions with the Department of Health (DoH) are undertaken to determine likely treatment requirements. Additional advice can be provided from relevant DoH guidelines, including:

- Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) (NHMRC 2008)
- Draft Alternate Water Supply Guidelines – Stormwater and Rainwater (doh 2009)
- Guidelines for the Non-potable Uses of Recycled Water in Western Australia (doh 2011).

Depending on the type of alternative supply, which is agreed to manage irrigation water needs, it may be necessary to:

- Consultation with the City, the Environmental Protection Authority and the Department of Health is undertaken when specific details on the proposed scheme have been confirmed
- Detailed investigations will be required to prove the proposed scheme is viable (dow 2013b)
- Apply for any environmental works approval and licences that may need information regarding anticipated water quality, system management, and end water uses (dow 2013b).

8 Water Balance

At this stage of the planning process no detailed design of the proposed development has been undertaken. However, the water balance for each cell development zone (as outlined in Appendix B) has been calculated based on the rates and methodology presented in the Water Corporation Spreadsheet H2Options. The resulting water consumptions for the development are provided below in **Table 12**.

Table 12 outlines the results for the residential development. Again, it was assumed that native POS would not require irrigation. Therefore, the school would use existing POS rather than have a separate oval.

Table 12: Water Consumption Requirements for Residential Development

Development Zone	Residential Drinking Water (m^3/year)	Residential Non - drinking Water (m3/year)	Total Residential demand (m^3/year)
Cell 1	43,756	9,580	53,222
Cell 2	21,821	4,790	26,611
Cell 3	29,136	6,396	35,532
Cell 4	19,837	4,355	24,192
Cell 5	14,754	3,239	17,993
Cell 6	29,632	6,505	36,137
TOTAL	**158,936**	**25,285**	**193,687**

The average water consumption for the total development area has been calculated as 50.4 m^3/person/year. This value is below the 100 m^3/person/year target.

Table 13 outlines the total water demand for the development includes the water demand for POS. No drinking water is assigned for POS irrigation.

Table 13 Water Consumption for the entire development

Development Zone	Residential Demand (kL/year)	Public Open Space demand (kL/year)	Total demand (kL/year)
Cell 1	53,222	11,373	64,596
Cell 2	26,611	10,995	37,607
Cell 3	35,532	4,243	39,775
Cell 4	24,192	0	24,192
Cell 5	17,993	17,881	35,874
Cell 6	36,137	17,470	53,607
TOTAL	**193,687**	**61,962**	**255,651**

8.1 Rainwater Tanks

The use of rainwater tanks can be a feasible solution for ex-house use to reduce the non-potable water consumption, which decreases the demand for scheme water.

Based on the non-drinking water demand listed in **Table 12,** 25,285 kL water per year can be potentially substituted by other water sources rather than scheme water. If rainwater tanks are used in half of the properties within each development cell (Appendix B), the amount can be supplied entirely by rainwater harvesting.

The harvested rainwater can only be used for non-drinking water purposes due to the quality of the source.

9 Water Management Strategy

This water management strategy recognises the finite limit to the water resources and the inter-relationships between the uses of water and its role in the natural environment. The State Water Plan (Government of Western Australia 2007) endorses the promotion of total water cycle management and application of water sensitive urban design (WSUD) principles to provide improvement in the management of stormwater and to increase the efficient use of existing water supplies. WSUD is considered best management practice and therefore the use of WSUD principles is expected at all levels of implementation of this water management strategy.

9.1 Stormwater Quantity Management

Surface water runoff should be managed both on a development and a lot scale to ensure post development flows are restricted to pre-development levels. The strategy should also ensure sediment transport is minimised and water discharged from the site is of a suitable quality.

A post development hydrological model based on the DSP was modelled in XPSWMM[1] to determine the volume of stormwater to be managed within the site boundary in a 1% AEP storm event. Modelling parameters and assumptions are provided in Appendix A. Stormwater which flows through the site from upstream catchments will not be managed within the site. The DSP has allowed for the provision of overland flow paths through the site to replicate current conditions.

As outlined in Table 7, stormwater management strategies for various rainfall events are proposed:

- The first 15 mm of rainfall is to be retained onsite wherever practical, or as close to source possible
- 1% AEP shall be managed to limit the peak outflow to pre-development levels and maintain a minimum 500 mm freeboard to adjacent finished floor levels for community safety
- The incorporation of WSUD measures to manage water quality and quantity.

To limit the maximum peak discharge of 1% AEP from the site to the same level of pre-development runoff, which is approximately 7.4 m^3/s (Table 3), storage will be required to be developed across the site. Due to the large size of the site, for the purposes of the DWMS each catchment has been developed to manage its own runoff to pre-development flow rates.

Table 14 presents the storage volume and area for each catchment. All storage is modelled to be 500 mm deep and rectangular in shape. The volumes and areas may be varied based on

[1] XPSWMM is a sophisticated hydrological and hydraulic software package which has the ability to generate hydrographs to model open channels, pressure flow networks, backwater effects and stage storage relationships using a complex routing package.

further engineering design at the LWMS and UWMP stages. Infiltration was assumed to be 5 m/day. This should be confirmed by geotechnical analysis in the LWMS.

Table 14: 1% AEP Event Runoff Management Storages

Catchment	Storage Volume (m3)	Storage Area (m2)	Percentage of POS area (%)
A	1050	2100	13.5
B	3500	7000	14.2
C	1250	2500	-
D	1250	2500	1.71

It is considered that, for Catchment A, B and D, sufficient space to manage this volume of water is available within the POS areas identified across the site as outlined in Appendix B. Catchment C does not contain POS area according to DSP. It is recommended that the runoff from this catchment to be managed in Catchment D, due to the large POS area in D. If this were to occur this would increase the percentage of POS used for drainage within Catchment D to 3.4%.

Peak outflow rates and corresponding critical durations are presented in Table 15. It is confirmed that the runoff managed by the storages with high infiltration meets the pre-development level in each catchment.

Table 15: 1% AEP Managed Runoff

Catchment	Critical Duration (hr)	Peak Outflow (m^3/s)	Pre-dev Outflow (m^3/s)
A	3	0.81	0.84
B	3	2.58	2.77
C	1	0.40	0.42
D	3	2.31	2.35

9.1.1 Basin Drain Times

To ensure sufficient capacity within designed basins should rainfall events of magnitude occur back-to-back the Urban Water Resources Centre (2008) has produced a series of recommended emptying time criteria. These are:

- 0.5 days (12 hours) for the first 15 mm.
- 1.5 days (36 hours) for 18.1% AEP event.
- 3.5 days (84 hours) for a 1% AEP event.

The LWMS and Urban Water Management Plan (UWMP) should show compliance with these drain times for any system developed.

9.2 Stormwater Quality Management

Management of erosion and sediment transport within the site must occur at all levels of planning from pre-construction until handover to the City. Strategies that could be adopted to minimise erosion and control sediment transport prior to and during construction include:

- Retention of vegetation along the road verge
- Incremental clearing of the development in stages to minimise erosion opportunities
- Ground disturbance activities avoided during the wet season
- Temporary offline sedimentation basins utilised, if required, to collect fine sediments in the event that drainage from the stage being developed cannot follow the drainage strategy
- Revegetation to occur as soon as possible
- An Erosion and Sediment Control Program documented for the development.

Long-term stormwater quality management within the site will occur within the bio-retention areas. This can be achieved through design including erosion and sediment control features such as vegetation and rock armour.

9.2.1 Bio-retention Areas

Bio-retention areas should be provided to treat runoff from the road network within the development is required to be sized as a minimum 2% of the associated connected impervious area (i.e. the road impervious area).

All lots of sufficient size should manage the first 15 mm of stormwater runoff internally.

9.3 Groundwater Management Strategy

9.3.1 Groundwater Level Management

Available data for groundwater levels across the site has indicated that groundwater is in excess of 25 m below ground level (Section 2.6.3). It is not anticipated that groundwater separation will be an issue across this development.

9.3.2 Groundwater Quality Management

The overall aim for groundwater is to ensure that the quality leaving the site is at least the same, or better, than the water entering the site. This will be achieved by the use of at source retention to treat the first 15 mm of rainfall runoff from the site. This combined with the depth to groundwater are considered sufficient to ensure groundwater quality is not impacted by the development.

10 Implementation Strategy

10.1 Requirements for LWMS

The LWMS should be developed in accordance with the City and DWER and should take into consideration any relevant policies and documents. While strategies have been provided within this DWMS that address planning for water management within the site, the LWMS will clarify details not offered within. The main areas that will require further assessment are outlined below:

- Detailed flood modelling of Crumpet Creek to ensure the proposed development is adequately protected from flood risk
- Geotechnical investigations to confirm infiltration capacity within critical drainage areas and to guide infiltration capacity within lots
- Investigation regarding the potential for contamination within specific lots in the site
- Investigation with Water Corporation to ensure that development of a suitable stormwater management strategy takes into account the outcomes of the Perth Airport North and South drainage strategies
- Detailed investigation and feasibility studies into alternative water supply opportunities to ensure proposed POS can be adequately maintained in the long term
- Foreshore Management Plan to ensure the area is appropriately managed, landscaped, and rehabilitated
- Irrigation water supply for POS areas, prioritising the proposed primary school.

10.2 Monitoring Programme

10.2.1 Pre-development Monitoring

Monitoring of Crumpet Creek surface water quality was undertaken during the winter of 2017 and should continue.

It may be necessary to undertake groundwater monitoring. This will be dependent on the location of any development located within the vicinity of Crumpet Creek.

10.2.2 Post Development Monitoring

Post-development monitoring programmes for surface water quality should be outlined in the LWMS and trigger levels set for this monitoring at the UWMP. These should be based on the results of the pre-development monitoring.

10.3 Irrigation Areas

Once a Local Structure Plan has been defined with defined POS areas and landscape, and irrigation requirements have been confirmed, a detailed plan should be provided as part of the LWMS to address how this land will be adequately irrigated. This plan should include:

- Details of the water requirements for the POS areas, including the proposed primary school, taking into account any opportunities to utilise planting which is draught resistant, minimising turf and choosing landscape systems which minimise water usage
- Confirmation of water supply, prioritising sufficient supply to the proposed primary school.

Should existing licenses be proposed to be transferred to the new landowner, water trading of existing water entitlements will need to follow *Water entitlement transactions for Western Australia Policy* (DWER, 2020). The following information is required:

- Agreement of this transfer with both the licensee and DWER
- Supporting documentation required by DWER and any studies undertaken to prove that the water resource will not be impacted
- Confirmation that licence transfer will occur before the development of the POS to ensure supply is available from commencement of planting.

Greywater reuse or other alternate sources should be investigated in more detail based on DWER's Guideline for the approval of non-drinking water systems in Western Australia (DWER, 2013) and the Department of Health's Guidelines for Non-Potable Uses of Recycled Water in Western Australia (DoH, 2011). If this source is proposed to manage irrigation requirements, full details of this alternative supply should be provided. This may include:

- Any supporting financial and feasibility studies
- Agreement between DWER and any other third party that the source is a viable solution to manage irrigation water requirements across the site
- Confirmation the City is willing to take ownership of the proposed alternative water supply into the future
- POS irrigation staging in accordance with development staging and water resource availability.

10.4 Roles and Responsibilities

The DWMS provides a framework that future developers can use to establish stormwater management systems consistent with relevant State and City policies. The responsibility for working within the framework established within the DWMS rests with the proponent. It is anticipated that future LWMS and UWMP documents will be developed in consultation with the City and DWER and will consider other relevant policies and documents. The future Local Structure Plan (LSP) will need to be supported by an LWMS and require approval from the City.

10.5 Funding

The proponent will meet the cost of developing and implementing management strategies outlined in this document.

10.6 Review

The next stages of development are anticipated to be structure planning through an LSP. Where an LSP is produced, this should be supported by an LWMS. The LWMS will primarily be an extension of the DWMS. It should provide concept designs and measures for water management from the options proposed within the DWMS.

The next stage of development following the LWMS is lot planning through a subdivision. A UWMP would support this stage. It is recognised that certain elements (i.e. non-structural controls) of the DWMS and LWMS will not be finalised until this late stage. There is little or no statutory control that can be applied to ensure the implementation of any remaining measures. While the remaining measures are unlikely to be enforced at this stage, the City could encourage their implementation through policy (or modification of these where necessary) or awareness programmes.

11 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data, and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive, or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness, and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive, and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions, and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions, and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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12 References

360 Environmental 2021, Foreshore Assessment Report, prepared for M Group in support of the Maida Vale MRS Amendment

Australian Government Initiative 2018, National Water Quality Management Strategy. Commonwealth of Australia.

Australian/New Zealand Standard 2012, On-site domestic-wastewater management, AS/NZS 1547-2012. Standards Australia/Standards New Zealand.

City of Kalamunda undated[1], Water Monitoring in the City of Kalamunda; Perth Airport South – Crumpet Creek. Available at: http://www.kalamunda.wa.gov.au/files/cc18a21f-aa61-44d1-9396-a283009e9b2f/Snap-Cards-Enviro-Water-Monitoring-in-the-City-of-Kalamunda-Perth-Airport-Crumpet-Creek.pdf

City of Kalamunda undated[2], Water Monitoring in the City of Kalamunda; Perth Airport North – Poison Gully. Available at: http://www.kalamunda.wa.gov.au/files/3ca52fdb-66c1-4d76-ab01-a28300a2d729/Snap-Cards-Enviro-Water-Monitoring-in-the-City-of-Kalamunda-Perth-Airport-Perth-Airport-North-Sub-Catchment-Poison-Gully.pdf

Department of Health (DoH) 2009, Draft Alternate Water Supply Guidelines – Stormwater and Rainwater, Western Australian Government.

Department of Health (DoH) 2013, Guidelines for the Non-potable Uses of Recycled Water in Western Australia, Western Australian Government.

Bureau of Meteorology 2021, Climate Data Online. Available at: http://www.bom.gov.au/climate/data/index.shtml

Department of Planning, Land and Heritage (DPLH), 2021. Aboriginal Heritage Inquiry system. Available at: https://espatial.dplh.wa.gov.au/AHIS/index.html?viewer=AHIS

Department of Parks and Wildlife (DPaW), 2016a. Threatened and Priority Ecological Communities. GIS Dataset. Database Search Request: 23-0915EC. Government of Western Australia.

Department of Parks and Wildlife (DPaW), 2016b. Threatened and Priority Flora. GIS Dataset. Database Search Request: 32-0915FL. Government of Western Australia.

Department of Water 2007, Stormwater Management Manual. Government of Western Australia.

Department of Water (DoW) 2012, Operational Policy 4.3: Identifying and Establishing Waterways Foreshore Areas

Department of Water (DoW) 2013a, Guidelines for district water management strategies: Guidelines for preparing a district water management strategy to support a region scheme amendment or district structure plan.

Department of Water (DoW) 2013b, Guidelines for the approval of non-drinking water systems in Western Australia: Urban Developments.

Department of Water 2014, Northwest Corridor Water Supply Strategy. Government of Western Australia.

Department of Water and Environment Regulation 2021a, Acid Sulfate Risk Mapping.

Department of Water and Environmental Regulation 2021b, Contaminated Sites Database. Available at: https://secure.dec.wa.gov.au/idelve/css/

Department of Water and Environmental Regulations 2017c, Decision Process for Stormwater Management in Western Australia.

Department of Water and Environmental Regulation 2021d, Perth Groundwater Map. Available at: https://maps.water.wa.gov.au/#/webmap/gwm

Department of Water and Environmental Regulation 2021e, Water Register. Available at: https://maps.water.wa.gov.au/#/webmap/register

Department of Water and Environmental Regulation 2021f. Clearing Permit System Map. Available at: https://cps.der.wa.gov.au.

Department of Water and Environmental Regulation 2021g. Managed Aquifer recharge in Western Australia. Government of Western Australia.

Department of Water and Environmental Regulation 2020. Water entitlement transactions for Western Australia. Government of Western Australia.

Engineers Australia 2016, Australia Rainfall and Runoff.

Environment Protection Authority 2008, Guidance Statement 33: Environmental Guidance for Planning and Development.

Government of Water Australia 2007, State Water Plan.

KCTT 2016, Infrastructure Servicing Report; Urban Expansion Precinct Maida Vale.

National Health and Medical Research Council (NHMRC) 2008, Australian Guidelines for Water Recycling: Managing Health and Environmental Risks, Australian Government.

Waters and Rivers Commission 2001, Determining foreshore reserves

Water Corporation 2006, Perth Airport Southern Main Drain – Scheme Review

Water Corporation 2019, Sewer Mining Internal Guideline

Western Australia Planning Commission 2006, State Planning Policy No.3: Urban Growth and Settlement.

Western Australia Planning Commission 2007, Liveable Neighbourhoods.

Western Australia Planning Commission 2008, Better Urban Water Management.

Western Australian Planning Commission 2018, Perth and Peel@3.5million. Government of Western Australia.

Urban Water Resources Centre 2008, Water Sensitive Urban Design: Basic Procedures for 'Source Control' of Stormwater, University of South Australia.

Figures

406000 406500 407000 407500

6464000 6463500 6463000 6462500 6462000

PEREGRINE GRN
DIRPHIA PL
ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD
MAIDA VALE RD ONTO ROE HWY (SOUTHBOUND)
TREE FERN GRN
WILLERN MEWS
BAZA GDNS SPUR
MAIDA VALE RD
HAWTIN RD
KALAMUNDA RD
BITTERN CL
BAZA GDNS
MAIDA VALE RD
STEWART RD
BRAE RD
DARTER WY
BANDIN PL
MYERSON CR
KAORKI CT
MCCORMACK PL
JUBATA CT
JECKS ST
PIMELEA ST
PIMELEA ST
KUNZEA CL
LILIAN RD
MILLSON ST
OXFORD CT
GILBA PL
HAROLD RD
HAROLD RD
IRWIN PL
BRAND RD
ROE HWY
QUENINGTON CT
HEWSON PL
NORWOOD RD
ARUNDEL CT
HAWTIN RD
ROE HWY
ROE HWY
RHODES PL
CLOVELLY CT
ROE HWY
SMOKEBUSH PL
SULTANA RD WEST
RAVENSWOOD RD
KENT RD
KENT RD
HAWTIN RD
BREWER RD
MAUD RD
MULBERRY CT
BRUCE RD
FRUIT TREE CR
FIG LN
PLUM WY
NECTARINE WY
CHERRY TREE RD
PASSIONFRUIT WY
LOQUAT WY
APRICOT ST
SEVILLE RD
QUINCE L
CUMQUAT WY
MANGOSTEEN DR
GALA WY
FRUIT TREE CR
APPLE WY
MANDON ST
NANDAT RD
YONGAR WY
JANDA WY
MENANGAL WY
TYLER MEWS
MANDON ST
WARDA CR
LOVETT DR
PEARCE AV
SETOSA DR
SULTANA RD EAST
HAWTIN RD
LESCHENAULTIA WY
HIBBERTIA CT
BERKSHIRE RD
ILEX WY
ILEX WY
BERKSHIRE RD
CALLUNA WY
KALMIA WY
MANDEVILLA ST
KALMIA WY
CALLUNA WY
AZALEA GDNS
CAMELLIA LOOP
SULTANA RD EAST

Landgate / SLIP

406000 406500 407000 407500

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Legend

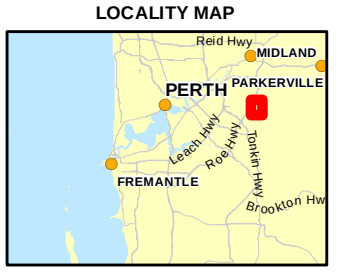
- Site Location
- Cadastre Lines

0 75 150 225 Meters
1:7,500 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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LF	PD	PD	0

M Group
Maida Vale, WA

DWMS

Figure 1
Site Location

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F01 Site Location.mxd

406000 406500 407000 407500

6464000 6463500 6463000 6462500 6462000

ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD

MAIDA VALE RD ONTO ROE HWY (SOUTHBOUND)

MAIDA VALE RD

HAWTIN RD

KALAMUNDA RD

PIMELEA ST

HAROLD RD

ROE HWY

HAWTIN RD

KENT RD

HAWTIN RD

ILEX WY

BERKSHIRE RD

MANDEVILLA ST

SULTANA RD EAST

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Legend

- Site Location
- Contours 1m interval (mAHD)

0 75 150 225 Meters

1:7,500 @ A4

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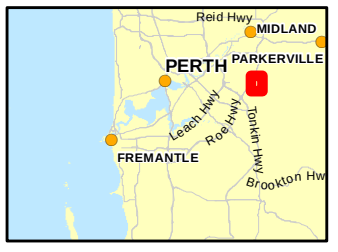
LOCALITY MAP



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M Group
Maida Vale, WA

DWMS

Figure 2
Topography

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F02 Topography.mxd

406000 406500 407000 407500

6464000 6463500 6463000 6462500 6462000

S10 S12 Mgs2 S10 Mgs1 Mgs2 S8

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Legend

Site Location

Surface Geology

Mgs2: GRAVELLY SILT - strong brown, tough with common pebbles of fine to coarse-grained, sub-rounded granite, some dolerite and rare sandstone (SS) variable sand content

S8: SAND - very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin

S10: SAND - very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin

Mgs1: PEBBLY SILT - strong brown silt with common, fine to occasionally coarse-grained, sub-rounded laterite quartz, heavily weathered granite pebble, some fine to medium-grained quartz sand, of alluvial or

S12: SAND - yellow, fine to medium-grained, sub-angular to rounded quartz, with some feldspar, well sorted, variable silt content, of colluvial origin

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0 75 150 225 Meters
1:7,500 @ A4

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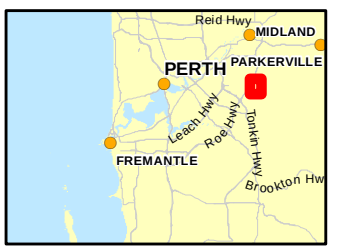
LOCALITY MAP



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M Group
Maida Vale, WA

DWMS

Figure 3
Surface Geology

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F03 Surface Geology.mxd

406000 406500 407000 407500

6464000 6463500 6463000 6462500 6462000

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406000 406500 407000 407500

Legend

Site Location

Acid Sulfate Soils Risk

Moderate to low risk

0 75 150 225 Meters

1:7,500 @ A4

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M Group
Maida Vale, WA

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Figure 4
Acid Sulfate Soil Risk Map

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6464000 6463500 6463000 6462500 6462000

Poison Gully

R 42914

Crumpet Creek

Crumpet Creek

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406000 406500 407000 407500

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Legend

- Site Location

Hydrography

- Watercourse - minor
- Open Drain
- Local Government Pipe
- Reserve

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0 75 150 225 Meters

1:7,500 @ A4

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M Group
Maida Vale, WA

DWMS

Figure 5
Drainage Infrastructure

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F05 Surface Water Features.mxd

406500 407000 407500 408000

6464000 6463500 6463000 6462500 6462000

ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD
MAIDA VALE RD ON TO ROE HWY (SOUTHBOUND)
ROE HWY
MAIDA VALE RD
HAWTIN RD
KALAMUNDA RD
PIMELEA ST
HAROLD RD
KENT RD
SULTANA RD EAST
BERKSHIRE RD
MANDEVILLA ST
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Legend

- Site Location
- Surface water flow direction
- Contours 1m interval (mAHD)
- Potential drainage basin locations
- POS
- Catchment A
- Catchment B
- Catchment B external
- Catchment C
- Catchment D

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0 75 150 225 Meters
1:7,500 @ A4

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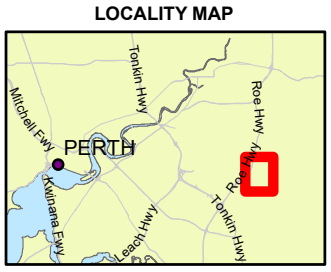

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M Group
Maida Vale, WA

DWMS

Figure 6
Surface water management

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 GIS Edits for Hydrology\4709 F06 Pre-development Catchment.mxd

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6464000 6463500 6463000 6462500 6462000

ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD
MAIDA VALE RD ON TO ROE HWY (SOUTHBOUND)
MAIDA VALE RD
HAWTIN RD
KALAMUNDA RD
PIMELEA ST
HAROLD RD
ROE HWY
ROE HWY
HAWTIN RD
KENT RD
MV01
MV02
HAWTIN RD
ILEX WY
BERKSHIRE RD
MANDEVILLA ST
SULTANA RD EAST
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406000 406500 407000 407500

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Legend

- Site Location
- Surface Water Monitoring Locations

0 75 150 225 Meters
1:7,500 @ A4
N

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M Group
Maida Vale, WA

DWMS

Figure 7
Surface Water Monitoring Locations

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F07 Surface Water Monitoring Locations.mxd

405500 406000 406500 407000 407500 408000 408500

6465000 6464500 6464000 6463500 6463000 6462500 6462000 6461500 6461000

BUTCHER RD
MAIDA VALE RD
MILNER RD
MAIDA VALE RD
ANACES CT
LITTLEFIELD RD
MAIDA VALE RD
ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD
MAIDA VALE RD ON TO ROE HWY (SOUTHBOUND)
MYERSON CR
MAIDA VALE RD
BRENDA RD
KALAMUNDA RD
MIDLAND RD
RIDGE HILL RD
DONALD RD
PRIORY RD
KALAMUNDA RD
BUGENDORE ST
ACACIA RD
CASUARINA RD
GOOSEBERRY HILL RD
HAWTIN RD
MAIDA VALE RD
KALAMUNDA RD
PIMELEA ST
WEST TCE
HAROLD RD
ROE HWY
ROE HWY
HAWTIN RD
KENT RD
HAWTIN RD
HARRISON RD
BERKSHIRE RD
BERKSHIRE RD
ILEX WY
BERKSHIRE RD
MANDEVILLA ST
SULTANA RD EAST
AZALEA GDNS
BERBERIS WY
BERKSHIRE RD
PASSIFLORA DR

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Legend

Site Location

Geomorphic Wetlands

- Conservation Category
- Resource Enhancement Category
- Multiple Use Category

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0 130 260 390 Meters
1:12,500 @ A4

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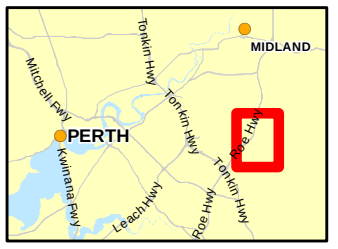

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M Group
Maida Vale, WA

DWMS

Figure 8
Geomorphic Wetlands

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F08 Geomorphic Wetlands.mxd

406000 406500 407000 407500

6464000 6463500 6463000 6462500 6462000

ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD
MAIDA VALE RD ON TO ROE HWY (SOUTHBOUND)
MAIDA VALE RD
HAWTIN RD
KALAMUNDA RD
PIMELEA ST
HAROLD RD
ROE HWY
HAWTIN RD
KENT RD
HAWTIN RD
ILEX WY
BERKSHIRE RD
MANDEVILLA ST
SULTANA RD EAST

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406000 406500 407000 407500

Legend

- Site Location
- Environmentally Sensitive Areas

0 75 150 225 Meters
1:7,500 @ A4

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M Group
Maida Vale, WA

DWMS

Figure 9
Environmentally Sensitive Areas

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Legend

- Site Location

Contaminated Sites Database

- Remediated for Restricted Use
- Contaminated, Restricted Use
- Contaminated, Remediation Required

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0 210 420 630 Meters
1:20,000 @ A4

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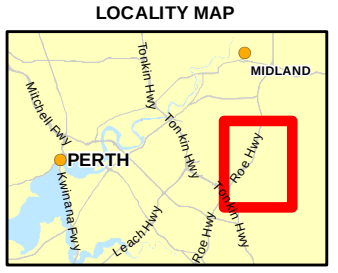

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M Group
Maida Vale, WA

DWMS

Figure 10
Contaminated Sites

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406000 406500 407000 407500

6464000 6463500 6463000 6462500 6462000

ROE HWY (NORTHBOUND) OFF TO MAIDA VALE RD
MAIDA VALE RD ON TO ROE HWY (SOUTHBOUND)
MAIDA VALE RD
HAWTIN RD
KALAMUNDA RD
PIMELEA ST
HAROLD RD
ROE HWY
ROE HWY
HAWTIN RD
Place ID: 25023 (Poison Gully Creek)
KENT RD
Place ID: 3638 (VALLEY FARM STABLES)
Place ID: 3668 (LESCHENAULTIA WAY)
HAWTIN RD
ILEX WY
BERKSHIRE RD
MANDEVILLA ST
SULTANA RD EAST
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Legend

Site Location

Aboriginal Heritage

Registered Sites

Lodged Sites

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0 75 150 225 Meters

1:7,500 @ A4

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M Group
Maida Vale, WA

DWMS

Figure 11
Heritage

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F11 Heritage.mxd

407000 407500

6463000

KENT RD

HAWTIN RD

1.4 m circular culvert

1.05 m circular culvert

Text

6462500

1.25 m circular culvert

HAWTIN RD

6462000

SULTANA RD EAST

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407000 407500

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Legend

Site Location

1%AEP Flood Depth

- 0 - 0.5m
- 0.5 - 1.0m
- 1.0 - 1.5m
- 1.5 - 2.0m
- 2.0 - 2.5m
- 2.5 - 3.0m
- 3.0 - 3.5m

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0 40 80 120

Meters

1:4,000 @ A4

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M Group
Maida Vale, WA

DWMS

Figure 12
Crumpet Creek
1% AEP Flood Mapping

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F12 Crumpet Creek 1% AEP Flood Mapping.mxd

406750 407000 407250 407500

6463000 6462750 6462500 6462250 6462000

KENT RD

HAWTIN RD

HAWTIN RD

SULTANA RD EAST

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Legend

- Site Location
- Foreshore Area
- Foreshore Buffer

1%AEP Flood Depth

- 0 - 0.5m
- 0.5 - 1.0m
- 1.0 - 1.5m
- 1.5 - 2.0m
- 2.0 - 2.5m
- 2.5 - 3.0m
- 3.0 - 3.5m

0 40 80 120 Meters

1:4,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP

Powered by SLIP ENABLER

- LOCALITY MAP SOURCED FROM LANDGATE 2021
- OTHER DATA SOURCED LANDGATE 2021
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2021
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PROJECT ID	DATE
4709	03/09/2021

HORIZONTAL DATUM AND PROJECTION
GDA2020 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	PD	PD	0

M Group
Maida Vale, WA

DWMS

Figure 13
Foreshore Area

K:\Projects\10. WAM\4709 Maida Vale - DWMS\4709 F13 Foreshore Area.mxd

Appendix A
XP-SWMM Hydraulic Modelling

Surface water runoff from rainfall events can be estimated using the relationship between the surface slope, area, roughness, infiltration, and rainfall. The interaction of runoff from areas with different characteristics and the routing of this runoff through a catchment can be very complex. It is for these reasons that computational models are used to ensure the accuracy and speed of the calculations.

For the calculation of the surface water runoff from the site, the XPSWMM hydrological and hydraulic modelling software was used. The hydrologic component of the software uses the Laurenson runoff-routing method which assumes runoff is proportional to slope, area, catchment roughness, infiltration, and percentage of imperviousness of a catchment. The runoff from each catchment is routed through the catchment using the hydraulic component of XPSWMM.

Rainfall Parameters

Design rainfall events for the site were determined following the procedure detailed in Australian Rainfall and Runoff (AR&R) (Engineers Australia 2016). Catchment areas and slopes are determined from analysis of topographical data. The catchment roughness and percentage imperviousness are conservative and were determined from a combination of field experiments, review of AR&R and other technical documents.

Pre-development Modelling

The pre-development was modelled as five catchments to model the runoff generated on the site, based on the existing surface elevation. The site was modelled as four catchments and the fifth catchment represent the external catchment east to the site, which has its runoff flowing into the site. The breakup of each catchment is displayed in Table A1.

The corresponding roughness and runoff coefficient, initial and continuing loss for each land class is shown in Table A2.

Table A1: Pre-development Catchment Areas Breakup

Catchment	Impervious Area	Pervious Area
Catchment A	3.04	18.57
Catchment B	12.19	63.48
Catchment B external	3.49	29.80
Catchment C	2.24	7.95
Catchment D	6.27	54.56

Table A2: Input Parameters for Lands

Land Class	Manning's n	Initial Loss (mm)	Absolute loss (mm/h)
Impervious	0.014	1	0
Pervious	0.03	26	6

The aim of the pre-development modelling was to determine the peak runoff for the site. Each of the five catchments is presented as a node in the model and the runoff from each node is simulated with a series of AEP events to determine the maximum peak runoff and critical duration.

Post Development Modelling

As no earthworks for the site has been generated, it was assumed the post development scenario would use existing ground elevations.

Table A3 presents the areas of different land classes in each catchment and Table A4 details the corresponding input parameters.

The aim of the post development modelling is to demonstrate the proposed drainage design is capable of safely limiting the peak runoff rate from the site to the level as pre-development.

A sandy storage area with an assumed infiltration rate of 5 m/day is integrated in post development modelling for each catchment. The value is to be confirmed by further geotechnical investigation in LWMS stage.

The storage area is set downstream to the site catchments and is capable of keeping and infiltrating surface water to reduce the runoff. The storage is modelled to be 500 mm deep and in a rectangular shape.

Table A3: Post development Catchment Areas Breakup

Catchment	Residential(Ha)		POS (Ha)	ROADS (Ha)	School (Ha)	Shopping Centre (ha)	Easement
	Impervious (ha)	Pervious (ha)					
A	5.80	5.80	1.56	3.80	-	-	4.66
B	20.83	22.74	4.92	14.53	3.55	1.05	6.21
C	3.72	3.72	-	2.74	-	-	-
D	14.66	14.66	14.62	11.39	0.57	-	4.92

Table A4: Input Hydrologic Parameters for Lands

Land Class	Manning's n	Initial Loss (mm)	Continuing Loss (mm/hr)
Residential	0.022	15	3.0
POS	0.03	26	6.0
Road	0.023	10	3.6
School	0.02	15	2.4
Shopping Centre	0.015	1	0.0
Easement	0.028	26	6.0

Modelling Assumptions

Assumptions adopted for the post development modelling include:

- Assumed post development catchment is same as pre-development catchments, shown in Table A1.
- Initial and continuing loss for pre-development is from AR&R Data Hub and amended based on impervious percentage in post development modelling.
- Roads are considered to have 60% pervious reserve area, based on planning recommendation.
- The school is assumed to be 60% impervious and can at least manage the runoff in the first 15 mm event.
- The shopping centre is assumed to be 95% impervious for a conservative calculation.
- Slopes of the catchments are assumed to be consistent with existing slopes based on the topography in Figure 2.

Appendix B
District Structure Plan

Overall Lot Summary		
Number of Lots	1281	
Total Area of Lots	947084	m²
Average Area of Lots	739	m²
Minimum Lot Area	230	m²
Maximum Lot Area	13574	m²

Cell 1 Lot Summary		
Number of Lots	352	
Total Area of Lots	262031	m²
Average Area of Lots	744	m²
Minimum Lot Area	303	m²
Maximum Lot Area	7869	m²

Cell 2 Lot Summary		
Number of Lots	176	
Total Area of Lots	129292	m²
Average Area of Lots	735	m²
Minimum Lot Area	357	m²
Maximum Lot Area	4554	m²

Cell 3 Lot Summary		
Number of Lots	235	
Total Area of Lots	165780	m²
Average Area of Lots	705	m²
Minimum Lot Area	323	m²
Maximum Lot Area	5836	m²

Cell 4 Lot Summary		
Number of Lots	160	
Total Area of Lots	104817	m²
Average Area of Lots	655	m²
Minimum Lot Area	230	m²
Maximum Lot Area	3706	m²

Cell 5 Lot Summary		
Number of Lots	119	
Total Area of Lots	130189	m²
Average Area of Lots	1094	m²
Minimum Lot Area	372	m²
Maximum Lot Area	13574	m²

Cell 6 Lot Summary		
Number of Lots	239	
Total Area of Lots	154975	m²
Average Area of Lots	648	m²
Minimum Lot Area	350	m²
Maximum Lot Area	4677	m²

CELL 1 DEVELOPMENT ZONE
CELL 2 DEVELOPMENT ZONE
CELL 3 DEVELOPMENT ZONE
CELL 4 DEVELOPMENT ZONE
CELL 5 DEVELOPMENT ZONE
CELL 6 DEVELOPMENT ZONE

Roe Hwy
Ravenswood Rd
Brewer Rd
Kent Rd
Bruce Rd
Sultana Rd
Hawtin Rd

POS
EASEMENT
NEIGHBOUR SHOPPING CENTRE Approx.1 Ha
PRIMARY SCHOOL Approx. 4 Ha

All areas and dimensions are subject to survey, engineering and detailed design and may change without notice. © Copyright of Burgess Design Group.

NORTH

0 50 100 150 200 250m

SCALE 1:8000 (A3)

DEVELOPMENT DIAGRAM
MAIDA VALE
SHIRE OF KALAMUNDA

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Appendix F
360 Environmental
Flora, Vegetation and Fauna Technical Notice 2022

Our Ref: 5525AA_Rev4

26 June 2023

John Wroth
Director
M Group
234 Railway Parade
WEST LEEDERVILLE WA 6007
Via Email: john.wroth@mgroup.com.au

Dear John

Maida Vale Flora, Vegetation, Fauna, and Black Cockatoo Technical Note to support Response to EPA Comments on Draft Environmental Review Document for Maida Vale Project

1 Background

360 Environmental was previously commissioned by Burgess Design Group in September 2015 to undertake a Level 2 flora and vegetation assessment, a Level 1 fauna assessment and black cockatoo habitat assessment on a 168.18 ha site in Maida Vale. The purpose of the assessment was to provide a flora and fauna report to inform and accompany an application for rezoning of the site from 'Rural' to 'Urban'. The report, Flora, and Fauna Report Maida Vale (360 Environmental 2016) was included with the draft Environmental Review Document (ERD) referred to the Environmental Protection Authority (EPA) in 2018. The EPA provided preliminary comments on the draft ERD and requested supplementary surveys be undertaken to bring the assessment into accordance with current EPA technical guidance for flora, vegetation, fauna, and black cockatoo surveys, which had all been updated since the previous surveys were undertaken.

This document has been prepared to present the actions undertaken to address EPA comments on the Draft ERD regarding flora and vegetation, fauna, and black cockatoos. This document is to be read in conjunction with the previous Maida Vale Flora and Fauna Report (360 Environmental, 2016)

The Survey Area is located approximately 15 km east of Perth, on the Swan Coastal Plain, Western Australia (Figure 1). The Survey Area comprises private land, roads, cleared tracks, Crumpet Creek and patches of native vegetation. Further background information on the Survey Area such as geology, soils, and broad vegetation types is provided in 360 Environmental (2016).

2 Methods

A supplementary survey was undertaken in 2022 by 360 Environmental to address EPA comments on the draft ERD. Prior to the survey the DBCA was consulted to confirm the proposed survey methodology for the additional flora, vegetation, fauna, and black cockatoo survey work to be undertaken at the site.

2.1 Database Searches

Database searches for the previous assessment were conducted in 2015 for flora, vegetation, and fauna. New database searches were undertaken to compile a current list of potential flora and fauna and identify potential conservation significant flora, fauna, and ecological communities within or surrounding the Survey Area (Table 1). The search area for each parameter was around a central co-ordinate of - 31.964764335769548, 116.01593397267733, with the buffer varied to reflect distances recommended by DBCA. In addition, a Protected Matters Search (PMST) was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within or surrounding the Survey Area. The search areas are herein referred to collectively as the Study Area.

Table 1: Database Searches of the Survey Area

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Ecological Communities database search (Department of Biodiversity Conservation and Attractions, 2022b) – DBCA Reference 29_0722EC	26 July 2022	TECs and PECs	20 km buffer around the Survey Area
Threatened and Priority Flora List (TPFL) database search (Department of Biodiversity Conservation and Attractions, 2022d) – DBCA Reference 7-0722FL	26 July 2022	Threatened and Priority Flora	10 km buffer around central co-ordinate
Western Australian Herbarium flora database search (Western Australian Herbarium, 2022) – DBCA Reference 7-0722FL			
NatureMap (Department of Biodiversity Conservation and Attractions, 2022e) – DBCA Reference 54-0822NM	15 August 2022	Threatened and Priority Flora and inventory of potential flora	20 km buffer around central co-ordinate
Protected Matters Search Tool (Department of Agriculture Water and the Environment, 2022a)	30 August 2022	Commonwealth listed Threatened flora and TECs	40 km buffer around central co-ordinate

Database Name	Date Received	Search Target	Search Area
Birdlife Great Cocky Count Data (Birdlife Australia, 2022)	22 September 2022	Black Cockatoo Data	10 km buffer
DBCA Threatened and Priority Fauna List and Black Cockatoo custom search (Department of Biodiversity Conservation and Attractions, 2022a)	26 July 2022	Threatened Priority Fauna and Black Cockatoo	20 km search buffer of the Survey Area

Conservation significant taxa identified by the updated desktop assessment were examined to determine their likelihood of occurrence within the Survey Area, both prior and post field survey. The assessment was completed based on the criteria presented in Table 2.

Table 2: Likelihood of Occurrence Criteria

Rank	Criteria
Previously Recorded	The taxon has been previously recorded in the Survey Area
High (Likely to occur)	• There are existing records of the taxon in close proximity to the Survey Area (within 5 km): ○ The taxon is strongly linked to a specific habitat, which is present in the Survey Area; or ○ The taxon has more general habitat preferences, and suitable habitat is present.
Medium (May potentially occur)	• There are existing records of the taxon from the locality (within 10 km), however: ○ The taxon is strongly linked to a specific habitat, of which only a small amount is present in the Survey Area; or ○ The taxon has more general habitat preferences, but only some suitable habitat is present. • There is suitable habitat in the Survey Area, but the taxon is recorded infrequently in the locality.
Low (Unlikely to occur)	• The taxon is linked to a specific habitat, which is absent from the Survey Area; or • Suitable habitat is present, however there are no existing records of the taxon from the locality despite reasonable previous search effort in suitable habitat; or: ○ There is some suitable habitat in the Survey Area, however the taxon is very infrequently recorded in the locality.

2.2 Flora and Vegetation

2.2.1 Supplementary Field Survey

The supplementary flora and vegetation field survey was undertaken by Principal Botanist Narelle Whittington (Flora Licence FB62000177) and Botanist Megan Young (Flora Licence FB62000388) on 1 – 2 September 2022.

2.2.1.1 Flora Sites

The aim of the supplementary field survey was to ensure that a quadrat was established in all vegetation considered to be in good or better condition (based on the vegetation condition scale in EPA (2016). In several locations this was achieved by upgrading relevés from the 2015 survey to quadrats.

At least three flora sites have now been sampled in each vegetation type observed within the Survey Area, where possible, to bring the survey in line with current guidance. Some vegetation types that were not large enough to accommodate three flora sites, or had limited vegetation, had only one or two sites sampled.

Quadrats sampled were 10 x 10 m, and the data collected was in accordance with EPA (2016).

In 2015, 11 flora sites (comprising six quadrats and five relevés) were established within the Survey Area. In 2022, four relevés were upgraded to quadrats, and four additional quadrats were established, resulting in a total of 14 quadrats and one relevé across the site Table 3.

Table 3: Flora Sites Established within the Survey Area

Flora Site	Comment
MVQ1	2015 quadrat
MVQ2	2015 quadrat
MVQ3	2015 quadrat
MVQ4	2015 quadrat
MVQ5	2015 quadrat
MVQ6	2015 quadrat
22Q01	Replaced MVR4 in 2022. The site was moved to a nearby location, as the location of MVR4 could no longer be accessed.
22Q02	New quadrat in 2022
22Q03	New quadrat in 2022
22Q04	New quadrat in 2022

Flora Site	Comment
22Q05	Previously MVR2, upgraded to quadrat 22Q05 in 2022
22Q06	New quadrat in 2022
22Q07	Previously MVR3, upgraded to quadrat 22Q07 in 2022
22Q08	Previously MVR5, upgraded to quadrat 22Q08 in 2022
MVR1	Relevé MVR1 was not upgraded or replaced as the vegetation condition was Degraded. The site was used to check vegetation and condition but was not included in any further analysis.

2.2.1.2 Targeted Searching

Prior to the survey a list of conservation significant flora with the potential to occur within the Survey Area was compiled (see section 3.1.3). Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey.

The entire Survey Area was not systematically searched. Rather, targeted searching focussed on remnants of native vegetation with habitat suitable for Threatened and Priority flora.

Personnel also actively searched for potential conservation significant flora in and around flora sites, while traversing on foot within the Survey Area, and in known locations or preferred habitat encountered in the field.

2.2.1.3 Taxonomy and Nomenclature

Where identification of plant taxa was not possible in the field, specimens were collected for identification using reference literature and resources at the WAH. Identification of flora collections was completed by experienced taxonomists Narelle Whittington and Frank Obbens.

The finalised species list was checked against FloraBase (Western Australian Herbarium, 2022) for taxonomic currency, and to determine the conservation status and known distribution of each taxon. Introduced species were checked against the current BAM Act Declared Plants list and the WoNS list to determine their status (Department of Agriculture Water and the Environment, 2021; Department of Primary Industries and Regional Development, 2021).

Where relevant, Threatened and Priority Flora Report Forms (TPRFs) were submitted to DBCA.

2.2.1.4 Vegetation and Condition Mapping

Vegetation and condition mapping was checked during the survey and required changes to boundaries were delineated over the previous mapping while in the field. Revised polygons were then digitised and produced as electronic mapping data using GIS software.

2.2.2 Statistical Analyses

Statistical analysis of flora site data was undertaken in accordance with EPA guidelines (2016) for a detailed flora and vegetation survey.

2.2.2.1 Species Accumulation Curve

Species accumulation curves were plotted using Primer v7 to determine the adequacy of the survey. The treatments comprised Sobs (Mao Tao), to reflect the number of species observed (based on a given total of species recorded), and richness estimators Chao 1, Chao 2, Jacknife 1, Bootstrap and Michaelis-Menton to predict the total number of flora taxa that could potentially be recorded. Species accumulation curves were calculated using data collected from flora sites. All flora taxa, both annual and perennial, within each flora site were used in generating the species accumulation curve, except for unknown flora taxa that could only be tentatively identified.

2.2.2.2 Multivariate Analysis

Statistical analyses were undertaken to compare the similarity of species presence data collected at each of the 14 survey quadrats with the Swan Coastal Plain (SCP) dataset (Gibson et al., 1994), and the Keighery et al (2012) SCP dataset, provided by DBCA.

At the request of DBCA, analysis was run on each quadrat individually, first against the Gibson et al (1994) dataset, and then against the Keighery et al (2012) dataset, to determine which SCP floristic community type (FCT) the vegetation from each quadrat best aligned with. It was considered this method of analysis could improve the accuracy and clarity of the results as single site insertion typically causes less disruption to the clustering of the SCP datasets.

The survey data was reasonably compatible with the SCP datasets as both were from data collected from 10 x 10 m quadrats, all in good or better condition.

Prior to multivariate analysis opportunistic and unconfirmed flora were removed from the data. To account for changes in taxonomic nomenclature over the last two decades plant taxa names were reconciled first between the survey data and the Gibson et al. (1994) data, and then between the survey data and the Keighery et al. (2012) dataset. In some instances, infra-specific names were reduced to species names where required, and some taxa that could not be reconciled were omitted. Initially, weed species were included in the analysis in accordance with Gibson et al. (1994) Weed species were then removed from all datasets and the analysis run again, as this method has been shown to provide slightly more definitive results in recent studies in the local area (RPS, 2015a, 2015b).

The vegetation composition of each quadrat was compared against the SCP datasets using absence presence values of species recorded from quadrat data and analysed using multivariate analysis tools in Primer v7. Absence presence values were tested for similarity using the Bray-Curtis resemblance output. The output was then sorted from greatest to least similarity to identify which SCP dataset sites were most similar to each of the 14 Maida Vale sites from the current survey. The nearest neighbour method was used to inform decisions when assigning an SCP FCT to each quadrat site, by determining which SCP sites were most floristically similar. Where the results of statistical analysis did not provide a definitive match, indicator species, soil

types and landform position, and notes provide by DBCA personnel on the subject (following a site visit with 360 Botanists in 2022) were also considered in assigning FCTs.

2.3 Fauna and Black Cockatoos

2.3.1 2022 Supplementary Field Surveys

The supplementary fauna and black cockatoo survey was undertaken by Senior Ecologist Lukas Geidans with approximately 3 years' experience and Ecologist Lachlan Crossley with approximately 2 years' experience. The survey was conducted over eight days between June and September 2022. Survey effort for the 2022 supplementary field survey is shown in Figure 3.

2.3.1.1 Basic Fauna Survey

2.3.1.1.1 Fauna Habitat Assessments

Previous fauna habitat assessments were re-assessed as part of the 2022 field survey alongside additional sampling sites. The combined data was used in association with vegetation types and distinctive features to identify the broad fauna habitats in the Survey Area. The following information, which has been adapted from the habitat attributes listed in the Technical Guidance (Environmental Protection Authority, 2020), was collected at each habitat assessment site using Fulcrum, a mobile data collection app:

- Site photo
- Landform
- Soil type and colour
- Rock types, surface stone cover and size classes
- Microhabitat features including leaf litter, logs, burrows, rocky outcrops, rock crevices, hollows, and water sources
- Habitat quality, fire history and evidence of disturbance
- General description of vegetation structure.

The 360 Environmental (2016) fauna habitat mapping was checked during the survey and revised according to additional fauna habitat assessments and notes made in the field. Revised polygons were then digitized and produced as electronic mapping data using GIS software.

2.3.1.1.2 Opportunistic Observation

Opportunistic observations of fauna were recorded throughout the Survey Area, including primary evidence (direct sightings, calls) and secondary evidence (tracks, scats, diggings, remains etc.). Opportunistic observation focussed on capturing priority species occurring within the Survey Area.

2.3.1.1.3 Identification and Taxonomy

An effort was made to determine the current scientific name for each taxon. Taxonomy and nomenclature in this report follows the WA Museum checklist 2022 (Western Australian Museum, 2022) where relevant.

2.3.1.2 Black Cockatoos

2.3.1.2.1 Foraging Habitat

The black cockatoo assessment involved assessing the habitat for tree and shrub species known to be important dietary items e.g. Marri and *Banksia* sp. as outlined within the referral guidelines. It also included looking for:

- Evidence of feeding (chewed cones, seed and nut material)
- Opportunistic observations of black cockatoos foraging or utilising the Survey Area.

Foraging habitat was mapped and classified as low or high quality using criteria based on the Foraging Habitat Scoring Tool in the EPBC Act Referral Guidelines for three WA threatened black cockatoo species (Department of Agriculture Water and the Environment, 2022b).

2.3.1.2.2 Nesting Habitat

Trees meeting the following criteria for potential nesting or future nesting, based on the criteria described in the EPBC Act Referral Guidelines for three WA threatened black cockatoo species (Department of Agriculture Water and the Environment, 2022b) were recorded using the Fulcrum mobile data-collection application:

- Tree species with the potential to form suitable hollows, particularly endemic eucalypt species (e.g. Jarrah, Tuart, Marri, Wandoo and Salmon Gum)
- Diameter at breast height (DBH) of greater than 500 mm (greater than 300 mm for Wandoo and Salmon Gum) regardless of the presence or absence of hollows (DBH is measured approximately 1.3 metres from the ground)
- Any trees containing hollows (observed from the ground), which were then categorized as:
    - Hollows that are unsuitable for black cockatoo nesting e.g. hollows with an estimated opening diameter of less than 100 mm, downwards-facing hollows
    - Hollows that are potentially suitable for black cockatoo nesting e.g. upwards or sideways-facing hollows with an estimated opening diameter of greater than 100 mm (Saunders et al., 2014).

Trees with multiple stems, swellings or forking/branching at breast height were measured separately. In these instances, the diameter was measured just above breast height to gain a more accurate measurement of diameter.

A black cockatoo hollow inspection was conducted as part of the supplementary field surveys. This involved revisiting all previously recorded trees during the 360 Environmental (2016) field survey to identify those that contained hollows. Hollows that were recorded as potentially suitable during the initial assessment from the ground were re-inspected using a DJI Mini 2 or DJI Mini 3 Pro drone. Each hollow was photographed and re-assessed for its suitability for use by black cockatoos.

2.3.1.2.3 Roosting Habitat

Areas suitable for black cockatoo roosting were identified and recorded. If observed, evidence of roosting such as scat at the base of trees was recorded (lack of roosting evidence does not rule out the possibility of black cockatoo roosting as dusk/dawn surveys were not undertaken).

2.3.2 2015 Field Survey

The 2015 field survey was undertaken on the 16th, 17th and 23rd September with the purpose of the field assessment was to verify the accuracy of the desktop assessment and to further delineate and characterise the fauna assemblages and fauna habitat in the Survey Area.

The survey consisted primarily of a fauna habitat assessment, opportunistic observations, and a black cockatoo assessment. The survey methodology for the 2016 field survey is outlined in the 360 Environmental (2016) report.

3 Results

3.1 Flora and Vegetation

3.1.1 Database Searches

The updated database searches identified 145 conservation significant taxa, comprising Threatened flora pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the WA *Biodiversity Conservation Act 2016* (BC Act), or DBCA listed Priority flora species. Of these 96 were identified by DBCA databases as occurring within 10 km of the Survey Area (Figure 2; Appendix A).

The likelihood of occurrence assessment (see Appendix B) provides information on the known flowering periods and preferred habitat of each taxon identified. Prior to the survey and investigation of the existing habitat available:

- Three taxa, *Conospermum undulatum* (T), *Isopogon autumnalis* (P3), and *Banksia pteridifolia* subsp. *vernalis* (P3), had been previously recorded in the Survey Area and were considered to have a high likelihood of occurrence in the Survey Area
- 30 were considered to have a high likelihood of occurrence
- 61 were considered to have a medium likelihood of occurrence
- 49 had a low likelihood of occurrence.

Following the survey, the likelihood of occurrence of each of these taxa was reassessed based on the availability of suitable habitat observed in the Survey Area:

- Two taxa were recorded, *Conospermum undulatum* (T) and *Isopogon autumnalis* (P3), were recorded
- Two, *Banksia pteridifolia* subsp. *vernalis* (P3) and *Haemodorum loratum* (P3) were considered to have a high likelihood of occurrence
- Three, *Banksia mimica* (T), *Macarthuria keigheryi* (T) and *Morelotia australiensis* (T), were considered to have a medium likelihood of occurrence.

The remaining 138 taxa identified by the database searches were considered to have a low likelihood of occurrence following the survey. Taxa that were recorded during the survey are addressed further in sections 3.1.4.1 and 4.1.3.

Some taxa that met the criteria of proximity and available habitat for a high or medium likelihood of occurrence following the survey were downgraded to a low likelihood of occurrence for other reasons. In these cases, a reason for the assignment has been provided in the likelihood of occurrence table (Appendix B). Threatened and Priority taxa considered to have a high or medium likelihood of occurrence following the field survey, but were not recorded, are further addressed in section 4.1.3.

The DBCA Threatened and Priority Ecological Community database search identified fifteen significant ecological communities occurring within 20 km of the Survey Area (Figure 2, Table 4). The communities identified comprised 11 State listed TECs, and four PECs. Twelve of the communities identified are listed as Threatened under the EPBC Act.

Table 4: Threatened and Priority Ecological Communities Identified by the DBCA Database Search

Community Code	Community Name	State	EPBC
Banksia WL SCP	*Banksia* Woodlands of the Swan Coastal Plain ecological community	P3	TEC (EN)
Central Granite Shrublands	Central Northern Darling Scarp Granite Shrubland Community (Com 5, Markey)	P4	-
Coastal Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	P3	TEC (VU)
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	TEC (EN)	TEC (EN)
SCP02	Southern wet shrublands, Swan Coastal Plain (floristic community type 2 as originally described in Gibson et al. (1994))	TEC (EN)	-
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	TEC (VU)	TEC (CR)
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	TEC (VU)	TEC (CR)

Community Code	Community Name	State	EPBC
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	TEC (EN)	TEC (CR)
SCP20a	*Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	TEC (EN)	
SCP20b	*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	TEC (EN)	TEC (EN)
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	TEC (CR)	TEC (EN)
SCP21c	Low lying *Banksia attenuata* woodlands or shrublands	P3	TEC (EN)
SCP3a	*Corymbia calophylla - Kingia australis* woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	TEC (CR)	TEC (EN)
SCP3b	*Corymbia calophylla - Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson et al. (1994))	TEC (VU)	-
SCP3c	*Corymbia calophylla - Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in in Gibson et al. (1994))	TEC (CR)	TEC (EN)

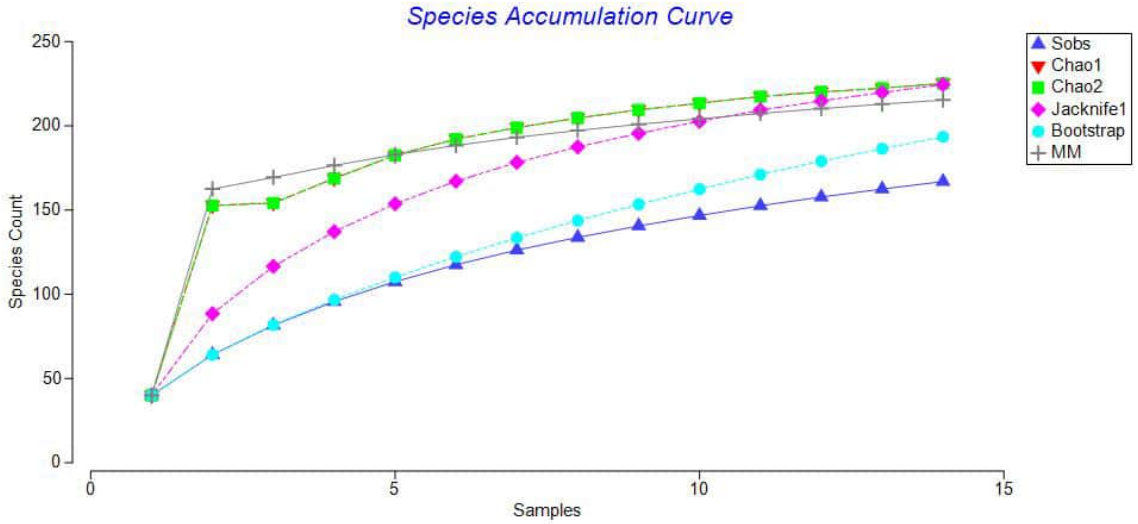
3.1.2 Survey Effort

Data was collected from 14 quadrats and one relevé within Survey Area (Figure 3; Appendix C). This was adequate to ensure three flora sites were sampled in each vegetation type, where possible, and that spatial coverage across the Survey Area was sufficient. Four vegetation types (EmNf, AhDg, EmAh and EwXp) were not spatially large enough, or did not have enough vegetation in good or better condition, to warrant three quadrats.

Six quadrats and five relevés were sampled in 2015, and four relevé sites updated to quadrats, plus four new quadrat sites were sampled in 2022.

Two vegetated portions of the Survey Area could not be accessed in 2022 or 2015 due to access not being granted during the field surveys (Figure 3). Therefore, no flora sites were established, and targeted searching and field vegetation mapping were not undertaken in these 'No Access' areas. In addition, numerous small portions of the Survey Area were not assessed due to access issues or because they were Parkland Cleared or garden. Areas classified as 'Not Surveyed' were highly fragmented and isolated and are unlikely to represent vegetation of significance or support significant flora.

The species accumulation curve for the Survey Area produced a smooth Sobs curve steadily increasing towards asymptote Graph 1.



Graph 1: Species Accumulation Curve

Estimated species richness for the Survey Area ranged from 194 to 225 expected species, with an observed value of 167 taxa (Table 5). Richness estimators indicated the survey was approximately 74% (Jacknife 1) to 86% (Michaelis-Menton) adequate in recording the full complement of vascular flora taxa within the Survey Area (Table 4). The data used to produce the species accumulation curve was conservative because five opportunistic species and 24 unconfirmed flora were not included.

Table 5: Species Richness Indicators

Treatment	Expected Species Richness	Percentage Adequate
Chao 1	225	74
Chao 2	225	74
Jacknife 1	225	74
Bootstrap	194	86
Michaelis-Menton	215	78

3.1.3 Flora Composition

A total of 198 taxa from 41 families across 117 genera were recorded during the surveys (Appendix D). The dominant families were Fabaceae (30 taxa), Proteaceae (23 taxa) and Cyperaceae (18 taxa). The dominant genera were *Stylidium* (eight taxa), *Acacia* (seven taxa), Lepidosperma (seven taxa) and *Hakea* (six taxa).

3.1.4 Conservation Significant Flora

3.1.4.1 Threatened and Priority Flora

One Threatened flora taxon, *Conospermum undulatum* (T) was recorded within the Survey Area (Figure 6). One DBCA listed Priority flora taxon, *Isopogon autumnalis* (P3) was recorded within the Survey Area (Figure 6).

Conospermum undulatum (T) (Plate 1) was recorded in the Survey Area from four patches of remnant vegetation (Figure 6). *Isopogon autumnalis* (P3) (Plate 2), was found in two vegetation remnants (Table 6, Figure 6).

Table 6: Conservation Significant Flora in the Survey Area

Taxon (status)	Number of Individuals	Habitat within the Survey Area
Conospermum undulatum (T)	10	Remnant patches of native vegetation in good or better condition. Vegetation either Woodland of *Corymbia* calophylla and *Eucalyptus marginata* over *Xanthorrhoea preissii, Hibbertia hypericoides*, *Mesomelaena pseudostygia*, *Acacia pulchella, Allocasuarina humilis, Synaphea spinulosa subsp. spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana* or Low Open Woodland of Eucalyptus marginata and *Nuytsia floribunda* over *Adenanthos cygnorum*, *Daviesia angulata, Calothamnus sanguineus, Verticordia densiflora var. densiflora, Mesomelaena pseudostygia* and *Lyginia imberbis* or Low Open Woodland of *Eucalyptus marginata* over *Xanthorrhoea preissii, Allocasuarina humilis, Kingia australis, Hibbertia hypericoides and Lambertia multiflora var. darlingensis*. Grey, sometimes brown sand, plain.
Isopogon autumnalis (P3)	15	Remnant patches of native vegetation in good or better condition. Vegetation either Woodland of *Corymbia calophylla* and Eucalyptus marginata over *Xanthorrhoea preissii, Hibbertia hypericoides, Mesomelaena pseudostygia, Acacia pulchella, Allocasuarina humilis, Synaphea spinulosa subsp. spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana*, or shrubland of *Allocasuarina humilis*, *Caustis dioica*, *Mesomelaena pseudostygia*, *Verticordia densiflora var. densiflora, Lambertia multiflora var. darlingensis, Mesomelaena tetragona*, *Hibbertia hypericoides* and *Xanthorrhoea preissii*. Grey sand.

Plate 1: *Conospermum undulatum* (T)

Plate 2: *Isopogon autumnalis* (P3)

3.1.4.2 Flora of Other Significance

Flora may be considered of other significance if it represents a range extension, novel taxon, taxon that play a keystone role in a community, has relic status, is locally endemic, or represents a range extension. No flora taxa of other significance were recorded in the Survey Area.

3.1.5 Introduced Flora

Twenty-two introduced flora taxa were recorded in the Survey Area, representing 11.1% of the total taxa recorded (Table 7; Appendix D). One of these, **Asparagus asparagoides* is listed as a Declared Pest under the BAM Act (Department of Primary Industries and Regional Development, 2018) and WoNS (Department of Agriculture Water and the Environment, 2020). Most of the Survey Area is covered by introduced weed species, including environmental weeds and a variety of garden plants. Only weeds that were present within intact native vegetation were recorded. Most of the weeds recorded during the surveys are common bushland and agricultural weeds (Hussey et al., 2007).

Table 7: Introduced Flora Species in the Survey Area

Species	Common Name	Status under BAM Act	WoNS
**Acacia iteaphylla*	Flinders Range Wattle	Permitted - s11	No
**Asparagus asparagoides*	Bridal Creeper	Declared Pest - s22(2)	Yes
**Briza maxima*	Blowfly Grass	Permitted - s11	No
**Briza minor*	Shivery grass	Permitted - s11	No
**Cenchrus clandestinus*	Kikuyu Grass	Permitted - s11	No
**Chamelaucium uncinatum*	Geraldton Wax	Permitted - s11	No
**Ehrharta calycina*	Perennial Veldt Grass	Permitted - s11	No
**Eragrostis curvula*	African Lovegrass	Permitted - s11	No
**Freesia* sp.	Freesia	Permitted - s11	No
**Fumaria capreolata*	Whiteflower Fumitory	Permitted - s11	No
**Gladiolus caryophyllaceus*	Wild Gladiolus	Permitted - s11	No
**Hypochaeris glabra*	Smooth Catsear	Permitted - s11	No
**Lavandula stoechas*	Italian Lavender	Permitted - s11	No
**Leptospermum laevigatum*	Coast Teatree	Permitted - s11	No
**Lysimachia arvensis*	Pimpernel	Permitted - s11	No
**Oxalis? glabra*	-	Permitted - s11	No
**Oxalis purpurea*	Largeflower Wood Sorrel	Permitted - s11	No
**Oxalis pes-caprae*	Soursob	Permitted - s11	No
**Romulea rosea*	Guildford Grass	Permitted - s11	No
**Tribolium uniolae*	Haas grass, Wheat grass	Permitted - s11	No
**Trifolium dubium*	Suckling Clover	Permitted - s11	No
**Ursinia anthemoides*	Ursinia	Permitted - s11	No

3.1.6 Unconfirmed Flora

Eighteen flora taxa could not be identified to species level because the plants observed were sterile at the time of the survey. Sixteen of these have been assigned a confirmed genus, and of these nine have been tentatively identified to species level. One of these *Haemodorum* sp., could be significant flora as there was a Priority flora taxon from this genus identified in the desktop assessment. This is discussed further in section 4.1.3. None of the remaining unconfirmed flora are considered potentially analogous to any Threatened or Priority flora species.

It is likely that some of the unconfirmed flora taxa are duplicates of taxa confirmed within the Survey Area.

3.1.7 Vegetation Condition

Most of the Survey Area had been historically cleared for housing, roads and agriculture and is now dominated by introduced weed species. Previous and existing land uses have caused heavy fragmentation of the native vegetation. Most remaining mature native trees have been integrated with gardens and non-endemic species. In these instances, the vegetation no longer has a natural structure and was mapped as Completely Degraded.

Native vegetation within the Survey Area is highly fragmented, comprising small patches bushland across the Survey Area. Most of the intact native vegetation with condition ratings of Good to Excellent is bound by Bruce Road, Brewer Road, and Sultana Road East. There are also pockets of intact native vegetation near Oxford Court and Kent Road. The vegetation along Crumpet Creek varies greatly. East of Brewer Road the structure of the creek vegetation has been significantly altered with few native species persisting (particularly in the mid- and groundstoreys). West of Brewer Road the native vegetation structure along the creek is relatively intact and considered to be in Good to Excellent condition.

Vegetation condition mapping within the Survey Area has been updated including minor changes to the delineation and classification of vegetation condition of natural vegetation where required. The updated vegetation condition mapping is provided in Figure 5.

Vegetation Condition within the Survey Area was reassessed as per technical guidance in EPA (2016) and ranged from Excellent to Completely Degraded/Cleared, with the majority considered to be Completely Degraded/Parkland Cleared.

- Excellent (4.06 ha / 2.41%)
- Very Good (4.58 ha / 2.72%)
- Good (3.62 ha / 2.15%)
- Degraded (2.39 ha / 1.42%)
- Completely Degraded/Parkland Cleared (142.46 ha / 84.7%).

The remainder of the Survey Area either could not be accessed (1.18 ha / 0.7%) or was not surveyed (9.9 ha / 5.89%). The parts of the Survey Area classified as Not Accessible likely contain native vegetation in Degraded or better condition. The parts of the Survey Area classified as Not Surveyed are likely all Parkland Cleared, and therefore would be classified as Completely Degraded.

3.1.8 Vegetation Associations

Six natural vegetation associations were described for the Survey Area in 360 Environmental (2016). In addition to the associations, other mapping units were delineated, which included mature trees in isolation or over gardens and weeds and the highly degraded section of Crumpet Creek. Minor changes to the delineation of vegetation associations were made in 2022, however the description have not changed. The vegetation association previously labelled AhDg

has been revised to AhCd, due to a minor labelling error in the previous report, however the description has not changed. The updated delineation of vegetation boundaries is provided is Figure 4, and associated changes to the total area of each is provided in Table 8.

Table 8: Vegetation Associations and Units and their Revised Extent in the Survey Area

Code (Quadrats)	Description	Area (ha)	Condition
Natural Vegetation Associations			
EmNf (MVQ1)	Low Open Woodland of *Eucalyptus marginata* and *Nuytsia floribunda* over *Adenanthos cygnorum*, *Daviesia angulata*, *Calothamnus sanguineus*, *Verticordia densiflora* var. *densiflora*, *Mesomelaena pseudostygia* and *Lyginia imberbis.*	0.46	Excellent
AhCd (MVQ6)	Shrubland of *Allocasuarina humilis, Caustis dioica, Mesomelaena pseudostygia, Verticordia densiflora* var. *densiflora, Lambertia multiflora* var. *darlingensis, Mesomelaena tetragona, Hibbertia hypericoides* and *Xanthorrhoea preissii*.	0.28	Excellent
CcMp (MVQ3, 22Q01, 22Q02, 22Q03, MVQ4)	Open Forest of *Corymbia calophylla* over *Mesomelaena pseudostygia, Xanthorrhoea preissii, Hibbertia hypericoides, Tetraria octandra, Acacia pulchella, Hakea undulata, Banksia dallanneyi* var. *dallanneyi* and *Allocasuarina humilis*.	2.57	Excellent to Degraded
CcEm (MVQ2, MVQ5, 22Q04, 22Q06, 22Q07, 22Q08)	Woodland of *Corymbia calophylla* and *Eucalyptus marginata* over *Xanthorrhoea preissii, Hibbertia hypericoides, Mesomelaena pseudostygia, Acacia pulchella, Allocasuarina humilis, Synaphea spinulosa* subsp. *spinulosa* and *Tetraria octandra* with occasional *Allocasuarina fraseriana*.	10.88	Excellent to Degraded
EmAh (22Q05)	Low Open Woodland of *Eucalyptus marginata* over *Xanthorrhoea preissii*, *Allocasuarina humilis, Kingia australis, Hibbertia hypericoides* and *Lambertia multiflora* var. *darlingensis*.	0.05	Excellent
EwXp (R1)	Open Forest of *Eucalyptus wandoo* and *Corymbia calophylla* over *Xanthorrhoea preissii, Hibbertia hypericoides, Phyllanthus calycinus* and *Banksia dallanneyi* var. *dallanneyi* dominated by weed species.	0.39	Degraded
Other Mapping Units (Completely Degraded / Cleared)			
Af / Cc / Em	Mature *Allocasuarina fraseriana, Corymbia calophylla* and *Eucalyptus marginata* trees in combination over garden and/or weeds.	0.3	Completely Degraded
Af	Mature *Allocasuarina fraseriana* over garden and/or weeds.	1	Completely Degraded
Af / Em	Mature *Allocasuarina fraseriana* and *Eucalyptus marginata* in combination over garden and/or weeds.	0.67	Completely Degraded

Code (Quadrats)	Description	Area (ha)	Condition
Cc	Mature *Corymbia calophylla* over garden and/or weeds.	5.55	Completely Degraded
Cc / Em	Mature *Corymbia calophylla* and/or *Eucalyptus marginata* in combination over garden and/or weeds.	9.55	Completely Degraded
Cc/Af	Mature *Corymbia calophylla* and *Allocasuarina fraseriana* in combination over garden and/or weeds.	0.05	Completely Degraded
CcEwEr	Open Woodland of *Corymbia calophylla, Eucalyptus wandoo* and *Eucalyptus rudis* over *Xanthorrhoea preissii, Hakea lissocarpha* and *Hardenbergia comptoniana* along creek.	1.41	Completely Degraded
CcEr	Mature *Corymbia calophylla* and *Eucalyptus rudis* over garden and/or weeds.	0.68	Completely Degraded
Eg	Mature *Eucalyptus gomphocephala* over garden and/or weeds.	0.62	Completely Degraded
Em	Mature *Eucalyptus marginata* over garden and/or weeds.	2.22	Completely Degraded
EmXp	Mature *Eucalyptus marginata* and *Xanthorrhoea preissii* over weeds.	0.27	Completely Degraded
Er	Mature *Eucalyptus rudis* over garden and/or weeds.	0.25	Completely Degraded
Ew	Mature *Eucalyptus wandoo* over garden and/or weeds.	0.98	Completely Degraded
NE	Non-endemic vegetation typically comprising gardens or orchards.	28.22	Completely Degraded
NA	No access	1.19	Unknown but likely Good or better
NS	Not surveyed	9.9	Unknown but likely Completely Degraded
Cleared	Cleared	90.68	Completely Degraded

Area is rounded to two decimal places.

3.1.9 Floristic Analysis

The results of the floristic analysis are provided in Table 9. The statistical analysis output summary is provided in Appendix E. Analysis of quadrat data against the SCP FCT analysis dataset produced some definitive results, for example sites MVQ1, MVQ2 and 22Q05 were strongly and consistently most similar to SCP 20a, particularly against the Keighery et al (2012) dataset with weeds removed. For the remaining sites analysis against the FCT dataset produced mixed results and required further analysis.

Where statistical analysis results were inconclusive, or strongly conflicted with field observations, the site data was reviewed against diagnostic factors for FCTs including presence of indicator species, soil types and landform position. FCTs that have been identified in surrounding areas were also considered to determine which FCTs the vegetation within the Survey Area most likely represented (Table 9).

Table 9: Floristic Community Type Assigned to each Flora Site

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcMp	MVQ4	20c/20b/ 20a	20a	20a	3b/3a	3b/3a	3a/3b	S18/3a/3 b	3b	MVQ4 most consistently aligns with 3b across the four datasets. MVQ4 occurs on alluvial soil (associated with Crumpet Creek) typical of 3b, and contains key taxa: *Corymbia calophylla* and *Eucalyptus marginata* over sedges, grasses and herbs including *Bossiaea eriocarpa*, *Hibbertia hypericoides* subsp. *hypericoide*, *Chamaescilla corymbosa*, *Desmocladus fasciculatus*, *Mesomelaena tetragona*, *Morelotia octandra, Babingtonia camphorosmae, Neurachne alopecuroidea* and *Burchardia congesta.*

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcMp	22Q01	N/A	20a	N/A	20b/28	20b/28	20b/28/20a	20b/3b	3b	22Q01 has a stronger affinity to 20b (48.6% similarity) than 3b (43.8%) when compared against the Keighery data with weeds removed, likely due to its position higher in the landscape and further from the creek than nearby sites (22Q02, 22Q03, MVQ3), and the presence of *Hakea stenocarpa.* However, the site contains key taxa aligning it with 3b: E*ucalyptus marginata* (and *Corymbia calophylla* noted nearby) over sedges, grasses and herbs, *Bossiaea eriocarpa*, *Hibbertia hypericoides* subsp. *hypericoides*, *Morelotia octandra*, *Chamaescilla corymbosa*, *Banksia dallanneyi* subsp. *dallanneyi*, *Mesomelaena tetragona*, *Babingtonia camphorosmae*, *Neurachne alopecuroidea*, *Philotheca spicata*, *Burchardia congesta*, *Drosera erythrorhiza* and *Caladenia flava*.

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcMp	22Q02	N/A	20a	N/A	3b/28	3b/28	3a/3b/28	3a/3b/28	3b	Although 22Q02 has the strongest similarity is with a 3a site (37.6%), this is followed closely by a 3b site (37.4%) and 22Q02 has strong similarity (over 30%) with six an additional 3b sites. This site occurs on alluvial clay/sand soil typical of 3b and contains *Corymbia calophylla* and (*Eucalyptus marginata* noted nearby) over sedges grasses and herbs *Hibbertia hypericoides* subsp. *hypericoides*, *Morelotia octandra*, *Chamaescilla corymbosa*, *Desmocladus fasciculatus*, *Mesomelaena tetragona*, *Babingtonia camphorosmae*, *Burchardia congesta* and *Drosera erythrorhiza*.

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcMp	22Q03	N/A	20a	N/A	20b/3a/1a	20b/1a/3a	3b/3a/20b	3b/20b/3c	3b	22Q03 was similar to various FCTs within, and across datasets, however has been assigned to 3b because it occurs on alluvial soil (associated with Crumpet Creek) typical of 3b, and contains key species: Corymbia calophylla and (Eucalyptus marginata noted nearby) over sedges grasses and herbs including *Hibbertia hypericoides* subsp. *hypericoides*, *Morelotia octandra*, *Chamaescilla corymbosa*, *Banksia dallanneyi* subsp. *dallanneyi*, *Mesomelaena tetragona*, *Babingtonia camphorosmae*, *Burchardia congesta* and *Drosera erythrorhiza*.

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcMp	MVQ3	20c/20b/ 20a	20a	20c	28/3b/3a	3b/28/3a	3a/28	3a/20a	3b	MVQ3 was similar to various FCTs within, and across datasets, however has been assigned to 3b because it occurs on alluvial soil (associated with Crumpet Creek) typical of 3b and contains key species: *Corymbia calophylla* (and *Eucalyptus marginata* noted nearby) over sedges grasses and herbs including *Hibbertia hypericoides* subsp. *hypericoides*, *Morelotia octandra*, *Chamaescilla corymbosa*, *Desmocladus fasciculatus*, *Banksia dallanneyi* subsp. *dallanneyi*, *Mesomelaena tetragona*, *Babingtonia camphorosmae*, and *Burchardia congesta*.
EmAh	22Q05 (R2)	N/A	20a	20a/20b	20b/28	20b/20a	20a/20b	20a/20b	20a	22Q05 was strongly aligned with two 20a sites in analysis against Keighery data both with and without weeds included.

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
EmNf	MVQ1	20a/20c/ 20b	20a	20a	20b/28	20a	20a	20a	20a	MVQ1 had a strong affinity to 20a, particularly when compared against sites in the Keighery weeds removed dataset, with the 10 most similar sites all being 20a.
AhCd	MVQ6	20a/20c/ 20b	20a	Viewed from road. Likely 20c with 20a influence	28/20c	28/20a	20b/20a/ 28	20b/20a	20a	Small, isolated patch of vegetation void of trees that has been repeatedly burnt, but regenerated each time. Strong affinity with both 20a (34.5%) and 20b (35.2%) sites, but more consistently aligned with 20a sites. Based on the location vegetation is most likely to represent 20a.
CcEm	22Q04	N/A	20a	N/A	20b/20c	20b/20c	20a/20b/ 20c	20a/20b/ 20c	20a	Best aligned with 20a in both Keighery datasets (44.4% no weeds; 43.1% with weeds). Also most appropriate FCT alignment determined from combinations of key taxa including *Conospermum undulatum*, *Isopogon drummondii* and *Hemiphora bartlingii*.

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcEm	22Q08 (R5)	N/A	20a	20a	20b/28	28/1b	28/3b	3b/S06/28	20a	Most consistently aligns with FCT 28, however it is unlikely that FCT 28 is present given FCT 28 predominantly occurs on Spearwood dunes in the Karrakatta and Cottesloe complexes and the site occurs on the Forrestfield and Southern River complexes. Based on field observations and sites from the local area 22Q08 aligns best with 20a.
CcEm	MVQ2	20a/20c/20b	20a	20a	20a/28/20b	20a/20b	20a	20a	20a	MVQ2 is strongly aligned with 20a particular in analysis of Keighery datasets, both with and without weeds.
CcEm	MVQ5	20a/20c/20b	20a	20a	20b/3b	20b/3b	3a/20a	20a/3a/20b	20a	MVQ5 affinities to 20a, 20b, 20c and 3b, however aligns best with a 20a site in the Keighery no weeds data (37.4%), and more consistently with 20a in both Keighery datasets.

Vegetation Association	Site	Previous Report Nearest Neighbour*	Previous Report Inferred	DBCA Notes	Gibson (weeds included)	Gibson (weeds Removed)	Keighery (weeds included)	Keighery (weeds removed)	Inferred	Notes
CcEm	22Q06	N/A	20a	N/A	20b/20c	20b/20c	20b/20a	20a/20b	20b	22Q06 most consistently aligned with 20b. The site occurs in the northern portion of the Survey Area at the base of the Darling Scarp on the Ridgehill Shelf. In a continuous and analogous patch with 22Q07, which contains *Hakea stenocarpa* a species typically used to differentiate 20b from other *Banksia* communities.
CcEm	22Q07 (R3)	N/A	20a	20b	20b/3b	20b/3b	3b/20b	3b/20b	20b	22Q07 most consistently aligned with 20b across the four datasets - occurs at the northern portion of the Survey Area at the base of the Darling Scarp on the Ridgehill Shelf. Contains *Hakea stenocarpa* a species typically used to differentiate 20b from other *Banksia* communities.
EwXp	No site	N/A	20a	Too degraded to assign with confidence	N/A	N/A	N/A	N/A	N/A	Too degraded to assign with confidence.

*Sites were combined by community in the analysis run for the 360 Environmental (2016) report

Three SCP FCTs were identified as occurring within the Survey Area:

1. **SCP 3b *Corymbia calophylla* - *Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson et al. (1994))**

   "The community is known from the eastern side of the Swan Coastal Plain largely between Queens Park and Dunsborough. Most sites of the community type are dominated by both *Corymbia calophylla* (marri) and *Eucalyptus marginata* (jarrah) with additional common taxa comprising low shrubs, sedges, grasses, and herbs. These include *Bossiaea eriocarpa* (common brown pea), *Conostylis juncea*, *Hibbertia hypericoides* (yellow buttercups), *Tetraria octandra*, *Chamaescilla corymbosa* (blue squill), *Desmocladus fasciculatus*, *Banksia dallanneyi* (couch honeypot), *Mesomelaena tetragona* (semaphore sedge), *Babingtonia camphorosmae* (camphor myrtle), *Lepidosperma squamatum*, *Neurachne alopecuroidea* (foxtail mulga grass), *Philotheca spicata* (pepper and salt), *Burchardia congesta*, *Caesia micrantha* (pale grass-lily), *Kingia australis* (kingia), *Drosera erythrorhiza* (red ink sundew), *Lomandra hermaphrodita* and Caladenia flava (Department of Biodiversity, 2020)."

2. **SCP 20a *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))**

   "The community occurs on sands near Koondoola and at the base of the Darling Scarp largely between Chittering and Gosnells. It is usually dominated by *Banksia attenuata* (slender banksia) occasionally with *Eucalyptus marginata* (jarrah) with *Bossiaea eriocarpa* (common brown pea), *Conostephium pendulum* (pearl flower), *Hibbertia huegelii*, *Hibbertia hypericoides* (yellow buttercups), *Petrophile linearis* (pixie mops), *Scaevola repens*, *Stirlingia latifolia* (blueboy), *Mesomelaena pseudostygia* and *Alexgeorgea nitens* being common in the understorey."(Department of Biodiversity, 2020b).

3. **SCP 20b Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (Swan Coastal Plain Community type 20b - Gibson et al. 1994)**

   "The community occurs on sands at the base of the scarp predominantly on the Pinjarra Plain and Ridge Hill Shelf. Most of the occurrences of this community comprise *Banksia attenuata* (slender banksia) - *Eucalyptus marginata* (jarrah) woodlands but the community also occurs as *Banksia* woodlands and heaths. The sedge *Mesomelaena pseudostygia* is a common component of the community, which is very species rich and has a diverse shrub layer and low weed frequency. *Hakea stenocarpa* (narrowfruited hakea), *Conostylis setosa* (white cottonhead), and *Johnsonia pubescens* subsp. *cygnorum* (priority 2) generally differentiate the community from similar *Banksia*

communities."https://www.dpaw.wa.gov.au/images/documents/plants-animals/tecs/SCP20b-Banksia-jarrah-woodlands.pdf (Department of Biodiversity, 2020a).

3.1.10 Conservation Significant Ecological Communities

All three of the SCP FCTs identified within the Survey Area are TECs pursuant to the BC Act and one is listed as a TEC under the EPBC Act (Table 10; Figure 6). The total area covered by TECs within the Survey Area is 14.25 ha. No DBCA listed PECs were recorded within the Survey Area.

Table 10:TECs Identified as Occurring within the Survey Area

TEC Community Code	State	EPBC Act	Area (ha)
SCP20a *Corymbia calophylla - Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain	TEC (EN)		10.47
SCP20b Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain	TEC (EN)	TEC (EN)	1.21
SCP3b *Corymbia calophylla - Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain	TEC (VU)		2.57
Total			**14.25**

Area is rounded to two decimal places.

3.2 Black Cockatoos

3.2.1 Black Cockatoo Desktop Assessment

The Survey Area occurs within the modelled distributions of all three threatened black cockatoo species (Department of Agriculture Water and the Environment, 2022b). The database searches identified the following results, all of which occur within a 20 km radius (Figure 7):

- 3,984 records of the Carnaby's Cockatoo, with 382 recorded in the past 10 years
- 389 records of the Baudin's Cockatoo, with 222 recorded in the past 10 years
- 437 records of the Forest Red-tailed Black Cockatoo, with 368 recorded in the past 10 years
- An additional 473 records of 'White-tailed Black Cockatoo', with 181 recorded in the past 10 years which could not be attributed as Baudin's Cockatoo or Carnaby's Cockatoo.

The DBCA and Great Cocky Count database search results identified 55 confirmed White-tailed Black Cockatoo roost sites within a 20 km radius of the Survey Area, with one occurring within the Survey Area (Birdlife Australia, 2022; Department of Biodiversity Conservation and Attractions, 2022c). A total of 65 confirmed Forest Red-tailed Black Cockatoo roost sites within a 20 km radius of the Survey Area were also identified, with one confirmed Forest Red-tailed Black Cockatoo roost site occurring within the Survey Area (Birdlife Australia, 2022; Department of Biodiversity Conservation and Attractions, 2022c) (Figure 7). The DBCA database search also

identified 15 confirmed White-tailed Black Cockatoo breeding areas within a 20 km radius. The nearest of which occurs approximately 6.7 km to the northeast (Birdlife Australia, 2022; Department of Biodiversity Conservation and Attractions, 2022c).

3.2.2 Foraging Habitat

The Survey Area contained a total of 38.55 ha of high-quality foraging habitat as identified from the Foraging Habitat Scoring Tool (Department of Agriculture Water and the Environment, 2022b). The high-quality foraging habitat was comprised primarily of Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*), Tuart (*Eucalyptus gomphocephala*) and *Allocasuarina* sp. The Survey Area also contained a total of 9.90 ha of unsurveyed vegetation which could not be classified in accordance with the Foraging Habitat Scoring Tool. The results of the Foraging Habitat Scoring Tool are shown below in Table 11 and displayed in Figure 8.

Table 11: Black Cockatoo Foraging Tool Results

Species	Foraging Potential	Connectivity	Proximity to Breeding	Proximity to Roosting	Impact from Significant Plant Disease	Total	Quality
Baudin's Cockatoo	-2	0	0	0	0	8	High Quality Native Foraging Habitat
Carnaby's Cockatoo	0	0	0	0	0	10	High Quality Native Foraging Habitat
Forest Red-tailed Black Cockatoo	0	0	0	0	0	10	High Quality Native Foraging Habitat

3.2.3 Nesting Habitat

The 2015 report identified a total of 479 potential nesting trees occurring within the Survey Area. The results of the supplementary field survey identified an additional 99 nesting trees with a DBH of greater than 500 mm within the Survey Area (Figure 9 and Appendix F), comprising:

- 18 Jarrah (*Eucalyptus marginata*)
- 29 Marri (*Corymbia calophylla*)
- 17 Tuarts (*Eucalyptus gomphocephala*)
- 15 Wandoo (*Eucalyptus wandoo*)

- Five Introduced Eucalypts
- 15 Stags.

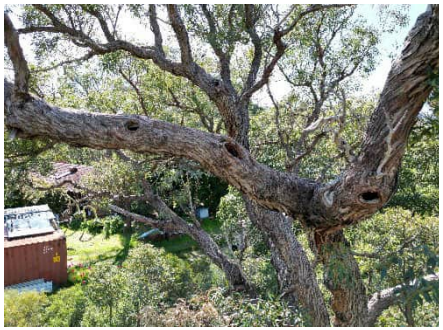
3.2.4 Hollow Inspection

The black cockatoo hollow inspection identified 40 trees which contained hollows when observed from the ground. Thirty-six of these were considered potentially suitable for black cockatoo nesting and were inspected by drone (Appendix F). Drone inspections found that:

- A total of 18 trees contain hollows that are suitable for black cockatoo nesting, of which seven show potential signs of previous use such as evidence of chewing around the entrance (Plate 3)
- Five trees contain hollows that may potentially be suitable for black cockatoo nesting in the future but are currently occupied by bees.

Tree ID: 1

Tree ID: 32



Tree ID: 43

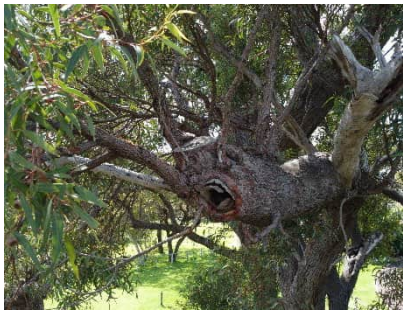
Tree ID: 43

Tree ID: 43

Tree ID: 44

Tree ID: 54

Tree ID: 60



Tree ID: 60

Tree ID: 60

Plate 3: Hollows Exhibiting Signs of Prior Use

3.2.5 Roosting Habitat

No direct sightings of roosting black cockatoos were made during the survey. The Survey Area contains approximately 38.55 ha of potential roosting habitat and all trees recorded as potential nesting trees may also be used for roosting. The DBCA Database Search Results identified two black cockatoo roost sites occurring within the Survey Area (Figure 7). These locations provided in DBCA data do not directly correspond to trees visible in aerial imagery of the site, due to a lack of precision in DBCA data available. Vegetation around these points was visually inspected during the field survey and no roosting black cockatoos were observed. However, this does not rule out their use as dawn/dusk surveys were not conducted.

3.3 Fauna

3.3.1 Database searches

The database searches identified 109 conservation significant species occurring within the Study Area. The potential species comprise of:

- 72 bird species
- 25 mammal species
- 12 reptile species.

The results of the DBCA Threatened and Priority Fauna database search are mapped in Figure 7. Database searches are displayed in their entirety in Appendix A.

3.3.2 Likelihood of Occurrence

The likelihood of occurrence assessment within the Survey Area for conservation significant fauna species found that:

- Five species have a high likelihood of occurrence:
  - Baudin's Cockatoo (*Zanda baudinii*) – EN (DBCA); EN (EPBC) (recorded in 2022 survey)
  - Carnaby's Cockatoo (Zanda *latirostris*) – EN (DBCA); EN (EPBC Act) (recorded in 2022 survey)
  - Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – VU (DBCA); VU (EPBC Act)
  - Wambenger Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – CD (DBCA)
  - Quenda (*Isoodon fusciventer*) – P4 (DBCA) (recorded in 2022 survey).

- Five species have a medium likelihood of occurrence:
  - Blue-billed Duck (*Oxyura australis*) – P4 (DBCA)
  - Black Bittern (*Ixobrychus flavicollis australis*) – P2 (DBCA)
  - Chuditch, Western Quoll (*Dasyurus geoffroii fortis*) – VU (DBCA); VU (EPBC)
  - Tammar Wallaby (*Notamacropus eugenii derbianus*) – P4 (DBCA)
  - Western Brush Wallaby (*Notamacropus irma*) – P4 (DBCA).
- The remaining 109 species have a low likelihood of occurrence.

The results of the likelihood of occurrence assessment are presented in Appendix G.

3.3.3 Fauna Habitat

Six broad fauna habitats were identified and mapped throughout the Survey Area (excluding Cleared and No Access). Habitat condition varied throughout the Survey Area, with the most prolific disturbances being clearing, infrastructure and weeds.

Descriptions, extents, and representative photos for fauna habitats within the Survey Area are provided below in Table 12. Fauna habitat mapping is displayed in Figure 10 and habitat assessment site sheets are presented in Appendix H.

Table 12: Fauna Habitats within the Survey Area

Fauna habitat	Extent within Survey Area*		Habitat Assessments Inside Habitat	Habitat Description	Representative Photograph
	Area (ha)	%			
Eucalypt Remnant with Understorey	7.59	5	Site 1 Site 8 Site 9	This habitat as an overstorey that includes Marri, Jarrah, Wandoo and Flooded Gum, a midstorey that comprises *Acacia*, *Allocasuarina*, *Banksia*, *Hakea* and *Xanthorrhoea*, over an understorey of mixed herbs. The large Eucalypt trees provide potential breeding and foraging habitat for black cockatoos, while the *Allocasuarina*, *Banksia*, *Hakea* and *Xanthorrhoea* trees and shrubs also provide foraging habitat. This habitat has vegetation in multiple strata (canopy, midstorey and understorey), woody debris and leaf litter that provides habitat for small reptile, bird, and mammal species. However, as these patches are for the most part fragmented, fauna movement between them is limited, particularly for the less mobile groups such as small reptiles and mammals.	
Marri woodland	21.96	13	Site 2 Site 10 Site 11 Site 12	The overstorey of this habitat is dominated by Marri (*Corymbia calophylla*) with a mixed mid storey and understorey of native and introduced species. The Marri overstorey provides valuable foraging and roosting habitat for the three threatened black cockatoo species as well as other avian species. There is also the potential that the mature species may develop suitable nesting hollows in the future. Leaf litter, sparse woody debris and the mixed understorey may provide shelter and foraging habitat for mixed reptile and mammal species.	

Fauna habitat	Extent within Survey Area*		Habitat Assessments Inside Habitat	Habitat Description	Representative Photograph
	Area (ha)	%			
Eucalypt Remnant Lacking Understorey	5.24	3		This habitat is disturbed as a result of vegetation clearing, it therefore provides limited value to fauna taxa. A lack of vegetation structure (cover), particularly in the midstorey and understorey, and limited litter (leaf and woody debris) means that there are few microhabitats for small fauna, in particular small reptiles, and mammals. The trees are a mix of Marri, Jarrah, Wandoo and Flooded Gum, which provide foraging and potential breeding habitat for several bird species, most importantly for threatened black cockatoos.	
Sheoak Woodland	1.00	1	Site 4	This habitat consists of native *Allocasuarina* sp. with little to no native vegetation in the midstorey and understorey. Consequently, this habitat provides limited value to most fauna species. However, *Allocasuarina* trees are a dietary item for black cockatoos.	

Fauna habitat	Extent within Survey Area*		Habitat Assessments Inside Habitat	Habitat Description	Representative Photograph
	Area (ha)	%			
Crumpet Creek	2.74	2	Site 5 Site 7 Site 13	Crumpet Creek runs through the southern section of the Survey Area (Figure 10). Trees along the edges of the creek include Marri, Jarrah, Wandoo and Flooded Gum. The southern section of Crumpet Creek has intact vegetation, both in the midstorey and understorey and is therefore considered to be in very good condition and of value to fauna. The northern section of Crumpet Creek is however, disturbed, lacks a midstorey and native understorey (the understorey is heavily impacted by weeds). This lack of vegetation structure (cover), limits the foraging and sheltering niches for fauna, particularly small reptiles and mammals. However, the trees, Marri, Jarrah, Wandoo and Flooded Gum provide foraging and potential breeding habitat for black cockatoos.	
Garden Planted	27.89	17	Site 3	Large parts of the Survey Area comprised gardens, roads, paths, and cleared paddocks. A lack of native vegetation and limited vegetation structure provides limited value to fauna.	

Fauna habitat	Extent within Survey Area*		Habitat Assessments Inside Habitat	Habitat Description	Representative Photograph
	Area (ha)	%			
Not Surveyed	9.90	6		Areas of site that were not surveyed and thus cannot be assigned a fauna habitat.	
No Access	1.19	1		Areas of site with prohibitive access and therefore not surveyed.	
Cleared	90.67	54	Site 6	Areas that have been cleared and do not contain vegetation. These areas include roads, footpaths, and infrastructure, which do not provide habitat value to native fauna, and grassed areas such as nature strips, which are widespread and provide limited habitat value aside from foraging opportunities for common species such as magpies and corellas.	
TOTAL	**168.18**	**100**			

3.3.4 Fauna Records

Six terrestrial vertebrate fauna species from five families were recorded during the field survey, comprising five birds and one mammal.

A list of fauna species recorded during the field survey is presented in Table 13, including the number of times each species was recorded. Fauna records are shown in Figure 10.

Table 13: Fauna Species Recorded During the Field Survey

Family	Scientific Name	Common Name	Abundance
Birds			
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	1
Psittaculidae	*Barnardius zonarius*	Australian Ringneck	3
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo	1
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	13
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckooshrike	1
Mammals			
Peramelidae	*Isoodon fusciventer*	Quenda	6

3.3.4.1 Conservation Significant Fauna Records

Three conservation significant fauna taxa were recorded within the Survey Area during the field survey:

- Carnaby's Cockatoo (*Zanda latirostris*), Endangered under the BC and EPBC Act – This species was identified at multiple locations throughout the Survey Area, with direct sightings overhead, foraging evidence on Marri nuts and audible calls
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*), Vulnerable under the BC and EPBC Act – Foraging evidence of the species was recorded within the Marri Woodland habitat
- Quenda (*Isoodon fusciventer*), Priority 4 under the BC Act – Multiple Quenda diggings were recorded throughout the Survey Area
- A White-tailed Black Cockatoo call was heard which may have been either the Baudin's Cockatoo or the Carnaby's Cockatoo.

4 Discussion

4.1 Flora and Vegetation

4.1.1 Survey Effort

The survey effort of the supplementary survey combined with the previous surveys undertaken in 2015 was considered adequate to meet the standards of EPA (2016), within the constraints of the highly fragmented rural/urban environment.

Where possible three flora sites were sampled in each vegetation type to ensure spatial coverage across the Survey Area was sufficient. Four vegetation types (EmNf, AhDg, EmAh and EwXp) were not spatially large enough, or did not have enough vegetation in good or better condition, to warrant three quadrats.

Two vegetated portions of the Survey Area could not be accessed in 2022, therefore, no flora sites were established, and targeted searching and field vegetation mapping was not undertaken in these areas. Aerial imagery and nearby mapping indicates these areas are likely to contain native vegetation dominated by *Corymbia calophylla* and *Eucalyptus marginata*, however on ground survey would be required to confirm the vegetation and floristic composition of these areas. According to DBCA database records Priority flora species *Banksia pteridifolia* subsp. *vernalis* has previously been recorded in one of these areas, on a private property on Brewer Road. The record is from 1998 and on ground survey would be required to confirm currency.

Numerous small portions of the Survey Area were not assessed due to access issues or because they were Parkland Cleared or garden. These areas are highly fragmented and isolated and are unlikely to represent vegetation of significance or support significant flora.

Despite the constraints of surveying in a highly fragmented rural/urban setting the data collected is considered to provide a good representation of the flora and vegetation within the Survey Area.

4.1.2 Flora Composition

Flora composition of remnant vegetation within the Survey Area was representative of the local area and typical of the Swan Coastal Plain, and Southern River and Forrestfield vegetation complexes. Species richness was lower than would be expected in a larger intact area of similar vegetation, however the inventory likely provides a near complete list of the native flora occurring within the Survey Area. The relatively low species richness within the Survey Area is likely the result of the fragmentation of native vegetation and associated edge effects, the prevalence of weeds in some areas particularly in the understorey, and the limited extent of vegetation in good or better condition within the Survey Area.

4.1.3 Conservation Significant Flora

One Threatened flora species, *Conospermum undulatum* (T), was recorded within the Survey Area. *Conospermum undulatum* (T) is a distinct erect, compact shrub 0.6 to 2 m tall with wavy leaf margins and white woolly flowers with long white hairs May to October (Department of Environment and Conservation, 2009; Western Australian Herbarium, 2022). It occurs on grey or yellow sand and sandy clay soils, often over laterite, on flat or gently sloping sites between the Swan and Canning Rivers, with a few records from slightly swampy habitat (Department of Environment and Conservation, 2009; Western Australian Herbarium, 2022).

All records of *Conospermum undulatum* were from vegetation in Very Good or Excellent condition. Two of the locations were in vegetation association CcEm, one was in EmNf, and one was in EmAh. The areas covered by vegetation within 50 m of Threatened flora (to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located) is considered critical habitat and therefore are regarded as ESAs (Department of Water and Environmental Regulation, 2014).

Most of the remaining potential Threatened flora species identified by the desktop assessment were considered to have a low likelihood of occurrence following the survey based on the proximity of nearest known locations and/or their typical habitat not being present within the Survey Area. Three were considered to have a medium likelihood of occurrence following the survey as habitat within the Survey Area may be suitable for their occurrence and there are known records of each nearby:

- *Banksia mimica* (T) is a prostrate perennial shrub, 0.15-0.4 m high with yellow brown flowers December or January to February (Western Australian Herbarium, 2022). It occurs in white or grey sand over laterite or sandy loam (Western Australian Herbarium, 2022). The nearest record of this species is 4.32 km away in remnant bushland on both sides of Tonkin Highway near Hartfield Golf Club. This species would have been detectable at the time of the survey but would not have been flowering.
- *Macarthuria keigheryi* (T) is an erect or spreading perennial, herb or shrub, 0.2-0.4 m high, and 0.3-0.6 m wide, flowering September to December, or February to March (Western Australian Herbarium, 2022). It occurs on white or grey sand (Western Australian Herbarium, 2022). The nearest record of this species is 2.9 km away and there are 22 records (some with multiple individuals) within 10 km of the Survey Area (Western Australian Herbarium, 2022). All records are from the eastern side of Roe Highway, in remnant bush surrounding the airport, and south of the Welshpool industrial area. This species may have been flowering at the time of the survey but could be difficult to detect even if present within the Survey Area.
- *Morelotia australiensis* (P3) (formerly *Tetraria australiensis*) is a rhizomatous tufted perennial sedge herb growing to 1 m high occurring on sand over clay flats (Western Australian Herbarium, 2022). There are two records of this species within 10 km, one from 1898 in an area that has since been developed, and another from 2019 in a small

patch of remnant bushland on the corner of Tonkin Highway and Kelvin Road in Maddington.

One Priority flora species, *Isopogon autumnalis,* was recorded in the Survey Area. *Isopogon autumnalis* (P3) is a perennial shrub 0.3 to 1 m high and 0.5 to 1 m wide with simple terete leaves and pale-yellow flowers (Rye & Macfarlane, 2019). It occurs in sandy soils, often in *Banksia* woodlands, in the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plain bioregions, between Green Head and Serpentine (Rye & Macfarlane, 2019; Western Australian Herbarium, 2022). All records of *Isopogon autumnalis* (P3) were from vegetation in Very Good or Excellent condition. One of the locations was in vegetation association CcEm and the other was in AhCd. The presence of Priority flora is not a statutory constraint for the Survey Area.

The desktop assessment also identified one record of Priority flora species *Banksia pteridifolia* subsp. *vernalis* (P3) within the Survey Area, however the record was located within an area that could not be accessed during the survey. The DBCA record was from 1998 and therefore this species may no longer be present at the site, however the location would need to be surveyed to confirm absence or presence of the species at the location. *Banksia pteridifolia* subsp. *vernalis* (P3) was not recorded from anywhere else in the Survey Area during the current survey, however there are several nearby locations, the closest being only 630 m from the Survey Area.

One unconfirmed flora species recorded during the survey, *Haemodorum* sp. could represent *Haemodorum loratum* (P3), a Priority flora species identified in the desktop assessment as having a high likelihood of occurrence within the Survey Area. *Haemodorum loratum* (P3) is a bulbaceous, perennial, herb, 0.45-1.2 m high with black/brown black/green flowers in November (Western Australian Herbarium, 2022). It occurs on grey or yellow sand, and gravel (Western Australian Herbarium, 2022). When not in flower *Haemodorum loratum* (P3) can be difficult to detect and therefore could have been missed during the surveys. The nearest record is 1 km from the Survey Area (on the eastern side of Roe Highway) from 1995.

The presence of Priority flora is dealt with by relevant State departments and agencies on a case by case basis, considering guidance provided in State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region, Native Vegetation Policy for WA, EPA Guidance for Planning and Development and recent (s.38) EPA Assessment Reports.

4.1.4 Vegetation Condition

Vegetation Condition within the Survey Area was as expected in the highly fragmented rural/urban environment. Most of the Survey Area was Completely Degraded, comprising grazing paddocks, houses and associated infrastructure, roads, gardens, and small orchards. The remaining patches of remnant or regenerated native vegetation ranged from Excellent to Degraded Condition, although all were subject to edge effects and weeds.

4.1.5 Conservation Significant Vegetation

The DBCA TEC PEC database search identified four conservation significant vegetation types or their associated buffers occurring within the Survey Area, SCP 20a, SCP 20b, SCP 20c and Banksia WL SCP. All of the intact vegetation within the Survey Area (except ExWp which had no vegetation in good enough condition to confidently assign an FCT), was inferred as being analogous to one of three TECs, being SCP 20a,20b and 3b.

SCP20a *Banksia attenuata* woodlands over species rich dense shrublands

Vegetation identified as EmAh, EmNf, AhCd, and most of the vegetation identified as CcEm was inferred to be the TEC SCP 20a, based on statistical analysis and other diagnostic factors. This inference is supported by DBCA TEC mapping, which shows the entire Survey Area (except a very small portion of the south-east corner) covered by SCP 20a, or associated buffers. Further supporting the inference of SCP 20a, nearby SCP sites classified as 20a are located 1 km to the north in Maida Vale, and 1.2 km and 2.5 km to the south-east and south, respectively, in Forrestfield and all situated on the eastern extent of the Swan Coastal Plain at the base of the Darling Scarp.

SCP20b *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain

A small portion of the vegetation identified as CcEm, located in the north-east portion of the Survey Area, was inferred to be the TEC SCP 20b based on statistical analysis and other diagnostic factors. This vegetation was consistent with the description for SCP 20b, which occurs at the base of the Darling Scarp on the Ridgehill Shelf. The vegetation also contains *Hakea stenocarpa*, a species typically used to differentiate 20b from other Banksia communities. This inference is strongly supported by DBCA TEC mapping, which shows these patches at the centre of a buffer for SCP 20b.

SCP3b *Corymbia calophylla* - *Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain

The intact vegetation identified as CcMp, surrounding Crumpet Creek, between Brewer Road and Sultana Road east was inferred to be the TEC SCP 3b. The results of statistical analysis leant towards SCP 3b but were not conclusive. The FCT was ultimately inferred based on a number of factors, primarily the location of the vegetation on alluvial soils associated with Crumpet Creek, and the presence of key taxa: *Corymbia calophylla* and *Eucalyptus marginata* over sedges,

grasses and herbs including *Bossiaea eriocarpa*, *Hibbertia hypericoides* subsp. *hypericoides*, *Chamaescilla corymbosa*, *Banksia dallanneyi* subsp. *dallanneyi*, *Desmocladus fasciculatus*, *Mesomelaena tetragona*, *Morelotia octandra*, *Babingtonia camphorosmae*, *Neurachne alopecuroidea, Philotheca spicata*, *Burchardia congesta, Drosera erythrorhiza* and *Caladenia flava*. The nearest SCP 3b site is located 6 km south in Maddington, and although it is some distance from the Survey Area, they are each located in a similar position in the landscape, on the edge of the SCP near the base of the Darling Scarp.

Statistical analysis and/or field observations indicated influence from FCTs SCP 20a, 20b, 20c and 3a. Influence from SCP 20a, 20b, and 20c are unsurprising as all have been mapped by DBCA in the local area. Furthermore, DBCA TEC mapping shows the vegetation at the centre of buffers for SCP 20a and 20c. Notes from DBCA personnel asserted that the vegetation surrounding sites MVQ3 and MVQ4 were analogous to SCP 20c and SCP 20a respectively, however this was based on the statistical analysis provided in 360 Environmental (2016), which grouped quadrats of the same vegetation type for analysis, and observation made from the road in the case of MVQ3. Influence of SCP 3a is supported by the presence of two SCP 3a site located approximately 1600 m away, on the eastern side of Roe Highway, that may have been hydrologically connected to the CcMp sites prior to urban development of the local area.

Although the final inference of this FCT assignment could be argued based on both statistical analysis and other diagnostic features, all of the likely alternatives (20a, 20b, 20c and 3a) are also TECs and therefore conservation significant.

SCP 20c Shrublands and woodlands of the eastern side of the Swan Coastal Plain

The SCP 20c TEC (and/or its associated buffers) was identified by the DBCA database searches as occurring within the Survey Area, however none of the vegetation within the Survey Area was inferred to be SCP 20c. Some sites (MVQ3, MVQ6 and 22Q06) were considered to be influenced by SCP 20c, however none were strongly aligned with SCP 20c sites in the statistical analysis and other diagnostic criteria pointed more strongly to other FCTs.

***Banksia* Woodlands of the Swan Coastal Plain ecological community**

The Banksia WL SCP TEC (and/or its associated buffers) was identified by the DBCA database searches as occurring within the Survey Area. SCP 20a and SCP 20b are regarded as sub-communities of the national ecological community, where they occur within the defined distribution of the TEC, however one of the key diagnostic criteria for the Banksia WL SCP TEC is that it must contain at least one of the following species: *Banksia menziesii*, *Banksia attenuata, Banksia prionotes* or *Banksia ilicifolia*. None of these species were recorded within the Survey Area and therefore none of the vegetation patches within the Survey Area meet the requirements to be considered Banksia WL SCP.

4.2 Fauna

4.2.1 Fauna Habitat

The supplementary fauna survey identified a new habitat previously classified within the Eucalypt Remnant Lacking Understorey and Eucalypt Remnant with Understorey habitat types. This new habitat type occurs in patches across the Survey Area and is identified as Marri Woodland and has an overstorey dominated by Marri (*Corymbia calophylla*) with mixed mid and understoreys (Figure 10). The presence of Marri throughout this habitat provides valuable foraging material for the three threatened black cockatoo species. Hollows were identified within this habitat and maybe utilised by the three threatened black cockatoos for breeding. Additionally, these taller trees will provide valuable shelter and foraging opportunities for the broader avian assemblage. Patches of this habitat contained a denser understorey comprised of mixed native species. This, along with the availability of woody debris and leaf litter may provide foraging and sheltering opportunities for the conservation significant Quenda (*Isoodon fusciventer*), as well as the broader faunal assemblage. The condition of this habitat varied widely throughout site, with disturbances from infrastructure, clearing and weeds.

4.2.2 Conservation Significant Fauna

4.2.2.1 Supplementary Field Survey

The supplementary fauna survey identified four conservation significant fauna occurring within the Survey Area. These species were previously identified during the 360 Environmental (2016) fauna survey and are described below:

Baudin's Cockatoo (*Zanda baudinii*) – Endangered (State and Commonwealth)

The Baudin's Cockatoo is distributed through the south-west WA from the northern Darling Range and adjacent far east of the Swan Coastal Plain (south of the Swan River), south to Bunbury and across to Albany (Johnstone & Kirkby, 2011) This species forages primarily in Eucalypt Forest, where it feeds on Marri seeds, flowers, nectar, and buds. They also feed on a wide range of seeds of *Eucalyptus* spp., *Banksia* spp., *Hakea* spp., and *Pinus* spp., as well as fruiting apples and pears and beetle larvae from under the bark of trees (Johnstone & Kirkby, 1999). Baudin's Cockatoo forages at all levels of the forest from the canopy to the ground, often feeding in the understorey on proteaceous trees and shrubs (especially *Banksia*) and in orchard trees within the canopy and on fallen fruit.

The Survey Area occurs within the modelled distribution for the Baudin's Cockatoo and contains high quality foraging habitat as identified by the foraging habitat scoring tool (Department of Agriculture Water and the Environment, 2022b). The high-quality foraging habitat comprises primarily Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*), Tuarts (*Eucalyptus gomphocephala*) with a mix of *Banksia* sp. and *Allocasuarina* sp. and is primarily contained within the Crumpet Creek, Eucalypt Remnant with Understorey, Eucalypt Remnant Lacking Understorey, Marri Woodland and Sheoak Woodland habitats. It is likely that the species may utilize these habitats for foraging given the presence of a confirmed roost site within the Survey Area (Department of Biodiversity Conservation and Attractions, 2022a). Additionally, 18 trees were found to contain hollows suitable for use by the Baudin's Cockatoo.

Carnaby's Black Cockatoo (*Zanda latirostris*) – Endangered (State and Commonwealth)

Carnaby's Cockatoos nest in the hollows of a wide range of Eucalypt trees, with a preference for smooth barked trees such as Salmon Gum (*E. salmonophloia*) and Wandoo (*E. wandoo*) but also rough barked Eucalyptus and Corymbia trees such as Red Morrell (*E. longicornis*), York Gum (*E. loxophleba*), Marri (*Corymbia calophylla*) and Tuart (*E. gomphocephala*) (Johnstone & Storr, 1998). Carnaby's Cockatoos feed on seeds, nuts, and flowers of a variety of native and exotic plants, including *Banksia* spp., Pine trees (*Pinus* sp.), Marri, Jarrah (*E. marginata*), *Grevillea* spp., *Allocasuarina* spp., and *Hakea* spp. (Shah, 2006).

The Survey Area occurs within the Swan Coastal Plain, which is considered a critical foraging area for the species during the non-breeding season (Department of Agriculture Water and the Environment, 2022b) and the results of the foraging habitat scoring tool classified particular areas of site as high-quality foraging habitat. The high-quality foraging habitat is comprised primarily of Jarrah (Eucalyptus marginata), Marri (*Corymbia calophylla*), Tuarts (*Eucalyptus gomphocephala*) with a mix of *Banksia* sp. and *Allocasuarina* sp. and is primarily contained within the Crumpet Creek, Eucalypt Remnant with Understorey, Eucalypt Remnant Lacking Understorey, Marri Woodland and Sheoak Woodland habitats. It is likely that the species may utilize these habitats for foraging given the presence of a confirmed roost site occurring within the Survey Area (Department of Biodiversity Conservation and Attractions, 2022a). Direct sightings and foraging evidence of this species were recorded at multiple locations during the field survey. Additionally, 18 trees were found to contain hollows suitable for use by the Carnaby's Cockatoo.

Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – Vulnerable (State and Commonwealth)

The Forest Red-tailed Black Cockatoo is distributed through the south-west of WA from Gingin through the Darling Ranges to the south-west from Bunbury to Albany. The Forest Red-tailed Black Cockatoo inhabits dense Jarrah, Karri (*E. diversicolor*) and Marri forests and feeds primarily on the fruit of Marri and Jarrah trees (Johnstone & Kirkby, 1999)

The Survey Area occurs within the modelled distribution for the Forest Red-tailed Black Cockatoo and contains high quality foraging habitat as identified by the foraging habitat scoring tool (Department of Agriculture Water and the Environment, 2022b). The high-quality foraging habitat is comprised primarily of Jarrah (*Eucalyptus marginata*), Marri (*Corymbia* calophylla), Tuarts (*Eucalyptus gomphocephala*) with a mix of *Banksia* sp. and *Allocasuarina* sp. and is primarily contained within the Crumpet Creek, Eucalypt Remnant with Understorey, Eucalypt Remnant Lacking Understorey, Marri Woodland and Sheoak Woodland habitats. It is likely that the species may utilize these habitats for foraging given the presence of a confirmed roost site contained within the Survey Area (Department of Biodiversity Conservation and Attractions, 2022a). Foraging evidence of this species was recorded at multiple locations during the field survey. Additionally, 18 trees were found to contain hollows suitable for use by the Forest Red-tailed Black Cockatoo.

Quenda (*Isoodon fusciventer*) – Priority 4 (State)

Quenda are nocturnal and omnivorous, feeding on insects, spiders, worms, and plant roots and are typically found in dense vegetation, including wetland fringes, forest woodland, shrub, and heath communities (Department of Biodiversity Conservation and Attractions, 2012; van Dyck & Strahan, 2008).

Quenda diggings were recorded at multiple locations throughout the Survey Area. There are 1,599 DBCA records within 20 km of the Survey Area, with 1,399 occurring within the previous 10 years (Department of Biodiversity Conservation and Attractions, 2022a). Quenda are likely to use many of the fauna habitats found in the Survey Area, such as Crumpet Creek, Eucalypt Remnant with Understorey and Marri Woodland in areas with denser understorey. It is likely that the Crumpet Creek and Eucalypt Remnant with Understorey will provide the most value to the species.

4.2.2.2 High Likelihood

Wambenger Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – CD (State)

The Wambenger Brush-tailed Phascogale is a rat-sized, arboreal, carnivorous marsupial, characterised by a tuft of black hairs on its tail (van Dyck & Strahan, 2008). Typically, the species has been observed in dry sclerophyll forests and open woodlands containing hollow-bearing trees with a sparse ground cover. The distribution of the Brush-tailed Phascogale is widespread but fragmented, stemming from habitat destruction and predation by cats and foxes (van Dyck & Strahan, 2008). In the south-west of Australia, the species is thought to have declined within the last 10 years given the lower number of records despite an increase in survey effort (van Dyck & Strahan, 2008). Although the species was not recorded, the Eucalyptus Remnant with Understorey, Marri Woodland, Eucalyptus Remnant Lacking Understorey and Crumpet Creek Habitats contain vegetation which may be suitable for the Wambenger Brushtailed Phascogale. The presence of hollows, logs and stags within this habitat may provide sheltering opportunities for the species. Database searches identified 48 records within a 20 km radius of the Survey Area, and it is likely that they may utilize parts of the Survey Area.

4.2.2.3 Medium Likelihood

Blue-billed Duck (*Oxyura australis*) – P4 (State)

The Blue-billed Duck is small Australian stiff-tailed duck, with both males and females growing to a length of approximately 40 cm (Pizzey & Knight, 2001). The males are characterized by a slate-blue bill which changes to bright-blue during the breeding season (Johnstone & Storr, 1998). The Blue-billed Duck is endemic to Australia's temperate regions, inhabiting natural inland and artificial wetlands (Johnstone & Storr, 1998). Its range extends from southern Queensland, through New South Wales and Victoria to Tasmania. It is also widespread in the southwest of Western Australia (Johnstone & Storr, 1998; Marchant & Higgins, 1990). It is almost wholly aquatic and prefers deep, freshwater swamps, with dense vegetation, including: cumbungi - *Typha orientalis* (broadleaf cumbungi) and *Typha domingensis* (narrow-leaved cumbungi) (Marchant & Higgins, 1990). No Blue-billed ducks were recorded within the Survey Area. There are 435 DBCA records within 20 km of the Survey Area, including a record located 0.5 km southwest in 1991 (Department of Biodiversity Conservation and Attractions, 2022a). Although the species may utilize the Crumpet Creek Fauna habitat it is unlikely the species will be reliant on the Survey Area.

Black Bittern (*Ixobrychus flavicollis australis*) – P2 (State)

The Black Bittern is a medium sized heron with dark upperparts and orange, yellow and reddish striping on the neck and breast. The species forages on a wide range of small animals, but primarily fish and amphibians. The species typically favours habitats with large rivers or permanent swamps with tall shady fringing vegetation such as rainforests, dense sclerophyll and Melaleuca woodlands (Menkhorst et al., 2017). No Black Bitterns were recorded within the Survey Area. There was one DBCA record identified approximately 9 km northeast in 1903 (Department of Biodiversity Conservation and Attractions, 2022a). The species is unlikely to be reliant on the Survey Area, however it may utilize the Crumpet Creek fauna habitat in the south of the Survey Area.

Chuditch, Western Quoll (*Dasyurus geoffroii fortis*) – VU (State)

The Western Quoll is the largest carnivorous marsupial occurring in Western Australia and formerly ranged across nearly 70% of the continent, however a drastic decline in numbers and contraction of range sees it only surviving in the south west of Western Australia. (Western Australia Department of Environment and Conservation, 2012). The species favours areas dominated by sclerophyll forest of drier woodland, heath, and mallee shrubland and nests in hollow logs or earth burrows. Chuditch are solitary animals and occupy large home ranges, foraging for insects, small mammals, birds and lizards (van Dyck & Strahan, 2008; Western Australia Department of Environment and Conservation, 2012). The database searches identified 92 records of the species occurring within a 20 km radius of the Survey Area, with one record occurring approximately 3 km to the east in 2017 (Department of Biodiversity Conservation and Attractions, 2022a). Although the species was not recorded during the field survey it may utilise the Marri Woodland and Crumpet Creek Fauna habitats given the connectivity between these and the broader remnant vegetation to the east of the Survey Area.

Western Brush Wallaby (*Notamacropus irma*) – P4 (State)

The Western Brush Wallaby occurs only in the south-west of Western Australia and closely resembles a larger kangaroo (van Dyck & Strahan, 2008). It has an optimum habitat of open forest or woodland, particularly favoring open and seasonally wet flats with low grasses and open scrubby thickets (van Dyck & Strahan, 2008). The Western Brush Wallaby was a common species during the early days of settlement, however, ongoing clearing and fragmentation of bushland in the Wheatbelt as well as the dramatic increase in foxes within the south-west of Western Australia has led to this species decline (van Dyck & Strahan, 2008).

Although no Western Brush Wallabies were recorded during the field survey, 31 records occurring within 20 km of the Survey Area were identified by the DBCA database search (Department of Biodiversity Conservation and Attractions, 2022a). Western Brush Wallabies are unlikely to be dependent on the habitats contained within the Survey Area, however may use the Crumpet Creek given its connectivity to the surround remnant vegetation to the east.

Black-striped Snake (*Neelaps calonotos*) – P3 (State)

The Black-striped Snake is a small-bodied burrowing snake that is endemic to the Perth Region. The species is restricted to the sandy coastal strip from Mandurah to Cataby, where it inhabits dunes and sand-plains vegetated with heaths and eucalypt/banksia woodland (Wilson & Swan, 2017). The Eucalyptus Remnant with Understorey, Eucalyptus Remnant Lacking Understorey and Marri Woodland fauna habitats contain sandy substrate that may be favorable to the Black-striped Snake, and it is therefore possible that this species may occur within the Survey Area.

4.2.3 Black Cockatoos

The supplementary black cockatoo assessment identified suitable nesting habitat within the Survey Area, contained primarily within the Eucalypt Remnant with Understorey, Eucalypt Remnant lacking Understorey and the Marri Woodland fauna habitats. These habitats were comprised mainly of Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and Tuart (*Eucalyptus gomphocephala*) species which have reached a size that are considered to be potential future hollow bearing trees (Department of Agriculture Water and the Environment, 2022b). The supplementary field survey identified 99 additional trees that met the criteria to be classed as potential nesting trees and have the potential to be used for black cockatoo nesting in the future. Of these additional nesting trees, 40 contained hollows and were inspected via drone to determine their suitability for use by black cockatoos. Eighteen trees were found to contain suitable nest hollows for black cockatoo breeding and seven of these hollows displayed signs of previous use, such as chew marks at the entrance (Department of Agriculture Water and the Environment, 2022b; Johnstone et al., 2013). It could not be determined if the prior signs of use were caused by black cockatoos.

The Survey Area contains vegetation which is suitable as a foraging resource for black cockatoo species. This included Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*), Tuart (*Eucalyptus gomphocephala*) and *Allocasuarina* sp. which are known dietary items of the three threatened black cockatoo species (Department of Agriculture Water and the Environment, 2022b). Evidence of the three threatened black cockatoo species was identified throughout the Survey Area with foraging evidence of the Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo and a White-tailed Black Cockatoo call which may have been either the Carnaby's Cockatoo or the Baudin's Cockatoo.

5 Conclusion

Flora and Vegetation

- One Threatened flora taxon, *Conospermum undulatum* (T) pursuant to the EPBC Act and BC Act was recorded within the Survey Area
- One DBCA listed Priority flora taxon, *Isopogon autumnalis* (P3) was recorded in the Survey Area
- Twenty-two introduced taxa were recorded from native vegetation associations during the survey, one of these **Asparagus asparagoides* is listed as both a Declared Pest and WoNS
- Six natural vegetation associations were described within the Survey Area, ranging in condition from Excellent to Degraded, the remainder of the Survey Area was Completely Degraded (which included Parkland Cleared areas, gardens, and crops)
- Three State TECs, SCP 20a, SCP 20b and SCP 3b, covering a total area of 14.25 ha, were inferred to be present within the Survey Area, based on statistical analysis and consideration of flora sites and consideration of other diagnostic features
- No PECs were recorded within the Survey Area.

Vertebrate Fauna and Black Cockatoo

- An additional fauna habitat, the Marri Woodland, was previously classified within the Eucalypt Remnant Lacking Understorey and has subsequently been separated. This habitat is likely to provide foraging and sheltering opportunities for the three threatened black cockatoo species and the wider avian assemblage.
- Four conservation significant species were identified during the field survey. The Carnaby's Cockatoo (*Zanda latirostris*) (Endangered State and Commonwealth), Baudin's Cockatoo (*Zanda baudinii*) (Endangered State and Commonwealth), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable State and Commonwealth) and the Quenda (*Isoodon fusciventer*) (Priority 4 State).
- 38.55 ha of high-quality black cockatoo foraging habitat was identified within the Survey Area.
- 38.55 ha of potential roosting habitat was identified within the Survey Area.
- 99 potential breeding trees were identified within the Survey Area, additional to the 479 previously surveyed in 2015. Of the 99 trees assessed in 2022:
    - A total of 40 trees were identified to contain hollows, with 18 trees containing suitable nest hollows
    - Seven hollows showed signs of previous use, however this could not be attributed to black cockatoos.

We trust this meets your requirements at this time. Should you have any questions or require further action please do not hesitate to contact Narelle Whittington or the undersigned on (08) 9388 8360. We look forward to hearing from you.

For and on behalf of 360 Environmental Pty Ltd

Scott Walker - WA Team Leader - Ecology and Biodiversity

Enc
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Appendix D Flora Inventory
Appendix E Statistical Analysis Results
Appendix F Additional Potential Breeding Tree Raw Data
Appendix G Fauna Likelihood Table
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7 References

360 Environmental. (2016). Various Lots - Maida Vale Flora and Fauna Report.

Birdlife Australia. (2022). Great Cocky Count.

Department of Agriculture Water and the Environment. (2020). Weeds of National Significance.

Department of Agriculture Water and the Environment. (2021). Weeds of National Significance. https://weeds.org.au/

Department of Agriculture Water and the Environment. (2022a). Protected Matters Search Tool. http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

Department of Agriculture Water and the Environment. (2022b). Referral guideline for 3 WA threatened black cockatoo species. https://doi.org/978-176003-330-9

Department of Biodiversity, C. and A. (2020a). Banksia attenuata - Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994)).

Department of Biodiversity, C. and A. (2020b). Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994)).

Department of Biodiversity Conservation and Attractions. (2012). Fauna Profile - Quenda Isoodon obesulus. 2012. https://www.dpaw.wa.gov.au/images/documents/conservation-management/pests-diseases/quenda_2012.pdf

Department of Biodiversity, C. and A. (2020). Corymbia calophylla - Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson et al. (1994)).

Department of Biodiversity Conservation and Attractions. (2022a). DBCA Threatened and Priority Fauna database search (custom search).

Department of Biodiversity Conservation and Attractions. (2022b). Threatened and Priority Ecological Communities (custom search).

Department of Biodiversity Conservation and Attractions. (2022c). Threatened and Priority Fauna database request (custom search).

Department of Biodiversity Conservation and Attractions. (2022d). Threatened and Priority Flora List (TPFL) database request (custom search).

Department of Biodiversity Conservation and Attractions. (2022e). NatureMap. https://naturemap.dpaw.wa.gov.au/

Department of Environment and Conservation. (2009). Waxy-leaved Smokebush Conospermum undulatum) .

Western Australia Department of Environment and Conservation. (2012). Chuditch (Dasyurus geoffroii) National Recovery Plan.

Department of Primary Industries and Regional Development. (2018). Declared Plants List. https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/declared-plants

Department of Primary Industries and Regional Development. (2021). Declared plants.

Department of Water and Environmental Regulation. (2014). Environmentally Sensitive Areas - Fact Sheet. Environmentally Sensitive Areas. https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Fact_sheets/fs24-clearing-regs_ESAs.pdf

Environmental Protection Authority. (2016). Technical Guidance - Flora and Vegetation surveys for Environmental Impact Assessment. http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA Technical Guidance - Flora and Vegetation survey_Dec13.pdf

Environmental Protection Authority. (2020). Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment. https://www.epa.wa.gov.au/policies-guidance/technical-guidance-terrestrial-vertebrate-fauna-surveys-environmental-impact

Gibson, N., Keighery, N., Keighery, B. J., Burbidge, B., Lyons, M. N., Keighery, G. J., Burbidge, A. H., & Lyons, M. N. (1994). A floristic survey of the southern Swan Coastal Plain. Department of Conservation and Land Management and the Conservation Council of Western Australia, Perth.

Hussey, B. M. J., Keighery, G. J., Dodd, J., Lloyd, S. G., & Cousens, R. D. (2007). Western weeds - A guide to the weeds of Western Australia. The Plant Protection Society of Western Australia.

Johnstone, R. E., & Kirkby, T. (1999). Food of the forest red-tailed black cockatoo Calyptorhynchus banksii naso in south-west Western Australia. Western Australian Naturalist, 22, 167–177.

Johnstone, R. E., & Kirkby, T. (2011). Carnaby's Black Cockatoo (Calyptorhynchus latirostris), Baudin's Black Cockatoo (Calyptorhynchus baudinii) and the Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) on the Swan Coastal Plain (Lancelin–Dunsborough), Western Australia.

Johnstone, R. E., Kirkby, T., & Sarti, K. (2013). The breeding biology of the Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso Gould in south-western Australia. Pacific Conservation Biology, 19(3), 121–142.

Johnstone, R. E., & Storr, G. M. (1998). Handbook of Western Australian birds (D. Louise, Ed.). Western Australian Museum.

Keighery, B., Keighery, G., Longman, V. M., & Clarke, K. A. (2012). Weed and native flora quadrat data compiled between 1990 - 1996 for the Southern Swan Coastal Plain. Data Compiled for the Departments of Environmental Protection and Conservation and Land Management.

Marchant, S., & Higgins, P. J. (1990). Handbook of Australian, New Zealand and Antarctic Birds. Volume One - Ratites to Ducks. Oxford University Press.

Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P., & Franklin, K. (2017). The Australian bird guide. CSIRO Publishing.

Pizzey, G., & Knight, F. (2001). Field Guide to Birds of Australia. Harpercollins Australia.

RPS. (2015a). Forrestfield Airport Link Project Survey of Floristic Community Types East of Dundas Road - Addendum Report.

RPS. (2015b). Forrestfield Airport Link Project Targeted Survey of Vegetation Floristic Community Types in High Wycombe - Addendum Report.

Rye, B., & Macfarlane, T. (2019). A new name, clarification of synonymy, and a new subspecies for Isopogon (Proteaceae) in Western Australia.

Saunders, D. A., Mawson, P. R., & Dawson, R. (2014). Use of tree hollows by Carnaby's Cockatoo and the fate of large hollow-bearing trees at Coomallo Creek, Western Australia 1969-2013. Biological Conservation. https://doi.org/10.1016/j.biocon.2014.07.002

Shah, B. (2006). Conservation of Carnaby's Black Cockatoo on the Swan Coastal Carnaby's plain, Western Australia.

van Dyck, S., & Strahan, R. (2008). The mammals of Australia (3rd ed.). New Holland Publishers.

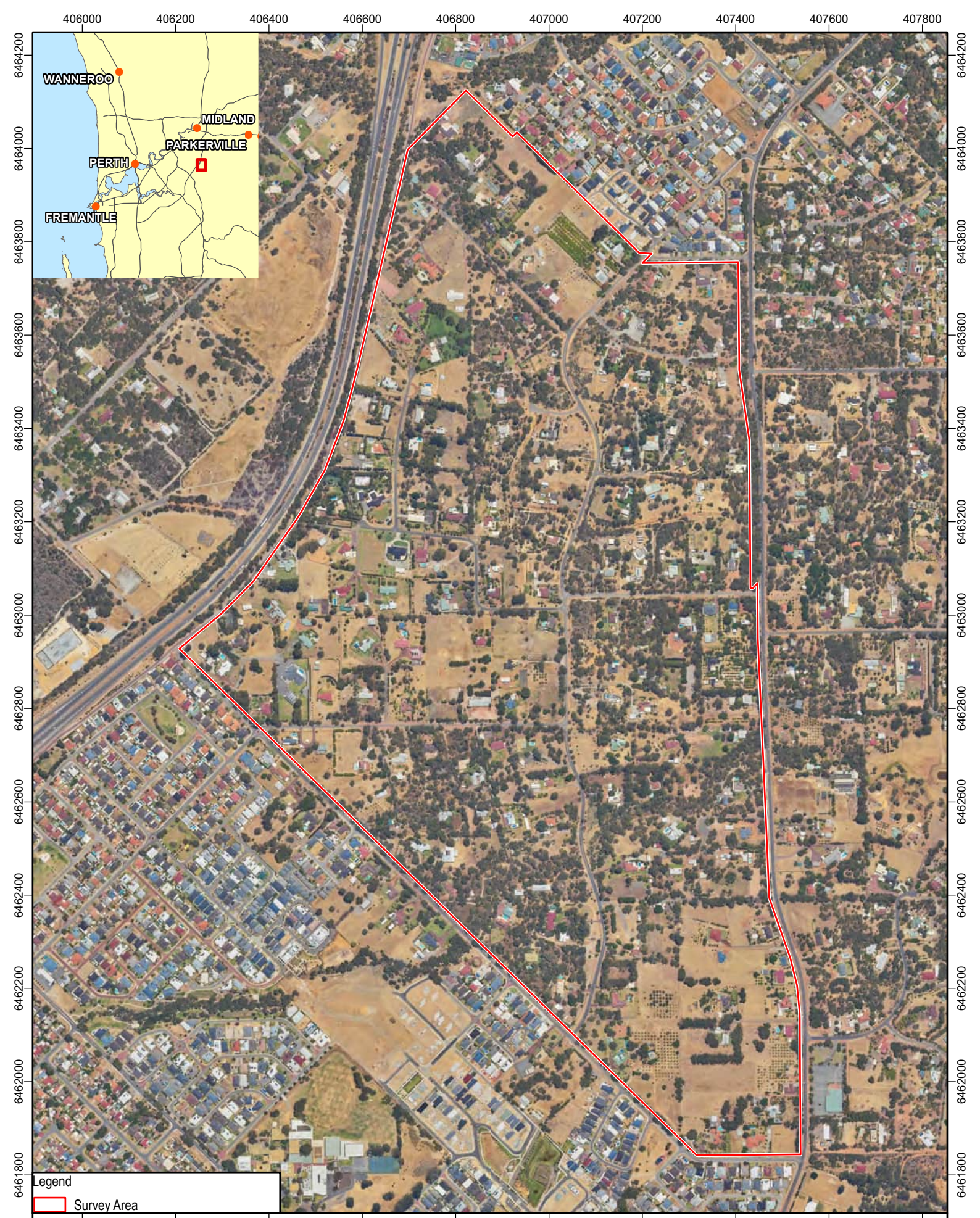
Western Australia Department of Environment and Conservation. (2012). Chuditch (Dasyurus geoffroii) National Recovery Plan.

Western Australian Herbarium. (2022). FloraBase - The Western Australian Flora. https://florabase.dpaw.wa.gov.au/

Western Australian Museum. (2022). Checklist of the Terrestrial Vertebrate Fauna of Western Australia. 2022.

Wilson, S., & Swan, G. (2017). A complete guide to reptiles of Australia. In Reptiles of Australia (5th ed.). New Holland Publishers.

Figures



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M Group

Flora, Vegetation and Fauna Technical note

Survey Area

FIGURE 1

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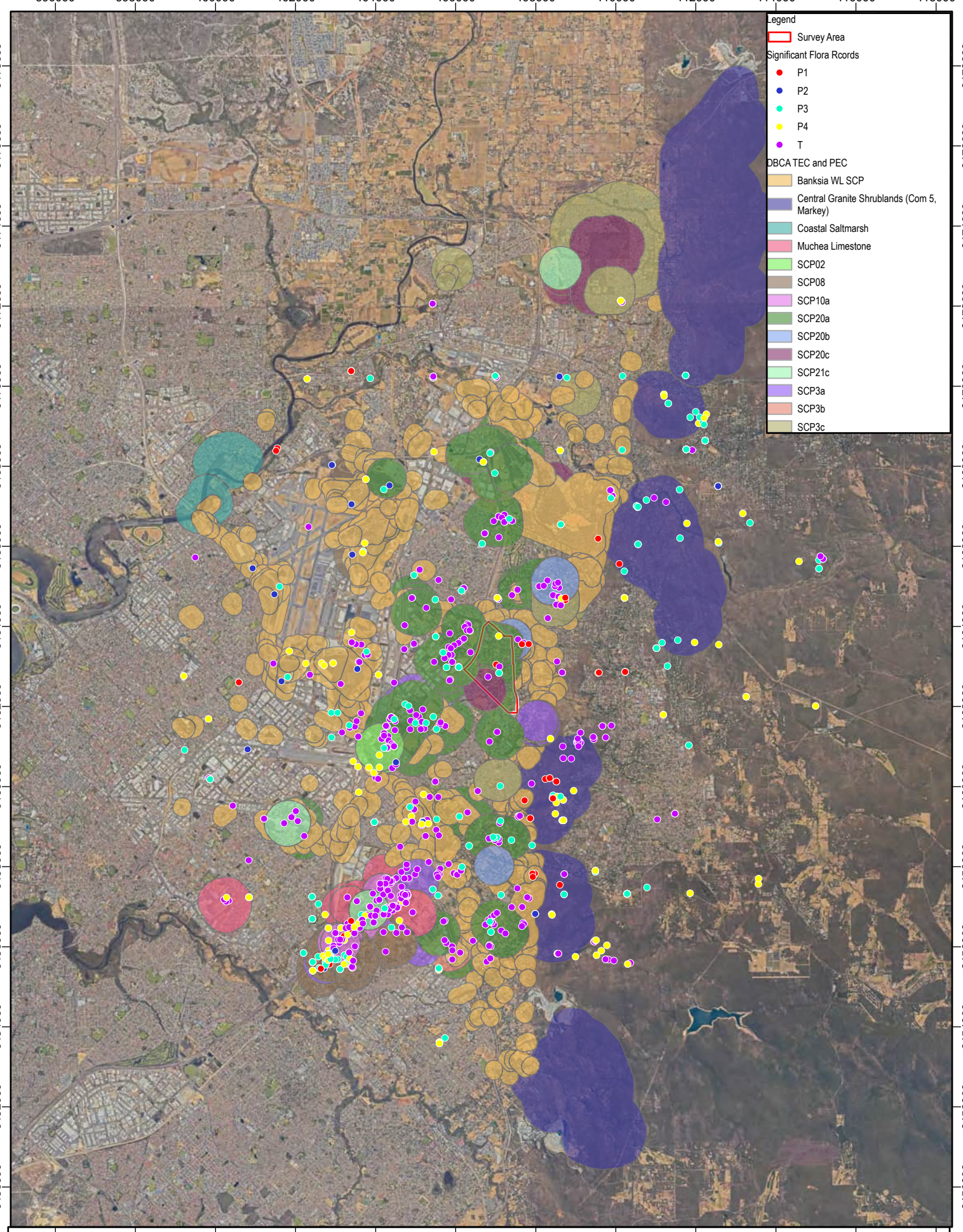

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Flora, Vegetation and Fauna
Technical note
Threatened and Priority Flora and Ecological Communities Identified by DBCA Database Searches

FIGURE 2

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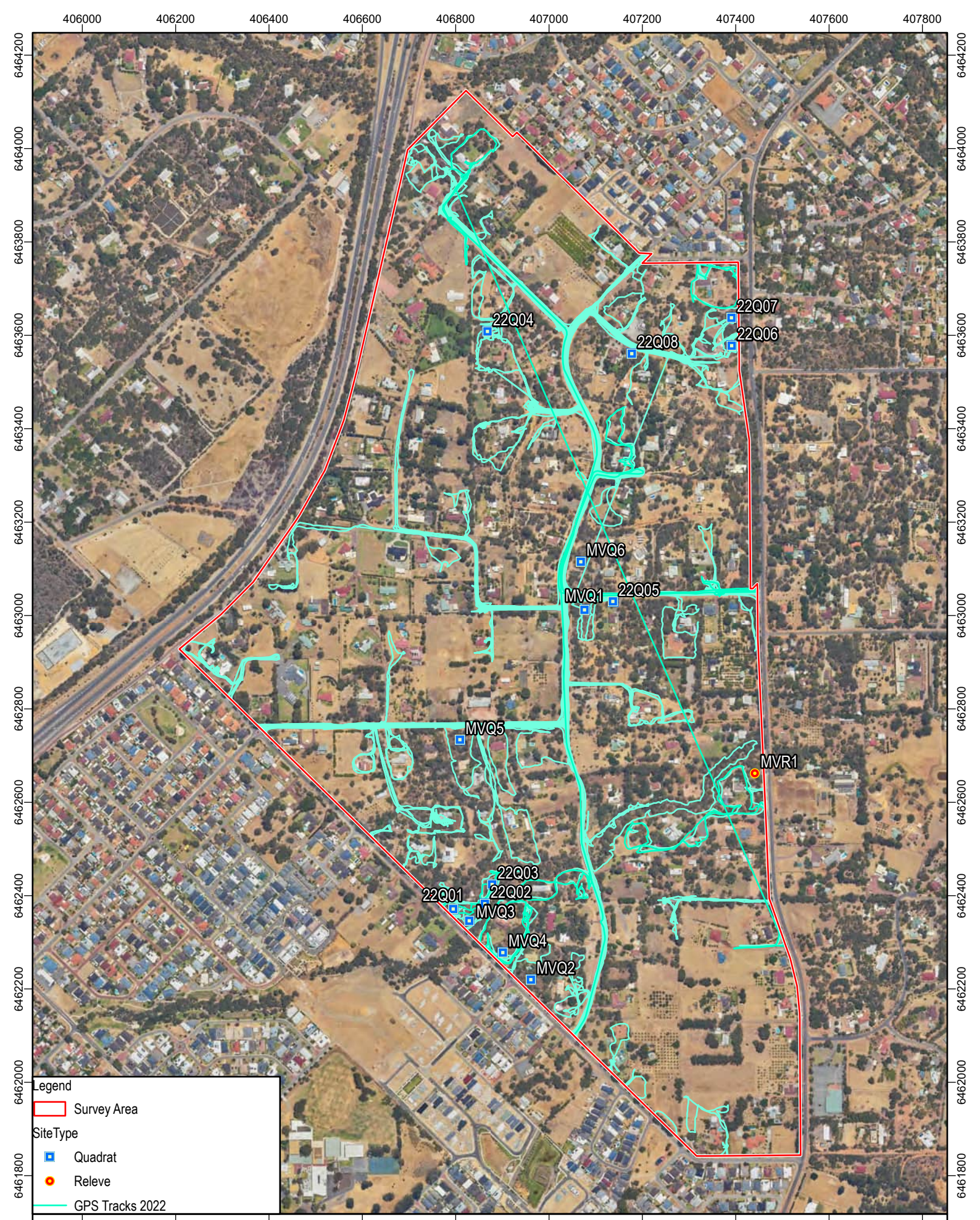

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Project Number:	5525
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	LG

Service Layer Credits:

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Flora, Vegetation and Fauna Technical note

Survey Effort

FIGURE 3

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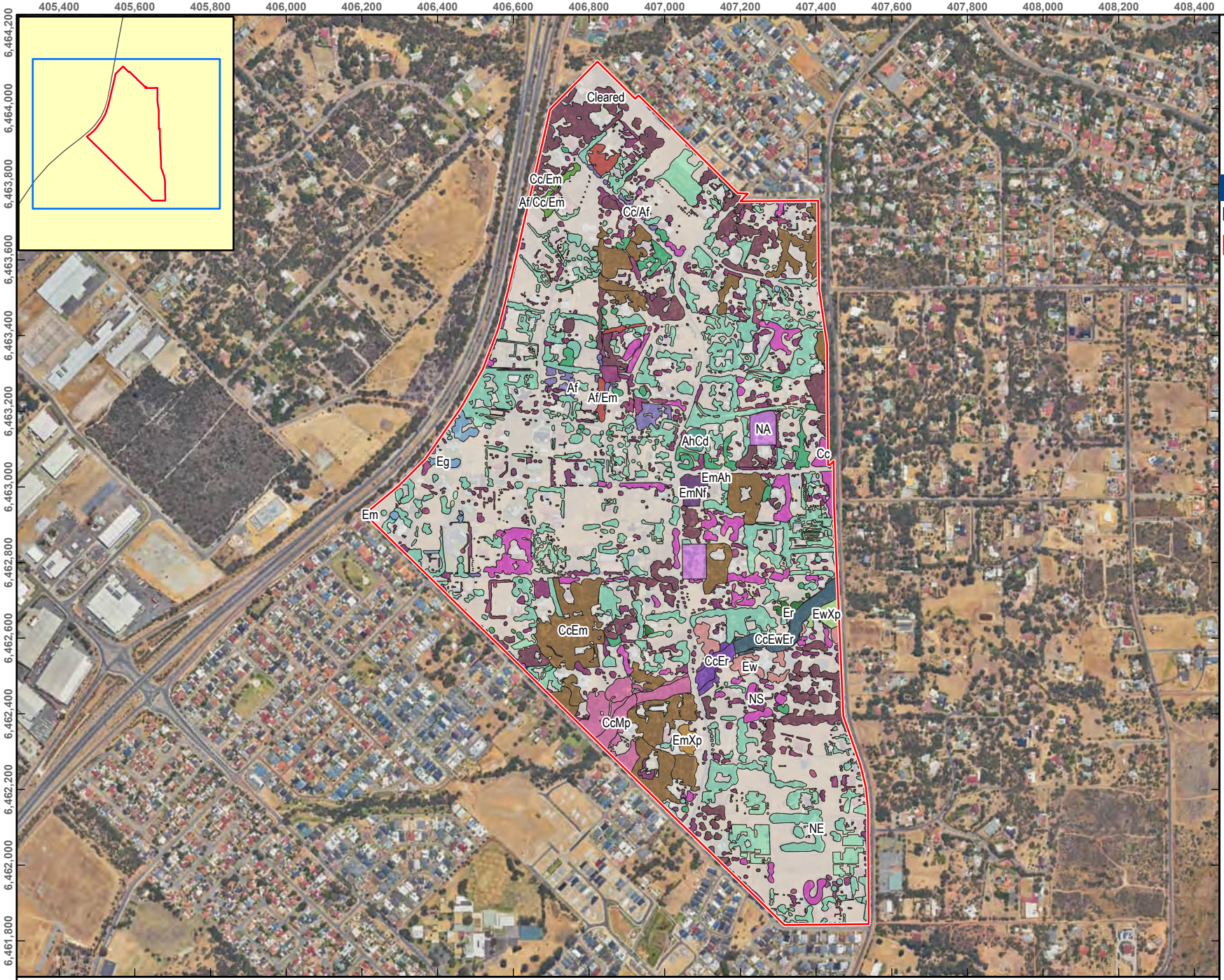
Path: K:\Projects\1.0 EBS\5525 003 007 Maida Vale F,F & V Amendment Work\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work_Eco_Maps\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work.aprx



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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - A

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:14,000 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

Vegetation

Af, Af/Cc/Em, Af/Em, AhCd, Cc, Cc/Af, Cc/Em, CcEm, CcEr, CcEwEr, CcMp, Eg, Em, EmAh, EmNf, EmXp, Er, Ew, EwXp, NA, NE, NS, Cleared

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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - B

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:6,500 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - C

LEGEND

Survey Area

Vegetation

Af/Cc/Em | AhCd | Cc/Af | CcEm | Em | EmNf | NE | Cleared

Af | Af/Em | Cc | Cc/Em | Eg | EmAh | NA | NS

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:6,500 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

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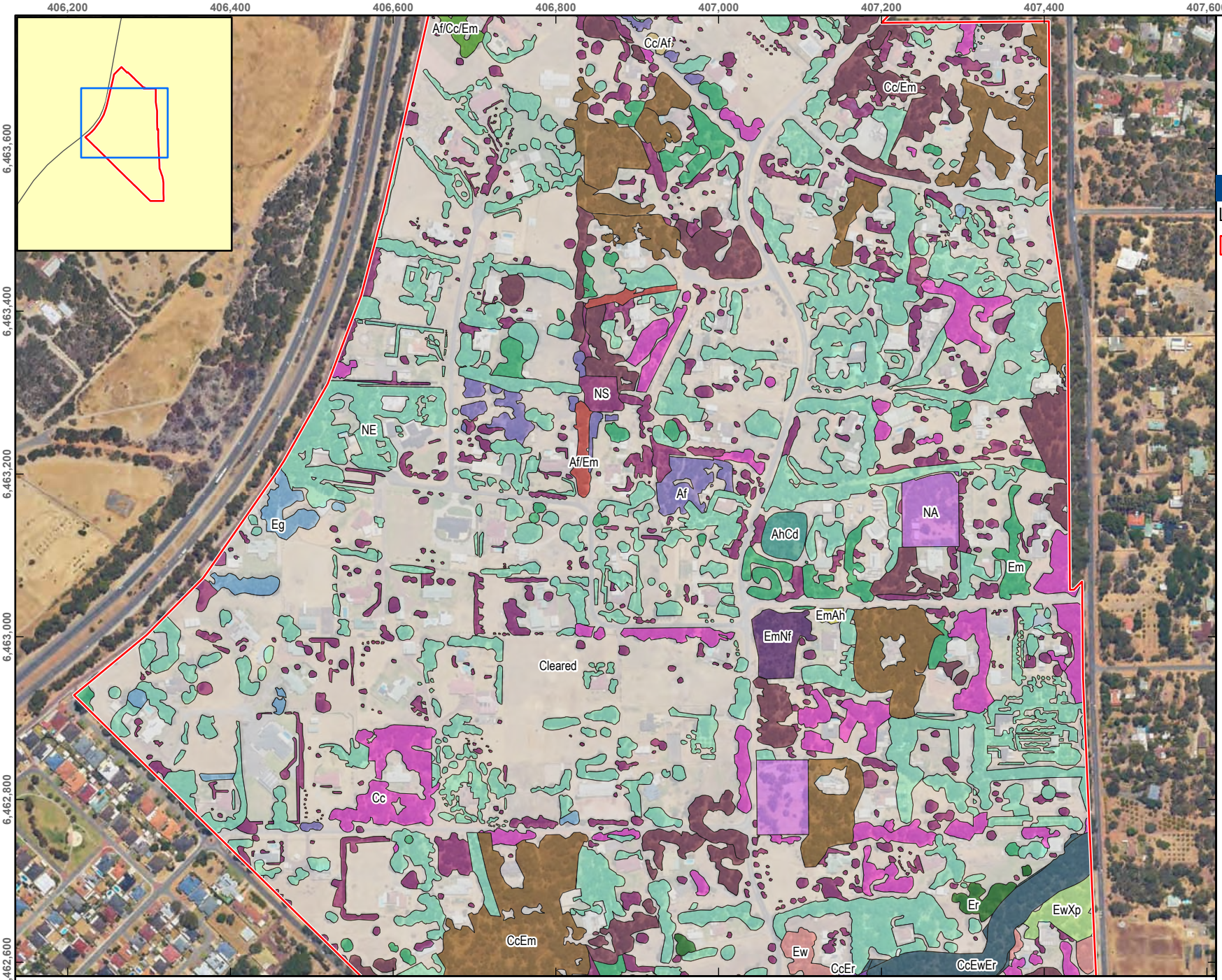

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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - D

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:6,500 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

Vegetation

Af | Af/Cc/Em | Af/Em | AhCd | Cc | Cc/Af | Cc/Em | CcEm | CcEr | CcEwEr | Eg | Em | EmAh | EmNf | Er | Ew | EwXp | NA | NE | NS | Cleared

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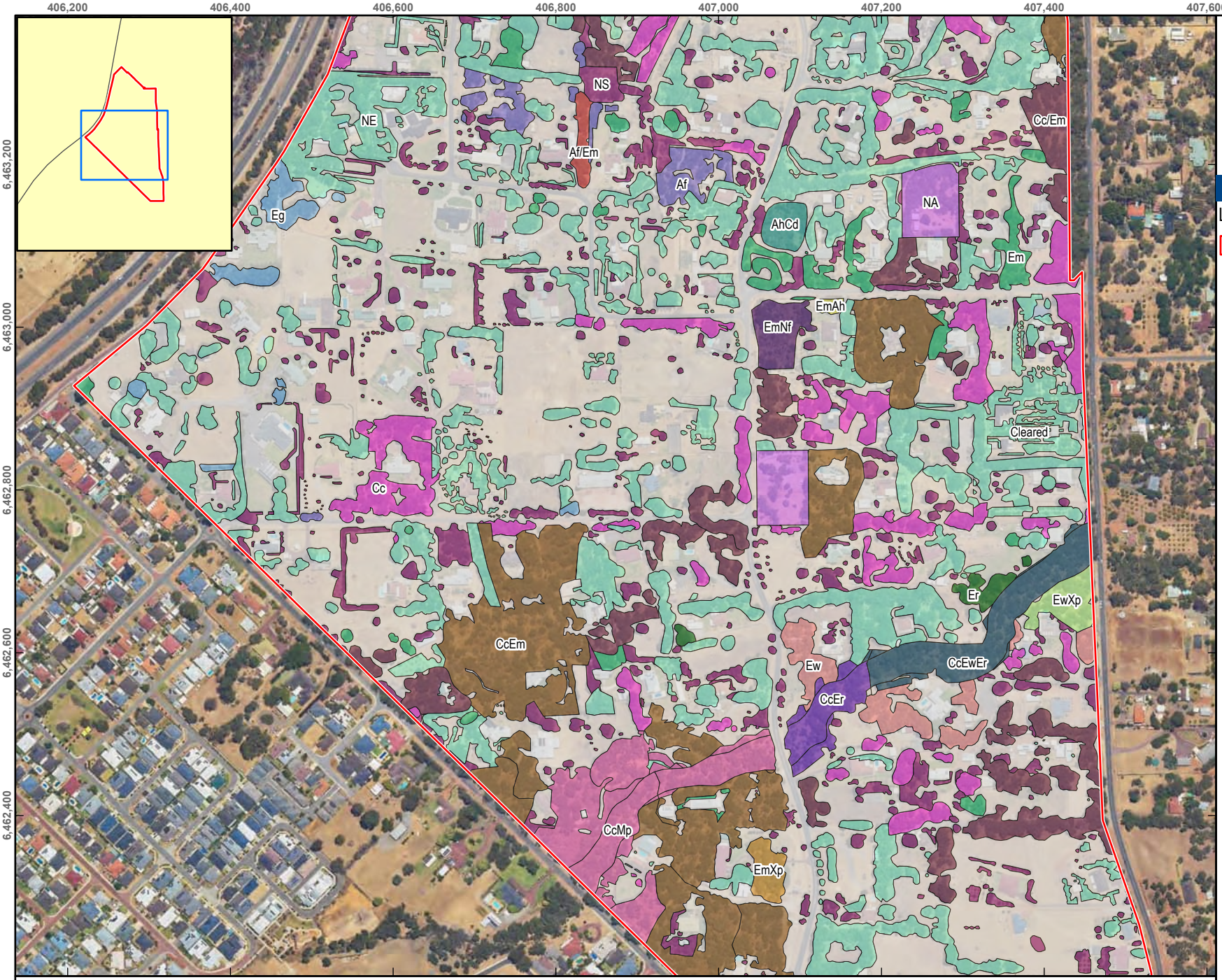

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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - E

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:6,500 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

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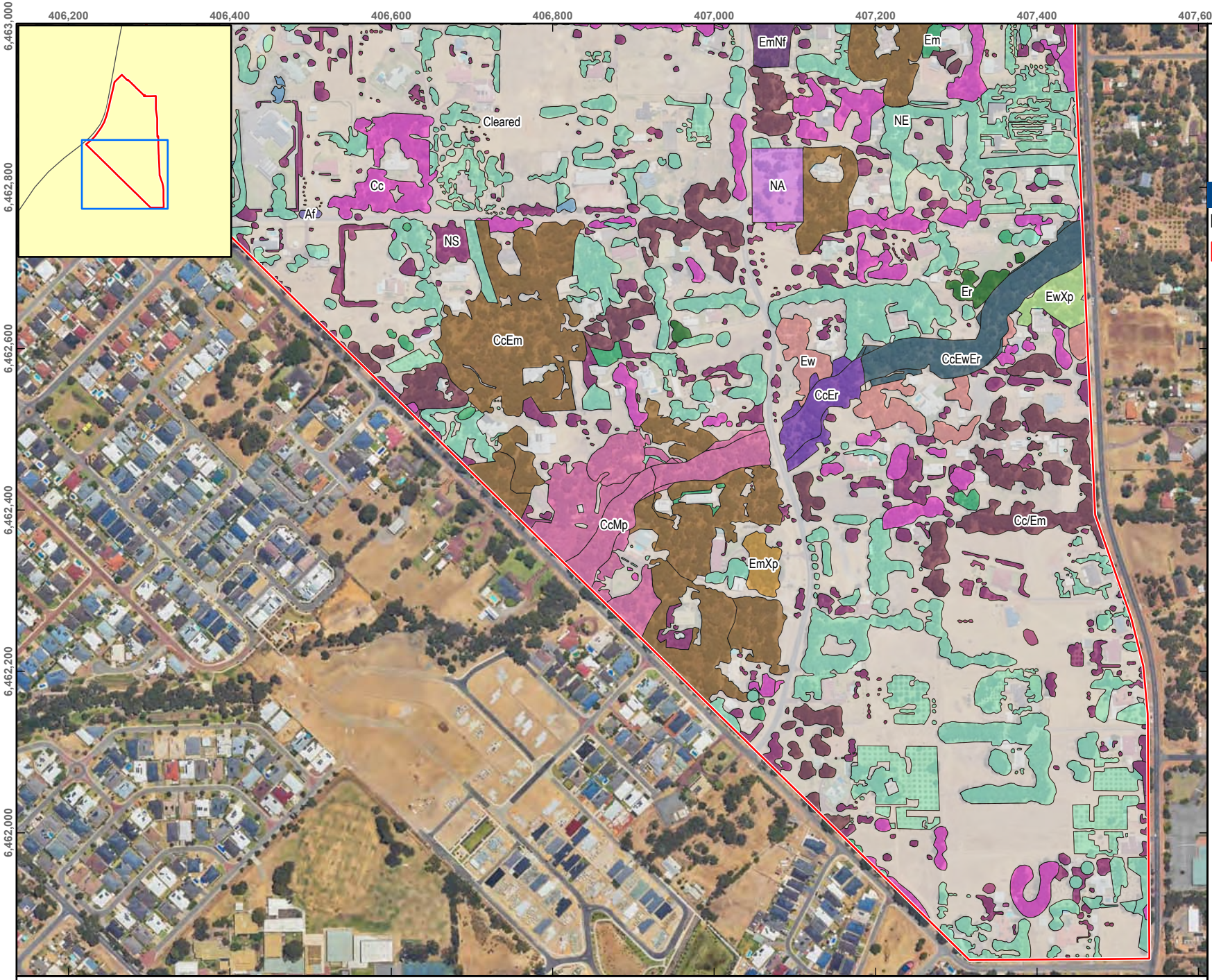

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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - F

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:6,500 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

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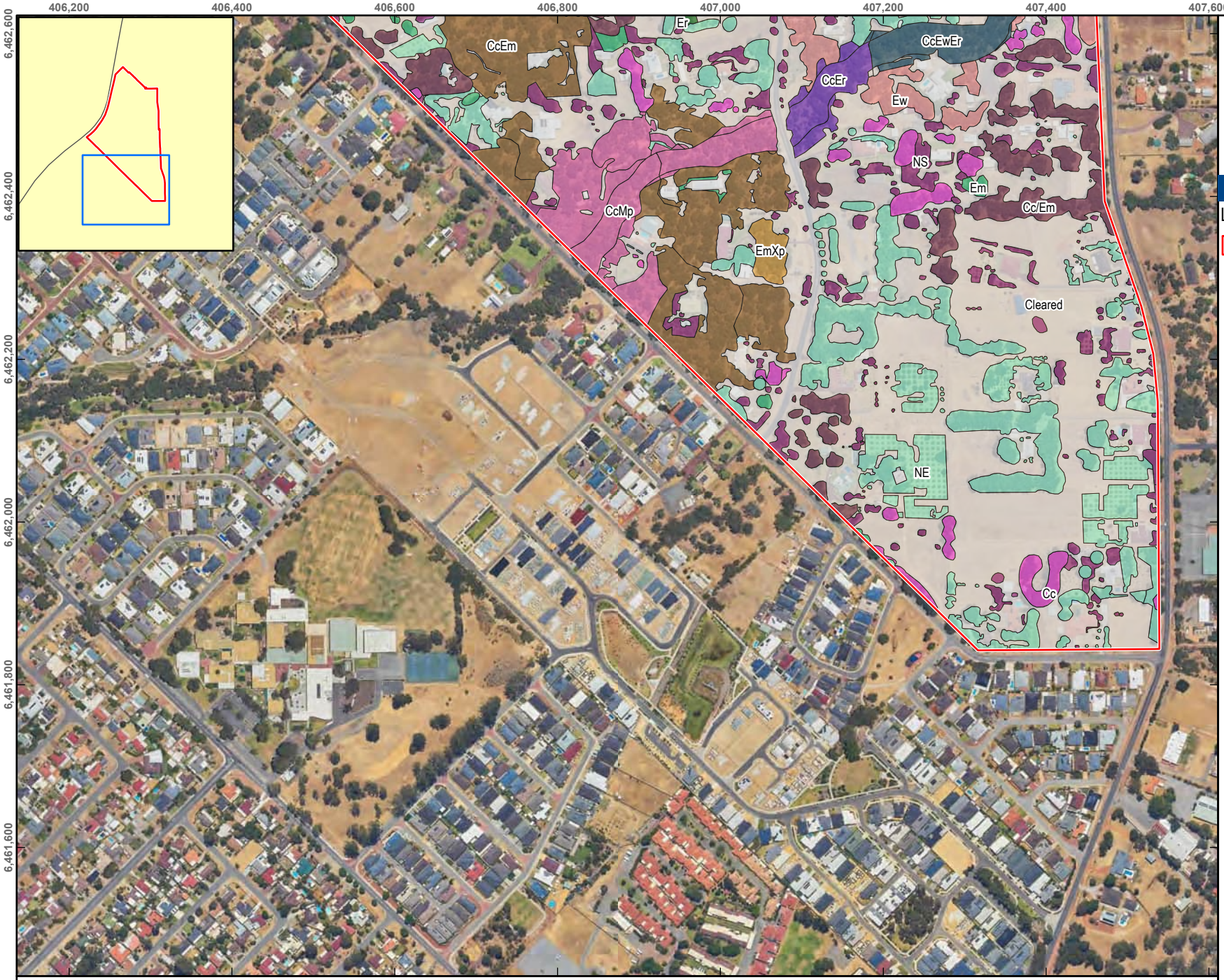
Vegetation: Af, Cc, Cc/Em, CcEm, CcEr, CcEwEr, CcMp, Eg, Em, EmNf, EmXp, Er, Ew, EwXp, NA, NE, NS, Cleared

Path: K:\Projects\1.0 EBS\5525 003 007 Maida Vale F,F & V Amendment Work\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work_Eco_Maps\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work.aprx



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Flora, Vegetation and Fauna Technical note

Revised Vegetation Mapping within the Survey Area

FIGURE 4 - G

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Esri, Geoscience Australia, NASA, NGA, USGS,SLIP

0 50 100 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:6,500 at A4
Project Number:	5043
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	JS

Vegetation

Cc, Cc/Em, CcEm, CcEr, CcEwEr, CcMp, Em, EmXp, Er, Ew, NE, NS, Cleared

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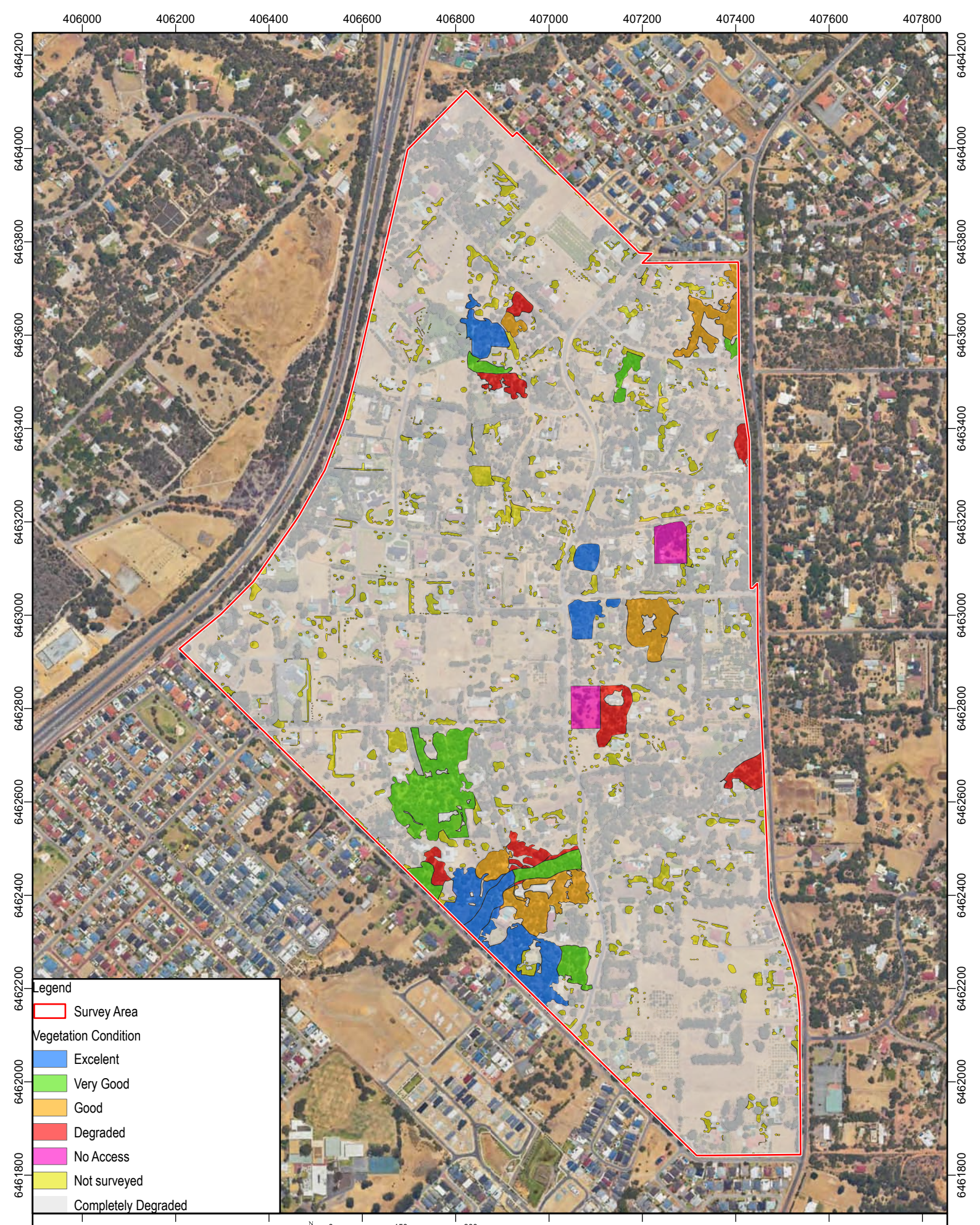

N

0 150 300 Meters

Service Layer Credits:

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	5525
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	LG

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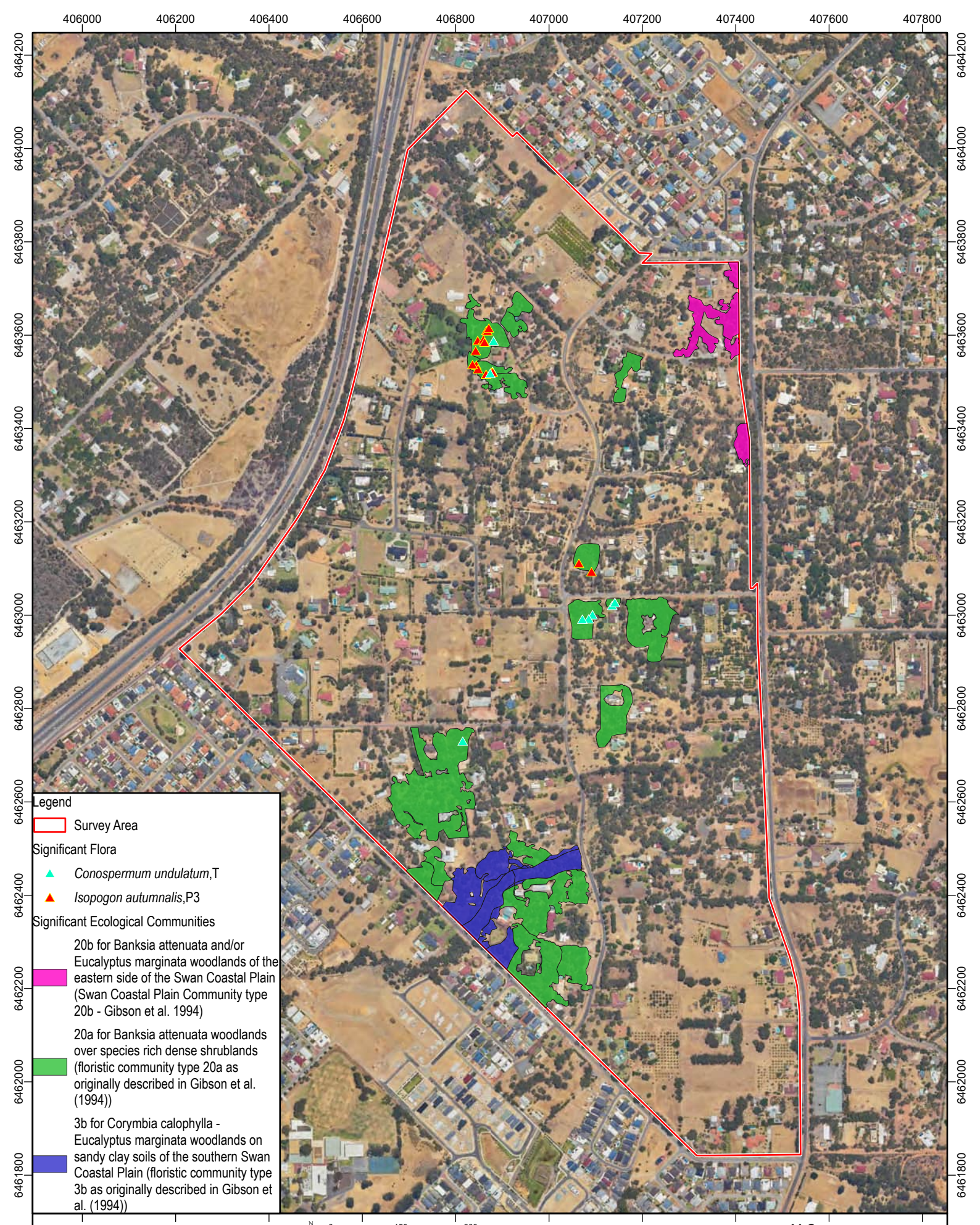
Flora, Vegetation and Fauna Technical note

Revised Condition Mapping within the Survey Area

FIGURE 5

Path: K:\Projects\1.0 EBS\5525 003 007 Maida Vale F,F & V Amendment Work\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work_Eco_Maps\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work.aprx



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N

0 150 300 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	5525
Date Drawn:	18-Nov-2022
Drawn by:	EC
Reviewed by:	LG

Service Layer Credits:

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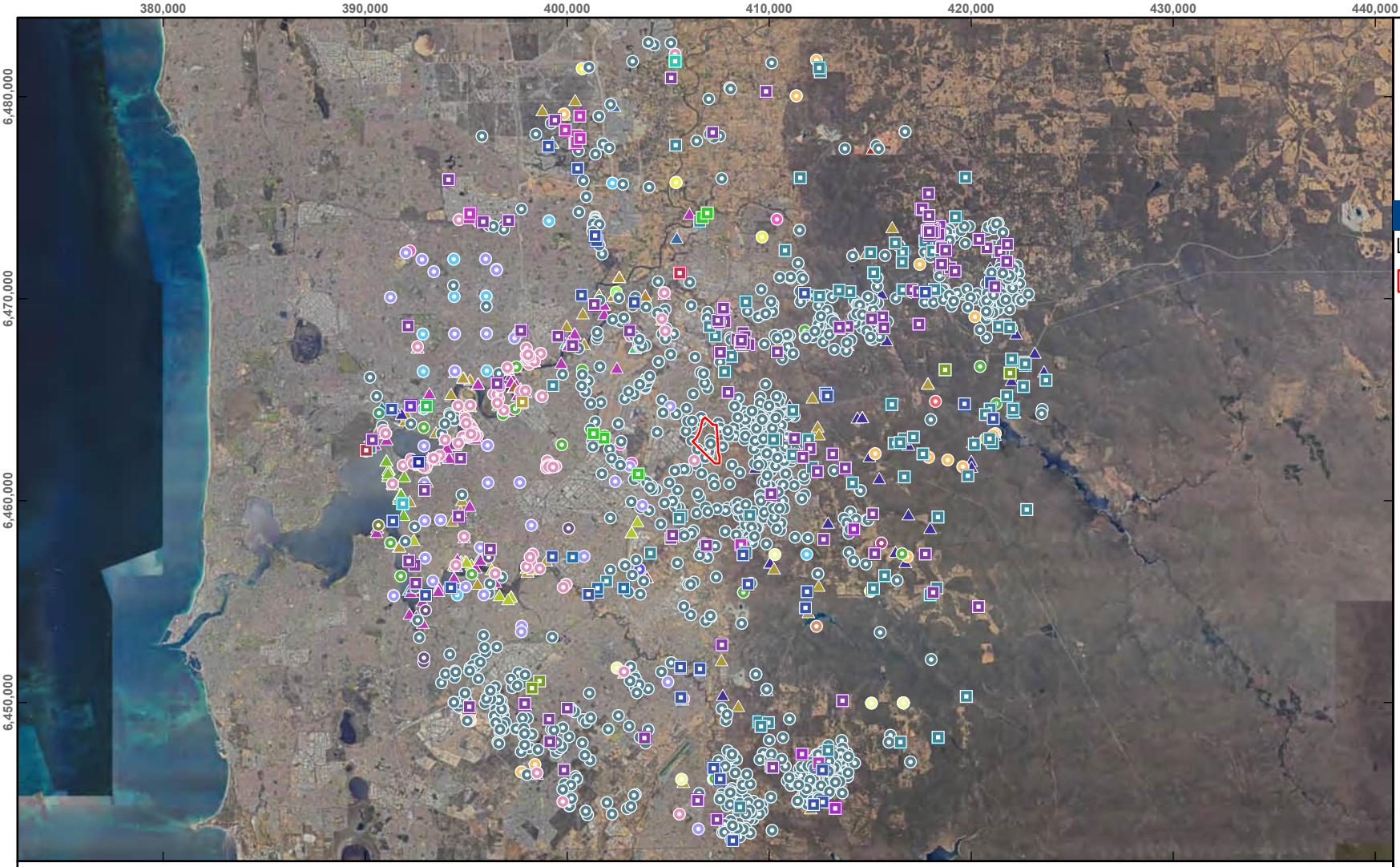
Flora, Vegetation and Fauna Technical note
Conservation Significant Flora and Vegetation within the Survey Area

FIGURE 6

Path: K:\Projects\1.0 EBS\5525 003 007 Maida Vale F,F & V Amendment Work\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work_Eco_Maps\5525_003_007_Maida_Vale_F_F_&_V_Amendment_Work.aprx



M Group

Flora, Vegetation and Fauna Technical note

Threatened and Priority Fauna Locations Identified by DBCA Database Searches

FIGURE 7 - A

LEGEND

Survey Area

Service Layer Credits:
Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS,SLIP

0 5 10 Kilometers

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:300,000 at A4
Project Number:	5525
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	LG

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Threatened and Priority Fauna Locations

- CR,Curlew Sandpiper
- CR,Eastern Curlew
- CR,Great Knot
- CR,Western Ringtail Possum, Ngwayir
- CR,Western Swamp Tortoise
- CR,Woylie, Brush-tailed Bettong
- EN,A Short-tongued Bee
- EN,Australasian Bittern
- EN,Numbat, Walpurti
- EN,Red Knot
- EN,Western Bristlebird
- EN,White-tailed Black Cockatoo
- VU,Bilby, Dalgyte, Ninu
- VU,Carter's Freshwater Mussel
- VU,Chuditch, Western Quoll
- VU,Greater Sand Plover, Large Sand Plover
- VU,Grey Falcon
- VU,Malleefowl
- VU,Quokka
- P1,Grey Vernal Katydid (Southwest)
- P2,A Short-tongued Bee (Southwest)
- P2,Black Bittern (Southwest subpop.)
- P3,Black-striped Snake, Black-striped Burrowing Snake
- P3,Cemetery Springtail, Guildford Springtail
- P3,Masked Owl (Southwest)
- P3,Perth Slider, Lined Skink
- P3,Southern Death Adder
- P3,Swan Coastal Plain Shield-backed Trapdoor Spider
- P3,Woolybush Bee
- P4,Australian Little Bittern
- P4,Blue-billed Duck
- P4,Dell's Skink, Darling Range Southwest Ctenotus
- P4,Graceful Sunmoth
- P4,Hooded Plover, Hooded Dotterel
- P4,Letter-winged Kite
- P4,Quenda, Southwestern Brown Bandicoot
- P4,Tammar Wallaby
- P4,Water-rat, Rakali
- P4,Western Brush Wallaby
- P4,Western Rosella (inland)
- CD,Muir's Corella
- CD,South-Western Brush-tailed Phascogale, Wambenger
- MI,Bar-tailed Godwit
- MI,Black-tailed Godwit
- MI,Caspian Tern
- MI,Common Greenshank, Greenshank
- MI,Common Sandpiper
- MI,Crested Tern
- MI,Fork-tailed Swift
- MI,Glossy Ibis
- MI,Grey Plover
- MI,Little Ringed Plover
- MI,Long-toed Stint
- MI,Marsh Sandpiper, Little Greenshank
- MI,Oriental Pratincole
- MI,Osprey, Eastern Osprey
- MI,Pacific Golden Plover
- MI,Pectoral Sandpiper
- MI,Red-necked Stint
- MI,Ruddy Turnstone
- MI,Ruff (reeve)
- MI,Sanderling
- MI,Sharp-tailed Sandpiper
- MI,Whimbrel
- MI,Wood Sandpiper
- MI,sooty Albatross
- OS,Peregrine Falcon

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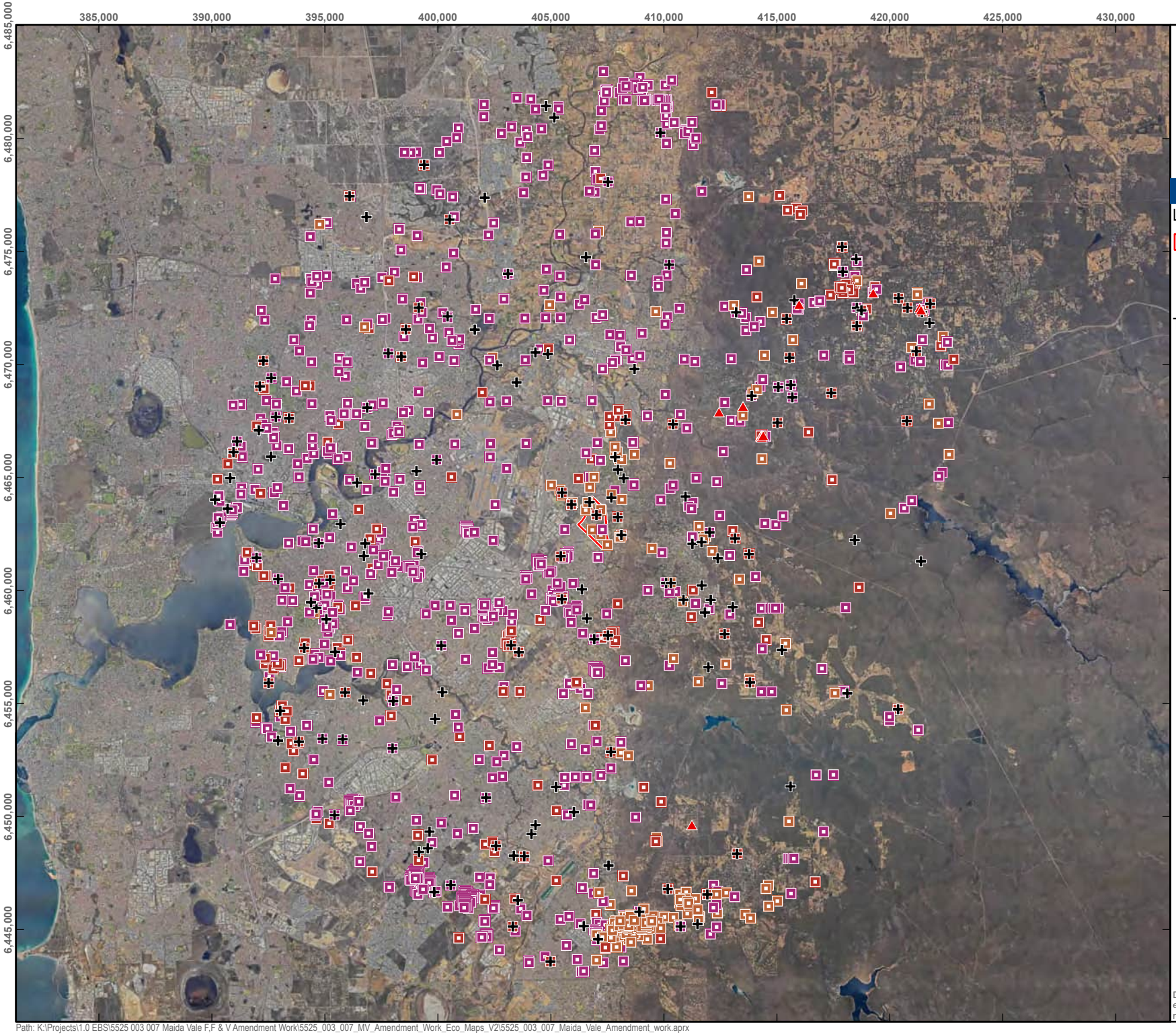

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Flora, Vegetation and Fauna Technical note

DBCA Black Cockatoo Roosting Site

FIGURE 7 - B

LEGEND

- Survey Area
- White Tailed Black Cockatoo
- Black Cockatoo Roosting Sites

Threatened and Priority Fauna Locations

- EN,Baudin's Cockatoo
- EN,Carnaby's Cockatoo
- VU,Forest Red-tailed Black Cockatoo

Service Layer Credits:
Esri, HERE, Garmin, FAO, NOAA, USGS, Esri, USGS,SLIP

0 3 6 Kilometers

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:225,000 at A4
Project Number:	5525
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	LG

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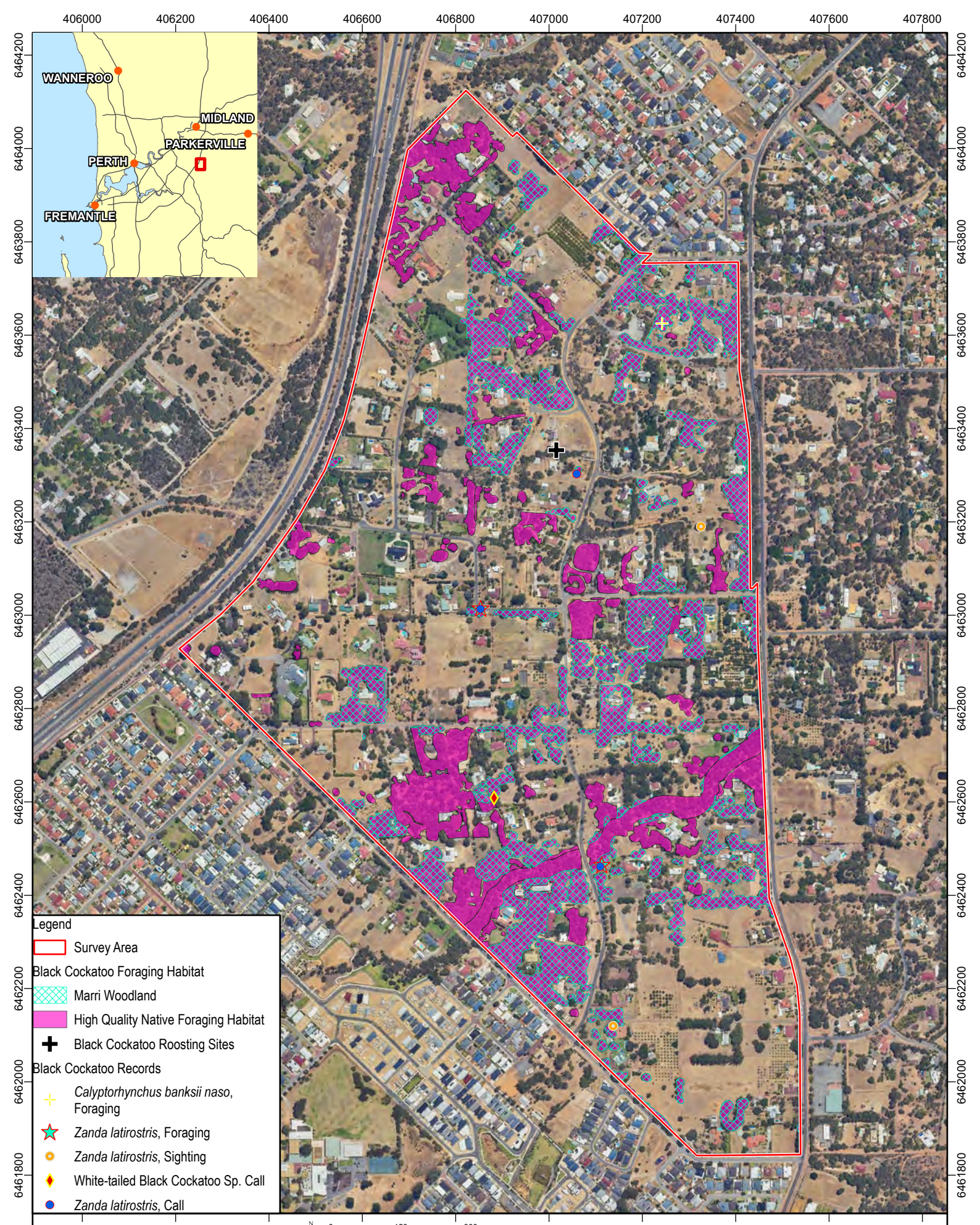

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N

0 150 300 Meters

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	5525
Date Drawn:	22-Jun-2023
Drawn by:	EC
Reviewed by:	LG

Service Layer Credits: Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS, Maxar

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Flora, Vegetation and Fauna Technical note

Black Cockatoo Foraging Habitat

FIGURE 8

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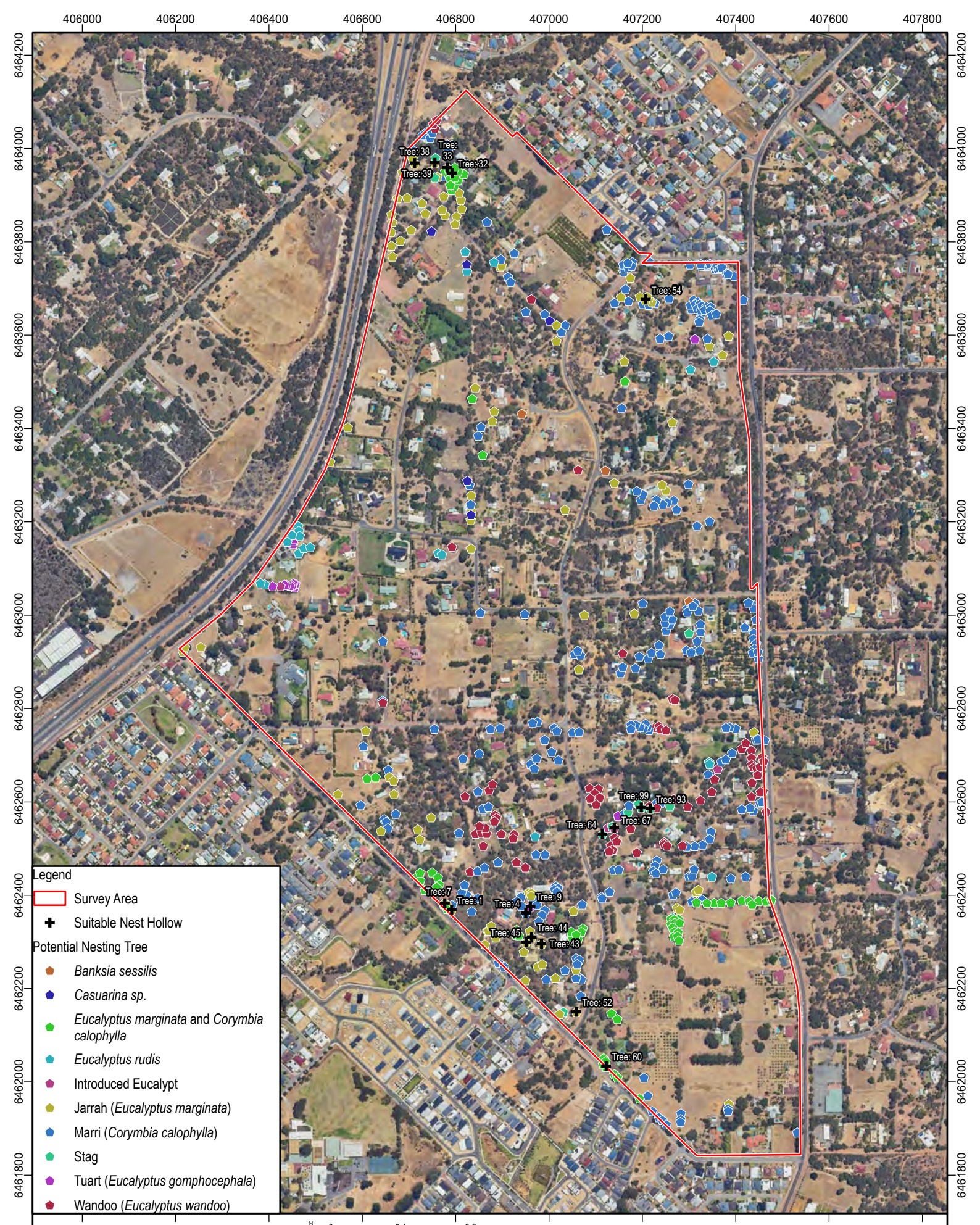

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Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	5525
Date Drawn:	21-Jun-2023
Drawn by:	EC
Reviewed by:	LG

Service Layer Credits:

M Group

Flora, Vegetation and Fauna Technical note

Black Cockatoo Potential Breeding Trees

FIGURE 9

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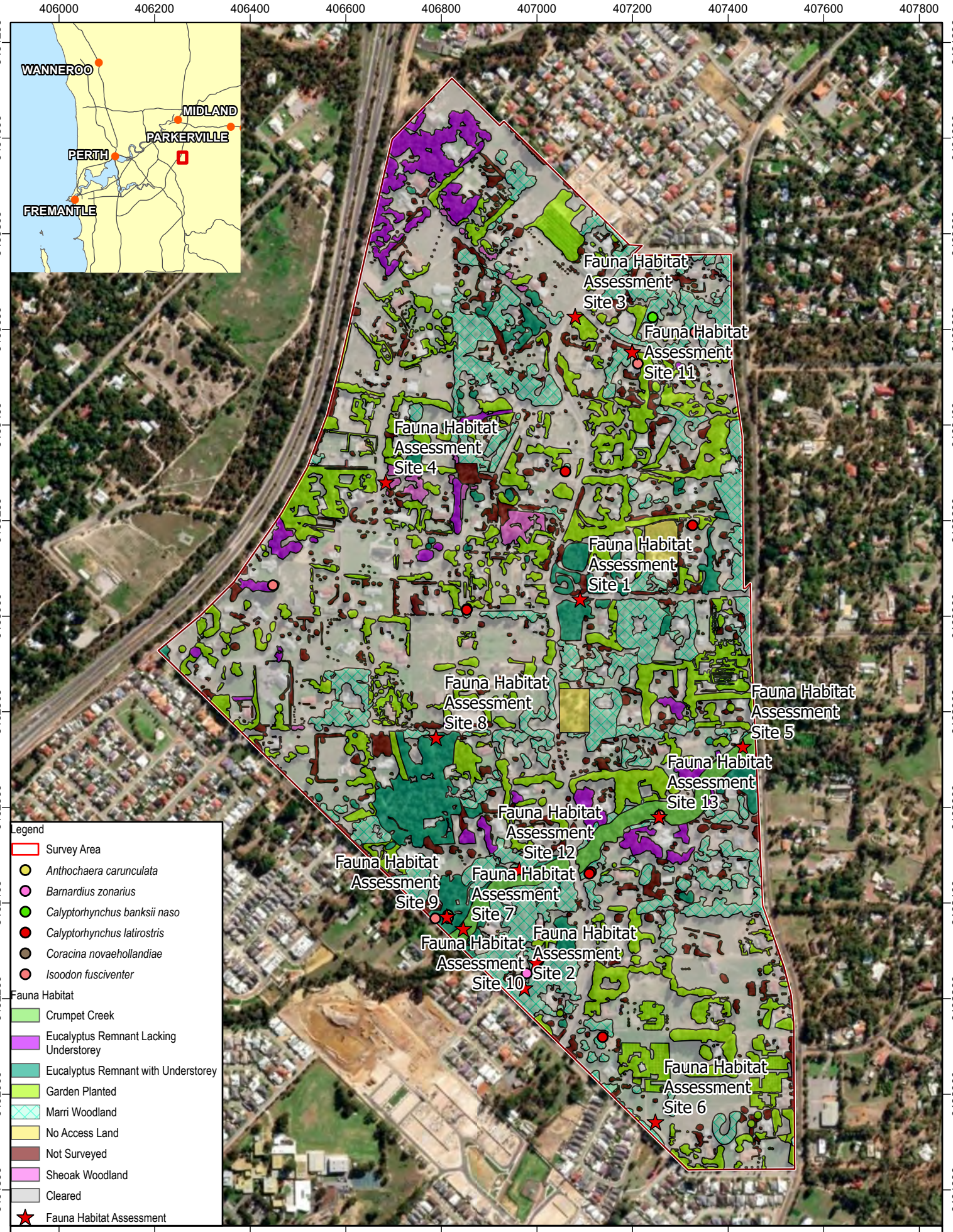

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Drawn by:	EC
Reviewed by:	LG

Service Layer Credits: Maxar

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Flora, Vegetation and Fauna Technical note

Fauna Habitat

FIGURE 10

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Appendices

Appendix A
Database Search Results

Appendix: Western Australian Herbarium Flora Database Search Results

Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Locality	Date
Acacia anomala	T	Flowers yellow.	In laterite.			Kalamunda	10/09/1985
Acacia anomala	T	Rhizomatous shrub to 0.5 m.	Gravelly loam, steep slope.	Eucalyptus marginata - E. calophylla woodland.		Recreation Reserve off Ozone Terrace, Kalamunda	11/09/1991
Acacia anomala	T	Slender form full flower and a grasslike shrub to 40 cms.	Steep slope SSE aspect near crest. Loam over gravel.	In Eucalyptus marginata 10 m, Euc. calophylla -12 m woodland with scattered Casuarina fraserana to 50 m, Xanthorrhea preissii -3 m, over Low Scrub of Hakea undulata, Hakes amplexicaulis and Dense Low Heath.		Kalamunda Shire, residence of John Marshall, Ozone Tce, Kalamunda (Lot 503), N side of Whistlepipe Gully	2/09/1982
Acacia anomala	T	Slender form, full flower, grasslike shrub to 40 cm.	Steep slope, SSE aspect, crest of N side of gully. Brown sandy loam.	Growing in E. marginata, E. calophylla, Casuarina fraserana over low shrub over dense low heath.		Whistlepipe Gully, 2.5 km WSW of Kalumunda shire offices	2/09/1982
Acacia aphylla	T		Slope. Moist - dry, brown clay loam. Granite - boulder.	Muir's: scattered marri on road verge. Hakea incrassata, H. erinacea, H. petiolaris, Dryandra armata, D. lindleyana, Nemcia sp., Xanthorrhoea preissii.	6 mature plants, 8 seedlings.	Helena Valley 1A at the junction of Ridge Hill Road and Bulkirra Pl - on the NW verge of the junction. 1B: Ridge Hill Road, 136 m S of the junction with Bulkirra Pl on the eastern verge,	11/07/2001
Acacia aphylla	T		N facing slope. Growing in gutter beside road. Orange-brown sandy clay loam.	Planted? Calothamnus thicket beside road.		Access road (Hardinge Road) to Victoria Reservoir from Bickley recreation camp. ca 430 m from gate and turn around near camp	12/08/2011
Acacia aphylla	T		Growing on road verge.			Junction of Ridge Hill Road and The Crescent, Helena Valley	30/12/1987
Acacia aphylla	T					Helena River Valley	/06/1974
Acacia drummondii subsp. affinis	3	Erect, perennial shrub up to 1 m high. Flowers yellow.	Hillside. Clay, rocky. In disturbed soil on road verge.	Medium trees, Marri.	21-50 plants.	175 m S of Bulkirra Place on Ridge Hill Road, Helena Valley	25/06/2006
Acacia horridula	3	Flowers pale lemon. Height 1 - 2 ft.	Gravel.			Helena Valley - end Moola Road	5/06/1977
Acacia oncinophylla subsp. oncinophylla	3	Shrub 4 - 6 ft.				Darlington, Creek	/10/1939
Acacia oncinophylla subsp. oncinophylla	3					Helena Valley	/01/1979
Acacia oncinophylla subsp. oncinophylla	3					Swan View	30/09/1901
Acacia oncinophylla subsp. oncinophylla	3	Flowers yellow.				Greenmount	/09/1919
Acacia oncinophylla subsp. oncinophylla	3		Grey-brown gritty loam, with lateritic gravel and cobbels on surface, on a gentle-steep midslope.	Grevillea endilcheriana Low Scrub, over Trymalium lidifolium, Baeckea camphorosmae Dwarf Scrub, over Borya sphaerocephala Dense Herbs.		Greenmount National Park, N of Padbury Rd, W of walking track near granites. (Plot-GHNP04)	18/09/1996
Acacia oncinophylla subsp. oncinophylla	3	Prostrate.	Numerous outcrops. Lower slope. Granite. Sandy loam with quartz.	Open heath.	2 plants.	Helena Valley	4/10/2005
Acacia oncinophylla subsp. oncinophylla	3	3 ft high. Flowers yellow.	Granite.	Heath.	scarce.	Helena Valley	26/09/1977
Acacia oncinophylla subsp. patulifolia	4					Crystal Brook [Kalamunda].	/08/1971
Acacia oncinophylla subsp. patulifolia	4	Loose shrub 2 m. Flowers yellow catkin; leaves linear, striated.	Granite.			Barrington Quarry	11/09/1979
Acacia oncinophylla subsp. patulifolia	4	Straggly shrub 6 - 8', spreading, flowers yellow (catkin). Bark brown, peeling like grasbyi	Granite.			Barrington Quarry	29/09/1969
Acacia oncinophylla subsp. patulifolia	4		Medium dark brown gritty loam, with surface gravel and cobbels, on a very steep west north-western upper slope.	Santalium acuminatum Scrub over Melaleuca fulgens Low Scrub over Calothamnus quadrifidus, Melalueca fulgens, Hibbertia erinacea Low Heath, over Hibbertia hypericoides Dwarf Scrub, over Cheilianthes sp. Open Herbs.		Off Crystal Brook Rd, Roleystone; near ridge top; to E of steep 4WD track, on edge of Santalum thicket. (Plot-CSBK02)	26/09/1996
Acacia oncinophylla subsp. patulifolia	4	Shrub 2-3 ft (0.6-0.9 m).	Open position, heavy soil, base of Darling Scarp.			Forrestfield, Perth	21/09/1946
Acacia oncinophylla subsp. patulifolia	4		N aspect slope of outcrop.	Open woodland of Eucalyptus calophylla around granite area.		Gazetted Water Reserve 18463, Bickley Brook Valley, S side, on E side of track running S from Hardinge Rd, just W of Recreation Camp	16/09/1992
Acacia oncinophylla subsp. patulifolia	4	Open shrub to 0.5 m, in full flower.	W aspect slight slope - nearly flat saddle, brown loam with granite boulders.	Very open woodland of Eucalyptus calophylla with low open scrub to 0.5 m among Acacia pulchella, Diplopeltis huegelii.		Lesmurdie Falls National Park, on ridge above falls to N of track between Lesmurdie Brook Valley & valley to the N	14/09/1992
Acacia oncinophylla subsp. patulifolia	4		Dark brown gritty loam, with surface gravel and cobbels on a very steep southern upper slope.	Grevillea endlicheriana, Hakea undulata Open Low Scrub, over Trymalium ledifolium, Hakea undulata mixed Dense Low Heath, over Amphipogon turbinata Low Grass, over Gonocarpus cordiger Very Open Herbs.		Lesmurdie National Park, Falls Rd, Lesmurdie, NW of carpark 30m, N of walking track. (Plot-LESM02)	24/09/1996
Acacia oncinophylla subsp. patulifolia	4	Openly branched shrub; bark peeling on trunk and main branches; branchlets smooth, pinkish, pruinose; juvenile phyllodes resinous, slightly aromatic; mature phyllodes subglaucous.	Rocky loam near creek.		Common.	Barrington Quarry, Darling Range, near Perth	10/09/1972
Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)	3					Midland railway	/10/1899
Amanita kalamundae	3		In deep litter.	Under Eucalyptus patens and Agonis eriafolia.		10 km E of Kalamunda at 'the Dell'	18/06/1989
Amanita preissii	3	Pileus to 48, 60 mm diameter, 4, 5 mm thick, white, plane with slightly depressed centre, margin appendiculate, context white, yellowing beneath pellis. Universal veil on pileus of thin layer over whole disc, breaking into small warts in centre of disc,		Garden of WA plants. Nearby woody plants: Eucalyptus spp., Calitris sp., Actinostrobus sp, Hemiandra sp.	single specimen.	Old WA Herbarium grounds	22/05/2005
Amanita quenda	1	Pileus 45 mm diameter, 5 mm thick, pale vinaceous buff (5A3), paler at the margin (5A2), margin appendiculate, surface tacky, no smell, context ivory. Universal veil on pileus ivory, as small floccose patches in the centre, easily removed. Lamellae cream	Bush reserve.	Nearby woody plants: Corymbia calophylla, Hypocalymna angustofolia and Acacia pulchella.	single specimen.	Brixton Street Wetlands	6/07/2015
Amanita wadjukiorum	3	Pileus 45-65 mm diameter, 6 mm thick, initially vinaceous buff (5B2) paler at the margin, aging hazel (6E4), especially in the middle of the pileus, paler towards the margin, margin appendiculate, surface shiny, context white and pale drab in the centre	Native bushland.	Nearby woody plants: Eucalyptus rudis.	collection.	Alison Baird Reserve	5/07/2015
Amanita wadjukiorum	3	Pileus 62, 98 mm diameter, 4, 6 mm thick, clay buff (6C3) becoming milky coffee (6E5) with age, margin appendiculate, surface slightly tacky, no smell, context ivory, grey in the centre under the pellis. Universal veil on the pileus pale vinaceous buff p	Bush reserve.	Nearby woody plants: Jacksonia furcellata.	several, two collected.	Brixton Street Wetlands	6/07/2015
Andersonia gracilis	T		White sand.			Nature Reserve owned by Botany Department Western Australian University Kenwick, Perth	4/11/1982
Andersonia gracilis	T	Straggly, open within other shrubs. Shrub 30 cm high, flowering pink.	Slight depression, damp grey clayey sand.	Low Heath C.	rare.	Yule Brook Nature Reserve, junction of 2 fire breaks c. 100 m N of Boundary Road firebreak,	29/11/1996
Andersonia gracilis	T	Pink flowers.	On edge of firebreak. Dry white / grey sand.	Dense low heath. Melaleuca sp., Banksia telmatiaea, Actinostrobus pyramidalis, Pericalymma ellipticum, Verticordia sp..	9 plants.	Lot 15 Boundary Road, Kenwick. Yule Brook Reserve (UWA fenced land), located between Brook, Boundary and Bickley Roads. Plants occur from c. 170 - 210 m along both sides of a N-S firebreak, 450 m NE of the Boundary and Bickley Roads intersection	23/11/2006
Andersonia gracilis	T	Low growing shrub to 50 cm high. Flowering.	Flat, claypan. Dry brown clay.	Heath over low heath over open low sedges. Actinostrobus pyramidalis, Hypocalymma angustifolia, Kunzea sp., Verticordia sp., Jacksonia sp., Leucopogon sp., Cassytha sp..	40 plants.	Lot 800 Boundary Road, Kenwick (previously lot 134). Plants occur from c. 100 - 125 m from N firebreak and c. 20 m SW	11/11/2009
Andersonia gracilis	T	Scraggly shrub with blue-green leaves and pink flowers.	Plain, brown sandy clay loam.	Tall open shrubland of Callitris pyramidalis over mid sparse shrubland of Beaufortia squarrosa and Petrophile seminuda over low sparse shrubland of Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777). Some minor weeds present.	c. 15 plants seen at this location.	Located along Tonkin Highway on W side of highway in Bush Forever site 320, ca. 560 m N of the Welshpool Road E and Tonkin Highway intersection and 1.9 km SW of Forrestfield	22/10/2019
Anthocercis gracilis	T	Wispy species, corolla inflated yellow with purple streaks.	On apron of granite outcrop.	Growing amongst thick Jarrah/Wandoo undergrowth.		Bickley Brook Reservoir, edge of Darling Scarp, approximately 22 km E of Perth.	18/10/1975
Anthocercis gracilis	T		Aspect SSE. Slope/outcrop. Moist brown loam. Granite sheet/boulder.	Associated species: Allocasuarina huegeliana (dead), Eucalyptus wandoo, E. calophylla, Hakea petiolaris, H. trifurcata, H. undulata, H. lissocarpha, Macrozamia riedlei, Acacia pulchella, Synaphea acutiloba, Hovea pungens, Tetratheca deltoidea, Pimelea ci		Bickley Brook Reservoir, population is NE cac 450 m (aerial) from centre of Reservoir wall,	20/10/1999
Anthocercis gracilis	T	Low spreading shrub 30 cm high x 30 cm wide. Corolla tube pale pink with purple stripes, lobes cream.	Darling scarp, granite outcrop. Dry, bare brown loam over granite.	Open Low Woodland B over Low Scrub B (Muir, 77). Allocasuarina huegeliana, Hakea petiolaris, Acacia pulchella.	locally common.	Darling Scarp, ca 400 m NE of Bickley Brook Reservoir,	4/09/1999
Anthocercis gracilis	T	Wispy much branched herbaceous perennial ca 50 cm high.	Growing in rock crevices in humus rich loamy soil. Granite rock outcrops at edge of delerite intrusion.	Eucalyptus wandes forest, with patches of Casuarina. Plant growing under Casuarina trees. Assoc. sp: Thomasia inacrocarpa, Xanthorrhea, Macroxamea Lepidosperms, Stypandra.		Steep granite slope on NE side of Bickley Brook Reservoir, ca 22 km ESE of Perth	1/10/1976
Anthocercis gracilis	T	Slender, inconspicuous, intricately branched shrub. Fairly short-lived, growing and flourishing after fire. Flowers delicate hanging yellow bells.	Granitic loam, among granite boulders.	Under Rock Sheoak, with Balga, Warrine, Zamia and Forest Rice-grass.		Sheoak thicket above Helena Valley Road, Gooseberry Hill	23/09/1995
Aponogeton hexatepalus	4	Perennial tuberous aquatic herb.	Winter inundated claypan. Brown clay.	Melaleuca lateritia shrubland/Amphibromus grassland. Associated species: Amphibromus nervosus, Triglochin linearis, Meeboldina spp., Astartea affinis. Excellent condition. Floristic community: herb rich shrublands in claypans (8).	common.	Brixton Street Wetlands, Kenwick	26/06/2008
Aponogeton hexatepalus	4		Inundated claypan.	Surrounded by Viminaria juncea heath A/Thicket and Melaleuca lateritica - Astartea fascicularis Heath B with Hydrocotyle lemnoides and Villarsia submersa.	several hundred plants.	Block bounded by Brixton Street, Park Road and Wanaping Road, Kenwick N end	12/09/1990
Aponogeton hexatepalus	4	Small aquatic plant with floating leaves and emergent flower spikes.	In shallow pools to c. l0 cm depth.	Surrounded by thick scrub to 1.5 m of Melaleuca lateritia and Melaleuca sp. burnt previous summer, with Hydrocotyle lemnoides, Wurmbea dioica.		Brixton Street, Kenwick near junction with Alton Street	14/08/1987
Aponogeton hexatepalus	4	Bulbous/tuberous perennial herb.	In very wet (flooded in winter) muddy clay.	Melaleuca lateritia swamp.	common.	Brixton Road, Kenwick	19/10/1981
Asteridea gracilis	3		Rocky.			Helena Valley, Gooseberry Hill	26/09/1977
Austrostipa bronweniae	T	Perennial grass, 0.6 m high x 0.3 m wide. Flowers green. Reproductive method: seeds, caespitose.	Wetland. Seasonally waterlogged muddy sand. Burnt ca 3 years ago.	Low trees. With Gahnia trifida, Actinostrobus pyramidalis, Grevillea thelemanniana, Melaleuca viminea subsp. viminea.		Lot 26 Brook Road, Kenwick	18/09/2009
Austrostipa bronweniae	T	Perennial grass, 0.6 m high x 0.3 m wide. Flowers green. Reproductive method: seeds, caespitose.	Wetland. Seasonally waterlogged muddy sand. Burnt ca 3 years ago.	Low trees. With Gahnia trifida, Actinostrobus pyramidalis, Grevillea thelemanniana, Melaleuca viminea subsp. viminea.		Lot 26 Brook Road, Kenwick	18/09/2009
Austrostipa bronweniae	T	Clumping, perennial grass. 0.6 m (in spike to 1.1.m) x to 0.5 m wide.	Dampland. Dry at time of collection. Seasonally wet. Brown to grey sandy clay.	Callitris pyramidalis and Viminaria juncea Tall Open Shrubland over Hypocalymma angustifolium, Grevillea thelemanniana var. thelemanniana, Acacia lasiocarpa, Boronia crenulata, Open Low Heath and Sedgeland/Herbland dominated by Chaetanthus aristatus, Cen	188 mature clumps and 45 juveniles.	Lot 26 Brook Road, Kenwick	29/10/2013
Babingtonia urbana	3	Low very straggly bush. 40 cm. Flowers white suffused pink.				Brentwood Road, Kenwick	24/02/1978
Banksia mimica	T					Orange Grove,	//
Banksia mimica	T	Dwarf clumped plant with very short prostrate stems, not strongly spreading. No plant larger than 0.5 m across. Leaves vertical. Not flowering.	Sandy rises in flat swampy areas. Rises some 20 - 50 cm above surrounding swamp, full of heath scrub to 50 cm.	No D. mimica in swamp. Slightly taller scrub on rises and includes D. sp. aff. nivea and occasional Eucalypt.		Tonkin Highway, Wattle Grove, between Welshpool and Hale Roads in swampy country west of highway	17/09/1984
Banksia mimica	T		In damp sandy loam.	With low scrub.		Corner Welshpool Road and Brentwood Road, Wattle Grove	6/08/1964
Banksia mimica	T	Prostrate, spreading lignotuberous shrub to 25 cm with yellow flowers.	Flat, grey sand.	Mid sparse shrubland of Allocasuarina humilis and Lambertia multiflora var. darlingensis over low sparse shrubland of Eremaea pauciflora var. pauciflora over mid sparse sedgeland of Cyathochaeta equitans.	4 plants at this location.	Ca. 230 m E of Tonkin Highway in Bush Forever site 320, ca. 640 m NNW of the Welshpool Road E and Tonkin Highway intersection	18/12/2019
Banksia mimica	T	Prostrate dwarf shrub to 15 cm.	In grey sand on slight rise next to flat.	Recently burnt. In heath with emergent Kingia australis, Nuytsia floribunda, Adenanthos cygnorum, Banksia menziesii, Dryandra nivea.		Lot 7 (No.20), Brentwood road, Orange Grove, close to junction with Crystal Brook road, opposite turf farm	21/03/1990
Banksia mimica	T	Prostrate dwarf shrub to 25 cm high.	White sand on flat ground.	In very open woodland with heath understory. Banksia attenuata, B. menziesii, Adenanthos cygnorum, Nuytsia floribunda, Casuarina fraseriana, Xanthorrhoea.		Wattle Grove, 30 Brentwood road, SE from junction with Crystal Brook road, E of Tonkin Highway	4/04/1990
Banksia pteridifolia subsp. vernalis	3					Agriculture Protection Board Station, Forrestfield	26/09/1989
Banksia pteridifolia subsp. vernalis	3	Prostrate shrub 40 cm tall x 50 cm wide. New growth pink/brown. No buds, flowers or fruits.	Flat, sandy soils over loamy sands 0.4 m deep.		one group of 5 plants near Casuarina Road.	Reserve 6.01 (SOK), Reserve on N end of Casuarina Road, Gooseberry Hill	27/10/1992
Banksia pteridifolia subsp. vernalis	3	Prostrate shrub to 0.4 m tall by 0.8 m wide.	Flat, grey sand.	Jarrah/Banksia over mixed heath natives.		Reserve 5.17 SOK, located in reserve between Lot 77 (Brae Road) and Lot 27 (Brand Road), Maida Vale	14/01/1993
Banksia pteridifolia subsp. vernalis	3		Flat. Dry grey sand. Previously a bridle trail.	Banksia attenuata - Eucalyptus marginata woodland. Lambertia multiflora subsp. darlingensis, Isopogon drummondii, Conospermum undulatum, Hakea ruscifolia, Hypolaena exsulca.	ca 10 plants.	Brae Road Reserve Maida Vale, along track opposite Stewart Road	8/08/1998
Banksia pteridifolia subsp. vernalis	3	Stems underground, resprouting after fire; leaves somewhat glaucous when young; perianth and style pale gold.	On sandy flat.	With low shrubs and occasional Casuarina fraseriana and Eucalyptus marginata.		Near corner of Brae Road and Stewart Road, High Wycombe,	18/08/1998
Banksia pteridifolia subsp. vernalis	3	Stems underground, resprouting after fire; leaves somewhat glaucous when young; perianth and style pale gold.	On sandy flat.	With low shrubs and occasional Casuarina fraseriana and Eucalyptus marginata.		Near corner of Brae Road and Stewart Road, High Wycombe,	18/08/1998
Beaufortia purpurea	3					Darlington	21/11/1949
Beaufortia purpurea	3					Swan View, Swan district	/12/1900
Beaufortia purpurea	3					Gooseberry Hill, Darling Range	28/11/1903
Beaufortia purpurea	3					Greenmount	10/01/1954
Beaufortia purpurea	3		Subseral (granite) area.			Darlington	26/09/1931
Beaufortia purpurea	3					Darlington, New Norcia	//
Beaufortia purpurea	3					Swan View, Darling Range	/12/1898

Beaufortia purpurea	3					Darlington, Darling Range	11/10/1906
Beaufortia purpurea	3					Swan View	/10/1923
Beaufortia purpurea	3					National Park, Swan View	/12/1933
Beaufortia purpurea	3	Flowers purpureis.				Swan View	/12/1923
Beaufortia purpurea	3	Height 2 ft to 3 ft. Flowers scarlet.	Granite.	Heath.		Helena Valley	12/11/1977
Beaufortia purpurea	3					Darlington, Darling Range	23/12/1903
Beaufortia purpurea	3		Yellow gritty clay, with surface gravel and cobbels, on a steep north-eastern upper slope.	Xanthorrhoea acanthostachya, Daviesia horrida Open Low Scrub, over Verticordia acerosa, Calothamnus sanguineus, Dryandra lindleyana var. lindleyana Dense Low Heath, over Borya sphaerocarpha Open Herbs.		Gooseberry Hill National Park, c. 200m E of first (highest) U-turn on Zig Zag Drive, about 90 m SE of granite outcrop. (Plot-ZIGZ01)	19/09/1996
Beaufortia purpurea	3	Shrub.	White/yellow clay.	Open Low Woodland A (marri, wandoo) over Dense Thicket.		950 m E of crossroads Ridge Hill and Helena Valley roads along Helena Valley Road, 50 m S of road along a track	13/12/1983
Beaufortia purpurea	3	Shrub to 1.5 m.	Clay among granite. Road verge.	Heath B.	200+ plants.	Zig Zag Road, Gooseberry Hill, 100 m from (outside) national park boundary	3/11/1982
Bolboschoenus fluviatilis	1	Perennial sedge, 1.7 m high.	Littoral zone, Swan River. Wet dark brown silt.	Flooded gum open woodland. Characteristic species: Melaleuca rhaphiophylla and Typha orientalis.	dense stand.	Loder Way, South Guildford	13/03/2018
Bolboschoenus fluviatilis	1	Perennial herb 2.0 m high x 0.6 m wide. Brown flowers.	Flood plain. Collection site: reserve.	Tall trees. With Eucalyptus rudis, Juncus pallidus, Baumea articulata.	over 50 plants. Area: 101-1000 m squared.	Loders Street[Loder Way], South Guildford	20/11/2008
Boronia humifusa	1	Small open spreading shrub to 0.15 m high. Multi-branching from base with viscid leaves and pink flowers.	Dry hilltop laterite with surface boulders.	Jarrah and Marri open woodland with Dryandra sessilis, D. lindleyana, Grevillea wilsonii	scattered ca 20 plants.	Snowball Road, on Parkland 0.55 km W of St Emiles Road, Kalamunda	17/07/2002
Byblis gigantea	3		Sandy places.			Guildford	3/11/1901
Byblis gigantea	3					Guildford (Perth)	/12/1901
Byblis gigantea	3	Herb 20-25 cm high with deep pink flowers.	Sandy soil often swampy.	Acacia lasiocarpa, Hakea, Grevillea, Boronia, Melaleuca, Leucopogon etc.		Brook Road, Wattle Grove	6/09/1976
Byblis gigantea	3	Insectivous plant. Large mauve flowers.	Growing in grey sand (white silica sand mixed with humis) soils.	Low shrubs on winter wet swamp flat heathland.		Newburn	28/12/1996
Byblis gigantea	3	Insectivous plant. Large mauve flowers.	Growing in grey sand (white silica sand mixed with humis) soils.	Low shrubs on winter wet swamp flat heathland.		Newburn	11/12/2001
Byblis gigantea	3	Erect perennial herb; flowers purple.	Palusplain; grey sand over ? clay.	Shrubland.	very common, fire the year before.	Perth Airport to E of Horrie Miller Drive (System 6 Area M52, Bush Forever Site 386)	7/12/1994
Byblis gigantea	3	Erect plant, multi-branching from the base, to c. 25 cm high. Blue/purple flowers.	Flat. Dry grey/brown sand.	Scattered Eucalyptus todtiana and Nuytsia floribunda with Kingia australis, Stirlingia latifolia, Verticordia densiflora, sedges.	2 plants.	Hartfield Park, R 17098/3894, Tonkin Highway, Forrestfield, between the golf course and the E side of the highway	7/12/2006
Byblis gigantea	3	Perennial 18 in. high, nearly finished flowering; flowers pale pink.	In grey swampy sand.			c. 50 yards along Kalamunda turn off from Hardy Road, Kewdale	23/01/1972
Byblis gigantea	3	Flowers purplish pink.				Guildford (Perth)	/01/1939
Byblis gigantea	3	Fls. violet.		Low scrubby swampy heath. Assoc. taxa: Lembertia [Lambertia].		Perth to Darlings [Darling Ranges] and return; Welshpool Rd, Cannington at base of Darling Ranges	23/10/1967
Caladenia huegelii	T					Queens Park	/09/1912
Calandrinia uncinella	1	Decumbent to semi erect annual herb. 4-8.5 cm x 1.5-7 cm. Plant relatively succulent and in fruit.	Swamp 0 seasonal. Grey white silty sand.	Heath with areas of herbfield. With Melaleuca brevifolia, Hypocalymma angustifolium, Acacia lasiocarpa, Pogonolepis stricta, Centrolepis aristata, Gahnia trifida, Drosera glandulifera and several annual weed species.	modestly abundant, but difficult to see amongst other plants.	Ca 250 m S of Bickley Road, Kenwick, in reserve area	1/10/2014
Calandrinia uncinella	1	Annual to 10 cm. Flowers white; fruits reddish, deflexed.	Swampy clay-based wsetlands.	Low, weed-infested wetland with Tecticornia lepidosperma, Triglochin, Cotula, Tribonanthes, Actinostrobus pyramidalis.	frequent.	Bickley Road, Kenwick	3/09/2011
Calandrinia uncinella	1	Small annual herb.	Seasonally wet poorly drained flat. Cream sand over clay.	Banksia telmatiaea over Chaetanthus aristatus over herbs.		Plot Yule 05. Yule Brook Reserve (University of Western Australia) bounded by Brook, Bickley and Boundary Roads, Kenwick	16/09/2013
Calandrinia uncinella	1	Decumbent to ascending, succulent annual herb. Flowering and fruiting. Flowers white-cream.	Wet flat. White-grey sandy loam.	Melaleuca acutifolia over low shrublands. Associated species: Melaleuca acutifolia, Chaetanthus aristatus, Tribonanthes variabilis, Acanthocarpus preissii, Acacia lasiocarpa, Hypocalymma balbakiae ms, Wurmbea dioica, Drosera heterophylla, Centrolepis ari	locally common.	Greater Brixton Street Wetlands, Lot 48 along Wanaping and Bickley roads, Kenwick	22/08/2019
Calectasia grandiflora	2	Erect clumped rhizomatous herb 30 x 40 cm, flowers glossy purple, anthers yellow.	Edges swamp, grey sandy clay over clay.	Low shrubland.	common.	Brixton Road, Beckenham	23/09/1983
Calectasia grandiflora	2	Rhizomatous undershrub to 65 cm, flowers blue, in full flower.	Low-lying open area beside swamp.	Low heath with Hypocalymma, Grevillea, Melaleuca, Hakea, Schoenus, Calectasia narragara.	c. 60 plants, very localised.	W side of Brixton Street Conservation Area, Cannington	16/10/2005
Calectasia grandiflora	2	Shrub to 20 cm. Flowers purple with yellow anthers.	Grey sandy clay.	Edge of Marri woodlands. Associated species: Lepidosperma sp., Philotheca spicata, Chamaescilla corymbosa, Drosera glanduligera, Neurachne alopecuroidea, Stylidium sp. Darling Range (H. Bowler 371), Tetraria octandra, Mesomelaena tetragona, Briza sp.	rare.	Brixton Street Wetlands, Kenwick	11/10/2011
Calothamnus accedens	4	Height to 3 ft. Flowers scarlet-crimson.		Open wandoo forest.		Helena Valley, near Ridge Hill Road	28/11/1978
Calothamnus accedens	4				rare.	Ridge Hill Road, Helena Valley	/11/1977
Calothamnus accedens	4	Shrub to 1 m, with lignotuber.	In gravelly clay.	In Marri - Wandoo woodland.		Corner of Bulkirra Road and Ridge Hill Road, Helena Valley	21/11/2006
Calytrix breviseta subsp. breviseta	T	Spreading low shrub 0.2-0.4 m high x 0.2-0.6 m wide. Purple-blue flowers. Small angular leaves to 6 mm. Twiggy shrubs.	Edge of seasonal clay base open depression. Moist, grey-brown sand to fine sandy loam over clay.	Tall Open shrubland of Callitris pyramidalus, Viminaria juncea and Melaleuca acutifolia over Open Heath of Hypocalymma angustifolia and Acacia lasiocarpa over Open Sedgeland of Schoenus rigens, Chaetanthus aristatus over Herbland of Centrolepis aristata,	4 plants.	Lot 138 Brentwood Road, Kenwick, NE side of property close to Boundary Road; 1.5 km E of Bickley Road	13/09/2012
Calytrix breviseta subsp. breviseta	T	Flowers purple-blue.	Swampy clay flats.			Bellevue, 12 miles E of Perth	5/10/1901
Calytrix breviseta subsp. breviseta	T		Flat. Moist white/grey sand/clay.	Area open due to last fire - previously Low Heath C/D with Verticordia plumosa seedlings, Calothamnus hirsutus seedlings.		35 m W from NE corner of Loc. 21, Gosnells Shire	23/10/1995
Calytrix breviseta subsp. breviseta	T		Swampy ground.			Bellevue	/10/1901
Calytrix breviseta subsp. breviseta	T		Swampy ground.			Bellevue	5/10/1901
Calytrix breviseta subsp. breviseta	T	Erect Low Shrub to 0.2 m by 0.2 m. Sterile, plants mature, not burnt for ?15+ years.	Palusplain; brown/grey clay over clay.	Verticordia Low Open Heath over Herbland and Sedgeland.	c. 100 plants.	Lot 139 Brentwood Road, Kenwick (part Bush Forever Site 387, site 6)	22/06/1995
Calytrix breviseta subsp. breviseta	T	Small shrub to 1 m.	Flat. Grey loam/clay.	Growing in low heath between firebreak and tall heath. With Acacia sp., Calothamnus sp., Hypocalymma sp., Melaleuca sp., Pericalymma sp., Verticordia sp., Viminaria juncea.	1000's.	Yule Brook Reserve, 0.9 km N of Bickley Road on Boundary Road	27/11/2003
Calytrix breviseta subsp. breviseta	T		Slope. Inundated grey sandy loam.	Healthy vegetation.	357 plants in ca area 760 m x 760 m. Includes a range of ages but mostly mature plants.	Lot 602 Boundary road Kemwick	24/10/2006
Calytrix breviseta subsp. breviseta	T	Small compact shrub to 1 m.	Flat. Grey/black sand.	With Calothamnus hirsutus, Verticordia plumosa.		Opposite Yule Brook Reserve, on Boundary Road, Kenwick. Follow firebreak E from gate, then follow N. One group of plants is 10 m W off firebreak in the NE corner of the property. The second group is ca 50 m SE of the entry gate	12/12/2008
Calytrix breviseta subsp. breviseta	T	Low shrub to 0.4 m, leaves small, linear to narrowly elliptic. Flowers purple. Late flower.	Brown sandy clay flat, winter-wet.	In low heath of Verticordia acerosa and V. plumosa.		0.9-1 km N of Bickley road on Boundary road, Kenwick, N side	1/11/1990
Calytrix breviseta subsp. breviseta	T	Small shrub to 0.5 m.	Grey-brown sandy loam to light clay.	Closed low heath of mixed Verticordia densiflora, V. acerosa subsp. acerosa, Hypocalymma angustifolium, Acacia lasiocarpa, Calothamnus hirsutus, Jacksonia lehmannii; over herbland and open sedgeland.	locally abundant.	Nature Reserve 50529, NW side of Boundary Road, Kenwick	7/10/2011
Calytrix breviseta subsp. breviseta	T	Small shrub to 0.75 m.	Grey-brown sandy loam to light clay.	Calothamnus hirsutus, Verticordia densiflora, V. acerosa, Hypocalymma angustifolium, Jacksonia lehmanii, Kunzea micrantha, Acacia lasiocarpa; over herbland of Stylidium spp., Trionanthus australis, Philydrella pygmaea, Drosera spp., Borya scirpodea.	locally frequent.	Nature Reserve 50529, c. 1 km NE of Bickley Road, on Boundary Road on SE side, c. 50 m into the reserve	13/10/2011
Calytrix breviseta subsp. breviseta	T		Flat. Seasonally wet white/grey sand/clay.	Low Heath C/D with Verticordia acerosa, V. plumosa, Hypocalymma angustifolium, Leptocarpus sp., Calothamnus hirsutus.		Loc. 134, Gosnells Shire	18/10/1995
Calytrix breviseta subsp. breviseta	T	Small shrub to 50 cm tall.	Low lying winter wet plain. Brown clay/loam.	Shrubland to 1 m. Acacia sp., Calothamnus sp., Hypocalymma sp., Neurachne alopecuroidea, Verticordia sp.	c. 60 plants.	Boundary Road, Lot 602. WAPC land. Kenwick. Population 1C	21/11/2007
Carex tereticaulis	3					Guildford	/10/1903
Chamaescilla gibsonii	3	Perennial herb. Flowers pale blue.	Wet flat. Poorly drained. Brown sandy clay loam.	Transition between Viminaria juncea tall shrubland and Marri woodlands. Associated species: Viminaria juncea, Hakea trifurcata, Gompholobium marginatum, Neurachne alopecuroidea. Excellent condition.	Uncommon.	Brixton Street Wetlands, Kenwick	29/08/2007
Comesperma griffinii	2	Herb to 7 cm, flowers blue. Possibly annual or short lived perennial.	Wet flats. Brown-grey sandy loam.	Edge of Marri woodlands. Associated species: Verticordia pennigera, V. densiflora, Daviesia physodes, Hibbertia hypericoides, Lepidosperma sp., Gastrolobium capitatum, Haemodorum laxum, Levenhookia stipitata, Neurachne alopecuroidea, Hydrocotyle callicar	rare only twelve plants seen.	Brixton Street Wetland, Kenwick	22/10/2013
Comesperma griffinii	2	Herb to 7 cm, flowers blue. Possibly annual or short lived perennial.	Wet flats. Brown-grey sandy loam.	Edge of Marri woodlands. Associated species: Verticordia pennigera, V. densiflora, Daviesia physodes, Hibbertia hypericoides, Lepidosperma sp., Gastrolobium capitatum, Haemodorum laxum, Levenhookia stipitata, Neurachne alopecuroidea, Hydrocotyle callicar	rare, only twelve plants seen.	Brixton Street Wetland, Kenwick	31/10/2013
Comesperma rhadinocarpum	3		White sand.			Kenwick, Nature Reserve owned by Botany Department Western Australian University	4/11/1982
Conospermum undulatum	T	Perennial shrub, 0.80 m high x 0.20 m wide. Flowers white.	Plain. Dry grey soil. Old soil disturbance.	Medium trees. With Banksia menziesii, Allocasuarina fraseriana, Xanthorrhoea preissii, Conostylis aculeata, Anigozanthos manglesii, Adenanthos cygnorum.	6-20 plants, 10 mature plants.	Lot 22 Bedford Crescent, Forrestfield	24/07/2009
Conospermum undulatum	T	Erect shrub. Several plants with less undulate leaves intermixed with norma; undulate type.	Grey sand over yellow sand.	Dense low heat C of Pericalymma ellipticum.		Between Tonkin Highway and Hartfield Country Club Golf Greens, Wattlegrove	12/11/1990
Conospermum undulatum	T	Small compact shrub to 1.5 m.				Hardy Road, Forrestfield	20/10/1977
Conospermum undulatum	T	Shrub to 2 m. Leaf margins undulate. Inflorescences emergent above branches.	Low rise, grey sand.	In Banksia open low woodland A over Low scrub A and Low heath D.		c. 500 m N of Tonkin Highway along fence bordering W side of Forrestfield marshalling yards	24/10/1990
Conospermum undulatum	T	1.00 m height.	Grey sandy soils, bottom of Darling Scarp.	0.5 -1.0 m open heathland not burnt. Banksia sp.		Bushland N side of Welshpool road at bottom of scarp	25/08/1993
Conospermum undulatum	T	Erect shrub 1 m. Flowers grey.				Palm Terrace, Forrestfield	5/10/1978
Conospermum undulatum	T					Welshpool road, Cannington	15/09/1948
Conospermum undulatum	T					Gooseberry Hill, Darling Ranges	/06/1901
Conospermum undulatum	T		Yellow-orange clayey sand over gravel.	With Banksia menziesii, B. attenuata, Eucalyptus marginata, Isopogon drummondii, Hakea conchifolia.		400 m E along Welshpool road from Lewis road, Wattle Grove. Northside Welshpool road	6/10/1990
Conospermum undulatum	T		Yellow sand over laterite.	With Allocasuarina fraserina, A. humilis, Eucalyptus marginata, Banksia grandis, B. menziesii, Lambertia multiflora, Hakea conchifolia, Isopogon drummondii, B. incana.		Northside Dawson avenue, Forrestfield, SW of Rubbish Tip, inside and outside cyclone fence in Gazetted Reserve 41156	6/10/1990
Conospermum undulatum	T		Clayey sand over gravel.	Open woodland of Eucalyptus marginata, E. calophylla over open low scrub A of Hakea sp., over dense low heath c.		Watsonia road, Maida Vale just north of Gooseberry Hill road, E & W side of road	/09/1990
Conospermum undulatum	T	Shrub 1 - 1.5 m high with grey flowers.	Sandy soil. Melaleauca flats often swampy.	Restionaceae, Cyperaceae, Acacia, Hakea, etc occurring.		Boundary road, Wattle Grove	6/09/1976
Conospermum undulatum	T	Multistemmed shrub, 4 ft tall.	On gravel at base of scarp.			Crystal Brook	/08/1971
Conospermum undulatum	T		Sand with some gravel.	Eucalyptus marginata, E. calophylla.		Kelvin road, Wattle Grove, N side strip adjacent to Trotting Track, E of White road intersection	/09/1990
Conospermum undulatum	T		Yellow-grey sand, flat.	Banksia attenuata - B. menziesii Low Woodland A over open Low Scrub B.		Sultana road, High Wycombe, uncleared block on S side opposite Ravenswood road and Brand road	14/10/1990
Conospermum undulatum	T					Vicinity of Forrestfield, off Dunbara road, Perth,	20/10/1992
Conospermum undulatum	T	Narrow, erect shrub. Leaves distinctly undulate. Inflorescences emergent above branches.	Grey-white sand over laterite. Flat to gradual slope.	Banksia attenuata, B. menziesii Low Woodland over dwarf scrub and low heath.		Between Dundas road and Roe Highway, both N and S of Bedford Crescent, Forrestfield	19/10/1990
Conospermum undulatum	T	Sprawling shrub 1 m tall.	Low plain/swamp. White-grey sand. Bassendean-Southern River complex. Seasonal dampland. Probably burnt within last 5 years.	Heath B/Open low sedges/Open herbs with Melaleuca preissiana, Stirlingia latifolia, Anigozanthos manglesii, A. viridis, Mesomelaena tetragona, Dasypogon bromeliifolius.	1 plant.	SW corner of Tonkin and Roe Highway intersection, Shire of Belmont	21/01/1999
Conospermum undulatum	T		Yellow sand over laterite.	Open low woodland of Allocasuaring fraserina and Eucalyptus marginata over dense low heath C of Lambertia multiflora with some Banksia incana.		S side Roe Highway between highway and Dawson road Rubbish Tip, Forrestfield, also on Roe Highway road verge	6/10/1990
Conospermum undulatum	T		Grey sand over yellow sand.	Open low woodland of Allocasuarina fraseriana, Banksia attenuata over heath B over low heath C. Lambertia multiflora, Hakea conchifolia, Adenanthos cygnorum, Isopogon drummondii.		Brae road, High Wycombe, vacant block opposite Lot 70 and between Lots 63 & 79	14/10/1990
Conospermum undulatum	T		White-grey sand over yellow sand.	Low woodland A over dense low heath C. With Banksia menziesii, B. attenuata, Eucalyptus todtiana, Lambertia multiflora, Isopogon drummondii, Eremaea pauciflora.		Lot 30 Crystal Brook road, Wattlegrove, also adjacent lot on eastern side and on S side Crystal Brook road opposite Johnson Place	6/10/1990
Conospermum undulatum	T	Erect shrub to 1.5 m.	Grey sand.	Open woodland, Eucalyptus marginata, Banksia attenuata, Banksia menziesii, Stirlingia latifolia, Hibbertia hypericoides.		High Wycombe, S of Adelaide Street	8/11/1994
Conospermum undulatum	T	1.00 m height.	Grey sandy/clay soils bottom of Darling Scarp.	Natural roadside vegetation not disturbed or burnt. Scattered Banksia sp. and Casuarina sp. (3-4 m), understorey 0.5 -1.0 m.		Adjacent to tip on Orange Spring road	30/08/1993
Conospermum undulatum	T	Woody, open, few stemmed shrub to 1m high, perianth segments black, leaves basal.	On small unfenced suburban block. Grey sandy soil.	With Eucalyptus marginata and shrub understorey including Casuarina, Lambertia, Dasypogon, Hibbertia spp.		Maida Vale, at corner of Kalamunda Road and Midland Road,	3/10/1996

Conospermum undulatum	T		Yellow clayey sand over gravel.	Surrounded by dense low heath.		WAWA pump station site on SE corner of intersection of Midland road and Kalamunda road, Maida Vale, southside adjacent to Primary School	14/10/1990
Conospermum undulatum	T		Sand and gravel, flat.	In Banksia - Eucalyptus low forest B over open low scrub A over dense low heath C. Lambertia multiflora and Isopogon drummondii.		Hawkevale Farm Village, High Wycombe, SW side of Roe Highway, Adelaide street junction	7/10/1990
Conospermum undulatum	T		Yellow clayey sand on a gentle slope.	With Banksia attenuata, B. menziesii, B. incana, Hakea conchifolia, Isopogon drummondii.		Orange Grove, 10 acres of bushland along E side of White Street from intersection with Kelvin road Lot No's 27-30	6/10/1990
Conospermum undulatum	T	Shrub to 0.75 m, leaves undulate. Inflorescences erect above braches. Full flower.	Grey sand, flat.	Regenerating Eucalyptus marginata, Banksia menziesii, B. attenuata woodland over heath B.		400-500 m SE along Tonkin Highway from Hale road, Wattle Grove, south side	7/11/1990
Conospermum undulatum	T		Grey sand.	In low forest A over low heath C. Associated species, Banksia menziesiim Eucalyptus marginata, Allocasuarina fraseriana, Lambertia multiflora, Isopogon drummondii.		"Fleming Reserve", High Wycombe, bounded by Upton road, Smith Crescent and Newburn road	7/10/1990
Conospermum undulatum	T	In flower up to 1.5 m high.	Grey white sand.	With Allocasuarina fraseriana, Eucalyptus marginata, Banksia menziesii, Eremaea paucifolia, Petrophile linearis.		400 m along N side of Clifford Street from junction with Kelvin road, Orange Grove	/09/1990
Conospermum undulatum	T		Flat, sand with gravel.	Low forest A of Banksia attenuata, B. menziesii and Allocasuarina fraseriana. In association with Lambertia multiflora and Isopogon drummondii.		Along Hartfield road, Forrestfield. At entrance to Golf Club and near Hale road intersection	12/11/1990
Conospermum undulatum	T		Flat land on orange-yellow clayey sand over laterite.	In open low woodland of Eucalyptus marginata, E. calophylla over dense low heath.		Maida Vale Recreation Reserce, uncleared E portion S of Ridge Hill road area c. 200 m x 500 m	/09/1990
Conospermum undulatum	T	Erect woody shrub, to 1.5 m. Flowers white-grey, in full flower.	Deep yellow sand.	Low open Banksia woodland.		Welshpool Road: Base of Darling Scarp, Perth	15/09/1984
Conospermum undulatum	T	Erect shrub, leaves with undulate margins. Inflorescences emergent above branches.	Brown-grey sand, flat to gentle slope.	Banksia attenauta, B. menziesii low forest over low heath.		N & W side of Reid Oval, Hartfield Park, Forrestfield	12/11/1990
Conospermum undulatum	T	"Smoke Bush".				Welshpool	11/10/1918
Conospermum undulatum	T	Low shrub to 0.6 m. Leaves onl slightly undulate.	Low lying flat, brown sand.	Regenerating Pericalymma ellipticum Dense Heath A.		Roe Highway extension, SW of Roe and Tonkin Highways junction, Wattle Grove, between Tonkin highway and Hardey road	7/11/1990
Conospermum undulatum	T	Shrub 1 - 1.5 m high with greyish flowers.	White sandy soils.	Among tall Banksias, with Gompholobium, Hibbertia, Acacia, etc.		Brook road, Wattle Grove	6/09/1976
Conospermum undulatum	T		Grey sand over laterite, flat.	Open low woodland A of Eucalyptus marginata, E. calophylla, Banksia menziesii and B. attenuata over dense heath B.		Agriculture Protection Board Research Centre, Bougainville Avenue, Forrestfield	23/04/1990
Conospermum undulatum	T		Yellow clayey sand over gravel.	Low Woodland A of Eucalyptus marginata and E. calophylla over heath B of Lambertia multiflora over low heath C.		NW corner of intersection of Edney and Newburn road, High Wycombe Primary School site	14/10/1990
Conospermum undulatum	T		On sand.	Jarrah-sheoak association.		Maidavale	22/08/1961
Conospermum undulatum	T		Red gravelly clay, with lateritic gravel, on a gentle northern lower slope.	Eucalyptus marginata, E. calophylla Open Low Woodland, over Hakea lissocarpha, Acacia pulchella, Dryandra lindleyana, Hakea ruscifolia, Xanthorrhoea preissii Dense Low Heath, over Conostylis setigera, Mesomelaena tetragona Open Tall Sedges.		E of Watsonia Rd, Gooseberry Hill, about 40 m N of Goosebery Hill Rd, and 50 m E of Watsonia Rd. (Plot-GBHR02)	20/09/1996
Conospermum undulatum	T		NNW aspect. Slope. Dry yellow/grey sand.	(Muir's) Jarrah, marri and Allocasuarina fraseriana woodland. Hakea trifurcata, H. conchifolia, H. ruscifolia, H. lissocarpha, H. stenocarpa, Isopogon dubius, I. drummondii, Xanthorrhoea preissii, X. gracilis, Lambertia multiflorus, Hibbertia hypericoide		Population 1a is located at the junction of Kalamunda Road and Midland Road adjoining the NW boundary of Maida Vale Primary School. Ridge Hill Road forms the northern boundary of population 1b and it comprises the remnant bush surrounding the Archery Clu	23/09/1998
Conospermum undulatum	T		N-W aspect. Slope. Dry brown/yellow/grey sand/loam/clay/gravel.	(Muir's) Jarrah, Marri open woodland. Xanthorrhoea preissii, X. gracilis, Acacia pulchella, Dryandra lindleyana, Hakea ruscifolia, H. undulata, H. lissocarpha, Zamia, Hibbertia hypericoides, Daviesia decurrens, Leschenaultia biloba, Sedge sp., Hypocalymm		SW corner of population 2a is found from Watsonia Road 150 m N of Gooseberry Hill Road on the eastern block. Pop. 2b can be found on the western side of Watsonia Road	23/09/1998
Conospermum undulatum	T	Shrub to 1.5 m. Flowers smokey-white, in full flower.	Yellow sand, colluvial.	Banksia menziesii/attenuata low forest.	scattered in area.	Sultana road, Forrestfield	20/08/1991
Conospermum undulatum	T	Slender few branched erect shrub .5-1.5 m high x 50 cm wide. Flowers smokey, white, inside purple-black. All plants in late buds, ca 10% in flower.	Flat, white sand. Summer fire.	Banksia attenuata - B. menziesii low woodland.	common through area, resprouting after fire.	Between Clifford Street and Kelvin Road, Maddington	11/06/2005
Conospermum undulatum	T		Small rise at base of Darling Scarp. Dry, yellow-grey sand.	Woodland over shrubland. Associated species: Alexgeorgea nitens, Daviesia nudiflora, Dryandra lindleyana, Pityrodia bartlingii, Hakea ruscifolia, Hibbertia hypericoides, Jarrah, Marri, Bossiaea eriocarpa.	177 mature plants in area 165 x 30 m.	Lot 202 Watsonia Road, Maida Vale	9/03/2005
Conospermum undulatum	T	Multi-stemmed erect shrub 1-1.5 m high. Flowers silvery-white; in flower.	Edges of and shallow sandy rises. Grey sand over clay.	Disturbed ? Banksia low woodland.	only 2-5 plants in area.	Intersection Roe - Tonkin Highway; eastern side, Kewdale	15/10/2005
Conospermum undulatum	T	Erect shrub.	Plain. Grey sand.		scattered with a range of maturity. 37 plants including 4 very small ones.	Private property, 78 Brand Road, High Wycombe	7/10/2003
Conospermum undulatum	T	Erect shrub. Plants flowering but many have lost buds.	Watercourse. Grey sand.		locally common.	Poison Gully Creek, High Wycombe - population follows the creek line NW from the end of Mark Place, the majority occurring 100 m NW from the junction of Mark Place and Palmer Crescent	7/10/2003
Conospermum undulatum	T		Sandy soil. Not burnt.	Banksia woodland.		End of Adelaide Road, High Wycombe	//
Conospermum undulatum	T			Burnt and regenerating.		Adelaide Road, High Wycombe	//
Conospermum undulatum	T			Regrowth.		Adelaide Road block, High Wycombe	//
Conospermum undulatum	T					Adelaide Road and Roe Highway	//
Conospermum undulatum	T	Shrub to 1.5 m tall. Undulate leaves.	Flat. White sand.	Banksia woodland. Associated species: Allocasuarina huegeliana, A. fraseri, Banksia attenuata, Hibbertia sp., Daviesia sp., Adenanthos sp., Lambertia multiflora var. darlingensis.	100+.	Fire and Emergency Services Authority grounds, Dundas Road (E side) Forrestfield	1/11/2001
Conospermum undulatum	T		Low lying plain, swamp-like in winter. Moist white-grey sand-clay over laterite. Plants begin ca 500 m N of Tonkin Highway intersection along road verge and into private property behind verge into bush.	Associated vegetation: Eucalyptus todtiana, Melaleuca, Allocasuarina, Banksia.		On NW verge of Roe Highway between Tonkin Highway and Berkshire Road,	14/01/1999
Conospermum undulatum	T		Flat. Dry grey sand.	Associated species: Banksia sp., Allocasuarina humilis, sedges, Daviesia sp., Dryandra lindleyana, Xanthorrhoea preissii.		Roe Highway, Maida Vale: 1.85 km S of Great Eastern Highway Bypass or 0.9 km N of Kalamunda Road intersection,	9/04/2001
Conospermum undulatum	T	Flowers white.	Dune Ridge; flat ground. Brown sand over yellow sand, well drained.	Associated species: Banksia menziesii.		Bushland in private property at the end of Sultana Road. System 6 Update quadrat sultana	10/11/1995
Conospermum undulatum	T		Gently sloping dune with grey over yellow sand.	Woodland over shrubland with Allocasuarina fraseriana, Banksia attenuata, Banksia menziesii, Xanthorrhoea preissii, Dryandra lindleyana, Lambertia multiflora var. darlingensis, Isopogon drummondii, Caustis dioica, Hakea prostrata and Daviesia nudiflora.	39 mature plants over ca 300 m x 50 m in area.	Road reserve heading NW from NW end of gravel road, Adelaide Street, Maida Vale	27/01/2005
Conospermum undulatum	T	Shrub.	Private land. Low plain.			Lot 25 Victoria Road, Kenwick (information recorded in Cardno BSD Consultants report (Maddington-Kenwick Strategic Industrial Area Environmental Review July 2005)	21/10/2004
Conospermum undulatum	T		Private land, low plain. Moist grey sand.	Open low woodland with associated vegetation: Banksia menziesii, Eucalyptus marginata, Allocasuarina fraseriana, Stirlingia latifolia, Hibbertia hypericoides, Eremaea ?pauciflora, Xanthorrhoea preisii, Bossiaea eriocarpa, Jacksonia floribunda, Daviesia s	2 mature plants in area 2 m x 2 m.	Private property Lot 703 No 61 Dale place, Orange Grove - Aldon nominees	12/09/2006
Conospermum undulatum	T		Sand over laterite.	With Stirlingia latifolia, Allocasuarina fraseriana, Corymbia calophylla, Dryandra sessilis, Grevillea wilsonii, Hakea stenocarpa, Petrophile striata, Hibbertia hypericoides, Hypocalymma robustum, Philotheca spicata, Haemodorum paniculatum, Conostylis ca		Grove Road, Lesmurdie	9/09/2005
Conospermum undulatum	T		Sand dune. Grey sand.	Open Banksia woodland with Eucalyptus marginata, Corymbia calophylla, Banksia attenuata, B. menziesii, B. grandis, Stirlingia latifolia.		Perth Airport	26/11/2002
Conospermum undulatum	T	Erect compact shrub, 0.8 m high with old flowering scapes, leaves narrowly linear to 10 mm wide, tapering to base, distinctly undulating leaf margins.	In grey sand on flat, well-drained site. Frequent slashing between bushland remnants.	Woodland of Eucalyptus marginata over Low Closed Forest of Banksia menziesii, Allocasuarina fraseriana, Agonis flexuosa (naturalised from planting) over Shrubland of Adenanthos cygnorum, Lambertia multiflora, Daviesia divaricata over Low Shrubland of All	2 plants only.	Road reserve, 8 Hybanthus Avenue, High Wycombe	7/12/2016
Conospermum undulatum	T		Slope. Brown sand.	Low Woodland of mixed species including Bossiaea eriocarpa, Banksia menziesii, Eucalyptus marginata over Open Low Heath of mixed species dominated by Eremaea pauciflora, Allocasuarina humilis, Xanthorrhoea preissii and Lambertia multiflora var. darlingen		N side of Welshpool Road	22/09/2004
Conospermum undulatum	T	Straggling, multi-stemmed shrub to 1.4 m; leaves crowded at ends of bare branches. Inflorescences and flowers white-woolly, the perianth black inside.	Sandplain - Bassendean Sand.	Jarrah-Marri-Banksia attenuata-Adenanthos cygnorum heathy woodland.	frequent but localised.	Hawkesvale Bushland Conservation Area, Hazelmere	11/08/2007
Conospermum undulatum	T	Shrub.	Flat. Grey sand.	Low woodland (Disturbed). Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Hibbertia subvaginata, Dasypogon bromeliifolius, Melaleuca seriata, Lyginia barbata, Patersonia occidentalis.		Perth Airport	21/08/2002
Conospermum undulatum	T	Shrub.	Flat. Grey sand.	Woodland. Corymbia calophylla, Banksia attenuata, Banksia menziesii, Melaleuca preissiana, Xanthorrhoea preissii, Hypocalymma angustifolium, Adenanthos obovatus, Regelia ciliata, Jacksonia furcellata.		Perth Airport	3/09/2002
Conospermum undulatum	T	Erect shrub with grey-white flowers 120 cm high. Flowers grey/white.	Grey sand. + 3 years since fire. Disturbed.	Acacia pulchella var. pulchella, Stirlingia latifolia, Desmocladus flexuosus, Corymbia citriodora, Persoonia saccata, Synaphea gracillima, Banksia menziesii, B. attenuata, Chamaecytisus palmensis, Eucalyptus todtiana, Melaleuca sericata and Jacksonia flo	2-5 plants.	Perth Airport	21/08/2002
Conospermum undulatum	T	Low compact shrub, 0.5 m high, with old flowering scapes, leaves linear/narrowly elliptic to 20 mm wide tapering to base, undulating margins.	In grey sand on flat, well-drained site. Frequent slashing between bushland remnants.	Disturbed small remnants of Open Woodland of Eucalyptus marginata, Banksia menziesii, Allocasuarina fraseriana over Shrubland of Daviesia divaricata, Xanthorrhoea preissii, Eremaea pauciflora, Hibbertia hypericoides and Very Open Sedgeland of Mesomelaena	1 plant only.	Road reserve, 8 Hybanthus Avenue, High Wycombe	7/12/2016
Conospermum undulatum	T		Orange clayey sand over gravel on gently sloping to flat ground.	Low forest A over open low scrub A over low heath C and very open tall sedges. Eucalyptus marginata, E. calophylla, Allocasuarina fraseriana.		Orange Grove, 200 m S of Kelvin road off unnamed track opposite Orange Grove Caravan park	6/10/1990
Conospermum undulatum	T	Shrub to 1.5 m, seed.	Light grey sandy soil, slight rise.	Banksia woodland, closed understory, not burnt.		In natural bush in Webster Rd Forrestfield	14/12/1994
Conospermum undulatum	T	Perennial, spreading, open shrub, 1 m x 1 m, with white flowers.	Gentle slope at foot of Darling Scarp in reserve which was once a gravel pit, on lateritic gravel. Burnt March 2004.	Regrowth open Jarrah-Marri woodland with Hakea trifurcata, Xanthorrhoea preissii, Calothamnus sanguineus, Hibbertia hypericoides and fringing Dryandra sessilis thicket.	several plants in one area only.	Norwood Reserve (Kalamunda Reserve 22502), off Norwood Road, Maida Vale. 3.8 km WNW of Kalamunda	31/10/2004
Conospermum undulatum	T	Shrub, 1.5 m high x ca. 0.7 m wide. Old flowers.	Dry white sand.	Banksia attenuata woodland, with Dasypogon obiquifolius and Lambertia multiflora.	ca. 100 plants.	Lot 711, Dale Place, Orange Grove	24/04/2018
Conospermum undulatum	T	Shrub, 1.5 m high x 0.7 m wide. Old flowers.	Dry white sand.	Banksia attenuata woodland, with Dasypogon obiquifolius and Lambertia multiflora.	ca. 100 plants.	Lot 711, Dale Place, Orange Grove	24/04/2018
Conospermum undulatum	T	Shrub, 1.5 m high x 0.7 m wide. Old flowers.	Flat, with dry grey/brown sandy loam.	Degraded site. Open Jarrah woodland with Banksia sessilis understorey. Associated species: Allocasuarina fraseriana and Grevillea wilsonii.	one plant only.	14 Trott Road, Lesmurdie, Shire Reserve	15/05/2018
Conospermum undulatum	T	Erect, narrow shrub 1.2 m high.	Grey sand over laterite on flat terrain.	Woodland and heath with Banksia attenuata, B. menziesii, Allo- casuarina fraseriana, Isopogon drummondii.	frequent-occasional.	Gazetted Reserve31709, Bedford Crescent, off Dundas road, Forrestfield	23/04/1990
Conospermum undulatum	T		Slope. Dry brown sand, laterite.	(Muir's) Jarrah and Marri open woodland. Isopogon sp., Grevillea trifurcata, Jacksonia sp., Anigozanthos manglesii, Conostylis sp., Leucopogon pulchellus.	3 plants over 15 m x 15 m.	Honey Road, Forrestfield. N road verge 60 m E of Waterfall Road, Forrestfield. Also on private property on S side of road	2/10/2003
Conospermum undulatum	T					Vicinity of Forrestfield, off Dunbara Road. Perth	20/10/1992
Conospermum undulatum	T					Vicinity of Forrestfield, off Dunbara Road, Perth	20/10/1992
Conospermum undulatum	T	0.8 m shrub.	Sandplain.	Low open Banksia attenuata, Banksia menziesii woodland over Eremaea pauciflora var. pauciflora, Allocasuarina humilis, Callitris acuminata low-mid shrubland over Mesomelaena pseudostygia, Desmocladus asper and Banksia dallanneyi subsp. dallanneyi var. me	2 individuals.	Ca. 70 m N of Kelvin Road corner White Road, Orange Grove, Perth	18/09/2020
Conospermum undulatum	T		Grey sand over yellow sand.	Low woodland A of Eucalyptus marginata, Allocasuarina fraserina, Banksia menziesii, over open low scrub of Lambertia multiflora with Isopogon drummondii over dense low heath C		Brand road, High Wycombe on vacant lot adjoining Lot 4 and opposite Lots 7 & 9	14/10/1990

Conospermum undulatum	T		Grey sand over yellow sand.	Low woodland A (Banksia menziesii, Eucalyptus marginata, Allo- casuarina fraseriana over dense low heath.	300+ plants in flower.	NW side of Milnere road between Sultana road and Berkshire road, High Wycombe	14/10/1990
Cyanicula ixioides subsp. ixioides	4		Previously burnt, some herb and shrub regeneration. Brown pea gravel over laterite.	Previously semi-cleared area on edge of Casuarina stand bordered by Jarrah forest.	found 4 or 5 forma gemmata.	0.6 km N along Canning Road from Welshpool Road T-junction, 0.6 km S from Pomeroy Road crossing, Carmel	24/09/1985
Cyanothamnus tenuis	4	Small perennial shrub to 40 cm tall.	SE facing hillside amongst granite boulders and outcrop. Brown loam over granite.	Sheoak thicket & open heath. With Allocasuarina huegeliana, Corymbia calophylla, Hakea petiolaris, H. trifurcata, Petrophile sp., Xanthorrhoea sp.	common.	Bickley, ca 300 m NE of reservoir	12/08/2011
Cyanothamnus tenuis	4	Very spindly and open small shrub to 0.3 m. Flowers pink.	On edge of brook. Slope.	With Eucalyptus overstorey and many introduced weeds - Watsonia etc.		Near Forrestfield. On Lesmurdie Brook at base of falls.	23/09/1990
Cyanothamnus tenuis	4					Foot of Lesmurdie Falls	//
Cyanothamnus tenuis	4					Below Lesmurdie Falls.	21/08/1954
Cyanothamnus tenuis	4		Wooded hillside.			Crystal Brook, Lesmurdie.	28/09/1955
Cyanothamnus tenuis	4		Red stony soil.			Kalamunda.	22/08/1953
Cyanothamnus tenuis	4		Dark brown clayey loam, with surface lateritic gravel, on a moderate southern lower slope.	Eucalyptus wandoo Open Low Woodland, over Calothamnus quadrifidus Low Scrub, over Xanthorrhoea preissii, Dryandra lindleyana var. linleyana Low Heath, over Chamaescilla corymbosa, Stylidium bulbiferum Very Open Herbs.		Firebreak off Crystal Brook Rd, Roleystone; S of track. (Plot-CSBK04)	26/09/1996
Cyanothamnus tenuis	4	Slender shrub to 30 cm.	Hillside. Yellow loamy clay over granite.	Open woodland. Associated species: Eucalytpus calophylla, Synaphea tenuiloba, Acacia pulchella, A. alata, Dampiera alata, Calothamnus sp., Hypocalymma sp.	1000+.	Bickley Brook valley. Take track E from carpark then first track N (across creek), growing mainly on E side of track going up hill	6/12/2001
Cyanothamnus tenuis	4	Erect, diffuse sub-shrub.	Steep slope of river valley, S facing. Brown loam.	Shrubland. Thomasia macrocarpa, Nemcia spathulum, Hovea pungens, Hakea trifurcata.	locally common.	Bickley Brook Reservoir, N on hillslope above E end of reservoir	12/09/1990
Darwinia apiculata	T	Densely branched, low, spreading shrub. 20 cm high x 80 cm wide.	Flat with laterite and brown loam.	Open Eucalyptus woodland, Eucalyptus marginata and Corymbia calophylla over Allocasuarina fraseriana, Banksia sessilis, Xanthorrhoea preissii shrubland. Many weedy and introduced species including Briza maxima, Ursinia anthemoides, Chamaecytisus palmensi	2 plants in a small pocket of 425 sq m.	Reserve 30142 (Lot 2261) between Alpine Road and Yorna Road, Kalamunda, Shire of Kalamunda	10/11/2011
Darwinia apiculata	T	Sprawling herb, 5 cm high by 50 cm wide. Flowering; immature fruit.	Gentle slope. Organic litter over brown/yellow clay. Underlying rock granite.	Forest over Open Low Woodland A with Dense Thicket. Characteristic species: Eucalyptus calophylla, E. marginata, Xanthorrhoea preissii and Darwinia citriodora.	common.	Population 2, W of gorge and E of Loc. 208, 1.5 km SE of the junction of Mills Road and Nelson Road,	10/11/1999
Darwinia apiculata	T	Sprawling herb, 5 cm high by 50 cm wide. Flowering; immature fruit.	Gentle slope. Organic litter over brown/yellow clay. Underlying rock granite.	Forest over Open Low Woodland A with Dense Thicket. Characteristic species: Eucalyptus calophylla, E. marginata, Xanthorrhoea preissii and Darwinia citriodora.	common.	Population 2, W of gorge and E of Loc. 208, 1.5 km SE of the junction of Mills Road and Nelson Road,	10/11/1999
Darwinia apiculata	T		Private land. Hilltop of moist concretionary gravel and laterite.	Open low woodland with associated vegetation: Marri - Jarrah, Dryandra sessilis, Dryandra sp., Conostylis sp, Hardenbergia comptoniana, numerous Orchiaceae spp.	160 mature plants 6 seedlings and 2 dead in area 0.28 acres.	13 Ozone terrace, Kalamunda. Uncleared private property lot	25/07/2006
Darwinia apiculata	T	Small compact shrub to 40 cm tall.	SE facing slope around granite boulders. Brown-grey sandy loam.	Dense Low heath to 0.5 m. Corymbia calophylla, Darwinia citriodora, Hakea sp., Hibbertia sp., Hypocalymma sp., Trymalium sp.	>100 plants.	SE of gate at the end of Nelson Road (near Darlington winery), Darlington	9/12/2011
Darwinia apiculata	T		Uncleared area.			Uncleared area W of Alpine Road, W of Kalamunda	17/10/1982
Darwinia pimelioides	4		Variable aspect. Slope/outcrop/ridge. Moist/dry red/brown/yellow loam/clay. Granite sheet/boulder.	(Muir's) Scattered marri and wandoo. Hakea undulata, H. trifurcata, H. erinacea, Microcorys longifolia, Acacia pulchella, Allocasuarina humilis, Grevillea pilulifera, G. bipinnatifida, Tetratheca sp. Granite, Hemigenia sericea, Petrophile biloba, Leucopo		Found from Padbury Road 200 m SSE of Robinson Road, T-junction on the stony ridge and also 200 m SE above the small granite outcrop to the E of the walk trail, Darlington	31/08/1999
Darwinia pimelioides	4	Low dense rounded shrub to ca 40 cm. Flowers green and pink/maroon.	Soil red brown loam amongst granite boulders. Steep slope, aspect S.	Open Euc. calophylla woodland with scrub to 2 m beneath, with Grevillea endlicherana Trymalium ledifolium, Acacia pulchella, Pimelea sylvestris, Hakea cristata.		Rocky Gully, John Forrest National Park, behind toilet block.	23/09/1986
Diplolaena andrewsii	T					Swan View	/07/1963
Diplolaena andrewsii	T	Shrub 2 - 3 ft high, flowers red.	Amongst granite rocks.			Swan View	/09/1927
Diplolaena andrewsii	T					Swan View, eastern suburb of Perth.	/10/1901
Diplolaena andrewsii	T					Swan View, eastern suburb of Perth.	/10/1901
Diuris brevis	2		Flat wet area, some pools. Black peaty soil in some areas, same grey mud as others.	Low vegetation.		Kenwick Swamp, Brixton Road Swamp (Alton Street). Beckenham township	30/08/1997
Diuris drummondii	T		Swamp.			Near Guildford	/12/1901
Diuris purdiei	T					Cannington.	/10/1902
Drosera occidentalis	4	Rosetted perennial herb, ca. 0.7 cm in diameter, ca. 1 cm in height. Rosette sparse, 1-5 active leaves, dark red in colour. Inflorescence solitary or rarely 2-flowered. Petals 4 or 5, white with reddish mid vein. Styles 4 or 5, curved, yellow in colour,	Seasonally wet swamp. Grey-brown clayey sand.		a few hundred plants growing in small area.	Wanaping Block Reserve, 310 m S of Brook/Bickley Road intersection, Kenwick	11/11/2020
Drosera occidentalis	4		Damp flat. Grey clayey sand.	In Leptocarpus aristatus low sedges fringed by Pericalymma ellipticum Low Heath C.	700 + plants.	UWA Botany Department Reserve. Bounded by Brook, Bickley and Boundary Roads, Kenwick,	29/11/1990
Drosera occidentalis	4	Small herb with sparse rosette. Flowers white, mostly solitary, on peduncles ca 1 cm long. Late flower.	Brown sandy clay. Edge of winter-wet clay pan.	Regenerating Viminaria juncea open low Scrub B.	200+ plants.	Brixton Street, between Alton Street and railway, Kenwick,	23/11/1990
Drosera occidentalis	4		Sandy swamp.	Wattle.		Bickley Road, Wattle Grove	/10/1965
Eleocharis keigheryi	T	Herb to 0.3 m.	Swamp with brown clay, ca 10% cover.	Melaleuca laterita shrubland, over Eleocharis keigheryi very open sedgeland, over Amphibromus nervosus very open grassland, over Triglochin linearis and Liparophyllum capitatum open herbland.		Brixton Street Reserve Wetland, Shire of Gosnells Reserve, Kenwick, within claypans	11/10/2011
Eleocharis keigheryi	T	Perennial herb. Flowers green.	Winter inundated claypan. Seasonally inundated pale brown clay.	Clay pan. Associated species: Aponogeton hexatepalus, Triglochin linearis. Excellent condition. Floristic community: herb rich shrublands in claypans (8).	Common.	Brixton Street Wetlands, Kenwick	29/08/2007
Eleocharis keigheryi	T		Swamp.	Associated species: Meeboldina cana, M. coangustata, Melaleuca lateritia, Chorizandra enodis, Goodenia sp., Isotoma pusilla.		Bush Forever Reserve 422, Brixton Street, near Maddington Road, Kenwick	15/12/2001
Eremophila glabra subsp. chlorella	T	Prostrate spreading shrub, 20 cm high. Flowers pale lime green.	Winter wet, low lying. Brown-grey sandy clay over clay.	Low open heath.	common.	Brixton Road, Beckenham	21/07/1983
Eremophila glabra subsp. chlorella	T	Low shrub 1 m. Flowers greenish-yellow. Leaves soft, green, lanceolate.	Swamp.			Kenwick	9/06/1972
Eremophila glabra subsp. chlorella	T	Shrub with erect to spreading form. To about 80 cm height and to about 1 m wide. Flowers green.	Moist grey clay on flat.	Low Woodland over Low Open Shrubland over very Low Open Sedgeland. Casuarina obesa, Viminaria juncea, Melaleuca lateritia, Verticordia sp. and Chorizandra enodis.	10 plants.	Carousel Swamp, Cannington, plants located on Western Power land on lot 43 and lot 0, Lake Street	27/06/2007
Eremophila glabra subsp. chlorella	T	Perennial, multistemmed, upright, mid-green, leafy shrub 0.8 m high and 1 m diameter. Green tubular flowers lightly suffused with yellow at the bases.	Seasonally wet dampland. Soil moist, brown/grey sand over clay.	Tall shrubland of Callitris pyramidalis, over open heath of Hypocalymma angustifolium, over sedgland of Chaetanthus aristatus, Cyathochaeta avenacea and Gahnia trifida. Associated species: Patersonia occidentalis, Grevillea thelemanniana subsp. thelemann	4 plants only.	281 Bickley Road, Kenwick	3/07/2012
Eremophila glabra subsp. chlorella	T		Seasonally inundated area on clay loam.	Heath dominated by Melaleuca lateritia over mixed species including Meeboldina cana, Chorizandra enodis and Astartea affinis. Weeds in area.		Canning	19/03/2009
Eremophila glabra subsp. chlorella	T	Shrub to 1 m high x ca 50 cm wide. Green-yellow flowers.	In seasonally inundated Dampland in sandy-clay. On Muchea Limestone.	Occasional Viminaria juncea over Open Heath of Callitris pyramidalis, Melaleuca seriata over Low Open Shrubland of Acacia lasiocarpa, Hypocalymma angustifolium, Petrophile juncifolia, Acacia sessilis, Hakea sulcata over Sedgeland of Chaetanthus aristatus	1 plant only.	Lot 48 (281) Bickley Road, Kenwick	29/08/2013
Eremophila glabra subsp. chlorella	T	Shrub to 1 m high x ca 50 cm wide. Green-yellow flowers and small green round fruits in leaf axils.	In seasonally inundated Dampland in clay.	Melaleuca viminea and M. acutifolia Tall Open Scrub over Gahnia trifida and Juncus kraussii Very Open Sedgeland and weeds.	2 plants only.	In the SW portion of private property, Lot 66 Brook Road, Kenwick	24/10/2014
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	3	Perennial herb to 40 cm. Flowers white and blue.	Winter inundated claypan. Grey-brown clay.	Viminaria juncea tall shrubland. Associated species: Meeboldina cana, M. coangustata, Astartea affinis, Pimela imbricata var. major, Triglochin linearis, Aphelia sp., Schoenolaena juncea.	localised.	Brixton Street Wetlands, Kenwick	21/10/2009
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	3	Tuberous herb to 50 cm. Flowers white or pale blue.	Winter wet claypan, water to 20 cm deep. Grey-brown clay.	Low open shrubland in burnt Melaleuca lateriata.	abundant.	Brixton Street: Beckenham, 15 km E of Perth	29/10/1989
Eryngium sp. Subdecumbens (G.J. Keighery 5390)	3	Caespitose perennial herb. Flowers greenish.	Open claypan, winter wet, claypan. Grey-white clay over clay.	With scattered shrubs.	common.	Brixton Road, Beckenham, Perth	19/11/1982
Eryngium sp. Subdecumbens (G.J. Keighery 5390)	3		Swamp.			Midland Junction	18/12/1899
Eryngium sp. Subdecumbens (G.J. Keighery 5390)	3	Perennial herb to 8 cm. Flowers green and white.	Winter inundated claypan. Grey clay.	Melaleuca lateritia shrubland/Amphibromus grassland. Associated species: Astartea affinis, Amphibromus nervosus, Meeboldina cana, Isotoma pusilla, Anthotium junciforme, Lachnagrostis filiformis.	uncommon.	Brixton Street Wetlands, Kenwick	13/01/2010
Grevillea dissectifolia	3		N aspect. Slope. Dry brown/yellow loam/clay.	(Muir's) Open marri woodland. Hakea trifurcata, H. undulata, H. erinacea, Acacia pulchella, Dryandra lindleyana, D. armata, Daviesia horrida, Petrophile biloba, Xanthorrhoea preissii, Grevillea pilulifera.		Helena Valley Road 900 m E of Ridge Hill Road roundabout then walk 18 m S of the bitumen to the first plant,	18/10/1998
Grevillea dissectifolia	3		N aspect. Slope. Dry brown/yellow loam/clay.	(Muir's) Open marri woodland. Hakea trifurcata, H. undulata, H. erinacea, Acacia pulchella, Dryandra lindleyana, D. armata, Daviesia horrida, Petrophile biloba, Xanthorrhoea preissii, Grevillea pilulifera.		Helena Valley Road 900 m E of Ridge Hill Road roundabout then walk 18 m S of the bitumen to the first plant,	18/10/1998
Grevillea dissectifolia	3		Landform: slope/outcrop. Rock type; granite. Rock form: boulder. Soil type: sand, loam and clay. Soil colour: brown/yellow. Soil condition: dry.	Vegetation classification: Scattered Marri. Associated species: Hakea trifurcata Hakea undulata, Hakea erinacea, Acacia pulchella, Dryandra armata, Dryandra lindleyana, Grevillea pilulifera, Xanthorrhoea preissii.	ca 3 mature plants.	Darling Range Regional Park, Helena Valley Block, Helena Valley: take Helena Valley Road for 0.9 km E of Ridge Hill Road roundabout - the plants grow upslope on the S side of the road	7/11/2003
Grevillea thelemanniana	T					Cannington, Lower Canning R. [River]	13/06/1899
Grevillea thelemanniana	T	Spreading shrub ca 0.5 m high, perianth bright pinkish red, nectary cream, stipe pink, ovary green, style pinkish red, topmost part of the style and style- end green. Lignotuberous.	On sand.	Low shrubland with Leptocarpus scariosus.	occasional.	University Reserve near Cannington, known as Cannington Swamp	7/07/1976
Grevillea thelemanniana	T	Low spreading compact shrub, 30 cm, flowers red.	On white saline clay.			Brentwood Road, Kenwick	20/06/1978
Grevillea thelemanniana	T	Regrowth from lignotuber.	Sand.	In low shrubland burnt last summer.	occasional.	University Reserve near Cannington, known as Cannington Swamp	7/07/1976
Grevillea thelemanniana	T	Dwarf shrub 30 cm to 100 cm high, with variable habit. Most plants low and prostrate. Foliage blue-green to yellow green.	In winter wet flat on grey sandy loam.	Associated with Actinostrobus pyramidalis, Banksia telmatiaea, Hypocalymma angustifolia, Calothamnus sp.		1 km along Brook road from Welshpool road, Kenwick, both side of road	4/04/1990
Grevillea thelemanniana	T	Spreading shrub with divided or simple leaves.	Sand and sandy clay, low lying.	Heath B - Low Heath C of Hypocalymma angustifolium, Calothamnus hirsutus, Actinostrobus pyramidalis, Hakea varia and Viminaria juncea.	abundant.	Unfenced lots between Brook and Boundary roads, Kenwick	18/10/1990
Grevillea thelemanniana	T	Low spreading shrub to 1 m.	In winter wet low flat in sand over clay.	In heath with Actinostrobus pyramidalis, Banksia telmatiaea, Calothamnus hirsutus.	occasional.	Yule Brook Botany Reserve	10/05/1990
Grevillea thelemanniana	T	Shrub to 1.5 m high.	Sand - sandy clay, flat.	Heath B/Low Heath C. Banksia telmatiaea, Actinostrobus pyramidalis, Calothamnus hirsutus and Hypocalymma angustifolium associated.	300 + plants.	UWA Botany Department Reserve, bounded by Biskley, Brook and Boundary roads, Kenwick	1/11/1990
Grevillea thelemanniana	T	Spreading shrub to 0.5 m high, flowers light red.	Found at roadside to a shrubland. Growing in grey, sandy clay.	Shrubland.		Kenwick, 1.1 km N along Boundary Road, from the intersection of Boundary and Bickley Road	29/08/1985
Grevillea thelemanniana	T	Radially spreading prostrate shrub; blue-green foliage, flowers red, leaves simple to divided.	On low ground with a very slight slope in Salmon-buff clayey sand.	With Actinostrobis pyramidalis, Verticordia densiflora, Viminaria juncea, Calothamnus hirsutus, Banksia telmatiaea, sedges.		200-300 m NE of intersection of Railway and Brixton strees, Beckenham	25/05/1990
Grevillea thelemanniana	T	Low spreading bush with pinky-red flowers.	On sand.			1 km S along Brook Road from Welshpool Road, Wattle Grove	22/05/1976
Grevillea thelemanniana	T	Shrub 2 ft high with red flowers.	In sandy, swampy soil.			Kenwick	/08/1936
Grevillea thelemanniana	T	Spreading shrub to 0.3 by 0.7 m; flowers red.	Palusplain; grey clayey sand over clay.	Melaleuca leptoclada Tall Shrubland over Mixed Open Low Heath over Leptocarpus canus Sedgeland.	scattered in Low Heath Layer.	Lot 139 Brentwood Road, Kenwick (part Bush Forever Site 387, site 2)	22/06/1995
Grevillea thelemanniana	T	Shrub to 1 m tall. Red flowers.	Seasonally wet swamp. Grey sand.	Open tall shrubland. Associated species: Grevillea thelemanniana subsp. thelemanniana.	>100 plants.	N section of Brixton Street Wetlands, N of Brixton Street, Kenwick	9/12/2016
Grevillea thelemanniana	T	Spreading shrub to 0.5 m high.	Low lying flat, sandy clay.	Mixed low heath C of Calothamnus hirsutus, Actinostrobus pyramidalis, Hypocalymma angustifolium and Banksia telmatiaea.		N side of Brook road, 1.2 km from Welshpool road, Kenwick	18/10/1990
Grevillea thelemanniana	T					Cannington	/09/1966
Grevillea thelemanniana	T	Low spreading shrubs 0.2-0.4 m in height. Flowers red.	Winter-wet, swampy area with yellow sand/grey clay soils.	Vegetation consisting of low Myrtaceous shrubs and Banksia, with frequent Actinostrobus pyramidalis, punctuated by open areas with small herbaceous ephemerals.	frequent.	SE side of Brook Road in Kenwick, 0.9 km SW of junction with Welshpool Road (Highway 35),	25/09/1999
Grevillea thelemanniana	T	Leaves simple or divided, light to mid-green, flowers red.	Sand and clayey sand, low lying flat.	Melaleuca bracteosa Heath A and mixed Low Heath C. Viminaria juncea, Banksia telmatiaea and Hypocalymma angustifolium association.		N side of Brook road, 0.85 km from Welshpool road, Kenwick	18/10/1990
Grevillea thelemanniana	T	Low shrub, leaves simple or divided. Flowers red.	Grey sand, flat.	Regenerating heath B/Low Heath B of Hypocalymma angustifolium, Actinostrobus pyramidalis and Calothamnus hirsutus.		Unfenced block on south side of Brentwood road, 1.4 km from Tonkin Highway, Kenwick	1/11/1990
Grevillea thelemanniana	T		Brown sandy clay, flat.	With Actinostrobus pyramidalis, Calothamnus hirsutus, Hypocalymma angustifolium, Verticordia plumosa and Melaleuca spp.		1.5 km N of Bickley road on Brentwood road, Kenwick. NW end of unfenced lot between Brentwood and Boundary roads	31/10/1990

Grevillea thelemanniana	T	Low spreading shrub.	Brown sandy clay flat.	Viminaria juncea scrub over Heath B/Low Heath C of Hypocalymma angustifolium, Pericalymma ellipticum, Calothamnus hirsutus, Actinostrobus pyramidalis.		Unfenced block between Boundary and Brentwood roads, Kenwick. Southern boundary is 1.3 km from Tonkin Highway on Boundary road	1/11/1990
Grevillea thelemanniana	T					Cannington	17/08/1898
Grevillea thelemanniana	T	Shrub to 1 m, spreading. Full flower. Heavily visited by bees.	Brown-grey sand over clay. Low lying flat, partially inundated.	Low Heath C and low sedges. With Viminaria juncea, Calothamnus hirsutus, Banksia telmatiaea and Actinostrobus pyramidalis.	300+ plants.	Block bounded by Brixton Street, Wanaping road, Bickley road and railway, Kenwick	12/09/1990
Grevillea thelemanniana	T	Decumbent shrub 30-40 cm high, flowers red.	Sandy soil often swampy.	Acacia lasiocarpa, Hakea, Banksia, Melaleuca, Boronia, Leucopogon, etc. also occuring.		Brook Road, Wattle Grove	6/09/1976
Grevillea thelemanniana	T	Widely spreading shrub 0.4-0.8 m high x 0.5-1.5 m wide. Red flowers and divided pinnatisect leaves.	Edge of a seasonal clay based open depression, on slightly deeper sandier soils. Moist grey-brown sandy loam over clay.	Tall shrubland of Melaleuca acutifolia, M. brevifolia and Callitris pyramidalus over Shrubland of Hypocalymma angustifolia, Acacia lasiocarpa, Verticordia densiflora var. densiflora over Very Open Sedgeland of Chaetanthus aristatus and Lepidosperma squam	69 plants.	NE section of property closed to Boundary Road, Lot 137 Brentwood Road Kenwick, 1.5 km E of Bickley Road	13/09/2012
Haemodorum loratum	3	Bracts and bracteoles greenish black, opaque, without conspicuous veining, the margins membranous, white. Outer perianth segments greenish black, glossy, inner segments black, dull, edged with orange. Plants at early flowering stage.	Eastern edge of coastal plain close to foot of Darling Scarp. Grey sand at surface changing to yellowish at about 10 cm deep.	Roadside strip of Jarrah (Eucalyptus marginata) and Banksia woodland with low shrub understorey.		Welshpool Road 1 km E of Lewis Road, Wattle Grove, suburban Perth.	19/11/1984
Haemodorum loratum	3		Midslope. Brown sand.	Low Woodland of mixed species including Banksia menziesii, Eucalyptus marginata over Open Low Heath of mixed species dominated by Eremaea pauciflora, Allocasuarina humilis, Xanthorrhoea preissii and Lambertia multiflora var. darlingensis. Associated spec		N side of Welshpool Road	23/09/2004
Haemodorum loratum	3	Annually renewed perennial herb.	Dune Ridge, flat ground, brown sand over yellow sand, well drained.	Associated species: Banksia menziesii.		Bushland in private property at the end of Sultana Road in System 6 Update quadrat sultaa	10/11/1995
Halgania corymbosa	3	Flowers blue.				Kalamunda (Lesmurdie Falls).	/11/1919
Halgania corymbosa	3	1.5-2 ft high. Flowers deep blue-purple.	Granite.	Some trees very scarce.		Helena Valley.	16/10/1977
Hydrocotyle lemnoides	4	Floating annual herb. Flowers red-purple and brown.	Winter inundated claypan. Brown clay.	Melaleuca lateritia shrubland/Amphibromus grassland. Associated species: Melaleuca lateritia, Meeboldina cana, Amphibromus nervosus, Astartea affinis, Crassula sp.	locally common.	Brixton Street Wetlands, Kenwick	27/08/2008
Hydrocotyle lemnoides	4					Midland Junction	8/10/1906
Hydrocotyle lemnoides	4	Waterplant. Light green leaves, purple flowers.	Clay depression. Flat. Brown soil over clay.		occasional.	Roe Highway Road Reserve - 80 m SW of Brixton Street, adjacent to railway line	18/10/1993
Hydrocotyle lemnoides	4	Small aquatic plant with floating leaves, flowers purple.	In shallow pools to ca 10 cm depth.	Surrounded by thick scrub to 1.5 m of Melaleuca lateritia and Melaleuca sp., burnt previous summer. With Aponogeton hexatepalus, Wurmbea dioica.		Brixton Street, Kenwick, near junction with Alton Street	14/08/1987
Hydrocotyle lemnoides	4	Floating annual aquatic, flowers purple.	Wet muddy clay pan.	Melaleuca lateritia scrub.		Brixton Road, Kenwick	21/10/1981
Hydrocotyle lemnoides	4	Aquatic herb rooted in clay and with leaves floating on the surface, flowers mauve.	Winter wet claypan.	With Aponogeton hexatelapus and Villarsia submersa.	abundant.	Block bounded by Brixton street, Park Road and Wanaping Road, Kenwick	12/09/1990
Hydrocotyle striata	1					Success Spring, Guildford	23/09/1901
Hydrocotyle striata	1		Clay borders of a spring.			Guildford, near Perth	23/09/1901
Hydrocotyle striata	1	Leaves to 3/4" diameter, 5-7 lobed, lobes cerate.				Gooseberry Hill, Darling Range	08/10/1898
Isopogon autumnalis	3	Shrub to 0.6 m high.	Grey sand.	Open woodland, Eucalyptus marginata, Banksia attenuata, Banksia menziesii, Stirlingia latifolia, Hibbertia hypericoides.	ca 40 plants.	High Wycombe, S of Adelaide Street	8/11/1994
Isopogon autumnalis	3	Erect multistemmed shrub, 40 x 50/60 cm wide, flowers pale yellow, largely past flowering.	Yellow sand.	Open Banksia woodland.	common in area.	Base Welshpool Road, Darling Scarp, 20 km E of Perth	10/06/1984
Isopogon autumnalis	3	Low shrub with terete leaves and globular, terminal flower cones.	Flat and gentle slope. Brown grey sand.	Banksia attenuata, B. menziesii Low Forest A over Low Heath.		Northern and western sides of Reid Oval, Forrestfield	12/11/1990
Isopogon autumnalis	3		Flat, white-grey sand over yellow sand.	Banksia menziesii, B. attenuata Low Woodland A over dense Low Heath C, Conospermum undulatum and Lambertia multiflora associated.	200 + plants.	Crystal Brook road, Wattle Grove, S side opposite Johnson Place	13/10/1990
Isopogon autumnalis	3	Shrub to 80 cm, flowers cream.	In sand at foot of Darling Scarp.	With scrub and Banksia low woodland.		Welshpool road, Wattle Grove	7/04/1970
Isopogon autumnalis	3	Shrub 0.5-1 m high.	Grey brown sand with gravel. Flat.	Low forest A of Banksia attenuata, B. menziesii and Allocasuarina fraseriana.		Along Hartfield Road, Forrestfield near entrance to golf club and at beginning of nature trail	12/11/1990
Isopogon autumnalis	3	Flowers pale yellow.				Near Bellevue, Perth	/06/1900
Isopogon autumnalis	3	Open shrub 1 m tall x 1 m wide.	Flat, grey sand over yellow loamy sand.	Jarrah/Banksia woodland.	uncommon in the undisturbed areas.	Reserve 14.9 (SOK) corner of Rothsay and Edinburgh Road in Forrestfield	26/10/1992
Isopogon autumnalis	3		Grey sand over yellow sand, flat.	Eucalyptus marginata, Allocasuarina fraseriana, Banksia menziesii Low Woodland A over open Low Scrub B. Lambertia multiflora and Conospermum undulatum associated.		Vacant lot, NW side of Brand road, High Wycombe	14/10/1990
Isopogon autumnalis	3					Maida Vale	18/05/1939
Isopogon autumnalis	3		Flat, sand.	Banksia menziesii Low Forest B over Open Low Scrub A and Dense low heath C. Lambertia multiflora, Conospermum undulatum and Banksia incana associated.	500 + plants.	Hawkeval Farm Village, High Wycombe	7/10/1990
Isopogon autumnalis	3		Flat, grey sand over yellow sand.	Open low woodland of Allocasuarina fraseriana, Banksia attenuata over Heath B and Low Heath C. Lambertia multiflora, Hakea conchifolia and Conopsermum undulatum.		Vacant block on south side of Brae road, High Wycombe	13/10/1990
Isopogon autumnalis	3	Erect shrub to 1 m high. Creamy yellow flowers.	On gentle slope in white-grey sand.	In woodland with Banksia attenuata, B. menziesii, Adenanthos cygnorum.	19 plants.	30 Brentwood road, Wattle Grove, SW from junction with Crystal Brook road	4/04/1990
Isopogon autumnalis	3	To 3 ft, flowers pale yellow.	Sandy.	Banksia etc.		Lower Helena Valley - Helena Valley road	/03/1979
Isopogon autumnalis	3	Erect shrub.	Grey sand on flat ground.	Open low woodland A over dense heath B with Banksia attenuata, B. menziesii, Eucalyptus marginata, E. calophylla.	300 + plants.	Agriculture Protection Board, Bougainvillea Avenue, Forrestfield	6/04/1990
Isopogon autumnalis	3				several plants.	New gatehouse, Brand Road Landfill Site, High Wycombe	/05/1995
Isopogon autumnalis	3	Shrub with creamy-yellow flowers, 75 cm - 100 cm high.	Yellow-brown sand over laterite.	In open woodland with mixed heath understory. With Banksia attenuata, B. menziesii, Eucalyptus marginata, Hakea conchifolia, Allocasuarina humilis.	abundant.	400 m E along Welshpool road from Lewis road, N side of Welshpool road	4/04/1990
Isopogon autumnalis	3	Erect shrub to 100 cm with creamy-yellow flowers and woolly grey fruiting cones.	In white-yellow sand over laterite on flat land.	Woodland with Banksia attenuata, B. menziesii, Casuarina fraseriana, Eucalyptus marginata.		Forrestfield, between Dawson Avenue and rubbish tip, both side of cyclone fence	4/04/1990
Isopogon autumnalis	3	Erect shrub to 1 m with creamy yellow flowers.	White yellow sand over laterite.	Very open woodland with dominant heath understory with Casuarina fraserina, Allocasuarina humilis, Lambertia multiflora, Hakea conchifolia.	40 plants.	Reserve No 37260 vested W.A. Fir Brigades, Forrestfield, c. 2/3 along S boundary (Roe Hwy) on inner side of internal firebreak	11/04/1990
Isopogon autumnalis	3	Shrub to c 1 m, leaves terete, pungent. Flowers terminal.	Grey sand over laterite. Flat to gradual slope.	Banksia attenuata, B. menziesii, low woodland A over heath with Hakea conchifolia, Conospermum undulatum.		BEtween Dundas road and Roe highway both north and south of Bedford Crescent, Forrestfield	19/10/1990
Isopogon autumnalis	3		Flat, sand.	Banksia menziesii, Eucalyptus marginata and Allocasuarina fraseriana Low forest A over Low Heath C.	50 + plants.	Fleming Reserve, bounded by Upton road, Smith Crescent and Newburn road High Wycombe	7/10/1990
Isopogon autumnalis	3		Sandplain.	Low open Banksia attenuata, Banksia menziesii woodland over Eremaea pauciflora var. pauciflora, Allocasuarina humilis, Callitris acuminata low-mid shrubland over Mesomelaena pseudostygia, Desmocladus asper and Banksia dallanneyi subsp. dallanneyi var. me	1 individual.	Ca. 75 m N of Kelvin Road corner White Road, Orange Grove, Perth	18/09/2020
Isopogon autumnalis	3	Erect shrub 70-100 cm high with creamy yellow flowers.	Yellow sand over laterite on gentle slopes.	Very open woodland over species rich heath. With Banksia attenuata, B. menziesii, Allocasuarina humilis, Hakea conchifolia, B. incana.	frequent.	Bushland along E side of White Street from junction with Kelvin road, Orange Grove	4/04/1990
Isopogon autumnalis	3		Flat, grey sand over yellow sand.	Banksia menziesii, B. attenuata Low Woodland A over Open Low Scrub B and Low Heath C. Lambertia multiflora and Conospermum undulatum.	700 + plants.	Sultana road, High Wycombe, uncleared block on S side, opposite Ravenswood road and Brand road	13/10/1990
Isopogon autumnalis	3	Upright single stem shrub, early fruit.	Dune Ridge, flat ground, brown sand over yellow sand, well drained.	Associated species: Banksia menziesii.		Bushland in private property at the end of Sultana Road in System 6 Update quadrat sultaa	10/11/1995
Isopogon autumnalis	3		Flat. Brown/grey sand.	Open - scattered Jarrah/Cas. fraseriana/Nuytsia floribunda/Banksia attenuata, B. grandis & B. menziessii, Dryandra nivea, Adenanthos cygnorum, Mesomelaena tetragona.	86 plants seen.	Kalamunda Shire Reserve - Forrestfield, bordering Dawson Avenue	13/03/1991
Isopogon autumnalis	3		Flat. Dry grey sand.	(Muir's) Scattered Jarrah, Marri with Banksia sp. Associated species: Adenanthos cygnorum, Dryandra sessilis, D. lindleyana, Isopogon sp., Allocasuarina humilis, sedges, Jacksonia sp., Xanthorrhoea priessii.		Roe Highway, Hazelmere and Maida Vale. The plants grow in 4 scattered populations along the eastern verge of Roe Highway from 100 m to 1.7 km S of the Great Eastern Highway Bypass	9/04/2001
Isopogon autumnalis	3		Small gently sloping dune with yellow over grey sand.	Woodland over shrubland with Eucalyptus marginata, Allocasuarina fraseriana, Banksia attenuata, B. menziesii and Conospermum undulatum.	more than 10 mature plants over 200 m x 50 m in area.	Road reserve heading NW from NW end of gravel road, Adelaide Street, Maida Vale	27/01/2005
Isopogon autumnalis	3	Multistemmed shrub to 0.4 m high; flowers pale yellow.	Bassendean sandplain with influence from Darling Scarp.	Marri - Banksia woodland.	frequent.	Welshpool Road East 0.5 km E of Lewis Road, Forrestfield	27/04/2013
Isopogon autumnalis	3	Small shrub to 1 m high with pointy leaves.	In yellow sand rise on Ridge Hill Shelf.	Occurs in Plot with Banksia menziesii, Allocasuarina fraseriana, A. humilis, Hakea ruscifolia, Pityrodia bartlingii, Stirlingia latifolia, Hibbertia hypericoides and Daviesia nudiflora.	occasional.	In Stirling Crescent Plot 1. Located in road reserve ca 300 m S of Great Eastern Highway Bypass and Roe Highway, Hazelmere, and ca 10 m W of fence on private land	8/06/2006
Isopogon autumnalis	3	Shrub 0.5 m high.	Sandy flat.	Jacksonia sternbergia, Hakea ruscifolia and Banksia armata.	5+ plants.	Cambridge Reserve, Cambridge Road	3/04/2019
Isotropis cuneifolia subsp. glabra	3	Perennial herb. Flowers orange-brown with red keel and yellow centre.	Low sandy rise. Grey sand, dry.	Marri woodlands. Associated species: Corymbia calophylla, Gastrolobium capitatum, Philotheca spicata, Acacia lasiocarpa var. lasiocarpa, Hibbertia hypericoides, Viminaria juncea, Xanthorrhoea sp.	rare.	Brixton Street Wetlands, Kenwick	24/09/2008
Jacksonia gracillima	3	Shrub to 50 cm with grey-green pungent branchlets and orange flowers. In early flower.	Winter-wet flat, grey-brown sandy loam.	Mid isolated clumps of shrubs of Hakea varia over low open shrubland of Pericalymma ellipticum var. floridum, Verticordia densiflora var. densiflora and Melaleuca seriata over low sparse forbland of Conostylis aculeata subsp. aculeata over tall sparse ru	a few plants seen.	Perth Airport, ca. 70 m ENE of Terminal 1, ca. 1.5 km NNW of the intersection between Grogan Road and Abernethy Road	15/10/2018
Jacksonia sericea	4	3 ft rambling plant, flowers reddish.				Bushmead	6/12/1962
Jacksonia sericea	4	Low spreading shrub, 0.6 m high.	Disturbed area. Limestone pad for a radar facility.	Mid woodland of Eucalyptus marginata subsp. marginata over low woodland of Allocasuarina fraseriana, Banksia menziesii and Banksia attenuata over mid open to sparse shrubland of mixed species dominated by Jacksonia floribunda and Calytrix fraseri over lo	uncommon.	Within the Perth Airport Estate, ca. 390 m SE of the intersection between Kalamunda Road and Adelaide Street	3/10/2019
Jacksonia sericea	4	Low spreading shrub, 0.6 m high.	Disturbed area. Limestone pad for a radar facility.	Mid woodland of Eucalyptus marginata subsp. marginata over low woodland of Allocasuarina fraseriana, Banksia menziesii and Banksia attenuata over mid open to sparse shrubland of mixed species dominated by Jacksonia floribunda and Calytrix fraseri over lo	uncommon.	Within the Perth Airport Estate, ca. 390 m SE of the intersection between Kalamunda Road and Adelaide Street	3/10/2019
Johnsonia pubescens subsp. cygnorum	2	Tufted herb, 0.3 m high, in flower.	Gently inclined mid slope, white sand.	Mid woodland of Eucalyptus marginata subsp. marginata over low woodland of Allocasuarina fraseriana, Banksia menziesii and Banksia attenuata over mid open to sparse shrubland of mixed species dominated by Jacksonia floribunda and Calytrix fraseri over lo		Perth Airport Estate, N edge ca. 350 m S of intersection between Kalamunda Road and Great Eastern Highway	24/10/2018
Johnsonia pubescens subsp. cygnorum	2	Tufted perennial herb to 0.2 m with green flowers and white/green bracts.	Very gently inclined flat, grey sand.	Low open woodland of Eucalyptus patens over tall sparse shrubland Adenanthos cygnorum subsp. cygnorum over mid sparse shrubland Xanthorrhoea preissii over low open shrubland of Eremaea pauciflora var. pauciflora over mid sparse sedgeland of Cyathochaeta	1 plant seen.	Located along Tonkin Highway on W side of highway in Bush Forever site 320, ca. 900 m N of the Welshpool Road E and Tonkin Highway intersection and 1.8 km SW of Forrestfield	20/09/2019
Lasiopetalum bracteatum	4					Kalamunda	6/11/1960
Lasiopetalum bracteatum	4					Lesmurdie Falls	/10/1995
Lasiopetalum bracteatum	4	Small shrub to 1 m tall x .6 m wide.	Lateritic on steep sides of valley.	Lithic complex.		Reserve 12.4 SOK. N of intersection of Hummerston Road and Aldersyde Road	14/12/1992
Lasiopetalum bracteatum	4					Darlington	/10/1914
Lasiopetalum bracteatum	4					Darling Range, near Darlington	6/11/1900
Lasiopetalum bracteatum	4					Darling Range, near Darlington.	17/11/1902
Lasiopetalum bracteatum	4					Darling Range, near Darlington	17/11/1902
Lasiopetalum bracteatum	4	Small shrub to .6 m tall by .5 m wide.	Mid slope on lateritic gravel grading to the palid zone. Also some granite outcrops.	Jarrah-Marri woodland over Hakea trifurcata.		Reserve 6.30 SOK. Ledger Road Reserve. 400 m NE of dam on an access track area of lithic complex	14/01/1993
Lasiopetalum bracteatum	4	Small shrub, 70 cm tall x 50 cm wide.	Gully.			Reserve 14.19 (SOK). Gully crossing Hartfield Road between Waterfall and Lew Roads, Wattle Grove	27/10/1992
Lasiopetalum bracteatum	4					Darlington, Swan District.	/10/1901
Lasiopetalum bracteatum	4		Stream side.			Darlington, Darling Range, E of Perth.	/11/1901
Lasiopetalum bracteatum	4	Shrub, sepals and floral bracts reddish-purple.				Kalamunda (Lesmurdie Falls).	/11/1919

Lasiopetalum bracteatum	4	Small shrub, 1 m tall x 70 cm wide.	Adjacent to a gully.			Reserve 14.14 SOK. On Lewis Road between Hartfield and Welshpool Road	17/11/1992
Lasiopetalum bracteatum	4					Helena River.	/10/1924
Lasiopetalum bracteatum	4		Clay swamp.			Kalamunda	//
Lasiopetalum bracteatum	4					Lesmurdie Falls,	/10/1994
Lasiopetalum bracteatum	4					Lesmurdie Falls,	/10/1994
Lasiopetalum bracteatum	4					Helena Valley	28/10/1986
Lasiopetalum bracteatum	4	Erect multistemmed shrub, 60-100 x 40-100 cm, calyx pink with anthers dark red.	Brown clayey sand over granite outcrops. Gully at base of hill.	In Corymbia calophylla, Eucalyptus marginata woodland with Xanthorrhoea, Grevillea, Macrozamia sp.		In Aldersyde Road, 100 m S of Humerston Road	5/12/2004
Lasiopetalum bracteatum	4	Erect multistemmed shrub, 60 - 100 cm high x 40 - 100 cm wide, calyx pink with anthers dark red. In full flower.	In gully at base of hill. Brown clayey sand over granite outcrops.	In Eucalyptus calophylla, E. marginata woodland, with Xanthorrhoea, Grevillea, Macrozamia sp.		In Aldersyde Road, 100 m S of Humerston Road	5/12/2004
Lasiopetalum bracteatum	4	Shrub to 1.2 m tall. Purple flowers.	Creekline. Brown loam over granite.	Dense heath to 1 m. With Calothamnus sp., Darwinia citriodora, Grevillea sp., Hakea sp., Weeds.		Ca 50 m WSW of bend on Pittersen Road, ca 150 m W from Lobelia Road. N facing slope on the S side of a creekline	4/09/2008
Lasiopetalum bracteatum	4					Lesmurdie Falls	/10/1994
Lasiopetalum bracteatum	4		Light orange gritty clay-loam, with surface gravel and granite and quartz cobbels, on a steep lower slope.	Eucalyptus calophylla Open Woodland, over E. laelaei Open Low Woodland, over Hakea undulata Heath, over Darwinea citriodora Low Heath, over Hibbertia hypericoides, H. communtata Dense Low Heath.		On E side of Piesse Brook, Kalamunda, c. 500 m along Bridle Path from Schipp Rd. (Plot-PIES01)	26/11/1996
Lasiopetalum bracteatum	4		Granite outcrops. Brown loamy sand.	Marri woodland.		Helena Valley	9/10/2005
Lasiopetalum bracteatum	4	Single stemmed shrub 1 m high, 1.5 m wide, flowers pink with a single pink, petaloid, epicalyx bract.	Mid slope in dark brown clayey sand over granite.	Marri - Jarrah woodland with Thomasia foliosa, Xanthorrhoea, Calothamnus and Melaleuca.	frequent in the area.	100 m along the walk trail to the top of Lesmurdie Falls from Falls Road, Lesmurdie	11/10/2016
Lasiopetalum bracteatum	4	Erect, open shrub 80 cm high x 60 cm wide. Flowers pink, dark purple at base.	Hillside. Littered, brown loam over granite.	Very open wandoo woodland with Eucalyptus wandoo, Hakea lissocarpha, Calothamnus quadrifidus.	occasional.	Whistlepipe Gully at the end of Lewis Road, Forrestfield	3/10/1997
Lasiopetalum bracteatum	4	Erect shrub, 1.5 m high x 1 m wide. Deep pink flower with maroon centre.	Streamside. Wet, dense vegetation on surface of brown clay, granite.	Woodland with Marri, Wandoo, Hakea trifurcata and Leucopogon.		Bibbulmun Track, Kalamunda National Park,	6/11/2000
Lasiopetalum bracteatum	4	Shrub to 1.2 m tall. Purple flowers.	Creekline. Brown loam over granite.	Dense heath to 1 m. With Banksia (Dryandra) sp., Calothamnus sp., Corymbia calophylla, Darwinia citriodora, Grevillea sp., Hakea cristata, Hovea pungens, Petrophile sp., weeds.	at least 35 plants.	Ca 50 m WSW of bend on Pittersen Road, ca 150 m W from Lobelia Road, N facing slope on the S side of a creekline	26/02/2009
Lasiopetalum bracteatum	4		Variable aspect. Slope/drainage line. Moist/dry brown loam/clay. Granite boulder.	(Muir's) Scattered marri. Associated species: Synaphea acutiloba, Hakea cristata, H. undulata, H. erinacea, Acacia pulchella, Dryandra lindleyana, Darwinia citriodora, Xanthorrhoea preissii, Watsonia bulbillifera.		Pittersen Road, Darlington, 100 m W of Lobelia Drive then 100 m SW to the small waterfall on the creek,	1/10/1999
Lasiopetalum bracteatum	4	Erect shrub to 1.5 m high. Pink flowers.	Slope, outcrop. Sheet boulder - granite.	Jarrah and Marri fringing granitic heath with Calytrix, Petrophile, Hakea, Hovea, Hemigenia, Xanthorrhoea preissii, Stylidium.	ca 30 plants.	UMR 22897/210, Oakleigh Road, Darlington. From the junction of Oakleigh and Allpike Roads take the walk trail/firebreak S to top of hill then W to granite outcrops	6/11/2006
Lasiopetalum bracteatum	4	Erect spreading shrub 1 m high.	Slope to river, yellow brown sandy loam.	Open Low Woodland of Eucalyptus calophylla, Thomasia glutinosa, Petrophile biloba.		Lesmurdie Falls National Park, track below upper carpark, near picnic site	14/09/1992
Lasiopetalum bracteatum	4	Juvenile plant, single stem to 50 cm high, flowers pink with a single pink, petaloid, epicalyx bract.	Mid slope in dark brown clayey sand over granite.	Marri - Jarrah woodland with Thomasia foliosa, Xanthorrhoea, Calothamnus and Melaleuca.	frequent in the area.	100 m along the walk trail to the top of Lesmurdie Falls from Falls Road, Lesmurdie	11/10/2016
Lasiopetalum glutinosum subsp. glutinosum	3		Yellow gritty clay, with surface gravel and cobbels, on a steep north-eastern upper slope.	Xanthorrhoea acanthostachya, Daviesia horrida Open Low Scrub, over Verticordia acerosa, Calothamnus sanguineus, Dryandra lindleyana var. lindleyana Dense Low Heath, over Borya sphaerocarpha Open Herbs.		Gooseberry Hill National Park, c. 200m E of first (highest) U-turn on Zig Zag Drive, about 90 m SE of granite outcrop. (Plot-ZIGZ01)	19/09/1996
Lasiopetalum glutinosum subsp. glutinosum	3		Dark brown gritty loam, with surface gravel and cobbels, on a moderate south-western upper slope.	Eucalyptus calophylla Low Woodland, over Hemigenia incana, Hakea undulata Dense Heath, over Xanthorrhoea preissii, Nemcia spathulata, Dryandra lindleyana Low Heath, over Tetraria octandra, Lepidosperma angustatum Tall Sedges.		Lesmurdie National Park, Falls Rd, Lesmurdie, N of car park and walking trail. (Plot-LESM03)	9/12/1996
Lasiopetalum glutinosum subsp. glutinosum	3					Welshpool	25/10/1918
Lasiopetalum glutinosum subsp. glutinosum	3					Darlington	/10/1901
Lasiopetalum glutinosum subsp. glutinosum	3					Welshpool	/10/1924
Lasiopetalum glutinosum subsp. glutinosum	3					Darlington, Darling Range	6/11/1900
Lasiopetalum glutinosum subsp. glutinosum	3	Flower purple.				Welshpool	25/10/1918
Lasiopetalum glutinosum subsp. glutinosum	3	Shrub ca 1 m. Inflorescences very sticky.	On laterite ridge.			Top of Darling Scarp near Crystal Brook	3/10/1966
Lasiopetalum glutinosum subsp. glutinosum	3					Gooseberry Hill, Darling Ranges	21/10/1897
Lasiopetalum glutinosum subsp. glutinosum	3	Stellate hairs above and below on leaf. Flowers purple-scarlet.				Melaleuca Road, Lesmurdie	29/09/1969
Lasiopetalum glutinosum subsp. glutinosum	3		Gravel over granite.			Darlington	8/09/1931
Lasiopetalum glutinosum subsp. glutinosum	3					Gooseberry Hill, Darling Ranges	21/10/1897
Lasiopetalum glutinosum subsp. glutinosum	3					Gooseberry Hill, Darling Ranges	21/10/1897
Lasiopetalum glutinosum subsp. glutinosum	3					Gooseberry Hill, Darling Ranges	21/10/1897
Lasiopetalum glutinosum subsp. glutinosum	3					Welshpool	25/10/1924
Lasiopetalum glutinosum subsp. glutinosum	3					Darlington	12/11/1982
Lasiopetalum glutinosum subsp. glutinosum	3					Darlington, Darling Range	6/11/1900
Lasiopetalum glutinosum subsp. glutinosum	3					Midland Junction, Helena River	20/08/1898
Lasiopetalum glutinosum subsp. glutinosum	3					Gooseberry Hill, Darling Ranges	21/10/1897
Lasiopetalum glutinosum subsp. glutinosum	3	Flowers pink. Height to 2 ft.	Granitic.	Heath.		Helena Valley	18/09/1977
Lasiopetalum glutinosum subsp. glutinosum	3	Slender shrub to 50 cm tall; flowers bright pink, becoming darker, sticky; no lignotuber.	In granitic loam.	Shrubland.		Crystal Brook hill, Darling Scarp	24/12/2005
Lasiopetalum glutinosum subsp. glutinosum	3	Openly-branched shrub to 1 m x 1 m. Inflorescence axes strongly viscid. Calyx bright pink; anthers dark reddish-purple.	Sandplain with some influence of Darling Scarp outwash.	Banksia menziesii - B. attenuata - jarrah woodland.	infrequent.	Forrestfield - bushland between Schofield Rd and Welshpool Road	11/10/2008
Lasiopetalum glutinosum subsp. glutinosum	3	4 ft, bushy growth; flowers very sticky.	By creek.			Darlington, Darling Range	//1959
Lasiopetalum glutinosum subsp. glutinosum	3		Gravel over granite.			Darlington.	8/09/1931
Lasiopetalum glutinosum subsp. glutinosum	3	Flowers purple-mauve, very glutinous, shrub to 2 ft, erect little branched.	On high ground, over hill to S of the brook.			Crystal Brook	2/09/1971
Lasiopetalum glutinosum subsp. glutinosum	3		Yellow gritty clay, with surface gravel and cobbels, on a steep north-eastern upper slope.	Xanthorrhoea acanthostachya, Daviesia horrida Open Low Scrub, over Verticordia acerosa, Calothamnus sanguineus, Dryandra lindleyana var. lindleyana Dense Low Heath, over Borya sphaerocarpha Open Herbs.		Gooseberry Hill National Park, c. 200m E of first (highest) U-turn on Zig Zag Drive, about 90 m SE of granite outcrop. (Plot-ZIGZ01)	29/11/1996
Lasiopetalum glutinosum subsp. glutinosum	3	Erect shrub 30-50 cm. Flowers pink-purple; anthers black.	Summit of scarp. Sandy clay over granite.	Low heath.	very common.	Crystal Brook area, 25 km E of Perth	6/11/1984
Lepidosperma rostratum	T	Perennial grass-like sedge c. 45 cm high. Flowering.	Claypan. Seasonally inundated. Brown clay.	Sedge dominated claypans. Dense shrubland of Hypocalymma angustifolium and Melaleuca sp.. Isolated stands of Actinostrobus pyramidalis. Hypolaena sp., Tribonanthes sp., Burchardia sp..	164 live plants.	CR50529 (Lot 800 on plan 53643). Access is off Boundary Road via a gate which is 1.4 km NE of Bickley Road. From the gate travel 80 m along the SW firebreak to the DRF markers to locate the population	22/06/2009
Lepidosperma rostratum	T	Perennial grass-like sedge, c. 30 cm high.	Claypan. Moist brown sandy clay.	Sparse to closed shrubland over sedgeland. Hypocalymma angustifolium, Calothamnus quadrifidus, Mesomelaena sp., Hypolaena sp., Actinostrobus pyramidalis, Banksia telmatiaea, Tribonanthes australis.	1991 live plants.	CR50529 (Lot 800 on Plan 53643). On the S (E) side of Boundary Road, 1 - 1.2 km NE of Bickley Road. Access is off Boundary Road via a gate which is 1.1 km N of Bickley Road	22/06/2009
Lepidosperma rostratum	T	Tufted perennial sedge, 60 cm high x 40 cm wide.	Wetland. Grey light clay. Last burnt 2007.	Sedgeland - open sedgeland of Chaetanthus aristatus with Herbland of Philydrella pygmaea and Tribonanthes australis, Drosera erythrorhiza. Associated species: Acacia lasiocarpa, A. saligna, Austrostipa compressa, Banksia telmatiaea, Calandrinia sp. Piawa	scattered - locally common throughout the wetlands in the area.	UWA, Yule Brook Wetlands. In the centre of the fenced property. Ca 35 m SW of the intersection between the two main tracks	13/09/2012
Lepidosperma rostratum	T	Perennial caespitose sedge .35 m high x 0.15 m wide. Finished flowering, spikelets grey, few fruits present. Some plants drying and yellowing.	Seasonal clay based open depression. Dry and hard packed. Grey clay.	Chaetanthus aristatus sedgeland. Associated species: Schoenus asperocarpus, Juncus bufonis, Lolium sp. Plants are close to the boundary of the sedgeland with adjacent Melaleuca rhaphiophylla dominated Low Open Forest over Closed Sedgeland of Lepidosperma	5 clumps.	Lot 222 Brentwood Road, Kenwick, centre of porperty; 1.5 km E of Bickley Road	16/02/2012
Lepidosperma rostratum	T	Perennial caespitose sedge 0.3-0.4 m high x 0.1-0.25 m wide. Finished flowering. Spikelets grey-brown, some fruit still present. Some plants drying and yellowing.	Seasonal clay based open depression. Moist, grey-brown fine sand to loam over clay.	Tall shrubland of Melaleuca acutifolia, M. brevifolia and Callitris pyramidalus over Shrubland of Hypocalymma angustifolia, Acacia lasiocarpa, Verticordia densiflora var. densiflora over Very Open Sedgeland of Chaetanthus aristatus and Lepidosperma squam	16 clumps.	Lot 138 Brentwood Road, Kenwick. NE side of property closed to Boundary Road, 1.5 km E of Bickley Road	13/09/2012
Lepidosperma rostratum	T	Perennial herb to 30 cm. Flowers brown. Flowering with some immature fruit.	Wet flats. Brown-grey sandy clay, wet.	Viminaria juncea tall shrubland. Associated species: Viminaria juncea, Gahnia trifida, Acacia lasiocarpa var. lasiocarpa, Chorizandra enodis.		Great Brixton Street Wetlands, Kenwick, near Wanaping Road and Brixton Street	24/09/2008
Lepidosperma rostratum	T	Tufted perennial sedge to 0.4 m tall.	Flat seasonal wetland. Brown/grey sandy clay.	Open Restionaceae shrubland surrounded by Viminaria. Associated species: Meeboldina cana, Scaevola sp., Verticordia densiflora.	>50.	Brixton St Wetlands, ca 125 m N of central track intersection & clearing, Kenwick	13/01/2012
Lepidosperma rostratum	T	Perennial grass-like sedge, c. 45 cm high.	Claypan, seasonally inundated. White / grey sandy clay. Low intensity fire in January 2007.	Low shrublands and herblands. Calytrix breviseta subsp. breviseta, Hypocalymma angustifolia, Acacia pulchella, Verticordia sp., Burchardia sp., Drosera sp..	392 live plants.	CR50529 (Lot 800 on Plan 53643). Between 0.9 - 1.1 km N of Bickley Road on Boundary Road, Kenwick. The population is rectangular (c. 200 x 50 m) and runs parallel with the road	22/06/2009
Lepidosperma rostratum	T	Clumped perennial sedge, c. 50 cm high, varied up to 10 cm wide. Flowers brown.	Wetland. Brown light clay.	Sparse sedgeland of Meeboldina cana with Astartea affinis and Verticordia ?pennigera. Scaevola lanceolata, Pimelea imbricata major, Hyalosperma cotula, Haemodorum simplex.	locally common, over 150 plants.	Brixton Street Nature Reserve at the S end of the wetland in the N corner of the reserve	25/11/2011
Lepidosperma rostratum	T	Erect sedge, height ca 30 cm, flowers/fruit?.	Palus plain (seasonally partially inundated) with white sandy clay soils (Guildford association).	Low shrub/heath community.	locally common.	Boundary Road, Kenwick, W side of road,	//1998
Lepidosperma rostratum	T	Tufted perennial herb 20 cm high x 20 cm wide. In flower.	Winter wet flat. Grey sandy clay over clay.	Banksia telmatiaea open shrubland over Gahnia trifida, Hypocalymma angustifolium over Leptocarpus sedgeland.	30-40 plants.	Botany Reserve, between Brook and Boundary Road, Orange Grove,	2/06/2000
Lepidosperma rostratum	T	Tufted perennial sedge to 60 cm high x 40 cm wide.	Flat, seasonally inundated site with grey sandy loam.	Open shrubland of Melaleuca acutifolia over low shrubland of Hypocalymma angustifolium, Callitris pyramidalis, Melaleuca viminea, M. brevifolia and M. acutifolia over low open shrubland of Grevillea thelemanniana subsp. thelemanniana, Acacia lasiocarpa a	1 plant only.	Lot 804 Boundary Road, Kenwick. Ca 50 m directly E of the western corner of the lot	17/01/2015
Lepidosperma rostratum	T	Sedge 31 cm high x 6 cm wide.	Palus plain. White sandy clay (Guildford association).	Heath/Shrubland.		Boundary Road, Kenwick, W side of road	/09/1996
Lepidosperma rostratum	T	Erect tufted perennial herb.	Palusplain; grey clay to sandy clay.	Mixed Sedgeland.	locally abundant, 50+ plants.	Lot 139 Brentwood Road, Kenwick (part Bush Forever Site 387, site 6 and 7)	22/06/1995
Lepidosperma rostratum	T	Clumped perennial sedge to c. 45 cm high. Size of clumps varied. Flowers brown.	Claypan. Inundated brown sandy clay.	Sedge dominated claypan bordered by an open shrubland of Hypocalymma angustifolium and Melaleuca viminea. Associated with Verticordia sp., Meeboldina sp., Chorizandra enodis.	125 plants recorded.	Rehoboth Christian School - Lot 107 Kenwick Road, Kenwick	15/07/2009
Lepidosperma rostratum	T	Clumped perennial sedge to c. 50 cm high. Flowers yellow/brown.	Claypan. Inundated brown clay.	Dense shrubland over sedges. Actinostrobus pyramidalis, Melaleuca spp., Hypocalymma angustifolium, Hypolaena sp., Tribonanthes sp., Burchardia sp.	164 plants counted, but likely to be underestimation.	Lot 800 on Plan 53643 - on eastern side of Boundary Road, 1.4 km from junction with Bickley Road (previously Lot 139 Brentwood Road), Kenwick	22/06/2009
Lepidosperma rostratum	T	Clumped perennial sedge to c. 50 cm high. Flowers yellow/brown.	Claypan. Inundated brown clay.	Dense shrubland over sedges. Actinostrobus pyramidalis, Melaleuca spp., Hypocalymma angustifolium, Hypolaena sp., Tribonanthes sp., Burchardia sp.	164 plants counted, but likely to be underestimation.	Lot 800 on Plan 53643 - on eastern side of Boundary Road, 1.4 km from junction with Bickley Road (previously Lot 139 Brentwood Road), Kenwick	22/06/2009
Lepidosperma rostratum	T	Clumped perennial sedge to c. 50 cm high. Flowers brown.	Claypan. Seasonally inundayed white/grey sandy clay. Burnt January 2007.	Low shrublands over herblands. Hypocalymma angustifolium, Calytrix breviseta subsp. breviseta, Acacia pulchella, Verticordia sp., Burchardia sp., Drosera sp.	392 plants recorded but likely to be an underestimation.	Lot 800 on Plan 53643, western side of Boundary Road. Populations between 0.9 and 1.1 km N of the junction of Bickley and Boundary Roads, Kenwick	22/06/2009
Lepidosperma rostratum	T	Clumped perennial sedge to c. 45 cm high. Flowers brown.	Claypan. Seasonally inundated brown sandy clay.	Sparse to closed shrubland over sedgeland. Actinostrobus pyramidalis, Banksia telmatiaea, Hypocalymma angustifolium, Calothamnus quadrifidus, Hypolaena sp., Tribonanthes australis.	1991 plants recorded, possibly an underestimation.	Lot 800 on Plan 53643, eastern side of Boundary Road. Populations between 1.0 and 1.2 km N of the junction of Bickley and Boundary Roads, Kenwick (previously lots 134 and 602 Brentwood Road)	22/06/2009
Lepidosperma rostratum	T	Perennial herb to 40 m high x 40 cm wide. Finished flowering.	Wet flats. Seasonally inundated. Brown sandy clay.	Viminaria juncea tall shrubland. Associated species: Verticordia densiflora, Scaevola lanceolata, Pimelea imbricata var. major, Podolepis gracilis, Goodenia pulchella subsp. Swan Coastal Plain B (L.W. Sage 2336), Hyalosperma cotula, Tribonanthes australi	locally common.	Brixton Street Wetlands, Kenwick	12/01/2012
Lepidosperma rostratum	T	Sedge, 0.4 m high.	Plain. Winter wet. Grey soil.	Sparse dwarf scrub D & C (Muirs).	over 50 plants.	Yule Brook Reserve, W side of Boundary Road, 850 m N of Bickley Road or 200 m N of NE corner of fenced University Reserve	12/11/2002

Lepidosperma rostratum	T	Tufted rhizomatous clumped herb to 30 cm diameter. Flowers brown, in early fruit	Winter wet flat. Grey sand clay over lateritic clay.	Banksia telmatiaea, Calothamnus hirsutus open heath.	locally common to scattered.	Yule Brook Nature Reserve, Boundary road, Kenwick	24/06/1995
Lepidosperma rostratum	T	Tufted perennial sedge to 0.5 m. Flowers brown/yellow.	Seasonally inundated brown sandy-clay claypan.	Vegetation in good condition.	150+ scattered clumps.	Lot 48, Bickley Road, Kenwick	13/12/2016
Lepidosperma rostratum	T		Seasonal clay based open depression. Moist, grey-brown fine sand to loam over clay.	Tall shrubland of Melaleuca acutifolia, M. brevifolia and Callitris pyramidalus, over shrubland of Hypocalymma angustifolia, Acacia lasiocarpa, Verticordia densiflora var. densiflora, over very open sedgeland of Chaetanthus aristatus and Lepidosperma squ		Lot 138 Brentwood Road, Kenwick, NE side of property closed to Boundary Road, 1.5 km E of Bickley Road	13/09/2012
Lepidosperma rostratum	T		Seasonal clay based open depression. Moist, grey-brown fine sand to loam over clay.	Tall shrubland of Melaleuca acutifolia, M. brevifolia and Callitris pyramidalus, over shrubland of Hypocalymma angustifolia, Acacia lasiocarpa, Verticordia densiflora var. densiflora, over very open sedgeland of Chaetanthus aristatus and Lepidosperma squ		Lot 138 Brentwood Road, Kenwick, NE side of property closed to Boundary Road, 1.5 km E of Bickley Road	13/09/2012
Lepidosperma rostratum	T		Seasonal clay based open depression. Moist, grey-brown fine sand to loam over clay.	Tall shrubland of Melaleuca acutifolia, M. brevifolia and Callitris pyramidalus, over shrubland of Hypocalymma angustifolia, Acacia lasiocarpa, Verticordia densiflora var. densiflora, over very open sedgeland of Chaetanthus aristatus and Lepidosperma squ		Lot 138 Brentwood Road, Kenwick, NE side of property closed to Boundary Road, 1.5 km E of Bickley Road	13/09/2012
Lepyrodia curvescens	2	Perennial herb to 30 cm.	Low sandy rise. Grey sandy clay, wet.	Marri woodlands. Associated species: Corymbia calophylla, Xanthorrhoea sp., Viminaria juncea, Acacia lasiocarpa var. lasiocarpa, Kunzea micrantha, Synaphea acutiloba, Banksia dallanneyi (was Dryandra lindleyana), Mesomelaena tetragona.	occasional.	Brixton Street Wetlands, Kenwick	23/07/2008
Lepyrodia curvescens	2	Sedge to 0.2 m tall. Stems to 1 mm diameter, flowering heads to 5 cm long.	On boundary of Southern River and Ridge Hill Shelf soil and landform units.	On edge of wetland with associated vegetation: Jacksonia floribunda, Eucalyptus todtiana, Caustis diocia, Xanthorrhoea ? drummondii, Hibbertia hypericoides, Acacia sessilis, Dryandra lindleyana.	occasional.	Stirling Crescent Plot 2. Located ca 300 m S of Great Eastern Highway Bypass and ca 200 m W of Roe Highway, Hazelmere, in road reserve	8/06/2006
Lepyrodia curvescens	2	Tufted restiad. Male & female.	Flat coastal plain. Dry littered surface on grey sand.	Very open Marri woodland over sparse shrubs and dense sedges. Characteristic species: Corymbia calophylla, Kingia australis and Mesomelaena tetragona.		Remnant bushland S of Great Eastern Highway bypass and between Stirling Cr. and Roe Highway, Hazelmere	25/11/2003
Levenhookia preissii	1		On margin of swamp.			Guildford (Perth)	/01/1954
Levenhookia preissii	1		White sand.			Back of Guildford aerodrome	5/01/1951
Levenhookia preissii	1	Erect annual herb; flowers pink.	Palusplain.	Was Dense Heath B but burnt 1993/94 summer, ground carpeted with Levenhookia.		Perth Airport land to N of Tonkin Highway. SE of S sand pit (site F), (System 6 Area M52, Bush Forever Site 386)	20/10/1994
Macarthuria keigheryi	T	Weak herb with yellow flowers.	Sandy soil.	Beneath tall Banksia, Eucalyptus and Nuytsia with Acacia pulchella, Eriostemon spicatus.		Kewdale	7/09/1976
Macarthuria keigheryi	T	Perennial herb or shrub.	Flat, grey sand.	Disturbed, Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Hibbertia subvaginata, Dasypogon bromeliifolius, Melaleuca seriata, Lyginia barbata, Patersonia occidentalis.		Perth Airport	21/08/2002
Macarthuria keigheryi	T	Shrub.	Low plain. Dry grey sand.	Open marri woodland. Corymbia calophylla, Eucalyptus marginata, Banksia menziesii, Banksia attenuata, Acacia pulchella, Gompholobium tomentosum, Burchardia sp., Watsonia sp., Ursinia anthemoides, Hypochaeris sp., Romula rosea, Trifolium sp..	1 plant.	Queens Park Regional Open Space - 343 Wharf Street, Queens Park. C. 20 m E along limestone walk track off major access track from Wharf Street. Plant located on N side of track on the edge	22/09/2009
Macarthuria keigheryi	T	Low multistemmed shrub 15 cm high x 20 cm wide. In flower, mostly bud.	Plain, dry grey sand.	Very open woodland. Eucalyptus marginata, Allocasuarina, Banksia grandis.		Kenwick,	/03/1996
Macarthuria keigheryi	T	Small shrub/twiner to 20 cm. Suckering?	Growing in occasional sandy open patches only. Sandy rise in low lying area. Bassendean sand.	Confined to small area of Banksia woodland over diverse dense low shrubland. Banksia woodland/Low heath with Banksia menziesii, B. attenuata, Allocasuarina fraseriana (mixed shrubs) Xanthorrhoea preissii, Stirlingia latifolia, Hibbertia hypericoides, All	nine plants.	SW corner Perth Airport bushland, Newburn	5/11/1998
Macarthuria keigheryi	T		Slope. Sand dune. Dry grey sand.	Adenanthos cygnorum shrubland. Associated species: Adenanthos cygnorum, Calytrix fraseri, Hibbertia hypericoides, Conostephium pendulum, Jacksonia floribunda.	2 mature plants.	South western area of Perth International Airport	1/11/2001
Macarthuria keigheryi	T	Prostrate, perennial,straggly shrub, 20 cm high x 15 m wide. Flowers white.	Plain. Grey sand.	Very Open Woodland. With Allocasuarina, Eucalyptus marginata, Patersonia, Hibbertia, Thysanotus, Banksia menziesii.		SW corner of Bushland at intersection of McDonnell and Welshpool Road (southern end of bush)	16/09/2002
Macarthuria keigheryi	T		On old dune system.	Low open woodland. Xanthorrhoea preissii, Eremaea pauciflora, Banksia menziesii, Jacksonia floribunda, Synaphea polymorpha, Alexgeorgia nitens.		Perth Airport	26/11/2002
Macarthuria keigheryi	T	Low shrub 20 cm high x 15 cm wide.	Grey sand over white sand.	Scattered Jarrah over Allocasuarina fraseriana, Banksia menziesii, B. attenuata and Nuytsia floribunda Open Low Woodland A over scattered Kingia australis over Stirlingia latifolia and Hibbertia hypericoides Dwarf Scrub C over Stipa compressa Open Low Gr		Dundas Road, Forrestfield, S at the entrance to the Fire Training establishment. (System 6 Area M53)	28/02/1996
Macarthuria keigheryi	T	Low shrub 20 cm high x 15 cm wide.	Grey sand over white sand.	Scattered Jarrah over Allocasuarina fraseriana, Banksia menziesii, B. attenuata and Nuytsia floribunda Open Low Woodland A over scattered Kingia australis over Stirlingia latifolia and Hibbertia hypericoides Dwarf Scrub C over Stipa compressa Open Low Gr		Dundas Road, Forrestfield, S at the entrance to the Fire Training establishment. (System 6 Area M53)	28/02/1996
Macarthuria keigheryi	T	Low shrub 20 cm high x 15 cm wide.	Grey sand over white sand.	Scattered Jarrah over Allocasuarina fraseriana, Banksia menziesii, B. attenuata and Nuytsia floribunda Open Low Woodland A over scattered Kingia australis over Stirlingia latifolia and Hibbertia hypericoides Dwarf Scrub C over Stipa compressa Open Low Gr		Dundas Road, Forrestfield, S at the entrance to the Fire Training establishment. (System 6 Area M53)	28/02/1996
Meionectes tenuifolia	3					Midland Junction	19/12/1930
Melaleuca viminalis	2	Slender erect shrub 3 m high x 1 m wide.	Drain. Grey sand over ? clay.	Scattered Callistemon over Typha orientalis tall sedgeland.	common along drain.	Queens Park Ecological Reserve, Queens Park, Welshpool Road, 15 km E of Perth	18/03/2000
Melaleuca viminalis	2	Slender erect shrub, with weeping branches. 0.75 m high x 2 m wide. Flowers red; largely not in flower.	Drain. Brown sandy clay over clay.		plants scattered along 100 m of drain.	Intersection Roe and Tonkin Highway; NE side, Kenwick	15/10/2005
Morelotia australiensis	T					Cannington	17/12/1898
Myriophyllum echinatum	3	Tiny annual, rooting at the nodes; flowers pinkish.	Winter-wet clay-based depression.		frequent.	Yule Brook Reserve, Kenwick, off Boundary Road	20/10/2010
Myriophyllum echinatum	3	Small herb, 0.05 m high, in flower.	Level closed depression, grey-black sandy clay.	Tall sparse shrubland of Melaleuca rhaphiophylla over mid shrubland of Melaleuca lateritia over low forbland and tussock grassland of mixed species dominated by Lachnagrostis filiformis, Lotus subbiflorus, Liparophyllum capitatum, Vulpia myuros forma meg		Perth Airport Estate, NE corner, ca. 950 m NNW from intersection between Kalamunda Road and Abernethy Road	16/10/2018
Myriophyllum echinatum	3	Annual herb to 2 cm. Flowers green, yellow and brown.	Winter inundated claypan. Brown-grey clay.	Melaleuca shrubland. Associated species: Meeboldina cana, Astartea affinis, Pimelea imbricata var. major, Stylidium roseoalatum, Melaleuca viminea, Hakea trifurcata.	abundant.	Brixton Street Wetlands, Kenwick	3/11/2009
Myriophyllum echinatum	3					Guildford.	/11/1902
Ornduffia submersa	4	Aquatic herb with leaves and flowers floating on the surface. Flowers white with hairy fringe at throat.	Seasonally wet claypan.	Melaleuca lateritica heath B. Hydrocotyle lemnoides and Aponogeton hexatepalus association.	frequent.	N end of block bounded by Brixton Street, Wanaping Road and Park road, Kenwick	12/09/1990
Ornduffia submersa	4	Aquatic herb rooted in clay. Leaves and flowers floating. Flowers white.	In winter wet claypan.	With Aponogeton nexatepalus, Hydrocotyle lemnoides, Tribonanthes sp. and Burchardia sp.		Brixton street, Kenwick - between Alton street and railway	12/09/1990
Ornduffia submersa	4	Aquatic, flowers and leaves floating on pond surface. Flowers white, floating.	Shallow ephemeral claypans. Brown clay.	With scattered Melaleuca laterita shrubs.	rare in area.	Brixton St., Beckenham, 15 km E of Perth	17/11/1989
Ornduffia submersa	4	Partially submerged aquatic, yellow flowers, young fruits.	Ephemeral wetland, dark silty sediments.	Ornduffia peltata, Ottelia ovalifolia, Myriophyllum crispatum, Glossostigma diandrum.	occasional.	Brixton Street Reserve, Kenwick, SW of Alton Street/Brixton Street intersection, c. 100 m NW of main trailhead from Alton Street	6/09/2007
Ornduffia submersa	4	Annually renewed aquatic herb 1 m wide. Leaves and flowers float on surface of the water.	Sumpland; brown/grey clay over clay.	Melaleuca rhaphiophylla low forest to low woodland over scattered Melaleuca lateritia.		Sumpland on the NE corner of bushland block. S of Munday Swamp in the grounds of Perth Airport (adjacent to site A). (Bush Forever Site 386)	24/08/1995
Phyllangium palustre	2	Flowers white.				Midland Junction.	/10/1901
Pimelea rara	4		Slope. ESE aspect. Dry, yellow clay/gravel over laterite.	Open Woodland, plenty of shade from jarrah and Banksia grandis. Associated with Eucalyptus marginata, marri, Banksia grandis, Xanthorrhoea gracilis, X. preissii, Zamia, Daviesia decurrens, D. rhombifolia, Bossiaea ornata, B. aquifolium, Patersonia sp., H		Palmateer Drive, Bickley	19/02/1998
Pimelea rara	4		Slope, brown sand, gravel.	Open Jarrah/Marri forest. Blackboys, Zamia, Grevillea's wilsonii/ bipinnatafida, Dryandra nivea, Hakea amplexicaulis.		230 m W along Forrest Road from the junction of Paterson Road and 35 m N to plants	21/01/1992
Pithocarpa corymbulosa	3	Spindly, weak-stemmed herb scrambling through understorey to c. 1 m. See also BJL & TRL 2494, 2566 and BJL et al. 3072 for flowering/fruiting and vegetative material respectively.	Red-brown gravelly loam on steep slope with some granite outcropping.	Corymbia calophylla woodland with understorey of Xanthorrhoea sp., Acacia spp., Dryandra sp., Hakea sp. and other shrubs.		c. 200 m downstream from Lesmurdie Falls, Lesmurdie Falls National Park, Forrestfield, Perth,	1/12/1996
Pithocarpa corymbulosa	3	See BJL & TRL 2994 for flowering material and BJL & TRL 3072 for vegetative material.	Red-brown gravelly loam on steep slope with some granite outcropping.	Eucalyptus calophylla woodland with understorey of Xanthorrhoea sp., Acacia spp., Dryandra sp., Hakea sp. and other shrubs.		Ca 200 m downstream from Lesmurdie Falls, Lesmurdie National Park, Forrestfield, Perth	14/04/1996
Pithocarpa corymbulosa	3	Spindly, weak-stemmed herb scrambling through understorey to c. 1 m. See BJL & T.R. Lally 2494 for flowering material, BJL & T.R. Lally 2566 for fruiting material.	Red-brown gravelly-loam on steep slope with some granite outcropping.	Eucalyptus calophylla woodland with understorey of Xanthorrhoea sp., Acacia spp., Dryandra sp., Hakea sp. and other shrubs.		c. 200 m downstream from Lesmurdie Falls, Lesmurdie Falls National Park, Forrestfield, Perth	30/09/1996
Pithocarpa corymbulosa	3		Pale brown, sandy-loam amongst granite outcrops.	With Xanthorrhoea sp., Hakea sp., Hovea sp., Nuytsia floribunda, Hemiandra sp. and other shrubs with very few Corymbia calophylla.	fairly common in small area.	0.8 km N of Old York Road on Throssel Road, just inside John Forrest National Park, E edge of Perth,	20/12/1997
Pithocarpa corymbulosa	3	Spindly, weak-stemmed herb to ca 1 m, scrambling through understorey. See also BJL & TRL 2444, 2566, 3111, 3836 & BJL et al. 3072 for other material.	Red-brown gravelly loam on steep slope with some granite outcropping.	Corymbia calophylla woodland with understorey of Xanthorrhoea sp., Acacia spp., Dryandra sp., Hakea sp. and other shrubs.	fairly common in patches.	Ca 200 m downstream from Lesmurdie Falls, Lesmurdie Falls National Park, Forrestfield, Perth,	20/12/1997
Pithocarpa corymbulosa	3	Spindly, weak-stemmed shrub to c. 1 m scrambling through understorey. See also BJL & TRL 2494, 2566, 3311 and BJL et al. 3072 for other material.	Red-brown gravelly loam on steep slope with some granite outcropping.	Corymbia calophylla woodland with understorey of Xanthorrhoea sp., Acacia spp., Dryandra sp., Hakea sp. and other shrubs.	fairly common in patches.	c. 200 m downstream from Lesmurdie Falls, Lesmurdie Falls National Park, Forrestfield, Perth,	12/01/1997
Pithocarpa corymbulosa	3		granite	wandoo		Helena Valley	/02/1978
Pithocarpa corymbulosa	3		granite near granite outcrops			Reserve C8120, Coulston Road, Boya	28/01/1986
Pithocarpa corymbulosa	3		Generally S. Slope/outcrop/ridge. Dry red/brown/yellow loam/clay. Granite boulder.	(Muir's) Scattered marri. Quite dense granitic shrubs. Associated species: Leucopogon gracillimus, Hakea undulata, H. incrassata, H. stenocarpa, H. trifurcata, Dryandra sessilis, D. lindleyana, Microcorys longifolia, Synaphea acutiloba.		Padbury Road, Darlington, grows on granite outcrops SSW to SE of the T junction of Padbury and Robinson Roads,	14/05/2000
Pithocarpa corymbulosa	3	Spindly, more or less weak-stemmed herb scrambling through understorey to c. 1 m. See BJL & TRL 2566 for fruiting material.	Red-brown gravelly-loam on steep slope with some granite outcropping.	Eucalyptus calophylla woodland with understorey of Xanthorrhoea sp., Acacia spp., Dryandra sp., Hakea sp. and other shrubs.		c. 200 m downstream from Lesmurdie Falls, Lesmurdie Falls National Park, Forrestfield, Perth	10/02/1996
Pithocarpa corymbulosa	3		Pale brown sandy loam amongst granite outcrops.	With Xanthorrhoea sp., Hakea sp., Hovea sp., Nuytsia floribunda, Hemigenia sp. and other shrubs with very few Corymbia calophylla.		0.8 km N of Old York Road on Throssel Road, just inside John Forrest National Park, E edge of Perth,	12/01/1997
Pithocarpa corymbulosa	3	Subshrub to c. 80 cm. Stems erect. Most plants in fruit, some flowers still present on plants in shelter of granite outcrops.	Pale brown sandy loam amongst granite outcrops.	With Xanthorrhoea sp., Hakea sp., Hovea sp., Nuytsia floribunda, Hemigenia sp. and other shrubs with very few Eucalyptus calophylla.	fairly common in small area.	0.8 km N of Old York Road on Throssel Road, just inside John Forrest National Park, E edge of Perth	14/04/1996
Pithocarpa corymbulosa	3	Subshrub to c. 80 cm. Stems erect. Most plants in fruit, some flowers still present on plants in shelter of granite outcrops.	Pale brown sandy loam amongst granite outcrops.	With Xanthorrhoea sp., Hakea sp., Hovea sp., Nuytsia floribunda, Hemigenia sp. and other shrubs with very few Eucalyptus calophylla.	fairly common in small area.	0.8 km N of Old York Road on Throssel Road, just inside John Forrest National Park, E edge of Perth	14/04/1996
Platysace ramosissima	3		Low sandy rise adjacent to damplands. Dry grey sand over limestone. No fire recorded.	Banksia attenuata and B. menziesii woodland over diverse low shrubland. With Xanthorrhoea preissii, Hibbertia hypericoides, Stirlingia latifolia, Amphipogon turbinatus, Dasypogon bromeliifolius, Desmocladus flexuosus, Mesomelaena pseudostygia. Very good		Perth Airport Bushland - at S eastern corner adjacent to Abernethy Road	19/11/2002
Platysace ramosissima	3		Wet Flat. Grey loamy sand over ?clay loam. Poor drainage, wet during winter and spring.	Low Heath C. Associated species: Stirlingia latifolia, Daviesia physodes, Allocasuarina humilis.		Dundas Road Bushland (System 6 Area M53, Bush Forever Site 319). System 6 Update quadrat m 5302, Forrestfield	4/11/1994
Platysace ramosissima	3	Perennial herb. Height 15 cm.	Dry, grey-white sand. + 10 years since last fire.	Phelbocarpa ciliata, Hypocalymma angustifolium, Calytrix fraseri, Bossiaea eriocarpa, Lyginia barbarta, Dampera linearis, Jacksonia furcellata, Xanthorrhoea gracillis, Adenanthos cygnorum subsp. cygnorum and Dasypogon bromeliifolius.	one only.	Perth Airport	13/12/2006
Poranthera moorokatta	2	Small herb, 0.02 m high, in flower.	Very gently inclined mid slope, white sand.	Mid woodland of Eucalyptus marginata subsp. marginata over low woodland of Allocasuarina fraseriana, Banksia menziesii and Banksia attenuata over mid open to sparse shrubland of mixed species dominated by Jacksonia floribunda and Calytrix fraseri over lo		Perth Airport Estate, ca. 330 m SE of roundabout between Dunreath Avenue and Boud Avenue	31/10/2018
Ptilotus pyramidatus	T	Perennial herb forming annual shoots <8 cm in height from slender subterranean rhizomes. Flowers white and pink.	In the grey, sandy mud of a flood plain (a flat area that is shallowly inundated in winter).	In the shelter of Melaleuca acutifolia.		Great Brixton St Wetland (Bush Forever Site 387) between Brixton Street and Bickley Road (Site B-4, V & C. Semeniuk Research Group Survey of flora and vegetation of BFS 387)	16/10/2010
Ptilotus pyramidatus	T	Erect, rhizomatous, perennial herb 6 cm x 3.5 cm wide. Flowers pink.	Grey-white sandy clay.	Scrub. Growing under Melaleuca lateriflora subsp. acutifolia.		Bickley Road, Kenwick	23/10/2010
Schoenus benthamii	3					Cannington	21/10/1911
Schoenus benthamii	3		White sand.			Kenwick, Nature Reserve owned by Botany Department Western Australia University	4/11/1982
Schoenus benthamii	3					Cannington (Perth)	/10/1902

Schoenus benthamii	3	Upright tufted sedge to 28 cm with brown/green flowers.	Inundated closed depression, grey-brown sandy clay.	Tall closed shrubland of Melaleuca viminea subsp. viminea over low sparse sedgeland of Isolepis cernua var. setiformis.	uncommon.	Perth Airport, ca. 2.4 km SSE of Terminal 1, ca. 730 m SW of the intersection between Hudswell Road and Abernethy Road	17/10/2018
Schoenus capillifolius	3	Annual herb.	Wet muddy clay, open clay pan edge.	By Melaleuca lateritia.	common in area.	Brixton Road, Kenwick	21/10/1981
Schoenus capillifolius	3	Annual aquatic herb to 2 cm. Flowers green and white, flowers when water dries out.	Winter inundated shallow drainage line next to a path. Grey clay.	Associated species: Amphibromus nervosus, Triglochin linearis, Viminaria juncea, Romulea rosea. Good condition.	locally common.	Brixton Street Wetlands, Kenwick	30/09/2009
Schoenus capillifolius	3	Tufted annual herb, 2 cm high. Flowers green.	Winter wet clay pans under ca 5 cm water over brown mud.	Melaleuca lateritia swamp.	very common.	Brixton Road, Beckenham, Perth to Armadale	30/10/1983
Schoenus capillifolius	3	Annual aquatic herb, Leaves filiform, forming dense tufts supported by the water.	In wet claypan.	With Hydatella dioica Trithuria sp. and Triglochin sp. surrounded by low sedges, Verticordia low heath D and Melaleuca lateritica low heath C.		N end of block bounded by Brixton street, Wanaping road and Park road, Kenwick	31/10/1990
Schoenus capillifolius	3	Sedge to 15 cm, aquatic annual.	Winter wet sand over claypan.	Low heath.	common.	S end of track through centre of Brixton Street Reserve, Cannington	30/09/2009
Schoenus capillifolius	3	Sedge, aquatic, rooting in mud.	Winter wet sand over claypan.	Low heath.	common.	S end of track through centre of Brixton Street Reserve, Cannington	30/09/2009
Schoenus griffinianus	4	Herb to 0.2 m tall. Stems have red tinge near base and bracts at each branch. Non flowering specimen.	On boundary of Southern River and Ridge Hill Shelf soil and landform units.	On edge of wetland. Associated vegetation: Jacksonia floribunda, Eucalyptus todtiana, Caustis diocia, Xanthorrhoea ? drummondii, Hibbertia hypericoides, Acacia sessilis, Dryandra lindleyana.	occasional.	Stirling Crescent Plot 2. Ca 300 m S of Great Eastern Highway Bypass and 200 m W of Roe Highway, Hazelmere, in road reserve	8/06/2006
Schoenus loliaceus	2	Annual emergent aquatic herb to 10 cm. Flower green.	Winter inundated shallow drainage line next to a path. Grey clay.	Associated species: Amphibromus nervosus, Triglochin linearis, Viminaria juncea, Romulea rosea. Good condition.	uncommon.	Brixton Street Wetlands, Kenwick	30/09/2009
Schoenus natans	4	Fine aquatic sedge, in full flower.	Flooded claypan.	Emergent Casuarina obesa over Chorizandra enodis, Meeboldina sp., Samolus sp.	Very common.	Carousel Swamp, Cannington, c. 300 m S of railway station	4/10/2004
Schoenus natans	4	Floating aquatic herb.	Edge of drying claypan.	Amphibromus over Chorizandra enodis, Crassula natans, Trithuria submersa.	Rare, only single individual seen.	Brixton Stret Wetlands	7/10/2004
Schoenus natans	4	Emergent floating perennial herb (sedge). Flowers red-brown, stigmas white-cream.	Winter inundated claypan. Brown clay.	Melaleuca lateritia shrubland/Amphibromus grassland. Associated species: Astartea affinis, Amphibromus nervosus, Leptocarpus cannus, Cycnogeton lineare, Aponogeton hexatepalus, Wurmbea dioica subsp. alba, Liparophyllum capitatum. Excellent condition. Flo	locally common.	Brixton Street Wetlands, Kenwick	5/09/2018
Schoenus pennisetis	3	Flowers brown.				System 6 area M53 (Bush Forever Site 319), Forrestfield	4/11/1994
Schoenus pennisetis	3		Above swamp.	Verticordia densiflora scrubland. Associated species: Verticordia densiflora, Hypocalymma angustifolium, Viminaria juncea, Isolepis cyperoides, Podolepis gracilis.	1 mature plant.	Bush Forever Site 422, Brixton Street, Kenwick	15/12/2001
Schoenus pennisetis	3	Upright annual herb, no nuts found but perianth segments present.	Sumpland, black-brown clay.	Melaleuca rhaphiophylla Low Forest B.	scattered.	Lot 106 Brixton Street, Kenwick (part Bush Forever Site 387)	24/08/1995
Schoenus pennisetis	3	Tufted sedge 5-10 cm high with dark brown spikelets.	Low lying sandy swamp, slightly saline.	With Drosera, Byblis, Schoenus, Acacia, Petrophils, Verticordia, etc.		`Cannington Swamp', Brook road, Wattle Grove	9/09/1976
Schoenus pennisetis	3	Small erect annual sedge to 12 cm with brown flowers.	Winter-wet flat, grey-brown sandy loam.	Mid isolated clumps of shrubs of Hakea varia over low open shrubland of Pericalymma ellipticum var. floridum, Verticordia densiflora var. densiflora and Melaleuca seriata over low sparse forbland of Conostylis aculeata subsp. aculeata over tall sparse ru	uncommon.	Perth Airport, ca. 70 m ENE of Terminal 1, ca. 1.5 km NNW of the intersection between Grogan Road and Abernethy Road	15/10/2018
Schoenus pennisetis	3	Green to more or less reddish annual, more or less erect tufts 7 - 12 cm high; spikelets black or pruplish-black.	Swampy heath on sand.	Heath.		Cannington, near Perth	22/08/1947
Schoenus pennisetis	3	Tiny annual.	Clayey soils, at edge of flooded area. Acid sand.			Brixton Street Wetland, Greater Perth	7/09/2007
Schoenus sp. Beaufort (G.J. Keighery 6291)	1	Annual semi-aquatic herb to 8 cm. Flowers red-brown and green.	Winter inundated shallow drainage line next to a path. Grey clay.	Associated species: Amphibromus nervosus, Triglochin linearis, Viminaria juncea, Romulea rosea. Good condition.	locally common.	Brixton Street Wetlands, Kenwick	30/09/2009
Schoenus sp. Waroona (G.J. Keighery 12235)	3	Tufted annual 5 cm high, flowers green.	Winter wet clay pan, sandy clay over clay.	Herbfield.	uncommon.	Brixton Street, Beckenham, 15 km E of Perth	21/10/1989
Senecio gilbertii	1	Spindly perennial, greyish. Leaf undersides woolly.	Massive laterite. Long unburnt area.	Under Jarrah and Bull Banksia, with Zamia, Balga and Kennedias.		The Knoll, Gooseberry Hill	26/12/1994
Senecio gilbertii	1		On laterite plateau.			The Knoll, Gooseberry Hill	5/10/1957
Senecio leucoglossus	4	2 ft spreading, flowers white.	Granite valley.			Northern slopes, Helena Valley	/09/1978
Senecio leucoglossus	4		gravelly soil			Swan View	10/10/1901
Senecio leucoglossus	4		Gravelly soil.			Swan View,	/10/1901
Senecio leucoglossus	4	3-4 ft erect herbaceous. Ray florets 3 or 4, white.	Granitic soil.			Lesmurdie Falls	/09/1929
Senecio leucoglossus	4		S aspect ridge, brown loam with granite boulders.	Low open scrub to 0.3 m among Burchardia sp., Sowerbaea laxiflora, Conospermum huegelii, Calytrix glutinosa, Darwinia citriodora.		Lesmurdie Falls National Park on ridge near track on N side of Falls	14/09/1992
Sporobolus blakei	3	Tufted perennial.	Granite rubble. Clayey.	Weeds.		Helena Valley Picnic Ground	16/11/1994
Stackhousia sp. Red-blotched corolla (A. Markey 911)	3					Gooseberry Hill, Darling Range, E of Perth	/10/1897
Stylidium aceratum	3	Annual herb. Flowers pink.	Brown loam over ironstone.	Burnt Viminoria juncea shrubland.	abundant in area.	Brixton Street, Beckenham, 15 km EN of Perth	4/11/1989
Stylidium aceratum	3	Small annual herb. Flowers pink or white.	Seasonally wet poorly drained flat. Grey clayey sand over ironstone.	Melaleuca lateritia, Pimelea imbricata, Astartea affinis over Lepyrodia glauca and Leptocarpus canus over herbs.		Plot Brix 04. Brixton Street Wetlands, Kenwick	30/10/2013
Stylidium longitubum	4	Corollas rose, violet bands at bases of corolla lobes, throat yellow to white.		With Villarsia, Centrolepis aristata, Stylidium calcaratum, S. utricularioides.	only one individual.	On Bickley Road near Brentwood Road, Cannington	17/11/1967
Stylidium longitubum	4	Flowers red.				Midland Junction (Perth)	/10/1901
Stylidium longitubum	4		Moist soil.			Perth Airport, ca 10 km E of Perth city centre	8/11/2012
Stylidium striatum	4		On laterite plateau.			The Knoll, Gooseberry Hill	5/10/1957
Stylidium striatum	4	Flowers pale yellow.	Ironstone.	Eucalyptus calophylla forest, with Hakea, Grevillea, Stylidium junceum, S. hispidum, Stackhousia, Thysanotus.		Corner of Lesmurdie Road and Sampson Road, Lesmurdie, Darling Range	23/10/1967
Stylidium striatum	4					Gooseberry Hill, Darling Range	21/10/1897
Stylidium striatum	4					Gooseberry Hill	21/10/1897
Styphelia filifolia	3	Erect, spreading shrub, multistemmed from ground level. To ca 45 cm high x ca 90 cm wide. White flowers, early flowering stage.	Flat. Dry, brown-grey sand.	Verticordia plumosa, Leptospermum sp., Hakea varia, Conostylis sp., Hypocalymma angustifolia, Banksia sphaerocarpa.	ca 11 plants SW of highway and ca 45 more on the NE side.	Hartfield Park, Res. 17098/3894, Tonkin Higihway, Wattle Grove	23/02/2006
Thelymitra magnifica	1	Plants were at ca peak of flowering.	Area formerly scraped for gravel.	Tall heath under sparse woodland.		Beside Crystal Brook Road ca 900 m from Welshpool Road	15/10/2000
Thelymitra magnifica	1		stony ridge			Near Kalamunda	/10/1931
Thelymitra magnifica	1					Maida Vale	/10/1932
Thelymitra magnifica	1		Slope. Dry-moist brown clay-loam-gravel. Granite and boulder. Burnt ? 1998-99.	(Muir's) Scattered Marri and Wandoo. Hakea trifurcata, H. incrassata, Melaleuca sp., Thelymitra benthamiana, Stylidium bulbiferum, Calothamnus sp., Nemcia acuta, Astroloma foliosum.	51 mature plants ca 10 seedlings over 4A: 400 m NS x 200 m E. 4B: 500 m NE x var..	Darling Range Regional Park, Honey Road, Forrestfield. ca 200 m E of Waterfall Road at the junction of Honey Road and Palm Terrace Walk Trail, scattered to 150 m N, 250 m SSE on Honey Road and 200 m E of Honey Road	19/10/2003
Thelymitra magnifica	1		Slope. Dry, clay over granite-boulder.	(Muir's) Wandoo open woodland. Xanthorrhoea preissii, Hakea trifurcata.	11 mature plants over 50 m x 50 m.	Crystal Brook Road, Kalamunda. S side of Crystal Brook Road, ca 100 m E of the Kelvin Road junction, in vicinity of soil-rock excavation site on road verge	19/10/2003
Thelymitra magnifica	1		Slope, hilltop. Dry, brown loam. Granite - boulder.	(Muir's)Scattered Marri. Hakea incrassata, H. crystata, Tricoryne elatior, Allocasuarina humilis, Xanthorrhoea preissii, grasses and weeds.	21 plants, 7 seedlings over 20 m EW x 15 m NS.	Lesmurdie National Park, Falls Road, Forrestfield. Along the EW walk trail high on the landscape 160 m N of the waterfall, S-SW side of a small granite outcrop	31/10/2003
Thelymitra magnifica	1	Erect, single stemmed annual with brown-yellow flowers, to 17 cm high. Full/late flowering stage.	NW slope. Dry, grey granitic clay. Area burnt summer 1997.	Small scattered marri with Hakea incrassata, Xanthorrhoea preissii, Allocasuarina humilis, sedge sp., Pimelea imbricata, Nemcia acuta.	4 flowering plants, scattered.	Darling Range Regional Park, Kalamunda Shire: found on hill crests and slopes between Whistlepipe Gully and Lesmurdie Falls National Park,	2/11/1999
Thelymitra magnifica	1		Slope - flat. Dry, brown sand-loam-clay.	(Muir's) Wandoo and Marri open woodland. Xanthorrhoea preissii, Patersonia occidentalis, Hakea lissocarpha, Calothamnus sp., Acacia pulchella, Hypocalymma angustifolium.	13 mature plants 18 seedlings over 100 m x 100 m.	Darling Range Regional Park, Gooseberry Hill block, Gooseberry Hill, take Watsonia Road for ca 200 m N of Gooseberry Hill Road then the walk trail E for 150 m, S side of the walk trail	28/10/2003
Thelymitra magnifica	1	Sturdy, erect orchid, 0.25 m high, scented flowers reddish-brown with gold markings and green reverse, anther bright orange.	Gentle slope at foot of Darling Scarp in reserve which was once a gravel pit, on lateritic gravel. Burnt March 2004.	Regrowth open Jarrah-Marri woodland with Hakea trifurcata, Xanthorrhoea preissii, Calothamnus sanguineus, Hibbertia hypericoides and fringing Dryandra sessilis thicket. Shrubs in early regrowth, Drosera spp., Stylidium spp., sedges, orchids, Haemodorum s	occasional.	Norwood Reserve (Kalamunda Reserve 22502), off Norwood Road, Maida Vale. 3.8 km WNW of Kalamunda	23/10/2004
Thelymitra magnifica	1					Maida Vale	//
Thelymitra magnifica	1		Slope - flat. Dry, yellow-brown sand-loam-clay. Laterite-boudler-granite. Burnt in 1997v and Pop.4B 2002/3 summer.	(Muir's) Scattered Marri. Acacia pulchella, Stylidium brunonium, Leucopogon pulchellus, Verticordia acerosa, Xanthorrhoea preissii, Nemcia acuta.	21 mature plants 5 seedlings over 3A: 100 m EW x 200 m NS.	Darling Range Regional Park, Kalamunda Block. Palm Terrace Walk Trail, 450 m W of the gate at Ashurst Road. Mostly W-SW and S of trail, Forrestfield	22/10/2003
Thysanotus anceps	3	Small straggling herb to .4 m tall by .1 m wide.	Lateritic gravel.	Open Jarrah and Marri woodland.		Reserve 6.28 SOK, adjacent to and south of Chaucer Way, Kalamunda	23/12/1992
Thysanotus anceps	3	Small herb to .3 m tall by .1 m wide.	Mid-slope on lateritic gravel grading to the palid zone. Also some granite outcrops.	Jarrah - Marri woodland over Hakea trifurcata.		Reserve 6.30 SOK. Ledger Road Reserve, 400 m NE of dam on an access track area of lithic complex	14/01/1993
Thysanotus brachiatus	2					Midland Junction, Swan River	18/12/1899
Thysanotus cymosus	3		Laterite.	Eucalypt woodland over dense tall shrubs.	common.	Welshpool Road East, 100 m E of Pomeroy Road	11/11/2007
Thysanotus sp. Badgingarra (E.A. Griffin 2511)	2	16 inches high, young rhizome. Flowers purple.	Granite.			Helena Valley	/12/1977
Thysanotus sp. Badgingarra (E.A. Griffin 2511)	2		Dark brown clayey loam, with surface lateritic gravel, on a moderate southern lower slope.	Eucalyptus wandoo Open Low Woodland, over Calothamnus quadrifidus Low Scrub, over Xanthorrhoea preissii, Dryandra lindleyana var. linleyana Low Heath, over Chamaescilla corymbosa, Stylidium bulbiferum Very Open Herbs.		Firebreak off Crystal Brook Rd, Roleystone; S of track. (Plot-CSBK04)	10/12/1996
Thysanotus sp. Badgingarra (E.A. Griffin 2511)	2		Yellow clay.			Greenmount	/01/1941
Trithuria occidentalis	T					Midland Junction	/09/1901
Trithuria occidentalis	T					Midland Junction	16/11/1898
Trithuria occidentalis	T					Midland Junction	/09/1901
Trithuria occidentalis	T					Midland Junction	16/11/1898
Trithuria occidentalis	T	Plant red, growing in tiny tufts.	Muddy spots.			Midland Junction	/09/1901
Trithuria occidentalis	T		Muddy spots.			Midland Junction	/09/1901
Verticordia lindleyi subsp. lindleyi	4					Lower Canning River, Cannington	26/12/1901
Verticordia lindleyi subsp. lindleyi	4	Low open erect shrub, 60 cm. Flowers mauve.				Hardy Road, Kewdale	26/05/1978
Verticordia lindleyi subsp. lindleyi	4	Dwarf shrub to 40 cm, with pink-purple flowers.	On winter wet flat in grey sand.	With Melaleuca (paperbark), Hypocalymma angustifolia, Pericalymma elipticum.		Junction Roe and Tonkin Highway, both side of Roe Highway	4/04/1990
Verticordia lindleyi subsp. lindleyi	4	Erect shrub, leaves opposite, elliptic to obovate; clustered at the ends of the branchlets.	Damp depression, clayey sand.	Dense heath B of Pericalymma ellipticum.		E side of Wanaping road - Brixton street junction, near school and private property	20/09/1990
Verticordia lindleyi subsp. lindleyi	4	Upright dwarf shrub to 75 cm, pink-purple flowers.	Yellow sandy loam in swampy flat.	With Pericalymma elipticum, Melaleuca sp., Verticordia densiflora, sedges.		Between Hardy road and Tonkin Highway, E from junction with Dundas road, continues to Tonkin and Roe Highway intersection	13/03/1990
Verticordia lindleyi subsp. lindleyi	4	Upright dwarf shrub, pink-purple flowers.	White sand.	With Actinostrobis pyramidalis, Beaufortia squarrosa, Pericalymma elipticum.		c. 1 km along Tonkin Highway N from Welshpool road on both side of Highway	21/03/1990
Verticordia lindleyi subsp. lindleyi	4	Shrub 45-60 cm x 30-45 cm, bare at base, flowers mauve-pink, striate.	Whitish sand in winter-wet area.			Kewdale	4/12/1982
Verticordia lindleyi subsp. lindleyi	4	Upright dwarf shrub to 75 cm.	Grey sandy clay in swampy flat.	In shrubland and sedgeland with Actinostrobis pyramidalis, Banksia telmatiaea, Beaufortia squarrosa.		UWA Botany Dept. Reserve, Kenwick, SE Brook road, mainly W of the Banksia woodland ridge	13/03/1990
Verticordia lindleyi subsp. lindleyi	4		Slope. Dry grey sand.			Near Hartfield Country Club and Tonkin Highway, Forrestfield	17/03/1997
Verticordia lindleyi subsp. lindleyi	4	Low open erect shrub, 60 cm, flowers mauve.				Hardy Road, Kewdale	26/05/1978
Verticordia lindleyi subsp. lindleyi	4					Cannington Swamp [Wattle Grove]	2/03/1948
Verticordia lindleyi subsp. lindleyi	4					Lower Canning River, Cannington	3/01/1900
Verticordia lindleyi subsp. lindleyi	4	Erect shrub 10"-15".	Boggy flat.			Cannington	6/12/1924
Verticordia lindleyi subsp. lindleyi	4		Gravelly soil.			Guildford	/11/1901
Verticordia lindleyi subsp. lindleyi	4	Upright dwarf shrub 50-70 cm.	In winter wet flat in brown sandy clay.	With Hypocalymma angustifolia, Viminaria juncea, Actinostrobis pyramidalis, sedges.		1.4 km N along Brentwood road from junction with Bickley road, Kenwick, bush area on W side of Bentley road	31/03/1990

Verticordia lindleyi subsp. lindleyi	4	Fine shrub, 0.5 m by 0.2 m, flowers pink/mauve.	Seasonal Wetland, flat ground, sand with little clay, over ?clay, poor drainage, wet during winter/spring.	Heath B, Associated species: Pericalymma elipticum, Melaleuca sp.B, Banksia telmatiaea.		System 6 Area M52, Perth Airport Bushland (Bush Forever Site 386), E side in security fenced Airport land, in System 6 Update quadrat perth05	20/10/1994
Verticordia lindleyi subsp. lindleyi	4	Erect, spreading open branching shrub to ca 50 cm high. Pink flowers. Full flowering stage.	Swamp. Dry, brown-grey sand.	Beaufortia squarrosa, Leptospermum sp., Hakea varia, Conostylis sp., Hypocalymma angustifolia, Banksia sphaerocarpa, Kingia australis.	ca 1000 plants.	Hartfield Park, Reserve 17098-3894, Tonkin Highway, Wattle Grove, SW of highway and NE of Maamba Road	23/02/2006
Verticordia lindleyi subsp. lindleyi	4	Erect shrub. Pink flowers.	Grey sand over brown sand.	Verticordia densiflora, Melaleuca preissiana, Pericalymma ellipticum.	common, ca. 1000 plants.	Tonkin Highway, near intersection with Roe Highway, Welshpool	23/05/2006
Verticordia lindleyi subsp. lindleyi	4	Shrub.	Flat. Grey sand.	Woodland. Corymbia calophylla, Banksia attenuata, Banksia menziesii, Melaleuca preissiana, Xanthorrhoea preissii, Hypocalymma angustifolium, Adenanthos obovatus, Regelia ciliata, Jacksonia furcellata.		Perth Airport	22/08/2002
Verticordia lindleyi subsp. lindleyi	4	Erect shrub.	Low plain on flat area.	Melaleuca preissiana, Xanthorrhoea preissii, Desmocladus flexuosus, Jacksonia furcellata, Lyginia barbata, Pericalymma ellipticum, Hypocalymma angustifolium, Eucalyptus linearis, Melaleuca seriata, Dryandra lindleyana and Patersonia occidentalis.	21-50 plants.	Perth Airport region	21/02/2007
Verticordia lindleyi subsp. lindleyi	4	Erect shrub.	Low plain on flat area.	Melaleuca preissiana, Xanthorrhoea preissii, Desmocladus flexuosus, Jacksonia furcellata, Lyginia barbata, Pericalymma ellipticum, Hypocalymma angustifolium, Eucalyptus linearis, Melaleuca seriata, Dryandra lindleyana and Patersonia occidentalis.	21-50 plants.	Perth Airport region	21/02/2007
Verticordia lindleyi subsp. lindleyi	4	Shrub.		Patersonia occidentalis, Melaleuca seriata, Cytogonidium leptocarpoides, Drosera menziesii, Phlebocarya ciliata, Dampiera linearis, Gladiolus caryophyllaceus, Philotheca spicata, Hypocalymma angustifolium, Xanthorrhoea gracilis, Alexgeorgea nitens.		Perth Airport	5/09/2007
Verticordia lindleyi subsp. lindleyi	4	60 cm high x 30 cm wide. Flowers pinkish-mauve. Flower-spikes fairly sparse on ends of branches.	Yellow sandy loam in low-lying area, wet in winter.	Growing in assocation with V. densiflora.		Maida Vale	14/12/1979
Verticordia lindleyi subsp. lindleyi	4	Perennial erect shrub to 50 cm heigh and 50 cm wide. Flowers purple.	Wet flats. Seasonally inundated. Brown sandy clay.	Viminaria juncea tall shrubland. Associated species: Viminaria juncea, Mesomelaena tetragona, Verticordia huegelii, Kunzea micrantha, Hakea candolleana. Excellent condition. Floristic community: herb rich shrublands in claypans (8).	uncommon.	Brixton Street Wetlands, Kenwick	27/11/2007

Appendix: Threatened and Priority Ecological Communities Database Search Results

COM_ID	COM_NAME	STATE_CATG	COMM_CATG	BUFFER
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20b	Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP3c	Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP3b	Corymbia calophylla - Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson et al. (1994))	Vulnerable		500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP3b	Corymbia calophylla - Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson et al. (1994))	Vulnerable		500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20b	Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP3c	Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	1000
SCP3c	Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
Central Granite Shrubland	Central Northern Darling Scarp Granite Shrubland Community	Priority 4		500

Central Granite Shrubland	Central Northern Darling Scarp Granite Shrubland Community	Priority 4		500
Central Granite Shrubland	Central Northern Darling Scarp Granite Shrubland Community	Priority 4		500
Central Granite Shrubland	Central Northern Darling Scarp Granite Shrubland Community	Priority 4		500
Central Granite Shrubland	Central Northern Darling Scarp Granite Shrubland Community	Priority 4		500
Coastal Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	Priority 3	Vulnerable	500
Coastal Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	Priority 3	Vulnerable	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
SCP02	Southern wet shrublands, Swan Coastal Plain (floristic community type 2 as originally described in Gibson et al. (1994))	Endangered		500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP21c	Low lying Banksia attenuata woodlands or shrublands	Priority 3	Endangered	500
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20b	Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	Endangered	Endangered	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP08	Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson et al. (1994))	Critically Endange	Endangered	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20c as originally described in in Gibson et al. (1994))	Critically Endange	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP02	Southern wet shrublands, Swan Coastal Plain (floristic community type 2 as originally described in Gibson et al. (1994))	Endangered		500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP08	Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Vulnerable	Critically Endange	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
Central Granite Shrubland	Central Northern Darling Scarp Granite Shrubland Community	Priority 4		500
SCP21c	Low lying Banksia attenuata woodlands or shrublands	Priority 3	Endangered	500
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP20b	Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson et al. (1994))	Endangered	Endangered	500
Muchea Limestone	Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	500
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	200
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	200
SCP10a	Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Endangered	Critically Endange	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
SCP21c	Low lying Banksia attenuata woodlands or shrublands	Priority 3	Endangered	500
SCP20a	Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. (1994))	Endangered	Endangered	500
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
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Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
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Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200
Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Banksia WL SCP	Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3	Endangered	200

Tuart woodlands	Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain	Priority 3	Critically Endange	500

Appendix: DBCA Conservation Significant Fauna Database Search Results

CLASS	FAMILY	SCI_NAME	COM_NAME	WA_status	EPBCstatus
BIRD	Accipitridae	Elanus scriptus	Letter-winged kite	P4	
BIRD	Accipitridae	Elanus scriptus	Letter-winged kite	P4	
BIRD	Accipitridae	Pandion cristatus	osprey, eastern osprey	MI	MI

BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	

BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	

BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	

BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	

BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	

BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	
BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	
BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	
BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	
BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	
BIRD	Anatidae	Oxyura australis	Blue-billed duck	P4	
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Apodidae	Apus pacificus	Fork-tailed swift	MI	MI
BIRD	Ardeidae	Botaurus poiciloptilus	Australasian bittern	EN	EN

BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU

BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU

BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU

BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU
BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU
BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU
BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU
BIRD	Cacatuidae	Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU
BIRD	Cacatuidae	Calyptorhynchus banksii naso

BIRD	Cacatuidae	Calyptorhynchus banksii naso	forest red-tailed black cockatoo	VU	VU

BIRD	Cacatuidae	Calyptorhynchus banksii naso	Forest red-tailed black cockatoo	VU	VU

BIRD	Cacatuidae	Calyptorhynchus baudinii	Baudin's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus baudinii	Baudin's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus baudinii	Baudin's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus baudinii	Baudin's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus baudinii	Baudin's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	white-tailed black cockatoo	EN	

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	white-tailed black cockatoo	EN	

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	white-tailed black cockatoo	EN	

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	white-tailed black cockatoo	EN	

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	white-tailed black cockatoo	EN	

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	white-tailed black cockatoo	EN	

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN

BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Cacatuidae	Calyptorhynchus sp. 'white-tailed black cockatoo'	White-tailed black cockatoo	EN	EN
BIRD	Charadriidae	Charadrius dubius	little ringed plover	MI	MI
BIRD	Charadriidae	Charadrius leschenaultii	Greater sand plover, large sand plover	VU	MI
BIRD	Charadriidae	Charadrius leschenaultii	Greater sand plover, large sand plover	VU	MI
BIRD	Charadriidae	Pluvialis fulva	Pacific golden plover	MI	MI
BIRD	Charadriidae	Pluvialis fulva	Pacific golden plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Pluvialis squatarola	Grey plover	MI	MI
BIRD	Charadriidae	Thinornis rubricollis	hooded plover, hooded dotterel	P4	
BIRD	Dasyornithidae	Dasyornis longirostris	western bristlebird	EN	EN
BIRD	Diomedeidae	Phoebetria fusca	sooty albatross	MI	MI
BIRD	Falconidae	Falco hypoleucos	grey falcon	VU	
BIRD	Falconidae	Falco peregrinus	peregrine falcon	OS	
BIRD	Falconidae	Falco peregrinus	peregrine falcon	OS	
BIRD	Falconidae	Falco peregrinus	peregrine falcon	OS	

BIRD	Falconidae	Falco peregrinus	peregrine falcon	OS	

BIRD	Falconidae	Falco peregrinus	Peregrine falcon	OS	

BIRD	Laridae	Thalasseus bergii	Crested tern	MI	MI

BIRD	Laridae	Thalasseus bergii	Crested tern	MI	MI

BIRD	Laridae	Thalasseus bergii	Crested tern	MI	MI

BIRD	Megapodiidae	Leipoa ocellata	malleefowl	VU	VU

BIRD	Scolopacidae	Calidris ruficollis	Red-necked stint	MI	MI

BIRD	Scolopacidae	Tringa nebularia	Common greenshank, greenshank	MI	MI

INVERTEBF	Colletidae	Leioproctus douglasiellus	a short-tongued bee	EN	CR
INVERTEBF	Colletidae	Leioproctus douglasiellus	a short-tongued bee	EN	CR
INVERTEBF	Colletidae	Neopasiphae simplicior	a short-tongued bee	EN	CR
INVERTEBF	Entomobryidae	Australotomurus morbidus	cemetery springtail, Guildford springtail	P3	
INVERTEBF	Entomobryidae	Australotomurus morbidus	cemetery springtail, Guildford springtail	P3	
INVERTEBF	Entomobryidae	Australotomurus morbidus	cemetery springtail, Guildford springtail	P3	
INVERTEBF	Entomobryidae	Australotomurus morbidus	cemetery springtail, Guildford springtail	P3	
INVERTEBF	Entomobryidae	Australotomurus morbidus	cemetery springtail, Guildford springtail	P3	
INVERTEBF	Hyriidae	Westralunio carteri	Carter's freshwater mussel	VU	VU

INVERTEBF	Hyriidae	Westralunio carteri	Carter's freshwater mussel	VU	VU

INVERTEBF	Idiopidae	Idiosoma sigillatum	Swan Coastal Plain shield-backed trapdoor spider	P3	

MAMMAL	Dasyuridae	Dasyurus geoffroii	chuditch, western quoll	VU	VU

MAMMAL	Dasyuridae	Phascogale tapoatafa wambenger	south-western brush-tailed phascogale, wambenger	CD	

MAMMAL	Macropodidae	Notamacropus irma	western brush wallaby	P4	
MAMMAL	Macropodidae	Notamacropus irma	western brush wallaby	P4	
MAMMAL	Macropodidae	Notamacropus irma	western brush wallaby	P4	
MAMMAL	Macropodidae	Notamacropus irma	western brush wallaby	P4	
MAMMAL	Macropodidae	Notamacropus irma	western brush wallaby	P4	
MAMMAL	Macropodidae	Notamacropus irma	Western brush wallaby	P4	
MAMMAL	Macropodidae	Notamacropus irma

MAMMAL	Muridae	Hydromys chrysogaster	Water-rat, rakali	P4	
MAMMAL	Myrmecobiidae	Myrmecobius fasciatus	numbat, walpurti	EN	EN
MAMMAL	Myrmecobiidae	Myrmecobius fasciatus	numbat, walpurti	EN	EN
MAMMAL	Myrmecobiidae	Myrmecobius fasciatus	numbat, walpurti	EN	EN
MAMMAL	Myrmecobiidae	Myrmecobius fasciatus	numbat, walpurti	EN	EN
MAMMAL	Myrmecobiidae	Myrmecobius fasciatus	numbat, walpurti	EN	EN
MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	
MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	
MAMMAL	Peramelidae	Isoodon fusciventer

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	
MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	
MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	
MAMMAL	Peramelidae	Isoodon fusciventer

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Peramelidae	Isoodon fusciventer	Quenda, southwestern brown bandicoot	P4	

MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Potoroidae	Bettongia penicillata ogilbyi	Woylie, brush-tailed bettong	CR	EN
MAMMAL	Pseudocheiridae	Pseudocheirus occidentalis	western ringtail possum, ngwayir	CR	CR
REPTILE	Cheluidae	Pseudemydura umbrina	western swamp tortoise	CR	CR
REPTILE	Cheluidae	Pseudemydura umbrina	western swamp tortoise	CR	CR
REPTILE	Cheluidae	Pseudemydura umbrina	western swamp tortoise	CR	CR
REPTILE	Cheluidae	Pseudemydura umbrina	western swamp tortoise	CR	CR
REPTILE	Cheluidae	Pseudemydura umbrina	western swamp tortoise	CR	CR
REPTILE	Cheluidae	Pseudemydura umbrina	western swamp tortoise	CR	CR
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Acanthophis antarcticus	southern death adder	P3	
REPTILE	Elapidae	Neelaps calonotos	black-striped snake, black-striped burrowing snake	P3	
REPTILE	Elapidae	Neelaps calonotos	black-striped snake, black-striped burrowing snake	P3	
REPTILE	Elapidae	Neelaps calonotos	black-striped snake, black-striped burrowing snake	P3	
REPTILE	Elapidae	Neelaps calonotos	black-striped snake, black-striped burrowing snake	P3	
REPTILE	Elapidae	Neelaps calonotos	black-striped snake, black-striped burrowing snake	P3	

REPTILE	Elapidae	Neelaps calonotos	black-striped snake, black-striped burrowing snake	P3	

Appendix:DBCA Black Cockatoo Roosting Data

SITE_CODE	WT_2010_C	WT_2011_C	WT_2012_C	WT_2013_C	WT_2014_C	WT_2015_C	WT_2016_C	WT_2017_C	WT_2018_C	WT_2019_C	WT_TOT_C	WT_MAX_C	FRT_2014_C	FRT_2015_C	FRT_2016_C	FRT_2017_C	FRT_2018_C	FRT_2019_C	FRT_TOT_C	FRT_MAX_C	N_SURVEYS
ARMKELR002	0	10	.	0	0	0	0	0	0	.	10	10	0	0	0	0	0	.	0	0	8
ARMROLR003	.	0	0	50	0	0	0	0	0	0	50	50	0	0	0	4	0	0	4	4	9
ARMROLR004	.	.	.	.	0	.	28	0	0	0	28	28	0	.	35	0	0	50	85	50	5
ARMROLR005	.	.	.	.	.	.	0	0	0	35	35	35	.	.	0	36	40	12	88	40	4
ARMROLR006	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	1
KALCANR001	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	5	5	5	1
KALCARR001	.	.	.	.	.	.	0	0	0	.	0	0	.	.	0	12	0	.	12	12	3
KALCARR002	.	.	.	.	.	.	.	90	.	8	98	90	.	.	.	0	.	24	24	24	2
KALCARR003	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	76	76	76	1
KALFORR001	0	.	.	.	0	0	.	.	.	.	0	0	0	0	.	.	.	.	0	0	3
KALFORR002	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	42	65	107	65	2
KALFORR003	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	31	10	41	31	2
KALGOOR001	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	5
KALHACR001	.	.	.	.	.	0	.	0	.	.	0	0	.	0	.	0	.	.	0	0	2
KALHACR002	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	0	.	0	0	1
KALHIGR001	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	7	78	5	90	78	3
KALHIGR002	.	.	.	.	.	.	0	0	0	.	0	0	.	.	0	0	0	.	0	0	3
KALHIGR003	.	.	.	.	.	.	0	0	0	.	0	0	.	.	0	7	0	.	7	7	3
KALHIGR004	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	2
KALKALR001	30	.	25	0	0	0	0	0	.	0	55	30	0	0	0	0	.	0	0	0	8
KALKALR002	.	25	23	85	28	10	58	107	48	0	384	107	0	0	0	0	0	0	0	0	9
KALKALR003	.	.	.	0	0	0	0	.	.	.	0	0	0	0	0	.	.	.	0	0	4
KALKALR004	.	.	.	.	.	.	65	215	0	5	285	215	.	.	0	0	0	0	0	0	4
KALLESR001	.	0	0	0	0	8	0	0	.	.	8	8	0	0	0	0	.	.	0	0	7
KALLESR002	0	.	0	.	.	0	.	0	.	.	0	0	.	0	.	0	.	.	0	0	4
KALLESR003	.	.	.	.	.	.	0	0	0	.	0	0	.	.	0	0	0	.	0	0	3
KALMAIR001	.	.	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	5
KALMAIR002	.	.	.	.	0	.	0	0	0	11	11	11	25	.	56	98	137	304	620	304	5
KALMAIR003	.	.	.	.	.	.	0	5	.	0	5	5	.	.	0	0	.	0	0	0	3
KALMAIR004	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	0	0	1
KALMAIR005	.	.	.	.	.	.	0	0	0	0	0	0	.	.	3	0	0	0	3	3	4
KALMAIR006	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	3	.	.	3	3	1
KALPICR001	.	.	.	.	.	.	.	5	0	.	5	5	.	.	.	0	0	.	0	0	2
KALPICR002	.	.	.	.	2	.	0	0	.	.	2	2	42	.	0	7	.	.	49	42	3
KALPIER001	.	82	46	0	0	0	163	.	210	133	634	210	0	0	25	.	29	6	60	29	8
KALPIER002	.	.	.	.	.	.	.	6	60	89	155	89	.	.	.	2	8	0	10	8	3
KALPIER003	.	.	.	.	.	.	97	132	163	145	537	163	.	.	0	0	0	0	0	0	4
KALWALR001	0	5	0	0	0	0	.	0	0	.	5	5	43	1	.	0	0	.	44	43	8
KALWALR002	0	0	0	0	.	0	0	0	.	.	0	0	.	0	0	0	.	.	0	0	7
KALWALR003	.	.	.	.	0	.	.	0	.	.	0	0	0	.	.	0	.	.	0	0	2
KALWALR004	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	2
KALWATR001	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	4
KALWATR002	.	.	.	.	.	.	0	0	0	0	0	0	.	.	150	31	150	23	354	150	4
KALWATR003	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	1
MUNBELR001	0	.	.	0	.	0	.	.	.	.	0	0	.	0	.	.	.	.	0	0	3
MUNDARR001	443	7	147	0	0	0	.	0	0	0	597	443	0	0	.	0	0	0	0	0	9
MUNGLER001	.	.	32	51	45	25	65	5	51	0	274	65	0	0	0	0	0	0	0	0	8
MUNGLER002	.	.	13	0	0	0	0	0	0	.	13	13	0	0	0	0	0	.	0	0	7
MUNGLER003	.	.	.	.	45	.	0	335	17	11	408	335	0	.	0	0	0	0	0	0	5
MUNGLER004	.	.	.	.	.	.	0	0	0	.	0	0	.	.	33	4	41	.	78	41	3
MUNHELR001	.	3	16	42	124	0	44	0	3	0	232	124	0	0	4	31	0	13	48	31	9
MUNHELR002	.	.	.	.	.	.	.	.	0	66	66	66	.	.	.	.	79	0	79	79	2
MUNHOVR001	.	.	40	0	.	0	0	0	0	0	40	40	.	14	52	21	78	52	217	78	7
MUNHOVR002	243	22	10	0	0	0	18	0	.	.	293	243	0	0	0	0	.	.	0	0	8
MUNHOVR003	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	0	0	1
MUNHOVR004	.	.	.	.	.	.	.	0	.	0	0	0	.	.	.	3	.	4	7	4	2
MUNHOVR005	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	27	27	27	1
MUNMUNR001	78	.	.	85	45	36	0	0	82	0	326	85	0	0	0	0	8	0	8	8	8
MUNMUNR002	.	.	.	.	.	0	0	0	0	0	0	0	.	20	16	32	7	3	78	32	5
MUNMUNR003	.	.	.	.	.	.	0	0	4	0	4	4	.	.	59	0	0	0	59	59	4
MUNPARR001	.	.	.	0	.	.	0	.	0	.	0	0	.	.	0	.	0	.	0	0	3
MUNPARR002	.	.	.	.	182	.	66	157	58	145	608	182	0	.	0	0	0	0	0	0	5
MUNPARR003	.	.	.	.	.	.	320	70	80	45	515	320	.	.	12	8	0	0	20	12	4
MUNPARR004	.	.	.	.	.	.	209	213	309	38	769	309	.	.	0	4	0	0	4	4	4
MUNPARR005	.	.	.	.	.	.	.	152	50	62	264	152	.	.	.	4	2	0	6	4	3
MUNSTOR001	.	.	.	.	141	0	7	0	0	0	148	141	0	24	0	0	0	0	24	24	6
MUNSTOR003	.	.	.	.	48	.	30	0	0	20	98	48	0	.	9	0	0	9	18	9	5
MUNSTOR004	.	.	.	.	.	.	90	0	0	0	90	90	.	.	3	0	0	0	3	3	4
MUNSTOR005	.	.	.	.	.	.	19	21	12	0	52	21	.	.	15	0	0	0	15	15	4
MUNSTOR006	.	.	.	.	.	.	.	.	42	0	42	42	.	.	.	.	0	0	0	0	2
SWASTRR001	.	.	.	0	0	.	0	.	.	.	0	0	0	.	0	.	.	.	0	0	3
ARMARMR001	.	.	.	0	0	0	.	0	.	.	0	0	0	0	.	0	.	.	0	0	4
ARMARMR004	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	0	6	4	10	6	3
ARMCHAR001	.	.	.	.	.	.	.	0	3	0	3	3	.	.	.	11	16	0	27	16	3
ARMHARR001	.	0	0	.	0	1	3	0	0	0	4	3	0	0	0	0	0	0	0	0	8
ARMHARR002	.	.	.	.	0	.	.	0	.	.	0	0	0	.	.	0	.	.	0	0	2
ARMKELR001	14	0	0	0	0	.	.	.	0	0	14	14	0	.	.	.	0	0	0	0	7
ARMKELR003	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	2
ARMKELR004	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	6	6	6	1
BAYBAYR001	0	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	6
BAYEMBR001	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	2
BAYEMBR002	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	34	.	34	34	1
BAYMAYR001	.	.	.	.	.	.	0	0	.	0	0	0	.	.	0	0	.	4	4	4	3
BAYMAYR002	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	0	0	1
BAYMORR001	0	.	.	.	0	0	0	0	0	0	0	0	0	0	36	130	300	299	765	300	7
BAYMORR002	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	8	30	2	40	30	3
BELBELR001	0	.	.	0	.	0	.	0	.	.	0	0	.	0	.	0	.	.	0	0	4
BELKEWR001	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
BELREDR001	0	.	.	.	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	5
CANCANR001	0	.	.	0	0	0	0	.	.	.	0	0	0	0	0	.	.	.	0	0	5
CANCNVR001	0	0	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	2
CANFERR001	.	.	.	5	0	0	0	0	0	.	5	5	0	0	0	0	0	.	0	0	6
CANPARR001	0	.	0	0	.	0	0	0	0	.	0	0	.	0	0	0	0	.	0	0	7
CANRIVR001	0	.	0	.	.	.	0	0	0	0	0	0	.	.	6	11	7	16	40	16	6
CANRIVR002	.	.	.	.	0	.	0	.	.	.	0	0	0	.	0	.	.	.	0	0	2
CANROSR001	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	14	2	16	14	4
CANWILR001	0	0	0	0	68	0	0	0	0	0	68	68	4	7	7	5	16	82	121	82	10
CANWILR002	0	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	6
CANWILR003	0	0	0	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	8
GOSCNVR001	0	19	.	.	0	0	0	0	.	80	99	80	2	0	0	0	.	0	2	2	7
GOSCNVR002	.	.	26	52	0	0	151	0	0	0	229	151	0	4	0	0	0	0	4	4	8
GOSCNVR003	0	.	.	.	0	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	2
GOSGOSR001	0	0	.	.	.	0	0	0	.	.	0	0	.	0	0	0	.	.	0	0	5
GOSGOSR002	0	0	0	0	0	.	0	.	.	.	0	0	0	.	0	.	.	.	0	0	6
GOSGOSR003	0	.	.	.	.	0	0	0	.	.	0	0	.	0	0	0	.	.	0	0	4
GOSGOSR004	.	.	.	.	0	.	0	0	0	0	0	0	19	.	31	32	79	0	161	79	5
GOSGOSR005	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0
GOSHUNR001	0	0	.	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	0	7
GOSKENR001	.	.	.	.	.	.	.	0	0	0	0	0	.	.	.	51	334	35	420	334	3
GOSKENR002	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	72	0	72	72	2
GOSLANR001	0	.	.	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	0	6
GOSLANR002	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	0	0	1
GOSMARR001	.	.	.	.	.	.	.	0	120	36	156	120	.	.	.	75	37	18	130	75	3
GOSSOUR001	.	.	.	.	.	.	0	.	.	0	0	0	.	.	0	.	.	0	0	0	2
GOSSOUR002	.	.	.	.	.	.	50	0	0	0	50	50	.	.	0	36	208	15	259	208	4
GOSSOUR003	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	0	0	0	1
KINKINR002	0	0	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	7
KINKINR003	.	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	8
KINPERR001	0	.	0	.	0	0	0	8	0	0	8	8	0	0	0	0	0	0	0	0	8
MELBULR001	0	0	0	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	3
PERWESR001	0	.	0	0	0	0	0	.	.	.	0	0	0	0	0	.	.	.	0	0	6
SOUBENR001	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0
SOUCOMR001	408	645	558	301	402	460	242	289	470	563	4338	645	0	0	0	0	0	1	1	1	10
SOUCOMR002	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0
SOUSALR001	12	0	0	0	5	0	0	0	2	0	19	12	2	0	0	0	8	0	10	8	10
SOUSOUR001	0	.	0	.	.	.	0	0	0	.	0	0	.	.	0	0	0	.	0	0	5
SOUSOUR002	0	35	0	0	0	0	0	0	0	0	35	35	0	0	0	0	0	0	0	0	10
STIMENR001	.	.	.	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	0	6
STIMENR002	.	.	.	.	0	.	0	0	0	0	0	0	0	.	0	5	0	0	5	5	5
STIYOKR001	.	0	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	5
STIYOKR002	0	.	0	0	0	0	0	.	0	0	0	0	0	1	0	.	83	142	226	142	8
STIYOKR003	0	0	0	.	0	0	0	0	0	0	0	0	47	28	0	239	276	391	981	391	9
SWABALR002	0	.	.	.	.	.	.	0	0	.	0	0	.	.	.	0	0	.	0	0	3
SWABALR003	0	.	0	.	.	.	0	0	0	0	0	0	.	.	0	120	151	151	422	151	6
SWACAVR001	.	.	.	.	.	.	.	.	0	0	0	0	.	.	.	.	0	0	0	0	2
SWAGUIR001	.	.	.	.	0	0	.	.	.	.	0	0	0	0	.	.	.	.	0	0	2
SWAHAZR001	.	.	.	.	.	.	.	.	.	0	0	0	.	.	.	.	.	12	12	12	1
SWAHAZR002	.	.	.	.	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	0
SWAHENR001	.	.	.	.	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	2
SWAHENR002	.	.	.	.	.	.	.	50	0	0	50	50	.	.	.	0	0	0	0	0	3
SWAHERR001	.	.	.	.	.	.	.	0	0	.	0	0	.	.	.	0	0	.	0	0	2
SWALOCR001	.	.	.	.	.	0	0	0	.	.	0	0	.	0	0	0	.	.	0	0	3

SWALOCR002	.	.	.	.	.	.	.	0	.	.	0	0	.	.	.	0	.	.	0	0	1
SWAMIDR001	0	.	.	0	.	.	.	.	.	.	0	0	.	.	.	.	.	.	0	0	2
SWAMILR001	.	.	.	.	0	.	250	0	40	0	290	250	0	.	0	0	0	0	0	0	5
SWASOUR001	0	.	0	0	0	.	0	0	.	.	0	0	0	.	0	0	.	.	0	0	6
SWAWESR001	0	0	0	0	.	.	0	0	0	.	0	0	.	.	0	0	36	.	36	36	7
SWAWHIR001	.	69	13	.	.	0	0	7	15	.	104	69	.	0	0	4	0	.	4	4	6
SWAWHIR002	.	.	.	.	.	.	.	.	0	.	0	0	.	.	.	.	0	.	0	0	1
VICBURR001	0	0	.	0	.	0	.	0	.	.	0	0	.	0	.	0	.	.	0	0	5
VICEASR001	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	9
VICEASR002	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	0	0	0	9
VICKENR001	0	.	0	0	0	0	0	0	0	2	2	2	94	121	0	116	108	140	579	140	9
VICKENR002	.	.	.	.	.	0	0	0	.	.	0	0	.	35	42	0	.	.	77	42	3
VICLATR001	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	15	32	47	32	9
VICVICR001	2	0	0	0	0	0	6	0	0	0	8	6	0	0	0	0	0	0	0	0	10
VICWATR001	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	0	0	0	0	0	4
VICWATR002	.	.	.	.	.	.	0	0	0	0	0	0	.	.	0	45	85	51	181	85	4
VINLEER001	.	.	.	0	0	0	0	0	.	.	0	0	0	0	0	0	.	.	0	0	5
VINMTLR001	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	.	0	0	0	9
VINNORR001	0	0	0	0	.	0	0	0	.	.	0	0	.	0	0	0	.	.	0	0	7
VINNORR002	.	.	.	.	.	.	.	0	0	.	0	0	.	.	.	0	0	.	0	0	2

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 30-Aug-2022

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	96
Listed Migratory Species:	49

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	9
Commonwealth Heritage Places:	None
Listed Marine Species:	74
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	33
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	38
Key Ecological Features (Marine):	2
Biologically Important Areas:	14
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Natural			
Lesueur National Park	WA	Listed place	In buffer area only

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
EEZ and Territorial Sea	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area	In buffer area only
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anous tenuirostris melanops			
Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
FISH			
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area	In feature area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area	In buffer area only
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat may occur within area	In feature area
PLANT			
Acacia aprica Blunt Wattle [64821]	Endangered	Species or species habitat may occur within area	In buffer area only
Acacia cochlocarpa subsp. cochlocarpa Spiral-fruited Wattle [23877]	Endangered	Species or species habitat may occur within area	In buffer area only
Acacia forrestiana Forest's Wattle [17235]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Acacia recurvata Recurved Wattle [64825]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Acacia wilsonii Wilson's Wattle [65228]	Endangered	Species or species habitat known to occur within area	In buffer area only
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area	In feature area
Banksia catoglypta [85021]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Banksia serratuloides subsp. perissa Northern Serrate Dryandra [82767]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Chorizema humile Prostrate Flame Pea [32573]	Endangered	Species or species habitat may occur within area	In buffer area only
Conostylis dielsii subsp. teres Irwin's Conostylis [3614]	Endangered	Species or species habitat known to occur within area	In feature area
Conostylis micrantha Small-flowered Conostylis [17635]	Endangered	Species or species habitat known to occur within area	In feature area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Daviesia bursarioides Three Springs Daviesia [56696]	Endangered	Species or species habitat known to occur within area	In buffer area only
Daviesia speciosa Beautiful Daviesia [56698]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Drummondita ericoides Morseby Range Drummondita [9193]	Endangered	Species or species habitat may occur within area	In buffer area only
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat known to occur within area	In buffer area only
Eremophila nivea Silky Eremophila [14431]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Eremophila sp. Narrow leaves (J.D.Start D12-150) [89307]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Eucalyptus crispata Yandanooka Mallee [24268]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus cuprea Mallee Box [56773]	Endangered	Species or species habitat may occur within area	In buffer area only
Eucalyptus impensa Eneabba Mallee [56711]	Endangered	Species or species habitat known to occur within area	In buffer area only
Eucalyptus johnsoniana Johnson's Mallee [14516]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eucalyptus lateritica Laterite Mallee [6271]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat known to occur within area	In feature area
Eucalyptus pruiniramis Midlands Gum, Jingymia Gum [56403]	Endangered	Species or species habitat known to occur within area	In buffer area only
Eucalyptus rhodantha Rose Mallee [9362]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eucalyptus suberea Cork Mallee, Mount Lesueur Mallee [5529]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Gastrolobium hamulosum Hook-point Poison [9212]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Glyceria drummondii Nangetty Grass [14008]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea althoferorum [64906]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea batrachioides Mt Lesueur Grevillea [21735]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea humifusa Spreading Grevillea [61182]	Endangered	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hakea megalosperma Lesueur Hakea [10505]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat likely to occur within area	In feature area
Hemiandra rutilans Sargents Snakebush, Colourful Snakebush [17932]	Endangered	Species or species habitat may occur within area	In buffer area only
Hensmania chapmanii Chapman's Hensmania [10481]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Hypocalymma angustifolium subsp. Hutt River (S.Patrick 2982) [85023]	Endangered	Species or species habitat known to occur within area	In buffer area only
Leucopogon marginatus Thick-margined Leucopogon [12527]	Endangered	Species or species habitat known to occur within area	In buffer area only
Leucopogon obtectus Hidden Beard-heath [19614]	Endangered	Species or species habitat known to occur within area	In feature area
Paracaleana dixonii Sandplain Duck Orchid [86882]	Endangered	Species or species habitat known to occur within area	In feature area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Schoenia filifolia subsp. subulifolia Mingenew Everlasting [63904]	Endangered	Species or species habitat known to occur within area	In buffer area only
Spirogardnera rubescens Spiral Bush [15667]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Styphelia longissima [89333]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Tetratheca nephelioides [83217]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area	In feature area
Verticordia albida White Featherflower [55635]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Verticordia spicata subsp. squamosa Scaly-leaved Featherflower [55822]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Wurmbea tubulosa Long-flowered Nancy [12739]	Endangered	Species or species habitat known to occur within area	In feature area
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
SHARK			
Carcharias taurus (west coast population)			
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhincodon typus			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini			
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
SPIDER			
Idiosoma nigrum			
Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus			
Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area	In buffer area only
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera borealis			
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni			
Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera physalus			
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Carcharhinus longimanus			
Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area	In buffer area only
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Orcinus orca](#)			
Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
[Pristis pristis](#)			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
[Rhincodon typus](#)			
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
[Motacilla cinerea](#)			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#)			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#)			
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
[Calidris canutus](#)			
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#)			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Calidris melanotos](#)			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Charadrius leschenaultii](#)			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Limosa lapponica](#)			
Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
[Numenius madagascariensis](#)			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pandion haliaetus](#)			
Osprey [952]		Breeding known to occur within area	In feature area
[Tringa nebularia](#)			
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [51485]	WA	In buffer area only
Commonwealth Land - [50393]	WA	In buffer area only
Commonwealth Land - [51998]	WA	In buffer area only
Commonwealth Land - [51999]	WA	In buffer area only
Commonwealth Land - [50392]	WA	In buffer area only
Commonwealth Land - [50391]	WA	In buffer area only
Commonwealth Land - [50381]	WA	In buffer area only
Commonwealth Land - [52114]	WA	In buffer area only
Commonwealth Land - [52116]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In buffer area only
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Chroicocephalus novaehollandiae as Larus novaehollandiae](#) Silver Gull [82326]		Breeding known to occur within area	In buffer area only
[Diomedea amsterdamensis](#) Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
[Hydroprogne caspia as Sterna caspia](#) Caspian Tern [808]		Breeding known to occur within area	In buffer area only
[Larus pacificus](#) Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area	In buffer area only
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In feature area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Stercorarius skua as Catharacta skua Great Skua [823]		Species or species habitat may occur within area	In buffer area only
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area	In buffer area only
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In buffer area only
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thinornis cucullatus as Thinornis rubricollis](#) Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area	In buffer area only
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area	In buffer area only
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area	In buffer area only
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In buffer area only
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
[Hippocampus subelongatus](#) West Australian Seahorse [66722]		Species or species habitat may occur within area	In buffer area only
[Lissocampus fatiloquus](#) Prophet's Pipefish [66250]		Species or species habitat may occur within area	In buffer area only
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area	In buffer area only
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Mammal			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Arctocephalus forsteri			
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In buffer area only
Neophoca cinerea			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area	In buffer area only
Reptile			
Aipysurus pooleorum			
Shark Bay Seasnake [66061]		Species or species habitat may occur within area	In buffer area only
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Disteira kingii			
Spectacled Seasnake [1123]		Species or species habitat may occur within area	In buffer area only
Natator depressus			
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Pelamis platurus			
Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area	In buffer area only

Whales and Other Cetaceans		[Resource Information]	
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata			
Minke Whale [33]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In buffer area only
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Beagle Islands	Nature Reserve	WA	In buffer area only
Beekeepers	Nature Reserve	WA	In feature area
Burma Road	Nature Reserve	WA	In buffer area only
Depot Hill	Nature Reserve	WA	In buffer area only
Dongara	Nature Reserve	WA	In buffer area only
Dookanooka	Nature Reserve	WA	In buffer area only
Kadathinni - Part lot 3 on Plan 15105	NRS Addition - Gazettal in Progress	WA	In buffer area only
Lake Logue	Nature Reserve	WA	In buffer area only
Lesueur	National Park	WA	In buffer area only
Lipfert, Milligan, Etc Islands	Nature Reserve	WA	In buffer area only
Mingenew	Nature Reserve	WA	In buffer area only
NTWA Bushland covenant (0084)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0101)	Conservation Covenant	WA	In feature area
South Eneabba	Nature Reserve	WA	In buffer area only
Stockyard Gully Reserve	5(1)(g) Reserve	WA	In buffer area only
Sweetman	Nature Reserve	WA	In buffer area only
Tathra	National Park	WA	In buffer area only
Unnamed WA00428	Nature Reserve	WA	In buffer area only
Unnamed WA02360	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Unnamed WA12705	Nature Reserve	WA	In buffer area only
Unnamed WA25495	Nature Reserve	WA	In feature area
Unnamed WA26001	Nature Reserve	WA	In buffer area only
Unnamed WA39744	Nature Reserve	WA	In buffer area only
Unnamed WA42481	Nature Reserve	WA	In buffer area only
Unnamed WA46982	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA46983	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA46984	5(1)(h) Reserve	WA	In buffer area only
Unnamed WA47436	Nature Reserve	WA	In feature area
Unnamed WA48098	Nature Reserve	WA	In buffer area only
White Gums	Nature Reserve	WA	In buffer area only
Wilson	Nature Reserve	WA	In buffer area only
Wotto	Nature Reserve	WA	In buffer area only
Yardanogo	Nature Reserve	WA	In feature area

Nationally Important Wetlands

[Resource Information]

Wetland Name	State	Buffer Status
Lake Logue/Indoon System	WA	In buffer area only

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Arrowsmith Central Silica Sand Project	2021/9067		Referral Decision	In buffer area only
Controlled action				
Arrowsmith North Silica Sand Project	2020/8788	Controlled Action	Proposed Decision	In feature area
Central West Coal Project near Enneabba, WA	2007/3869	Controlled Action	Completed	In buffer area only
construction and operation of a unmanned platform at the Cliff Head oil field, a	2003/1300	Controlled Action	Post-Approval	In buffer area only
Coolimba Coal Power Project	2007/3876	Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Expansion of mineral sand mine	2008/4192	Controlled Action	Completed	In feature area
IPL North Project - Eneabba Mineral Sands Mine, WA	2012/6408	Controlled Action	Proposed Decision	In buffer area only
Karara Magnetite Project	2006/3017	Controlled Action	Post-Approval	In buffer area only
Mount Gibson Iron Ore Pellet Project	2000/95	Controlled Action	Completed	In buffer area only
Natta 3D Seismic Acquisition Survey, 36 km east of Dongara	2021/8992	Controlled Action	Referral Decision	In feature area
Ocean Hill 3D seismic survey, Eneabba, WA	2017/7970	Controlled Action	Referral Decision	In buffer area only
open cut mine & assoc infrastructure	2005/2381	Controlled Action	Post-Approval	In buffer area only
Tiwest Dongara Project, mineral sands mining and concentrating operation, 25km	2009/5032	Controlled Action	Post-Approval	In feature area
Trieste 3D seismic survey, WA	2017/8133	Controlled Action	Post-Approval	In feature area
Undertake seismic survey to assess shale resources	2013/7088	Controlled Action	Post-Approval	In feature area
West Erregulla 3D onshore seismic survey & appraisal drilling exploration program WA	2013/7054	Controlled Action	Post-Approval	In feature area
West Erregulla Field Development Program, 40 km southeast of Dongara, WA	2021/8991	Controlled Action	Assessment Approach	In buffer area only
West Erregulla Processing Plant and Pipeline	2021/8907	Controlled Action	Assessment Approach	In feature area
Zemira 3D Seismic Survey	2020/8658	Controlled Action	Assessment Approach	In feature area
Not controlled action				
Cliff Head 6 appraisal well	2004/1702	Not Controlled Action	Completed	In buffer area only
Cliff Head Appraisal Wells	2003/938	Not Controlled Action	Completed	In buffer area only
Drilling between Kalbarri and Cliff Head	2005/2185	Not Controlled Action	Completed	In buffer area only
Exploration drilling program located in exploration permits WA-286-P and TP/15	2002/676	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Iluka Eneabba Rare Earth Refinery	2021/9096	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Indian Ocean Drive Passing Lane and Widening 52-258 SLK	2017/7884	Not Controlled Action	Completed	In buffer area only
Mumbida Wind Farm	2002/650	Not Controlled Action	Completed	In buffer area only
Northern Looping project, Karratha to Gingin	2005/2251	Not Controlled Action	Completed	In buffer area only
WA-286-P Exploration Drilling Programme	2007/3863	Not Controlled Action	Completed	In buffer area only
Waitsia Gas Project Stage 2, Yardarino WA	2020/8633	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
3D Marine Seismic Survey	2007/3800	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Marine Seismic Survey for oil and gas in Commonwealth waters off the WA coast.	2004/1802	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Marine Seismic Survey in Permit WA-481P	2012/6626	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Transmission Line Rebuild and Extension	2009/5105	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
3D Marine Seismic survey	2007/3729	Referral Decision	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Referral decision				
Transmission Line Rebuild and Extension	2009/4972	Referral Decision	Completed	In buffer area only

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region	Buffer Status
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	South-west	In buffer area only
Western rock lobster	South-west	In buffer area only

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna pacifica			
Wedge-tailed Shearwater [84292]	Foraging (in high numbers)	Known to occur	In buffer area only
Hydroprogne caspia			
Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In buffer area only
Larus pacificus			
Pacific Gull [811]	Foraging (in high numbers)	Known to occur	In buffer area only
Onychoprion anaethetus			
Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In buffer area only
Pelagodroma marina			
White-faced Storm petrel [1016]	Foraging (in high numbers)	Known to occur	In buffer area only
Puffinus assimilis tunneyi			
Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In buffer area only
Sterna dougallii			
Roseate Tern [817]	Foraging	Known to occur	In buffer area only
Sternula nereis			
Fairy Tern [82949]	Foraging (in high	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
	numbers)		
Seals			
[Neophoca cinerea](#) Australian Sea Lion [22]	Foraging (male)	Likely to occur	In buffer area only
[Neophoca cinerea](#) Australian Sea Lion [22]	Foraging (male and female)	Known to occur	In buffer area only
Sharks			
[Carcharodon carcharias](#) White Shark [64470]	Foraging	Known to occur	In buffer area only
Whales			
[Balaenoptera musculus brevicauda](#) Pygmy Blue Whale [81317]	Distribution	Known to occur	In buffer area only
[Megaptera novaeangliae](#) Humpback Whale [38]	Migration (north)	Known to occur	In buffer area only
[Megaptera novaeangliae](#) Humpback Whale [38]	Migration (north and south)	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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NatureMap Database Search Results

Taxon	WA Cons
?Arnocrinum preissii	
?Desmocladus flexuosus	
?Epilobium sp.	
?Haemodorum spicatum	
?Jacksonia furcellata	
?Kennedia prostrata	
?Kunzea glabrescens	
?Lepidosperma squamatum	
?Lepidosperma squamatum s.l.	
?Lomandra sericea	
?Microtis media	
?Rytidosperma occidentalis	
?Rytidosperma sp.	
?Symphyotrichum squamatum	
?Trachymene pilosa	
?Vulpia sp.	
Abortiporus biennis	
Abutilon grandifolium	
Acacia ?longifolia	
Acacia acuminata	
Acacia alata	
Acacia alata var. alata	
Acacia alata var. alata x applanata	
Acacia anomala	VU
Acacia aphylla	VU
Acacia applanata	
Acacia auronitens	
Acacia baileyana	
Acacia baileyana x decurrens	
Acacia barbinervis	
Acacia barbinervis subsp. barbinervis	
Acacia benthamii	P2
Acacia blakelyi	
Acacia celastrifolia	
Acacia cochlearis	
Acacia consobrina	
Acacia costata	
Acacia craspedocarpa	
Acacia cyclops	
Acacia dealbata	
Acacia debilis	
Acacia decurrens	
Acacia dentifera	
Acacia divergens	
Acacia drewiana subsp. drewiana	
Acacia drummondii	
Acacia drummondii subsp. affinis	P3

Acacia drummondii subsp. drummondii	
Acacia drummondii subsp. elegans	
Acacia elata	
Acacia ericifolia	
Acacia extensa	
Acacia horridula	P3
Acacia huegelii	
Acacia incrassata	
Acacia incurva	
Acacia iteaphylla	
Acacia jibberdingensis	
Acacia lasiocalyx	
Acacia lasiocarpa	
Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)	P1
Acacia lasiocarpa var. lasiocarpa	
Acacia lasiocarpa var. sedifolia	
Acacia lateriticola	
Acacia latipes subsp. latipes	
Acacia littorea	
Acacia longifolia	
Acacia longifolia subsp. longifolia	
Acacia longifolia subsp. sophorae	
Acacia melanoxylon	
Acacia microbotrya	
Acacia nervosa	
Acacia obovata	
Acacia oncinophylla	
Acacia oncinophylla subsp. oncinophylla	P3
Acacia oncinophylla subsp. patulifolia	P4
Acacia paradoxa	
Acacia parramattensis	
Acacia podalyriifolia	
Acacia pulchella	
Acacia pulchella var. glaberrima	
Acacia pulchella var. goadbyi	
Acacia pulchella var. pulchella	
Acacia pycnantha	
Acacia pycnocephala	
Acacia restiacea	
Acacia saligna	
Acacia saligna subsp. lindleyi	
Acacia saligna subsp. pruinescens	
Acacia saligna subsp. saligna	
Acacia sessilis	
Acacia sp.	
Acacia stenoptera	
Acacia subcaerulea	
Acacia teretifolia	
Acacia tetragonocarpa	
Acacia truncata	

Acacia urophylla	
Acacia willdenowiana	
Acacia xanthina	
Acaena echinata	
Acaena sp.	
Acanthagenys rufogularis	
Acanthaluteres brownii	
Acanthiza apicalis	
Acanthiza chrysorrhoa	
Acanthiza chrysorrhoea	
Acanthiza inornata	
Acanthiza uropygialis	
Acanthocarpus canaliculatus	
Acanthocarpus preissii	
Acanthopagrus butcheri	
Acanthophis antarcticus	P3
Acanthorhynchus superciliosus	
Acanthospermum hispidum	
Acariformes sp.	
Acarospora citrina	
Accipiter cirrhocephalus	
Accipiter cirrocephalus	
Accipiter cirrocephalus subsp. cirrocephalus	
Accipiter fasciatus	
Accipiter fasciatus subsp. didimus	
Accipiter fasciatus subsp. fasciatus	
Acentrogobius bifrenatus	
Acercella falcipes	
Achillea millefolium	
Achoerodus gouldii	
Acridotheres tristis	
Acritoscincus trilineatum	
Acritoscincus trilineatus	
Acroaspis olorina	
Acrocephalus australis	
Acrocephalus australis subsp. gouldi	
Acrochaetium savianum	
Acrochaetium sp.	
Actinostrobus pyramidalis	
Actinotus glomeratus	
Actinotus leucocephalus	
Actitis hypoleucos	MI
Adenanthos barbiger	
Adenanthos cygnorum	
Adenanthos cygnorum subsp. chamaephyton	P3
Adenanthos cygnorum subsp. cygnorum	
Adenanthos obovatus	
Adenanthos sp.	
Adiantum aethiopicum	
Adversaeschna brevistyla	

Aecidium sp.	
Aegotheles cristatus	
Aegotheles cristatus subsp. cristatus	
Aeonium haworthii	
Afurcagobius suppositus	
Aganippe cupulifex	
Aganippe rhaphiduca	
Aganippe sp.	
Agapornis sp.	
Agaricus californicus	
Agaricus campestris	
Agaricus rotalis	
Agaricus sp.	
Agaricus subrufescens	
Agaricus sylvicola	
Agave americana	
Agave angustifolia	
Agave sp.	
Ageratina adenophora	
Agonis flexuosa	
Agonis flexuosa var. flexuosa	
Agonis grandiflora	
Agonis linearifolia	
Agrocybe arenicola	
Agrocybe pediades	
Agrocybe semiorbicularis	
Agrocybe sp.	
Agrostis avenacea	
Agrostis gigantea	
Agrostis plebeia	
Agrostocrinum hirsutum	
Agrostocrinum scabrum	
Agrostocrinum scabrum subsp. scabrum	
Ailanthus altissima	
Aira caryophyllea	
Aira caryophyllea/cupaniana group	
Aira cupaniana	
Aira elegantissima	
Aira praecox	
Aira sp.	
Aira sp. indet.	
Aizoon pubescens	
Akamptogonus novarae	
Albuca canadensis	
Albuca flaccida	
Albugo candida	
Albugo portulacae	
Albugo sp.	
Albugo tragopogonis	
Aldrichetta forsteri	

Aleuria rhenana	
Aleurina asperulus	
Aleurina ferruginea	
Aleurodiscus sp.	
Alexgeorgea nitens	
Allium ampeloprasum	
Allium neapolitanum	
Allium porrum	
Allium triquetrum	
Allocasuarina fraseriana	
Allocasuarina grevilleoides	P3
Allocasuarina huegeliana	
Allocasuarina humilis	
Allocasuarina lehmanniana subsp. lehmanniana	
Allocasuarina littoralis	
Allocasuarina microstachya	
Allocasuarina sp.	
Allocasuarina thuyoides	
Allothereua maculata	
Alocasia brisbanensis	
Alopecurus myosuroides	
Alstroemeria psittacina	
Alternanthera denticulata	
Alternanthera nodiflora	
Alternaria alternata group	
Alternaria solani	
Alternaria sp.	
Althenia australis	
Althenia preissii	
Alyogyne pinoniana var. leptochlamys	
Amanita albofimbriata	
Amanita basiorubra	
Amanita carneiphylla	P3
Amanita conicobulbosa	
Amanita djarilmari	
Amanita drummondii	P3
Amanita eucalypti	
Amanita fibrillopes	P3
Amanita hiltonii	
Amanita kalamundae	P3
Amanita nauseosa	
Amanita ochroterrea	
Amanita persicina	
Amanita preissii	P3
Amanita pupatju	
Amanita quenda	P1
Amanita sp.	
Amanita umbrinella	
Amanita wadjukiorum	P3
Amanita wadulawitu	P2

Amanita xanthocephala	
Amaranthus albus	
Amaranthus blitum	
Amaranthus caudatus	
Amaranthus cruentus	
Amaranthus hybridus	
Amaranthus lividus	
Amaranthus powellii	
Amaranthus sp. (a garden cultivar)	
Amaranthus viridis	
Amaryllis belladonna	
Amaryllis sp.	
Ambicodamus kochi	
Amblyomma albolimbatum	
Amblyomma fimbriatum	
Amblyomma triguttatum	
Ambrosia artemisiifolia	
Ambrosia psilostachya	
Ammi majus	
Amniataba caudavittata	
Amperea protensa	
Amphibromus neesii	
Amphibromus nervosus	
amphipod sp.	
Amphipogon amphipogonoides	
Amphipogon debilis	
Amphipogon laguroides	
Amphipogon laguroides subsp. havelii	
Amphipogon laguroides subsp. laguroides	
Amphipogon sp. indet.	
Amphipogon strictus	
Amphipogon turbinatus	
Amphisopodidae sp.	
Amsinckia calycina	
Amyema linophylla	
Amyema linophylla subsp. linophylla	
Amyema miquelii	
Amyema preissii	
Anabaena sp.	
Anagallis arvensis	
Anagallis arvensis var. caerulea	
Aname mainae	
Aname tepperi	
Anarthria gracilis	
Anarthria humilis	
Anarthria laevis	
Anas castanea	
Anas clypeata	
Anas gracilis	
Anas platyrhynchos	

Anas platyrhynchos subsp. domesticus	
Anas rhynchotis	
Anas superciliosa	
Anas superciliosa subsp. x platyrhynchos	
Anas superciliosus	
Ancylidae sp.	
Andersonia aristata	
Andersonia gracilis	VU
Andersonia heterophylla	
Andersonia involucrata	
Andersonia lehmanniana	
Andersonia lehmanniana subsp. lehmanniana	
Andersonia lehmanniana subsp. pubescens	
Andersonia micrantha	
Andersonia sp. Blepharifolia (F. & J. Hort 1919)	P2
Andropogon distachyos	
Angianthus micropodioides	P3
Angianthus preissianus	
Anguilla australis	
Anguillaria dioica	
Anhinga melanogaster	
Anhinga melanogaster subsp. novaehollandiae	
Anhinga novaehollandiae	
Anigozanthos bicolor	
Anigozanthos bicolor subsp. bicolor	
Anigozanthos bicolor x viridis	
Anigozanthos flavidus x manglesii	
Anigozanthos humilis	
Anigozanthos humilis subsp. chrysanthus	P4
Anigozanthos humilis subsp. humilis	
Anigozanthos humilis x manglesii	
Anigozanthos manglesii	
Anigozanthos manglesii subsp. manglesii	
Anigozanthos manglesii var. x angustifolius	
Anigozanthos manglesii x viridis	
Anigozanthos viridis	
Anigozanthos viridis subsp. viridis	
Anilios australis	
Anisomeles farinacea	
Anisops hyperion	
Anogramma leptophylla	
Anoplocapros lenticularis	
Anous tenuirostris subsp. melanops	EN
Anredera cordifolia	
Anser anser	
ant sp.	
Antaresia stimsoni subsp. orientalis	
Antaresia stimsoni subsp. stimsoni	
Antechinus flavipes	
Antechinus flavipes subsp. leucogaster	

Anthocercis anisantha subsp. anisantha	
Anthocercis gracilis	VU
Anthocercis ilicifolia subsp. ilicifolia	
Anthocercis littorea	
Anthoceros laevis	
Anthoceros sp.	
Anthochaera carunculata	
Anthochaera lunulata	
Anthotium junciforme	
Anthoxanthum odoratum	
Anthracobia melaloma	
Anthracobia muelleri	
Anthus australis	
Anthus australis subsp. australis	
Antichiopus variabilis	
Antichiropus variabilis	
Antichiropus whistleri	
Antiporus sp.	
Aotus cordifolia	
Aotus gracillima	
Aotus procumbens	
Aotus sp. Diffusa (W.E. Blackall & C.A. Gardner 1739)	
Aphanes arvensis	
Aphelia brizula	
Aphelia cyperoides	
Aphelia drummondii	
Aphelia sp. Albany (B.G. Briggs 596)	
Aphyctoschaema vultuosum	
Apium annuum	
Apium prostratum subsp. prostratum var. prostratum	
Apium sp.	
Apogon rueppellii	
Apogon victoriae	
Aponogeton hexatepalus	P4
Aprasia pulchella	
Aprasia repens	
Aprasia repens (Sand-plain Worm-lizard)	
Apus pacificus	MI
Aquila audax	
Aquila morphnoides	
Aquila morphnoides subsp. morphnoides	
Ara ararauna	
Aracana aurita	
Arachnopeziza aurata	
Arachnura higginsi	
Araneus cyphoxis	
Araneus eburneiventris	
Araneus eburnus	
Araneus ginninderranus	
Araneus senicaudatus	

Araneus talipedatus	
Araujia sericifera	
Arbutus unedo	
Arcangeliella daucina	
Archaeosynthemis occidentalis	
Archiargiolestes pusillus	
Archidium rehmannii	
Arctocephalus tropicalis	VU
Arctotheca calendula	
Arcyria cinerea	
Arcyria incarnata	
Arcyria major	
Arcyria minuta	
Arcyria obvelata	
Arcyria pomiformis	
Arcyria sp.	
Ardea alba subsp. modesta	
Ardea garzetta	
Ardea garzetta subsp. nigripes	
Ardea ibis	
Ardea intermedia	
Ardea modesta	
Ardea novaehollandiae	
Ardea pacifica	
Ardea sacra	
Ardeotis australis	
Arenigobius bifrenatus	
Argemone ochroleuca subsp. ochroleuca	
Argiope protensa	
Argiope trifasciata	
Argoctenus bidentatus	
Argusianus argus	
Argyranthemum frutescens subsp. foeniculaceum	
Argyrosomus japonicus	
Aristida contorta	
Aristida holathera	
Aristida holathera var. holathera	
Aristida ramosa	
Aristolochia grandiflora	
Armillaria luteobubalina	
Armillaria sp.	
Arnocrinum preissii	
Arrenuridae sp.	
Arrhenatherum elatius var. bulbosum	
Arrhenia sp.	
Arripis truttacea	
Artamus cinereus	
Artamus cinereus subsp. melanops	
Artamus cyanopterus	
Artamus personatus	

Artema atlanta	
Artemisia arborescens	
Arthrinium phaeospermum	
Arthrobotrys anchonia	
Arthrobotrys sp.	
Arthropodium sp.	
Artoria flavimana	
Artoria impedita	
Artoria linnaei	
Artoria taeniifera	
Artoriopsis eccentrica	
Artoriopsis expolita	
Artoriopsis joergi	
Arundo donax	
Asadipus kunderang	
Ascobolus furfuraceus	
Ascobolus immersus	
Ascobolus sp.	
Ascochyta abelmoschi	
Ascochyta pisi	
Ascochyta rhei	
Asparagus aethiopicus	
Asparagus asparagoides	
Asparagus declinatus	
Asparagus officinalis	
Asparagus plumosus	
Aspergillus sp.	
Asphodelus fistulosus	
Astartea aff. fascicularis	
Astartea aff. fascicularis sthcst	
Astartea affinis	
Astartea leptophylla	
Astartea scoparia	
Astartea sp.	
Asterella drummondii	
Asterella sp.	
Asteridea gracilis	P3
Asteridea pulverulenta	
Asterolasia pallida	
Astroloma ciliatum	
Astroloma foliosum	
Astroloma glaucescens	
Astroloma macrocalyx	
Astroloma microcalyx	
Astroloma pallidum	
Astroloma serratifolium	
Astroloma stomarrhena	
Astroloma xerophyllum	
Atelomastix nigrescens	
Atherinomorus vaigiensis	

Atherinosoma elongata	
Atherinosoma presbyteroides	
Atherinosoma wallacei	
Atriplex hypoleuca	
Atriplex isatidea	
Atriplex prostrata	
Atriplex semibaccata	
Aturidae sp.	
Auranticarpa rhombifolia	
Aurecocrypta lugubris	
Auricularia cornea	
Auriporia sp.	
Auriscalpium barbatum	
Auritella chamaecephala	
Austracantha minax	
Australomimetus aurioculatus	
Australomimetus ovidi	
Australotomurus morbidus	P3
Austrammo harveyi	
Austroagrion coeruleum	
Austroboletus occidentalis	
Austrodanthonia occidentalis	
Austrogautieria manjimupana	
Austrogomphus collaris	
Austromerope poultoni	
Austronomus australis	
Austroparmelina conlabrosa	
Austropaxillus muelleri	
Austrostipa ?compressa	
Austrostipa bronwenae	EN
Austrostipa campylachne	
Austrostipa compressa	
Austrostipa elegantissima	
Austrostipa flavescens	
Austrostipa hemipogon	
Austrostipa jacobsiana	CR
Austrostipa mollis	
Austrostipa semibarbata	
Austrostipa sp.	
Austrostipa sp. Marchagee (B.R. Maslin 1407)	
Austrostipa variabilis	
Avellinia michelii	
Avena barbata	
Avena fatua	
Avena sativa	
Avena sp.	
Avena sp. indet.	
Avena sp. Yule5	
Axonopus fissifolius	
Aythya australis	

Azolla rubra	
Babiana angustifolia	
Babiana nana	
Babingtonia camphorosmae	
Babingtonia pelloeae	
Babingtonia urbana	P3
Backobourkia brounii	
Backobourkia heroine	
Bacopa monnieri	
Badhamia foliicola	
Badhamia macrocarpa	
Badhamia panicea	
Badhamia utricularis	
Badumna insignis	
Baeckea camphorosmae	
Baeometra uniflora	
Baetidae sp.	
Baiami volucripes	
Ballarra longipalpus	
Bangia atropurpurea	
Bangia fuscopurpurea	
Banksia armata var. armata	
Banksia attenuata	
Banksia bipinnatifida subsp. bipinnatifida	
Banksia dallanneyi	
Banksia dallanneyi subsp. dallanneyi var. dallanneyi	
Banksia dallanneyi subsp. dallanneyi var. mellicula	
Banksia fraseri var. fraseri	
Banksia grandis	
Banksia ilicifolia	
Banksia ilicifolia/menziesii	
Banksia incana	
Banksia incana var. incana	
Banksia kippistiana	
Banksia kippistiana var. paenepeccata	P3
Banksia littoralis	
Banksia menziesii	
Banksia mimica	VU
Banksia nivea	
Banksia nivea subsp. nivea	
Banksia prionotes	
Banksia pteridifolia subsp. vernalis	P3
Banksia sceptrum	
Banksia sessilis	
Banksia sessilis var. cygnorum	
Banksia sessilis var. sessilis	
Banksia sphaerocarpa var. sphaerocarpa	
Banksia squarrosa subsp. squarrosa	
Banksia telmatiaea	
Banksia undata var. undata	

Banksia vestita	
Banksia victoriae	
Barbula calycina	
Barbula indica	
Barnardius zonarius	
Bartramia breutelii	
Bartramia hampeana subsp. hampei	
Bartramia pseudostricta	
Bartsia trixago	
Basidiodendron cinereum	
Battarrea stevenii	
Baumea acuta	
Baumea arthrophylla	
Baumea articulata	
Baumea juncea	
Baumea laxa	
Baumea preissii	
Baumea riparia	
Baumea rubiginosa	
Baumea vaginalis	
Beaufortia aestiva	
Beaufortia elegans	
Beaufortia incana	
Beaufortia macrostemon	
Beaufortia purpurea	P3
Beaufortia squarrosa	
beetle sp.	
Bellardia trixago	
Bellardia viscosa	
Berkheya rigida	
Bettongia penicillata	
Bettongia penicillata subsp. ogilbyi	CR
Beyeria lechenaultii	
Bidens pilosa	
Bigenditia zuytdorp	
Billardiera bicolor var. bicolor	
Billardiera coeruleo-punctata	
Billardiera drummondiana var. collina	
Billardiera floribunda	
Billardiera fraseri	
Billardiera fusiformis	
Billardiera heterophylla	
Billardiera variifolia	
Billima attrita	
Bipolaris australiensis	
Bipolaris cynodontis	
Bipolaris hawaiiensis	
Bipolaris spicifera	
Biziura lobata	
Bjerkandera adusta	

Blancoa canescens	
Bolbitius sp.	
Bolbitius titubans	
Bolbitius titubans var. olivacea	
Bolboschoenus caldwellii	
Bolboschoenus fluviatilis	P1
Boletellus ananaeceps	
Boletellus obscurecoccineus	
Boletus appendiculatus	
Boletus caesareus	
Boletus multicolor	
Boletus nigerrimus	
Boletus pallidus	
Boletus prolinus	
Boletus pulverulentus	
Boletus sinapecruentus	
Boletus sp.	
Boletus sphaerocephalus	
Boronia crenulata	
Boronia crenulata subsp. crenulata var. crenulata	
Boronia crenulata subsp. viminea	
Boronia cymosa	
Boronia dichotoma	
Boronia fastigiata	
Boronia humifusa	P1
Boronia ovata	
Boronia purdieana subsp. purdieana	
Boronia ramosa	
Boronia ramosa subsp. anethifolia	
Boronia ramosa subsp. ramosa	
Boronia scabra subsp. scabra	
Boronia subsessilis	
Boronia tenuis	P4
Borya constricta	
Borya scirpoidea	
Borya sphaerocephala	
Bos taurus	
Bossiaea angustifolia	
Bossiaea aquifolium	
Bossiaea aquifolium subsp. aquifolium	
Bossiaea eriocarpa	
Bossiaea modesta	P2
Bossiaea ornata	
Bossiaea pulchella	
Bossiaea rufa	
Bossiaea sp. Waroona	
Bossiaea spinescens	
Bostockia porosa	
Botaurus poiciloptilus	EN
Bothriembryon serpentinus	

Botryosporium longibranchiatum	
Botrytis cinerea	
Bovista pulyuggeodes	
Bovista sp.	
Brachychiton acerifolius x discolor	
Brachychiton populneus	
Brachychiton populneus subsp. populneus	
Brachyloma preissii	
Brachypodium distachyon	
Brachyscome bellidioides	
Brachyscome glandulosa	
Brachyscome iberidifolia	
Brachyscome perpusilla	
Brachyscome pusilla	
Brachyurophis fasciolatus subsp. fasciolatus	
Brachyurophis semifasciata	
Brachyurophis semifasciatus	
Brassica barrelieri subsp. oxyrrhina	
Brassica fruticulosa	
Brassica oleracea	
Brassica rapa	
Brassica tournefortii	
Brassica x napus	
Brassica x napus x rapa	
Brentidae sp.	
Briza maxima	
Briza minor	
Briza sp.	
Brizula drummondii	
Bromus alopecuros	
Bromus catharticus	
Bromus diandrus	
Bromus hordeaceus	
Bromus madritensis	
Bromus rubens	
Bryoerythrophyllum dubium	
Bryopsis plumosa	
Bryum argenteum	
Bryum lanatum	
Buddleja dysophylla	
Buddleja madagascariensis	
Buellia dissa	
Buellia homophylia	
Buellia sp.	
Buellia subdisciformis	
Bulbine semibarbata	
Burchardia bairdiae	
Burchardia congesta	
Burchardia multiflora	
Burchardia umbellata	

Burhinus grallarius	
Byblis gigantea	P3
Byssomerulius corium	
Byssomerulius hirtellus	
Byssonectria fusispora	
Cacatua galerita	
Cacatua galerita subsp. galerita	
Cacatua leadbeateri	
Cacatua pastinator	
Cacatua pastinator subsp. butleri	
Cacatua pastinator subsp. pastinator	CD
Cacatua roseicapilla	
Cacatua sanguinea	
Cacatua sanguinea subsp. westralensis	
Cacatua sulphurea subsp. galerita	
Cacatua tenuirostris	
Cacomantis flabelliformis	
Cacomantis flabelliformis subsp. flabelliformis	
Cacomantis pallidus	
Caenidae sp.	
Caesia micrantha	
Caesia occidentalis	
Cakile maritima	
Caladenia ?flava	
Caladenia arenicola	
Caladenia arenicola x georgei	
Caladenia arenicola x huegelii	
Caladenia arenicola x paludosa	
Caladenia arrecta	
Caladenia deformis	
Caladenia denticulata	
Caladenia denticulata subsp. rubella	
Caladenia discoidea	
Caladenia falcata	
Caladenia ferruginea	
Caladenia flava	
Caladenia flava subsp. flava	
Caladenia footeana	
Caladenia gemmata	
Caladenia georgei	
Caladenia hiemalis	
Caladenia hirta subsp. hirta	
Caladenia huegelii	CR
Caladenia latifolia	
Caladenia longicauda	
Caladenia longicauda subsp. calcigena	
Caladenia longicauda subsp. clivicola	
Caladenia longicauda subsp. eminens	
Caladenia longicauda subsp. longicauda	
Caladenia longicauda x paludosa	

Caladenia longiclavata	
Caladenia macrostylis	
Caladenia marginata	
Caladenia nobilis	
Caladenia paludosa	
Caladenia paludosa x sp.	
Caladenia pectinata	
Caladenia reptans subsp. reptans	
Caladenia sericea	
Caladenia serotina	
Caladenia serrata	
Caladenia sp.	
Caladenia sp. indet.	
Caladenia splendens	
Caladenia varians subsp. varians	
Caladenia vulgata	
Caladenia x spectabilis	
Caladenia xantha	
Calandrinia calyptrata	
Calandrinia corrigioloides	
Calandrinia granulifera	
Calandrinia liniflora	
Calandrinia sp. indet.	
Calandrinia sp. Kenwick (G.J. Keighery 10905)	
Calandrinia sp. Piawaning (A.C. Beauglehole 12257)	
Calanoida sp.	
Calectasia cyanea	CR
Calectasia grandiflora	P2
Calectasia narragara	
Calicotome spinosa	
Calidris acuminata	MI
Calidris canutus	EN
Calidris ferruginea	CR
Calidris melanotos	MI
Calidris ruficollis	MI
Calidris subminuta	MI
Calidris tenuirostris	CR
Callistachys lanceolata	
Callistemon citrinus	
Callistemon linearis	
Callistemon phoeniceus	
Callistemon sp.	
Callithamnion perpusillum	
Callitriche stagnalis	
Callitris acuminata	
Callitris canescens	
Callitris columellaris	
Callitris preissii	
Callitris pyramidalis	
Callitris roei	

Callitris sp.	
Callitris verrucosa	
Calocera guepinioides	
Calocera sp.	
Calochilus stramenicola	
Caloplaca sp.	
Calostoma sp.	
Calothamnus accedens	P4
Calothamnus gilesii	
Calothamnus graniticus	
Calothamnus graniticus subsp. leptophyllus	P4
Calothamnus hirsutus	
Calothamnus homalophyllus	
Calothamnus lateralis	
Calothamnus macrocarpus	P2
Calothamnus quadrifidus	
Calothamnus quadrifidus subsp. angustifolius	
Calothamnus quadrifidus subsp. homalophyllus	
Calothamnus quadrifidus subsp. quadrifidus	
Calothamnus rupestris	
Calothamnus sanguineus	
Calothamnus torulosus	
Calothamnus villosus	
Calothrix parietina	
Calotis erinacea	
Calvatia candida	
Calvatia fusca	
Calvatia lilacina	
Calycopeplus paucifolius	
Calyptorhynchus banksii	
Calyptorhynchus banksii naso	
Calyptorhynchus banksii subsp. naso	VU
Calyptorhynchus baudinii	EN
Calyptorhynchus latirostris	EN
Calyptorhynchus sp.	
Calyptorhynchus sp. 'white-tailed black cockatoo'	
Calytrix acutifolia	
Calytrix angulata	
Calytrix aurea	
Calytrix breviseta subsp. breviseta	CR
Calytrix depressa	
Calytrix flavescens	
Calytrix flavescens x fraseri	
Calytrix fraseri	
Calytrix glutinosa	
Calytrix leschenaultii	
Calytrix sapphirina	
Calytrix simplex subsp. suboppositifolia	
Calytrix sp.	
Calytrix sylvana	

Calytrix variabilis	
Campanella gregaria	
Campsis radicans	
Campsis x tagliabuana	
Campylopus acuminatus var. kirkii	
Campylopus australis	
Campylopus bicolor var. bicolor	
Campylopus introflexus	
Campylopus sp.	
Canis lupus	
Canis lupus subsp. familiaris	
Canna x generalis	
Cantharellula sp.	
Capsella bursa-pastoris	
Carabidae sp.	
Carassius auratus	
Carcharhinus leucas	
Cardamine hirsuta	
Cardamine occulta	
Cardiospermum grandiflorum	
Carduelis carduelis	
Carduelis carduelis subsp. britannica	
Carduus pycnocephalus	
Carex appressa	
Carex divisa	
Carex fascicularis	
Carex inversa	
Carex tereticaulis	P3
Carpobrotus edulis	
Cartonema philydroides	
Cassytha aurea var. hirta	
Cassytha flava	
Cassytha glabella	
Cassytha glabella forma casuarinae	
Cassytha glabella forma dispar	
Cassytha glabella forma glabella	
Cassytha micrantha	
Cassytha pomiformis	
Cassytha pubescens	
Cassytha racemosa	
Cassytha racemosa forma pilosa	
Cassytha racemosa forma racemosa	
Cassytha sp. indet.	
Cassytha sp. scps	
Casuarina cunninghamiana subsp. cunninghamiana	
Casuarina glauca	
Casuarina glauca x obesa	
Casuarina obesa	
Catapodium rigidum	
Catha edulis	

Caulerpa flexilis var. muelleri	
Caulerpa lagara	
Caulerpa sp.	
Caustis dioica	
Ceinidae sp.	
Celaenia excavata	
Cenchrus ciliaris	
Cenchrus clandestinus	
Cenchrus echinatus	
Cenchrus longisetus	
Cenchrus macrourus	
Cenchrus purpureus	
Cenchrus setaceus	
Centaurea melitensis	
Centaurea solstitialis	
Centaurium erythraea	
Centaurium erythraea x tenuiflorum	
Centaurium tenuiflorum	
Centella asiatica	
Centipeda cunninghamii	
Centipeda sp.	
Centranthus macrosiphon	
Centranthus ruber subsp. ruber	
Centratherum punctatum	
Centroceras clavulatum	
Centrolepis alepyroides	
Centrolepis aristata	
Centrolepis caespitosa	
Centrolepis cephaloformis subsp. cephaloformis	
Centrolepis drummondiana	
Centrolepis glabra	
Centrolepis inconspicua	
Centrolepis mutica	
Centrolepis pilosa	
Centrolepis polygyna	
Centrolepis sp. indet.	
Centrolepis sp. Kalannie (B.J. Lepschi et al. BJL 3517)	
Cephaloziella exiliflora	
Cephaloziella varians	
Ceraceomyces sp.	
Ceramium fastigiatum	
Cerastium glomeratum	
Ceratiomyxa fruticulosa	
Ceratodon purpureus subsp. convolutus	
Ceratopogonidae sp.	
Cercartetus concinnus	
Cercophonius granulosus	
Cercophonius squama	
Cercophonius sulcatus	
Cercospora santalacea	

Cercospora sp.	
Ceriporia reticulata	
Ceriporia sp.	
Ceriporia tarda	
Ceryerda cursitans	
Cethegus fugax	
Chaetanthus aristatus	
Chaetomorpha aerea	
Chaetomorpha linum	
Chalinolobus gouldii	
Chalinolobus morio	
Chamaecytisus palmensis	
Chamaescilla corymbosa	
Chamaescilla corymbosa var. corymbosa	
Chamaescilla corymbosa var. latifolia	
Chamaescilla corymbosa var. paradoxa	
Chamaescilla corymbosa x versicolor	
Chamaescilla gibsonii	P3
Chamaescilla sp.	
Chamaescilla spiralis	
Chamaescilla versicolor	
Chamaexeros serra	
Chamelaucium axillare x uncinatum	
Chamelaucium sp. Winchester (C. Chapman s.n. PERTH 07879180)	
Chamelaucium uncinatum	
Chamonixia sp.	
Champia stipitata	
Charadrius leschenaultii	VU
Charadrius melanops	
Charadrius mongolus	EN
Charadrius ruficapillus	
Chasmanthe floribunda	
Cheilanthes austrotenuifolia	
Cheilanthes distans	
Cheilanthes lasiophylla	
Cheilanthes sieberi subsp. sieberi	
Cheilodactylus gibbosus	
Cheiranthera preissiana	
Chelidonichthys kumu	
Chelmonops curiosus	
Chelodina colliei	
Chelodina oblonga	
Chelonia mydas	VU
Chenonetta jubata	
Chenopodium album	
Chenopodium giganteum	
Chenopodium glaucum	
Chenopodium macrospermum	
Chenopodium murale	
Chenopodium sp.	

Cheramoeca leucosterna	
Cherax cainii	
Cherax destructor	
Cherax preissii	
Cherax quinquecarinatus	
Cherax quinquecarnatus	
Cherax sp.	
Chiloscyphus semiteres var. semiteres	
Chironominae sp.	
Chironomus aff. alternans (V24) (CB)	
Chironomus tepperi	
Chlamydomonas sp.	
Chloris gayana	
Chlorophyllum brunneum	
Chlorophyllum molybdites	
Chlorosplenium sp.	
Chondria capillaris	
Chondria dasyphylla	
Chondrilla juncea	
Chordifex sinuosus	
Chorizandra enodis	
Chorizandra multiarticulata	
Chorizema cordatum	
Chorizema dicksonii	
Christinus marmoratus	
Christinus marmoratus (Marbled Gecko)	
Chroicocephalus novaehollandiae	
Chrysanthemoides monilifera subsp. monilifera	
Chrysococcyx basalis	
Chrysococcyx lucidus	
Chrysococcyx lucidus subsp. plagosus	
Chrysocoma coma-aurea	
Chrysomyxa ledi var. rhododendri	
Chrysopogon albopunctatus (Macquart, 1846)	
Chrysopogon sp.	
Chrysothrix candelaris	
Chthonocephalus pseudevax	
Cicendia filiformis	
Cicer arietinum	
Cichorium intybus	
Cichorium sp.	
Cincloramphus cruralis	
Cincloramphus mathewsi	
Cinnamomum camphora	
Circus approximans	
Circus assimilis	
Cirsium vulgare	
Citrullus amarus	
Cladia aggregata	
Cladia ferdinandii	

Cladia muelleri	
Cladia schizopora	
Cladocera (unident.)	
Cladonia angustata	
Cladonia cervicornis subsp. verticillata	
Cladonia ramulosa	
Cladonia southlandica	
Cladonia sulcata var. sulcata	
Cladonia tessellata	
Cladopelma curtivalva	
Cladophora albida	
Cladophora glomerata	
Cladophora laetevirens	
Cladophora sp.	
Cladorhynchus leucocephalus	
Cladosporium sp.	
Clathrus pusillus	
Clathrus ruber	
Clavulina coralloides	
Clavulina cristata	
Clavulina sp.	
Cleidopus gloriamaris	
Clematis aristata var. occidentalis	
Clematis linearifolia	
Clematis pubescens	
Climacteris rufa	
Clitocybe brunneoceracea	
Clitocybe clitocyboides	
Clitocybe dealbata	
Clitocybe kenkulunea	
Clitocybe semiocculta	
Clitocybe sp.	
Clitopilus hobsonii	
Clynotis severus	
Cnidoglanis macrocephalus	
Codium harveyi	
Codium laminarioides	
Codium muelleri	
Coenagrionidae sp.	
Coix lacryma-jobi	
Colaconema daviesii	
Coleonema pulchellum	
Collaria arcyrionema	
Collaria sp.	
Colletotrichum gloeosporioides	
Colletotrichum sp.	
Colletotrichum xanthorrhoea	
Collocalia esculenta	
Colluricincla harmonica	
Colluricincla harmonica subsp. rufiventris	

Collybia butyracea	
Collybia fusipes	
Collybia nijerria	
Collybia peronata	
Collybia sp.	
Collybia velutipes	
Colocasia esculenta	
Colocasia esculenta var. esculenta	
Colpomenia sinuosa	
Coltricia cinnamomea	
Coltricia sp.	
Coltriciella dependens	
Coltriciella sp.	
Columba livia	
Colus pusillus	
Comatricha elegans	
Comatricha ellae	
Comatricha laxa	
Comatricha longipila	
Comatricha nigra	
Comatricha rigidireta	
Comatricha sp.	
Comesperma calymega	
Comesperma ciliatum	
Comesperma flavum	
Comesperma griffinii	P2
Comesperma integerrimum	
Comesperma polygaloides	
Comesperma rhadinocarpum	P3
Comesperma sp. Brix1R (possibly virigatum)	
Comesperma virgatum	
Comesperma volubile	
Commelina benghalensis	
Commersonia corniculata	
Condocerus aptus	
Coniophora olivacea	
Coniophora puteana	
Conocybe apala var. apala	
Conocybe sp.	
Conospermum acerosum	
Conospermum acerosum subsp. acerosum	
Conospermum amoenum	
Conospermum amoenum subsp. amoenum	
Conospermum boreale subsp. boreale	
Conospermum canaliculatum	
Conospermum canaliculatum subsp. canaliculatum	
Conospermum capitatum subsp. glabratum	
Conospermum glumaceum	
Conospermum huegelii	
Conospermum incurvum	

Conospermum sp.	
Conospermum stoechadis	
Conospermum stoechadis subsp. sclerophyllum	
Conospermum stoechadis subsp. stoechadis	
Conospermum stoechadis x triplinervium	
Conospermum triplinervium	
Conospermum triplinervium x undulatum	
Conospermum undulatum	VU
Conospermum undulatum hybrid	
Conostephium minus	
Conostephium pendulum	
Conostephium preissii	
Conostylis aculeata	
Conostylis aculeata subsp. aculeata	
Conostylis aculeata subsp. cygnorum	
Conostylis aculeata subsp. preissii	
Conostylis androstemma	
Conostylis aurea	
Conostylis bracteata	P3
Conostylis candicans	
Conostylis candicans subsp. candicans	
Conostylis caricina	
Conostylis caricina subsp. caricina	
Conostylis festucacea	
Conostylis festucacea subsp. festucacea	
Conostylis juncea	
Conostylis latens	
Conostylis serrulata	
Conostylis setigera	
Conostylis setigera subsp. setigera	
Conostylis setosa	
Conostylis sp.	
Conothamnus trinervis	
Convolvulus remotus	
Conyza albida	
Conyza bonariensis	
Conyza canadensis var. canadensis	
Conyza parva	
Conyza sp.	
Conyza sp. Brix1R	
Conyza sp. Brix4	
Conyza sumatrensis	
Copidognathus cooki	
Coprinellus callinus	
Coprinellus micaceus	
Coprinellus pellucidus	
Coprinellus pyrrhanthes	
Coprinellus truncorum	
Coprinellus truncorum / micaceus	
Coprinus comatus	

Coprinus cordisporus	
Coprinus curtus	
Coprinus disseminatus	
Coprinus fimetarius	
Coprinus flocculosus	
Coprinus impatiens	
Coprinus lagopus	
Coprinus macrocephalus	
Coprinus patouillardii	
Coprinus plicatilis	
Coprinus radians	
Coprinus sp.	
Coracina maxima	
Coracina novaehollandiae	
Coracina novaehollandiae subsp. novaehollandiae	
Corduliidae sp.	
Cordyceps sp.	
Coreopsis lanceolata	
Coriolopsis merulinus	
Coriolus sp.	
Coris auricularis	
Corixidae sp.	
Cormocephalus aurantiipes	
Cormocephalus novaehollandiae	
Cormocephalus rubriceps	
Cormocephalus strigosus	
Cormocephalus turneri	
Corrigiola litoralis	
Cortaderia selloana subsp. selloana	
Corticium sp.	
Cortinarius archeri	
Cortinarius ardesiacus	
Cortinarius areolatoimbricatus	
Cortinarius australiensis	
Cortinarius basirubescens	
Cortinarius clelandii	
Cortinarius erythraeus	
Cortinarius globuliformis	
Cortinarius ochraceofulvus	
Cortinarius ochraceus	
Cortinarius phalarus	
Cortinarius radicatus	
Cortinarius rotundisporus	
Cortinarius sebosus	
Cortinarius sp.	
Cortinarius subarcheri	
Cortinarius sublargus	
Corvus bennetti	
Corvus coronoides	
Corvus coronoides subsp. perplexus	

Corybas recurvus	
Corymbia calophylla	
Corymbia calophylla x ficifolia	
Corymbia citriodora	
Corymbia maculata	
Corynotheca micrantha	
Corynotheca micrantha var. elongata	
Corynotheca micrantha var. micrantha	
Cosmos bipinnatus	
Cotoneaster pannosus	
Cotula australis	
Cotula bipinnata	
Cotula coronopifolia	
Cotula cotuloides	
Cotula turbinata	
Coturnix pectoralis	
Coturnix ypsilophora	
Cracticus nigrogularis	
Cracticus tibicen	
Cracticus tibicen subsp. dorsalis	
Cracticus tibicen subsp. tibicen	
Cracticus torquatus	
Cracticus torquatus subsp. torquatus	
Craspedia sp. (GJK 13121)	
Craspedia variabilis	
Crassocephalum crepidioides	
Crassula alata	
Crassula alata var. alata	
Crassula closiana	
Crassula colorata	
Crassula colorata var. acuminata	
Crassula colorata var. colorata	
Crassula decumbens	
Crassula decumbens var. decumbens	
Crassula exserta	
Crassula extrorsa	
Crassula natans	
Crassula natans var. minus	
Crassula pedicellosa	
Crassula peduncularis	
Crassula sp.	
Crassula tetragona subsp. robusta	
Crassula thunbergiana	
Crassula thunbergiana subsp. thunbergiana	
Craterium leucocephalum	
Craterium minutum	
Craterocephalus mugiloides	
Crenadactylus ocellatus	
Crenadactylus ocellatus subsp. ocellatus	
Crepidotus / Galerina sp.	

Crepidotus applanatus	
Crepidotus eucalyptorum	
Crepidotus mollis	
Crepidotus nephrodes	
Crepidotus prostratus	
Crepidotus sp.	
Crepidotus sphaerosporus	
Crepidotus uber	
Crepidotus variabilis	
Crepis foetida	
Crepis foetida subsp. foetida	
Cribraria confusa	
Cribraria microcarpa	
Cribraria minutissima	
Cribraria sp.	
Cricotopus 'parbicinctus'	
Crinia georgiana	
Crinia glauerti	
Crinia insignifera	
Crinia pseudinsignifera	
Crinia sp.	
Cristonia biloba	
Cristonia biloba subsp. biloba	
Croninia kingiana	
Crotalaria agatiflora subsp. agatiflora	
Crustoderma marianum	
Crustulina bicruciata	
Cryptandra apetala var. anomala	
Cryptandra arbutiflora	
Cryptandra arbutiflora var. arbutiflora	
Cryptandra arbutiflora var. tubulosa	
Cryptandra humilis	
Cryptandra mutila	
Cryptandra myriantha	
Cryptandra nutans	
Cryptandra pungens	
Cryptandra scoparia	
Cryptoblepharus buchananii	
Cryptoblepharus plagiocephalus	
Cryptoblepharus sp.	
Cryptoerithus quobba	
Ctenophorus adelaidensis	
Ctenophorus ornatus	
Ctenotus australis	
Ctenotus delli	P4
Ctenotus fallens	
Ctenotus gemmula	
Ctenotus impar	
Ctenotus labillardieri	
Ctenotus ora	P3

Ctenotus sp.	
Cuculus pallidus	
Cucumis myriocarpus subsp. myriocarpus	
Cudoniella sp.	
Culicidae sp.	
Cuphea hyssopifolia	
Curculionidae sp.	
Curvularia brachyspora	
Cuscuta campestris	
Cuscuta epithymum	
Cuscuta planiflora	
Cyanella hyacinthoides	
Cyanicula deformis	
Cyanicula gemmata	
Cyanicula ixioides subsp. ixioides	P4
Cyanicula sericea	
Cyanorhamphus auriceps	
Cyathea cooperi	
Cyathochaeta avenacea	
Cyathochaeta clandestina	
Cyathochaeta equitans	
Cyathochaeta teretifolia	P3
Cyclodomorphus celatus	
Cyclodomorphus celatus (Western Slender Blue-tongue)	
Cyclosa trilobata	
Cyclospermum leptophyllum	
Cycnogeton huegelii	
Cycnogeton lineare	
Cygnus atratus	
Cygnus olor	
Cylindrocladium sp.	
Cymbalaria muralis subsp. muralis	
Cymbopogon obtectus	
Cynodon dactylon	
Cynoglossus maculipinnis	
Cynosurus echinatus	
Cyperus brevifolius	
Cyperus congestus	
Cyperus eragrostis	
Cyperus gymnocaulos	
Cyperus involucratus	
Cyperus laevigatus	
Cyperus papyrus	
Cyperus polystachyos	
Cyperus sp.	
Cyperus tenellus	
Cyperus tenuiflorus	
Cyperus vaginatus	
Cyperus vorsteri	
Cyrtophora parnasia	

Cyrtostylis huegelii	
Cyrtostylis tenuissima	
Cytogonidium leptocarpoides	
Dacelo novaeguinea	
Dacelo novaeguineae	
Dacelo novaeguineae subsp. novaeguineae	
Dacryobolus sudans	
Dactylaria candida	
Dactylis glomerata	
Dactylopus dactylopus	
Daedalea gigantea	
Dampiera alata	
Dampiera coronata	
Dampiera lavandulacea	
Dampiera lindleyi	
Dampiera linearis	
Dampiera pedunculata	
Dampiera trigona	
Dampiera triloba	P3
Danthonia caespitosa	
Danthonia occidentalis	
Danthonia pilosa	
Danthonia sp.	
Danthonia sp. indet.	
Daphoenositta chrysoptera	
Daphoenositta chrysoptera subsp. pileata	
Darwinia apiculata	EN
Darwinia citriodora	
Darwinia pimelioides	P4
Darwinia pinifolia	
Darwinia sp.	
Darwinia thymoides	
Darwinia thymoides subsp. thymoides	
Dasturella sp.	
Dasya sp.	
Dasymalla teckiana	
Dasyornis longirostris	EN
Dasypogon bromeliifolius	
Dasypogon obliquifolius	
Dasyscyphus acuum	
Dasyscyphus sp.	
Dasyurochirus tapoatafa	
Dasyurus geoffroii	VU
Dasyurus hallucatus	EN
Datronia stereoides	
Datura inoxia	
Datura metel	
Datura stramonium	
Datura wrightii	
Daucus glochidiatus	

Daviesia angulata	
Daviesia angulata / polyphylla	
Daviesia brachyphylla	
Daviesia cordata	
Daviesia decurrens	
Daviesia decurrens subsp. decurrens	
Daviesia divaricata	
Daviesia divaricata subsp. divaricata	
Daviesia hakeoides subsp. hakeoides	
Daviesia hakeoides subsp. subnuda	
Daviesia horrida	
Daviesia incrassata subsp. incrassata	
Daviesia longifolia	
Daviesia nudiflora	
Daviesia nudiflora subsp. nudiflora	
Daviesia pedunculata	
Daviesia physodes	
Daviesia podophylla	
Daviesia polyphylla	
Daviesia preissii	
Daviesia rhombifolia	
Daviesia triflora	
Deinopis unicolor	
Delena cancerides	
Delma fraseri	
Delma grayii	
Demansia psammophis	
Demansia psammophis subsp. reticulata	
Dendrelaphis punctulata	
Dendrocygna eytoni	
Dendrothele acerina	
Dennstaedtia davallioides	
Dermochelys coriacea	VU
Dermocybe clelandii	
Dermocybe erythrocephala	
Dermocybe sp.	
Descomyces albus	
Descomyces sp.	
Desmocladus asper	
Desmocladus aspera	
Desmocladus fasciculatus	
Desmocladus flexuosus	
Desmocladus lateriflorus	
Desmocladus sp.	
Deyeuxia quadriseta	
Diachea leucopodia	
Diachea radiata	
Dianella caerulea	
Dianella revoluta	
Dianella revoluta var. divaricata	

Diaporthe sp.	
Diaporthe woodii	
Dicaeum hirundinaceum	
Dichelachne crinita	
Dichelobius flavens	
Dichondra repens	
Dichopogon capillipes	
Dichopogon preissii	
Dichopogon sp.	
Dicrastylis micrantha	P3
Dicrastylis soliparma	
Dicrotendipes sp. A (V47) (SAP)	
Dictyographa sp.	
Dictyota dichotoma	
Dictyota furcellata	
Diderma cinereum	
Diderma crustaceum	
Diderma effusum	
Diderma hemisphaericum	
Diderma saundersii	
Diderma spumarioides	
Didymium anellus	
Didymium bahiense	
Didymium difforme	
Didymium megalosporum	
Didymium minus	
Didymium serpula	
Didymium sp.	
Didymium squamulosum	
Didymium verrucosporum	
Didymodon australasiae	
Didymodon torquatus	
Dielsia stenostachya	
Dietes grandiflora	
Digitaria aequiglumis	
Digitaria ciliaris	
Digitaria didactyla	
Digitaria eriantha	
Digitaria longiflora	
Digitaria sanguinalis	
Digitaria violascens	
Dillwynia dillwynioides	P3
Dillwynia laxiflora	
Dillwynia sp.	
Dillwynia sp. A	
Dillwynia sp. A Perth Flora (R. Coveny 8036)	
Dilophospora alopecuri	
Dingosa murata	
Dingosa serrata	
Dinocambala ingens	

Diodon nicthemerus	
Diomedea chlororhynchos	
Diomedea chrysostoma	
Dioscorea hastifolia	
Diospyros sp.	
Diplachne fusca subsp. fusca	
Diplocarpon rosae	
Diplodactylus granariensis	
Diplodactylus granariensis subsp. granariensis	
Diplodactylus lateroides	
Diplodactylus polyophthalmus	
Diplodactylus polyopthalmus	
Diplodactylus pulcher	
Diplodactylus sp.	
Diplodina melanocraspeda	
Diplolaena andrewsii	EN
Diplolaena angustifolia	
Diplolaena drummondii	
Diplolaena sp.	
Diplopeltis huegelii	
Diplopeltis huegelii subsp. lehmannii	
Diplopeltis huegelii var. lehmanii	
Diplotaxis muralis	
Dipogon lignosus	
Dirinaria aegialita	
Disa bracteata	
Dischisma arenarium	
Dischisma capitatum	
Distimake dissectus	
Ditrichum difficile	
Dittrichia graveolens	
Diuris brumalis	
Diuris carinata	
Diuris corymbosa	
Diuris corymbosa/magnifica	
Diuris decrementa	
Diuris drummondii	VU
Diuris laxiflora	
Diuris longifolia	
Diuris longifolia var. parviflora	
Diuris magnifica	
Diuris ostrina	
Diuris porrifolia	
Diuris purdiei	EN
Diuris setacea	
Diuris sp.	
Diuris sp. indet.	
Dodonaea adenophora	
Dodonaea aptera	
Dodonaea ceratocarpa	

Dodonaea ericoides	
Dodonaea hackettiana	P4
Dodonaea pinifolia	
Dodonaea sinuolata subsp. sinuolata	
Dodonaea viscosa	
Dolichopodidae sp.	
Dombeya sp.	
Drakaea elastica	CR
Drakaea glyptodon	
Drakaea gracilis	
Drakaea livida	
Drakaea micrantha	EN
Drechslera campanulata	
Drechslera poae	
Drechslera teres	
Dromaius novaehollandiae	
Drosanthemum candens	
Drosera ?paleacea	
Drosera ?porrecta	
Drosera bulbigena	
Drosera bulbosa	
Drosera bulbosa subsp. bulbosa	
Drosera callistos	
Drosera collina	
Drosera drummondii	
Drosera erythrogyne	
Drosera erythrorhiza	
Drosera erythrorhiza subsp. erythrorhiza	
Drosera gigantea	
Drosera gigantea subsp. gigantea	
Drosera glanduligera	
Drosera helodes	
Drosera heterophylla	
Drosera hirsuta	
Drosera hyperostigma	
Drosera leucoblasta	
Drosera macrantha	
Drosera mannii	
Drosera marchantii	
Drosera menziesii	
Drosera menziesii subsp. menziesii	
Drosera menziesii subsp. penicillaris	
Drosera micra	
Drosera micrantha	
Drosera microphylla	
Drosera miniata	
Drosera minutiflora	
Drosera neesii	
Drosera nitidula	
Drosera occidentalis	P4

Drosera paleacea subsp. paleacea	
Drosera pallida	
Drosera penicillaris	
Drosera platystigma	
Drosera porrecta	
Drosera pulchella	
Drosera pycnoblasta	
Drosera ramellosa	
Drosera rosulata	
Drosera sp.	
Drosera sp. "climbing"	
Drosera sp. Branched styles (S.C. Coffey 193)	
Drosera sp. indet.	
Drosera sp.indet.	
Drosera spilos	
Drosera stolonifera	
Drosera stricticaulis	
Drosera subhirtella	
Drosera tubaestylis	
Drosera walyunga	
Drosera zonaria	
Dryandra armata	
Dryandra bipinnatifida	
Dryandra lindleyana subsp. lindleyana var. lindleyana	
Dryandra nivea	
Dryandra sessilis	
Dugesiidae sp.	
Dysphania ambrosioides	
Dysphania glomulifera	
Dysphania glomulifera subsp. glomulifera	
Dysphania multifida	
Dysphania pumilio	
Dytiscidae sp.	
earthworm sp.	
Ecballium elaterium	
Eccremidium pulchellum	
Echeneis naucrates	
Echinochloa colona	
Echinochloa crus-galli	
Echinochloa crus-pavonis	
Echinochloa esculenta	
Echinochloa pyramidalis	
Echinochloa telmatophila	
Echinodorus sp.	
Echinostelium minutum	
Echiopsis curta	
Echium plantagineum	
Eclipta prostrata	
Eclipta sp.	
Ectocarpus confervoides	

Ectocarpus sp.	
Edelia vittata	
Egeria densa	
Egernia kingii	
Egernia kingii (King's Skink)	
Egernia napoleonis	
Egretta garzetta	
Egretta novaehollandiae	
Egretta sacra	
Ehrharta brevifolia	
Ehrharta brevifolia var. brevifolia	
Ehrharta brevifolia var. cuspidata	
Ehrharta calycina	
Ehrharta longiflora	
Ehrharta sp.	
Eichhornia crassipes	
Elanus axillaris	
Elanus caeruleus	
Elanus caeruleus subsp. axillaris	
Elapognathus coronatus	
Elatine gratioloides	
Eleocharis acuta	
Eleocharis keigheryi	VU
Eleocharis sphacelata	
Eleusine coracan	
Eleusine indica	
Elops hawaiensis	
Elseyornis melanops	
Elsinoe ampelina	
Elymus scaber	
Elythranthera brunonis	
Elythranthera emarginata	
Empodisma gracillimum	
Endoptychum agaricoides	
Enerthenema papillatum	
Engraulis australis	
Enoplosus armatus	
Enteromorpha compressa var. compressa	
Enteromorpha flexuosa subsp. flexuosa	
Entoloma byssisedum	
Entoloma conferendum	
Entoloma moongum	
Entoloma sp.	
Entoloma undatum	
Entomosporium mespili	
Entomosporium sp.	
Entorrhiza casparyana	
Entosthodon apophysatus	
Entosthodon productus	
Entosthodon subnudus var. gracilis	

Eodelena convexa	
Eodelena lapidicola	
Eolophus roseicapillus	
Eopsaltria australis	
Eopsaltria australis griseogularis	
Eopsaltria australis subsp. griseogularis	
Eopsaltria georgiana	
Eopsaltria griseogularis	
Epiblema grandiflorum	
Epicoccum sp.	
Epilobium billardiereanum subsp. intermedium	
Epilobium ciliatum	
Epilobium hirtigerum	
Epilobium tetragonum subsp. tetragonum	
Epinephelides armatus	
Epthianura albifrons	
Epthianura tricolor	
Equus caballus	
Eragrostis brownii	
Eragrostis cilianensis	
Eragrostis curvula	
Eragrostis elongata	
Eragrostis sp.	
Eragrostis tenuifolia	
Eremaea asterocarpa	
Eremaea asterocarpa subsp. asterocarpa	
Eremaea asterocarpa subsp. brachyclada	
Eremaea fimbriata	
Eremaea pauciflora	
Eremaea pauciflora subsp. pauciflora	
Eremaea pauciflora var. calyptra	
Eremaea pauciflora var. pauciflora	
Eremaea purpurea	
Eremiascincus richardsonii	
Eremophila glabra subsp. albicans	
Eremophila glabra subsp. chlorella	EN
Eriachne ovata	
Ericksonella saccharata	
Ericomyrtus tenuior	
Erigeron karvinskianus	
Erigone prominens	
Eriobotrya japonica	
Eriochilus dilatatus	
Eriochilus dilatatus subsp. dilatatus	
Eriochilus dilatatus subsp. magnus	
Eriochilus dilatatus subsp. multiflorus	
Eriochilus dilatatus subsp. undulatus	
Eriochilus helonomos	
Eriochilus palludosus	
Eriochilus scaber subsp. scaber	

Eriochilus sp.	
Eriochilus sp. Roleystone (G. Brockman 1140)	P1
Eriochilus sp.indet.	
Eriochilus tenuis	
Eriophora biapicata	
Eriophora pustulosa	
Eriostemon spicatus	
Ero aphana	
Erodium botrys	
Erodium cygnorum	
Erodium moschatum	
Eryngium pinnatifidum	
Eryngium pinnatifidum subsp. palustre	
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	P3
Eryngium pinnatifidum subsp. pinnatifidum	
Eryngium sp. Subdecumbens (G.J. Keighery 5390)	P3
Erysiphe graminis	
Erysiphe necator	
Erythracarus decoris	
Erythrina crista-galli	
Erythrina x sykesii	
Erythrogonys cinctus	
Ethmostigmus rubripes	
Eucalyptus accedens	
Eucalyptus arachnaea subsp. arachnaea	
Eucalyptus botryoides	
Eucalyptus calophylla	
Eucalyptus camaldulensis	
Eucalyptus camaldulensis subsp. obtusa	
Eucalyptus cladocalyx subsp. petila	
Eucalyptus decipiens	
Eucalyptus educta	P2
Eucalyptus erythrocorys	
Eucalyptus foecunda	
Eucalyptus gomphocephala	
Eucalyptus gomphocephala x macrandra	
Eucalyptus grandis	
Eucalyptus laeliae	
Eucalyptus lane-poolei	
Eucalyptus lansdowneana	
Eucalyptus marginata	
Eucalyptus marginata subsp. marginata	
Eucalyptus marginata subsp. marginata / marginata subsp. thalassica	
Eucalyptus marginata subsp. thalassica	
Eucalyptus patens	
Eucalyptus rudis	
Eucalyptus rudis subsp. rudis	
Eucalyptus sp.	
Eucalyptus todtiana	
Eucalyptus utilis	

Eucalyptus wandoo	
Eucalyptus wandoo subsp. pulverea	
Eucalyptus wandoo subsp. wandoo	
Eucalyptus x mundijongensis	P1
Euchilopsis linearis	
Euchiton sphaericus	
Eucyrtops latior	
Eudyptula minor subsp. novaehollandiae	
Eulimnadia sp.	
Euoplos inornatus	P3
Euphorbia dendroides	
Euphorbia drummondii	
Euphorbia helioscopia	
Euphorbia hyssopifolia	
Euphorbia lathyris	
Euphorbia maculata	
Euphorbia marginata	
Euphorbia paralias	
Euphorbia peplus	
Euphorbia prostrata	
Euphorbia terracina	
Eupograpta kottae	
Eurostopodus argus	
Eurystomus orientalis	
Eurytion incisunguis	
Eustachys distichophylla	
Eutaxia virgata	
Exobasidium vaccinii	
Exocarpos sparteus	
Eylaidae sp.	
Falco berigora	
Falco berigora subsp. berigora	
Falco cenchroides	
Falco cenchroides subsp. cenchroides	
Falco hypoleucos	VU
Falco longipennis	
Falco longipennis subsp. longipennis	
Falco peregrinus	OS
Falco peregrinus subsp. macropus	
Fallopia convolvulus	
Falsistrellus mackenziei	P4
Favonigobius lateralis	
Favonigobius sp.	
Felis catus	
Ferraria crispa	
Ferraria crispa subsp. crispa	
Festuca arundinacea	
Festuca pratensis	
Festuca sp.	
Ficinia nodosa	

Ficus carica	
Ficus macrophylla	
Filicampus tigris	
Fimbristylis velata	
Fissidens curvatus var. curvatus	
Fissidens megalotis	
Fissidens sp.	
Fissidens taylorii	
Fissidens taylorii var. taylorii	
Fistulina hepatica	
Flavoparmelia marchantii	
Flavoparmelia rutidota	
Flavoparmelia soredians	
fly sp.	
Foeniculum vulgare	
Fomes sp.	
Fomitopsis lilacinogilva	
Frankenia pauciflora	
Fraxinus angustifolia	
Freesia aff. leichtlinii	
Freesia alba x leichtlinii	
Freesia laxa	
Freesia leichtlinii	
Freesia sp.	
Fringilla coelebs	
Fulica atra	
Fulica atra subsp. australis	
Fuligo septica	
Fumaria bastardii	
Fumaria capreolata	
Fumaria muralis	
Fumaria muralis subsp. muralis	
Fumaria sp.	
Funambulus pennanti	
Funaria hygrometrica	
Furcraea foetida	
Fusarium concolor	
Fusarium culmorum	
Fusarium heterosporum	
Fusarium moniliforme	
Fusarium moniliforme var. subglutinans	
Fushitsunagia catenata	
Gahnia aristata	
Gahnia decomposita	
Gahnia trifida	
Galaxias maculatus	
Galaxias occidentalis	
Galinsoga parviflora	
Galium aparine	
Galium divaricatum	

Galium murale	
Galium sp.	
Galium sp. indet	
Gallicolumba jobiensis	
Gallinula tenebrosa	
Gallinula tenebrosa subsp. tenebrosa	
Gallinula ventralis	
Gallirallus philippensis	
Gallirallus philippensis subsp. mellori	
Gallus gallus	
Gambusia affinis	
Gamochaeta coarctata	
Gamochaeta pensylvanica	
Ganoderma australe	
Ganoderma sp.	
Gastridium phleoides	
Gastrolobium acutum	
Gastrolobium alternifolium	
Gastrolobium bilobum	
Gastrolobium calycinum	
Gastrolobium capitatum	
Gastrolobium celsianum	
Gastrolobium dilatatum	
Gastrolobium ebracteolatum	
Gastrolobium epacridoides	
Gastrolobium hookeri	
Gastrolobium linearifolium	
Gastrolobium nervosum	
Gastrolobium oxylobioides	
Gastrolobium parviflorum	
Gastrolobium praemorsum	
Gastrolobium retusum	
Gastrolobium spathulatum	
Gastrolobium spinosum	
Gastrolobium villosum	
Gavicalis virescens	
Gazania linearis	
Gazania sp.	
Gea theridioides	
Geastrum fornicatum	
Geastrum sp.	
Geastrum triplex	
Gehyra variegata	
Gelidiopsis intricata	
Gemmabryum cheelii	
Gemmabryum chrysoneuron	
Gemmabryum dichotomum	
Gemmabryum inaequale	
Gemmabryum pachythecum	
Gemmabryum preissianum	

Gemmabryum sullivanii	
Genista linifolia	
Geocrinia leai	
Geogarypus taylori	
Geoglossum cookeianum	
Geoglossum sp.	
Geopelia cuneata	
Geotria australis	P3
Geranium molle	
Geranium retrorsum	
Geranium solanderi	
Gerres subfasciatus	
Gerygone fusca	
Gerygone fusca subsp. fusca	
Gigaspermum repens	
Gladiolus alatus	
Gladiolus angustus	
Gladiolus carneus	
Gladiolus caryophyllaceus	
Gladiolus undulatus	
Gladiolus watsonius	
Glandularia aristigera	
Glebionis coronaria	
Gleditsia triacanthos	
Glinus lotoides	
Glischrocaryon angustifolium	
Glischrocaryon aureum	
Glischrocaryon aureum var. aureum	
Gloeocystidiellum sp.	
Gloeophyllum sepiarium	
Gloeoporus adustus	
Gloeoporus dichrous	
Gloiothele globosa	
Glossiphoniidae sp.	
Glossopsitta concinna	
Glossopsitta porphyrocephala	
Glossostigma diandrum	
Glossostigma drummondii	
Glossurocolletes bilobatus	P2
Glyceria declinata	
Glyciphila melanops	
Gnaphalium sp. indet.	
Gnephosis angianthoides	
Gnephosis drummondii	
Gnephosis tenuissima	
Gnephosis tenuissima - drummondii complex	
Gnephosis tenuissima-drummondii complex	
Gobiomorphus coxii	
Gomphidae sp.	
Gomphocarpus fruticosus	

Gomphocarpus physocarpus	
Gompholobium aristatum	
Gompholobium capitatum	
Gompholobium confertum	
Gompholobium knightianum	
Gompholobium marginatum	
Gompholobium ovatum	
Gompholobium polymorphum	
Gompholobium preissii	
Gompholobium scabrum	
Gompholobium shuttleworthii	
Gompholobium tomentosum	
Gonocarpus benthamii subsp. benthamii	
Gonocarpus cordiger	
Gonocarpus diffusus	
Gonocarpus nodulosus	
Gonocarpus paniculatus	
Gonocarpus pithyoides	
Gonocarpus sp.	
Gonorynchus greyi	
Goodenia aff micrantha	
Goodenia arthrotricha	EN
Goodenia caerulea	
Goodenia claytoniacea	
Goodenia coerulea	
Goodenia drummondii subsp. megaphylla	
Goodenia fasciculata	
Goodenia incana	
Goodenia micrantha	
Goodenia pinifolia	
Goodenia pulchella	
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)	
Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)	
Goodenia pusilla	
Goodenia scapigera	
Gracilaria confervoides forma tumida	
Gracilaria gracilis	
Gracilaria sp.	
Gracilaria verrucosa	
Gracula religiosa	
Grallina cyanoleuca	
Grammatotheca bergiana var. bergiana	
Graphis sp.	
Gratiola peruviana	
Gratiola pubescens	
Grevillea bipinnatifida	
Grevillea bipinnatifida subsp. bipinnatifida	
Grevillea biternata	
Grevillea crithmifolia	
Grevillea curviloba subsp. incurva	EN

Grevillea curviloba subsp. incurva x manglesii subsp. manglesii	
Grevillea diversifolia subsp. diversifolia	
Grevillea endlicheriana	
Grevillea flexuosa	VU
Grevillea leucopteris	
Grevillea manglesii	
Grevillea manglesii subsp. dissectifolia	P3
Grevillea manglesii subsp. manglesii	
Grevillea manglesii subsp. ornithopoda	P2
Grevillea obtusifolia	
Grevillea paniculata	
Grevillea paniculata x vestita	
Grevillea pilulifera	
Grevillea pimeleoides	P4
Grevillea preissii subsp. preissii	
Grevillea pulchella subsp. ascendens	
Grevillea quercifolia	
Grevillea synapheae	
Grevillea synapheae subsp. synapheae	
Grevillea thelemanniana	CR
Grevillea vestita	
Grevillea vestita subsp. vestita	
Grevillea wilsonii	
Griffithsia crassiuscula	
Grifola berkeleyi	
Grifola sp.	
Grimmia laevigata	
Gripopterygidae sp.	
Guichenotia micrantha	
Guichenotia sarotes	
Gymnapistes marmoratus	
Gymnopilus allantopus	
Gymnopilus crociphyllus	
Gymnopilus junonius	
Gymnopilus marginatus	
Gymnopilus perplexus	
Gymnopilus purpuratus	
Gymnopilus sp.	
Gymnostomum calcareum	
Gymnothorax richardsoni	
Gyrinidae sp.	
Gyroporus cyanescens	
Gyroporus mcnabbii	
Gyroporus occidentalis	
Gyroporus sp.	
Gyrostemon ramulosus	
Gyrostemon subnudus	
Haematopus fuliginosus	
Haematopus longirostris	
Haemodorum brevisepalum	

Haemodorum discolor	
Haemodorum laxum	
Haemodorum loratum	P3
Haemodorum paniculatum	
Haemodorum simplex	
Haemodorum simulans	
Haemodorum sp.	
Haemodorum sp. indet.	
Haemodorum sparsiflorum	
Haemodorum spicatum	
Hakea amplexicaulis	
Hakea auriculata	
Hakea candolleana	
Hakea ceratophylla	
Hakea conchifolia	
Hakea costata	
Hakea cristata	
Hakea cyclocarpa	
Hakea erinacea	
Hakea incrassata	
Hakea laurina	
Hakea lissocarpha	
Hakea myrtoides	
Hakea neospathulata	
Hakea petiolaris	
Hakea petiolaris subsp. petiolaris	
Hakea prostrata	
Hakea recurva subsp. recurva	
Hakea ruscifolia	
Hakea sp. Eastern coastal plain (G.J. Keighery 8014)	
Hakea stenocarpa	
Hakea sulcata	
Hakea trifurcata	
Hakea undulata	
Hakea varia	
Halgania corymbosa	P3
Haliaeetus leucogaster	
Haliastur sphenurus	
Halimeda sp.	
Halobaena caerulea	
Haloplegma preissii	
Haloragis scoparia	P1
Halosarcia halocnemoides	
Hamirostra isura	
Hardenbergia comptoniana	
Harknessia uromycoides	
Harperia lateriflora	
Harrisius sp. A (SAP)	
Harrisius sp. B (SFM)	
Hasarius adansoni	

Hebeloma aminophilum	
Hebeloma crustuliniforme	
Hebeloma sp.	
Hebeloma westraliense	
Hebridae sp.	
Hedypnois rhagadioloides	
Hedypnois rhagadioloides subsp. cretica	
Heleioporus albopunctatus	
Heleioporus barycragus	
Heleioporus eyrei	
Heleioporus inornatus	
Heleioporus psammophilus	
Heleioporus sp.	
Helianthus annuus	
Helianthus debilis subsp. cucumerifolius	
Helianthus tuberosus	
Helichrysum cordatum	
Helichrysum leucopsideum	
Helichrysum luteoalbum	
Heliophila pusilla	
Heliotropium amplexicaule	
Heliotropium curassavicum	
Hellyethira litua	
Hellyethira sp.	
Helminthotheca echioides	
Hemarthria uncinata	
Hemarthria uncinata var. uncinata	
Hemiandra glabra	
Hemiandra incana	
Hemiandra linearis	
Hemiandra pungens	
Hemiandra sp.	
Hemiandra sp. Jurien (B.J. Conn & M.E. Tozer BJC 3885)	
Hemicloea sp.	
Hemicloea sublimbata	
Hemicordulia tau	
Hemicorduliidae sp.	
Hemidactylus frenatus	
Hemiergis initialis	
Hemiergis initialis subsp. initialis	
Hemiergis peronii	
Hemiergis peronii subsp. peronii	
Hemiergis quadrilineata	
Hemigenia argentea	
Hemigenia incana	
Hemigenia parviflora	
Hemigenia pritzelii	
Hemigenia sericea	
Hemigenia sp.	
Hemimycena sp.	

Hemiphora bartlingii	
Hemiphora uncinata	
Hemitrichia calyculata	
Henicops dentatus	
Hensmania turbinata	
Hertelidea pseudobotryosa	
Hesperantha falcata	
Heteronotia binoei	
Heurodes turritus	
Hexagonia vesparia	
Hexagonia vesparius	
Hibbertia acerosa	
Hibbertia aff. glomerata	
Hibbertia amplexicaulis	
Hibbertia aurea	
Hibbertia commutata	
Hibbertia cuneiformis	
Hibbertia diamesogenos	
Hibbertia glomerata subsp. darlingensis	
Hibbertia hemignosta	
Hibbertia huegelii	
Hibbertia huegelii complex	
Hibbertia hypericoides	
Hibbertia hypericoides subsp. hypericoides	
Hibbertia lasiopus	
Hibbertia montana	
Hibbertia montana / ovata	
Hibbertia mylnei	
Hibbertia nymphaea	
Hibbertia ovata	
Hibbertia perfoliata	
Hibbertia pilosa	
Hibbertia quadricolor	
Hibbertia racemosa	
Hibbertia serrata	
Hibbertia sp.	
Hibbertia spicata	
Hibbertia spicata subsp. leptotheca	
Hibbertia spicata subsp. spicata	
Hibbertia stellaris	
Hibbertia striata	
Hibbertia subvaginata	
Hibbertia vaginata	
Hibiscus diversifolius	
Hibiscus diversifolius subsp. diversifolius	
Hibiscus mutabilis	
Hieraaetus morphnoides	
Himantopus himantopus	
Hippocampus elongatus	
Hirundo ariel	

Hirundo neoxena	
Hirundo nigricans	
Hirundo nigricans subsp. nigricans	
Histrio histrio	
Hoggicosa storri	
Hogna crispipes	
Hogna immansueta	
Hogna kuyani	
Hohenbuehelia bingarra	
Hohenbuehelia petaloides	
Hohenbuehelia sp.	
Holasteron perth	
Holasteron wamuseum	
Holconia insignis	
Holconia westralia	
Holcus lanatus	
Holcus setiger	
Holocnemus pluchei	
Holoplatys fusca	
Homalosciadium homalocarpum	
Homalospermum firmum	
Homeria flaccida	
Hordeum glaucum	
Hordeum leporinum	
Hordeum marinum	
Hordeum vulgare	
Hovea chorizemifolia	
Hovea pungens	
Hovea sp.	
Hovea trisperma	
Hovea trisperma var. grandiflora	
Hovea trisperma var. trisperma	
Humulus lupulus	
Hyalosperma cotula	
Hyalosperma demissum	
Hyalosperma simplex subsp. simplex	
Hybanthus calycinus	
Hybanthus floribundus	
Hybanthus floribundus subsp. floribundus	
Hybanthus sp.	
Hydnangium archeri	
Hydnangium carneum	
Hydnangium sp.	
Hydnellum scrobiculatum	
Hydnellum sp.	
Hydnellum zonatum	
Hydnomerulius pinastri	
Hydnum repandum	
Hydnum rufescens	
Hydnum sp.	

Hydrilla verticillata	
Hydrocotyle alata	
Hydrocotyle blepharocarpa	
Hydrocotyle callicarpa	
Hydrocotyle diantha	
Hydrocotyle lemnoides	P4
Hydrocotyle pilifera	
Hydrocotyle pilifera var. pilifera	
Hydrocotyle ranunculoides	
Hydrocotyle sp. indet.	
Hydrocotyle striata	P1
Hydrometridae sp.	
Hydromys chrysogaster	P4
Hydrophilidae sp.	
Hydroprogne caspia	MI
Hydropsychidae sp.	
Hydroptilidae sp.	
Hygrocybe astatogala	
Hygrocybe conica forma conica	
Hygrocybe polychroma	
Hygrocybe sp.	
Hygrophorus sp.	
Hylacola cauta subsp. whitlocki	
Hylaeus globuliferus	P3
Hymenochaete semistupposa	
Hymenogaster sp.	
Hymenoscyphus immutabilis	
Hymenoscyphus sp.	
Hyparrhenia hirta	
Hypericum canariense	
Hypericum gramineum	
Hypholoma australe	
Hypholoma ericaeum	
Hypholoma fasciculare	
Hypoblemum sp.	
Hypocalymma angustifolium	
Hypocalymma angustifolium subsp. Dandaragan plateau (S. Patrick 702A)	
Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)	
Hypocalymma robustum	
Hypocenomyce australis	
Hypochaeris glabra	
Hypochaeris radicata	
Hypocrea citrina	
Hypocrea gelatinosa	
Hypocrea sp.	
Hypogymnia subphysodes var. austerodioides	
Hypolaena exsulca	
Hypolaena pubescens	
Hypolaena robusta	P4
Hypolaena sp.	

Hypomyces sp.	
Hyporhamphus regularis	
Hypoxis occidentalis	
Hypoxylon bovei	
Hypoxylon sp.	
Hyriidae sp.	
Hysterangium salmonaceum	
Hysterangium sp.	
Idiommata blackwalli	
Idiosoma hirsutum	
Idiosoma sigillatum	P3
Ileodictyon gracile	
Imleria badia	
Indigofera colutea	
Inocybe australiensis	
Inocybe campestris	
Inocybe clypeata	
Inocybe curvipes	
Inocybe emergens	
Inocybe fibrillosibrunnea	
Inocybe fissurata	
Inocybe froudistii	
Inocybe gomphocephala	
Inocybe isabellina	
Inocybe rufuloides	
Inocybe serrata group	
Inocybe sindonia	
Inocybe sp.	
Inocybe spadicea var. latispora	
Inocybe subferruginea	
Inocybe subflavospora	
Inocybe tomentipes	
Inocybe violaceocaulis	
Inonotus sp.	
Iochroma sp.	
Ipomoea cairica	
Ipomoea indica	
Ipomoea sp.	
Iris unguicularis	
Isoetes australis	
Isoetes drummondii	
Isoetes sp.	
Isolepis cernua	
Isolepis cernua var. cernua	
Isolepis cernua var. setiformis	
Isolepis cyperoides	
Isolepis hookeriana	
Isolepis hystrix	
Isolepis marginata	
Isolepis oldfieldiana	

Isolepis prolifera	
Isolepis sp.	
Isolepis stellata	
Isometroides vescus	
Isoodon fusciventer	P4
Isoodon fusciventer (Quenda)	
Isoodon obesulus	
Isoodon obesulus fusciventer	
Isoodon obesulus subsp. fusciventer	
Isopeda leishmanni	
Isopeda magna	
Isopedella cana	
Isopedella tindalei	
Isopogon asper	
Isopogon divergens	
Isopogon drummondii	
Isopogon dubius	
Isopogon sphaerocephalus	
Isotoma hypocrateriformis	
Isotoma pusilla	
Isotoma scapigera	
Isotropis cuneifolia	
Isotropis cuneifolia subsp. cuneifolia	
Isotropis cuneifolia subsp. glabra	P3
Ixia maculata	
Ixia maculata hybrid	
Ixia paniculata	
Ixia polystachya	
Ixiolaena viscosa	
Ixobrychus dubius	P4
Ixobrychus flavicollis subsp. australis	P2
Ixobrychus flavicollis subsp. australis (southwest subpop.)	
Ixobrychus minutus	
Ixobrychus minutus subsp. dubius	
Ixodes australiensis	
Ixodes fecialis	
Ixodes hydromyidis	
Ixodes tasmani	
Jacaranda mimosifolia	
Jacksonia alata	
Jacksonia angulata	
Jacksonia calcicola	
Jacksonia condensata	
Jacksonia densiflora	
Jacksonia floribunda	
Jacksonia furcellata	
Jacksonia gracillima	P3
Jacksonia lehmannii	
Jacksonia restioides	
Jacksonia sericea	P4

Jacksonia sternbergiana	
Jamesoniella colorata	
Johnsonia pubescens	
Johnsonia pubescens subsp. cygnorum	P2
Johnsonia pubescens subsp. pubescens	
Juncus acutus	
Juncus acutus subsp. acutus	
Juncus amabilis	
Juncus aridicola	
Juncus aridicola x subsecundus	
Juncus articulatus	
Juncus bufonius	
Juncus caespiticius	
Juncus capitatus	
Juncus holoschoenus	
Juncus kraussii	
Juncus kraussii subsp. australiensis	
Juncus microcephalus	
Juncus oxycarpus	
Juncus pallidus	
Juncus pallidus x subsecundus	
Juncus pauciflorus	
Juncus planifolius	
Juncus sp.	
Juncus sp. indet.	
Juncus subsecundus	
Juncus usitatus	
Kangarosa ludwigi	
Kangarosa properipes	
Karaops ellenae	
Karaops jarrit	
Kawaniphila pachomai	P1
Kennedia carinata	
Kennedia coccinea	
Kennedia coccinea subsp. coccinea	
Kennedia prostrata	
Kennedia rubicunda	
Kennedia sp.	
Kennedia stirlingii	
Kickxia elatine	
Kickxia elatine subsp. crinita	
Kickxia elatine subsp. elatine	
Kickxia spuria	
Kiefferulus intertinctus	
Kiefferulus martini	
Kingia australis	
Kunzea ericifolia	
Kunzea glabrescens	
Kunzea micrantha	
Kunzea micrantha / recurva	

Kunzea micrantha subsp. micrantha	
Kunzea micrantha subsp. petiolata	
Kunzea praestans	
Kunzea pulchella	
Kunzea recurva	
Kunzea sp.	
Kunzea x recurva	
Kurtia argillacea	
Labichea lanceolata	
Labichea lanceolata subsp. lanceolata	
Labichea punctata	
Lablab purpureus	
Labyrinthomyces sp.	
Labyrinthomyces varius	
Laccaria laccata	
Laccaria lateritia	
Laccaria ohiensis	
Laccaria sp.	
Laccocephalum tumulosum	
Lachenalia aloides	
Lachenalia bulbifera	
Lachenalia mutabilis	
Lachenalia reflexa	
Lachnagrostis aemula	
Lachnagrostis filiformis	
Lachnagrostis plebeia	
Lachnostachys verbascifolia var. verbascifolia	
Lachnum sp.	
Lachnum virgineum	
Lactarius clarkeae	
Lactarius eucalypti	
Lactarius sp.	
Lactuca saligna	
Lactuca serriola	
Lactuca serriola forma serriola	
Laetiporus portentosus	
Lagenifera huegelii	
Lagenophora huegelii	
Lagunaria patersonia	
Lagurus ovatus	
Lalage tricolor	
Lambertia multiflora	
Lambertia multiflora var. darlingensis	
Lampona brevipes	
Lampona cylindrata	
Lampona punctigera	
Lampona yanchep	
Lamponella ainslie	
Lamprochernes savignyi	
Lamproderma arcyrioides	

Lamproderma scintillans	
Lamprospora sp.	
Lancetes lanceolatus	
Lancetes sp.	
Landoltia punctata	
Lantana camara	
Lantana camara var. camara	
Larus dominicanus	
Larus novaehollandiae	
Larus novaehollandiae subsp. novaehollandiae	
Lasiopetalum bracteatum	P4
Lasiopetalum floribundum	
Lasiopetalum glabratum	
Lasiopetalum glutinosum subsp. glutinosum	P3
Lasiopetalum glutinosum subsp. latifolium	
Lasiopetalum membranaceum	P3
Lasiosphaeria ovina	
Lathyrus tingitanus	
Latrobea tenella	
Latrodectus hasselti	
Latrodectus hasseltii	
Laurencia obtusa	
Lavandula dentata var. candicans	
Lavandula stoechas	
Lavandula stoechas subsp. stoechas	
Lawrencella rosea	
Lawrencia squamata	
Laxitextum bicolor	
Laxmannia grandiflora	
Laxmannia grandiflora subsp. grandiflora	
Laxmannia ramosa	
Laxmannia ramosa subsp. ramosa	
Laxmannia sessiliflora	
Laxmannia sessiliflora subsp. australis	
Laxmannia sp.	
Laxmannia squarrosa	
Lecanora flavopallida	
Lecanora livido-cinerea	
Lecanora sp.	
Lechenaultia biloba	
Lechenaultia expansa	
Lechenaultia floribunda	
Lecidea ochroleuca	
Leiopotherapon unicolor	
Leioproctus douglasiellus	EN
Leioproctus sp.	
Leipoa ocellata	VU
Lemna disperma	
Lentinellus cochleatus	
Lentinellus pulvinulus	

Lentinellus sp.	
Lentinus giganteus	
Lentinus strigosus	
Leocarpus fragilis	
Leocarpus sp.	
Leonotis leonurus	
Leonotis nepetifolia	
Leontodon rhagadioloides	
Leontodon saxatilis	
Lepidium didymum	
Lepidobolus preissianus	
Lepidobolus preissianus subsp. preissianus	
Lepidobolus preissianus subsp. preissianus / volubilis	
Lepidosperma angustatum	
Lepidosperma apricola	
Lepidosperma asperatum	
Lepidosperma costale	
Lepidosperma drummondii	
Lepidosperma eastern terete (BJK&NG 232)	
Lepidosperma effusum	
Lepidosperma gladiatum	
Lepidosperma gladiatum x angustatum	
Lepidosperma leptostachyum	
Lepidosperma longitudinale	
Lepidosperma obtusum	
Lepidosperma oldhamii	
Lepidosperma pruinosum	
Lepidosperma pubisquameum	
Lepidosperma resinosum	
Lepidosperma rostratum	EN
Lepidosperma scabrum	
Lepidosperma sp.	
Lepidosperma sp. (coastal terete varient) (BJK&NG 231)	
Lepidosperma sp. (E - Flora Perth Region)	
Lepidosperma sp. Brixton Street	
Lepidosperma sp. Brixton Street broad inflorescence	
Lepidosperma sp. Darling Range Heath	
Lepidosperma sp. Darling Scarp	
Lepidosperma sp. Gosnells (A. Markey 1145)	
Lepidosperma sp. indet.	
Lepidosperma sp. Margaret River (B.J. Lepschi 1841)	
Lepidosperma sp. Norwood (G. Smith 162)	
Lepidosperma sp. P1 small head (M.D. Tindale 166A)	
Lepidosperma squamatum	
Lepidosperma squamatum s.l.	
Lepidosperma striatum	
Lepidosperma tenue	
Lepidosperma tetraquetrum	
Lepidosperma tuberculatum	
Lepidozia glaucophylla	

Lepiota booloola	
Lepiota exocarpi	
Lepiota konradii	
Lepiota lutea	
Lepiota rhacodes	
Lepiota sp.	
Lepista nuda	
Lepista sordida	
Lepista sp.	
Leporella fimbriata	
Lepraria sp.	
Leptobryum pyriforme	
Leptocarpus aristatus	
Leptocarpus canus	
Leptocarpus coangustatus	
Leptocarpus decipiens	
Leptocarpus kraussii	
Leptocarpus laxus	
Leptocarpus roycei	
Leptocarpus scariosus	
Leptocarpus sp.	
Leptocarpus tenax	
Leptocarpus tephrinus	
Leptoceras menziesii	
Leptoceridae sp.	
Leptogium azureum	
Leptogium menziesii	
Leptomeria cunninghamii	
Leptomeria empetriformis	
Leptomeria pauciflora	
Leptonia incana	
Leptonia sp.	
Leptoperla australica	
Leptophlebiidae sp.	
Leptospermum continentale	
Leptospermum erubescens	
Leptospermum laevigatum	
Leptospermum sericeum	
Leptospermum spinescens	
Leptosphaeria maculans	
Leptosphaeria sp.	
Leptosphaerulina trifolii	
Lepyrodia curvescens	P2
Lepyrodia glauca	
Lepyrodia heleocharoides	P3
Lepyrodia macra	
Lepyrodia muirii	
Lepyrodia riparia	
Lerista distinguenda	
Lerista elegans	

Lerista gerrardii	
Lerista lineata	P3
Lerista lineopunctulata	
Lerista praepedita	
Lespedeza juncea subsp. sericea	
Lethocolea pansa	
Leucaena leucocephala	
Leucauge dromedaria	
Leucoagaricus leucothites	
Leucoagaricus macrorhizus	
Leucoagaricus sp.	
Leucocoprinus fragilissimus	
Leucojum aestivum	
Leucopaxillus lilacinus	
Leucopogon aff. nutans	
Leucopogon aff. oliganthus	
Leucopogon australis	
Leucopogon capitellatus	
Leucopogon conostephioides	
Leucopogon darlingensis subsp. darlingensis	
Leucopogon glaucifolius	
Leucopogon gracillimus	
Leucopogon hirsutus	
Leucopogon nutans	
Leucopogon oxycedrus	
Leucopogon parviflorus	
Leucopogon polymorphus	
Leucopogon propinquus	
Leucopogon pulchellus	
Leucopogon racemulosus	
Leucopogon sp.	
Leucopogon sp. Great Southern (R.S. Cowan A 586)	
Leucopogon sp. Parkerville (A. Meebold 11654)	
Leucopogon sprengelioides	
Leucopogon squarrosus	
Leucopogon squarrosus subsp. squarrosus	
Leucopogon strictus	
Leucopogon tenuis	
Leucopogon verticillatus	
Levenhookia preissii	P1
Levenhookia pusilla	
Levenhookia stipitata	
Lialis burtonis	
Libellulidae sp.	
Licea biforis	
Licea kleistobolus	
Licea minima	
Lichenomphalia sp.	
Lichenomphalia umbellifera	
Lichenostomus leucotis	

Lichenostomus ornatus	
Lichenostomus virescens	
Lichmera indistincta	
Lichmera indistincta subsp. indistincta	
Ligustrum ovalifolium	
Limacella ochraceolutea	
Limacella pitereka	
Limnesiidae sp.	
Limnobium laevigatum	
Limnochares australica	
Limnodynastes dorsalis	
Limnoxenus sp.	
Limonium sp.	
Limosa lapponica	MI
Limosa limosa	MI
Linaria maroccana	
Linaria sp.	
Lindsaea linearis	
Lindtneria chordulata	
Linum marginale	
Linum trigynum	
Linum usitatissimum	
Linyphia cupidinea	
Liparophyllum capitatum	
Liparophyllum violifolium	
Lissanthe sp.	
Lissolepis luctuosa	
Litoria adelaidensis	
Litoria moorei	
Litschauerella gladiola	
Lobelia alata	
Lobelia anceps	
Lobelia gibbosa	
Lobelia heterophylla	
Lobelia rhombifolia	
Lobelia rhytidosperma	
Lobelia tenuior	
Lobularia maritima	
Logania campanulata	
Logania vaginalis	
Logfia gallica	
Lolium loliaceum	
Lolium multiflorum	
Lolium perenne	
Lolium perenne x rigidum	
Lolium remotum	
Lolium rigidum	
Lolium sp.	
Lolium temulentum forma arvense	
Lolium temulentum forma temulentum	

Lolium x hybridum	
Lomandra ?caespitosa	
Lomandra brittanii	
Lomandra caespitosa	
Lomandra hermaphrodita	
Lomandra integra	
Lomandra maritima	
Lomandra micrantha	
Lomandra micrantha subsp. micrantha	
Lomandra nigricans	
Lomandra odora	
Lomandra preissii	
Lomandra purpurea	
Lomandra sericea	
Lomandra sonderi	
Lomandra sp.	
Lomandra sp. indet.	
Lomandra spartea	
Lomandra suaveolens	
Lonchura castaneothorax	
Longepi woodman	
Longrita insidiosa	
Lonicera japonica	
Lophochroa leadbeateri	
Lophognathus longirostris	
Lophoictinia isura	
Lophostemon sp.	
Lotus angustissimus	
Lotus hispidus	
Lotus sp.	
Lotus sp. indet.	
Lotus subbiflorus	
Lotus uliginosus	
Loxocarya cinerea	
Loxocarya fasciculata	
Loxocarya flexuosa	
Loxocarya sp.	
Loxocarya striata	
Lucasium alboguttatum	
Ludwigia repens	
Lupinus angustifolius	
Lupinus cosentinii	
Lupinus luteus	
Luzula meridionalis	
Lychas sp.	
Lychas splendens	
Lycium ferocissimum	
Lycogala epidendrum	
Lycosa ariadnae	
Lycosa australicola	

Lycosa gilberta	
Lycosa godeffroyi	
Lyginia barbata	
Lyginia barbata/imberbis	
Lyginia imberbis	
Lyginia sp.	
Lymnaeidae sp.	
Lynceus sp.	
Lyperanthus nigricans	
Lyperanthus serratus	
Lysiana casuarinae	
Lysimachia arvensis	
Lysimachia minima	
Lysinema ciliatum	
Lysinema elegans	
Lysinema pentapetalum	
Lythrum hyssopifolia	
Lythrum junceum	
Macarthuria apetala	
Macarthuria australis	
Macarthuria keigheryi	EN
Macrogyrus angustatus	
Macrohyporia dictyopora	
Macrolepiota clelandii	
Macrolepiota turbinata	
Macronectes giganteus	MI
Macropidia fuliginosa	
Macroptilium atropurpureum	
Macropus eugenii subsp. derbianus	
Macropus fuliginosus	
Macropus irma	
Macropus robustus subsp. erubescens	
Macropus sp.	
Macrotis lagotis	VU
Macrozamia fraseri	
Macrozamia riedlei	
Malacorhynchus membranaceus	
Malajczukia viridigleba	
Malleostemon tuberculatus	
Mallocybe sp.	
Malurus elegans	
Malurus lamberti	
Malurus leucopterus	
Malurus pulcherrimus	
Malurus sp.	
Malurus splendens	
Malurus splendens subsp. splendens	
Malus domestica	
Malva parviflora	
Malva pseudolavatera	

Malvaviscus arboreus	
Manorina flavigula	
Marasmius siccus	
Maratus mungaich	
Maratus pavonis	
Maratus spicatus	
Marchantia berteroana	
Marchantia inflexa	
Marianthus bicolor	
Marianthus candidus	
Marianthus coeruleopunctatus	
Marianthus drummondianus	
Marianthus erubescens	
Marsilea drummondii	
Marsilea mutica	
Masasteron maini	
Masasteron mas	
Masasteron tuart	
Mauranthemum paludosum	
Mazoyerella australis	
Medicago arabica	
Medicago laciniata	
Medicago littoralis	
Medicago minima	
Medicago polymorpha	
Medicago sativa	
Meeboldina cana	
Meeboldina coangustata	
Megalurus gramineus	
Megalurus gramineus subsp. gramineus	
Megapodagrionidae sp.	
Megaporus solidus	
Megaporus sp.	
Megathyrsus maximus var. maximus	
Meionectes brownii	
Meionectes tenuifolia	P3
Melaleuca acerosa	
Melaleuca acutifolia	
Melaleuca aff. scabra	
Melaleuca armillaris	
Melaleuca armillaris subsp. armillaris	
Melaleuca aspalathoides	
Melaleuca brevifolia	
Melaleuca calothamnoides	
Melaleuca citrina	
Melaleuca cuticularis	
Melaleuca fulgens	
Melaleuca fulgens subsp. fulgens	
Melaleuca huegelii	
Melaleuca huegelii subsp. huegelii	

Melaleuca incana	
Melaleuca incana subsp. incana	
Melaleuca lanceolata	
Melaleuca lateritia	
Melaleuca leucadendra	
Melaleuca linariifolia	
Melaleuca megacephala	
Melaleuca nervosa	
Melaleuca nesophila	
Melaleuca osullivanii	
Melaleuca parviceps	
Melaleuca pauciflora	
Melaleuca preissiana	
Melaleuca quinquenervia	
Melaleuca radula	
Melaleuca rhaphiophylla	
Melaleuca ryeae	
Melaleuca scabra	
Melaleuca seriata	
Melaleuca sp.	
Melaleuca sp. (BJK & NG 054)	
Melaleuca subtrigona	
Melaleuca systena	
Melaleuca teretifolia	
Melaleuca thymoides	
Melaleuca trichophylla	
Melaleuca viminalis	P2
Melaleuca viminea	
Melaleuca viminea subsp. viminea	
Melampsora coleosporioides	
Melampsora euphorbiaegerardianae	
Melampsora larici-populina	
Melampsora lini	
Melampsora ricini	
Melampsora sp.	
Melampsoridium betulinum	
Melanodryas cucullata	
Melanoleuca cognata	
Melanoleuca fusca	
Melanoleuca melaleuca	
Melanoleuca sp.	
Melanotus hepatochrous	
Melia azedarach	
Melilotus albus	
Melilotus indicus	
Melilotus sp.	
Melinis minutiflora	
Melinis repens	
Melithreptus brevirostris	
Melithreptus brevirostris subsp. leucogenys	

Melithreptus chloropsis	
Melithreptus lunatus	
Melopsittacus undulatus	
Menetia greyii	
Mentha sp.	
Mentha spicata	
Mentha suaveolens	
Mentha x piperita var. citrata	
Merismodes sp.	
Merops ornatus	
Merulius corium	
Mesomelaena graciliceps	
Mesomelaena pseudostygia	
Mesomelaena tetragona	
Mesophellia glauca	
Mesophellia sabulosa	
Mesophellia sp.	
Microcanthus strigatus	
Microcarbo melanoleucos	
Microcoleus acutissimus	
Microcoleus sp.	
Microcorys longifolia	
Microdiplodia sp.	
Microeca fascinans	
Microlaena stipoides	
Micronecta robusta	
Micronecta sp.	
Microtis alba	
Microtis alboviridis	
Microtis atrata	
Microtis cupularis	
Microtis familiaris	
Microtis media	
Microtis media subsp. densiflora	
Microtis media subsp. media	
Microtis sp.	
Millotia myosotidifolia	
Millotia sp. indet.	
Millotia tenuifolia	
Millotia tenuifolia var. tenuifolia	
Milvus migrans	
Miniargiolestes minimus	
Minuartia mediterranea	
Mirabilis jalapa	
Mirbelia dilatata	
Mirbelia floribunda	
Mirbelia ramulosa	
Mirbelia spinosa	
Misopates orontium	
Missulena granulosa	

Missulena hoggi	
Missulena occatoria	
Mitrasacme paradoxa	
Mituliodon tarantulinus	
Miturga catograpta	
Mitzoruga insularis	
Miyagia pseudosphaeria	
Modiola caroliniana	
Molycria quadricauda	
Momordica balsamina	
Momordica charantia	
Monacanthus chinensis	
Monacrosporium sp.	
Monadenia bracteata	
Monoculus monstrosus	
Monodictys sp.	
Monopsis debilis	
Monopsis debilis var. depressa	
Monosporus australis	
Monotaxis grandiflora	
Monotaxis grandiflora var. grandiflora	
Monotaxis occidentalis	
Moraea flaccida	
Moraea lewisiae	
Moraea miniata	
Moraea ochroleuca	
Moraea setifolia	
Moraea vegeta	
Morchella elata	
Morchella esculenta	
Morchella sp.	
Morelia spilota subsp. imbricata	
Morelia spilota subsp. variegata	
Morethia lineoocellata	
Morethia obscura	
Mormopterus kitcheneri	
Mormopterus planiceps	
Morus alba	
Morus serrator	
Muehlenbeckia adpressa	
Muehlenbeckia polybotrya	
Mugil cephalus	
Multiclavula mucida	
Muraenichthys sp.	
Muraenichthys tasmaniensis	
Mus musculus	
Musa acuminata	
Mustela putorius	
Myandra bicincta	
Myandra cambridgei	

Mycena alcalina	
Mycena algeriensis	
Mycena carmeliana	
Mycena clarkeana	
Mycena galericulata	
Mycena judithiana	
Mycena kuurkacea	
Mycena lactea	
Mycena latifolia	
Mycena madronicola	
Mycena nargan	
Mycena sp.	
Mycena subgalericulata	
Mycena vinacea	
Mycosphaerella brassicicola	
Mycosphaerella dianthi	
Mycosphaerella fragariae	
Mycosphaerella pinodes	
Mycosphaerella tassiana	
Myiagra inquieta	
Myobatrachus gouldii	
Myoporum caprarioides	
Myriocephalus appendiculatus	
Myriocephalus isoetes	
Myriocephalus occidentalis	
Myriophyllum aquaticum	
Myriophyllum crispatum	
Myriophyllum drummondii	
Myriophyllum echinatum	P3
Myriophyllum limnophilum	
Myriophyllum sp.	
Myriophyllum tillaeoides	
Myrmecobius fasciatus	EN
Myrsiphyllum asparagoides	
Naididae sp.	
Nannoperca vittata	
Nanometa gentilis	
Narcissus papyraceus	
Narcissus tazetta	
Narcissus tazetta subsp. aureus	
Narcissus tazetta subsp. italicus	
Narcissus tazetta subsp. tazetta	
Neatypus obliquus	
Necterosoma darwini	
Necterosoma sp.	
Needhamiella pumilio	
Neelaps bimaculatus	
Neelaps bimaculatus (Black-naped Snake)	
Neelaps calonotos	P3
Nematalosa come	

Nematoda sp.	
Nemcia acuta	
Nemcia capitata	
Nemcia dilatata	
Nemcia reticulata	
Nemcia spathulata	
Neobatrachus pelobatoides	
Neochmia temporalis	
Neochmia temporalis subsp. temporalis	
Neopasiphae simplicior	EN
Neophema elegans	
Neophema petrophila	
Neophema pulchella	
Neosebastes pandus	
Nephila edulis	
Neurachne alopecuroidea	
Nicandra physalodes	
Nicodamus mainae	
Nicotiana glauca	
Nicotiana rotundifolia	
Nidula candida	
Ninox connivens	
Ninox novaeseelandiae	
Ninox novaeseelandiae subsp. boobook	
Ninox novaeseelandiae subsp. rufigaster	
Nolanea sp.	
Noltea africana	
Nomindra flavipes	
Notalina spira	
Notamacropus irma	P4
Notechis scutatus	
Notechis scutatus (Tiger Snake)	
Nothoscordum gracile	
Notiasemus glauerti	
Notodanthonia acerosa	
Notodanthonia setacea	
Notolabrus parilus	
Notonectidae sp.	
Notoperata sp. AV1 (SFM)	
Notsodipus muckera	
Novakiella trituberculosa	
Numenius madagascariensis	CR
Numenius madagascariensis subsp. cyanopus	
Numenius phaeopus	MI
Nunciella aspera	
Nuytsia floribunda	
Nycticorax caledonicus	
Nycticorax caledonicus subsp. hilli	
Nyctophilus geoffroyi	
Nyctophilus gouldi	

Nyctophilus timoriensis subsp. timoriensis	
Nymphaea mexicana	
Nymphaea odorata	
Nymphicus hollandicus	
Occiperipatoides gilesii	
Oceanites marinus subsp. dulciae	
Ochrolechia sp.	
Ocimum americanum	
Ocrisiona leucocomis	
Octospora carbonigena	
Ocyphaps lophotes	
Oecobius navus	
Oenothera affinis	
Oenothera drummondii	
Oenothera drummondii subsp. drummondii	
Oenothera glazioviana	
Oenothera jamesii	
Oenothera laciniata	
Oenothera lindheimeri	
Oenothera mollissima	
Oenothera sp.	
Oenothera speciosa	
Oenothera stricta	
Oenothera stricta subsp. stricta	
Offadens soror (ex genus 1 WA sp. 1)	
Oidium sp.	
Oidium tuckeri	
Olax benthamiana	
Olax scalariformis	
Olea europaea subsp. europaea	
Olearia axillaris	
Olearia elaeophila	
Olearia paucidentata	
Olearia rudis	
Oligochaeta sp.	
Oligonema schweinitzii	
Ommatoiulus moreleti	
Ommatoiulus moreletii	
Omphalotus nidiformis	
Oniscidae sp.	
Opercularia apiciflora	
Opercularia echinocephala	
Opercularia hispidula	
Opercularia vaginata	
Ophioglossum lusitanicum	
Ophisurus serpens	
Opopaea sp.	
Opuntia ficus-indica	
Opuntia monacantha	
Opuntia stricta	

Opuntia tomentosa	
Oratemnus curtus	
Orchidaceae sp.	
Orectolobus ornatus	
Orianthera campanulata	
Orianthera flaviflora	
Orianthera serpyllifolia subsp. angustifolia	
Oribatida sp.	
Ornduffia albiflora	
Ornduffia submersa	P4
Ornithogalum arabicum	
Ornithogalum thyrsoides	
Ornithopus compressus	
Ornithopus pinnatus	
Ornithopus sativus	
Orobanche minor	
Orphnaeus brevilabiatus	
Orthetrum caledonicum	
Orthocladiinae sp.	
Orthocladiinae 'woodminer' (SAP)	
Orthrosanthus laxus	
Orthrosanthus laxus var. gramineus	
Orthrosanthus laxus var. laxus	
Oryctolagus cuniculus	
Ostearius melanopygius	
Osteospermum clandestinum	
Osteospermum ecklonis	
Ostracoda (unident.)	
Ottelia ovalifolia	
Ottelia ovalifolia subsp. chrysobasis	
Ottelia ovalifolia subsp. ovalifolia	
Ovis aries	
Oxalis bowiei	
Oxalis caprina	
Oxalis corniculata	
Oxalis debilis var. corymbosa	
Oxalis exilis	
Oxalis glabra	
Oxalis incarnata	
Oxalis perennans	
Oxalis pes-caprae	
Oxalis purpurea	
Oxalis violacea	
Oxidae sp.	
Oxidus gracilis	
Oxyethira sp.	
Oxyopes gracilipes	
Oxyopes punctatus	
Oxyura australis	P4
Ozarchaea westraliensis	

Ozimops kitcheneri	
Ozothamnus cordatus	
Pachycephala occidentalis	
Pachycephala pectoralis	
Pachycephala pectoralis subsp. fuliginosa	
Pachycephala rufiventris	
Pachycephala rufiventris subsp. rufiventris	
Pachyptila belcheri	
Pachyptila desolata	
Pachyptila salvini	
Pachyptila turtur	
Padda oryzivora	
Palaemonidae sp.	
Pallavicinia lyellii	
Panaeolina foenisecii	
Panaeolus fimicola	
Panaeolus papilionaceus	
Panaeolus retirugis	
Panaeolus sp.	
Pandion cristatus	MI
Pandion haliaetus	
Pandion haliaetus subsp. cristatus	
Pandorea pandorana	
Panellus stipticus	
Panicum capillare	
Panicum hillmanii	
Panicum miliaceum	
Papaver rhoeas	
Papaver somniferum	
Papillogobius punctatus	
Parablennius postoculomaculatus	
Paracaleana brockmanii	
Paracaleana hortiorum	
Paracaleana nigrita	
Paracaleana sp. Laterite (G. Brockman GBB 3571)	
Parachironomus sp. 1 (VSCL35) (SAP)	
Paracladopelma M1 [SFM)	
Paradiacheopsis fimbriata	
Paragonis grandiflora	
Parakiefferiella sp. S1	
Paralampona marangaroo	
Paralimnophyes pullulus (V42)	
Paramelitidae sp.	
Paramerina levidensis	
Parapholis incurva	
Paraplectanoides crassipes	
Paraporpidia glauca	
Paraporpidia leptocarpa	
Paraserianthes lophantha	
Paraserianthes lophantha subsp. lophantha	

Parastacidae sp.	
Parasuta gouldii	
Parasuta nigriceps	
Pardalotus punctatus	
Pardalotus punctatus subsp. punctatus	
Pardalotus punctatus subsp. xanthopyge	
Pardalotus striatus	
Pardalotus striatus subsp. westraliensis	
Parentucellia latifolia	
Parentucellia viscosa	
Parietaria debilis	
Parietaria judaica	
Parkinsonia aculeata	
Parma microlepis	
Parmelia sp.	
Parmotrema chinense	
Paroaria coronata	
Parthenocissus quinquefolia	
Parthenocissus tricuspidata	
Paspalum dilatatum	
Paspalum distichum	
Paspalum notatum	
Paspalum urvillei	
Passer domesticus	
Passiflora filamentosa	
Patersonia babianoides	
Patersonia juncea	
Patersonia occidentalis	
Patersonia occidentalis var. angustifolia	
Patersonia occidentalis var. latifolia	
Patersonia occidentalis var. occidentalis	
Patersonia pygmaea	
Patersonia rudis subsp. rudis	
Patersonia tenuis	
Patersonia umbrosa	
Patersonia umbrosa var. xanthina	
Pauridia gardneri	
Pauridia glabella var. glabella	
Pauridia occidentalis	
Pauridia occidentalis var. occidentalis	
Pauridia occidentalis var. quadriloba	
Pauridia vaginata	
Pauridia vaginata var. vaginata	
Pavo cristatus	
Pavonia hastata	
Paxillus involutus	
Paxillus muelleri	
Paxillus sp.	
Pediana occidentalis	
Pegasus volitans	

Pelargonium capitatum	
Pelargonium havlasae	
Pelargonium littorale	
Pelargonium littorale subsp. littorale	
Pelargonium x asperum	
Pelecanoides urinatrix subsp. exsul	
Pelecanus conspicillatus	
Pempheris klunzingeri	
Pennisetum setaceum	
Pentameris airoides subsp. airoides	
Pentameris pallida	
Pentameris patula	
Pentaneurini genus V20	
Pentapeltis peltigera	
Pentaschistis airoides	
Pentasteron securifer	
Perenniporia medulla-panis	
Perenniporia oviformis	
Pericalymma ellipticum	
Pericalymma ellipticum var. ellipticum	
Pericalymma ellipticum var. floridum	
Perichaena corticalis	
Perichaena depressa	
Perichaena vermicularis	
Peripatoides woodwardi	
Peronospora destructor	
Peronospora knautiae	
Peronospora sp.	
Peronospora viciae	
Persicaria decipiens	
Persicaria hydropiper	
Persicaria lapathifolia	
Persicaria maculosa	
Persicaria sp.	
Persoonia angustiflora	
Persoonia elliptica	
Persoonia longifolia	
Persoonia macrostachya	
Persoonia quinquenervis	
Persoonia saccata	
Persoonia sulcata	P4
Pertusaria gibberosa	
Pertusaria remota	
Pertusaria sp.	
Petrochelidon ariel	
Petrochelidon nigricans	
Petroica boodang	
Petroica cucullata	
Petroica goodenovii	
Petroica multicolor	

Petroica multicolor subsp. campbelli	
Petrophile biloba	
Petrophile brevifolia	
Petrophile brevifolia subsp. brevifolia	
Petrophile heterophylla	
Petrophile juncifolia	
Petrophile linearis	
Petrophile macrostachya	
Petrophile media var. juncifolius	
Petrophile rigida	
Petrophile seminuda	
Petrophile squamata subsp. northern (J. Monks 40)	
Petrophile striata	
Petrorhagia dubia	
Petrorhagia velutina	
Petunia axillaris	
Petunia x atkinsiana	
Peziza austrogeaster	
Peziza moravecii	
Peziza repanda	
Peziza retiderma	
Peziza sp.	
Peziza tenacella	
Peziza vesiculosa	
Phacelia tanacetifolia	
Phaeomarasmius sp.	
Phaeothyriolum microthyrioides	
Phaeotrametes decipiens	
Phalacrocorax carbo	
Phalacrocorax carbo subsp. novaehollandiae	
Phalacrocorax fuscescens	
Phalacrocorax melanoleucos	
Phalacrocorax melanoleucos subsp. melanoleucos	
Phalacrocorax sp.	
Phalacrocorax sulcirostris	
Phalacrocorax varius	
Phalacrocorax varius subsp. hypoleucos	
Phalaris angusta	
Phalaris aquatica	
Phalaris arundinacea	
Phalaris arundinacea var. arundinacea	
Phalaris canariensis	
Phalaris minor	
Phalaris paradoxa	
Phalaris sp.	
Phalloceros caudimaculatus	
Phalloceros harpagos	
Phallus costatus	
Phallus hadriani	
Phallus sp.	

Phaps chalcoptera	
Phaps elegans	
Phascogale calura	CD
Phascogale tapoatafa subsp. tapoatafa	
Phascogale tapoatafa subsp. wambenger	CD
Pheladenia deformis	
Phellinus contiguus	
Phellinus gilvus	
Phellinus robustus	
Phellinus sp.	
Phellinus zealandicus	
Phenasteron longiconductor	
Phenasteron machinosum	
Philonotis australiensis	
Philonotis tenuis	
Philotheca spicata	
Philydrella drummondii	
Philydrella pygmaea	
Philydrella pygmaea subsp. pygmaea	
Phlebia reflexa	
Phlebia sp.	
Phlebia subceracea	
Phlebia subochracea	
Phlebocarya ciliata	
Phlebocarya filifolia	
Phloeospora maculans	
Phlox sp.	
Phoebetria fusca	EN
Phoenix canariensis	
Pholcus phalangioides	
Pholiota adiposa	
Pholiota communis	
Pholiota drummondii	
Pholiota highlandensis	
Pholiota sp.	
Phoma medicaginis	
Phomopsis emicis	
Phomopsis leptostromiformis	
Phomopsis rhapidis	
Phragmidium mucronatum	
Phragmidium rubi-idaei	
Phragmidium tuberculatum	
Phragmidium violaceum	
Phreatoicidae sp.	
Phryganoporus candidus	
Phryganoporus gausapatus subsp. occidentalis	
Phryganoporus nigrinus	
Phycodurus eques	P2
Phyla nodiflora var. nodiflora	
Phylidonyris melanops	

Phylidonyris niger	
Phylidonyris nigra	
Phylidonyris nigra subsp. gouldii	
Phylidonyris novaehollandiae	
Phyllachora grevilleae / hakeae	
Phyllangium divergens	
Phyllangium palustre	P2
Phyllangium paradoxum	
Phyllanthus calycinus	
Phyllanthus scaber	
Phyllanthus sp.	
Phyllanthus tenellus	
Phylloglossum drummondii	
Phyllopodium cordatum	
Phylloporus clelandii	
Phylloporus hyperion	
Phylloporus rhodoxanthus	
Phylloporus sp.	
Phyllopteryx taeniolatus	
Phyllostachys sp.	
Phyllosticta longispora	
Phyllosticta sp.	
Physalis angulata	
Physalis peruviana	
Physarum album	
Physarum bitectum	
Physarum bivalve	
Physarum cinereum	
Physarum compressum	
Physarum flavicomum	
Physarum melleum	
Physarum nudum	
Physarum pusillum	
Physarum sessile	
Physarum sp.	
Physarum vernum	
Physarum viride	
Physidae sp.	
Physocyclus globosus	
Physoderma trifolii	
Phytolacca octandra	
Phytophthora cinnamomi	
Phytophthora citrophthora	
Picipes badius	
Picris compacta	EX
Pileanthus peduncularis	
Pilostyles hamiltonii	
Pilularia novae-hollandiae	
Pimelea angustifolia	
Pimelea argentea	

Pimelea brevistyla	
Pimelea brevistyla subsp. brevistyla	
Pimelea ciliata	
Pimelea ciliata subsp. ciliata	
Pimelea ferruginea	
Pimelea imbricata var. major	
Pimelea imbricata var. piligera	
Pimelea lanata	
Pimelea lehmanniana subsp. nervosa	
Pimelea leucantha	
Pimelea preissii	
Pimelea rara	P4
Pimelea rosea	
Pimelea rosea subsp. rosea	
Pimelea sp.	
Pimelea spectabilis	
Pimelea suaveolens	
Pimelea suaveolens subsp. suaveolens	
Pimelea sulphurea	
Pimelea sylvestris	
Pinkfloydia harveii	
Pinus halepensis	
Pinus pinaster	
Piptatherum miliaceum	
Pisolithus albus	
Pisolithus microcarpus	
Pisolithus sp.	
Pisolithus tinctorius	
Pistia stratiotes	
Pithocarpa cordata	
Pithocarpa corymbulosa	P3
Pithocarpa pulchella	
Pithocarpa pulchella var. melanostigma	
Pithocarpa pulchella var. melanostigma / pulchella var. pulchella	
Pithocarpa pulchella var. pulchella	
Pittosporum undulatum	
Pityrodia axillaris	
Pityrodia bartlingii	
Placoasterella baileyi	
Planorbidae sp.	
Plantago coronopus subsp. commutata	
Plantago exilis	
Plantago lanceolata	
Plantago major	
Plantago sp.	
Platalea flavipes	
Platalea regia	
Platanus x hispanica	
Platax teira	
Platycephalus endrachtensis	

Platycephalus indicus	
Platycercus icterotis	
Platycercus icterotis (Western Rosella)	
Platycercus icterotis subsp. icterotis	
Platycercus spurius	
Platycercus spurius (Red-capped Parrot)	
Platycercus zonarius	
Platycercus zonarius subsp. semitorquatus	
Platycercus zonarius subsp. semitorquatus (twenty-eight parrot)	
Platycercus zonarius subsp. zonarius	
Platynectes sp.	
Platysace compressa	
Platysace filiformis	
Platysace juncea	
Platysace ramosissima	P3
Platysace sp.	
Platysace sp. sterile	
Platysace tenuissima	
Platytheca galioides	
Plectania sp.	
Plegadis falcinellus	MI
Pleospora sp.	
Pletholax gracilis	
Pletholax gracilis subsp. gracilis	
Pleuridium ecklonii	
Pleuridium nervosum var. nervosum	
Pleuroflammula sp.	
Pleurosorus rutifolius	
Pleurosorus subglandulosus	
Pleurotus australis	
Pleurotus nidiformis	
Plicaria sp.	
Plotosus unicolor	
Plumatichilos barbatum	
Pluteus atromarginatus	
Pluteus cervinus	
Pluteus pauperculus	
Pluteus perroseus	
Pluteus petasatus	
Pluteus romellii	
Pluteus sp.	
Pluvialis fulva	MI
Pluvialis squatarola	MI
Poa annua	
Poa drummondiana	
Poa homomalla	
Poa poiformis	
Poa porphyroclados	
Poa sp.	
Poa sp. indet.	

Podalyria sericea	
Podargus strigoides	
Podargus strigoides subsp. brachypterus	
Podiceps cristatus	
Podiceps cristatus subsp. australis	
Podolepis aristata subsp. aristata	
Podolepis capillaris	
Podolepis gracilis	
Podolepis gracilis (swamp form) (GJK 13126)	
Podolepis lessonii	
Podolepis nutans	
Podosphaera fuliginea	
Podosphaera leucotricha	
Podosphaera pannosa	
Podotheca angustifolia	
Podotheca chrysantha	
Podotheca gnaphalioides	
Podykipus collinus	
Poephila cincta	
Pogisperma sp.	
Pogona microlepidota (Kimberley Bearded Dragon)	
Pogona minor	
Pogona minor (Dwarf Bearded Dragon)	
Pogona minor subsp. minor	
Pogonolepis stricta	
Poliocephalus poliocephalus	
Poltys laciniosus	
Polycarpon tetraphyllum	
Polygala myrtifolia	
Polygala virgata	
Polygonarea repanda	
Polygonum arenastrum	
Polygonum aviculare	
Polypedilum nr. convexum (SAP)	
Polypogon monspeliensis	
Polypogon tenellus	
Polypompholyx multifida	
Polypompholyx tenella	
Polypompholyx tenella scps	
Polyporus eucalyptorum	
Polyporus infernalis	
Polyporus oviformis	
Polyporus pelliculosus	
Polyporus sp.	
Polysiphonia sp.	
Polytelis anthopeplus	
Polytelis anthopeplus subsp. westralis	
Pomatostomus superciliosus	
Populus alba	
Populus nigra cv. italica	

Poranthera drummondii	
Poranthera ericoides	
Poranthera huegelii	
Poranthera microphylla	
Poranthera microphylla/moorokatta	
Poranthera moorokatta	P2
Poronia erici	
Porostereum crassum	
Porphyrio porphyrio	
Porphyrio porphyrio subsp. bellus	
Portulaca oleracea	
Portulaca sp.	
Porzana fluminea	
Porzana pusilla	
Porzana pusilla subsp. palustris	
Porzana tabuensis	
Postia pelliculosa	
Potamogeton crispus	
Potamogeton drummondii	
Prasophyllum brownii	
Prasophyllum cuneatum	
Prasophyllum cyphochilum	
Prasophyllum drummondii	
Prasophyllum drummondii x regium	
Prasophyllum elatum	
Prasophyllum fimbria	
Prasophyllum gibbosum	
Prasophyllum giganteum	
Prasophyllum gracile	
Prasophyllum hians	
Prasophyllum macrostachyum	
Prasophyllum odoratissimum	
Prasophyllum ovale	
Prasophyllum parvifolium	
Prasophyllum plumiforme	
Prasophyllum plurifera	
Prasophyllum regium	
Prasophyllum sp.	
Prasophyllum sp. indet.	
Prionosternum nitidiceps	
Prionosternum scutatum	
Proboscidea louisianica	
Procladius paludicola	
Procladius villosimanus	
Pronaya fraseri	
Pronaya fraseri var. fraseri	
Propolis farinosa	
Protea repens	
Protogarypinus giganteus	
Protoglossum luteum	

Prunus cerasifera	
Psathyrella albidula	
Psathyrella bipellis	
Psathyrella candolleana	
Psathyrella gracilis	
Psathyrella hirta	
Psathyrella hydrophila	
Psathyrella sp.	
Psathyrella spadiceogrisea	
Psathyrella tetrophylla	
Psephotus dissimilis	
Pseudechis australis	
Pseudemydura umbrina	CR
Pseudocaranx dentex	
Pseudocercosporella capsellae	
Pseudocheirus occidentalis	CR
Pseudocrossidium hornschuchianum	
Pseudocyphellaria neglecta	
Pseudognaphalium luteoalbum	
Pseudogobius olorum	
Pseudomys albocinereus	
Pseudomys delicatulus	
Pseudonaja affinis	
Pseudonaja affinis subsp. affinis	
Pseudonaja affinis subsp. exilis	P4
Pseudonaja mengdeni	
Pseudonaja modesta	
Pseudonaja nuchalis	
Pseudopeziza medicaginis	
Pseudophryne guentheri	
Pseudophryne occidentalis	
Pseudorhombus jenynsii	
Psilocybe coprophila	
Psilocybe sp.	
Psittacula krameri	
Psittacus erithacus	
Psoralea pinnata	
Pteridium esculentum subsp. esculentum	
Pterochaeta paniculata	
Pterodroma brevirostris	
Pterodroma lessonii	
Pterodroma macroptera	
Pteropus scapulatus	
Pterostylis aff. nana	
Pterostylis aff. sanguinea	
Pterostylis aspera	
Pterostylis atrosanguinea	
Pterostylis barbata	
Pterostylis brevisepala	
Pterostylis concava	

Pterostylis crebriflora	
Pterostylis dilatata	
Pterostylis ectypha	
Pterostylis erubescens	
Pterostylis glebosa	
Pterostylis nana	
Pterostylis nana "short sepal"	
Pterostylis orbiculata	
Pterostylis pyramidalis	
Pterostylis recurva	
Pterostylis sanguinea	
Pterostylis sp.	
Pterostylis sp. crinkled leaf (G.J. Keighery 13426)	
Pterostylis vittata	
Ptilotula ornatus	
Ptilotus declinatus	
Ptilotus drummondii	
Ptilotus drummondii var. drummondii	
Ptilotus drummondii var. minor	
Ptilotus esquamatus	
Ptilotus gaudichaudii	
Ptilotus manglesii	
Ptilotus polystachyus	
Ptilotus pyramidatus	CR
Ptilotus sericostachyus subsp. roseus	P1
Ptilotus sericostachyus subsp. sericostachyus	
Ptilotus stirlingii	
Ptilotus stirlingii subsp. stirlingii	
Ptychostomum angustifolium	
Puccinia antirrhini	
Puccinia chrysanthemi	
Puccinia coronata	
Puccinia cymbopogonis	
Puccinia dampierae	
Puccinia gilgiana	
Puccinia graminis	
Puccinia graminis forma tritici	
Puccinia graminis subsp. graminicola	
Puccinia haemodori	
Puccinia helianthi	
Puccinia heterospora	
Puccinia hieracii	
Puccinia hordei	
Puccinia horiana	
Puccinia hypochoeridis	
Puccinia iridis	
Puccinia kunzeae	
Puccinia lagenophorae	
Puccinia malvacearum	
Puccinia menthae	

Puccinia oahuensis	
Puccinia oenotherae	
Puccinia oxalidis	
Puccinia pelargonii-zonalis	
Puccinia poarum	
Puccinia pygmae	
Puccinia recondita	
Puccinia saccardoi	
Puccinia sorghi	
Pucciniastrum epilobii	
Puffinus assimilis subsp. assimilis	
Puffinus carneipes	
Puffinus pacificus	
Pultenaea ericifolia	
Pultenaea reticulata	
Pulvinula archeri	
Pulvinula constellatio	
Pulvinula miltina	
Pulvinula sp.	
Punctelia subalbicans	
Punctularia strigosozonata	
Purnella albifrons	
Purpureicephalus spurius	
Pycnoporus coccineus	
Pygopus lepidopodus	
Pyrenophora sp.	
Pyrenophora teres	
Pyronema omphalodes	
Pyrorchis nigricans	
Pyxine sorediata	
Quambalaria coyrecup	
Quercus robur	
Quinetia urvillei	
Rachycentron canadum	
Racopilum cuspidigerum var. convolutaceum	
Ramalina inflata	
Ramalina inflata subsp. australis	
Ramalina sp.	
Ramaria botryoides	
Ramaria flaccida	
Ramaria fumigata	
Ramaria myceliosa	
Ramaria ochraceosalmonicolor	
Ramaria sinapicolor	
Ramaria sp.	
Ramaria stricta	
Ramphotyphlops australis	
Ramphotyphlops bituberculatus	
Ramphotyphlops braminus	
Ramphotyphlops pinguis	

Ramphotyphlops waitii	
Ramularia sp.	
Ranunculus colonorum	
Ranunculus muricatus	
Ranunculus sessiliflorus var. sessiliflorus	
Ranunculus trilobus	
Raphanus raphanistrum	
Raphanus sativus	
Rattus fuscipes	
Rattus norvegicus	
Rattus rattus	
Rattus rattus (Black Rat)	
Rattus sp.	
Raveniella cirrata	
Raveniella peckorum	
Recurvirostra novaehollandiae	
Reddellomyces westraliensis	
Regelia ciliata	
Regelia inops	
Reseda lutea	
Restio sinosus	
Restio sinuosus	
Restio tremulus	
Resupinatus cinerascens	
Resupinatus sp.	
Resupinatus subapplicatus	
Retama raetam	
Reticularia intermedia	
Reticularia liceoides	
Reticularia lycoperdon	
Rhabdosargus sarba	
Rhagodia baccata subsp. baccata	
Rhagodia preissii subsp. preissii	
Rhamnus alaternus	
Rhamnus sp.	
Rhantus suturalis	
Rheotanytarsus sp. (SFM)	
Rhipidura albiscapa	
Rhipidura fuliginosa	
Rhipidura fuliginosa subsp. preissi	
Rhipidura fuliginosus	
Rhipidura leucophrys	
Rhipidura leucophrys subsp. leucophrys	
Rhizochaete radicata	
Rhizoclonium sp.	
Rhizopogon roseolus	
Rhizopogon rubescens	
Rhizopogon rubra	
Rhizopogon sp.	
Rhodanthe chlorocephala subsp. rosea	

Rhodanthe citrina	
Rhodanthe corymbosa	
Rhodanthe manglesii	
Rhodanthe pyrethrum	
Rhodanthe spicata	
Riccia bifurca	
Riccia multifida	
Richardsonianidae sp.	
Ricinocarpos glaucus	
Ricinocarpos graniticus	
Ricinocarpos megalocarpus	
Ricinocarpos undulatus	
Ricinus communis	
Rickenella fibula	
Riethia v4	
Rimelia reticulata	
Rinzia communis	
Rinzia crassifolia	
Robinia pseudoacacia	
Roldana petasitis	
Romneya coulteri	
Romulea flava	
Romulea flava var. minor	
Romulea rosea	
Romulea rosea var. australis	
Romulea rosea var. communis	
Romulea sp.	
Rorippa nasturtium-aquaticum	
Rosa chinensis x moschata	
Rosa sempervirens	
Rosa sp.	
Rostraria cristata	
Rostraria pumila	
Rostratula australis	EN
Rosulabryum albolimbatum	
Rosulabryum billarderi	
Rosulabryum billarderii	
Rosulabryum campylothecium	
Rosulabryum capillare	
Rosulabryum torquescens	
Rothmannia globosa	
Royoungia boletoides	
Rubus anglocandicans	
Rubus laudatus	
Rubus rugosus	
Rubus ulmifolius	
Rubus ulmifolius var. ulmifolius	
Rulingia cygnorum	
Rumex acetosella	
Rumex conglomeratus	

Rumex crispus	
Rumex hypogaeus	
Rumex obtusifolius subsp. obtusifolius	
Rumex pulcher	
Rumex pulcher subsp. woodsii	
Rumex sagittatus	
Rumex vesicarius	
Ruppia megacarpa	
Ruppia polycarpa	
Russula clelandii	
Russula delica	
Russula erumpens	
Russula flocktonae	
Russula flocktoniae	
Russula marangania	
Russula mariae	
Russula pumicoidea	
Russula rosacea	
Russula sp.	
Rytidosperma acerosum	
Rytidosperma caespitosum	
Rytidosperma occidentale	
Rytidosperma pilosum	
Rytidosperma setaceum	
Rytidosperma sp.	
Sagina apetala	
Sagina procumbens	
Sagittaria platyphylla	
Salicornia blackiana	
Salicornia quinqueflora	
Salicornia quinqueflora subsp. quinqueflora	
Salix alba x matsudana	
Salix babylonica	
Salix cinerea	
Salix humboldtiana	
Salix matsudana	
Salix sp.	
Salpichroa origanifolia	
Salvia reflexa	
Salvia sp.	
Salvia verbenaca	
Salvinia molesta	
Salvinia sp.	
Samolus junceus	
Samolus repens	
Samolus repens var. repens	
Sandalodes joannae	
Sandalodes superbus	
Santalum acuminatum	
Santalum spicatum	

Sarcocornia quinqueflora	
Sargassum sp.	
Scabiosa atropurpurea	
Scaevola anchusifolia	
Scaevola calliptera	
Scaevola canescens	
Scaevola glandulifera	
Scaevola lanceolata	
Scaevola phlebopetala	
Scaevola pilosa	
Scaevola platyphylla	
Scaevola repens	
Scaevola repens var. angustifolia	
Scaevola repens var. repens	
Scaevola sp.	
Scaevola thesioides subsp. thesioides	
Schenkia australis	
Schinus terebinthifolia	
Schinus terebinthifolius	
Schizaea fistulosa	
Schizophyllum commune	
Schizopora paradoxa	
Schizymenium bryoides	
Schoenolaena juncea	
Schoenoplectus pungens	
Schoenoplectus tabernaemontani	
Schoenus andrewsii	
Schoenus armeria	
Schoenus asperocarpus	
Schoenus benthamii	P3
Schoenus bifidus	
Schoenus brevisetis	
Schoenus caespititius	
Schoenus capillifolius	P3
Schoenus clandestinus	
Schoenus cruentus	
Schoenus curvifolius	
Schoenus discifer	
Schoenus efoliatus	
Schoenus elegans	
Schoenus grammatophyllus	
Schoenus grandiflorus	
Schoenus griffinianus	P4
Schoenus humilis	
Schoenus laevigatus	
Schoenus latitans	
Schoenus loliaceus	P2
Schoenus nanus	
Schoenus natans	P4
Schoenus odontocarpus	

Schoenus pedicellatus	
Schoenus pennisetis	P3
Schoenus pleiostemoneus	
Schoenus plumosus	
Schoenus rigens	
Schoenus sculptus	
Schoenus sp.	
Schoenus sp. (GJK 5739)	
Schoenus sp. Beaufort (G.J. Keighery 6291)	P1
Schoenus sp. indet.	
Schoenus sp. smooth culms (K.R. Newbey 7823)	
Schoenus sp. Waroona (G.J. Keighery 12235)	P3
Schoenus subbarbatus	
Schoenus subbulbosus	
Schoenus subfascicularis	
Schoenus subflavus	
Schoenus sublateralis	
Schoenus tenellus	
Schoenus unispiculatus	
Schoenus variicellae	
Scholtzia capitata	
Scholtzia involucrata	
Scholtzia laxiflora	
Scholtzia sp.	
Scholtzia sp. Bickley (W.H. Loaring s.n. PERTH 06165184)	EX
Scirtidae sp.	
Scleroderma areolatum	
Scleroderma australe	
Scleroderma cepa	
Scleroderma flavidum	
Scleroderma geaster	
Scleroderma paradoxum	
Scleroderma sp.	
Scleroderma verrucosum	
Sclerotinia fuckeliana	
Sclerotinia sclerotiorum	
Sclerotium rolfsii	
Scobinichthys granulatus	
Scolopendra laeta	
Scolopendra morsitans	
Scomberoides lysan	
Scorpis aequipinnis	
Scorpis georgianus	
Scotorepens balstoni	
Scutigerella indecisa	
Scytinostroma duriusculum	
Scytinostroma portentosum	
Scytodes thoracica	
Seimatosporium carpophilus	
Selaginella gracillima	

Sematophyllum homomallum	
Sematophyllum subhumile var. contiguum	
Senecio condylus	
Senecio diaschides	
Senecio gilbertii	P1
Senecio glossanthus x lautus	
Senecio hispidulus	
Senecio leucoglossus	P4
Senecio multicaulis subsp. multicaulis	
Senecio picridioides	
Senecio pinnatifolius	
Senecio pinnatifolius var. latilobus	
Senecio quadridentatus	
Senecio ramosissimus	
Senecio sp.	
Senecio vulgaris	
Senegalia rugata	
Senna artemisioides subsp. helmsii	
Sepedonium sp.	
Septoria antirrhini	
Septoria apiicola	
Septoria dianthi	
Septoria divaricata	
Septoria obesa	
Septoria phlogis	
Septoria sp.	
Sericornis frontalis	
Sericornis frontalis subsp. maculatus	
Sericornis frontatus	
Seringia integrifolia	
Serinus canarius	
Seriola hippos	
Serpula himantioides	
Serpula lacrymans	
Servaea melaina	
Servaea spinibarbis	
Setaria italica	
Setaria palmifolia	
Setaria parviflora	
Setaria sp.	
Setaria sphacelata	
Setaria verticillata	
Setchelliogaster tenuipes	
Setonix brachyurus	VU
Sida fallax	
Sida hookeriana	
Silene calabrica	
Silene gallica	
Silene gallica var. gallica	
Silene gallica var. quinquevulnera	

Silene nocturna	
Silene vulgaris	
Sillago burrus	
Sillago schomburgkii	
Siloxerus filifolius	
Siloxerus humifusus	
Siloxerus multiflorus	
Siloxerus sp.	
Silybum marianum	
Simaetha tenuior	
Simoselaps bertholdi	
Simuliidae sp.	
Siphonotus flavomarginatus	
Siphula coriacea	
Sirophysalis trinodis	
Sistotrema sp.	
Sisymbrium irio	
Sisymbrium orientale	
Sisyrinchium rosulatum	
Smeringopus natalensis	
Smeringopus natalensis?	
Smicrornis brevirostris	
Sminthopsis gilberti	
Sminthopsis griseoventer subsp. griseoventer	
Sminthopsis murina	
Solaenodolichopus pruvoti	
Solanum americanum	
Solanum aviculare	
Solanum giganteum	
Solanum laciniatum	
Solanum linnaeanum	
Solanum lycopersicum	
Solanum nigrum	
Solanum rantonnei	
Solanum sisymbriifolium	
Solanum sp.	
Solidago altissima var. pluricephala	
Solidago chilensis	
Soliva sessilis	
Sollya heterophylla	
Sonchus asper	
Sonchus oleraceus	
Sordaria sp.	
Sorghum bicolor	
Sorghum halepense	
Sorghum x drummondii	
Sowerbaea laxiflora	
Sparaxis bulbifera	
Sparaxis pillansii	
Sparidentex hasta	

Spergula arvensis	
Spergularia marina	
Spergularia rubra	
Sphacelaria tribuloides	
Sphaceloma ampelinum	
Sphaerellopsis filum	
Sphaerobolus sp.	
Sphaerobolus stellatus	
Sphaerolobium hygrophilum	
Sphaerolobium linophyllum	
Sphaerolobium macranthum	
Sphaerolobium medium	
Sphaerolobium sp.	
Sphaerolobium sp. indet.	
Sphaerolobium vimineum	
Sphaerotrichopus ramosus	
Spiculaea ciliata	
Spiraea sp.	
Sporobolus africanus	
Sporobolus blakei	P3
Sporobolus schoenoides	
Sporobolus virginicus	
springtail sp.	
Spyridium globulosum	
Spyridium tridentatum	
Stachys arvensis	
Stachystemon sp. Keysbrook (R. Archer 17/11/99)	
Stachystemon vermicularis	
Stackhousia huegelii	
Stackhousia monogyna	
Stackhousia pubescens	
Stackhousia scoparia	
Stackhousia sp.	
Stackhousia sp. Red-blotched corolla (A. Markey 911)	P3
Stagonopleura oculata	
Stagonospora curtisii	
Steatoda capensis	
Steatoda grossa	
Stellaria media	
Stellaria pallida	
Stemonitis fusca	
Stemonitis splendens	
Stemonitopsis amoena	
Stemonitopsis hyperopta	
Stemonitopsis sp.	
Stemphylium vesicarium	
Stenanthemum emarginatum	
Stenanthemum humile	
Stenanthemum notiale subsp. chamelum	
Stenanthemum sublineare	P2

Stenopetalum filifolium	
Stenopetalum gracile	
Stenotaphrum secundatum	
Stereocaulon corticatulum	
Stereum hirsutum	
Stereum illudens	
Stereum sp.	
Sterna bergii	
Sterna caspia	
Sterna fuscata subsp. nubilosa	
Sterna nereis subsp. nereis	
Sternopriscus browni	
Sternopriscus marginatus	
Sternopriscus sp.	
Sternula nereis	
Sternula nereis subsp. nereis	VU
Stictonetta naevosa	
Stigmatopora argus	
Stigmina sp.	
Stilbella sp.	
Stipa campylachne	
Stipa compressa	
Stipa elegantissima	
Stipa flavescens	
Stipa hemipogon	
Stipa mollis	
Stipa pycnostachya	
Stipa semibarbata group	
Stipa sp.	
Stipa sp. indet.	
Stipiturus malachurus	
Stirlingia latifolia	
Stirlingia simplex	
Storena formosa	
Storena sinuosa	
Storena tricolor	
Storosa tetrica	
Stratiomyidae sp.	
Strepera versicolor	
Streptopelia chinensis	
Streptopelia chinensis subsp. tigrina	
Streptopelia senegalensis	
Streptopelia senegalensis subsp. senegalensis	
Stropharia aurantiaca	
Stropharia semiglobata	
Strophurus spinigerus	
Strophurus spinigerus subsp. inornatus	
Strophurus spinigerus subsp. spinigerus	
Struvea plumosa	
Stuckenia pectinata	

Sturnus vulgaris	
Stylidium aceratum	P3
Stylidium adpressum	
Stylidium affine	
Stylidium amoenum	
Stylidium amoenum var. amoenum	
Stylidium amoenum var. caulescens	
Stylidium androsaceum	
Stylidium araeophyllum	
Stylidium araeophyllum/neurophyllum	
Stylidium asteroideum	P3
Stylidium bicolor	
Stylidium bindoon	
Stylidium breviscapum	
Stylidium brunonianum	
Stylidium bulbiferum	
Stylidium calcaratum	
Stylidium caricifolium	
Stylidium carnosum	
Stylidium ciliatum	
Stylidium crassifolium	
Stylidium cygnorum	
Stylidium despectum	
Stylidium dichotomum	
Stylidium diuroides	
Stylidium diuroides subsp. diuroides	
Stylidium divaricatum	
Stylidium ecorne	
Stylidium emarginatum	
Stylidium eriopodum	
Stylidium guttatum	
Stylidium hesperium	
Stylidium hispidum	
Stylidium inundatum	
Stylidium junceum	
Stylidium lateriticola	
Stylidium leptophyllum	
Stylidium lineatum	
Stylidium longitubum	P4
Stylidium mimeticum	
Stylidium neurophyllum	
Stylidium obtusatum	
Stylidium paludicola	P3
Stylidium periscelianthum	P3
Stylidium perpusillum	
Stylidium petiolare	
Stylidium piliferum	
Stylidium pubigerum	
Stylidium pulchellum	
Stylidium pycnostachyum	

Stylidium recurvum	
Stylidium repens	
Stylidium rhynchocarpum	
Stylidium rigidulum	
Stylidium roseoalatum	
Stylidium roseo-alatum	
Stylidium scariosum	
Stylidium schoenoides	
Stylidium sp.	
Stylidium sp. Boulder Rock (A.H. Burbidge 2536)	
Stylidium sp. cormaceous ephemeral (F. Hort, J. Hort & J. Shanks 2382)	
Stylidium sp. Darling Range (H. Bowler 371)	
Stylidium sp. indet.	
Stylidium striatum	P4
Stylidium tenue subsp. majusculum	
Stylidium tenue subsp. tenue	
Stylidium thesioides	
Stylidium utricularioides	
Stylidium xanthellum	
Styloniscidae sp.	
Stypandra glauca	
Styphelia filifolia	P3
Styphelia tenuiflora	
Suaeda australis	
Succowia balearica	
Sugomel niger	
Suillus granulatus	
Suillus sp.	
Sula serrator	
Supunna funerea	
Supunna picta	
Sus scrofa	
Sutorectus tentaculatus	
Symphyotrichum squamatum	
Symphytum uplandicum	
Synaphea acutiloba	
Synaphea decorticans	
Synaphea gracillima	
Synaphea petiolaris	
Synaphea petiolaris subsp. petiolaris	
Synaphea pinnata	
Synaphea sp.	
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	CR
Synaphea sp. indet	
Synaphea sp. Pinjarra Plain (A.S. George 17182)	EN
Synaphea sp. Udumung (A.S. George 17058)	
Synaphea spinulosa	
Synaphea spinulosa subsp. spinulosa	
Synemon gratiosa	P4
Synothele durokoppin	

Synothele michaelseni	
Synothele mullaloo	
Synothele rastelloides	
Synsphyronus magnus	
Synthemistidae sp.	
Syntrichia antarctica	
Syntrichia pagorum	
Syringa vulgaris	
Tabanidae sp.	
Tachybaptus navaehollandiae	
Tachybaptus novaehollandiae	
Tachybaptus novaehollandiae subsp. novaehollandiae	
Tachybaptus sp.	
Tachyglossus aculeata	
Tachyglossus aculeatus	
Tadarida australis	
Tadorna tadornoides	
Tagetes erecta	
Tagetes minuta	
Talitridae sp.	
Tamopsis darlingtoniana	
Tamopsis facialis	
Tamopsis perthensis	
Tandanus bostocki	
Tanypodinae sp.	
Tanytarsus aff manleyensis	
Tanytarsus fuscithorax/semibarbitarsus	
Tanytarsus nr K5	
Tanytarsus palmatus	
Taphrina deformans	
Tapinella panuoides	
Taraxacum khatoonae	
Taraxacum officinale	
Taraxacum sp.	
Tarsipes rostratus	
Tasmanicosa leuckartii	
Tasmanocoenis tillyardi	
Taxandria linearifolia	
Tayloria octoblepharum	
Tecticornia halocnemoides	
Tecticornia halocnemoides subsp. halocnemoides	
Tecticornia indica subsp. bidens	
Tecticornia lepidosperma	
Tecticornia pergranulata	
Tecticornia sp.	
Tegenaria atrica	
Teloschistes chrysophthalmus	
Templetonia biloba	
Templetonia drummondii	
Templetonia retusa	

Tephrocybe sp.	
Tetragnatha demissa	
Tetragnatha luteocincta	
Tetragonia nigrescens	
Tetrapterum cylindricum	
Tetraria australiensis	
Tetraria capillaris	
Tetraria octandra	
Tetraria sp. Jarrah Forest (R. Davis 7391)	
Tetrarrhena laevis	
Tetratheca hirsuta	
Tetratheca hirsuta (granite)	
Tetratheca hirsuta subsp. hirsuta	
Tetratheca hirsuta subsp. viminea	
Tetratheca nuda	
Tetratheca pilifera	P3
Tetratheca setigera	
Tetratheca sp. Granite (S. Patrick SP1224)	
Thalasseus bergii	MI
Thaxterogaster sp.	
Thelephora congesta	
Thelephora sp.	
Thelephora terrestris	
Thelymitra ?graminea	
Thelymitra antennifera	
Thelymitra benthamiana	
Thelymitra campanulata	
Thelymitra canaliculata	
Thelymitra cornicina	
Thelymitra crinita	
Thelymitra crinita x macrophylla	
Thelymitra dedmaniarum	CR
Thelymitra flexuosa	
Thelymitra flexuosa x vulgaris	
Thelymitra fuscolutea	
Thelymitra graminea	
Thelymitra macrophylla	
Thelymitra maculata	
Thelymitra magnifica	P1
Thelymitra mucida	
Thelymitra sp.	
Thelymitra sp. indet.	
Thelymitra spiralis	
Thelymitra stellata	EN
Thelymitra tigrina	
Thelymitra variegata	P2
Thelymitra villosa	
Thelymitra vulgaris	
Themeda triandra	
Thereuopoda lesueurii	

Thienemanniella sp. (V19) (SAP)	
Thinornis rubricollis	P4
Thomasia foliosa	
Thomasia glutinosa	
Thomasia grandiflora	
Thomasia macrocarpa	
Thomasia paniculata	
Thomasia pauciflora	
Thomasia petalocalyx	
Thomasia purpurea	
Thomasia rulingioides	
Thomasia triphylla	
Threpterius maculosus	
Threskiornis molucca	
Threskiornis moluccus	
Threskiornis spinicollis	
Thunbergia alata	
Thysanophrys cirronasus	
Thysanothecium hookeri	
Thysanothecium scutellatum	
Thysanotus ?thyrsoideus	
Thysanotus aff. tennellus	
Thysanotus anceps	P3
Thysanotus arbuscula	
Thysanotus arenarius	
Thysanotus asper	
Thysanotus dichotomus	
Thysanotus fastigiatus	
Thysanotus glaucus	P4
Thysanotus gracilis	
Thysanotus manglesianus	
Thysanotus manglesianus/patersonii complex	
Thysanotus multiflorus	
Thysanotus patersonii	
Thysanotus scaber	
Thysanotus sp.	
Thysanotus sp. Badgingarra (E.A. Griffin 2511)	P2
Thysanotus sp. Coastal plain (N.H. Brittan 66/63)	
Thysanotus sp. indet.	
Thysanotus sp. manglesianus/patersonii group	
Thysanotus sparteus	
Thysanotus tenellus	
Thysanotus thyrsoideus	
Thysanotus triandrus	
Tiliqua occipitalis	
Tiliqua rugosa	
Tiliqua rugosa rugosa	
Tiliqua rugosa subsp. aspera	
Tiliqua rugosa subsp. rugosa	
Tilletia ehrhartae	

Tilletia viennotii	
Tilodon sexfasciatum	
Tipulidae sp.	
Todiramphus sanctus	
Todiramphus sanctus subsp. sanctus	
Tolpis barbata	
Tomentella pilosa	
Tomentella sp.	
Tomentellopsis echinospora	
Torquigener pleurogramma	
Tortella rubripes	
Tortula muralis	
Tortula recurvata	
Trachurus novaezelandiae	
Trachycosmus sculptilis	
Trachymene coerulea	
Trachymene coerulea subsp. coerulea	
Trachymene coerulea var. coerulea	
Trachymene cyanopetala	
Trachymene grandis	
Trachymene ornata	
Trachymene pilosa	
Trachyspina mundaring	
Tragopogon porrifolius	
Trametes hirsutum	
Trametes lilacinogilva	
Trametes sp.	
Trametes versicolor	
Trametes versicolor complex	
Tranzschelia discolor	
Trapelia lilacea	
Trapelia sp.	
Trapeliopsis flexuosa	
Trechispora farinacea	
Trechispora microspora	
Trechispora sp.	
Tremella aurantia	
Tremella aurantia/mesenterica	
Tremella mesenterica	
Tremella sp.	
Tremulina tremula	
Tribolium uniolae	
Tribonanthes australis	
Tribonanthes australis x brachypetala	
Tribonanthes australis x longipetala	
Tribonanthes brachypetala	
Tribonanthes longipetala	
Tribonanthes sp.	
Tribonanthes uniflora	
Tribonanthes variabilis	

Tribonanthes violacea	
Tribonyx ventralis	
Tribulus terrestris	
Trichaptum biforme	
Trichia affinis	
Trichia decipiens	
Trichia munda	
Trichia persimilis	
Trichia verrucosa	
Trichinium drummondii	
Trichocline sp.	
Trichocline sp. Treeton (B.J. Keighery & N. Gibson 564)	
Trichocline spathulata	
Trichocyclus balladong	
Trichocyclus nullarbor	
Trichoglossus chlorolepidotus	
Trichoglossus haematodus	
Trichoglossus haematodus subsp. moluccanus	
Trichoglossus haematodus subsp. rubritorquis	
Trichoglossus moluccanus	
Tricholoma eucalypticum	
Tricholoma saponaceum	
Tricholoma sp.	
Tricholomopsis rutilans	
Tricholomopsis sp.	
Trichostomum eckelianum	
Trichosurus vulpecula	
Trichosurus vulpecula subsp. vulpecula	
Tricoryne aff. humlis	
Tricoryne elatior	
Tricoryne humilis	
Tricoryne tenella	
Tricostularia exsul	
Tricostularia neesii	
Tricostularia neesii var. neesii	
Tridentiger trigonocephalus	
Trifolium angustifolium	
Trifolium angustifolium var. angustifolium	
Trifolium arvense	
Trifolium arvense var. arvense	
Trifolium campestre	
Trifolium campestre var. campestre	
Trifolium cernuum	
Trifolium cherleri	
Trifolium dubium	
Trifolium fragiferum var. fragiferum	
Trifolium glomeratum	
Trifolium hirtum	
Trifolium hybridum var. hybridum	
Trifolium incarnatum	

Trifolium incarnatum var. incarnatum	
Trifolium ligusticum	
Trifolium michelianum	
Trifolium micranthum	
Trifolium ornithopodioides	
Trifolium pratense var. sativum	
Trifolium repens	
Trifolium repens var. repens	
Trifolium resupinatum var. majus	
Trifolium resupinatum var. resupinatum	
Trifolium scabrum	
Trifolium spumosum	
Trifolium striatum	
Trifolium subterraneum	
Trifolium suffocatum	
Trifolium tomentosum	
Trifolium tomentosum var. tomentosum	
Triglochin calcitrapa	
Triglochin calcitrapum	
Triglochin centrocarpa	
Triglochin centrocarpum	
Triglochin linearis	
Triglochin minutissima	
Triglochin mucronata	
Triglochin muelleri	
Triglochin nana	
Triglochin procerum	
Triglochin sp.	
Triglochin sp. indet.	
Triglochin sp. scps	
Triglochin sp.Brixton 04 (possibly T. mullerii)	
Triglochin stowardii	
Triglochin striata	
Trihaloragis hexandra subsp. integrifolia	
Tringa brevipes	MI & P4
Tringa glareola	MI
Tringa hypoleucos	
Tringa nebularia	MI
Tringa stagnatalis	
Triplectides australis	
Triplectides sp. AV21 (SFM)	
Tripterococcus brunonis	
Tripterococcus sp. Brachylobus (A.S. George 14234)	P4
Trisetum flavescens	
Trithuria bibracteata	
Trithuria occidentalis	CR
Trithuria submersa	
Triticum aestivum	
Tritonia gladiolaris	
Tropaeolum majus	

Tropaeolum pentaphyllum	
Truncospora ochroleuca	
Trygonoptera ovalis	
Trygonorrhina fasciata	
Trymalium albicans	
Trymalium angustifolium	
Trymalium floribundum	
Trymalium floribundum subsp. floribundum	
Trymalium ledifolium	
Trymalium ledifolium var. ledifolium	
Trymalium ledifolium var. rosmarifolium	
Trymalium ledifolium var. rosmarinifolium	
Trymalium odoratissimum subsp. odoratissimum	
Tubaria rufofulva	
Tubaria serrulata	
Tubaria sp.	
Tubulicrinis calothrix	
Turnix varia	
Turnix varia subsp. varia	
Turnix varius	
Turnix velox	
Tursiops aduncus	
Tursiops sp.	
Tursiops truncatus	
Typha domingensis	
Typha orientalis	
Typha sp.	
Typhonium peltandroides	P1
Tyto alba	
Tyto alba subsp. delicatula	
Tyto novaehollandiae	
Tyto novaehollandiae subsp. novaehollandiae	P3
Ulex europaeus	
Ulmus parvifolia	
Ulothrix subflaccida	
Ulva clathrata	
Ulva compressa	
Ulva flexuosa	
Ulva flexuosa subsp. paradoxa	
Ulva intestinalis	
Ulva lactuca	
Ulva prolifera	
Ulva sp.	
Underwoodisaurus milii	
unknown unknown	
Uredo angiosperma	
Uredo behnickiana	
Uredo sp.	
Urocampus carinirostris	
Urochilus sanguineus	

Urodacus armatus	
Urodacus hartmeyeri	
Urodacus novaehollandiae	
Urodacus planimanus	
Urodacus woodwardii	
Uromyces anthyllidis	
Uromyces betae	
Uromyces dianthi	
Uromyces fabae	
Uromyces rumicis	
Uromyces sp.	
Uromyces striatus	
Uromyces transversalis	
Uromyces trifolii	
Uromyces viciae-fabae	
Uromycladium sp.	
Uromycladium tepperianum	
Urospermum picroides	
Ursinia anthemoides	
Ursinia anthemoides subsp. anthemoides	
Urtica urens	
Usnea sp.	
Ustilago avenae	
Ustilago bromivora	
Ustilago cynodontis	
Ustilago hordei	
Ustilago nuda	
Ustilago tepperi	
Utricularia gibba	
Utricularia inaequalis	
Utricularia menziesii	
Utricularia multifida	
Utricularia sp.	
Utricularia tenella	
Utricularia violacea	
Utricularia volubilis	
Vachellia karroo	
Vallisneria australis	
Vallisneria nana	
Vanellus miles	
Vanellus tricolor	
Varanus gouldii	
Varanus rosenbergi	
Varanus sp.	
Varanus tristis	
Velleia trinervis	
Vellereophyton dealbatum	
Venator immansueta	
Venatrix arenaris	
Venatrix pullastra	

Venturia pirina	
Verbascum sp.	
Verbascum thapsus subsp. thapsus	
Verbascum virgatum	
Verbena incompta	
Verbena officinalis	
Verbena rigida var. rigida	
Verbesina encelioides	
Verbesina encelioides var. encelioides	
Veronica aff. calycina (BJK & NG 235)	
Veronica arvensis	
Veronica persica	
Verreauxia reinwardtii	
Verticordia acerosa	
Verticordia acerosa var. acerosa	
Verticordia acerosa var. preissii	
Verticordia densiflora	
Verticordia densiflora var. cespitosa	
Verticordia densiflora var. densiflora	
Verticordia drummondii	
Verticordia eriocephala	
Verticordia huegelii	
Verticordia huegelii var. decumbens	
Verticordia huegelii var. huegelii	
Verticordia insignis subsp. insignis	
Verticordia lindleyi subsp. lindleyi	P4
Verticordia monadelpha	
Verticordia monadelpha var. monadelpha	
Verticordia nitens	
Verticordia pennigera	
Verticordia picta	
Verticordia plumosa	
Verticordia plumosa var. brachyphylla	
Verticordia plumosa var. plumosa	
Verticordia preissii	
Verticordia serrata var. ciliata	
Verticordia serrata var. linearis	P3
Verticordia venusta	P3
Vespadelus regulus	
Vicia benghalensis	
Vicia hirsuta	
Vicia sativa	
Vicia sativa subsp. cordata	
Vicia sativa subsp. nigra	
Vicia sativa subsp. sativa	
Vicia tetrasperma	
Villarsia capitata	
Viminaria juncea	
Vinca major	
Vitis vinifera	

Vizella sp.	
Volvariella bombycina	
Volvariella sp.	
Volvariella speciosa	
Volvariella speciosa var. gloiocephala	
Volvopluteus gloiocephalus	
Vulpes vulpes	
Vulpia bromoides	
Vulpia fasciculata	
Vulpia membranacea	
Vulpia muralis	
Vulpia myuros	
Vulpia myuros forma megalura	
Vulpia myuros forma myuros	
Vulpia sp. indet.	
Wahlenbergia capensis	
Wahlenbergia gracilenta	
Wahlenbergia multicaulis	
Wahlenbergia preissii	
Waitzia citrina	
Waitzia nitida	
Waitzia paniculata	
Waitzia podolepis	
Waitzia suaveolens	
Waitzia suaveolens var. suaveolens	
Waltheria indica	
Watsonia aletroides	
Watsonia borbonica	
Watsonia knysnana	
Watsonia marginata	
Watsonia meriana	
Watsonia meriana var. bulbillifera	
Watsonia meriana var. meriana	
Watsonia sp.	
Watsonia sp. indet.	
Watsonia versfeldii	
Weissia controversa	
Weissia rutilans	
Westralunio carteri	VU
Westrarchaea spinosa	
Westringia dampieri	
Westringia fruticosa	
Wigandia urens var. caracasana	
Willkommlangea reticulata	
Wilsonia backhousei	
Withius piger	
Wurmbea dioica	
Wurmbea dioica subsp. aff. alba (gjk 12803)	
Wurmbea dioica subsp. alba	
Wurmbea dioicha subsp. alba x tenella	

Wurmbea monantha	
Wurmbea pygmaea	
Wurmbea sp.	
Wurmbea tenella	
Xanthium spinosum	
Xanthoparmelia antleriformis	
Xanthoparmelia digitiformis	
Xanthoparmelia elevata	
Xanthoparmelia imitatrix	
Xanthoparmelia nana	
Xanthoparmelia sp.	
Xanthoparmelia verrucella	
Xanthorrhoea acanthostachya	
Xanthorrhoea brunonis	
Xanthorrhoea brunonis subsp. brunonis	
Xanthorrhoea brunonis subsp. semibarbata	
Xanthorrhoea drummondii	
Xanthorrhoea gracilis	
Xanthorrhoea preissii	
Xanthorrhoea sp.	
Xanthorrhoea sp. Lesueur (G.J. Keighery 16404)	
Xanthosia atkinsoniana	
Xanthosia candida	
Xanthosia ciliata	
Xanthosia huegelii	
Xenus cinereus	MI
Xerochrysum macranthum	
Xerula atrocaerulea	
Xerula mundroola	
Xerula superbiens	
Xylaria hypoxylon	
Xylodon brevisetus	
Xylomelum occidentale	
Xysticus periscelis	
Youngia japonica	
Zachria flavicoma	
Zaluzianskya divaricata	
Zantedeschia aethiopica	
Zebraplatys fractivittata	
Zelleromyces australiensis	
Zelleromyces sp.	
Zosterops lateralis	
Zosterops lateralis subsp. gouldi	

Appendix B
Flora Likelihood of Occurrence

Distance to Nearest Record from the Survey Area is based on a distance analysis undertaken against 2022 DBCA database, all records from only NatureMap (NM) and PMST (Protected Matters Search Tool) are greater than 10km from the Survey Area. High = Suitable habitat present and records less than 5 km from the Survey Area, Medium = Suitable habitat present and records between 5 km and 10 km from the Survey Area, and Low = No suitable habitat present and/or records greater than 10 km from the Survey Area, Unknown = Insufficient information available to classify . CR= Listed as Critically Endangered under the EPBC Act, EN = Listed as Endangered under the EBPC Act, VU = listed as Vulnerable under the EBPC Act. T = Threatened under the BC Act, P = Priority Listed, Ranked and Listed by the DBCA. Likelihoods are assessed both pre and post survey based on knowledge of the Survey Area, nearest known records, known flowering period of flora taxa and knowledge gained from the survey effort during ground truthing. 1: Department of the Environment (2021). SPRAT EPBC Threatened Flora in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. 2: Department of Biodiversity, Conservation and Attractions (2021). FloraBase - TheWestern Australian Flora. https://florabase.dpaw.wa.gov.au/

Species	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Prefered Habitat	Pre-Survey Likelihood of Occurrence	Habitat occurs within the Survey Area	Post-Survey Likelihood of Occurrence
	DBCA	EPBC	NM	PMST	DBCA						
Acacia anomala	T	VU			x	2.75	Aug - Sep	The species grows over laterite in shallow sand, loam, clay or gravel that is brown, yellow or grey. It grows on ridges, slopes and low plains.[1]	High	No	Low
Acacia aphylla	T	VU			x	5.12	Aug - Oct	This species is largely associated with laterite and granite outcrops on hillsides. Soils may be sand, loam, clay or gravel; brown or yellow in colour.[1]	Medium	No	Low
Andersonia gracilis	T	EN			x	4.63	Sep - Nov	Currently known from the Badgingarra, Dandaragan and Kenwick areas where it is found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils.[1]	High	No	Low
Anigozanthos viridis subsp. *terraspectans*	T	VU		x		>10km	Aug - Sep	Occurs in winter-wet depressions where it grows on grey sandy clay loam, or grey sand, in low post-fire regenerating heath.[1]	Low	No	Low
Anthocercis gracilis	T	VU			x	7.01	Sep - Oct	Typically grows on steep granite slopes along the Darling Scarp in shallow, humus-rich sandy or loamy soils.[1]	Medium	No	Low
Austrostipa bronwenae	T	EN			x	5.94	Oct - Nov	Typically grows within the Swan Coastal Plain in flat low-lying calcareous winter wet grey-brown sandy loam or dark brown loam over clay.[1]	Medium	No	Low
Banksia mimica	T	EN			x	4.32	Dec or Jan - Feb	Grows on flat to gentle slopes, on grey and white sand in open woodlands.[1]	High	Yes	Medium
Caladenia huegelii	T	EN			x	7.88	Sep - Oct	Grows in well-drained, deep sandy soils in low mixed woodlands.[1]	Medium	No	Low
Calytrix breviseta subsp. *breviseta*	T	EN			x	6.17	Oct - Nov	The species is restricted to winter-wet clay flats with low shrubs or jarrah forest.[1]	Medium	No	Low
Chamelaucium lullfitzii	T			x		>10km	Sep - Nov	Slopes, undulating plains. Sand. Known only from Chittering and Gingin local government areas.[2]	Low	No	Low
Conospermum undulatum	T	VU			x	0.09	May - Oct	Sand and sandy clay soils, often over laterite, on flat or gently sloping sites between the Swan and Canning Rivers. Banksia and jarrah/marri woodland, with a few records from slightly swampy habitat.[1]	High	Yes	Recorded
Darwinia apiculata	T	EN			x	1.66	Oct	The species' habitat generally consists of open Jarrah-Marri woodland on shallow, gravely soil over laterite, or open heathland over sandy loams with granite boulders. It may also grow on hilltops and slopes, in red clay or gravel soils.[1] Occurs on the Darling Scarp.[2]	High	No	Low
Diplolaena andrewsii	T	EN			x	9.59	Jul - Oct	Occurs in the loam and clay soils of granite outcrops and hillsides in the Darling Scarp.[1]	Medium	No	Low
Diuris drummondii	T	*VU*			x	8.56	Nov - Dec or Jan	Found in low-lying depressions in peaty and sandy clay swamps.[2]	Medium	No	Low

[1] Department of Agriculture, Water and Environment (2020) [2]Western Australian Herbarium (2020)

Diuris micrantha	T	*VU*		x		>10km	Sep - Oct	Found on dark, grey to blackish, sandy clay-loam substrates in winter wet depressions or swamps.[2]	Low	No	Low
Diuris purdiei	T	EN			x	7.03	Sep - Oct	Typically found on sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and dense heath.[1]	Medium	No	Low
Drakaea elastica	T	EN		x		>10km	Oct - Nov	White, grey sand, low-lying situations adjoining winter-wet swamps.[1]	Medium	No	Low
Drakaea micrantha	T	VU		x		>10km	Sep - Oct	Usually found on cleared firebreaks or open sandy patches that have been disturbed, where competition from other plants has been removed.[1]	Low	Yes	Low
Eleocharis keigheryi	T	VU			x	8.37	Aug - Nov	Grows in small clumps in a substrate of clay or sandy loam. This species is emergent in freshwater creeks, and transient waterbodies such as drainage lines and claypans in water to approximately 15 cm deep.[1]	Medium	No	Low
Eremophila glabra subsp. *chlorella*	T	EN			x	6.01	Jul - Nov	Sandy clay. Winter-wet depressions.[2]	Medium	No	Low
Eucalyptus x balanites	T	EN		x		>10km	Oct - Jan	Sandy soils with lateritic gravel.[2]	Low	No	Low
Goodenia arthrotricha	T	EN		x		>10km	Oct - Nov	Gravel. Granite rocks, slopes.[2]	Low	No	Low
Grevillea christineae	T	EN		x		>10km	Aug - Sep	Clay loam, sandy clay, often moist.[2]	Low	No	Low
Grevillea curviloba subsp. *incurva*	T	EN		x		>10km	Aug - Sep	Sand, sandy loam. Winter-wet heath.[2]	Low	No	Low
Grevillea thelemanniana	T	CR			x	5.47	May - Nov	Sand, sandy clay. Winter-wet low-lying flats.[2]	Medium	No	Low
Grevillea flexuosa	T			x		>10km	Jul - Oct	Red-brown sand with laterite & gravel, sand over granite. Ridgetop plateau & associated breakaways.[2]	Low	No	Low
Lepidosperma rostratum	T	EN			x	5.81	Aug	Grows in peaty sand and clay amongst low heath, in winter-wet swamps.[2]	Medium	No	Low
Macarthuria keigheryi	T	EN			x	2.91	Sep - Dec or Feb - Mar	White or grey sand.[2]	High	Yes	Medium
Morelotia australiensis	T				x	7.22	Jun - Sep	Grey, yellow, brown sand or sandy loam. Plains.[2]	Medium	Yes	Medium
Ptilotus pyramidatus	T	CR			x	7.90	Oct	Inhabits a seasonally inundated flat (floodplain) at an elevation of about 6.5 m above sea level.[1]	Medium	No	Low
Synaphea sp. Pinjarra Plain (A.S. George 17182)	T	EN		x		>10km	Sep - Nov	Grey sandy loam or clay, grey-brown clayey sand, brown clayey loam, laterite. Flats, seasonally wet areas, railroad reserves often with wet depressions or drains.[2]	Low	No	Low
Thelymitra dedmaniarum	T	EN		x		>10km	Nov - Dec or Jan	Granite.[2]	Low	No	Low
Thelymitra stellata	T	EN		x	x	1.60	Oct - Nov	Grows on both on ridges and slopes, flats, also on riverbanks and breakaways. Soil types are red, brown, yellow, or grey sandy loams clay or gravel over laterite or gravel. Dry, moist or saline conditions are tolerated.[1]	High	No	Low

[1] Department of Agriculture, Water and Environment (2020) [2]Western Australian Herbarium (2020)

Trithuria occidentalis	T	EN			x	7.37	Oct-Nov	Low-lying depression. Grey-brown clay.[2]	Medium	No	Low
Austrostipa jacobsiana	T	CR	x			>10	Oct - Nov	Found on the Swan Coastal Plain in flat low-lying area of seasonally wet depressions on calcareous clay to fine sandy clay.[1]	Low	No	Low
Calectasia cyanea	T	CR	x			>10	Jun - Oct	Occurs in heathland on flat to gentle slope growing in white sand or laterite gravel with the parent soil material being laterite.[1]	Low	No	Low
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	T	CR	x			>10	Oct	Occurs on grey, clayey sand with lateritic pebbles in low woodland areas near winter-wetflats.[1]	Low	No	Low
Bolboschoenus fluviatilis	P1				x	7.67	Apr or Dec	Winter-wet areas.[2]	Medium	No	Low
Boronia humifusa	P1				x	7.00	Jun or Sep	Gravelly clay loam over laterite. Jarrah-marri open forest.[2]	Medium	Yes	Low - the only records within 10km are on the scarp.
Calandrinia uncinella	P1				x	7.20	Aug - Oct	Seasonally wet swamps or on saline river flats on ground or embankments just above water, growing in soils described as grey-brown sandy or silty loams or white to creamy sands over clays usually with poor drainage.[1]	Medium	No	Low
Hydrocotyle striata	P1				x	4.03	Oct	Clay. Springs.[2]	High	No	Low
Levenhookia preissii	P1				x	6.45	Sep - Dec or Jan	Grey or black, peaty sand. Swamps.[2]	Medium	No	Low
Schoenus sp. Beaufort (G.J. Keighery 6291)	P1				x	8.77	Jul - Sep	Mud. Winter-wet claypans.[2]	Medium	No	Low
Senecio gilbertii	P1				x	2.32	Sep - Nov	Peaty sand. Swamps, slopes.[2]	High	No	Low
Thelymitra magnifica	P1				x	0.96	Sep - Oct	Stony ridges.[2]	High	No	Low
Eriochilus sp. Roleystone (G. Brockman 1140)	P1		x			>10	Jun	Lateritic sandy gravel. Darling Scarp.[2]	Low	No	Low
Eucalyptus x mundijongensis	P1		x			>10	N/A	Loam. Paddocks.[2]	Low	No	Low
Haloragis scoparia	P1		x			>10	Oct	Loam, clay.[2]	Low	No	Low
Ptilotus sericostachyus subsp. *roseus*	P1		x			>10	Sep - Dec	Swan Coastal Plain. Local Government Areas - Armadale, Canning, Murray.[2]	Low	No	Low
Calectasia grandiflora	P2				x	7.84	Jun - Nov	White, grey or yellow sand, sandy clay, gravel, laterite, granite. Swampy areas, rock outcrops, flats, slopes, ridges. Nearest known habitat Brixton Street Wetlands.[2]	Medium	No	Low
Comesperma griffinii	P2				x	8.38	Oct	Yellow or grey sand, plains, wet flats. Nearest known habitat Brixton Street Wetlands.[2]	Medium	No	Low
Diuris brevis	P2				x	8.92	Aug	Flat areas. Grey soils.[2] Nearest known habitat Brixton Street Wetlands.[2]	Medium	No	Low - the only locations within 10km are in high quality habitat at Brixton St Wetlands

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Johnsonia pubescens subsp. *cygnorum*	P2				x	3.47	Sep	Grey-white-yellow sand. Flats, seasonally-wet sites.[2]	High	No	Low
Lepyrodia curvescens	P2				x	5.07	Sep - Nov	Sand, laterite. Seasonally inundated swampland.[2]	Medium	No	Low
Melaleuca viminalis	P2				x	3.50	Mar or May or Sept - Nov	Creeklines. [2]	High	Yes	Low - habitat available but would likely have been detected if present.
Phyllangium palustre	P2				x	7.34	Oct - Nov	Clay. Winter-wet claypans, low-lying seasonal wetlands.[2]	Medium	No	Low
Schoenus loliaceus	P2				x	2.89	Aug - Nov	Sandy soils. Winter-wet depressions.[2]	High	No	Low
Thysanotus brachiatus	P2				x	7.37	Nov - Dec	Grey sand.[2]	Medium	Yes	Low - habitat available but very unlikely to occur here as there is only one record within 10km, near the Swan River, the next nearest record is from Kulin.
Thysanotus sp. Badgingarra (E.A. Griffin 2511)	P2				x	6.30	Dec	Grey sand with lateritic gravel.[2]	Medium	Yes	Low- all three locations witihn 10km occur on the scarp
Acacia benthamii	P2		x			>10	Aug - Sep	Sand. Typically on limestone breakaways.[2]	Medium	No	Low
Andersonia sp. Blepharifolia (F. & J. Hort 1919)	P2		x			>10	Sep - Nov	Brown or red sandy loam. Gravel, granite, laterite or quartz. Hilltops.[2]	Low	No	Low
Bossiaea modesta	P2		x			>10	Oct - Dec	Soils derived from granite. Damp areas close to stream.[2]	Low	No	Low
Calothamnus macrocarpus	P2		x			>10	Feb or Apr or Aug - Dec	Rocky quartzite soils, sand. Slopes.[2]	Low	No	Low
Eucalyptus educta	P2		x			>10	Apr	Shallow soils. Granite rocks.[2]	Low	No	Low
Poranthera moorokatta	P2		x		x	5.90	Sep - Nov	Grey sand, yellow sand, clay, thick white sand.[2]	Medium	Yes	Low - there is only one location within 10km of the Survey Area, near Perth Airport
Stenanthemum sublineare	P2		x			>10	Oct - Dec	Littered white sand, coastal plain.[2]	Low	No	Low
Thelymitra variegata	P2		x			>10	Jun - Sep	Sandy clay, sand, laterite.[2]	Low	Yes	Low
Acacia drummondii subsp. *affinis*	P3				x	5.05	Jul - Aug	Lateritic gravelly soils.[2]	Medium	No	Low
Acacia horridula	P3				x	7.26	May - Aug	Gravelly soils over granite, sand. Rocky hillsides.[2]	Medium	No	Low
Acacia oncinophylla subsp. *oncinophylla*	P3				x	6.34	Aug - Oct	Granitic soils.[2]	Medium	No	Low

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Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)	P3				x	7.37	Aug or Dec	Orange, yellow, red sands on plains.[2]	Medium	No	Low
Asteridea gracilis	P3				x	4.18	Sep - Dec	Sand, clay, gravelly soils.[2]	High	Yes	Low - the only record within 10km is from 1977 and located on the scarp.
Babingtonia urbana	P3				x	7.07	Jan - Mar	Associated with wetlands on the coastal plain.[2]	Medium	No	Low
Banksia pteridifolia subsp. *vernalis*	P3				x	0.00	Sep - Oct	White/grey sand over laterite.[2]	High	Yes	High - previously recorded, but occurs in no access area.
Beaufortia purpurea	P3				x	3.96	Oct - Feb	Lateritic or granitic soils. Rocky slopes.[2]	High	No	Low
Byblis gigantea	P3				x	4.29	Sep - Dec or Jan	Sandy-peat swamps. Seasonally wet areas.[2]	High	No	Low
Carex tereticaulis	P3				x	8.18	Sep - Oct	Black peaty sand.[2]	Medium	No	Low
Chamaescilla gibsonii	P3				x	8.57	Sep	Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.[2]	Medium	No	Low
Comesperma rhadinocarpum	P3				x	7.10	Oct - Nov	Sandy soils. Nearest known habitat Brixton Street Wetlands.[2]	Medium	No	Low
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	P3				x	8.19	Sep - Nov	Seasonally wet inundated areas. Grey-brown clay.[2]	Medium	No	Low
Eryngium sp. subdecumbens (G.J. Keighery 5390)	P3				x	7.34	Oct - Nov	Seasonally inundated claypans, grey clay.[2]	Medium	No	Low
Grevillea dissectifolia	P3				x	5.29	Mar or Jun	Brown- yellow, sand, loam and clay. Granite.[2]	Medium	No	Low
Haemodorum loratum	P3				x	0.95	Nov	Grey or yellow sand, gravel.[2]	High	Yes	High
Halgania corymbosa	P3				x	8.42	Aug - Nov	Gravelly soils, soils over granite.[2]	Medium	No	Low
Isopogon autumnalis	P3				x	0.00	Feb - Jun	White, yellow or grey sand. Laterite gravel. Sandplains, gentle slopes.[2]	High	Yes	Recorded
Isotropis cuneifolia subsp. *glabra*	P3				x	8.40	Sep	Sand, clay loam. Winter-wet flats.[2]	Medium	No	Low
Jacksonia gracillima	P3				x	4.36	Oct - Nov	Coastal plains, dry grey sand, near seasonal wetlands and winter-wet areas.[2]	High	No	Low
Lasiopetalum glutinosum subsp. *glutinosum*	P3				x	3.61	Sep - Dec	Open, low scrub over heath, on steep slopes of lateritic gravel, clay or sandy loam near granite outcrops and creek lines.[2]	High	No	Low
Meionectes tenuifolia	P3				x	7.34	Sep - Dec	Seasonally wet inundated areas. Grey sand.[2]	Medium	No	Low

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Myriophyllum echinatum	P3				x	5.20	Nov	Clay. Winter-wet flats.[2]	Medium	No	Low
Pithocarpa corymbulosa	P3				x	3.56	Jan - Apr	Gravelly or sandy loam. Amongst granite outcrops.[2]	High	No	Low
Platysace ramosissima	P3				x	2.48	Oct - Nov	Sandy soils.[2]	High	Yes	Low - perennial herb that would have been detectable at the time of the survey and likely to have been recorded if present.
Schoenus benthamii	P3				x	8.40	Oct - Nov	White, grey sand, sandy clay. Winter-wet flats, swamps.[2]	Medium	No	Low
Schoenus capillifolius	P3				x	8.30	Oct - Nov	Brown mud. Claypans.[2]	Medium	No	Low
Schoenus pennisetis	P3				x	2.89	Aug - Sep	Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.[2]	High	No	Low
Schoenus sp. Waroona (G.J. Keighery 12235)	P3				x	7.84	Oct - Nov	Clay or sandy clay. Winter-wet flats.[2]	Medium	No	Low
Sporobolus blakei	P3				x	5.57	Jun - Jul	Red sandy clay, loam. Creeks.	Medium	No	Low
Stackhousia sp. Red-blotched corolla (A. Markey 911)	P3				x	4.03	Sep - Nov	White or brown sandy clay. Granite or laterite. Gentle slopes, base of breakaways.[2]	Medium	No	Low
Stylidium aceratum	P3				x	7.84	Oct - Nov	Sandy soils. Swamp heathland.[2]	Medium	No	Low
Styphelia filifolia	P3				x	4.40	Mar - May	Yellow sand, brown sand, grey sand, flat sandplains, lower slopes.[2]	High	Yes	Low - habitat may be available, but there is only one record within 10km, which occurs in a large patch of remnant bushland, from 2006.
Thysanotus anceps	P3				x	4.28	Oct - Dec	White or grey sand, lateritic gravel, laterite.[2]	High	Yes	Low - would have been detectable at the time of the survey and likely to have been recorded if present
Thysanotus cymosus	P3				x	6.72	Sep - Oct	Clay, granitic or lateritic sand.[2]	Medium	No	Low
Adenanthos cygnorum subsp. *chamaephyton*	P3		x			>10	Jul or Sep - Dec or Jan	Grey sand, lateritic gravel.[2]	Low	Yes	Low
Allocasuarina grevilleoides	P3		x			>10	Sep - Nov	Sand over laterite, gravel.[2]	Low	Yes	Low
Angianthus micropodioides	P3		x			>10	Nov - Dec or Jan - Feb	Saline sandy soils. River edges, saline depressions, claypans.[2]	Low	No	Low
Banksia kippistiana var. *paenepeccata*	P3		x			>10	Oct - Nov	Lateritic gravelly soils.[2]	Low	No	Low
Conostylis bracteata	P3		x			>10	Aug - Sep	Sand, limestone, consolidated sand dunes.[2]	Low	No	Low

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Cyathochaeta teretifolia	P3		x			>10	Dec	Grey sand, sandy clay, swamps, creek edges.[2]	Low	No	Low
Dampiera triloba	P3		x			>10	Aug - Dec	Dark brown/black peaty soils, dark grey soils, hillsides, coastal plains.[2]	Low	No	Low
Dicrastylis micrantha	P3		x			>10	Sep - Dec	Red sand. Sandplains.[2]	Low	No	Low
Dillwynia dillwynioides	P3		x			>10	Aug - Dec	Sandy soils. Winter-wet depressions.[2]	Low	No	Low
Lasiopetalum membranaceum	P3		x			>10	Sep - Dec	Sand over limestone.[2]	Low	No	Low
Lepyrodia heleocharoides	P3		x			>10	Dec	Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps.[2]	Low	No	Low
Stylidium paludicola	P3		x			>10	Oct - Dec	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.[2]	Low	No	Low
Stylidium periscelianthum	P3		x			>10	Sep - Oct	Loamy clay, moist soils pockets. Wet flats, low granitic hills.[2]	Low	No	Low
Tetratheca pilifera	P3		x			>10	Aug - Oct	Gravelly soils.[2]	Low	No	Low
Verticordia serrata var. *linearis*	P3		x			>10	Sep - Oct	White sand, gravel. Open woodland.[2]	Low	No	Low
Acacia oncinophylla subsp. *patulifolia*	P4				x	3.63	Aug - Nov or Nov - Dec	Granitic soils, occasionally on laterite.[2]	High	No	Low
Aponogeton hexatepalus	P4				x	7.53	Jul - Oct	Mud. Freshwater: ponds, rivers, claypans.[2]	Medium	No	Low
Calothamnus accedens	P4				x	3.85	Jan - Feb	Sandy soils over laterite, brown loam. Road verge.[2]	High	Yes	Low - erect perennial shrub that would have been detectable at the time of the survey and likely to have been recorded if present.
Cyanicula ixioides subsp. *ixioides*	P4				x	7.49	Aug - Oct	Laterite, gravel.[2]	Medium	No	Low
Cyanothamnus tenuis	P4				x	3.23	Nov	Granite slopes. Yellow, brown clay, loam.[2]	High	No	Low
Darwinia pimelioides	P4				x	7.87	Oct - Sep	Loam, sandy loam. Granite outcrops.[2]	Medium	No	Low
Drosera occidentalis	P4				x	7.07	Oct - Dec or Jan	Peaty sand around the margins of swamps, winter wet depressions and watersheds in open areas.[2]	Medium	No	Low
Grevillea pimeleoides	P4			x	x	7.99	May - Nov	Gravelly soils over granite. Rocky hillsides.[2]	Medium	No	Low
Hydrocotyle lemnoides	P4				x	7.53	Aug - Oct	Swamps.[2]	Medium	No	Low

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Jacksonia sericea	P4				x	5.54	Dec or Jan - Feb	Calcareous and sandy soils.[2]	Medium	Yes	Low - perennial spreading shrub that would have been detectable at the time of the survey and likely to have been recorded if present.
Lasiopetalum bracteatum	P4				x	2.29	Aug - Nov	Sandy clay, clay, lateritic gravel, along drainage lines, creeks, gullies, granite outcrops.[2]	High	Yes	Low - erect open shrub that would have been flowering and highly detectable at the time of the survey and likely to have been recorded if present.
Ornduffia submersa	P4				x	8.06	Sep - Oct	Dry, seasonally inundated grey soil.[2]	Medium	No	Low - there is a record within the Survey Area however it is incorrect because it's labelled Brixton St Wetland
Pimelea rara	P4				x	8.05	Dec or Jan	Lateritic soils.[2]	Medium	No	Low - records within 10km are restriced to the scarp
Schoenus griffinianus	P4				x	5.07	Sep - Oct	White sand.[2]	Medium	Yes	Low - habitat may be available , however there is only one record within 10 km, all others are north of the Survey Area
Schoenus natans	P4				x	8.43	Oct	Winter-wet depressions.[2]	Medium	No	Low
Senecio leucoglossus	P4				x	4.01	Aug - Dec	Gravelly lateritic or granitic soils. Granite outcrops, slopes.[2]	High	No	Low
Stylidium longitubum	P4				x	4.75	Oct - Dec	Sandy clay, clay. Seasonal wetlands.[2]	High	No	Low
Stylidium striatum	P4				x	2.32	Oct - Nov	Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland.[2]	High	No	Low
Verticordia lindleyi subsp. lindleyi	P4				x	1.00	May or Nov - Dec or Jan	Sand, sandy clay. Winter-wet depressions.[2]	Low	No	Low
Anigozanthos humilis subsp. *chrysanthus*	P4		x			>10	Jul - Oct	Grey or yellow sand.[2]	Low	Yes	Low
Boronia tenuis	P4		x			>10	Aug - Nov	Laterite, stony soils, granite.[2]	Low	No	Low
Calothamnus graniticus subsp. *leptophyllus*	P4		x			>10	Jun - Aug	Clay over granite, lateritic soils. Hillsides.[2]	Low	No	Low
Dodonaea hackettiana	P4		x			>10	Jul - Oct	Sand. Outcropping limestone.[2]	Low	No	Low
Hypolaena robusta	P4		x			>10	Sep - Oct	White sand. Sandplains.[2]	Low	No	Low
Persoonia sulcata	P4		x			>10	Sep - Nov	Lateritic or granitic soils.[2]	Low	No	Low

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Thysanotus glaucus	P4		x			>10	Nov-Feb	White, grey or yellow sand, sand gravel.[2]	Low	Yes	Low
Tripterococcus sp. Brachylobus (A.S. George 14234)	P4		x			>10	Feb	Winter wet flats, peaty sand over clay.[2]	Low	No	Low
Picris compacta	X		x			>10	N/A	Loam, limestone. River banks.[2]	Low	No	Low

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Appendix C
Flora and Vegetation Site Data

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q01		
Location	MGA 50	406796 mE	6462373 mN
Described by:	NW		
Date:	1-09-2022		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Loam, Sand		
Soil Colour:	Grey		

Vegetation: *Eucalyptus marginata low open woodland over Hakea stenocarpa, Hakea lissocarpha and Xanthorrhoea preissii mid open shrubland over Acacia pulchella, Hibbertia hypericoides subsp. hypericoides and Mesomelaena pseudostygia low mixed shrubland and sedgeland.*

Condition: Excellent **Disturbance Type:** Fire evidence, Rabbit tracks/scats, Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia pulchella	85	12	
Allocasuarina humilis	120	2	
Anigozanthos manglesii	80	2	
Austrostipa elegantissima	35	0.5	
Babingtonia camphorosmae	35	0.5	
Banksia armata var. armata	30	4	
Banksia dallanneyi subsp. dallanneyi	75	4	
Bossiaea eriocarpa	20	0.1	
Burchardia congesta	45	0.5	
Caladenia flava	10	0.1	
Chamaescilla corymbosa	5	0.1	
Conostylis setigera subsp. setigera	15	0.5	
Daviesia decurrens	50	2	
Daviesia nudiflora subsp. nudiflora	100	1	
Drosera erythrorhiza	0.1	1	
Drosera macrantha	55	0.1	
Drosera porrecta	20	0.1	
**Ehrharta calycina*	75	4	
Eucalyptus marginata	600	10	
**Freesia sp.*	20	0.5	
Gastrolobium ?linearifolium/capitatum	40	0.5	
**Gladiolus caryophyllaceus*	80	1	
Gompholobium marginatum	5	0.1	
Haemodorum simplex	50	0.1	
Haemodorum sp.	15	0.1	
Hakea incrassata	90	3	
Hakea lissocarpha	110	5	
Hakea stenocarpa	100	7	
Hibbertia hypericoides subsp. hypericoides	60	15	
Hyalosperma cotula	4	0.1	
**Hypochaeris glabra*	1	0.5	
Isolepis cernua	1	0.1	
Labichea punctata	15	0.1	
Lepidosperma pubisquameum	40	1	
Lomandra caespitosa	50	0.1	
Mesomelaena pseudostygia	80	5	
Mesomelaena tetragona	100	3	
Morelotia octandra	35	1	
Neurachne alopecuroidea	20	2	
Patersonia juncea	30	0.1	
Philotheca spicata	40	0.5	
Pyrorchis nigricans	0.5	0.1	
Scaevola canescens	40	0.5	
Scaevola repens var. repens	15	1	
Stylidium affine	30	3	
Stylidium hispidum	10	0.1	
Styphelia pallida	20	0.1	
Synaphea spinulosa subsp. spinulosa	45	1	
Thysanotus dichotomus	30	0.1	
Trachymene pilosa	5	0.5	
Trymalium ledifolium	90	1	
**Ursinia anthemoides subsp. anthemoides*	15	1	
Xanthorrhoea preissii	120	4	
Xanthosia huegelii	20	0.5	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q02		
Location	MGA 50	406863 mE	6462384 mN
Described by:	NW		
Date:	1-09-2022		
Type:	Quadrat		
Landform:	Mid slope		
Slope:	South		
Rock Type:			
Soil Type:	Clay, Sand		
Soil Colour:	Grey		

Vegetation: *Corymbia calophylla low woodland over Calothamnus quadrifidus subsp. quadrifidus, Thomasia macrocarpa and Acacia pulchella mid open shrubland over Cyathochaeta avenacea and Mesomelaena pseudostygia mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia pulchella	100	6	
Allocasuarina humilis	70	0.5	
Anigozanthos manglesii	50	1	
Babingtonia camphorosmae	35	1	
**Briza maxima*	30	0.1	
Burchardia congesta	60	0.5	
Calothamnus quadrifidus subsp. quadrifidus	160	6	
**Cenchrus clandestinus*	20	2	
Chamaescilla corymbosa	20	2	
Conospermum huegelii	40	0.2	
Conostylis setigera subsp. setigera	20	0.5	
Corymbia calophylla	1200	40	
Cyathochaeta avenacea	60	6	
Daviesia decurrens	60	3	
Daviesia nudiflora subsp. nudiflora	70	2	
Desmocladus fasciculatus	15	3	
Drosera erythrorhiza	1	0.2	
Drosera macrantha	15	0.5	
Drosera porrecta	20	1	
**Freesia sp.*	20	4	
Gastrolobium ?linearifolium/capitatum	80	0.5	
**Gladiolus caryophyllaceus*	60	0.1	
Gompholobium confertum	30	0.1	
Gompholobium marginatum	10	0.1	
Haemodorum simplex	50	0.1	
Hemerocallidaceae sp.	50	0.2	
Hibbertia hypericoides subsp. hypericoides	60	3	
Hypocalymma angustifolium	40	0.5	
Lepidosperma ?costale	100	2.5	
Lepidosperma pubisquameum	80	0.5	
Lomandra sericea	40	0.3	
Mesomelaena pseudostygia	50	6	
Mesomelaena tetragona	80	4	
Morelotia octandra	60	4	
**Oxalis ?glabra*	5	1	
Scaevola canescens	30	0.2	
Stylidium ?purpureum	15	0.1	
Stylidium affine	20	0.2	
Thomasia macrocarpa	100	10	
**Ursinia anthemoides subsp. anthemoides*	10	0.5	
Xanthorrhoea preissii	110	1	
Xanthosia candida	40	4	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q03		
Location	MGA 50	406879 mE	6462425 mN
Described by:	NW		
Date:	1-09-2022		
Type:	Quadrat		
Landform:	Mid slope		
Slope:	East		
Rock Type:			
Soil Type:	Loam, Sand		
Soil Colour:	Brown		

Vegetation: *Corymbia calophylla low woodland over Hakea undulata and Xanthorrhoea preissii mid open shrubland over Mesomelaena pseudostygia, Morelotia octandra and Hibbertia hypericoides subsp. hypericoides mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Austrostipa elegantissima	30	1	
Babingtonia camphorosmae	35	0.5	
Banksia dallanneyi subsp. dallanneyi	30	1.5	
**Briza maxima*	40	0.5	
Burchardia congesta	50	0.2	
Cassytha glabella forma casuarinae	30	0.5	
Chamaescilla corymbosa	25	0.2	
Corymbia calophylla	1300	65	
Dampiera linearis	15	0.1	
Daviesia nudiflora subsp. nudiflora	40	0.5	
**Freesia sp.*	25	3	
**Gladiolus caryophyllaceus*	50	0.2	
Haemodorum simplex	60	0.2	
Hakea stenocarpa	90	1	
Hakea undulata	170	3	
Hibbertia hypericoides subsp. hypericoides	50	6	
Hypocalymma angustifolium	45	1	
Isopogon dubius	30	0.2	
Labichea punctata	30	0.2	
Lepidosperma pubisquameum	50	3	
Lomandra sericea	40	1	
Mesomelaena pseudostygia	50	15	
Mesomelaena tetragona	100	3	
Monotaxis grandiflora var. grandiflora	22	0.1	
Morelotia octandra	50	10	
Poaceae sp.	20	4	
Thelymitra macrophylla	40	0.1	
Thomasia macrocarpa	110	1.5	
Thysanotus dichotomus	40	0.1	
Trymalium ledifolium	110	1	
Xanthorrhoea preissii	120	4	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q04		
Location	MGA 50	406869 mE	6463610 mN
Described by:	NW		
Date:	1-09-2022		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Brown, Grey		

Vegetation: *Eucalyptus marginata, Allocasuarina fraseriana and Nuytsia floribunda low woodland over Lambertia multiflora var. darlingensis and Xanthorrhoea preissii mid open shrubland over Hibbertia hypericoides subsp. hypericoides, Mesomelaena tetragona and Mesomelaena pseudostygia mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: >10 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Allocasuarina fraseriana	10000	30	
Anigozanthos manglesii	80	2	
Babingtonia camphorosmae	15	0.1	
Banksia dallanneyi subsp. dallanneyi	20	1	
Bossiaea eriocarpa	40	3	
**Briza maxima*	20	0.2	
Burchardia congesta	45	0.5	
Caesia micrantha	30	0.1	
Cassytha glabella forma casuarinae	20	0.2	
Caustis dioica	40	2.5	
Chamaescilla corymbosa	10	0.1	
Conostylis setigera subsp. setigera	10	0.5	
Cyanothamnus ramosus subsp. anethifolius	10	0.1	
Desmocladus fasciculatus	10	1	
Diuris sp.	20	0.1	
Drosera erythrorhiza	0.5	1	
Drosera macrantha	30	0.1	
Eucalyptus marginata	1200	35	
**Gladiolus caryophyllaceus*	50	0.5	
Haemodorum simplex	100	0.1	
Hakea conchifolia	110	0.5	
Hakea incrassata	100	0.5	
Hibbertia hypericoides subsp. hypericoides	50	6	
Hyalosperma cotula	3	0.2	
Isopogon autumnalis	80	1	
Isopogon dubius	50	0.5	
Johnsonia pubescens subsp. pubescens	30	0.2	
Lambertia multiflora var. darlingensis	130	7	
Lechenaultia biloba	20	5	
Lepidosperma pubisquameum	40	0.5	
Lomandra sericea	40	0.1	
Melaleuca trichophylla	80	0.5	
Mesomelaena pseudostygia	50	5	
Mesomelaena tetragona	70	6	
Morelotia octandra	55	1	
Neurachne alopecuroidea	15	1	
Nuytsia floribunda	500	15	
Pentapeltis peltigera	15	2	
Persoonia saccata	100	0.5	
Philotheca spicata	30	0.1	
Scaevola repens var. repens	5	2	
Schoenus caespititius	70	3	
Sphaerolobium ?macranthum	5	0.2	
Stylidium hispidum	5	0.1	
Synaphea gracillima	40	0.2	
Tricoryne elatior	50	0.5	
**Ursinia anthemoides subsp. anthemoides*	15	0.2	
Xanthorrhoea preissii	100	7	
Xanthosia huegelii	5	0.5	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q05		
Location	MGA 50	407138 mE	6463032 mN
Described by:	NW		
Date:	2-09-2022		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Grey		

Vegetation: *Eucalyptus marginata and Corymbia calophylla low woodland over Xanthorrhoea preissii and Lambertia multiflora var. darlingensis mid open shrubland over Acacia pulchella, Allocasuarina humilis and Morelotia octandra mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia alata var. alata	20	0.3	
Acacia pulchella	80	6	
Allocasuarina humilis	70	4	
Anigozanthos manglesii	100	0.3	
Banksia armata var. armata	70	2.5	
Banksia dallanneyi subsp. dallanneyi	30	1.5	
Bossiaea eriocarpa	40	1.5	
**Briza maxima*	30	0.5	
Burchardia congesta	50	0.5	
Caesia micrantha	40	0.1	
Calothamnus quadrifidus subsp. quadrifidus	40	1.5	
Caustis dioica	45	1.5	
Chamaescilla corymbosa	15	1	
Conospermum huegelii	40	0.2	
Conospermum undulatum	150	0.3	
Conostylis setigera subsp. setigera	15	0.2	
Corymbia calophylla	500	3	
Dasypogon obliquifolius	45	0.5	
Daviesia nudiflora subsp. nudiflora	70	1	
Daviesia preissii	80	1.5	
Desmocladus fasciculatus	10	0.5	
Drosera erythrorhiza	1	0.5	
Drosera macrantha	30	0.1	
Drosera porrecta	20	0.1	
**Eragrostis curvula*	70	0.2	
Eucalyptus marginata	1200	30	
**Freesia sp.*	25	3	
**Fumaria capreolata*	5	0.1	
**Gladiolus caryophyllaceus*	50	0.5	
Gompholobium knightianum	5	0.1	
Gompholobium marginatum	15	1	
Gompholobium tomentosum	40	0.5	
Haemodorum simplex	40	0.2	
Hakea conchifolia	80	1	
Hakea incrassata	100	1	
Hibbertia hypericoides subsp. hypericoides	40	3	
**Hypochaeris glabra*	1	0.2	
Isopogon dubius	45	0.5	
Kingia australis	130	2	
Labichea punctata	20	0.5	
Lambertia multiflora var. darlingensis	150	7	
Lepidosperma ?pubisquameum	40	2	
Lepidosperma sp.	40	0.5	
Lomandra preissii	50	1.5	
Lyginia imberbis	60	1.5	
Mesomelaena pseudostygia	50	1	
Morelotia octandra	50	10	
Neurachne alopecuroidea	10	0.2	
Patersonia juncea	20	0.1	
Petrophile linearis	60	0.5	
Philotheca spicata	50	0.1	
Schoenus caespititius	50	0.5	

Stylidium ?purpureum	10	0.5
Stylidium hispidum	5	0.1
Thelymitra macrophylla	40	0.1
Thysanotus manglesianus	50	0.2
Trachymene pilosa	4	0.1
**Trifolium dubium*	20	0.1
**Ursinia anthemoides subsp. anthemoides*	15	0.5
Xanthorrhoea preissii	120	10
Xanthosia huegelii	20	1

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q06		
Location	MGA 50	407392 mE	6463579 mN
Described by:	NW		
Date:	2-09-2022		
Type:	Quadrat		
Landform:	Mid slope		
Slope:	West		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Grey		

Vegetation: *(Corymbia calophylla and Eucalyptus marginata low woodland over) Banksia sessilis subsp. sessilis and Acacia saligna subsp. Wheatbelt (B.R. Maslin 8602), Lambertia multiflora var. darlingensis and Daviesia preissii tall to mid open shrubland over Caustis dioica, Hibbertia hypericoides subsp. hypericoides*

Condition: Very Good Disturbance Type: Litter, Rabbit tracks/scats, Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia pulchella	110	3	
Acacia saligna subsp. Wheatbelt (B.R. Maslin 8602)	400	3	
Allocasuarina humilis	140	2	
Babingtonia camphorosmae	50	1.5	
Banksia sessilis subsp. sessilis	400	7	
Bossiaea eriocarpa	40	0.1	
**Briza maxima*	25	0.2	
Burchardia congesta	60	0.3	
Caustis dioica	50	15	
Chamaescilla corymbosa	10	0.2	
Conostylis setigera subsp. setigera	10	0.5	
Crassula decumbens var. decumbens	1	0.1	
Daviesia preissii	110	4	
Desmocladus fasciculatus	10	1	
Drosera erythrorhiza	1	0.5	
Drosera macrantha	70	0.3	
**Eragrostis curvula*	30	0.2	
**Freesia sp.*	25	0.5	
Gastrolobium ?linearifolium/capitatum	40	0.1	
Gompholobium confertum	40	0.1	
Gompholobium knightianum	30	0.2	
Grevillea bipinnatifida subsp. bipinnatifida	60	2	
Haemodorum simplex	40	1	
Hakea undulata	25	0.2	
Hibbertia hypericoides subsp. hypericoides	70	8	
Hibbertia racemosa	25	0.2	
**Hypochaeris glabra*	1	0.1	
Isolepis cernua	1	0.1	
Lambertia multiflora var. darlingensis	150	4	
**Lavandula stoechas*	45	2	
Lepidosperma pubisquameum	50	1	
**Leptospermum laevigatum*	20	0.2	
Lomandra hermaphrodita	35	0.2	
Lomandra preissii	50	2.5	
Lomandra sericea	40	0.2	
**Lysimachia arvensis*	2	0.1	
Melaleuca trichophylla	150	0.5	
Mesomelaena pseudostygia	50	5	
Mesomelaena tetragona	60	7	
Morelotia octandra	50	1.5	
**Oxalis purpurea*	20	0.2	
Patersonia juncea	15	0.1	
Philotheca spicata	45	0.3	
**Romulea rosea*	10	0.1	
Scaevola repens var. repens	20	0.5	
Schoenus caespititius	50	1	
Sphaerolobium medium	50	0.2	
Stylidium ?purpureum	10	0.1	
Stylidium hispidum	5	0.1	
Styphelia tenuiflora	60	1	
Thysanotus multiflorus	40	0.2	
Thysanotus sparteus	100	0.1	

**Ursinia anthemoides subsp. anthemoides*	15	0.1

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q07		
Location	MGA 50	407392 mE	6463639 mN
Described by:	NW		
Date:	2-09-2022		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Brown, Grey, White		

Vegetation: *Eucalyptus marginata and Corymbia calophylla low woodland over Xanthorrhoea preissii mid sparse shrubland over Hibbertia hypericoides subsp. hypericoides and Mesomelaena pseudostygia mixed low shrubland and sedgeland.*

Condition: Good

Disturbance Type: Rabbit tracks/scats, Weeds, logging

Fire Age: >10 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Babingtonia camphorosmae	40	0.2	
Banksia armata var. armata	65	1	
Banksia dallanneyi subsp. dallanneyi	25	1	
Bossiaea eriocarpa	35	1	
**Briza maxima*	35	3	
Burchardia congesta	50	0.2	
Chamaescilla corymbosa	15	1	
Corymbia calophylla	1200	15	
Drosera erythrorhiza	1	0.1	
Drosera stolonifera	10	0.1	
**Ehrharta calycina*	80	6	
Eucalyptus marginata	1200	30	
**Freesia sp.*	20	10	
Gompholobium knightianum	10	0.1	
Haemodorum sp.	40	0.1	
Hakea lissocarpha	45	0.5	
Hakea stenocarpa	45	0.5	
Hakea trifurcata	170	0.5	
Hibbertia hypericoides subsp. hypericoides	55	4	
Hybanthus calycinus	10	0.1	
Hypocalymma angustifolium	50	0.5	
Labichea punctata	40	1	
Lepidosperma ?costale	60	0.5	
Lomandra sericea	30	0.1	
Lomandra sonderi	45	0.1	
Mesomelaena pseudostygia	50	4	
Morelotia octandra	40	3	
Neurachne alopecuroidea	25	2	
Pterostylis vittata	25	0.1	
**Romulea rosea*	15	0.2	
Thelymitra macrophylla	35	0.1	
Xanthorrhoea preissii	110	3	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	22Q08		
Location	MGA 50	407178 mE	6463562 mN
Described by:	NW		
Date:	8-09-2022		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Gravel, Sand		
Soil Colour:	Brown, Orange		

Vegetation: *Eucalyptus marginata low woodland over *Chamelaucium uncinatum and *Leptospermum laevigatum tall to mid sparse shrubland over Isopogon dubius and Mesomelaena pseudostygia mixed low shrubland and sedgeland.*

Condition: Very Good Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia pulchella	45	0.4	
Babingtonia camphorosmae	35	0.5	
**Briza maxima*	30	0.5	
Caustis dioica	45	1	
**Chamelaucium uncinatum*	240	3	
Cyanothamnus ramosus subsp. anethifolius	35	0.2	
Daviesia decurrens	50	1	
**Ehrharta calycina*	55	1	
Eucalyptus marginata	800	40	
**Freesia sp.*	25	0.2	
Gastrolobium capitatum	40	0.2	
Gompholobium knightianum	25	0.2	
Gompholobium marginatum	20	0.1	
Gompholobium polymorphum	25	0.1	
Haemodorum sp.	40	0.1	
Hakea trifurcata	170	1	
Hakea undulata	120	1	
Hibbertia huegelii	30	0.2	
Hibbertia hypericoides subsp. hypericoides	45	1	
Hovea sp.	35	0.5	
Isopogon dubius	85	4	
Kennedia coccinea	15	2	
Lambertia multiflora var. darlingensis	80	1.5	
Laxmannia squarrosa	10	0.2	
Lepidosperma leptostachyum	50	2	
**Leptospermum laevigatum*	150	4	
Lomandra preissii	45	0.5	
Mesomelaena pseudostygia	40	3	
Neurachne alopecuroidea	15	0.5	
Pentapeltis peltigera	6	1.5	
**Romulea rosea*	25	0.5	
Scaevola ?glandulifera	40	0.4	
Schoenus ?brevisetus	30	0.4	
Sphaerolobium medium	35	0.1	
Stylidium hispidum	3	0.1	
Tricoryne ?elatior	45	0.4	
**Ursinia anthemoides subsp. anthemoides*	10	0.5	
Xanthosia candida	5	0.1	
Xanthosia huegelii	10	0.1	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	MVQ1		
Location	MGA 50	407076 mE	6463012 mN
Described by:	NW		
Date:	16-09-2015		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Fine sand		
Soil Colour:	Grey		

Vegetation: *Eucalyptus marginata and Nuytsia floribunda low open woodland over Adenanthos cygnorum subsp. cygnorum mid open shrubland over Verticordia densiflora var. densiflora, Calothamnus sanguineus, Lyginia imberbis and Mesomelaena pseudostygia mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Adenanthos cygnorum subsp. cygnorum	130	7	
Allocasuarina humilis	95	1	
Anigozanthos manglesii	100	1	
Banksia nivea subsp. nivea	30	0.1	
**Briza maxima*	15	3	
Burchardia congesta	45	0.1	
Calothamnus sanguineus	60	6	
Calytrix fraseri	200	1	
Caustis dioica	40	1	
Conostylis setigera subsp. setigera	15	0.1	
Dasypogon obliquifolius	40	1	
Daviesia angulata	110	3	
Desmocladus fasciculatus	10	0.1	
Drosera erythrorhiza	1	0.1	
Eucalyptus marginata	200	1.5	
**Gladiolus caryophyllaceus*	80	0.1	
Haemodorum sp.	40	0.1	
Hemiphora bartlingii	40	0.1	
Hibbertia hypericoides subsp. hypericoides	60	1.5	
**Hypochaeris glabra*	1	1	
Jacksonia lehmannii	40	0.1	
Johnsonia pubescens subsp. pubescens	25	0.1	
Labichea punctata	30	0.1	
Lechenaultia biloba	40	0.1	
Lepidosperma ?pubisquameum	30	0.1	
Lomandra sericea	40	0.1	
Lyginia imberbis	45	2	
Mesomelaena pseudostygia	45	2	
Neurachne alopecuroidea	35	0.1	
Nuytsia floribunda	450	1	
Philotheca spicata	80	0.1	
Scaevola repens var. repens	5	0.1	
Stylidium preissii	10	0.1	
Synaphea spinulosa subsp. spinulosa	45	1.5	
**Tribolium uniolae*	45	0.1	
**Ursinia anthemoides subsp. anthemoides*	15	0.1	
Verticordia densiflora var. densiflora	90	3	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	MVQ2		
Location	MGA 50	406961 mE	6462220 mN
Described by:	NW		
Date:	16-09-2015		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Grey		

Vegetation: *Eucalyptus marginata low woodland over Xanthorrhoea preissii and Allocasuarina humilis mid shrubland over Hibbertia hypericoides subsp. hypericoides, Mesomelaena pseudostygia, Labichea punctata and Bossiaea eriocarpa mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Allocasuarina humilis	100	3	
Anigozanthos manglesii	120	0.1	
Banksia nivea subsp. nivea	20	1	
Banksia sessilis subsp. sessilis	30	0.1	
Bossiaea eriocarpa	35	2	
**Briza maxima*	15	2	
Burchardia congesta	40	0.1	
Caladenia flava	15	0.1	
Conostylis setigera subsp. setigera	15	1	
Daviesia nudiflora subsp. nudiflora	50	1	
Desmocladus fasciculatus	10	0.1	
Drosera stolonifera	40	0.1	
Eucalyptus marginata	900	15	
**Gladiolus caryophyllaceus*	80	0.1	
Haemodorum sp.	45	0.1	
Hibbertia hypericoides subsp. hypericoides	55	2	
Hyalosperma cotula	10	0.1	
**Hypochaeris glabra*	1	0.1	
Jacksonia lehmannii	40	0.1	
Johnsonia pubescens subsp. pubescens	20	0.1	
Labichea punctata	35	5	
Laxmannia sessiliflora subsp. australis	5	0.1	
Lechenaultia biloba	35	1.5	
Lepidosperma ?pubisquameum	25	0.1	
Lepidosperma leptostachyum	55	0.1	
Lomandra sericea	40	0.1	
Mesomelaena pseudostygia	50	2	
Monotaxis grandiflora var. grandiflora	10	0.1	
Morelotia octandra	45	1	
Patersonia occidentalis	45	1	
Philotheca spicata	50	1	
Rytidosperma sp.	7	0.1	
Scaevola repens var. repens	10	0.1	
Schoenus brevisetis	40	0.1	
Stirlingia latifolia	55	0.1	
Stylidium piliferum	20	0.1	
Synaphea spinulosa subsp. spinulosa	45	0.1	
Trachymene pilosa	5	0.1	
Tricostularia neesii	50	0.1	
**Ursinia anthemoides subsp. anthemoides*	15	0.1	
Xanthorrhoea preissii	110	4	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	MVQ3		
Location	MGA 50	406829 mE	6462346 mN
Described by:	NW		
Date:	16-09-2015		
Type:	Quadrat		
Landform:	Slope		
Slope:	South west		
Rock Type:			
Soil Type:	Sand, Silty clay		
Soil Colour:	Cream		

Vegetation: *Corymbia calophylla low woodland over Hakea undulata and Xanthorrhoea preissii mid open shrubland over Mesomelaena pseudostygia and Hibbertia hypericoides subsp. hypericoides mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia pulchella	90	3.5	
Allocasuarina humilis	110	1.5	
Banksia armata var. armata	90	2	
Banksia dallanneyi subsp. dallanneyi	35	2	
**Briza maxima*	15	0.1	
Burchardia congesta	70	0.1	
Caesia occidentalis	100	0.1	
Calothamnus quadrifidus subsp. quadrifidus	110	1.5	
Chamaescilla corymbosa	3	0.1	
Conostylis setigera subsp. setigera	10	0.1	
Corymbia calophylla	1000	35	
Daviesia decurrens	40	0.1	
Desmocladus fasciculatus	10	0.1	
Drosera stolonifera	30	0.1	
**Ehrharta calycina*	80	1	
**Freesia sp.*	20	0.1	
Gastrolobium capitatum	40	0.1	
**Gladiolus caryophyllaceus*	80	0.1	
Haemodorum sp.	45	0.1	
Hakea incrassata	55	2	
Hakea stenocarpa	45	0.1	
Hakea undulata	230	2	
Hibbertia hypericoides subsp. hypericoides	45	10	
Hovea trisperma	40	0.1	
Hyalosperma cotula	10	0.1	
Hypocalymma angustifolium	45	0.1	
Jacksonia lehmannii	30	0.1	
Lechenaultia biloba	20	0.1	
Lyperanthus serratus	35	0.1	
Mesomelaena pseudostygia	45	7	
Mesomelaena tetragona	110	1	
Monotaxis grandiflora var. grandiflora	15	0.1	
Morelotia octandra	60	3	
Neurachne alopecuroidea	30	0.1	
Scaevola repens var. repens	10	1	
Stylidium affine	40	0.1	
Thomasia macrocarpa	95	1	
Thysanotus manglesianus	0.1	0.1	
Trymalium ledifolium	115	1	
Xanthorrhoea preissii	120	3	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	MVQ4		
Location	MGA 50	406901 mE	6462278 mN
Described by:	NW		
Date:	21-09-2015		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Grey		

Vegetation: *Eucalyptus marginata and Corymbia calophylla low woodland over Xanthorrhoea preissii, Acacia pulchella and Anigozanthos manglesii mid open shrubland over Mesomelaena tetragona and Labichea punctata mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Minimal weeds

Fire Age: > 15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia applanata	40	0.1	
**Acacia iteaphylla*	140	1	
Acacia pulchella	110	6	
Anigozanthos manglesii	110	4	
Austrostipa elegantissima	70	0.1	
Babingtonia camphorosmae	35	0.1	
Banksia sessilis subsp. sessilis	220	1.5	
Bossiaea eriocarpa	35	0.1	
**Briza maxima*	25	2	
**Briza minor*	40	0.1	
Burchardia congesta	70	0.1	
Chamaescilla corymbosa	5	0.1	
Corymbia calophylla	1300	5	
Dampiera linearis	30	0.1	
Desmocladus fasciculatus	15	0.1	
Drosera stolonifera	35	0.1	
**Ehrharta calycina*	100	4	
Eucalyptus marginata	700	15	
**Freesia sp.*	20	0.1	
Gastrolobium capitatum	45	1.5	
**Gladiolus caryophyllaceus*	80	0.1	
Gompholobium marginatum	20	0.1	
Gompholobium polymorphum	25	0.1	
Gonocarpus cordiger	30	1	
Haemodorum laxum	110	0.1	
Haemodorum sp.	40	0.1	
Hibbertia hypericoides subsp. hypericoides	40	0.1	
Hypocalymma angustifolium	55	0.1	
Labichea punctata	25	3	
Lechenaultia biloba	30	0.1	
Lepidosperma leptostachyum	40	0.1	
Lepidosperma pubisquameum	35	0.1	
Lomandra sericea	30	0.1	
Mesomelaena tetragona	80	3	
Monotaxis grandiflora var. grandiflora	20	0.1	
Morelotia octandra	35	1	
Neurachne alopecuroidea	15	0.1	
Patersonia occidentalis	35	0.1	
Pyrorchis nigricans	1	0.1	
Synaphea gracillima	30	0.1	
Thelymitra macrophylla	40	0.1	
Thomasia macrocarpa	130	1.5	
Thysanotus thyrsoideus	45	0.1	
**Ursinia anthemoides subsp. anthemoides*	20	1	
Xanthorrhoea preissii	120	5	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	MVQ5		
Location	MGA 50	406809 mE	6462734 mN
Described by:	NW		
Date:	21-09-2015		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Grey		

Vegetation: *Corymbia calophylla and Eucalyptus marginata low woodland over Xanthorrhoea preissii mid sparse shrubland over Mesomelaena tetragona, Mesomelaena pseudostygia and *Freesia sp. mixed low shrubland and sedgeland.*

Condition: Excellent Disturbance Type: Weeds

Fire Age: >15 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Austrostipa elegantissima	110	0.1	
Banksia armata var. armata	90	1.5	
Banksia dallanneyi subsp. dallanneyi	35	2.5	
Bossiaea eriocarpa	30	0.1	
**Briza maxima*	30	0.1	
Burchardia congesta	60	0.1	
Caustis dioica	55	1.5	
Chamaescilla corymbosa	10	0.1	
Conospermum undulatum	100	0.1	
Conostylis setigera subsp. setigera	15	0.1	
Corymbia calophylla	1200	20	
Daviesia angulata	45	0.1	
Drosera erythrorhiza	1	0.1	
Drosera stolonifera	25	0.1	
**Ehrharta calycina*	80	5	
Eucalyptus marginata	1000	10	
**Freesia sp.*	20	20	
Gastrolobium capitatum	55	1	
**Gladiolus caryophyllaceus*	70	0.1	
Grevillea bipinnatifida subsp. bipinnatifida	50	1	
Haemodorum sp.	40	0.1	
Hakea incrassata	50	2	
Hakea lissocarpha	60	1.5	
Hibbertia hypericoides subsp. hypericoides	50	2	
Hovea elliptica	30	0.1	
Labichea punctata	35	1.5	
Lomandra sericea	40	0.1	
Marianthus sylvaticus	0.1	0.1	
Melaleuca trichophylla	45	1	
Mesomelaena pseudostygia	45	3	
Mesomelaena tetragona	65	5	
Morelotia octandra	50	6.5	
Neurachne alopecuroidea	20	0.1	
Pentapeltis peltigera	10	0.1	
Petrophile linearis	45	0.1	
Petrophile striata	55	1	
Pimelea ?suaveolens	55	0.1	
Stachystemon vermicularis	65	0.1	
Thelymitra macrophylla	70	0.1	
Thysanotus thyrsoideus	60	0.1	
Xanthorrhoea preissii	120	3	

FLORA SITE SHEET

Project Name	5525 Maida Vale		
Site:	MVQ6		
Location	MGA 50	407068 mE	6463115 mN
Described by:	NW		
Date:	07-10-2015		
Type:	Quadrat		
Landform:	Plain		
Slope:	N/A		
Rock Type:			
Soil Type:	Sand		
Soil Colour:	Grey		

Vegetation: *Allocasuarina humilis and Xanthorrhoea preissii mid open shrubland over Daucus glochidiatus, Lambertia multiflora var. darlingensis and Verticordia densiflora var. densiflora mixed low shrubland.*

Condition: Excellent
Disturbance Type: Weeds, Clearing
Fire Age: 4 - 8 years

SPECIES LIST

Taxon	Height (cm)	Cover (%)	Notes
Acacia pulchella	55	1.5	
Allocasuarina humilis	110	10	
Anigozanthos manglesii	60	0.1	
Babingtonia camphorosmae	50	0.1	
Banksia dallanneyi subsp. dallanneyi	35	1.5	
Bossiaea eriocarpa	40	0.1	
Conostylis setigera subsp. setigera	15	0.1	
Daucus glochidiatus	40	8	
Eremaea fimbriata	60	1	
**Gladiolus caryophyllaceus*	70	0.1	
Gompholobium marginatum	15	0.1	
Haemodorum sp.	40	0.1	
Hakea undulata	150	1	
Hemiphora bartlingii	45	0.1	
Hibbertia huegelii	35	0.1	
Hibbertia hypericoides subsp. hypericoides	50	2	
Isopogon dubius	45	0.1	
Jacksonia lehmannii	85	0.1	
Labichea punctata	35	0.1	
Lambertia multiflora var. darlingensis	45	7	
Lepidosperma tetraquetrum	45	0.1	
Lomandra sericea	25	0.1	
Lysinema ciliatum	130	0.1	
Mesomelaena pseudostygia	45	1.5	
Mesomelaena tetragona	55	3	
Neurachne alopecuroidea	5	0.1	
Patersonia occidentalis	35	0.1	
Scaevola repens var. repens	2	0.1	
Schoenus pleiostemoneus	20	0.1	
Sphaerolobium macranthum	30	0.1	
Stylidium brunonianum	10	0.1	
Stylidium piliferum	3	0.1	
Stylidium pubigerum	2	0.1	
Stylidium repens	3	0.1	
Thysanotus manglesianus	0.1	0.1	
**Ursinia anthemoides subsp. anthemoides*	20	0.1	
Verticordia densiflora var. densiflora	60	6	
Xanthorrhoea preissii	110	2	

Appendix D
Flora Inventory

Family	Taxa
Anarthriaceae	*Lyginia imberbis*
Apiaceae	*Daucus glochidiatus* *Pentapeltis peltigera* *Xanthosia candida* *Xanthosia huegelii*
Araliaceae	*Trachymene pilosa*
Asparagaceae	**Asparagus asparagoides* *Chamaescilla corymbosa* *Chamaescilla versicolor* *Laxmannia sessiliflora* subsp. *australis* *Laxmannia squarrosa* *Lomandra caespitosa* *Lomandra hermaphrodita* *Lomandra preissii* *Lomandra sericea* *Lomandra sonderi* *Thysanotus dichotomus* *Thysanotus manglesianus* *Thysanotus multiflorus* *Thysanotus sparteus* *Thysanotus thyrsoideus* *Sowerbaea laxiflora*
Asteraceae	*Hyalosperma cotula* **Hypochaeris glabra* *Trichocline spathulata* **Ursinia anthemoides* subsp. *anthemoides*
Casuarinaceae	*Allocasuarina humilis* *Allocasuarina fraseriana*
Colchicaceae	*Burchardia congesta*
Crassulaceae	*Crassula decumbens* var. *decumbens*
Cyanothamnus	*Cyanothamnus ramosus* subsp. *anethifolius*
Cyperaceae	*Caustis dioica* *Cyathochaeta avenacea* *Isolepis cernua* *Lepidosperma ?costale* *Lepidosperma ?pubisquameum* *Lepidosperma leptostachyum* *Lepidosperma pubisquameum* *Lepidosperma* sp. *Lepidosperma tenue* *Lepidosperma tetraquetrum* *Mesomelaena pseudostygia* *Mesomelaena tetragona* *Morelotia octandra* *Schoenus ?brevisetus* *Schoenus brevisetis* *Schoenus caespititius* *Schoenus pleiostemoneus* *Tricostularia neesii*

Family	Taxa
Dasypogonaceae	*Dasypogon obliquifolius* *Kingia australis*
Dilleniaceae	*Hibbertia huegelii* *Hibbertia hypericoides* subsp. *hypericoides* *Hibbertia racemosa*
Droseraceae	*Drosera erythrorhiza* *Drosera macrantha* *Drosera porrecta* *Drosera stolonifera*
Elaeocarpaceae	*Tetratheca nuda*
Ericaceae	*Lysinema ciliatum* *Styphelia pallida* *Styphelia tenuiflora*
Euphorbiaceae	*Monotaxis grandiflora* var. *grandiflora* *Stachystemon vermicularis*
Fabaceae	*Acacia alata* var. *alata* *Acacia applanata* **Acacia iteaphylla* *Acacia pulchella* *Acacia restiacea* *Acacia saligna* subsp. Wheatbelt (B.R. Maslin 8602) *Acacia teretifolia* *Bossiaea eriocarpa* *Cristonia biloba* subsp. *biloba* *Daviesia angulata* *Daviesia decurrens* *Daviesia nudiflora* subsp. *nudiflora* *Daviesia preissii* *Gastrolobium ?linearifolium/capitatum* *Gastrolobium capitatum* *Gompholobium confertum* *Gompholobium knightianum* *Gompholobium marginatum* *Gompholobium polymorphum* *Gompholobium tomentosum* *Hovea elliptica* *Hovea* sp. *Hovea trisperma* *Jacksonia lehmannii* *Kennedia coccinea* *Labichea punctata* *Sphaerolobium macranthum* *Sphaerolobium medium* *Sphaerolobium ?macranthum* **Trifolium dubium*
Goodeniaceae	*Dampiera linearis* *Lechenaultia biloba* *Scaevola ?glandulifera* *Scaevola canescens*

Family	Taxa
	Scaevola repens var. *repens*
Haemodoraceae	*Anigozanthos manglesii*
	Conostylis setigera subsp. *setigera*
	Haemodorum laxum
	Haemodorum simplex
	Haemodorum sp.
Haloragaceae	*Gonocarpus cordiger*
Hemerocallidaceae	*Caesia micrantha*
	Caesia occidentalis
	Hemerocallidaceae sp.
	Johnsonia pubescens subsp. *pubescens*
	Tricoryne ?elatior
	Tricoryne elatior
Iridaceae	**Freesia* sp.
	Patersonia occidentalis
	Patersonia juncea
	**Gladiolus caryophyllaceus*
	**Romulea rosea*
Lamiaceae	*Hemiphora bartlingii*
	**Lavandula stoechas*
Lauraceae	*Cassytha glabella forma casuarinae*
Loranthaceae	*Nuytsia floribunda*
Malvaceae	*Thomasia macrocarpa*
Myrtaceae	*Babingtonia camphorosmae*
	Calothamnus quadrifidus subsp. *quadrifidus*
	Calothamnus sanguineus
	Calytrix fraseri
	**Chamelaucium uncinatum*
	Corymbia calophylla
	Eremaea fimbriata
	Eremaea pauciflora var. *pauciflora*
	Eucalyptus camaldulensis
	Eucalyptus marginata
	Eucalyptus wandoo
	Hypocalymma angustifolium
	**Leptospermum laevigatum*
	Melaleuca trichophylla
	Verticordia densiflora var. *densiflora*
Orchidaceae	*Caladenia arenicola*
	Caladenia flava
	Diuris sp.
	Lyperanthus serratus
	Pterostylis vittata
	Pyrorchis nigricans
	Thelymitra macrophylla
Oxalidaceae	**Oxalis ?glabra*
	**Oxalis purpurea*
	**Oxalis pes-caprae*
Papaveraceae	**Fumaria capreolata*

Family	Taxa
Phyllanthaceae	*Lysiandra calycina*
Pittosporaceae	*Marianthus sylvaticus*
Poaceae	*Austrostipa elegantissima* **Briza maxima* **Briza minor* **Cenchrus clandestinus* **Ehrharta calycina* **Eragrostis curvula* **Tribolium uniolae* *Neurachne alopecuroidea* *Poaceae* sp. *Rytidosperma* sp.
Primulaceae	**Lysimachia arvensis*
Proteaceae	*Adenanthos cygnorum* subsp. *cygnorum* *Banksia armata* var. *armata* *Banksia dallanneyi* subsp. *dallanneyi* *Banksia nivea* subsp. *nivea* *Banksia sessilis* subsp. *sessilis* *Conospermum huegelii* *Conospermum undulatum* (T) *Grevillea bipinnatifida* subsp. *bipinnatifida* *Hakea conchifolia* *Hakea incrassata* *Hakea lissocarpha* *Hakea stenocarpa* *Hakea trifurcata* *Hakea undulata* *Isopogon autumnalis* (P3) *Isopogon dubius* *Lambertia multiflora* var. *darlingensis* *Persoonia saccata* *Petrophile linearis* *Petrophile striata* *Stirlingia latifolia* *Synaphea gracillima* *Synaphea spinulosa* subsp. *spinulosa*
Restionaceae	*Desmocladus fasciculatus*
Rhamnaceae	*Trymalium ledifolium*
Rutaceae	*Philotheca spicata*
Stylidiaceae	*Stylidium ?purpureum* *Stylidium affine* *Stylidium brunonianum* *Stylidium hispidum* *Stylidium piliferum* *Stylidium preissii* *Stylidium pubigerum* *Stylidium repens*
Thymelaeaceae	*Pimelea ?suaveolens* *Pimelea suaveolens* subsp. *suaveolens*

Family	Taxa
Violaceae	*Hybanthus calycinus*
Xanthorrhoeaceae	*Xanthorrhoea preissii*

* indicates an introduced weed species, T - Threatened, P - Priority

Appendix E
Statistical Analysis Results

Results of Bray-Curtis resembance analysis, showing similarity of SCP sites to each of the Maida Vale Sites. Results are shown against four datasets 1. Keighery Weeds Removed; 2. Keighery Weeds Included; 3. Gibson Weeds Removed; 4. Gibson Weeds Included. Note: Only the top 100 most similar sites are shown for each.

Keighery Weeds Removed

22Q01	FCT	Similarity	22Q02	FCT	Similarity	22Q03	FCT	Similarity	22Q04	FCT	Similarity	22Q05	FCT	Similarity	22Q06	FCT	Similarity	22Q07	FCT	Similarity	22Q08	FCT	Similarity	MVQ1	FCT	Similarity	MVQ2	FCT	Similarity	MVQ3	FCT	Similarity	MVQ4	FCT	Similarity	MVQ5	FCT	Similarity	MVQ6	FCT	Similarity
card1	20b	48.60	m5305	3a	37.65	serp01	3b	32.43	hart01	20a	44.44	hart01	20a	47.17	hart01	20a	37.50	serp03	3b	40.00	serp03	3b	30.30	APBF-2	20a	35.64	activ03	20a	40.86	m5305	3a	38.20	CH060ASH	S18	38.81	hart01	20a	37.36	Rush02	20b	35.16
card13	3b	43.81	card13	3b	37.36	card1	20b	29.55	card1	20b	42.31	activ03	20a	44.04	card5	20b	36.54	serp04	3b	36.62	MWR06	S06	27.78	m5303	20a	35.05	APBF-1	20a	38.89	hart01	20a	34.78	BRIX-2	3a	38.55	m5305	3a	36.36	maida02	20a	34.48
card5	20b	43.64	BULL-9	28	34.88	WATER-3	3c	28.57	talb8	20c	39.29	card5	20b	43.86	card1	20b	35.64	card1	20b	36.36	SHENT-1	28	25.81	m5302	20a	34.88	hart01	20a	37.78	BURNRD02	3b	33.77	serp02	3b	38.55	card1	20b	35.42	Rush01	20b	32.61
maida02	20a	42.86	serp04	3b	34.21	m5305	3a	27.50	activ03	20a	39.22	card1	20b	41.44	APBF-1	20a	35.09	MWR09	S10	34.48	BULL-4	28	25.00	activ03	20a	34.09	maida01	20a	37.62	serp01	3b	33.73	card12	3b	36.78	maida02	20a	34.48	Redh07	S08	31.17
BULL-4	28	42.11	card12	3b	34.15	wicher01	1a	27.50	card13	3b	39.22	maida02	20a	41.18	card6	20b	34.04	BW04	S10	33.85	serp04	3b	25.00	5C02	23b	32.94	m5302	20a	37.36	wire01	28	33.71	KOOLJ-5	3b	36.36	BURNRD02	3b	34.21	BULL-4	28	31.07
BULL-9	28	42.00	serp01	3b	32.91	BRIX-2	3a	27.40	yarl03	3b	38.71	card13	3b	40.37	talb8	20c	33.03	Rush01	20b	33.33	YALLIN-1	1b	24.24	hart01	20a	32.94	m5303	20a	37.25	FYR02	S10	33.33	serp01	3b	35.71	activ03	20a	34.04	APBF-2	20a	29.91
hart01	20a	41.18	BURNRD02	3b	32.88	serp02	3b	27.40	maida01	20a	38.18	APBF-1	20a	40.32	m5302	20a	32.99	AMBR-1	1b	32.91	hart01	20a	23.81	maida02	20a	32.10	maida02	20a	37.21	lamb2	3a	31.68	waro 01	3b	35.64	CH060ASH	S18	33.85	activ03	20a	29.79
Rush01	20b	40.78	WATER-3	3c	32.79	BULL-9	28	27.16	m5303	20a	37.84	BULL-4	28	38.98	Norm03	20b	32.94	BNR16	S18	32.73	Rush02	20b	23.81	maida01	20a	31.25	KOON-1	20a	37.11	SHENT-1	28	31.43	waro 02	3b	35.19	BW04	S10	32.88	maida01	20a	29.41
card3	21a	40.43	BULL-10	28	31.33	card5	20b	26.37	card5	20b	37.38	m5303	20a	38.98	talb9	20c	32.38	serp01	3b	32.43	maida01	20a	23.16	APBF-1	20a	31.07	Rush02	20b	35.56	BULL-9	28	31.11	AMBR-9	1b	34.86	sams01	28	32.35	card1	20b	29.17
activ03	20a	40.00	card5	20b	31.25	Rush01	20b	26.19	talb9	20c	37.04	card3	21a	36.73	activ03	20a	32.32	WATER-3	3c	32.14	Redh07	S08	22.86	ELE11	21a	31.03	BULL-4	28	35.29	Rush01	20b	30.11	activ03	20a	33.33	serp01	3b	31.71	talb8	20c	28.85
Rush02	20b	39.22	lamb2	3a	30.93	card12	3b	25.97	Rush02	20b	36.36	talb9	20c	36.52	card13	3b	32.32	CH060ASH	S18	31.58	Redh06	S08	22.54	activ01	20a	30.93	BURNRD01	20b	35.29	card13	3b	29.47	BURNRD02	3b	33.33	RGR06	20d	31.58	hart01	20a	28.57
card12	3b	37.50	serp02	3b	30.77	BNR02	S10	25.71	maida02	20a	35.79	serp03	3b	36.36	BULL-9	28	31.91	Rush02	20b	31.33	card1	20b	22.47	CH060ASH	S18	30.51	Tele01	23a	35.29	BULL-1	28	29.27	card13	3b	33.33	maida01	20a	31.37	card5	20b	28.28
maida01	20a	37.17	KOOLJ-5	3b	30.56	BNR16	S18	25.45	waro 02	3b	35.09	maida01	20a	35.90	BURNRD01	20b	31.48	card12	3b	31.17	m5305	3a	22.22	MWR06	S06	30.14	wire02	28	35.29	card1	20b	28.87	m5305	3a	33.33	MTB-1	24	31.25	m5302	20a	28.26
m5305	3a	36.36	card6	20b	30.23	much04	25	25.45	card6	20b	35.05	Rush02	20b	35.85	m5303	20a	31.48	yarl03	3b	31.17	BULL-9	28	21.95	5A01	23b	29.33	card5	20b	34.69	BULL-4	28	28.85	WATER-3	3c	33.33	WATER-3	3c	31.25	talb9	20c	28.00
waro 02	3b	35.90	NEER-23	28	30.19	serp04	3b	25.35	Norm03	20b	34.09	Rush01	20b	35.51	Rush02	20b	31.25	BNR13	S18	30.77	FYR02	S10	21.95	M53	20a	29.17	wire01	28	34.48	wire02	28	28.57	card1	20b	32.65	CH157TEE	S09	30.99	BULL-10	28	27.91
BULL-1	28	34.78	card3	21a	30.00	AMBR-1	1b	25.32	BURNRD02	3b	33.33	BULL-1	28	35.42	FYR03	S10	30.59	card5	20b	30.77	Norm03	20b	21.92	MR05	23b	28.57	CH157TEE	S09	34.29	talb2	20c	28.30	DUCK-2	3c	32.00	card12	3b	30.59	Tele01	23a	27.91
card2	20b	33.90	Redh06	S08	29.33	maida02	20a	25.32	Bushm01	20a	33.03	talb2	20c	35.00	maida02	20a	30.43	RGR03	S10	30.77	CH058ASH	S09	21.88	MWR01	20d	28.57	Bushm01	20a	34.00	perth03	20b	28.24	5C01	S18	31.71	yarl03	3b	30.59	CH060ASH	S18	27.69
BNR02	S10	33.71	waro 02	3b	29.13	Rush03	3b	25.29	card3	21a	32.97	wire01	28	34.95	BNR12	S18	30.38	serp02	3b	30.14	RGR03	S10	21.21	KOON-1	20a	28.26	APBF-2	20a	33.96	Redh07	S08	28.21	AMBR-1	1b	31.46	card5	20b	30.30	APBF-1	20a	27.52
brick2	20b	33.33	MWR06	S06	28.95	AMBR-4	1b	25.00	CH060ASH	S18	32.88	BULL-9	28	34.62	maida01	20a	29.91	m5305	3a	30.00	5G01	S09	21.05	Rush02	20b	28.24	perth03	20b	33.73	card12	3b	27.91	xlamb01	20b	31.25	MWR09	S10	30.30	Norm03	20b	27.50
serp03	3b	33.33	talb9	20c	28.87	NEER-23	28	25.00	yarl04	20b	32.43	activ02	20a	34.15	yarl04	20b	29.63	ACTON-1	1a	29.89	talb8	20c	20.62	MOOR 02	S09	28.00	card1	20b	33.68	WATER-3	3c	27.69	maida01	20a	30.77	BULL-10	28	30.23	M53	20a	27.45
talb8	20c	33.04	AMBR-1	1b	28.57	wire01	28	25.00	card12	3b	32.26	serp04	3b	34.04	NEER-23	28	29.51	KOOLJ-5	3b	29.85	BURNRD02	3b	20.29	card5	20b	27.96	M53	20a	33.66	brick8	3a	27.66	R116703	1b	30.77	serp03	3b	30.14	MWR09	S10	27.27
SHENT-1	28	32.50	maida02	20a	28.57	card6	20b	24.69	serp03	3b	32.10	yarl03	3b	34.00	Rush01	20b	28.87	NEER-21	28	29.85	Norm06	3b	20.29	CH157TEE	S09	27.69	activ01	20a	33.33	elbr01	3b	27.52	smith02	1a	30.63	Norm07	20b	29.73	m5303	20a	27.18
lamb2	3a	32.43	serp03	3b	28.57	BW04	S10	24.62	Rush01	20b	32.00	activ01	20a	33.90	APBF-2	20a	28.57	Ellib06	S08	29.63	AMBR-1	1b	20.00	talb9	20c	27.66	Kens01	23a	32.61	serp04	3b	27.50	smith03	1a	30.61	BULL-1	28	29.63	Norm07	20b	27.03
talb9	20c	32.43	wire01	28	28.24	serp03	3b	24.62	serp02	3b	31.46	BURNRD01	20b	33.90	card2	20b	28.57	BURNRD02	3b	29.41	C 98PU.R	S10	19.67	Bushm02	20c	27.59	perth07	20a	31.33	activ03	20a	27.37	CH059ASH	S18	30.30	wire01	28	29.55	serp01	3b	26.83
wire01	28	32.32	BULL-1	28	28.21	CH060ASH	S18	24.56	APBF-2	20a	31.30	Sunday02	21a	33.66	CH060ASH	S18	28.57	Norm06	3b	29.41	elbr03	S08	19.51	MOOR 01	S09	27.52	brick2	20b	31.25	AMBR-1	1b	27.27	Rush01	20b	29.79	APBF-1	20a	29.36	talb10	20c	25.45
serp01	3b	32.26	ELLEN-6	3c	28.07	WONN-1	1a	24.44	serp01	3b	31.11	talb8	20c	33.61	BW04	S10	28.21	leda02	28	29.27	YAN-3	28	19.44	activ02	20a	27.45	CH060ASH	S18	31.25	CH060ASH	S18	27.27	serp04	3b	29.63	KOOLJ-5	3b	29.33	WN100WNR	23b	25.35
YAN-25	28	32.26	card1	20b	27.96	leda02	28	24.39	Rush03	3b	31.07	AMBR-1	1b	33.33	ACTON-1	1a	28.00	NEER-23	28	29.17	yuri01	23c	19.35	Bushm01	20a	27.37	5C02	23b	31.11	Rush03	3b	27.08	Sunday02	21a	29.55	NEER-21	28	29.33	activ01	20a	25.24
BURNRD02	3b	32.18	talb2	20c	27.45	AMBR-9	1b	24.24	BRIX-5	3a	30.93	waro 02	3b	33.06	Rush03	3b	28.00	NEER-4	28	28.99	yela01	28	19.28	BNR19	23b	27.03	card7	21a	30.99	serp03	3b	27.03	AMBRAL-1	1b	29.47	card6	20b	29.21	talb2	20c	24.76
card6	20b	32.00	Rush02	20b	27.27	Norm07	20b	24.24	M53	20a	30.91	BURNRD02	3b	32.97	activ01	20a	27.78	hart01	20a	28.92	BW05	S09	18.87	BW04	S10	26.87	perth04	23a	30.77	MWR09	S10	26.87	CARB-2	1b	28.99	smith03	1a	29.17	brick2	20b	24.74
Norm04	3b	31.58	SHENT-1	28	27.27	MWR09	S10	24.14	smith03	1a	30.77	APBF-2	20a	32.79	CAPEL-5	1b	27.72	BNR02	S10	28.57	CARB-4	1b	18.69	FYR02	S10	26.51	Rush01	20b	30.77	card6	20b	26.67	BNR12	S18	28.95	yarl04	20b	29.13	BRIX-5	3a	24.72
yarl04	20b	31.58	Rush01	20b	26.97	Rush02	20b	24.10	BURNRD01	20b	30.63	card2	20b	32.79	FYR02	S10	27.66	CH059ASH	S18	28.57	beel01	28	18.60	talb5	20c	26.19	hart04	23a	30.43	sand01	28	26.37	BULL-1	28	28.92	5C03	20a	28.92	BULL-9	28	24.72
serp04	3b	31.11	card2	20b	26.92	card4	6	23.81	KOON-1	20a	30.19	Rush03	3b	32.73	serp01	3b	27.59	KERO-1	24	28.57	MWR01	20d	18.42	CH050CUL	S09	25.93	Norm03	20b	30.38	KOOLJ-5	3b	26.32	wicher01	1a	28.89	BNR16	S18	28.57	card6	20b	24.72
m5302	20a	31.07	AMBRAL-1	1b	26.67	CARB-2	1b	23.73	talb2	20c	30.09	CAPEL-1	21b	32.69	KOON-2	20a	27.45	MTB-1	24	28.57	activ03	20a	18.39	BNR20	S09	25.71	talb9	20c	30.30	BW01	S16	26.09	wire01	28	28.89	card9	20b	28.24	FYR02	S10	24.72
BW04	S10	30.95	card8	20b	26.67	xlamb01	20b	23.73	m5302	20a	30.00	yarl04	20b	32.20	card3	21a	27.27	BNR15	S18	28.07	BW04	S10	18.18	ELE02	21c	25.71	Norm07	20b	30.14	C 98PU.R	S10	26.09	ACTON-1	1a	28.87	CH059ASH	S18	28.13	BRIX-2	3a	24.69
xlamb01	20b	30.66	elbr01	3b	26.67	MUD-4	3a	23.68	xlamb01	20b	29.85	brick2	20b	32.14	YAN-20	23b	27.18	maida02	20a	27.85	MHR03	S10	18.18	MWR07	S09	25.71	dian01	23a	30.11	sams01	28	26.09	sand01	28	28.26	serp04	3b	27.85	BULL-1	28	24.69
TRIG-4	28	30.38	much04	25	26.67	BURNRD02	3b	23.53	brick8	3a	29.70	KOON-1	20a	31.86	BURNRD02	3b	27.16	Norm03	20b	27.78	Norm04	3b	18.18	BC1	20d	25.40	5A01	23b	30.00	card5	20b	26.00	5C03	20a	28.24	NEER-3	28	27.40	MWR05	S10	24.69
Bushm01	20a	30.36	CH157TEE	S09	26.47	yarl03	3b	23.38	lamb2	3a	29.63	m5302	20a	31.78	waro 02	3b	27.03	maida01	20a	27.66	quinn01	S10	17.98	talb6	20c	25.35	LAND-1	20a	30.00	MWR07	S09	25.97	5C05	S18	28.17	wicher01	1a	27.27	KOON-1	20a	24.49
NEER-21	28	30.23	activ03	20a	26.37	activ03	20a	23.26	card2	20b	29.57	Tele01	23a	31.68	YALLIN-1	1b	27.03	BNR09	S10	27.59	MSF03	23c	17.91	MHR01	23b	25.00	activ02	20a	29.91	Norm06	3b	25.97	KOOLJ-4	21a	28.00	5A01	23b	27.16	YAN-25	28	24.39
Rush03	3b	30.19	ACTON-1	1a	26.09	card13	3b	23.26	dian01	23a	29.41	lamb2	3a	31.30	card12	3b	26.67	wicher01	1a	27.50	Norm07	20b	17.91	MR09	23b	25.00	BNR24	S18	29.73	yarl03	3b	25.58	WONN-1	1a	28.00	serp02	3b	27.16	5C02	23b	24.18
APBF-1	20a	30.00	card7	21a	26.09	SF1201	2	23.26	5A01	23b	29.21	m5305	3a	31.07	Bushm01	20a	26.42	BULL-1	28	27.40	Redh03	S08	17.86	Tele01	23a	25.00	talb11	20c	29.63	lamb1	3a	25.45	KOOLJ-3	21a	27.91	BNR12	S18	27.03	card3	21a	24.10
Norm06	3b	29.89	FYR03	S10	25.97	BNR13	S18	23.08	BRIX-2	3a	29.21	SHENT-1	28	30.95	RAAF-3	23b	26.42	NEER-9	24	27.40	elbr01	3b	17.82	BURNRD01	20b	24.74	DUNS-1	3b	29.47	BNR02	S10	25.32	Norm04	3b	27.91	BULL-9	28	26.97	activ02	20a	24.07
sand01	28	29.70	AMBR-4	1b	25.88	BULL-10	28	23.08	BULL-1	28	29.21	AUSTRA-1	21a	30.93	Tele01	23a	26.37	BURNRD01	20b	27.37	APBF-1	20a	17.65	CH058ASH	S09	24.62	smith03	1a	29.47	Redh06	S08	25.32	perth03	20b	27.91	talb8	20c	26.92	yuri01	23c	24.00
BC5	S18	29.69	CH060ASH	S18	25.81	ELLEN-6	3c	23.08	DUNS-1	3b	28.85	serp01	3b	30.93	BULLER-1	21a	26.19	yarl04	20b	27.37	lamb1	3a	17.65	FL-5	21c	24.62	SHENT-1	28	29.41	KING-1	28	25.29	card5	20b	27.72	leda02	28	26.67	tokyu03	28	23.81
KOON-1	20a	29.36	talb12	3c	25.81	wire02	28	22.95	activ01	20a	28.83	talb11	20c	30.93	serp04	3b	26.19	smith03	1a	27.27	smith02	1a	17.65	card1	20b	24.44	yarl04	20b	29.41	Tele01	23a	25.29	BNR16	S18	27.69	sand01	28	26.67	xlamb01	20b	23.81
talb2	20c	29.31	talb8	20c	25.74	MUD-5	3a	22.78	Norm04	3b	28.26	card6	20b	30.77	M53	20a	26.17	BULL-9	28	27.16	BC1	20d	17.60	GOLF-1	20a	24.39	KING-2	28	29.33	xlamb01	20b	25.20	card9	20b	27.59	BW01	S16	26.47	Bushm01	20a	23.76
CH157TEE	S09	29.27	BW04	S10	25.71	smith03	1a	22.73	much04	25	28.17	Norm06	3b	30.77	Ellib02	20d	25.97	card6	20b	27.16	YAN-20	23b	17.58	5C01	S18	24.32	5C03	20a	29.27	BURNRD01	20b	25.00	yarl03	3b	27.59	waro 02	3b	26.42	BURNRD02	3b	23.68
star03	28	29.21	NEER-22	28	25.71	BRIX-5	3a	22.22	card9	20b	27.96	CAPEL-5	1b	30.63	xlamb01	20b	25.95	FYR02	S10	27.16	Redh02	S08	17.54	BULL-3	23a	24.18	talb5	20c	29.21	CH157TEE	S09	25.00	DUCK-1	3c	27.03	Rush02	20b	26.37	ELE02	21c	23.68
CORON-1	21a	29.17	BRIX-2	3a	25.64	C 99PU.R	S18	22.22	ELE15	21a	27.78	DUNS-1	3b	30.63	m5305	3a	25.81	C 98PU.R	S10	26.67	maida02	20a	17.50	card6	20b	24.10	talb8	20c	29.13	much04	25	25.00	lamb1	3a	27.03	MWR07	S09	26.32	MWR07	S09	23.68
yarl03	3b	29.17	BNR12	S18	25.35	CH157TEE	S09	22.22	MWR06	S06	27.59	ELE15	21a	30.38	smith03	1a	25.74	C 99PU.R	S18	26.67	card5	20b	17.39	BNR01	S09	24.00	xlamb01	20b	28.80	talb4	3c	25.00	maida02	20a	26.97	Norm04	3b	26.19	buffer01	21b	23.53
BULL-10	28	28.87	WONN-1	1a	25.26	FYR03	S10	22.22	serp04	3b	27.59	REDL-1	21a	30.36	serp03	3b	25.64	card3	21a	26.67	BNR15	S18	17.24	ELE03	23b	24.00	card9	20b	28.57	CAPEL-5	1b	24.74	MUD-5	3a	26.97	APBF-2	20a	26.17	BW02	S09	23.53
Cresw01	23a	28.87	YALLIN-1	1b	25.24	MUD-7	8	22.22	Ellib02	20d	27.50	CH157TEE	S09	30.23	MWR05	S10	25.58	sams01	28	26.67	CARB-1	1b	17.24	MWR03	S06	24.00	ELE11	21a	28.57	quinn01	S10	24.74	white03	4	26.87	card2	20b	26.17	C 98PU.R	S10	23.53
KING-1	28	28.87	CARB-2	1b	25.00	talb4	3c	22.22	AMBR-1	1b	27.37	YAN-20	23b	30.09	CAPEL-1	21b	25.53	TRIG-4	28	26.67	card6	20b	17.07	serp02	3b	24.00	ELE15	21a	28.57	AMBR-4	1b	24.72	AMBR-4	1b	26.67	Rush01	20b	26.09	TRIG-4	28	23.53
yuri01	23c	28.83	hart01	20a	25.00	BULL-1	28	21.92	APBF-1	20a	27.35	card12	3b	30.00	MODO-5	23a	25.29	WONN-1	1a	26.67	R116703	1b	17.07	4M01	23c	23.81	gibson01	21b	28.57	5C01	S18	24.69	serp03	3b	26.67	SHENT-1	28	26.09	card13	3b	23.40
activ02	20a	28.57	m5302	20a	24.72	DUCK-1	3c	21.88	BW04	S10	27.16	CORON-1	21a	30.00	WONN-1	1a	25.24	Norm04	3b	26.32	mrnp04	23b	17.02	Light02	23a	23.66	Light02	23a	28.57	much01	28	24.69	yarl04	20b	26.67	talb9	20c	26.00	BURNRD01	20b	23.30
MWR09	S10	28.57	perth03	20b	24.69	APBF-1	20a	21.78	DUCK-2	3c	27.16	NINE-2	21a	30.00	5C02	23b	25.00	CH156TEE	S18	25.93	BNR09	S10	16.95	quinn09	20d	23.40	yarl03	3b	28.57	Redh01	S08	24.69	CAPEL-5	1b	26.53	NEER-4	28	25.97	Rush03	3b	23.16
Norm03	20b	28.57	MWR07	S09	24.66	hart01	20a	21.69	m5305	3a	27.08	xlamb01	20b	29.79	bibra01	23a	25.00	APBF-1	20a	25.74	MWR09	S10	16.95	5C03	20a	23.38	bibra01	23a	28.30	KOON-2	20a	24.49	MWR09	S10	26.47	Redh07	S08	25.97	Redh06	S08	23.08
HARRY-2	28	28.28	BW01	S16	24.62	DUCK-2	3c	21.54	m5306	3a	27.08	BULL-10	28	29.70	Light02	23a	25.00	BC5	S18	25.69	BNR02	S10	16.90	5G01	S09	23.38	card2	20b	28.30	brick7	3a	24.39	PLINE-3	21a	26.47	Bushm01	20a	25.74	WN085CHE	S09	23.08
BNR06	S10	28.26	C 98PU.R	S10	24.62	MHR03	S10	21.54	wire01	28	27.08	MANEA-2	21a	29.36	perth07	20a	24.72	activ03	20a	25.58	MR09	23b	16.90	MWR09	S10	23.33	BULL-10	28	28.24	BRIX-2	3a	24.39	BULL-9	28	26.37	lamb1	3a	25.69	MWR02	20d	22.78
BRIX-2	3a	28.26	smith02	1a	24.53	NEER-22	28	21.54	BULL-4	28	27.03	Bushm01	20a	29.31	Norm06	3b	24.69	card13	3b	25.58	sand01	28	16.87	BNR24	S18	23.19	WELL-2	21a	27.96	serp02	3b	24.39	Ellib06	S08	26.37	BC5	S18	25.64	MWR06	S06	22.78
serp02	3b	28.26	brick8	3a	24.44	RGR03	S10	21.54	BNR18	S09	26.97	serp02	3b	29.17	NINE-2	21a	24.44	WOODV-2	28	25.45	activ01	20a	16.67	Kens01	23a	22.99	CH055ASH	S09	27.69	BW04	S10	24.32	FYR02	S10	26.37	card13	3b	25.53	serp04	3b	22.78
talb10	20c	28.10	xlamb01	20b	24.39	Bushm01	20a	21.51	brick7	3a	26.97	ACTON-1	1a	29.09	yarl03	3b	24.44	xlamb01	20b	25.42	BULL-11	28	16.67	BURNRD02	3b	22.86	GOLF-1	20a	27.59	waro 02	3b	24.30	Norm07	20b	26.32	CH056ASH	S18	25.45	GOLF-1	20a	22.73
BURNRD01	20b	28.07	yarl03	3b	24.39	CH059ASH	S18	21.43	quinn01	S10	26.92	lamb1	3a	29.03	Redh07	S08	24.39	talb4	3c	25.40	BURNRD01	20b	16.67	card9	20b	22.78	BNR18	S09	27.50	brick6	3a	24.10	talb2	20c	26.17	much04	25	25.40	BULL-3	23a	22.68
CAPEL-5	1b	28.04	Sunday02	21a	24.10	MTB-1	24	21.43	BNR12	S18	26.83	BW01	S16	28.92	MANEA-2	21a	24.24	AMBR-4	1b	25.00	Ellib04	S08	16.67	perth08	23a	22.78	BULL-1	28	27.50	AMBR-9	1b	24.07	leda02	28	26.09	xlamb01	20b	25.40	jand08	23a	22.68
DUNS-1	3b	28.04	Tele01	23a	24.10	5C03	20a	21.33	Norm07	20b	26.83	KOOLJ-5	3b	28.89	BULL-10	28	24.18	ELE15	21a	25.00	m5303	20a	16.67	yarl03	3b	22.78	serp02	3b	27.50	5C03	20a	23.81	BNR24	S18	25.97	AMBR-1	1b	25.29	YUR02	23c	22.54
FYR02	S10	28.00	BNR02	S10	24.00	card3	21a	21.33	BULL-9	28	26.80	MGK03	21b	28.87	Cresw01	23a	24.18	wire01	28	25.00	Rush01	20b	16.47	card13	3b	22.73	CAPEL-1	21b	27.27	talb9	20c	23.76	Norm06	3b	25.64	ACTON-1	1a	25.26	elbr03	S08	22.47
AUSTRA-1	21a	27.96	C 99PU.R	S18	24.00	maida01	20a	21.28	brick2	20b	26.67	YAN-25	28	28.87	BULL-4	28	24.07	brick2	20b	24.72	BW01	S16	16.39	dian01	23a	22.73	card6	20b	27.27	smith02	1a	23.64	MUD-4	3a	25.58	Rush03	3b	25.26	YAN-20	23b	22.45
MGK03	21b	27.96	PEARCE-2	3c	24.00	BNR12	S18	21.21	brick5	3a	26.67	GUTHR-3	21a	28.85	will04	1a	23.93	CAPEL-1	21b	24.69	BW02	S09	16.39	BULL-4	28	22.68	FYR02	S10	27.27	Bushm01	20a	23.53	lamb2	3a	25.49	BULL-4	28	25.24	bibra01	23a	22.43
RIVD-2	21a	27.96	MUD-5	3a	23.81	Punr02	3a	21.21	leda02	28	26.53	ELE02	21c	28.57	CH156TEE	S18	23.88	BNR06	S10	24.66	BC5	S18	16.36	BW01	S16	22.58	KOON-2	20a	27.08	MUD-4	3a	23.53	MILT-6	21a	25.35	BURNRD01	20b	25.24	5A01	23b	22.22
talb11	20c	27.96	CAPEL-5	1b	23.66	AMBRAL-1	1b	21.18	sand01	28	26.53	KING-2	28	28.57	5D01	23b	23.68	BRIX-2	3a	24.66	AMBRAL-1	1b	16.28	BW02	S09	22.58	Cavs10	21a

CARB-4	1b	27.20	AMBR-9	1b	23.08	MWR07	S09	20.59	activ02	20a	25.86	buffer01	21b	28.00	ELE15	21a	23.19	PLINE-3	21a	24.14	ACTON-1	1a	15.91	WN107MNR	S16	22.22	WN092HED	S18	26.67	MWR06	S06	22.50	brick2	20b	24.24	WONN-1	1a	24.49	ELE11	21a	21.88
bibra01	23a	27.12	talb1	3c	23.08	Norm06	3b	20.59	BC1	20d	25.71	card8	20b	27.96	sand01	28	23.16	5C03	20a	24.00	Rush03	3b	15.91	RAAF-2	23b	21.95	tokyu03	28	26.51	m5306	3a	22.47	CAPEL-1	21b	24.18	brick6	3a	24.39	WATER-3	3c	21.88
buffer01	21b	27.08	sand01	28	22.99	KING-1	28	20.51	CH156TEE	S18	25.71	Redh06	S08	27.96	gibson01	21b	23.08	WOODV-1	28	24.00	MOOR 03	S10	15.87	wire01	28	21.95	WN086CHE	23b	26.51	wicher01	1a	22.47	Hamp01	4	24.18	AMBR-9	1b	24.30	boyan 01	21b	21.82
NINE-2	21a	27.08	YAN-4	28	22.78	Sunday02	21a	20.51	YAN-19	23b	25.69	bibra01	23a	27.87	AUSTRA-1	21a	22.99	talb9	20c	23.91	activ02	20a	15.84	WN089CHE	23b	21.92	zBEER 03	23c	26.51	card2	20b	22.22	CARB-4	1b	24.14	waro 01	3b	24.24	CH056ASH	S18	21.82
perth08	23a	27.08	APBF-1	20a	22.64	CAPEL-5	1b	20.45	lamb1	3a	25.64	beel01	28	27.78	talb11	20c	22.99	BNR24	S18	23.88	5C03	20a	15.79	bibra01	23a	21.78	talb6	20c	26.32	Ellib06	S08	22.22	CRAMPT-1	21a	24.10	BNR24	S18	24.00	mrnp04	23b	21.78
Redh06	S08	26.97	YULE-3	21c	22.50	waro 02	3b	20.41	WELL-2	21a	25.49	card7	21a	27.59	smith02	1a	22.81	YAN-14	26b	23.88	CH157TEE	S09	15.63	FYR03	S10	21.62	quinn09	20d	26.26	quinn08	S08	22.22	YALLIN-1	1b	24.07	lamb2	3a	24.00	MILT-4	28	21.62
NEER-23	28	26.87	Bushm01	20a	22.45	brick5	3a	20.34	BNR16	S18	25.35	LAND-1	20a	27.59	Norm07	20b	22.78	bold17	S15	23.81	perth03	20b	15.58	BNR23	S09	21.54	perth08	23a	26.19	talb1	3c	22.22	KOON-1	20a	24.00	BNR17	S18	23.88	WATERRD1	28	21.57
Ellib01	S08	26.80	KOOLJ-3	21a	22.22	brick2	20b	20.22	CH157TEE	S09	25.32	NINE-1	21a	27.59	5C03	20a	22.73	AMBRAL-1	1b	23.53	brick2	20b	15.56	quinn05	23c	21.51	beel01	28	26.09	waro 06	3a	22.22	WN091HED	S10	24.00	BNR20	S09	23.68	hurst03	23a	21.51
Sunday02	21a	26.80	M53	20a	22.22	KOON-2	20a	20.22	BULLER-1	21a	25.29	WELL-2	21a	27.52	perth04	23a	22.68	ELE29	21c	23.53	jand08	23a	15.56	brick7	3a	21.33	ELE17	23b	26.09	waro 01	3b	22.00	card2	20b	23.85	beel01	28	23.66	Kens01	23a	21.51
Tele01	23a	26.80	MUD-4	3a	22.22	card2	20b	20.20	CH059ASH	S18	25.00	CH060ASH	S18	27.50	YAN-19	23b	22.64	MWR07	S09	23.53	Ellib02	20d	15.38	card7	21a	21.21	YAN-19	23b	26.00	leda02	28	21.98	AUSTRA-1	21a	23.81	SF1201	2	23.40	perth03	20b	21.43
ELE11	21a	26.67	MWR09	S10	22.22	card8	20b	20.00	ELE11	21a	25.00	Norm03	20b	27.37	MWR09	S10	22.54	YAN-6	28	23.53	Ellib05	S08	15.38	Ellib02	20d	21.21	BNR02	S10	25.97	MWR05	S10	21.95	MGK03	21b	23.81	WELL-2	21a	23.40	yarl04	20b	21.36
ELE15	21a	26.67	BULL-4	28	22.00	KOOLJ-4	21a	20.00	FYR03	S10	25.00	M53	20a	27.35	PLINE-3	21a	22.54	card9	20b	23.38	quinn08	S08	15.38	R116702	21b	21.18	CH057ASH	S10	25.97	Ellib02	20d	21.92	white06	23a	23.81	BNR13	S18	23.33	SINT-1	23b	21.28
lamb1	3a	26.67	BURNRD01	20b	22.00	PEARCE-2	3c	20.00	HARRY-2	28	25.00	BW04	S10	27.27	BNR24	S18	22.50	card11	6	23.26	WN117MOR	S16	15.38	quinn03	20d	21.15	Sunday02	21a	25.88	APBF-1	20a	21.82	Punr02	3a	23.68	m5303	20a	23.30	quinn06	23c	21.24
MTB-1	24	26.67	yarl04	20b	22.00	Redh06	S08	20.00	NEER-23	28	25.00	NEER-22	28	27.27	Norm04	3b	22.47	WELL-2	21a	23.26	yarl03	3b	15.38	MHR02	S09	21.05	YULE-2	23a	25.88	talb11	20c	21.69	card3	21a	23.53	MILT-6	21a	23.19	4M03	28	21.21
MWR06	S06	26.67	SF1201	2	21.98	sams01	28	20.00	NINE-1	21a	25.00	boyan 01	21b	27.20	perth03	20b	22.47	BULL-4	28	23.16	MWR08	23b	15.15	MODO-5	23a	21.05	BNR16	S18	25.81	NEER-22	28	21.62	talb9	20c	23.53	wire02	28	23.19	perth08	23a	21.18
NEER-5	28	26.67	card9	20b	21.95	smith02	1a	19.80	KOON-2	20a	24.76	talb10	20c	27.20	AMBRAL-1	1b	22.45	BULL-10	28	23.08	NEER-3	28	15.15	OYR01	23b	21.05	card13	3b	25.81	MTB-1	24	21.54	APBF-1	20a	23.42	BNR02	S10	23.08	ELE24	23b	21.05
WATER-3	3c	26.67	KING-2	28	21.92	waro 01	3b	19.78	REDL-1	21a	24.76	HARRY-2	28	27.18	hart04	23a	22.45	Ellib01	S08	23.08	WN091HED	S10	15.15	quinn02	28	21.05	boyan 01	21b	25.69	m5302	20a	21.51	m5302	20a	23.40	card8	20b	23.08	YAN-23	26b	21.05
WELL-2	21a	26.67	RGR06	20d	21.92	Ellib06	S08	19.75	CAPEL-1	21b	24.74	m5306	3a	27.18	will02	1a	22.43	Rush03	3b	22.99	BNR13	S18	15.09	RAAF-3	23b	21.05	talb10	20c	25.69	card3	21a	21.43	FL-1	4	23.38	talb2	20c	22.86	YAN-9	28	21.05
MANEA-3	21b	26.53	brick5	3a	21.88	FYR02	S10	19.75	FYR02	S10	24.74	5A01	23b	27.08	MILT-4	28	22.41	Redh06	S08	22.86	gill01	23a	15.00	RIVD-2	21a	21.05	BULLER-1	21a	25.64	YULE-3	21c	21.43	Cavs02	21a	23.33	MWR02	20d	22.78	MOOR 09	23b	20.93
card7	21a	26.51	Redh05	S15	21.82	Ellib04	S08	19.72	R116703	1b	24.74	BRIX-2	3a	27.08	BNR17	S18	22.22	MUD-5	3a	22.78	MPK01	23b	15.00	serp01	3b	21.05	gnan03	23a	25.53	maida01	20a	21.36	boyan 02	1a	23.30	GOLF-1	20a	22.73	quinn01	S10	20.83
NINE-1	21a	26.51	Rush03	3b	21.74	MWR02	20d	19.72	KOOLJ-4	21a	24.53	NEER-9	24	27.08	card9	20b	22.22	talb12	3c	22.73	BNR12	S18	14.93	YAN-19	23b	21.05	talb3	20c	25.53	Norm07	20b	21.33	YOON-1	1b	23.26	brick2	20b	22.68	talb6	20c	20.78

Keighery Weeds Included

22Q01	FCT	Similarity	22Q02	FCT	Similarity	22Q03	FCT	Similarity	22Q04	FCT	Similarity	22Q05	FCT	Similarity	22Q06	FCT	Similarity	22Q07	FCT	Similarity	22Q08	FCT	Similarity	MVQ1	FCT	Similarity	MVQ2	FCT	Similarity	MVQ3	FCT	Similarity	MVQ4	FCT	Similarity	MVQ5	FCT	Similarity	MVQ6	FCT	Similarity
card1	20b	48.21	m5305	3a	41.24	serp01	3b	31.33	hart01	20a	43.14	activ03	20a	44.63	card5	20b	35.71	serp03	3b	38.24	SHENT-1	28	28.57	m5302	20a	38.30	activ03	20a	43.14	m5305	3a	38.00	BRIX-2	3a	39.56	m5305	3a	36.36	Rush02	20b	37.11
activ03	20a	43.86	card13	3b	37.62	m5305	3a	28.89	card1	20b	42.59	hart01	20a	44.25	hart01	20a	34.95	card1	20b	34.78	serp03	3b	28.17	activ03	20a	37.11	m5302	20a	40.40	wire01	28	36.36	serp02	3b	39.13	hart01	20a	36.17	maida02	20a	35.56
BULL-4	28	43.55	BULL-9	28	34.78	card1	20b	28.57	talb8	20c	40.68	card5	20b	42.62	card1	20b	34.86	serp04	3b	34.67	BULL-4	28	26.17	m5303	20a	36.54	maida01	20a	40.37	SHENT-1	28	33.73	card12	3b	38.78	activ03	20a	35.29	BULL-4	28	32.43
card13	3b	43.48	card12	3b	34.78	BRIX-2	3a	28.21	activ03	20a	40.00	BULL-4	28	41.22	card13	3b	33.93	MWR09	S10	32.79	MWR06	S06	25.97	maida01	20a	34.62	BULL-4	28	39.29	hart01	20a	33.68	m5305	3a	36.89	card1	20b	34.00	Rush01	20b	32.32
card5	20b	43.48	BULL-10	28	34.04	serp02	3b	27.85	talb9	20c	40.00	card13	3b	40.98	Norm03	20b	33.68	Rush01	20b	32.61	Redh06	S08	25.00	APBF-2	20a	34.29	Rush02	20b	38.78	BURNRD02	3b	33.33	KOOLJ-5	3b	36.78	BURNRD02	3b	33.73	activ03	20a	31.68
BULL-9	28	43.40	Redh06	S08	33.73	WATER-3	3c	27.27	card13	3b	39.64	card1	20b	40.34	talb8	20c	33.61	BW04	S10	31.43	YALLIN-1	1b	24.30	ELE11	21a	33.85	wire01	28	38.78	perth03	20b	32.61	waro 02	3b	36.67	sams01	28	33.33	maida01	20a	31.48
maida02	20a	42.72	serp01	3b	33.33	wire01	28	26.97	m5303	20a	39.32	maida02	20a	40.00	m5302	20a	33.33	AMBR-1	1b	31.33	Rush02	20b	23.66	maida02	20a	32.56	m5303	20a	38.53	FYR02	S10	32.26	CH060ASH	S18	36.11	maida02	20a	32.97	talb8	20c	31.19
Rush02	20b	41.82	BULL-1	28	32.94	wicher01	1a	26.83	maida01	20a	39.32	m5303	20a	39.06	APBF-1	20a	33.06	yarl03	3b	31.33	5G01	S09	23.53	Rush02	20b	32.26	APBF-1	20a	37.50	serp01	3b	32.26	activ03	20a	35.85	wire01	28	32.65	m5302	20a	30.61
Rush01	20b	41.07	serp02	3b	32.56	Rush01	20b	26.37	yarl03	3b	38.38	APBF-1	20a	38.17	Rush01	20b	33.03	BNR16	S18	31.03	m5305	3a	23.40	talb5	20c	32.26	Tele01	23a	37.50	BULL-1	28	31.82	card13	3b	35.51	CH060ASH	S18	32.35	Redh07	S08	30.38
card3	21a	40.40	talb9	20c	32.38	Rush03	3b	26.37	card5	20b	37.84	talb9	20c	38.10	BULL-9	28	33.01	serp01	3b	30.95	card1	20b	23.16	5A01	23b	32.10	Bushm01	20a	37.38	talb2	20c	31.03	serp01	3b	35.42	BULL-1	28	32.18	card1	20b	30.30
maida01	20a	39.67	BURNRD02	3b	32.10	BULL-9	28	25.88	Rush02	20b	37.74	BULL-1	28	37.74	card6	20b	33.01	card12	3b	30.23	maida01	20a	23.08	talb6	20c	32.10	maida02	20a	37.36	lamb2	3a	30.91	wire01	28	35.29	NEER-3	28	31.71	talb9	20c	30.19
hart01	20a	39.62	serp04	3b	32.10	card12	3b	25.88	maida02	20a	36.36	Rush02	20b	37.61	talb9	20c	32.76	CH060ASH	S18	30.00	serp04	3b	23.08	5C02	23b	31.46	perth03	20b	37.36	BULL-4	28	30.09	waro 01	3b	35.09	BULL-10	28	31.25	BULL-10	28	29.47
card12	3b	37.74	lamb2	3a	31.78	card6	20b	25.88	waro 02	3b	35.48	wire01	28	37.61	activ03	20a	32.43	serp02	3b	30.00	CH058ASH	S09	22.86	hart01	20a	31.46	wire02	28	37.21	wire02	28	29.89	DUCK-2	3c	33.33	maida01	20a	31.19	Tele01	23a	29.47
BULL-1	28	36.36	card5	20b	31.68	MUD-5	3a	25.88	card6	20b	35.29	maida01	20a	37.50	Rush02	20b	31.78	WATER-3	3c	29.85	yela01	28	22.68	Bushm01	20a	31.37	KOON-1	20a	36.89	Rush01	20b	29.70	BULL-1	28	32.97	BW04	S10	30.77	card5	20b	29.41
wire01	28	36.36	wire01	28	31.25	WONN-1	1a	25.81	Bushm01	20a	34.78	talb2	20c	37.31	BURNRD01	20b	30.77	card5	20b	29.47	BULL-9	28	22.47	talb9	20c	31.37	hart01	20a	36.17	BULL-9	28	29.47	card1	20b	32.69	yarl03	3b	30.77	APBF-2	20a	29.36
SHENT-1	28	36.17	card3	21a	30.59	BULL-1	28	25.64	Norm03	20b	34.04	Rush01	20b	36.97	m5303	20a	30.51	RGR03	S10	29.41	hart01	20a	22.47	ELE03	23b	31.33	perth04	23a	35.29	activ03	20a	29.13	AMBR-9	1b	32.48	serp01	3b	30.43	Norm03	20b	28.24
talb8	20c	36.07	card6	20b	30.43	card5	20b	25.53	BULL-1	28	33.68	card3	21a	35.85	maida01	20a	30.51	BURNRD02	3b	29.33	Norm03	20b	22.22	Bushm02	20c	31.25	BURNRD01	20b	35.19	MWR07	S09	28.92	R116703	1b	32.32	card12	3b	29.79	hart01	20a	27.96
m5305	3a	36.04	WATER-3	3c	30.14	NEER-23	28	25.40	card3	21a	33.68	talb8	20c	35.66	maida02	20a	30.00	KOOLJ-5	3b	29.33	yuri01	23c	21.78	activ01	20a	31.07	Kens01	23a	35.19	Tele01	23a	28.87	BURNRD02	3b	32.18	card6	20b	29.79	BULL-1	28	27.91
waro 02	3b	35.94	talb2	20c	30.09	BULL-10	28	25.29	card12	3b	33.33	activ02	20a	35.56	BW04	S10	29.89	leda02	28	29.21	Norm04	3b	21.74	activ02	20a	30.63	card5	20b	34.95	card13	3b	28.85	xlamb01	20b	32.12	CH157TEE	S09	29.73	talb10	20c	27.83
m5302	20a	34.23	SHENT-1	28	30.00	AMBR-4	1b	25.00	Rush01	20b	33.33	BULL-9	28	35.40	serp01	3b	29.70	BNR13	S18	29.09	Redh02	S08	21.54	GOLF-1	20a	30.43	hart04	23a	34.95	sand01	28	28.57	talb2	20c	31.93	RGR06	20d	29.63	m5303	20a	27.78
card2	20b	34.15	waro 02	3b	29.82	CARB-2	1b	25.00	serp02	3b	33.33	Sunday02	21a	35.09	NEER-23	28	29.63	Norm06	3b	28.95	Redh07	S08	21.33	BW04	S10	30.14	perth07	20a	34.78	brick8	3a	28.28	maida01	20a	31.86	5C03	20a	29.55	APBF-1	20a	27.03
Bushm01	20a	33.61	KOOLJ-5	3b	29.63	leda02	28	25.00	BURNRD02	3b	32.97	yarl03	3b	34.55	card12	3b	29.13	ACTON-1	1a	28.89	talb8	20c	20.95	APBF-1	20a	29.91	talb5	20c	34.69	sams01	28	28.24	5C01	S18	31.82	WATER-3	3c	29.33	M53	20a	26.92
talb9	20c	33.61	maida02	20a	29.21	Rush02	20b	24.72	talb2	20c	32.52	waro 02	3b	34.07	waro 02	3b	28.80	Rush02	20b	28.89	NEER-3	28	20.78	perth08	23a	29.55	dian01	23a	34.29	Redh06	S08	27.91	Norm04	3b	31.68	MWR07	S09	29.27	CH060ASH	S18	26.87
BNR02	S10	33.33	Rush02	20b	29.17	MWR07	S09	24.66	serp01	3b	32.00	m5302	20a	33.90	card2	20b	28.33	m5305	3a	28.57	FYR02	S10	20.69	Light02	23a	29.13	SHENT-1	28	34.15	card1	20b	27.72	perth03	20b	31.58	SHENT-1	28	29.27	MWR09	S10	26.47
brick2	20b	33.33	card1	20b	28.57	BNR16	S18	24.56	5A01	23b	31.91	serp03	3b	33.68	BURNRD02	3b	28.26	NEER-4	28	28.21	activ03	20a	20.62	card11	6	29.09	KING-2	28	34.09	Rush03	3b	27.72	CARB-2	1b	31.17	card5	20b	29.13	Bushm01	20a	26.42
BW04	S10	33.33	NEER-23	28	28.57	SF1201	2	24.44	dian01	23a	31.86	SHENT-1	28	33.66	FYR03	S10	28.26	Ellib06	S08	27.96	beel01	28	20.62	serp02	3b	28.92	card1	20b	34.00	much01	28	27.66	white03	4	31.17	MWR09	S10	28.99	serp01	3b	26.37
talb2	20c	33.07	Rush01	20b	28.57	AMBR-1	1b	24.39	m5302	20a	31.78	CAPEL-1	21b	33.63	YALLIN-1	1b	28.10	card6	20b	27.91	C 98PU.R	S10	20.59	WHITE-1	23a	28.89	Rush01	20b	34.00	card12	3b	27.37	Rush01	20b	30.77	serp03	3b	28.95	talb2	20c	26.32
Norm04	3b	33.03	talb12	3c	28.57	maida02	20a	24.39	BRIX-2	3a	31.58	BURNRD02	3b	33.33	BNR12	S18	27.91	hart01	20a	27.91	BURNRD02	3b	20.51	BULL-10	28	28.57	talb9	20c	33.64	card6	20b	27.37	5C03	20a	30.43	KOOLJ-5	3b	28.92	Redh06	S08	26.19
serp01	3b	32.69	BRIX-2	3a	28.24	perth03	20b	24.39	CH060ASH	S18	31.58	activ01	20a	33.07	yarl04	20b	27.83	BULL-1	28	27.85	Norm06	3b	20.25	card5	20b	28.57	activ01	20a	33.33	KING-1	28	27.18	WATER-3	3c	30.38	sand01	28	28.87	activ01	20a	26.17
YAN-25	28	32.69	C 99PU.R	S18	28.07	yarl03	3b	24.39	yarl04	20b	31.58	BURNRD01	20b	33.07	Bushm01	20a	27.59	WONN-1	1a	27.66	R116703	1b	20.00	CH060ASH	S18	28.57	BULL-10	28	33.33	Redh07	S08	27.16	Sunday02	21a	30.30	APBF-1	20a	28.57	activ02	20a	26.09
KING-2	28	32.00	activ03	20a	28.00	BURNRD02	3b	24.32	Rush03	3b	31.48	BULL-10	28	33.04	MANEA-2	21a	27.52	CH156TEE	S18	27.59	YAN-3	28	20.00	KOON-1	20a	28.57	LAND-1	20a	33.33	elbr01	3b	26.89	sand01	28	29.70	yarl04	20b	28.30	5A01	23b	25.88
serp03	3b	31.82	talb8	20c	27.78	serp04	3b	24.32	serp03	3b	30.95	Tele01	23a	33.04	Rush03	3b	27.52	C 99PU.R	S18	27.45	jand08	23a	19.80	MWR06	S06	28.57	Light02	23a	33.33	WATER-3	3c	26.32	sams01	28	29.55	smith03	1a	28.28	BULL-9	28	25.81
Cresw01	23a	31.78	Tele01	23a	27.66	xlamb01	20b	24.19	lamb2	3a	30.77	AMBR-1	1b	32.73	Light02	23a	27.35	CH059ASH	S18	27.12	RGR03	S10	19.72	MWR07	S09	28.57	GOLF-1	20a	32.99	KOOLJ-5	3b	26.19	AMBR-1	1b	29.47	talb9	20c	28.04	Norm07	20b	25.64
BURNRD02	3b	31.58	card2	20b	27.52	BNR02	S10	24.00	KOON-1	20a	30.63	Redh06	S08	32.69	CAPEL-5	1b	27.27	NEER-3	28	27.03	BRIX-2	3a	19.51	Tele01	23a	28.57	card7	21a	32.91	serp04	3b	26.19	AMBRAL-1	1b	29.41	5A01	23b	27.91	BRIX-2	3a	25.58
KING-1	28	31.58	MWR06	S06	27.50	C 99PU.R	S18	24.00	APBF-2	20a	30.51	serp01	3b	32.43	card7	21a	27.27	Norm04	3b	26.97	BULL-1	28	19.51	5G01	S09	28.24	activ02	20a	32.76	AMBR-1	1b	26.09	KOOLJ-4	21a	29.36	NEER-4	28	27.91	card3	21a	25.58
BULL-10	28	31.48	MWR07	S09	27.50	DUCK-1	3c	23.88	card2	20b	30.25	card2	20b	32.31	CAPEL-1	21b	27.18	card11	6	26.92	WELL-2	21a	19.42	YULE-3	21c	28.24	APBF-2	20a	32.73	CH060ASH	S18	26.09	smith03	1a	29.13	Norm07	20b	27.85	KOON-1	20a	25.49
TRIG-4	28	31.46	bold09	24	27.40	much04	25	23.88	brick8	3a	30.19	m5305	3a	32.20	card3	21a	27.08	NEER-21	28	26.83	5C03	20a	19.28	BULL-4	28	28.04	talb8	20c	32.73	yarl03	3b	26.09	m5306	3a	28.85	BNR16	S18	27.27	BULL-11	28	25.26
lamb2	3a	31.40	YULE-3	21c	27.27	serp03	3b	23.88	BRIX-5	3a	30.19	talb11	20c	32.08	Cresw01	23a	26.92	BNR15	S18	26.67	BW04	S10	19.18	dian01	23a	28.00	5A01	23b	32.56	serp03	3b	25.97	talb9	20c	28.83	serp02	3b	27.27	C 98PU.R	S10	25.00
star03	28	31.37	serp03	3b	27.03	CH060ASH	S18	23.73	wire01	28	30.19	MANEA-2	21a	31.93	APBF-2	20a	26.89	wire01	28	26.67	Rush01	20b	18.95	M53	20a	28.00	Norm03	20b	32.56	talb9	20c	25.93	smith02	1a	28.81	talb8	20c	27.27	ELE24	23b	25.00
activ02	20a	31.25	AMBR-1	1b	26.97	Redh06	S08	23.68	M53	20a	30.09	Rush03	3b	31.93	bibra01	23a	26.77	yarl04	20b	26.53	AMBR-1	1b	18.60	wire01	28	27.96	talb6	20c	32.56	5C01	S18	25.88	Cavs11	21a	28.57	CH059ASH	S18	26.87	GOLF-1	20a	25.00
sand01	28	31.19	perth03	20b	26.97	activ03	20a	23.66	BULL-4	28	30.00	card12	3b	31.86	BULL-10	28	26.67	maida02	20a	26.51	maida02	20a	18.60	BULL-3	23a	27.72	CH157TEE	S09	32.43	Norm06	3b	25.88	Ellib06	S08	28.57	leda02	28	26.80	BULL-3	23a	24.76
Redh06	S08	30.93	card8	20b	26.83	card13	3b	23.40	m5305	3a	29.91	KING-2	28	31.78	Tele01	23a	26.67	wicher01	1a	26.51	perth03	20b	18.60	FL-5	21c	27.40	M53	20a	32.38	m5306	3a	25.74	MUD-5	3a	28.57	Norm04	3b	26.80	jand08	23a	24.76
bibra01	23a	30.77	m5302	20a	26.80	wire02	28	23.38	smith03	1a	29.91	serp02	3b	31.78	BULL-4	28	26.45	smith03	1a	26.37	perth04	23a	18.56	YAN-4	28	27.27	perth08	23a	32.26	MWR09	S10	25.71	WONN-1	1a	28.30	BULL-4	28	26.79	yuri01	23c	24.76
NEER-9	24	30.77	ELLEN-6	3c	26.67	MWR09	S10	23.33	xlamb01	20b	29.79	Bushm01	20a	31.75	Norm04	3b	26.42	BNR02	S10	26.32	C 99PU.R	S18	18.52	Kens01	23a	27.18	bibra01	23a	32.20	KOON-2	20a	25.49	CH059ASH	S18	28.17	NEER-21	28	26.67	talb5	20c	24.74
HARRY-2	28	30.63	YAN-4	28	26.37	BW04	S10	23.19	brick5	3a	29.63	quinn08	S08	31.75	ACTON-1	1a	26.17	sams01	28	26.32	CARB-4	1b	18.49	quinn02	28	27.18	BULL-1	28	32.18	xlamb01	20b	25.37	card5	20b	28.04	Rush02	20b	26.53	tokyu03	28	24.72
Norm03	20b	30.61	BW04	S10	26.32	AMBR-9	1b	23.08	m5306	3a	29.63	ELE17	23b	31.58	card11	6	26.09	FYR02	S10	26.19	Redh03	S08	18.46	MOOR 02	S09	26.92	talb11	20c	32.18	Redh01	S08	25.29	MUD-4	3a	28.04	serp04	3b	26.51	MWR07	S09	24.69
yarl04	20b	30.51	NEER-4	28	26.19	Norm07	20b	22.86	activ01	20a	29.31	AUSTRA-1	21a	31.48	NINE-2	21a	26.00	NEER-9	24	26.19	perth07	20a	18.39	MR05	23b	26.87	5C03	20a	31.82	MUD-5	3a	25.26	Punr02	3a	27.91	card9	20b	26.37	WN100WNR	23b	24.32
yuri01	23c	30.51	MUD-5	3a	26.09	talb4	3c	22.86	BURNRD01	20b	29.31	ELE15	21a	31.46	yarl03	3b	26.00	TRIG-4	28	26.09	YAN-25	28	18.39	Cresw01	23a	26.67	ELE03	23b	31.82	brick6	3a	25.00	SHENT-1	28	27.91

Tele01	23a	29.63	CARB-2	1b	25.35	Punr02	3a	21.92	BULL-9	28	27.45	sand01	28	31.03	KOON-2	20a	25.45	card3	21a	25.32	Ellib05	S08	17.78	NEER-3	28	25.97	sand01	28	30.93	Norm04	3b	24.49	BNR12	S18	27.16	xlamb01	20b	25.56	card6	20b	23.66
KOON-1	20a	29.57	AMBR-4	1b	25.26	SHENT-1	28	21.92	activ02	20a	27.42	APBF-2	20a	31.01	YAN-20	23b	25.45	card13	3b	25.26	BNR02	S10	17.72	SHENT-1	28	25.97	card9	20b	30.77	C 98PU.R	S10	24.32	white06	23a	27.08	BULL-9	28	25.53	card13	3b	23.53
ELE17	23b	29.55	sand01	28	25.26	brick5	3a	21.88	DUCK-2	3c	27.27	low07	21c	30.93	xlamb01	20b	25.35	5C03	20a	25.00	sams01	28	17.72	NEER-8	28	25.81	DUNS-1	3b	30.77	brick7	3a	24.18	MANEA-2	21a	26.92	CAPEL-1	21b	25.53	talb6	20c	23.53
serp04	3b	29.47	talb1	3c	25.23	KOON-2	20a	21.74	R116703	1b	27.18	NINE-2	21a	30.91	ELE15	21a	25.32	APBF-1	20a	25.00	bibra01	23a	17.70	CH058ASH	S09	25.71	yarl03	3b	30.77	YULE-3	21c	24.18	BULLER-2	21a	26.80	beel01	28	25.49	BW04	S10	23.38
5G01	S09	29.41	ACTON-1	1a	25.00	YOON-1	1b	21.69	CH156TEE	S18	27.03	DUNS-1	3b	30.89	BULLER-1	21a	25.26	BC5	S18	25.00	elbr01	3b	17.70	BNR19	23b	25.64	Norm07	20b	30.38	yarl01	3c	24.14	WELL-2	21a	26.79	WONN-1	1a	25.49	YUR02	23c	23.38
CORON-1	21a	29.41	AMBRAL-1	1b	25.00	FYR03	S10	21.62	bibra01	23a	26.98	REDL-1	21a	30.89	perth04	23a	25.23	NEER-23	28	25.00	mrnp04	23b	17.65	BURNRD02	3b	25.64	much01	28	30.11	NEER-3	28	24.10	CAPEL-5	1b	26.67	APBF-2	20a	25.45	hurst03	23a	23.30
NEER-21	28	29.41	brick8	3a	25.00	KOOLJ-5	3b	21.62	BULL-10	28	26.92	bibra01	23a	30.66	WONN-1	1a	25.23	AMBR-4	1b	24.72	quinn08	S08	17.65	talb7	20c	25.64	Cavs11	21a	29.89	Bushm01	20a	24.07	Cavs02	21a	26.67	brick6	3a	25.29	talb11	20c	23.26
YULE-3	21c	29.41	BW01	S16	25.00	CH157TEE	S09	21.54	Tele01	23a	26.92	NEER-9	24	30.63	hart04	23a	25.00	C 98PU.R	S10	24.62	BULL-11	28	17.58	card9	20b	25.58	5C02	23b	29.79	quinn08	S08	24.07	lamb2	3a	26.55	BRIX-2	3a	25.29	ELE11	21a	23.19
hurst03	23a	29.31	CH157TEE	S09	25.00	KING-1	28	21.51	APBF-1	20a	26.67	YAN-25	28	30.63	R116703	1b	25.00	MWR07	S09	24.32	gill01	23a	17.58	kailis02	23a	25.58	CAPEL-1	21b	29.79	talb12	3c	24.07	BULL-9	28	26.53	card13	3b	25.24	ELE02	21c	23.08
ELE11	21a	29.27	WARI-2	28	25.00	APBF-1	20a	21.36	leda02	28	26.67	GUTHR-3	21a	30.51	RAAF-3	23b	24.78	talb9	20c	24.24	Ellib04	S08	17.50	yarl03	3b	25.58	YULE-2	23a	29.79	BW01	S16	24.00	beel01	28	26.42	card2	20b	25.23	serp02	3b	22.99
ELE15	21a	29.27	Bushm01	20a	24.76	5C01	S18	21.33	MWR06	S06	26.67	HARRY-2	28	30.51	DRAIN-1	21a	24.76	Ellib01	S08	24.10	Light01	23a	17.48	ELE17	23b	25.35	ELE24	23b	29.63	CH157TEE	S09	24.00	perth04	23a	26.42	BC5	S18	25.00	jand01	23a	22.92
Norm06	3b	29.17	quinn08	S08	24.76	Norm06	3b	21.33	MWR07	S09	26.67	talb6	20c	30.48	5C03	20a	24.74	bold17	S15	24.00	BW01	S16	17.39	FL-6	21c	25.35	WELL-2	21a	29.63	quinn01	S10	24.00	KOOLJ-3	21a	26.37	MTB-1	24	25.00	sand01	28	22.92
perth03	20b	29.13	NEER-22	28	24.72	sams01	28	21.33	5G01	S09	26.53	yarl04	20b	30.40	serp02	3b	24.74	WELL-2	21a	24.00	GOLF-1	20a	17.39	WN107MNR	S16	25.35	Cresw01	23a	29.47	waro 02	3b	23.93	5C05	S18	26.32	NEER-23	28	25.00	boyan 01	21b	22.81
yarl03	3b	29.13	PEARCE-2	3c	24.72	MUD-4	3a	21.28	brick7	3a	26.53	perth08	23a	30.36	dian01	23a	24.56	WOODV-2	28	24.00	sand01	28	17.39	5C01	S18	25.32	Sunday02	21a	29.47	BURNRD01	20b	23.85	perth10	4	26.32	Redh07	S08	25.00	buffer01	21b	22.73
talb5	20c	29.09	yarl03	3b	24.72	hart01	20a	21.18	YULE-3	21c	26.53	m5306	3a	30.25	M53	20a	24.56	Rush03	3b	23.91	m5303	20a	17.31	FYR02	S10	25.29	WHITE-1	23a	29.47	BW02	S09	23.68	Tele01	23a	26.00	lamb1	3a	24.78	xlamb01	20b	22.73
WARI-2	28	29.09	FYR03	S10	24.69	Sunday02	21a	20.93	KOOLJ-5	3b	26.37	BRIX-2	3a	30.19	GOLF-1	20a	24.53	BNR06	S10	23.68	5A01	23b	17.28	perth07	20a	25.29	CH060ASH	S18	29.41	m5303	20a	23.64	brick5	3a	25.97	KOOLJ-4	21a	24.76	BRIX-5	3a	22.68
APBF-1	20a	29.03	xlamb01	20b	24.43	MHR03	S10	20.90	serp04	3b	26.37	BW01	S16	30.11	sand01	28	24.53	KERO-1	24	23.53	NEER-4	28	17.28	serp01	3b	25.29	waro 02	3b	29.31	bibra01	23a	23.53	DUNS-1	3b	25.93	AMBR-4	1b	24.74	SINT-1	23b	22.68
xlamb01	20b	28.97	BNR02	S10	24.39	RGR03	S10	20.90	yuri01	23c	26.32	card6	20b	30.09	AUSTRA-1	21a	24.49	SVH-2	27	23.53	wire01	28	17.20	card1	20b	25.26	NEER-3	28	29.27	BNR02	S10	23.53	YALLIN-1	1b	25.86	GOLF-1	20a	24.74	mrnp04	23b	22.64
BC5	S18	28.79	sams01	28	24.39	KOOLJ-4	21a	20.83	AMBR-1	1b	26.26	CAPEL-5	1b	30.00	gosn12	23a	24.49	waro 01	3b	23.53	BW02	S09	17.14	m5306	3a	25.26	WN092HED	S18	29.27	CAPEL-5	1b	23.53	AUSTRA-1	21a	25.81	ACTON-1	1a	24.49	WN085CHE	S09	22.50
NEER-4	28	28.57	DUCK-1	3c	24.32	yarl01	3c	20.83	much04	25	26.19	LAND-1	20a	29.92	jand08	23a	24.35	brick2	20b	23.40	HARRY-2	28	17.02	BURNRD01	20b	25.24	card13	3b	29.13	waro 06	3a	23.53	MGK03	21b	25.81	BW01	S16	24.32	YULE-3	21c	22.47
RIVD-2	21a	28.57	much04	25	24.32	NEER-4	28	20.78	quinn01	S10	26.17	Cresw01	23a	29.82	YULE-3	21c	24.24	Redh06	S08	23.38	quinn01	S10	17.02	BNR01	S09	25.00	gibson01	21b	29.13	talb8	20c	23.42	leda02	28	25.74	CH156TEE	S18	24.24	m5305	3a	22.45
Rush03	3b	28.57	CH060ASH	S18	24.24	CH059ASH	S18	20.69	BNR18	S09	26.09	R116703	1b	29.82	NEER-3	28	24.18	YAN-3	28	23.38	BW05	S09	16.95	Ellib02	20d	25.00	gnan03	23a	29.13	much04	25	23.38	BNR16	S18	25.71	SF1201	2	24.24	BURNRD01	20b	22.43
wire02	28	28.57	much01	28	24.18	Tele01	23a	20.69	Norm06	3b	26.09	yela01	28	29.75	SHENT-1	28	24.18	BNR11	S18	23.33	MHR03	S10	16.90	MWR03	S06	25.00	KOOLJ-5	3b	28.92	beel01	28	23.30	dian01	23a	25.69	AMBR-1	1b	24.18	Kens01	23a	22.43
BURNRD01	20b	28.33	card11	6	24.14	yarl04	20b	20.62	quinn08	S08	26.09	NEER-3	28	29.70	WN092HED	S18	24.18	card2	20b	23.30	KING-2	28	16.87	perth04	23a	24.74	low04	21a	28.92	Ellib02	20d	23.08	lamb1	3a	25.64	CH056ASH	S18	24.14	LAND-1	20a	22.43
Kens01	23a	28.33	BNR12	S18	24.00	BNR12	S18	20.59	BNR12	S18	25.88	MGK03	21b	29.63	MODO-4	23a	24.07	MUD-5	3a	23.26	MWR01	20d	16.87	card6	20b	24.72	talb7	20c	28.92	MUD-4	3a	23.08	FL-1	4	25.58	WOODV-2	28	24.10	Light02	23a	22.43
quinn02	28	28.33	KING-1	28	24.00	ELLEN-6	3c	20.59	NINE-1	21a	25.88	hurst01	23a	29.51	smith03	1a	24.07	BNR12	S18	23.19	serp02	3b	16.87	YULE-2	23a	24.72	CRAMPT-1	21a	28.89	TRIG-4	28	23.08	MWR07	S09	25.58	BURNRD01	20b	24.07	WATERRD1	28	22.43
WELL-2	21a	28.33	hart01	20a	23.91	Ellib02	20d	20.59	WELL-2	21a	25.86	KOOLJ-5	3b	29.41	card9	20b	24.00	BULL-4	28	23.08	m5306	3a	16.84	WN112MOR	S16	24.66	tokyu03	28	28.89	talb6	20c	22.99	CRAMPT-1	21a	25.53	WELL-2	21a	24.07	lamb2	3a	22.22
CAPEL-5	1b	28.32	NEER-2	28	23.81	waro 02	3b	20.56	Redh06	S08	25.81	tokyu03	28	29.36	CH156TEE	S18	24.00	R116703	1b	22.99	MANEA-2	21a	16.84	ELE15	21a	24.62	leda02	28	28.87	moore03	28	22.86	yarl04	20b	25.45	m5306	3a	24.00	MWR02	20d	22.22
MELA-9	23b	28.30	Redh01	S08	23.81	card3	21a	20.51	CARB-4	1b	25.76	YULE-3	21c	29.36	PAGA-4	21a	24.00	PLINE-3	21a	22.95	Rush03	3b	16.84	BC1	20d	24.43	R116702	21b	28.87	AMBR-9	1b	22.81	WIRR-1	23a	25.42	white06	23a	23.91	MWR06	S06	22.22
C 98PU.R	S10	28.24	talb6	20c	23.81	Norm04	3b	20.45	BULLER-2	21a	25.74	GOLF-1	20a	29.31	perth03	20b	24.00	BNR24	S18	22.86	APBF-1	20a	16.82	Cavs11	21a	24.39	card2	20b	28.83	BW04	S10	22.78	m5302	20a	25.24	lamb2	3a	23.85	NEER-3	28	22.22
beel01	28	28.07	moore03	28	23.53	sand01	28	20.45	KOON-2	20a	25.69	hurst03	23a	29.27	Kens01	23a	23.93	Cavs11	21a	22.78	BC1	20d	16.79	BNR20	S09	24.32	ELE04	21a	28.57	talb11	20c	22.73	SF1201	2	25.24	5C01	S18	23.81	perth03	20b	22.22
Sunday02	21a	28.04	talb13	3c	23.53	talb9	20c	20.41	ELE11	21a	25.64	NINE-1	21a	29.17	Light01	23a	23.93	BULL-10	28	22.73	lamb1	3a	16.67	card7	21a	24.32	WARI-2	28	28.57	gill01	23a	22.68	CARB-4	1b	25.00	BNR06	S10	23.81	quinn06	23c	22.22
zBEER 03	23c	28.00	talb4	3c	23.38	KING-2	28	20.25	NEER-4	28	25.53	hurst04	23a	29.09	WELL-2	21a	23.93	PEARCE-1	6	22.64	MSF03	23c	16.67	ELE02	21c	24.32	xlamb01	20b	28.57	smith02	1a	22.61	FYR02	S10	25.00	BNR18	S09	23.81	Rush03	3b	22.22
CH157TEE	S09	27.91	KOOLJ-4	21a	23.30	ACTON-1	1a	20.22	talb6	20c	25.53	C71-2	21a	29.03	serp04	3b	23.91	ELE04	21a	22.58	MWR08	23b	16.67	ELE28	23b	24.24	BULL-3	23a	28.30	leda02	28	22.45	Norm06	3b	25.00	bibra01	23a	23.73	SHENT-1	28	22.22
hart04	23a	27.83	5C03	20a	23.26	AMBRAL-1	1b	20.22	5C02	23b	25.49	dian01	23a	29.03	5D01	23b	23.81	ELE15	21a	22.58	talb1	3c	16.67	moore03	28	24.24	yarl04	20b	28.30	BRIX-5	3a	22.22	serp03	3b	25.00	much04	25	23.68	YAN-20	23b	22.00
buffer01	21b	27.72	smith02	1a	23.21	brick8	3a	20.22	CAPEL-1	21b	25.49	xlamb01	20b	28.95	MWR05	S10	23.66	Norm07	20b	22.54	TRIG-3	28	16.67	CH050CUL	S09	24.14	yuri01	23c	28.30	Cavs02	21a	22.22	much01	28	24.74	waro 01	3b	23.64	NEER-9	24	21.98
MGK03	21b	27.72	CARB-4	1b	22.95	WARI-2	28	20.22	MUD-5	3a	25.49	BW04	S10	28.87	sams01	28	23.66	MTB-1	24	22.50	YAN-20	23b	16.67	KING-2	28	24.10	smith03	1a	28.28	wilb07	28	22.22	Ellib04	S08	24.72	BNR15	S18	23.53	RAAF-2	23b	21.98
NEER-3	28	27.66	card4	6	22.95	AMBR-6	1b	20.20	brick2	20b	25.45	YAN-3	28	28.85	CRAMPT-2	21a	23.64	sand01	28	22.47	smith02	1a	16.51	quinn09	20d	24.00	serp01	3b	28.26	AMBR-6	1b	22.02	Redh06	S08	24.72	KING-1	28	23.53	white06	23a	21.98
TAM-1	21a	27.66	NEER-8	28	22.92	WELL-2	21a	20.20	WONN-1	1a	25.45	perth07	20a	28.83	yang02	23a	23.64	talb2	20c	22.43	WIRR-1	23a	16.51	R116702	21b	23.91	white06	23a	28.26	HARRY-2	28	22.00	MWR09	S10	24.66	Redh06	S08	23.53	BURNRD02	3b	21.95
DUNS-1	3b	27.59	DEPOT-1	28	22.78	talb8	20c	19.80	yela01	28	25.45	white06	23a	28.83	ELE17	23b	23.53	AMBRAL-1	1b	22.22	KING-1	28	16.49	sand01	28	23.91	YAN-25	28	28.26	m5302	20a	22.00	PLINE-3	21a	24.66	YAN-3	28	23.53	serp04	3b	21.95
moore03	28	27.59	RGR06	20d	22.78	waro 01	3b	19.80	waro 01	3b	25.42	5A01	23b	28.57	much01	28	23.53	AUSTRA-1	21a	22.22	CARB-1	1b	16.39	ELE24	23b	23.68	BNR24	S18	28.21	SF1201	2	22.00	bibra01	23a	24.59	NINE-1	21a	23.38	talb7	20c	21.95
REDL-1	21a	27.59	HARRY-2	28	22.68	YULE-3	21c	19.75	ELE02	21c	25.29	card7	21a	28.57	serp03	3b	23.53	quinn08	S08	22.22	CH049CUL	S09	16.39	MR09	23b	23.68	BW04	S10	28.21	perth10	4	21.92	talb8	20c	24.56	TRIG-4	28	23.38	card2	20b	21.82

Gibson Weeds Removed

22Q01	FCT	Similarity	22Q02	FCT	Similarity	22Q03	FCT	Similarity	22Q04	FCT	Similarity	22Q05	FCT	Similarity	22Q06	FCT	Similarity	22Q07	FCT	Similarity	22Q08	FCT	Similarity	MVQ1	FCT	Similarity	MVQ2	FCT	Similarity	MVQ3	FCT	Similarity	MVQ4	FCT	Similarity	MVQ5	FCT	Similarity	MVQ6	FCT	Similarity
card1	20b	48.15	card12	3b	35.00	card1	20b	30.23	card1	20b	44.23	card5	20b	42.48	card1	20b	37.25	card1	20b	38.64	SHENT-1	28	26.23	APBF-2	20a	36.89	APBF-1	20a	41.82	BURNRD02	3b	35.90	KOOLJ-5	3b	39.47	card1	20b	37.50	SULT-2	MISSI	32.32
card5	20b	43.24	BULL-9	28	34.48	wicher01	1a	27.85	talb8	20c	41.07	card1	20b	41.82	card5	20b	36.19	card5	20b	32.97	BULL-4	28	24.74	ACTIV-1	20a	32.65	card5	20b	38.38	SHENT-1	28	34.78	BRIX-2	3a	38.55	BURNRD02	3b	35.90	BULL-4	28	31.68
BULL-4	28	42.74	card13	3b	32.97	BRIX-2	3a	27.40	talb9	20c	40.74	APBF-1	20a	38.71	talb8	20c	34.55	yarl03	3b	32.91	YALLIN-1	1b	24.00	APBF-1	20a	32.38	card1	20b	37.50	lamb2	3a	34.00	card12	3b	37.65	card5	20b	32.32	APBF-2	20a	30.77
BULL-9	28	40.38	card6	20b	32.56	card5	20b	26.97	yarl03	3b	37.89	BULL-4	28	38.66	APBF-1	20a	34.48	AMBR-1	1b	32.10	card1	20b	22.73	SULT-1	MISSI	30.61	KOON-1	20a	36.73	card1	20b	31.25	BURNRD02	3b	35.90	yarl03	3b	32.18	card1	20b	30.43
card13	3b	38.89	BULL-10	28	31.71	card12	3b	26.67	card5	20b	37.38	talb9	20c	36.84	talb9	20c	33.96	ACTON-1	1a	31.82	BULL-9	28	21.43	card5	20b	29.79	M53	20a	36.36	card13	3b	31.25	waro 02	3b	35.85	APBF-1	20a	30.91	SULT-1	MISSI	30.30
card3	21a	37.89	NEER-23	28	30.77	NEER-23	28	25.53	card13	3b	36.54	card13	3b	36.36	SULT-1	MISSI	33.03	BURNRD02	3b	31.43	talb8	20c	20.83	M53	20a	29.79	BULL-4	28	36.19	talb2	20c	30.48	card1	20b	35.42	card12	3b	30.59	talb8	20c	30.00
card12	3b	37.11	BURNRD02	3b	30.14	AMBR-1	1b	25.32	card6	20b	34.34	ACTIV-1	20a	35.90	card6	20b	32.99	card12	3b	31.17	BURNRD02	3b	20.00	talb9	20c	29.47	APBF-2	20a	35.19	brick8	3a	29.79	card13	3b	35.42	MTB-1	24	30.30	card5	20b	29.47
BULL-1	28	36.17	card5	20b	29.79	card4	6	25.00	waro 02	3b	33.33	SULT-1	MISSI	35.90	BURNRD01	20b	31.19	MIND-1	29b	30.77	AMBR-1	1b	19.75	KOON-1	20a	27.96	BURNRD01	20b	34.95	BULL-1	28	29.27	waro 01	3b	34.00	BULL-10	28	29.89	M53	20a	29.47
waro 02	3b	33.90	lamb2	3a	29.47	card6	20b	24.69	card3	21a	32.97	BULL-1	28	35.42	SULT-2	MISSI	31.19	KOOLJ-5	3b	29.41	APBF-1	20a	19.61	talb6	20c	27.78	SULT-1	MISSI	34.95	KOOLJ-5	3b	28.95	AMBR-9	1b	33.64	BULL-1	28	29.27	talb9	20c	29.17
card2	20b	33.33	AMBR-1	1b	28.57	CARB-2	1b	24.56	BURNRD02	3b	32.56	card3	21a	35.05	BULL-9	28	30.61	card3	21a	29.33	card6	20b	19.28	BURNRD01	20b	26.53	brick2	20b	34.69	BULL-4	28	28.57	DUCK-2	3c	32.00	smith03	1a	29.17	BULL-10	28	28.92
yarl04	20b	33.04	BULL-1	28	28.57	BULL-9	28	24.39	SULT-1	MISSI	32.43	BURNRD01	20b	34.19	card2	20b	29.82	NEER-21	28	28.99	YAN-3	28	18.67	card1	20b	26.37	talb11	20c	34.57	card6	20b	28.57	AMBR-1	1b	31.46	yarl04	20b	29.13	APBF-1	20a	28.30
card6	20b	33.01	WATER-3	3c	28.57	wonn01	1a	24.18	yarl04	20b	32.43	BULL-9	28	33.96	card13	3b	29.41	NEER-4	28	28.99	CARB-4	1b	18.18	card11	6	26.09	talb9	20c	34.00	card5	20b	28.28	ACTON-1	1a	31.25	SHENT-1	28	28.99	BRIX-5	3a	28.24
NEER-21	28	31.46	card3	21a	28.21	WATER-3	3c	24.14	card12	3b	32.26	talb8	20c	33.90	ACTIV-1	20a	29.36	KERO-1	24	28.57	lamb1	3a	17.82	talb5	20c	25.88	card7	21a	33.33	BULL-9	28	28.26	smith03	1a	31.25	KOOLJ-5	3b	28.95	talb10	20c	26.42
talb8	20c	31.03	waro 02	3b	27.72	BURNRD02	3b	23.53	M53	20a	31.78	talb2	20c	33.61	yarl04	20b	29.36	NEER-23	28	28.57	card5	20b	17.58	brick7	3a	25.64	ACTIV-1	20a	33.01	card12	3b	28.24	KOOLJ-3	21a	30.95	talb8	20c	28.85	ACTIV-1	20a	26.26
brick2	20b	30.91	card8	20b	27.40	ELLEN-6	3c	23.53	APBF-2	20a	31.03	AMBR-1	1b	33.01	NEER-23	28	28.57	MTB-1	24	27.59	MPK01	23b	17.50	card6	20b	25.58	talb8	20c	32.69	yarl03	3b	27.59	smith02	1a	30.36	card6	20b	28.57	IOPP	MISSI	26.09
KOON-1	20a	30.91	talb9	20c	27.37	BULL-10	28	23.38	card2	20b	31.03	APBF-2	20a	32.79	APBF-2	20a	28.07	APBF-1	20a	27.45	smith02	1a	17.31	BULL-3	23a	25.53	yarl03	3b	32.18	AMBR-1	1b	26.97	card5	20b	30.30	NEER-21	28	28.57	talb2	20c	25.74
lamb2	3a	30.36	card1	20b	26.37	yarl03	3b	23.38	BRIX-5	3a	30.93	card2	20b	32.79	ACTON-1	1a	27.45	BURNRD01	20b	27.37	CARB-1	1b	17.24	BURNRD02	3b	24.66	SHENT-1	28	31.88	WATER-3	3c	26.47	KOOLJ-4	21a	30.00	card9	20b	28.24	BULL-1	28	25.64
talb9	20c	30.36	AMBRAL-1	1b	26.09	card13	3b	23.26	smith03	1a	30.77	CAPEL-1	21b	32.69	KOON-2	20a	27.45	yarl04	20b	27.37	ACTIV-1	20a	16.84	SULT-2	MISSI	24.49	card2	20b	31.48	talb9	20c	26.00	yarl03	3b	29.89	talb9	20c	28.00	brick2	20b	25.53
TRIG-4	28	30.00	talb12	3c	26.09	smith03	1a	23.26	ACTIV-1	20a	30.63	yarl04	20b	32.48	card3	21a	26.97	card13	3b	27.27	BURNRD01	20b	16.84	BULL-10	28	24.39	card3	21a	31.33	lamb1	3a	25.69	CARB-2	1b	29.85	card2	20b	27.78	KOON-1	20a	25.53
YAN-25	28	29.70	talb2	20c	26.00	MUD-4	3a	23.08	BURNRD01	20b	30.63	KOON-1	20a	32.14	M53	20a	26.67	smith03	1a	27.27	SULT-1	MISSI	16.84	yarl03	3b	24.39	IOPP	MISSI	31.25	talb4	3c	25.35	WATER-3	3c	29.41	NEER-3	28	27.40	BRIX-2	3a	25.32
SHENT-1	28	29.63	CARB-2	1b	25.81	talb4	3c	22.95	KOON-1	20a	30.19	yarl03	3b	31.68	card12	3b	26.37	wicher01	1a	27.16	SULT-2	MISSI	16.84	talb8	20c	24.24	smith03	1a	31.25	KING-1	28	25.29	BULL-1	28	29.27	ACTON-1	1a	27.08	card3	21a	25.32
BURNRD01	20b	29.57	BRIX-2	3a	25.64	BRIX-5	3a	22.78	talb2	20c	30.09	waro 02	3b	31.67	YALLIN-1	1b	26.32	BULL-1	28	27.03	BULL-11	28	16.47	card13	3b	24.18	SULT-2	MISSI	31.07	BURNRD01	20b	25.24	wicher01	1a	29.21	card13	3b	27.08	card6	20b	25.29
NEER-4	28	29.21	AMBR-4	1b	25.58	AMBR-9	1b	22.68	lamb2	3a	29.63	talb11	20c	31.58	BURNRD02	3b	26.19	brick2	20b	26.67	hurst03	23a	16.47	BULL-4	28	24.00	yarl04	20b	31.07	KOON-2	20a	25.00	AMBRAL-1	1b	28.87	wicher01	1a	26.97	BULL-9	28	25.00
BURNRD02	3b	28.89	MIND-1	29b	25.45	MUD-7	8	22.54	brick8	3a	29.41	SULT-2	MISSI	30.77	talb11	20c	25.29	NEER-9	24	26.67	waro 02	3b	16.33	FL-5	21c	23.88	talb2	20c	30.48	talb8	20c	25.00	talb2	20c	28.57	WATER-3	3c	26.47	TRIG-4	28	25.00
waro 01	3b	28.57	KOOLJ-5	3b	25.35	AMBR-4	1b	22.22	BULL-1	28	28.89	card6	20b	30.48	CAPEL-5	1b	25.24	TRIG-4	28	26.67	YAN-20	23b	16.33	GOLF-1	20a	23.53	BULL-10	28	29.89	CAPEL-5	1b	24.74	card9	20b	28.24	waro 02	3b	26.42	BURNRD02	3b	24.32
BULL-10	28	28.28	NEER-22	28	25.35	BULL-1	28	22.22	APBF-1	20a	28.81	BURNRD02	3b	30.43	CAPEL-1	21b	25.00	WATER-3	3c	26.67	BULL-1	28	16.22	card3	21a	23.08	LAND-1	20a	29.70	talb11	20

NEER-7	24	27.08	AMBR-9	1b	23.53	brick5	3a	21.05	SHENT-1	28	25.97	C71-2	21a	28.32	BULL-4	28	23.42	WOODV-1	28	24.00	RAAF-2	23b	15.00	talb11	20c	21.05	card9	20b	28.24	SULT-1	MISSI	23.30	SHENT-1	28	26.09	brick2	20b	24.49	boyan 01	21b	22.43
APBF-2	20a	26.67	talb1	3c	23.53	ACTON-1	1a	20.93	waro 01	3b	25.93	low07	21c	28.24	talb2	20c	23.42	YAN-5	26b	23.88	YAN-25	28	14.81	card7	21a	20.90	BURNRD02	3b	28.21	YULE-3	21c	23.26	talb9	20c	26.00	CAPEL-1	21b	24.44	MILT-4	28	22.22
buffer01	21b	26.26	MUD-5	3a	23.26	KOON-2	20a	20.93	lamb1	3a	25.64	waro 01	3b	28.07	YAN-20	23b	23.21	BULL-9	28	23.81	boyan 02	1a	14.74	RAAF-3	23b	20.83	gibson01	21b	28.00	smith02	1a	23.21	card2	20b	25.93	DUCK-1	3c	24.32	YAN-4	28	22.22
CORON-1	21a	26.26	DUCK-1	3c	23.19	WELL-2	21a	20.93	CARB-4	1b	25.40	LAND-1	20a	27.83	card7	21a	23.08	NEER-22	28	23.53	yarl04	20b	14.74	MODO-5	23a	20.78	ACTON-1	1a	27.08	PEARCE-2	3c	23.08	MILT-6	21a	25.71	NINE-1	21a	24.32	yarl04	20b	22.22
KING-1	28	26.26	CARB-4	1b	23.01	waro 02	3b	20.83	YAN-19	23b	25.23	wonn01	1a	27.83	KOON-1	20a	23.08	card9	20b	23.38	GOLF-1	20a	14.63	BULL-9	28	20.69	WELL-2	21a	27.08	BULL-10	28	22.99	lamb1	3a	25.69	brick6	3a	24.10	talb6	20c	21.92
NINE-2	21a	26.26	brick5	3a	22.58	AMBRAL-1	1b	20.69	HARRY-2	28	25.00	buffer01	21b	27.72	AMBR-9	1b	23.01	AUSTRA-1	21a	22.73	card11	6	23.26	NEER-4	28	14.49	YAN-19	23b	20.41	AUSTRA-1	21a	26.83	MUD-4	3a	22.73	APBF-1	20a	25.45	card3	21a	24.10	WATERRD1	28	21.78
WARI-2	28	26.26	card9	20b	22.50	CAPEL-5	1b	20.69	KOON-2	20a	25.00	CORON-1	21a	27.72	AUSTRA-1	21a	22.73	CRAMPT-2	21a	23.26	talb2	20c	14.43	RIVD-2	21a	20.25	CAPEL-1	21b	26.67	talb12	3c	22.68	card7	21a	25.00	YAN-5	26b	24.00	PEARCE-2	3c	21.62
yarl03	3b	26.26	YAN-4	28	22.50	card8	20b	20.59	MUD-4	3a	25.00	lamb1	3a	27.64	gibson01	21b	22.64	CRAMPT-2	21a	23.26	talb2	20c	14.43	NEER-8	28	20.00	GOLF-1	20a	26.67	yarl01	3c	22.64	MUD-4	3a	25.00	lamb1	3a	23.85	YAN-23	26b	21.62
talb10	20c	26.23	brick8	3a	22.47	PEARCE-2	3c	20.59	WELL-2	21a	25.00	HARRY-2	28	27.45	NEER-9	24	22.47	SVH-2	27	23.19	WARB-3	23a	14.43	NEER-8	28	20.00	GOLF-1	20a	26.67	yarl01	3c	22.64	MUD-4	3a	25.00	lamb1	3a	23.85	YAN-23	26b	21.62
card7	21a	26.19	BURNRD01	20b	22.45	brick2	20b	20.45	talb11	20c	24.72	talb10	20c	27.42	PLINE-3	21a	22.22	YAN-14	26b	23.19	PLINE-3	21a	13.79	YAN-4	28	20.00	CRAMPT-1	21a	26.51	waro 06	3a	22.50	talb8	20c	25.00	KOOLJ-3	21a	23.81	YAN-20	23b	21.57
NEER-23	28	26.09	yarl04	20b	22.45	AMBR-6	1b	20.41	NEER-23	28	24.62	ACTON-1	1a	27.27	YAN-19	23b	22.02	SHENT-1	28	22.95	card13	3b	13.64	waro 02	3b	19.80	BULLER-1	21a	26.19	wicher01	1a	22.47	BULL-4	28	24.76	wonn01	1a	23.76	SHENT-1	28	21.54
MANEA-3	21b	26.00	card4	6	22.22	card2	20b	20.41	CAPEL-1	21b	24.49	KOON-2	20a	27.27	gibson02	1a	22.00	YAN-6	28	22.86	CARB-2	1b	13.56	IOPP	MISSI	19.78	BULL-9	28	26.09	brick2	20b	22.45	BULLER-2	21a	24.72	WELL-1	21a	23.53	SINT-1	23b	21.51
ACTON-1	1a	25.93	NEER-4	28	22.22	SHENT-1	28	20.34	MODO-5	23a	24.44	MANEA-2	21a	27.27	card9	20b	21.98	BULL-10	28	22.78	talb13	3c	13.51	KOON-2	20a	19.78	card12	3b	25.88	talb1	3c	22.43	DUNS-1	3b	24.49	brick8	3a	23.40	MIND-1	29b	21.43
smith03	1a	25.93	TRIG-4	28	22.22	KERO-1	24	20.00	WOODV-1	28	24.24	WELL-2	21a	27.27	KOOLJ-2	21a	21.98	WELL-2	21a	22.73	talb12	3c	13.48	smith03	1a	19.78	wonn01	1a	25.74	AMBR-6	1b	22.22	KOON-1	20a	24.49	KING-1	28	22.99	RAAF-2	23b	21.43
WELL-2	21a	25.93	BULL-4	28	22.00	KOOLJ-4	21a	20.00	brick6	3a	24.18	boyan 01	21b	27.20	will02	1a	21.82	BULL-4	28	22.68	MILT-4	28	13.46	talb3	20c	19.78	GUTHR-6	21a	25.58	M53	20a	22.22	CAPEL-1	21b	24.44	WELL-2	21a	22.92	card2	20b	21.15
talb11	20c	25.81	WARI-2	28	21.95	MIND-1	29b	20.00	KOOLJ-4	21a	24.07	YAN-25	28	27.18	TRIG-4	28	21.62	talb2	20c	22.68	card3	21a	13.33	GUTHR-6	21a	19.75	KING-1	28	25.29	KOOLJ-4	21a	22.00	NINE-1	21a	24.32	MILT-6	21a	22.86	SEAB-6	28	21.05
WOODV-1	28	25.71	yarl03	3b	21.95	waro 01	3b	20.00	BULLER-1	21a	23.91	brick6	3a	26.80	IOPP	MISSI	21.57	ELLEN-6	3c	22.64	KOON-1	20a	13.33	MTB-1	24	19.67	YULE-2	23a	25.29	MUD-5	3a	21.98	M53	20a	24.24	talb4	3c	22.54	YAN-9	28	21.05
CAPEL-5	1b	25.69	CAPEL-5	1b	21.74	smith02	1a	19.61	brick3	3a	23.85	BRIX-2	3a	26.80	MANEA-2	21a	21.57	AMBRAL-1	1b	22.47	MILT-7	23b	13.33	YULE-2	23a	19.51	YAN-19	23b	25.24	talb10	20c	21.82	AMBR-4	1b	24.18	AMBR-9	1b	22.43	SHE-2	28	20.95
MTB-1	24	25.64	card11	6	21.74	card11	6	19.51	wonn01	1a	23.85	CAPEL-2	21b	26.80	AMBRAL-1	1b	21.36	talb12	3c	22.47	NEER-9	24	13.33	lamb1	3a	19.23	boyan 01	21b	25.23	MTB-1	24	21.21	AMBR-6	1b	24.07	GOLF-1	20a	22.22	talb11	20c	20.78
PLINE-3	21a	25.64	MUD-4	3a	21.69	talb8	20c	19.15	KOOLJ-5	3b	23.81	NEER-9	24	26.80	SHENT-1	28	21.33	waro 02	3b	22.45	yarl01	3c	13.33	talb10	20c	19.05	talb3	20c	25.00	NEER-22	28	21.05	YALLIN-1	1b	24.07	talb11	20c	22.22	LAND-1	20a	20.62
talb5	20c	25.49	brick2	20b	21.51	brick8	3a	19.05	talb10	20c	23.73	REDL-1	21a	26.79	MANEA-3	21b	21.28	REDL-1	21a	22.22	BULL-3	23a	13.19	TAM-1	21a	19.05	YAN-25	28	24.72	CARB-2	1b	20.90	brick5	3a	23.88	WOODV-2	28	22.22	RAAF-3	23b	20.62
REDL-1	21a	25.45	KOON-1	20a	21.51	DEPOT-1	28	19.05	TRIG-4	28	23.68	NEER-22	28	26.67	RAAF-2	23b	21.28	talb11	20c	21.92	KOOLJ-3	21a	13.16	TRIG-4	28	19.05	NEER-23	28	24.56	smith03	1a	20.83	BULLER-1	21a	23.81	waro 01	3b	22.00	FL-5	21c	20.59
NEER-5	28	25.32	BRIX-5	3a	21.43	yarl01	3c	18.60	boyan 01	21b	23.53	M53	20a	26.55	brick2	20b	21.15	card7	21a	21.88	TRIG-3	28	13.16	WELL-1	21a	19.05	REDL-1	21a	24.49	talb6	20c	20.78	YOON-1	1b	23.81	AMBR-4	1b	21.98	NEER-3	28	20.29
NEER-9	24	25.26	wicher01	1a	21.43	CARB-4	1b	18.52	NEER-21	28	23.53	NEER-21	28	26.37	AMBR-1	1b	21.05	KOOLJ-4	21a	21.74	YOON-1	1b	13.16	wicher01	1a	19.05	NINE-1	21a	24.32	AMBRAL-1	1b	20.62	CARB-4	1b	23.73	AUSTRA-1	21a	21.95	NEER-9	24	20.25
RIVD-2	21a	25.00	M53	20a	21.28	wonn02	MISSI	18.52	YULE-3	21c	23.40	NEER-4	28	26.37	card11	6	21.05	lamb2	3a	21.74	gibson01	21b	13.04	boyan 01	21b	18.87	BULL-3	23a	24.24	TRIG-4	28	20.59	wonn02	MISSI	23.73	KERO-2	24	21.88	YAN-3	28	20.25
TAM-1	21a	25.00	lamb1	3a	21.15	YAN-5	26b	18.46	smith02	1a	23.33	talb6	20c	26.37	CARB-4	1b	20.97	waro 01	3b	21.74	lamb2	3a	13.04	CAPEL-1	21b	18.82	MTB-1	24	24.24	WELL-1	21a	20.59	FL-1	4	23.68	CRAMPT-1	21a	21.69	YAN-19	23b	20.20
WATER-3	3c	25.00	KOOLJ-4	21a	21.05	KING-1	28	18.18	BULL-10	28	23.16	card9	20b	26.26	wonn02	MISSI	20.97	AMBR-4	1b	21.69	waro 01	3b	13.04	LAND-1	20a	18.75	PLINE-3	21a	24.24	card8	20b	20.51	OATES-1	MISSI	23.53	smith02	1a	21.43	WARB-3	23a	19.80
LAND-1	20a	24.78	waro 01	3b	21.05	KOON-1	20a	18.18	NINE-2	21a	23.16	hurst03	23a	26.17	BULL-3	23a	20.95	GUTHR-3	21a	21.69	card12	3b	12.99	SHENT-1	28	18.75	BRIX-2	3a	24.10	HARRY-2	28	20.45	will02	1a	23.08	HARRY-1	28	21.33	card12	3b	19.75
wonn01	1a	24.78	APBF-1	20a	20.95	WARI-2	28	18.18	ACTON-1	1a	23.08	card8	20b	26.09	C71-2	21a	20.95	MUD-5	3a	21.69	KOOLJ-2	21a	12.99	wonn01	1a	18.75	NEER-9	24	24.10	KOON-1	20a	20.41	KING-1	28	22.99	CRAMPT-2	21a	21.28	card9	20b	19.75
hurst03	23a	24.76	yarl01	3c	20.83	NEER-21	28	17.91	RAAF-2	23b	22.92	CARB-3	21b	26.00	RUAB-2	21b	20.93	AUSTRA-1	21a	21.62	NEER-8	28	12.99	talb7	20c	18.67	lamb2	3a	24.00	CARB-4	1b	20.34	ELLEN-6	3c	22.95	PLINE-3	21a	21.21	DUCK-2	3c	19.72
card9	20b	24.74	talb13	3c	20.78	NEER-4	28	17.91	talb4	3c	22.78	CARB-4	1b	25.76	GOLF-1	20a	20.83	CORON-2	25	21.62	RAAF-3	23b	12.90	AMBR-4	1b	18.60	NEER-7	24	23.81	BRIX-5	3a	20.22	MANEA-2	21a	22.92	NEER-22	28	21.05	waro 02	3b	19.61
low04	21a	24.72	DEPOT-1	28	20.59	PLINE-3	21a	17.86	CARB-1	1b	22.73	WIRR-1	23a	25.64	talb5	20c	20.83	DEPOT-1	28	21.54	kemp01	1a	12.77	THOM-2	24	18.46	RIVD-2	21a	23.81	TRIG-6	24	20.00	WELL-2	21a	22.92	YULE-3	21c	20.93	KOON-2	20a	19.57
PAGA-7	21a	24.49	brick6	3a	20.51	lamb2	3a	17.78	BULLER-2	21a	22.68	card7	21a	25.58	OATES-1	MISSI	20.80	KERO-2	24	21.43	smith04	10b	12.70	BULL-1	28	18.18	brick8	3a	23.40	waro 01	3b	20.00	MANEA-3	21b	22.73	KOON-2	20a	20.83	YULE-3	21c	19.51
YAN-23	26b	24.44	brick7	3a	20.51	talb9	20c	17.78	wicher01	1a	22.68	MANEA-3	21b	25.49	KOOLJ-4	21a	20.75	YAN-3	28	21.33	buffer01	21b	12.66	MTB-3	24	18.18	low04	21a	23.38	brick3	3a	19.80	yarl01	3c	22.64	NINE-2	21a	20.69	FL-1	4	19.44
MELA-9	23b	24.00	SULT-1	MISSI	20.41	C58-1	4	17.54	REDL-1	21a	22.64	IOPP	MISSI	25.45	lamb2	3a	20.75	NINE-1	21a	21.21	BULL-10	28	12.66	talb2	20c	18.00	NEER-21	28	23.38	wonn01	1a	19.80	CARB-1	1b	22.58	WOODV-1	28	20.69	KING-2	28	19.44
YAN-9	28	23.91	will04	1a	20.37	CAPEL-1	21b	17.50	WOODV-2	28	22.54	smith03	1a	25.45	waro 01	3b	20.75	smith02	1a	21.15	CORON-1	21a	12.66	gibson02	1a	17.98	NEER-4	28	23.38	MUD-7	8	19.75	talb4	3c	22.54	talb12	3c	20.62	talb1	3c	19.42
SINT-1	23b	23.85	KOOLJ-3	21a	20.25	WELL-1	21a	17.24	talb5	20c	22.45	smith02	1a	25.40	talb10	20c	20.69	BULLER-1	21a	21.05	KING-1	28	12.66	BRIX-2	3a	17.95	boyan 02	1a	23.30	ELLEN-6	3c	19.67	RUAB-2	21b	22.50	TRIG-4	28	20.59	PLINE-3	21a	19.35
talb12	3c	23.85	YOON-1	1b	20.25	BURNRD01	20b	17.20	BANK-3	23a	22.43	DEPOT-1	28	25.29	boyan 01	21b	20.51	KOOLJ-3	21a	21.05	NINE-2	21a	12.66	CRAMPT-1	21a	17.95	GUTHR-5	21a	23.16	yarl02	9	19.44	waro 06	3a	22.50	card8	20b	20.51	KING-1	28	19.28
AMBR-1	1b	23.76	DUCK-2	3c	20.00	waro 06	3a	17.14	BULL-3	23a	22.43	NEER-3	28	25.29	BULL-1	28	20.45	NEER-7	24	21.05	WIRR-1	23a	12.63	YAN-20	23b	17.82	kelly01	1a	23.01	yarl04	20b	19.42	yarl02	9	22.22	PEARCE-2	3c	20.51	NINE-2	21a	19.28
BRIX-5	3a	23.76	NEER-8	28	20.00	CAPEL-3	4	16.95	YALLIN-1	1b	22.41	GOLF-1	21a	25.00	MODO-4	23a	20.41	TRIG-3	28	21.05	MANEA-3	21b	12.50	KOOLJ-3	21a	17.72	buffer01	21b	22.99	NEER-9	24	19.28	card6	20b	21.98	YAN-6	28	20.51	AMBR-6	1b	19.23
YAN-20	23b	23.73	TRIG-5	24	20.00	NEER-11	24	16.95	AMBR-4	1b	22.22	hurst01	23a	25.00	MILT-4	28	20.34	HARRY-1	28	20.90	MELA-9	23b	12.50	NEER-3	28	17.65	WARI-2	28	22.99	NEER-3	28	19.18	GUTHR-3	21a	21.98	HARRY-2	28	20.45	NEER-20	28	19.18
AMBR-9	1b	23.53	YAN-5	26b	20.00	BULL-4	28	16.84	gibson01	21b	22.22	low06a	21c	25.00	NEER-3	28	20.25	talb8	20c	20.83	WATERRD1	28	12.37	card12	3b	17.50	MANEA-3	21b	22.73	KOOLJ-3	21a	19.05	DEPOT-1	28	21.92	MUD-4	3a	20.45	YALG-4	27	19.18
DEPOT-1	28	23.53	YAN-8	28	20.00	talb2	20c	16.84	MUD-5	3a	22.22	MTB-1	24	25.00	CAPEL-2	21b	20.22	YAN-1	26b	20.59	wicher01	1a	12.35	PLINE-2	23b	17.50	MELA-9	23b	22.73	TRIG-3	28	19.05	talb10	20c	21.82	KOON-1	20a	20.41	hurst02	23a	19.05
GOLF-1	20a	23.53	KOON-2	20a	19.78	AMBR-2	2	16.67	OATES-1	MISSI	22.05	talb5	20c	25.00	BULL-11	28	20.20	PAGA-4	21a	20.51	DEPOT-1	28	12.31	WOODV-2	28	17.24	RAAF-2	23b	22.73	YOON-1	1b	19.05	brick6	3a	21.69	REDL-1	21a	20.41	MPK01	23b	19.05
NEER-3	28	23.53	smith03	1a	19.78	CORON-2	25	16.67	LAND-1	20a	22.02	AMBR-9	1b	24.79	CARB-1	1b	20.00	KOON-2	20a	20.45	AMBR-6	1b	12.00	brick2	20b	17.20	WHITE-1	23a	22.73	DUCK-1	3c	18.92	boyan 01	21b	21.62	BRIX-5	3a	20.22	NEER-23	28	18.87
talb1	3c	23.53	WELL-2	21a	19.78	CRAMPT-2	21a	16.67	NEER-9	24	21.98	BANK-3	23a	24.78	CRAMPT-2	21a	20.00	CARB-2	1b	20.34	WOODV-1	28	12.00	MELA-3	23b	17.20	SINT-1	23b	22.68	card9	20b	18.82	RIVD-2	21a	21.43	BULLER-2	21a	20.22	KOOLJ-4	21a	18.75
BULL-3	23a	23.42	YULE-3	21c	19.75	MILT-6	21a	16.67	DUCK-1	3c	21.95	GUTHR-3	21a	24.76	KOOLJ-3	21a	20.00	NEER-5	28	20.34	HARRY-1	28	11.94	YAN-5	26b	17.14	YAN-20	23b	22.64	YAN-4	28	18.82	boyan 02	1a	21.36	YAN-25	28	20.22	waro 01	3b	18.75
dard03	1a	23.42	MTB-1	24	19.67	WOODV-1	28	16.67	NINE-1	21a	21.95	brick7	3a	24.74	NEER-7	24	20.00	talb6	20c	20.29	WHILL-4	27	11.94	buffer01	21b	17.07	HARRY-5	21a	22.50	YAN-8	28	18.82	BURNRD01	20b	21.36	dard03	1a	20.20	dard02	21b	18.69
M53	20a	23.42	PLINE-3	21a	19.67	brick6	3a	16.44	hurst03	23a	21.78	YAN-3	28	24.74	NINE-1	21a	20.00	AMBR-9	1b	20.20	SHE-2	28	11.88	NINE-2	21a	17.07	RUAB-2	21b	22.50	IOPP	MISSI	18.75	WIRR-1	23a	21.36	KERO-1	24	20.00	RUAB-2	21b	18.42
SEAB-6	28	23.42	KING-1	28	19.51	brick7	3a	16.44	RIVD-2	21a	21.74	KOOLJ-4	21a	24.56	RIVD-2	21a	20.00	APBF-2	20a	20.00	KING-2	28	11.76	dard03	1a	17.02	talb7	20c	22.50	DUCK-2	3c	18.67	CRAMPT-2	21a	21.28	MIND-1	29b	20.00	talb7	20c	18.42
KOOLJ-4	21a	23.21	NINE-2	21a	19.51	CRAMPT-1	21a	16.44	HARRY-1	28	21.69	hurst04	23a	24.49	WABL-4	28	19.80	DUNS-1	3b	20.00	boyan 01	21b	11.65	KERO-2	24	16.95	AMBR-1	1b	22.47	YAN-5	26b	18.67	will04	1a	21.24	talb10	20c	20.00	MUD-5	3a	18.39
CAPEL-2	21b	23.16	talb6	20c	19.44	APBF-2	20a	16.33	WHILL-4	27	21.69	RIVD-2	21a	24.49	WELL-2	21a	19.61	KOON-1	20a	20.00	talb6	20c	11.59	FL-1	4	16.90	BULLER-2	21a	22.47	APBF-2	20a	18.52	MTB-1	24	21.21	waro 06	3a	20.00	HARRY-4	23a	18.18
CRAMPT-1	21a	23.16	AMBR-6	1b	19.42	YALLIN-1	1b	16.33	MTB-1	24	21.62	TRIG-3	28	24.49	GUTHR-6	21a	19.57	MUD-4	3a	20.00	kelly01	1a	11.43	KING-2	28	16.90	ELDO-1	23b	22.47	YALLIN-1	1b	18.52	KOOLJ-2	21a	21.18	GUTHR-3	21a	19.78	WARB-2	22	18.18
YAN-3	28	23.16	DUNS-1	3b	19.35	BULLER-1	21a	16.22	MYALUP-2	25	21.57	KING-2	28	24.44	PAGA-4	21a	19.57	PEARCE-2	3c	20.00	PEARCE-2	3c	11.43	MANEA-3	21b	16.87	wicher01	1a	22.47	TRIG-5	24	18.46	GUTHR-5	21a	21.05	low07	21c	19.72	WIRR-1	23a	18.18
RAAF-3	23b	23.01	NEER-5	28	19.35	KOOLJ-3	21a	16.22	NEER-22	28	21.43	KOOLJ-5	3b	24.44	YULE-3	21c	19.57	BANK-3	23a	19.78	will04	1a	11.43	smith02	1a	16.82	dard03	1a	22.22	NINE-2	21a	18.39	NEER-23	28	21.05	card11	6	19.61	TRIG-6	24	17.86
HARRY-1	28	22.99	HARRY-2	28	19.28	talb12	3c	16.09	GUTHR-6	21a	21.28	TAM-1	21a	24.39	MTB-1	24	19.44	dard03	1a	19.78	IOPP	MISSI	11.36	BRIX-5	3a	16.67	low13a	21a	22.22	brick1	3a	18.37	GUTHR-6	21a	20.93	CORON-2	25	19.51	FISH-5	2	17.78
YAN-5	26b	22.99	SHE-2	28	19.23	KOOLJ-2	21a	16.00	PAGA-7	21a	21.28	WELL-1	21a	24.39	SINT-1	23b	19.42	YAN-25	28	19.75	KOON-2	20a	11.36	BULLER-2	21a	16.67	DEPOT-1	28	21.92	DRAIN-1	21a	18.18	YULE-3	21c	20.93	ACTIV-1	20a	19.42	CAPEL-2	21b	17.72
TRIG-3	28	22.92	YAN-6	28	19.18	brick1	3a	15.91	low04	21a	21.18	MIND-1	29b	24.32	buffer01	21b	19.35	NEER-2	28	19.72	MANEA-2	21a	11.36	ELDO-1	23b	16.67	NEER-3	28	21.92	NEER-4	28	18.18	KOON-2	20a	20.83	NEER-9	24	19.28	card7	21a	17.65
OATES-1	MISSI	22.90	NEER-2	28	18.92	YULE-3	21c	15.79	NEER-4	28	21.18	NEER-8	28	24.24	CORON-1	21a	19.35	NEER-11	24	19.67	smith03	1a	11.36	MELA-6	23b	16.67	RAAF-3	23b	21.78	SEAB-6	28	18.18	talb6	20c	20.78	YAN-3	28	19.28	WABL-4	28	17.58
KING-2	28	22.73	WOODV-1	28	18.87	M53	20a	15.73	talb6	20c	21.18	YAN-4	28	24.24	WARI-2	28	19.35	talb10	20c	19.61	dard01	1a	11.21	NEER-21	28	16.67	brick6	3a	21.69	talb5	20c	17.78	BULL-10	28	20.69	will02	1a	19.23	NEER-7	24	17.50
KOOLJ-5	3b	22.73	CAPEL-1	21b	18.82	WATER-4	8	15.73	IOPP	MISSI	21.15	brick8	3a	24.07	AMBR-6	1b	19.30	YAN-9	28	19.44	DUNS-1	3b	11.11	NEER-4	28	16.67	brick7	3a	21.69	GUTHR-3	21a	17.58	NINE-2	21a	20.69	DEPOT-1	28	19.18	YALG-2	26b	17.48
NEER-22	28	22.73	YAN-9	28	18.67	MUD-3	8	15.63	CORON-1	21a	21.05	CRAMPT-2	21a	24.07	NEER-4	28	19.28	MILT-6	21a	19.35	RUAB-2	21b	11.11	will04	1a	16.67	CAPEL-2	21b	21.69	NEER-23	28	17.54	talb12	3c	20.62	BULLER-1	21a	19.05	ACTON-1	1a	17.39
NEER-8	28	22.68	CARB-1	1b	18.49	NINE-1	21a	15.63	WELL-1	21a	21.05	GUTHR-5	21a	23.85	REDL-1	21a	19.23	MTB-3	24	19.23	SHE-1	26b	11.11	YAN-25	28	16.67	hurst03	23a	21.51	YAN-9	28	17.50	card8	20b	20.51	NEER-7	24	19.05	card4	6	17.39

Gibson Weeds Included

22Q01	FCT	Similarity	22Q02	FCT	Similarity	22Q03	FCT	Similarity	22Q04	FCT	Similarity	22Q05	FCT	Similarity	22Q06	FCT	Similarity	22Q07	FCT	Similarity	22Q08	FCT	Similarity	MVQ1	FCT	Similarity	MVQ2	FCT	Similarity	MVQ3	FCT	Similarity	MVQ4	FCT	Similarity	MVQ5	FCT	Similarity	MVQ6	FCT	Similarity
card1	20b	47.79	card12	3b	35.16	card1	20b	29.21	card1	20b	44.44	card5	20b	41.32	card1	20b	36.36	card1	20b	36.96	SHENT-1	28	31.17	APBF-2	20a	35.51	APBF-1	20a	40.35	SHENT-1	28	36.14	KOOLJ-5	3b	39.53	card1	20b	36.00	SULT-2	MISSI	33.33
BULL-4	28	44.09	BULL-10	28	34.41	BRIX-2	3a	27.85	talb9	20c	43.48	BULL-4	28	40.91	card5	20b	35.40	yarl03	3b	32.94	BULL-4	28	25.93	talb6	20c	34.15	BULL-4	28	40.00	BURNRD02	3b	35.29	card12	3b	39.18	BURNRD02	3b	35.29	BULL-4	28	33.03
card5	20b	43.10	BULL-9	28	34.41	wicher01	1a	27.16	talb8	20c

brick2	20b	31.03	BRIX-2	3a	27.91	DUCK-1	3c	23.88	ACTIV-1	20a	31.03	waro 02	3b	32.84	YALLIN-1	1b	27.42	NEER-23	28	27.27	WELL-2	21a	19.23	talb8	20c	28.30	talb5	20c	34.34	KING-1	28	27.18	card5	20b	30.48	smith03	1a	28.28	card3	21a	26.83
KOON-1	20a	31.03	SHENT-1	28	27.85	card13	3b	23.40	M53	20a	30.91	talb11	20c	32.69	BURNRD02	3b	27.37	NEER-3	28	27.03	HARRY-2	28	19.15	KOON-1	20a	28.28	talb2	20c	34.19	SULT-1	MISSI	27.03	ACTON-1	1a	29.70	NEER-4	28	27.91	KOON-1	20a	26.53
talb2	20c	31.01	card8	20b	27.50	BULL-9	28	23.26	lamb2	3a	30.77	AMBR-1	1b	32.43	ACTIV-1	20a	27.12	BRIX-2	3a	26.83	APBF-1	20a	18.69	WHITE-1	23a	28.26	yarl03	3b	34.04	BULL-9	28	26.80	smith03	1a	29.70	talb2	20c	27.59	BULL-9	28	26.09
BULL-10	28	30.91	card1	20b	27.08	talb4	3c	23.19	yarl03	3b	32.43	talb2	20c	26.98	card13	3b	26.80	card5	20b	18.56	card13	3b	27.72	APBF-2	20a	33.93	MIND-1	29b	26.09	AMBR-1	1b	29.47	card2	20b	26.79	BRIX-2	3a	25.88
SULT-1	MISSI	30.65	AMBR-1	1b	26.97	WATER-3	3c	23.19	card2	20b	32.31	waro 02	3b	26.98	wonn01	1a	26.80	lamb1	3a	18.52	BURNRD02	3b	27.16	BULL-1	28	33.71	KOON-2	20a	26.00	yarl03	3b	29.47	card13	3b	26.67	BULL-11	28	25.81
NEER-21	28	30.48	NEER-4	28	26.83	BRIX-5	3a	22.73	card12	3b	31.86	card7	21a	26.97	APBF-1	20a	26.67	talb1	3c	18.52	card1	20b	27.08	KING-2	28	33.71	AMBR-1	1b	25.81	KOOLJ-3	21a	29.21	card9	20b	26.37	talb5	20c	25.81
WARI-2	28	30.36	talb8	20c	26.42	smith03	1a	22.73	brick8	3a	29.91	SHENT-1	28	31.68	card3	21a	26.80	SHENT-1	28	26.67	AMBR-1	1b	18.39	yarl03	3b	26.97	IOPP	MISSI	33.33	YULE-3	21c	25.81	AMBRAL-1	1b	28.85	BULL-4	28	26.32	BRIX-5	3a	25.53
YAN-25	28	30.36	WATER-3	3c	26.32	card4	6	22.64	BRIX-5	3a	29.91	KOON-1	20a	31.40	CAPEL-1	21b	26.67	yarl04	20b	26.53	card11	6	18.18	BURNRD01	20b	26.92	ACTIV-1	20a	33.03	talb11	20c	25.58	lamb2	3a	28.83	ACTON-1	1a	26.26	GOLF-1	20a	25.53
NEER-4	28	30.30	brick5	3a	26.09	brick5	3a	22.58	smith03	1a	29.91	low04	21a	31.37	MANEA-2	21a	26.55	smith03	1a	26.37	MPK01	23b	18.18	FL-5	21c	26.67	LAND-1	20a	33.03	talb8	20c	25.45	AUSTRA-1	21a	28.57	KOOLJ-4	21a	26.17	BULL-3	23a	25.24
HARRY-2	28	30.09	CARB-2	1b	26.09	MUD-7	8	22.50	brick5	3a	29.63	BURNRD02	3b	31.07	APBF-2	20a	26.45	talb9	20c	26.26	waro 02	3b	18.18	card6	20b	26.09	card13	3b	32.08	brick6	3a	25.00	smith02	1a	28.57	NEER-21	28	26.09	MIND-1	29b	25.00
NEER-9	24	29.91	YAN-4	28	26.09	AMBR-4	1b	22.47	BULL-4	28	29.51	APBF-2	20a	31.01	BULL-10	28	26.17	NEER-21	28	26.19	CARB-4	1b	18.03	YAN-4	28	26.09	GOLF-1	20a	32.00	talb4	3c	25.00	wonn01	1a	28.04	wicher01	1a	26.09	TRIG-4	28	25.00
BURNRD01	20b	29.75	card2	20b	25.93	KOON-2	20a	22.47	BURNRD01	20b	29.31	low07	21c	30.93	BULL-4	28	25.81	wicher01	1a	26.19	card12	3b	17.98	NEER-3	28	25.64	card2	20b	31.86	WATER-3	3c	25.00	MUD-5	3a	28.00	waro 02	3b	25.86	talb11	20c	24.69
lamb2	3a	29.51	wonn01	1a	25.74	DUCK-2	3c	22.22	SHENT-1	28	28.57	talb6	20c	30.77	SHENT-1	28	25.81	TRIG-4	28	26.09	low04	21a	17.95	SHENT-1	28	25.32	card3	21a	31.82	BULL-10	28	24.74	card9	20b	27.96	lamb2	3a	25.69	talb6	20c	24.69
NEER-3	28	29.47	MUD-5	3a	25.53	SHENT-1	28	22.22	card9	20b	28.28	DUNS-1	3b	30.65	ACTON-1	1a	25.69	BURNRD01	20b	26.00	TRIG-5	24	17.95	card9	20b	25.29	SULT-2	MISSI	31.48	lamb1	3a	24.56	CRAMPT-1	21a	27.66	DUCK-1	3c	25.64	brick2	20b	24.49
AUSTRA-1	21a	29.41	BULL-4	28	25.45	YOON-1	1b	22.22	APBF-1	20a	28.10	yarl04	20b	30.65	KOON-2	20a	25.45	talb2	20c	25.93	talb9	20c	17.82	NEER-8	28	25.26	talb10	20c	30.77	talb1	3c	24.56	wicher01	1a	27.66	card7	21a	25.32	hurst03	23a	24.24
KING-1	28	29.31	talb1	3c	25.45	DEPOT-1	28	21.92	DUNS-1	3b	28.07	NINE-2	21a	30.63	NINE-2	21a	25.24	NEER-9	24	25.58	NEER-4	28	17.50	SULT-2	MISSI	25.24	waro 02	3b	30.77	MUD-5	3a	24.49	BULL-4	28	27.59	NINE-1	21a	25.32	card6	20b	24.18
BRIX-2	3a	29.13	YALLIN-1	1b	25.45	KOOLJ-5	3b	21.92	SULT-2	MISSI	27.83	HARRY-2	28	30.51	yarl03	3b	25.24	CAPEL-1	21b	25.29	talb12	3c	17.48	OATES-1	MISSI	24.79	KOOLJ-5	3b	30.59	BRIX-2	3a	24.44	DUCK-1	3c	27.50	CAPEL-1	21b	25.26	YAN-4	28	24.18
hurst03	23a	29.06	PEARCE-2	3c	25.29	AMBR-9	1b	21.57	HARRY-2	28	27.78	SULT-2	MISSI	30.40	CAPEL-5	1b	25.00	brick2	20b	25.26	BULL-11	28	17.39	brick7	3a	24.72	card9	20b	30.43	NEER-3	28	24.39	MUD-4	3a	27.27	KING-1	28	25.24	YAN-9	28	24.10
talb5	20c	28.83	WARI-2	28	25.26	APBF-1	20a	21.57	YULE-3	21c	27.72	NEER-9	24	30.36	M53	20a	25.00	card2	20b	25.00	card4	6	17.24	NEER-9	24	24.44	BURNRD02	3b	30.23	waro 02	3b	24.14	card3	21a	26.97	APBF-2	20a	25.23	card13	3b	24.00
BURNRD02	3b	28.57	AMBR-4	1b	25.00	NEER-4	28	21.33	talb11	20c	27.66	LAND-1	20a	30.16	NEER-9	24	25.00	card4	6	25.00	GOLF-1	20a	17.20	talb11	20c	24.39	OATES-1	MISSI	30.16	yarl01	3c	24.14	CAPEL-5	1b	26.92	brick6	3a	25.00	boyan 01	21b	23.42
KOON-2	20a	28.32	KOOLJ-5	3b	25.00	yarl01	3c	21.28	BULL-10	28	26.67	NEER-3	28	30.00	talb11	20c	25.00	AUSTRA-1	21a	24.69	YAN-25	28	17.20	FL-6	21c	24.32	CRAMPT-1	21a	30.11	BURNRD01	20b	24.07	WATER-3	3c	26.83	WATER-3	3c	25.00	YAN-25	28	23.40
talb11	20c	28.28	YULE-3	21c	24.72	card3	21a	21.05	BULL-9	28	26.67	lamb2	3a	29.92	wonn01	1a	24.35	WOODV-2	28	24.00	TRIG-3	28	16.84	YULE-2	23a	24.18	smith03	1a	30.00	AMBR-4	1b	24.00	BULLER-2	21a	26.80	wonn01	1a	24.76	NEER-3	28	23.38
LAND-1	20a	28.10	card11	6	24.56	yarl04	20b	21.05	talb5	20c	26.42	AUSTRA-1	21a	29.91	AUSTRA-1	21a	24.24	CRAMPT-1	21a	23.81	WARB-3	23a	16.82	card3	21a	24.10	DUNS-1	3b	29.91	talb12	3c	23.85	talb8	20c	26.79	BULL-9	28	24.74	BURNRD01	20b	23.30
IOPP	MISSI	28.07	AMBRAL-1	1b	24.49	waro 02	3b	20.95	DUCK-2	3c	26.37	MIND-1	29b	29.89	DRAIN-1	21a	24.07	talb12	3c	23.76	talb13	3c	16.67	card7	21a	24.00	yarl04	20b	29.91	waro 06	3a	23.81	WELL-2	21a	26.79	AUSTRA-1	21a	24.72	LAND-1	20a	23.30
talb10	20c	27.91	NEER-22	28	24.44	KOOLJ-4	21a	20.83	KOON-2	20a	25.93	card6	20b	29.82	talb5	20c	24.07	KERO-1	24	23.53	WIRR-1	23a	16.67	BULL-1	28	23.81	KOON-2	20a	29.70	brick7	3a	23.66	brick5	3a	26.67	MTB-1	24	24.72	buffer01	21b	23.26
MELA-9	23b	27.78	talb6	20c	24.39	talb9	20c	20.83	talb10	20c	25.81	brick2	20b	29.75	BRIX-2	3a	24.00	WELL-2	21a	23.53	KING-1	28	16.49	KING-2	28	23.81	CAPEL-1	21b	29.17	CAPEL-5	1b	23.53	KING-1	28	26.67	BRIX-2	3a	24.44	lamb2	3a	23.08
KING-2	28	27.72	DUCK-1	3c	24.32	MUD-4	3a	20.62	AMBR-1	1b	25.74	MANEA-2	21a	29.75	NEER-3	28	23.91	WELL-1	21a	23.38	MANEA-2	21a	16.49	talb7	20c	23.81	card12	3b	29.17	TRIG-4	28	23.38	card2	20b	26.32	NEER-23	28	24.32	SHENT-1	28	23.08
YAN-9	28	27.72	SULT-1	MISSI	24.30	ELLEN-6	3c	20.59	brick7	3a	25.74	BRIX-2	3a	29.63	TAM-1	21a	23.91	waro 01	3b	23.08	CARB-1	1b	16.39	BULL-9	28	23.66	YULE-2	23a	29.17	talb6	20c	23.26	BULL-9	28	26.26	brick8	3a	24.24	RAAF-2	23b	22.99
WELL-2	21a	27.64	NEER-2	28	24.10	ACTON-1	1a	20.45	NEER-4	28	25.53	hurst03	23a	29.51	GOLF-1	20a	23.85	PLINE-3	21a	22.95	smith02	1a	16.22	BRIX-2	3a	23.26	NEER-3	28	28.92	card2	20b	23.21	DUNS-1	3b	25.93	GOLF-1	20a	24.24	DEJONG-a	22	22.95
NEER-7	24	27.52	card7	21a	24.00	brick8	3a	20.45	talb6	20c	25.53	card8	20b	29.41	MODO-4	23a	23.85	CRAMPT-2	21a	22.92	card13	3b	16.16	talb2	20c	23.21	AUSTRA-1	21a	28.89	AMBR-9	1b	23.01	yarl04	20b	25.93	WOODV-2	28	24.10	SINT-1	23b	22.92
TAM-1	21a	27.37	ELLEN-6	3c	24.00	WARI-2	28	20.45	WELL-2	21a	25.42	talb5	20c	29.31	BULLER-1	21a	23.76	REDL-1	21a	22.68	yarl03	3b	16.09	waro 02	3b	23.21	card6	20b	28.87	APBF-1	20a	23.01	WIRR-1	23a	25.86	BURNRD01	20b	24.07	YULE-3	21c	22.73
waro 01	3b	27.20	talb4	3c	23.68	talb8	20c	20.20	BULLER-2	21a	25.24	C71-2	21a	29.27	card9	20b	23.76	BULL-4	28	22.64	NEER-9	24	15.91	LAND-1	20a	23.08	WHITE-1	23a	28.87	card3	21a	22.99	YALLIN-1	1b	25.86	AMBR-1	1b	23.66	WATERRD1	28	22.64
card11	6	27.03	card4	6	23.33	WELL-2	21a	20.20	CAPEL-1	21b	25.24	CORON-1	21a	29.09	OATES-1	MISSI	23.70	card7	21a	22.54	SULT-2	MISSI	15.84	TAM-1	21a	23.08	KING-1	28	28.85	KOOLJ-4	21a	22.43	brick8	3a	25.74	YULE-3	21c	23.66	BURNRD02	3b	22.50
APBF-1	20a	26.98	talb13	3c	23.26	AMBR-6	1b	20.00	brick2	20b	25.23	GOLF-1	20a	29.06	HARRY-2	28	23.64	ELLEN-6	3c	22.54	ACTIV-1	20a	15.69	lamb2	3a	22.86	WELL-2	21a	28.83	talb10	20c	22.41	FL-1	4	25.58	WELL-2	21a	23.64	NEER-9	24	22.47
CARB-4	1b	26.95	ACTON-1	1a	23.16	card11	6	20.00	brick6	3a	25.00	YAN-25	28	29.06	smith02	1a	23.62	NINE-1	21a	22.54	BURNRD01	20b	15.69	THOM-2	24	22.78	BRIX-2	3a	28.57	ACTON-1	1a	22.22	AMBR-4	1b	25.49	WELL-1	21a	23.53	card2	20b	22.43
buffer01	21b	26.92	brick8	3a	23.16	card9	20b	20.00	CARB-4	1b	25.00	NEER-4	28	28.85	IOPP	MISSI	23.42	BULL-10	28	22.47	WOODV-2	28	15.58	WOODV-2	28	22.78	BULL-9	28	28.57	BRIX-5	3a	22.22	PLINE-3	21a	25.35	TRIG-4	28	23.38	WARB-3	23a	22.22
card9	20b	26.92	NEER-8	28	23.16	PEARCE-2	3c	20.00	hurst03	23a	25.00	hurst04	23a	28.83	WELL-2	21a	23.33	BULL-9	28	22.47	lamb2	3a	15.53	CRAMPT-1	21a	22.73	gibson01	21b	28.57	MUD-4	3a	22.22	YULE-3	21c	25.26	brick2	20b	23.30	lamb1	3a	22.02
DUNS-1	3b	26.89	NEER-3	28	23.08	card2	20b	19.80	waro 01	3b	25.00	WIRR-1	23a	28.79	PAGA-4	21a	23.30	KERO-2	24	22.22	YAN-20	23b	15.53	RAAF-2	23b	22.73	MIND-1	29b	28.57	smith02	1a	22.22	GUTHR-3	21a	25.24	talb11	20c	23.26	yarl04	20b	21.78
MIND-1	29b	26.83	smith02	1a	23.01	waro 01	3b	19.80	BANK-3	23a	24.78	boyan 01	21b	28.36	YULE-3	21c	23.30	KOOLJ-4	21a	22.22	BULL-10	28	15.38	IOPP	MISSI	22.68	low04	21a	28.24	HARRY-2	28	22.00	OATES-1	MISSI	25.20	MIND-1	29b	23.19	KING-2	28	21.69
low04	21a	26.80	card9	20b	22.99	AMBRAL-1	1b	19.78	wonn01	1a	24.78	talb10	20c	28.36	MODO-5	23a	23.16	MTB-1	24	22.22	FL-1	4	15.38	talb3	20c	22.68	WARI-2	28	28.00	PEARCE-2	3c	21.98	talb6	20c	25.00	card3	21a	22.99	talb7	20c	21.69
GOLF-1	20a	26.79	HARRY-2	28	22.92	CAPEL-5	1b	19.78	lamb1	3a	24.59	CAPEL-5	1b	28.33	brick2	20b	23.01	MUD-5	3a	22.22	FL-8	MISSI	15.38	FL-1	4	22.50	YAN-25	28	28.00	CARB-2	1b	21.92	SULT-1	MISSI	24.78	KOOLJ-3	21a	22.99	YAN-3	28	21.43
lamb1	3a	26.77	CARB-4	1b	22.58	NEER-11	24	19.72	YAN-19	23b	24.56	brick6	3a	28.30	waro 01	3b	22.95	SVH-2	27	22.22	MHENRY-2	30a2	15.38	AMBR-1	1b	22.47	GUTHR-6	21a	27.66	TRIG-3	28	21.78	brick2	20b	24.76	card11	6	22.95	TWIN-7	21c	21.33
WIRR-1	23a	26.77	DEPOT-1	28	22.50	brick2	20b	19.57	MUD-5	3a	24.53	KING-2	28	28.30	CRAMPT-2	21a	22.81	waro 02	3b	22.22	PTWALT-1	24	15.38	GUTHR-6	21a	22.47	YULE-3	21c	27.66	wicher01	1a	21.74	KOON-1	20a	24.76	lamb1	3a	22.81	YAN-20	23b	21.15
CORON-1	21a	26.67	TRIG-5	24	22.50	KING-1	28	19.57	NEER-3	28	24.44	WELL-2	21a	28.13	gibson01	21b	22.81	YAN-3	28	22.22	yarl01	3c	15.38	card2	20b	22.22	NEER-4	28	27.59	AMBR-6	1b	21.62	MANEA-2	21a	24.76	KING-2	28	22.73	KOON-2	20a	21.05
BULL-3	23a	26.45	yarl03	3b	22.47	KOON-1	20a	19.57	NEER-23	28	24.39	hurst01	23a	28.10	RAAF-3	23b	22.81	MUD-4	3a	22.00	waro 01	3b	15.09	YULE-1	23a	22.22	BULL-3	23a	27.52	M53	20a	21.57	CAPEL-1	21b	24.74	KERO-2	24	22.50	MILT-4	28	21.05
NINE-2	21a	26.42	KING-1	28	22.22	YULE-3	21c	19.51	KOOLJ-4	21a	24.35	YAN-4	28	28.07	MANEA-3	21b	22.64	talb13	3c	21.95	ACTON-1	1a	15.05	WARB-3	23a	22.02	NINE-1	21a	27.50	TRIG-5	24	21.43	card7	21a	24.69	talb4	3c	22.50	card9	20b	20.93
yarl03	3b	26.42	KOON-1	20a	22.22	BULL-4	28	19.42	boyan 01	21b	24.19	CAPEL-2	21b	28.04	NEER-7	24	22.64	WOODV-1	28	21.92	BRIX-5	3a	15.05	BULLER-2	21a	21.98	talb3	20c	27.45	brick2	20b	21.36	ELLEN-6	3c	24.69	YAN-3	28	22.47	PEARCE-2	3c	20.93
YULE-3	21c	26.42	yarl01	3c	22.22	C58-1	4	19.35	WOODV-2	28	24.18	YAN-3	28	28.04	BANK-3	23a	22.61	lamb2	3a	21.78	NEER-8	28	15.05	CAPEL-1	21b	21.98	NEER-9	24	27.37	KOON-1	20a	21.36	NINE-1	21a	24.69	YAN-5	26b	22.47	SEAB-6	28	20.75
TRIG-3	28	26.32	AMBR-9	1b	22.02	NEER-22	28	19.28	BULL-3	23a	24.14	waro 01	3b	27.69	C71-2	21a	22.61	AMBR-4	1b	21.74	WARI-2	28	15.05	card12	3b	21.98	boyan 01	21b	27.35	NEER-9	24	21.28	CARB-4	1b	24.62	BRIX-5	3a	22.22	KING-1	28	20.41
talb6	20c	26.26	TRIG-4	28	21.92	card8	20b	19.18	LAND-1	20a	24.14	BANK-3	23a	27.64	NINE-1	21a	22.47	card9	20b	21.69	talb6	20c	15.00	NEER-4	28	21.95	NEER-2	28	27.27	WELL-1	21a	21.18	MANEA-3	21b	24.49	WARI-2	28	22.22	FL-1	4	20.25
talb12	3c	26.23	yarl04	20b	21.57	waro 06	3a	19.18	MUD-4	3a	24.14	REDL-1	21a	27.64	BULL-1	28	22.45	MUD-7	8	21.69	AMBR-9	1b	14.95	BULL-5	5	21.92	GUTHR-5	21a	27.18	wonn01	1a	20.95	KING-2	28	24.44	talb12	3c	22.02	YAN-23	26b	20.25
CAPEL-5	1b	26.09	brick6	3a	21.43	CAPEL-1	21b	19.05	OATES-1	MISSI	24.06	wonn01	1a	27.64	boyan 01	21b	22.22	NEER-11	24	21.62	brick5	3a	14.93	WIRR-1	23a	21.82	BULLER-2	21a	27.08	NEER-4	28	20.93	APBF-1	20a	24.35	AMBR-4	1b	22.00	MPK01	23b	20.22
card7	21a	26.09	KING-2	28	21.43	CAPEL-3	4	19.05	NEER-21	28	24.00	buffer01	21b	27.52	CAPEL-2	21b	22.22	TAM-1	21a	21.62	CARB-2	1b	14.93	NEER-2	28	21.69	MELA-9	23b	27.08	YAN-4	28	20.83	BULL-10	28	24.24	HARRY-2	28	22.00	MELA-8	23b	20.20
NEER-2	28	26.00	YAN-9	28	21.43	talb2	20c	19.05	RAAF-2	23b	24.00	card9	20b	27.52	KOOLJ-4	21a	22.22	CARB-2	1b	21.54	card3	21a	14.81	yarl04	20b	21.57	brick5	3a	27.03	DUCK-1	3c	20.51	lamb1	3a	24.14	KOON-2	20a	22.00	RAAF-3	23b	20.20
APBF-2	20a	25.81	KOOLJ-4	21a	21.36	smith02	1a	18.87	KOOLJ-5	3b	23.91	DEPOT-1	28	27.45	will04	1a	22.22	GUTHR-3	21a	21.51	IOPP	MISSI	14.74	boyan 01	21b	21.43	talb7	20c	26.97	talb5	20c	20.41	MILT-6	21a	24.00	MILT-6	21a	21.92	talb1	3c	20.18
NEER-5	28	25.81	low07	21c	21.33	CARB-4	1b	18.80	low04	21a	23.91	NEER-8	28	27.35	BULL-3	23a	22.03	TRIG-3	28	21.51	WARI-1	28	14.68	RIVD-2	21a	21.43	low13a	21a	26.80	CARB-4	1b	20.31	NEER-3	28	23.81	CRAMPT-1	21a	21.74	WIRR-1	23a	20.18
RIVD-2	21a	25.74	talb5	20c	21.28	talb6	20c	18.67	IOPP	MISSI	23.85	WARI-2	28	27.35	NEER-8	28	22.02	DUCK-2	3c	21.33	AMBRAL-1	1b	14.58	talb10	20c	21.43	NEER-7	24	26.80	AUSTRA-1	21a	20.22	BRIX-5	3a	23.76	NINE-2	21a	21.51	card12	3b	20.00
MANEA-3	21b	25.69	YAN-3	28	21.18	lamb2	3a	18.37	hurst04	23a	23.76	NEER-21	28	27.27	smith03	1a	22.02	YAN-6	28	21.33	AUSTRA-1	21a	14.46	YAN-9	28	21.43	hurst03	23a	26.67	YAN-3	28	20.22	WARI-2	28	23.76	DEPOT-1	28	21.43	hurst02	23a	20.00
YAN-3	28	25.49	YAN-5	26b	21.18	talb12	3c	18.37	NINE-2	21a	23.76	WARB-1	23a	27.20	WARI-2	28	22.02	AMBRAL-1	1b	21.28	brick2	20b	14.43	YAN-5	26b	21.18	NEER-23	28	26.67	smith03	1a	20.20	talb10	20c	23.73	waro 01	3b	21.43	MELA-9	23b	20.00
YAN-5	26b	25.49	BURNRD01	20b	21.15	brick6	3a	18.18	MODO-5	23a	23.66	KOON-2	20a	27.12	lamb2	3a	21.85	PAGA-4	21a	21.18	hurst01	23a	14.43	ACTON-1	1a	21.05	REDL-1	21a	26.42	WARI-2	28	20.20	BULLER-1	21a	23.66	waro 06	3a	21.43	NEER-20	28	20.00
REDL-1	21a	25.42	MUD-4	3a	21.15	KING-2	28	18.18	NEER-9	24	23.53	YULE-3	21c	27.03	talb12	3c	21.85	DEPOT-1	28	21.05	ELLEN-7	6	14.29	BANK-2	23a	21.05	wonn01	1a	26.42	talb13	3c	20.00	talb12	3c	23.42	KOON-1	20a	21.36	waro 02	3b	19.82
NEER-23	28	25.29	BRIX-5	3a	21.05	wonn02	MISSI	18.02	TRIG-4	28	23.53	GUTHR-3	21a	26.89	will02	1a	21.85	MANEA-2	21a	21.05	BANK-3	23a	14.14	KERO-2	24	21.05	HARRY-5	21a	26.37	IOPP	MISSI	19.80	YOON-1	1b	23.40	NEER-9	24	21.28	YAN-19	23b	19.80
ACTON-1	1a	25.00	NEER-5	28	21.05	SULT-1	MISSI	18.00	MIND-1	29b	23.38	IOPP	MISSI	26.89	WIRR-2	23a	21.85	TRIG-5	24	21.05	low13b	23a	14.14	MODO-4	23a	21.05	BULLER-1	21a	26.09	MUD-7	8	19.78	yarl01	3c	23.33	AMBR-9	1b	21.24	WHITE-1	23a	19.78
NEER-8	28	25.00	KOON-2	20a	20.83	MTB-1	24	17.95	MELA-9	23b	23.30	TRIG-3	28	26.89	YAN-20	23b	21.85	NEER-22	28	20.93	PEARCE-2	3c	14.12	TWIN-7	21c	21.05	WIRR-1	23a	26.09	waro 01	3b	19.64	DEPOT-1	28	23.26	CRAMPT-2	21a	21.15	NEER-4	28	19.75
smith03	1a	25.00	WELL-2	21a	20.75	YAN-5	26b	17.95	DUCK-1	3c	23.26	card7	21a	26.80	WABL-4	28	21.82	talb1	3c	20.75	yarl04	20b	14.00	YAN-25	28	21.05	ACTON-1	1a	26.00	AMBRAL-1	1b	19.61	RUAB-2	21b	23.26	BULLER-2	21a	21.05	MELA-5	22	19.72
WOODV-2	28	25.00	IOPP	MISSI	20.62	NINE-1	21a	17.65	card11	6	23.19	NEER-22	28	26.79	CARB-4	1b	21.74	BANK-3	23a	20.62	BOLD-2	24	13.95	AMBR-4	1b	20.83	brick8	3a	26.00	BOLD-2	24	19.57	waro 06	3a	23.26	REDL-1	21a	20.95	SHE-2	28	19.64
CRAMPT-1	21a	24.76	TWIN-8	21c	20.51	talb1	3c	17.48	REDL-1	21a	23.01	WIRR-2	23a	26.77	card4	6	21.62	HARRY-1	28	20.51	CORON-1	21a	13.95	KOON-2	20a	20.83	WARB-1	23a	25.93	YOON-1	1b	19.57	GUTHR-5	21a	23.08	HARRY-1	28	20.93	NEER-2	28	19.51
DEPOT-1	28	24.74	wicher01	1a	20.45	YALLIN-1	1b	17.48	NINE-1	21a	22.99	YAN-20	23b	26.77

WHITE-1	23a	23.85	CAPEL-1	21b	19.78	WOODV-2	28	16.67	NEER-11	24	22.22	KOOLJ-5	3b	25.49	NEER-4	28	20.83	talb8	20c	19.61	WHITE-1	23a	13.33	CAPEL-7	21a	19.51	YAN-3	28	24.44	DRAIN-1	21a	18.37	talb4	3c	21.95	PEARCE-2	3c	19.78	MPK03	23b	18.39
YAN-4	28	23.85	will04	1a	19.64	ACTIV-1	20a	16.49	talb12	3c	22.22	low06b	21c	25.49	talb6	20c	20.83	KOON-2	20a	19.57	WOODV-1	28	13.33	NEER-6	28	19.51	YAN-19	23b	24.30	GOLF-1	20a	18.18	GOLF-1	20a	21.78	WOODV-1	28	19.75	OATES-1	MISSI	18.33

Appendix F
Additional Potential Breeding Tree Raw Data

Treeid	Latitude	Longitude	Taxa	DBH (mm)	Approx height (m)	# of hollows	# of hollows > 120 mm	# of hollows with bees	Comments	Suitable for Black Cockatoo	Tree Photo Reference	Hollow Photo Reference
1	-31.97086337	116.01353254	Jarrah (Eucalyptus marginata)	0	0	4	3		Birds observed using hollow	3	aa0c57e9-fbc5-49e6-aa02-61ac499917d8,7d5260d0-5923-43d9-a975-b92e74ab6869	DJI370-DJI374
2	-31.97126950	116.01433930	Jarrah (Eucalyptus marginata)	0	0	1	0				db3e7fc0-a05f-4011-8e60-853238ce6071	
3	-31.97062360	116.01510940	Marri (Corymbia calophylla)	0	0	1	0	1			0059f7ac-d3e5-442d-b8d2-6af0bcb09e81	
4	-31.97094159	116.01521295	Marri (Corymbia calophylla)	0	0	5	4			3	ae23c23b-2b1c-4cd9-a52a-e362f0b47c44,93911c2d-04a9-48cf-a5d0-4555c66413cd	DJI361-DJI365
5	-31.97128480	116.01530350	Jarrah (Eucalyptus marginata)	0	0	0			No access, may have hollows		cbc5a5a8-d797-4f25-8756-a95cfc0375ff,08360ad2-8717-40c2-b6fb-3e4f1f83efaf	DJI389-DJI391
6	-31.95911950	116.02026840	Marri (Corymbia calophylla)	0	0	2	0				e67abcb9-6c60-498e-8709-982f7e2fec20	
7	-31.97073890	116.01337780	Stag	0	0	2		1		1		DJI383-DJI384
8	-31.97075460	116.01341160	Stag	0	0	7	2	1				DJI379-DJI382
9	-31.97081500	116.01532010	Tuart (Eucalyptus gomphocephala)	0	0	1	1			1		DJI366-DJI368
10	-31.97070770	116.01921420	Marri (Corymbia calophylla)	0	0	2	0					b0cfe8ea-5598-4300-8845-7d0fba5ce6b5
11	-31.97073860	116.01898190	Marri (Corymbia calophylla)	0	0	0						DJI387
12	-31.97104880	116.01853570	Stag	0	0	1	0					DJI385-DJI386
13	-31.96932110	116.01760790	Wandoo (Eucalyptus wandoo)	0	0	1	0					43958af5-f543-4d5c-9f0f-5a6a7db6ea5d
14	-31.95865850	116.02006820	Marri (Corymbia calophylla)	0	0	1	0					DJI388
15	-31.96169940	116.01423030	Marri (Corymbia calophylla)	0	0	0					d2e6ae76-1c11-4f61-a905-7157aa0096d8,c92c3808-45c7-4853-aef7-6d81adcd0f99,d3403713-6492-43eb-9980-6147cc40fa82	
16	-31.96937370	116.01371370	Marri (Corymbia calophylla)	0	0	1	1	1			d478294f-7beb-457e-9cc5-c0be5f325b9c,4ddebbac-00c0-419f-8ffa-c900365f24d3	
17	-31.96459850	116.01003700	Tuart (Eucalyptus gomphocephala)	99	21	0					d3b3ad80-6379-4501-82f2-75013580426f	
18	-31.96453170	116.01005330	Tuart (Eucalyptus gomphocephala)	104	26	0					5472d8ce-7647-4c43-aa29-b109693cf43f	
19	-31.96452340	116.01001020	Tuart (Eucalyptus gomphocephala)	119	22	0					945ac263-f2e5-4a13-9e40-34b85da34a9d	
20	-31.96456010	116.00997950	Tuart (Eucalyptus gomphocephala)	92	22	0					5afcfe16-d757-4071-bd73-f2b7f586d6f2	
21	-31.96456523	116.00993536	Tuart (Eucalyptus gomphocephala)	98	21	0					43fffcbc-4436-4b67-ada6-a89f43875695	
22	-31.96455020	116.00985130	Tuart (Eucalyptus gomphocephala)	123	23	0					71964e34-2057-4353-8b7c-66322db14b1d	
23	-31.96454750	116.00981040	Tuart (Eucalyptus gomphocephala)	75	24	0					48489540-d089-4b02-8a21-696fa1a316b8	
24	-31.96457260	116.00971680	Introduced Eucalypt	73	21	0					06093504-f1e5-4c7b-abbb-f4e287f175f9	
25	-31.96457330	116.00953660	Tuart (Eucalyptus gomphocephala)	180	18	0					3d705df2-4a00-447a-af7a-4d4ea327d0d4	
26	-31.96376400	116.00999310	Tuart (Eucalyptus gomphocephala)	77	20	0					480892a5-422e-4465-b8ec-849405380fee	
27	-31.96376010	116.01001650	Tuart (Eucalyptus gomphocephala)	76	19	0					a09f5372-7f01-419e-bf49-089924c23d76	
28	-31.96370537	116.01001449	Tuart (Eucalyptus gomphocephala)	78	20	0					04bc8587-690e-41db-b4a4-dc5e11d62ebf	
29	-31.96366580	116.01003280	Tuart (Eucalyptus gomphocephala)	109	22	0					aba03e97-ab52-454b-951f-0f9e6d34d845	
30	-31.96358020	116.01003340	Tuart (Eucalyptus gomphocephala)	102	19	0					2d1c24ea-3b13-4a75-bce8-2f532f9285ce	
31	-31.96555780	116.01897230	Stag	45	8	1		1			c506cfd1-72d2-4109-b0e7-66591e653bb4	
32	-31.95662450	116.01369390	Jarrah (Eucalyptus marginata)	68	12	2	1		Signs of prior use	1	f0b7ec9d-e234-4156-9b7e-34c86e667fba	DJI0001
33	-31.95651900	116.01358920	Jarrah (Eucalyptus marginata)	175	14	5	1			1	f646374e-a9cb-45b8-8b2e-e925331104ab	DJI0002-DJI0007
34	-31.95668190	116.01352580	Marri (Corymbia calophylla)	105	17	0	0				3c5c358b-c169-4cc2-96c4-52301ab5fca0	DJI0009-DJI0010
35	-31.95668920	116.01335860	Jarrah (Eucalyptus marginata)	109	16	0	0				ad00da08-b37e-4bcd-b26d-06fdd6b2e869	DJI0011
36	-31.95670310	116.01330160	Stag	64	9	0	0				c2883ba8-6aea-44e7-88ae-b01dac0aaabb	DJI0012
37	-31.95624960	116.01271320	Stag	72	8	2	2	1			aee4c480-0df4-4657-892a-4ae1df6305ca	DJI0018-DJI0020
38	-31.95642490	116.01284670	Jarrah (Eucalyptus marginata)	160	12	3	1			1	fa7191ad-3e85-4832-abed-d31aa9790035	DJI0021-DJI0024
39	-31.95642277	116.01330657	Jarrah (Eucalyptus marginata)	64	11	1	1			1	21bf4c42-8b0f-4485-82b7-33cf52cbb8e2	DJI0013-DJI0015
40	-31.95632410	116.01332140	Stag	65	8	1	1				e39dcc6d-5431-4795-b332-dbd128ee49a4	DJI0016-DJI0017
41	-31.97197220	116.01547200	Jarrah (Eucalyptus marginata)	0	10	1	0				92b1f664-eddc-426f-9f0d-7924d96b96f7	
42	-31.97192720	116.01557700	Jarrah (Eucalyptus marginata)	0	15	1		1			6ad9ef40-8257-449f-98ff-34f847d88392	
43	-31.97153420	116.01556270	Jarrah (Eucalyptus marginata)	62	12	7	5		Signs of prior use	4	8db16bb4-33fc-40f5-bb03-5261c44622b7	DJI0029-DJI0036
44	-31.97140590	116.01534060	Jarrah (Eucalyptus marginata)	45	7	4	2		Bird nesting in hollow	2	348c0ee9-91f5-4cc8-bd90-a280f5f094f3	DJI0026-DJI0028
45	-31.97150340	116.01521370	Jarrah (Eucalyptus marginata)	54	9	2	1		Bird using hollow. Drone not flown.	1	5c6f1e6c-9e56-49df-a52a-54edd1b20ebb	
46	-31.97168550	116.01516040	Jarrah (Eucalyptus marginata)	67	12	1	0				e4641ffb-b2aa-4a52-bd0a-7890265fdc42	DJI0025
47	-31.97218360	116.01641030	Marri (Corymbia calophylla)	101	14	0					f0708976-6338-4d28-9b2c-7df369f4359a	
48	-31.97222610	116.01646160	Marri (Corymbia calophylla)	96	14	0					32aa5455-0538-4d0d-9cd5-f3ce30b3a333	
49	-31.97220390	116.01633720	Marri (Corymbia calophylla)	98	16	1	1	1			917b46fc-75a3-4088-bc0f-f15252071947	DJI0043
50	-31.97204201	116.01634149	Jarrah (Eucalyptus marginata)	88	10	0					99268ba8-f23f-467a-a88b-cf662199deb7,d9c80d64-1a37-4451-bfa5-44efb1137e03,b4e3cb7c-fc40-4404-b0fc-327360eb3463	
51	-31.97204769	116.01609003	Marri (Corymbia calophylla)	64	15	2	0	1			0db7071d-ecab-44ea-9267-a13d88b73c93	
52	-31.97285913	116.01633847	Jarrah (Eucalyptus marginata)	122	13	1	1			1	fc9e854a-4e74-4d09-9464-214d85ff3ee7	DJI0037
53	-31.97285350	116.01604520	Stag	104	6	1	0				b2ee7dd6-bcab-46ef-ae59-35877414c044	DJI0038-DJI0042
54	-31.95910040	116.01805920	Marri (Corymbia calophylla)	83	14	1	1		Bird nesting in hollow	1		DJI0045
55	-31.95957700	116.01622780	Marri (Corymbia calophylla)	130	14	1	1				673509b4-df7c-4b04-9698-876b07c3c5fd	DJI0046-DJI0047
56	-31.95987330	116.01916530	Tuart (Eucalyptus gomphocephala)	114	22	0					191da79c-0e80-4e34-855b-81ba5d4ed932,a2ab5642-38bc-4448-a19e-e4080b335af2	
57	-31.95835830	116.01813950	Marri (Corymbia calophylla)	55	20	0					32d9ba5e-d360-48f4-855d-94de19d237dd	
58	-31.95867420	116.01771250	Jarrah (Eucalyptus marginata)	53	13	0					a95db01f-ba7a-4a2f-9f56-1483b73fcc91	
59	-31.96735740	116.01317900	Marri (Corymbia calophylla)	71	22	0					0396f4ba-80aa-4d6e-8a55-2fcacf8014e7	
60	-31.97391288	116.01700433	Marri (Corymbia calophylla)	0	0	9	6		Four hollows show signs of prior use. Bird nesting in one hollow	5		DJI0182-DJI195
61	-31.97466360	116.01977450	Jarrah (Eucalyptus marginata)	86	18	0					630fbc23-e64b-4710-8a8f-5937a60f8688	
62	-31.97474940	116.01975840	Marri (Corymbia calophylla)	59	21	0					56e6c5f3-dfcd-4fa5-a020-91b7417d01f5	
63	-31.97479510	116.01976070	Marri (Corymbia calophylla)	62	17	0					5f472769-2d4b-4f86-86c1-a752c9a73b6a	
64	-31.96942840	116.01696730	Stag	56	7	1	1			1	576ebc7d-1fcf-4499-ba4c-8e90909a7cd9	DJI0209
65	-31.96929950	116.01709940	Introduced Eucalypt	116	13	0					93230a57-90c5-40b9-9d6f-81436592b2af	
66	-31.96927870	116.01718720	Stag	50	10	1	0					
67	-31.96931030	116.01723580	Introduced Eucalypt	53	18	1	1	1		1	5d04a7d2-8c56-4333-b4f1-25b94f46a741	DJI199
68	-31.96908230	116.01732390	Tuart (Eucalyptus gomphocephala)	52	13	0					77fc7b4a-bbf3-46f4-a6ec-28f07a516abc	
69	-31.96907100	116.01732550	Tuart (Eucalyptus gomphocephala)	54	18	0					5e018ab4-b23c-4cab-baf0-85d89d6b7c3d	
70	-31.96902530	116.01747250	Marri (Corymbia calophylla)	74	26	0					9811d55d-c59b-4a49-92de-4738bbeed34f	
71	-31.96900890	116.01754990	Stag	68	22	0					589e1759-6283-4646-a7cc-3b0222b0a9d2	
72	-31.96887240	116.01757440	Marri (Corymbia calophylla)	88	17	0					8ca2fca9-27fb-4a23-a482-26fb1920de00	
73	-31.96884130	116.01778260	Marri (Corymbia calophylla)	53	12	0					5cd53db0-dee9-490a-bc17-2173bb07819d	
74	-31.96884370	116.01779110	Stag	56	18	1	0				77c9c1b2-a95b-471a-b145-0dd7b653ce43	
75	-31.96888635	116.01804268	Wandoo (Eucalyptus wandoo)	75	22	2		1			6f79e416-d57c-4285-a25f-3b37b80e4adf	DJI201-DJI202
76	-31.96883220	116.01820440	Marri (Corymbia calophylla)	56	22	0					718c53f5-51a6-45b4-a4d8-b01623a710a6	

77	-31.96882700	116.01829450	Marri (Corymbia calophylla)	50	26	0					4e01a9e6-99cb-4507-b42c-700f14f02fc0	
78	-31.96875570	116.01859180	Introduced Eucalypt	54	16	0					b4ccd38b-30ee-4d9e-9cae-9fcd94b79522	
79	-31.96890470	116.01890380	Wandoo (Eucalyptus wandoo)	60	12	0					5dbc4a99-af62-492e-91a3-8c74c9b7ea90	
80	-31.96878630	116.01919440	Wandoo (Eucalyptus wandoo)	56	11	0					95413645-0839-4d14-8837-cbbe9031c066	
81	-31.96828490	116.01937740	Marri (Corymbia calophylla)	170	25	0					e0533b4e-dc71-485b-8d76-f6d2ae5f4c6c	
82	-31.96818665	116.01959299	Introduced Eucalypt	67	19	0					dff41ab4-fb3f-4112-a446-8f03611742d8	
83	-31.96804360	116.01967730	Marri (Corymbia calophylla)	50	17	0					cce10915-604b-4cbf-9fff-50deba2376e3	
84	-31.96799710	116.01977840	Marri (Corymbia calophylla)	55	15	0					b5576091-26ff-4511-9970-d46ac23375a4	
85	-31.96787860	116.01992370	Marri (Corymbia calophylla)	88	17	0					57bacc01-3f17-4b8d-ac6c-23fa0c9c0485	
86	-31.96779630	116.02014380	Wandoo (Eucalyptus wandoo)	56	11	0					c1db2758-514f-4c2a-bfcb-792c8f01d504	
87	-31.96768710	116.02023610	Wandoo (Eucalyptus wandoo)	53	12	0					0060ea04-3e81-40e5-83f6-6a2fcdcfe560	
88	-31.96783080	116.02036150	Wandoo (Eucalyptus wandoo)	57	13	0					cc5a0c30-b372-4f0c-a88b-8d17f84fb6c0	
89	-31.96838550	116.01952010	Wandoo (Eucalyptus wandoo)	57	13	0					a09e679c-a780-47c3-844b-84b52900c990	
90	-31.96862590	116.01945530	Wandoo (Eucalyptus wandoo)	59	14	0					0f4eeb1f-b2df-4643-9f3a-fd8777a4e0d1	
91	-31.96889715	116.01850234	Stag	60	14	0					31d756ea-4af7-4695-bc48-5d6133f605cf	
92	-31.96892105	116.01820227	Wandoo (Eucalyptus wandoo)	62	14	0					83fab1e0-3e89-42ad-9cf6-345e498a3395	
93	-31.96894240	116.01805520	Stag	56	16	2	2			1	df00a49f-28f1-4250-9e53-6e2c854483b0	DJI203-DJI204
94	-31.96949380	116.01723970	Wandoo (Eucalyptus wandoo)	67	17	0					76642816-a72a-4a3a-aa1f-a70cd7e625c9	
95	-31.96964760	116.01715360	Wandoo (Eucalyptus wandoo)	79	18	0					ad08735f-4e6f-45a2-b33c-51fde72a1246	
96	-31.96973490	116.01720480	Wandoo (Eucalyptus wandoo)	62	19	0					c3c03bd4-15dd-4c16-9494-8f0cc8f8cf29	
97	-31.96972950	116.01719110	Wandoo (Eucalyptus wandoo)	55	19	0					d556e91a-9c17-4d09-879b-b88756b95726	
98	-31.96975510	116.01711780	Wandoo (Eucalyptus wandoo)	63	18	0					59fbd93b-cb3b-4f20-a399-8384ab19c1ef	
99	-31.96892019	116.01785291	Stag	50	8	1	1			1	1796f6e8-c0c6-4b08-92e5-6f22cf8c3315	DJI205-DJI206

Appendix G
Fauna Likelihood Table

Conservation Status: State - Listed under Biodiversity Conservation Act 2016 or Department of Biodiversity, Conservation and Attractions Conservation, Federal - Listed under Environmental Protection and Biodiversity Conservation Act 1999.

CR - Critically Endangered, EN - Endangered, VU - Vulnerable, IA/MI - Migratory, CD - Conservation Dependent fauna, OS - Other Specially Protected fauna, MA - Marine, P - Listed as Priority by DBCA.

Source: NM - NatureMap, PMST - EPBC Protected Matters Search Tool, DBCA - DBCA Threatened and Priority Fauna database search, Field - Recorded during the current field survey. Due to the some ALA records in Western Australia being Sensitive, the locations are generalised to 10km by WA DEC.

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
AVIAN											
Accipitridae	*Elanus scriptus*	Letter-winged Kite	P4				2			Low	Two DBCA records within 20 km of the Survey Area, including 10 km northwest in 1980 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (open country and grasslands of arid and semi-arid interior).
Anatidae	*Oxyura australis*	Blue-billed Duck	P4		x		435	4		Medium	435 DBCA records within 20 km of the Survey Area, including 0.5 km southwest in 1991 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area contains habitat that although not optimal, may still be suitable for the species (densely vegetated freshwater lakes, swamps, dams) (Morcombe, 2003).
Apodidae	*Apus pacificus*	Pacific Swift, Fork-tailed Swift	MI	MI, MA	x	x	8	1		Low	Eight DBCA records within 20 km of the Survey Area, including 8.5 km northeast in 2000 (Department of Biodiversity Conservation and Attractions, 2022a). Species is ulikely to utilise the Survey Area, however may overfly the Survey Area (low to very high airspace over varied habitat) (Morcombe, 2003).
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN	EN	x		10			Low	Ten DBCA records within 20 km of the Survey Area, including 10.5 km northeast in 1977 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (freshwater wetlands with heavy vegetation, shrubbery, reedbeds, sedges) (Morcombe, 2003).
Ardeidae	*Ixobrychus dubius*	Australian Little Bittern, Black-backed Bitt	P4		x		1	1		Low	One DBCA record within 20 km of the Survey Area, including 11.5 km west in 2012 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (freshwater swamps, lakes and rivers with dense beds of Baumeal, Typha and other tall rushes) (Johnstone & Storr, 1998).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Ardeidae	*Ixobrychus flavicollis australis*	Black Bittern	P2 (southwest subpop.)		x		1			Medium	One DBCA record within 20 km of the Survey Area, including 9 km northeast in 1903 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area contains suitable habitat (large rivers to small creeks, permanent swamps with tall shady fringing vegetation, such as rainforests, vine thickets, dense sclerophyll, and Melaleuca woodlands) (Menkhorst et al., 2017).
Cacatuidae	*Cacatua pastinator pastinator*	Muir's Corella	CD		x		7			Low	Seven DBCA records within 20 km of the Survey Area, including 6.75 km northeast (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (wheat andsheep farming country, with remnant native forest, woodland, scrub, sandplain heath) (Pizzey and Knight, 2001).
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo	VU	VU	x		437	368		Recorded	437 DBCA records within 20 km of the Survey Area, including within the Survey Area in 2017 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area contains suitable habitat (tall eucalypt forest, woodland, feeds on seeds of large-fruited eucalypts) (Menkhorst et al., 2017).
Cacatuidae	*Zanda baudinii*	Baudin's Cockatoo	EN	EN	x		389	222		High	389 DBCA records within 20 km of the Survey Area, including within the Survey Area in 2015 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area contains suitable habitat (forests, farm trees; feeds on Marri and wood-boring insects) (Morcombe, 2003).
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN	EN	x	x	3984	382		Recorded	3984 DBCA records within 20 km of the Survey Area, including within the Survey Area in 2012 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area contains suitable habitat (forests, woodlands, heathlands, farms; feeds on Banksias and Hakeas, pine plantations) (Morcombe, 2003).
Charadriidae	*Charadrius dubius*	Little Ringed Plover	MI	MI, MA			1			Low	One DBCA record within 20 km of the Survey Area, including 15 km southwest in 1981 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (tidal or freshwater wetlands, Mudfalts, estuaries, lakes, lagoons, dams, ponds) (Morcombe, 2003).
Charadriidae	*Charadrius leschenaultii*	Greater Sand Plover	VU	VU, MI, MA	x	x	2			Low	Two DBCA records within 20 km of the Survey Area, including 15 km southwest in 1979 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (tidal flats, beaches) (Menkhorst et al., 2017).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Charadriidae	*Charadrius mongolus*	Lesser Sand Plover	EN	EN, MI, MA	x					Low	No DBCA records within the Survey Area. One record from Naturemap Search Results. Survey Area does not contain suitable habitat (tidal flats) (Menkhorst et al., 2017).
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	MI	MI, MA	x		2			Low	Two DBCA records within 20 km of the Survey Area, including 15 km southwest in 1981 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, tidal flats, beaches, reefs) (Menkhorst et al., 2017).
Charadriidae	*Pluvialis squatarola*	Grey Plover	MI	MI, MA	x		35			Low	35 DBCA records within 20 km of the Survey Area, including 10 km west in 1981 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, tidal flats) (Menkhorst et al., 2017).
Charadriidae	*Thinornis cucullatus*	Hooded Dotterel	P4	MA	x	x	1			Low	One DBCA record within 20 km of the Survey Area, including 16 km west in 1994 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (beaches, margins of inland salt lakes) (Menkhorst et al., 2017).
Dasyornithidae	*Dasyornis longirostris*	Western Bristlebird	EN	EN	x		1			Low	One DBCA record within 20 km of the Survey Area, including 14 km west (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not fall within the species distribution (floristically diverse low dense coastal heathland). Restricted to a coastal strip of southern Western Australia from Two Peoples Bay to near East Mount Barren (SPRAT, 2022).
Diomedeidae	*Diomedea amsterdamensis*	Amsterdam Albatross	CR	EN, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Pizzey & Knight 1999).
Diomedeidae	*Diomedea epomophora (not WAM, some*	Southern Royal Albatross	VU	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Pizzey & Knight 1999).
Diomedeidae	*Diomedea exulans*	Wandering Albatross	VU	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat Breeds on South Georgia and sub-Antarctic Island of Indian Ocean with circumpolar distribution in Southern Ocean (Menkhorst et al., 2017).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Diomedeidae	*Phoebetria fusca*	Sooty Albatross	EN	VU, MI, MA	x		1			Low	One DBCA record within 20 km of the Survey Area, including 15.5 km west (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (oceanic) (Morcombe, 2003).
Diomedeidae	*Thalassarche carteri*	Indian Yellow-nosed Albatross	EN	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (inshore and offshore waters) (Menkhorst et al., 2017).
Diomedeidae	*Thalassarche cauta*	Shy Albatross	VU	EN, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat Breeds on Australian and New Zealand islands with circumpolar distribution in Southern Ocean, scarse visitor to south-western seas. (oceanic) (Johnstone & Storr, 1998).
Diomedeidae	*Thalassarche cauta steadi*	White-capped Albatross	VU	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (inshore and offshore waters) (Menkhorst et al., 2017).
Diomedeidae	*Thalassarche melanophris*	Black-browed Albatross	EN	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Menkhorst et al., 2017).
Diomedeidae	*Thalassarche melanophris impavida*	Campbell Island Albatross	VU	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Menkhorst et al., 2017).
Falconidae	*Falco hypoleucos*	Grey Falcon	VU	VU	x	x	1			Low	One DBCA record within 20 km of the Survey Area, including 13.2 km west (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (open plains with treed watercourses in arid inland) (Menkhorst et al., 2017).
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS		x		95	3		Low	Six DBCA records within 20 km of the Survey Area, including 15 km so+uthwest in 1981 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (open plains, open areas aound tidal flats, beaches, wetlands) (Morcombe, 2003).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	MI	MI, MA			6			Low	Six DBCA records within 20 km of the Survey Area, including 15 km southwest in 1981 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (open plains, open areas aound tidal flats, beaches, wetlands) (Morcombe, 2003).
Laridae	*Anous stolidus*	Common Noddy, Brown Noddy	MI	MI, MA		x				Low	No DBCA records within the Survey Area. Two records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Morcombe, 2003).
Laridae	*Anous tenuirostris melanops*	Australian Lesser Noddy	EN	VU, MA	x	x				Low	No DBCA records within the Survey Area. One record from Naturemap and two records from PMST Search Results. Outside taxon distribution. Breeds on Abrolhos Island and Black Noddy on Ashmore Reef, infrequently storm-blown to coast of mainland WA (Menkhorst et al., 2017).
Laridae	*Hydroprogne caspia*	Caspian Tern	MI	MI, MA	x	x	5	1		Low	Five DBCA records within 20 km of the Survey Area, including 12 km southwest in 2016 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (sheltered coastal waters, fresh to saline lakes, large rivers, temporary wetlands, estauries, tidal creeks, near-coastal saltlakes, brackish pools) (Menkhorst et al., 2017, Johnstone and Storr, 1998).
Laridae	*Onychoprion anaethetus*	Bridled Tern	MI	MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (tropical and subtropical seas) (Morcombe, 2003).
Laridae	*Sterna dougallii*	Roseate Tern	MI	MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (tropical and subtropical seas and coastlines) (Morcombe, 2003).
Laridae	*Sternula albifrons*	Little Tern	MI	MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (sheltered coastal waters, beaches, sandbars, estauries, mangroves, near-coastal saltworks) (Johnstone and Storr, 1998, Menkhorst et al., 2017).
Laridae	*Sternula nereis nereis*		VU	VU	x	x				Low	No DBCA records within the Survey Area. One from Naturemap results and one record from PMST Search Results. Survey Area does not contain suitable habitat (coastal, bays, inlets, beaches, salt ponds and lakes) (Morcombe, 2003).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Laridae	*Thalasseus bergii*	Greater Crested Tern, Crested Tern	MI	MI, MA	x		242	8		Low	242 DBCA records within 20 km of the Survey Area, including 8.4 km northwest in 2011 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, beaches, bays, lagoons, salt ponds and lakes, estauries, tidal creeks) (Morcombe, 2003, Johnstone and Storr, 1998).
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU	VU	x	x	46			Low	46 historic DBCA records within 20 km of the Survey Area, including 16.8 km west in 1971 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (unburned mallee and woodland with abundant litter and low scrub) (Morcombe, 2003).
Motacillidae	*Motacilla cinerea*	Grey Wagtail	MI	MI, MA		x				Low	No DBCA records within the Survey Area. Two records from PMST Search Results. Species is an infrequent Summer visitor and is typically found in Northern Australia Survey Area may contain suitable habitat (fresh sandy or rocky streams, mown grass, ploughed land, sewage ponds) (Morcombe, 2003).
Pandionidae	*Pandion haliaetus*	Osprey	MI	MI, MA	x	x				Low	No DBCA records within the Survey Area. One from Naturemap results and two records from PMST Search Results. Survey Area does not contain suitable habitat (coastal, estauries, large rivers, major rivers, wetlands, river pools) (Johnstone and Storr, 1998; Morcombe, 2003).
Pandionidae	*Pandion haliaetus cristatus*	Eastern Osprey	MI (P. haliaetus)		x		16			Low	16 DBCA records within 20 km of the Survey Area, including 12.5 km west in 2016 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (beaches, coastal reaches of rivers and large inland waterbodies) (Menkhorst et al., 2017).
Phaethontidae	*Phaethon lepturus*	White-tailed Tropicbird	MI	MI, MA		x				Low	No DBCA records. Two records from PMST search results. Survey Area does not contain suitable habitat
Procellariidae	*Ardenna carneipes*	Flesh-footed Shearwater	VU	MI, MA	x	x				Low	No DBCA records within the Survey Area. One from Naturemap results and two records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Morcombe, 2003).
Procellariidae	*Ardenna pacifica*	Wedge-tailed Shearwater	MI	MI, MA	x	x				Low	No DBCA records within the Survey Area. One from Naturemap results and three records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic) (Johnstone and Storr, 1998).
Procellariidae	*Halobaena caerulea*	Blue Petrel	-	VU, MA	x					Low	No DBCA records within the Survey Area. One from Naturemap results. Survey Area does not contain suitable habitat (oceanic) (Morcombe, 2003).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Procellariidae	*Macronectes giganteus*	Southern Giant Petrel	MI	EN, MI, MA	x	x				Low	No DBCA records within the Survey Area. One from Naturemap results and three records from PMST Search Results. Survey Area does not contain suitable habitat (southern oceans, bays, habours) (Menkhorst et al., 2017).
Procellariidae	*Macronectes halli*	Northern Giant Petrel	MI	VU, MI, MA		x				Low	No DBCA records within the Survey Area. Three records from PMST Search Results. Survey Area does not contain suitable habitat (sheltered estuaries, salt marsh lagoons, salt lakes, salty edges of waterways, brackish pools, claypans) (Morcombe, 2003).
Procellariidae	*Pterodroma mollis*	Soft-plumaged Petrel	-	VU, MA		x				Low	No DBCA records within the Survey Area. Two records from PMST Search Results. Survey Area does not contain suitable habitat (oceanic, south-west WA to Exmouth and extending to Vic) (Menkhorst et al., 2017).
Psittaculidae	*Platycercus icterotis xanthogenys*	Western Rosella	P4	-			1	1		Low	One DBCA record within 20 km of the Survey Area, including 9 km southeast in 2020 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area falls outside Priority subspecies distribution (salmon gum and wandoo woodlands, farmlands; less common in heavy wet Karri and Jarrah; scarce on sandy west coastal plain) (Menkhorst et al., 2017).
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	EN	EN, MA	x	x				Low	No DBCA records. One NatureMap record and two records from PMST search results. Survey Area does not contain suitable habitat (well vegetated surrounds and shallows of wetlands) (Morcombe, 2003).
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	MI	MI, MA	x	x	1			Low	One historic DBCA record 7.3 km south of the Survey Area in 1976 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal and interior wetlands, narrow muddy edges of billabongs, river pools, mangroves, rocky beaches, estauries, near-coastal saltlakes, lagoons, claypans, sewage ponds) (Morcombe, 2003, Johnstone and Storr, 1998).
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	MI	MI, MA			1			Low	One historic DBCA record 8.6 km east of the Survey Area in 1980 Survey Area does not contain suitable habitat (coastal, tidal flats, beaches, rocky shorelines) (Menkhorst et al., 2017).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	MI	MI, MA	x	x	11			Low	11 DBCA records within 20 km of the Survey Area, including 10.6 km west in 1977 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (fresh and salt wetlands, muddy edges of lagoons, swamps, lakes, dams, soaks, sewage farms, temporary floodwaters) (Morcombe, 2003).
Scolopacidae	*Calidris alba*	Sanderling	MI	MI, MA			3			Low	Three DBCA records within 20 km of the Survey Area, including 10.6 km west in 1980 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (beaches, sandy tidal flats) (Menkhorst et al., 2017).
Scolopacidae	*Calidris canutus*	Red Knot	EN	EN, MI, MA	x	x	3			Low	Three DBCA records within 20 km of the Survey Area, including 10.6 km west in 1978 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, extensive firm tidal flats) (Menkhorst et al., 2017).
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR	CR, MI, MA	x	x	22			Low	22 DBCA records within 20 km of the Survey Area, including 9.3 km west in 2001 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (inter-tidal mudflats of estuaries, lagoons, mangrove channels, dams, floodwaters, flooded saltbush surrounds of inland lakes) (Morcombe, 2003).
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	MI	MI, MA	x	x	4			Low	Four DBCA records within 20 km of the Survey Area, including 9.8 km west in 1992 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal fresh to saline wetlands, inland permanent and temporary wetlands, mudfalts, swamps with dense vegetation) (Morcombe, 2003).
Scolopacidae	*Calidris pugnax*	Ruff	MI	MI, MA		x				Low	No DBCA records. Two records from PMST search. Survey Area does not contain suitable habitat (shallow wetlands, freshwater lakes, swamps, floodlands, salt ponds, dry grassland, tidal mudflats, beaches, estauries) (Johnstone & Storr, 1998).
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	MI	MI, MA	x		43			Low	43 DBCA records within 20 km of the Survey Area, including 10.6 km west in 1977 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (mudflats, salt marshes, beaches, salt fields, temporary floodwaters) (Morcombe, 2003).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Scolopacidae	*Calidris subminuta*	Long-toed Stint	MI	MI, MA	x		8			Low	Eight DBCA records within 20 km of the Survey Area, including 13.6 km west in 1991 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (muddy fringes of fresh wetlands) (Menkhorst et al., 2017).
Scolopacidae	*Calidris tenuirostris*	Great Knot	CR	CR, MI, MA	x		3			Low	Three DBCA records within 20 km of the Survey Area, including 10.6 km east in 1978 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, tidal flats, beaches) (Menkhorst et al., 2017).
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	MI (VU or CR at subsp. level)	MI, MA	x	x	8			Low	Eight DBCA records within 20 km of the Survey Area, including 10.6 km west in 1978 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, tidal flats) (Menkhorst et al., 2017).
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	MI	MI, MA	x		4			Low	Four DBCA records within 20 km of the Survey Area, including 10.6 km west in 1980 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (shallow inland wetlands) (Menkhorst et al., 2017).
Scolopacidae	*Numenius madagascariensis*	Far Eastern Curlew, Eastern Curlew	CR	CR, MI, MA	x	x	1			Low	One historic DBCA record 14.3 km west of the Survey Area in 1959 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, tidal flats) (Menkhorst et al., 2017).
Scolopacidae	*Numenius phaeopus*	Whimbrel	MI	MI, MA	x		1			Low	One historic DBCA record 8.6 km east of the Survey Area in 1978 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (coastal, tidal flats, mangroves) (Menkhorst et al., 2017).
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	MI, P4	MI, MA	x					Low	Survey Area does not contain suitable habitat (coastal, tidal flats, rocky shorlines) (Menkhorst et al., 2017).
Scolopacidae	*Tringa glareola*	Wood Sandpiper	MI	MI, MA	x		8			Low	Eight historic DBCA records within 20 km of the Survey Area, including 7.3 km south in 1959 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (freshwater wetlands with emergent sedges and taller fringing vegetation) (Menkhorst et al., 2017).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Scolopacidae	*Tringa nebularia*	Common Greenshank	MI	MI, MA	x	x	62	1		Low	62 DBCA records within 20 km of the Survey Area, including 5.2 km southwest in 1999 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (permanent and temporary wetlands, billabongs, swamps, lakes, floodplains, sewage farms and salt works ponds, flooded irrigated crops, mudflats, mangrove swamps, muddy shallows of lagoons) (Morcombe, 2003).
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	MI	MI, MA			3			Low	Three historic DBCA records within 20 km of the Survey Area, including 7.3 km east in 1977 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (shallow, fresh to brackish inland wetlands) (Menkhorst et al., 2017).
Scolopacidae	*Xenus cinereus*	Terek Sandpiper	MI	MI, MA	x					Low	Survey Area does not contain suitable habitat (tidal flat, saltwork ponds) (Menkhorst et al., 2017).
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	MI	MI, MA	x		12			Low	12 DBCA records within 20 km of the Survey Area, including 17.2 km north in 2009 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (Shallow, fresh water, and estuarine waters, dry grasslands) (Menkhorst et al., 2017).
Tytonidae	*Tyto novaehollandiae novaehollandiae*		P3		x		1			Low	One DBCA record within 20 km of the Survey Area 16.2 km west in 2000 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (forests and woodlands with hollow bearing large old trees; roosts in tree hollows, foliage, and caves) (Menkhorst et al., 2017).
BIVALVES											
Hyriidae	*Westralunio carteri*	Carter's Freshwater Mussel	VU (not WAM)	-	x		74	8		NA	Species may occur within the Crumpet Creek habitat, however the species has been omitted as it is outside the Scope of Works
CHONDRICHTHYES											
Carcharhinidae	*Carcharhinus longimanus*	Oceanic Whitetip Shark	-	MI		x				NA	Species is marine. No suitable habitat present
Lamnidae	*Carcharodon carcharias (not WAM)*	Great White Shark	VU	VU, MI		x				NA	Species is marine. No suitable habitat present
Lamnidae	*Lamna nasus*	Porbeagle, Mackerel Shark	MI	MI		x				NA	Species is marine. No suitable habitat present
Mobulidae	*Mobula alfredi*	Manta Ray	MI	MI		x				NA	Species is marine. No suitable habitat present

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Mobulidae	*Mobula birostris*	Giant Oceanic Manta Ray	MI	MI		x				NA	Species is marine. No suitable habitat present
Odontaspididae	*Carcharias taurus (not WAM)*	Grey Nurse Shark	VU			x				NA	Species is marine. No suitable habitat present
Pristidae	*Pristis pristis (not WAM)*	Freshwater Sawfish	MI, P3	VU, MI		x				NA	Species is marine. No suitable habitat present
Rhincodontidae	*Rhincodon typus (not WAM)*	Whale Shark	MI	VU, MI		x				NA	Species is marine. No suitable habitat present
Sphyrnidae	*Sphyrna lewini*	Scalloped Hammerhead	-	CD		x				NA	Species is marine. No suitable habitat present
MAMMALIAN											
Balaenidae	*Eubalaena australis*	Southern Right Whale	VU	EN, MI		x				NA	Species is marine. No suitable habitat present
Balaenopteridae	*Balaenoptera borealis schlegelii*	Sei Whale	EN (sp. level)	VU, MI		x				NA	Species is marine. No suitable habitat present
Balaenopteridae	*Balaenoptera edeni*	Bryde's Whale	MI	MI		x				NA	Species is marine. No suitable habitat present
Balaenopteridae	*Balaenoptera musculus (check subsp.)*	Blue Whale	EN (sp. level)	EN, MI		x				NA	Species is marine. No suitable habitat present
Balaenopteridae	*Balaenoptera physalus quoyi*	Fin Whale	EN (sp. level)	VU, MI		x				NA	Species is marine. No suitable habitat present
Balaenopteridae	*Megaptera novaeangliae australis*	Humpback Whale	MI, CD	MI		x				NA	Species is marine. No suitable habitat present
Dasyuridae	*Dasyurus geoffroii fortis*	Western Quoll, Chuditch	VU	VU	x	x	92	14		Medium	92 DBCA records within 20 km of the Survey Area, including 3.3 km east in 2017 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (sclerophyll forest or drier woodland, heath and mallee shrubland) (Van Dyck and Strahan, 2008).
Dasyuridae	*Parantechinus apicalis*	Dibbler	EN	EN		x				Low	No DBCA records. One PMST search result. Survey Area may contain suitable habitat (mature mallee heath; prefers vegetation not burnt for at least 10 yrs) (Van Dyck, Gynther and Baker, 2013) (SPRAT, 2022).
Dasyuridae	*Phascogale calura*	Red-tailed Phascogale	CD	VU	x					Low	No DBCA records. One NatureMap search result. Survey Area may contain suitable habitat (*Allocasuarina* woodlands with hollow-containing eucalypts (e.g. *Eucalyptus wandoo*) and Gastrolobium spp.; prefers vegetation not burnt for at least 20 yrs) (Van Dyck and Strahan, 2008).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Dasyuridae	*Phascogale tapoatafa wambenger*	Wambenger Brush-tailed Phascogale	CD		x		48	33		High	48 DBCA records within 20 km of the Survey Area, including 2.7 km east in 2016 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (mature rough-barked trees, large logs, dead standing trees) (Van Dyck and Strahan, 2008).
Deliphinidae	*Orcinus orca*	Killer Whale	MI	MI		x				NA	Species is marine. No suitable habitat present
Deliphinidae	*Tursiops aduncus*	Indo-pacific Bottlenose Dolphin	MI	MI	x	x				NA	Species is marine. No suitable habitat present
Macropodidae	*Notamacropus eugenii derbianus*	Tammar Wallaby	P4				6	6		Low	Six DBCA records within 20 km of the Survey Area, including 16.1 km north in 2016 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland) (Van Dyck and Strahan, 2008).
Macropodidae	*Notamacropus irma*	Western Brush Wallaby	P4		x		31	7		Medium	31 DBCA records within 20 km of the Survey Area, including 14.6 km north in 2017 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (open forest and woodland, open seasonally wet flats) (Van Dyck and Strahan, 2008).
Macropodidae	*Setonix brachyurus*	Quokka	VU	VU	x		10			Low	Ten DBCA records within 20 km of the Survey Area, including 16.2 km south in 2011 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (dense wet ground cover in forest or swampy flats) (Van Dyck and Strahan, 2008).
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	VU		x				Low	No DBCA records. One PMST search result. Survey Area does not contain suitable habitat (rainforest, deciduous vine thicket, open woodland, spinifex and black soil grasslands; undisturbed roost caves or mineshafts, usually complex systems with several openings) (Van Dyck and Strahan, 2008) (Menkhorst and Knight, 2001).
Muridae	*Hydromys chrysogaster*	Water Rat	P4		x		38	3		Low	38 DBCA records within 20 km of the Survey Area, including 10 km northwest in 2019 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (permanent fresh to brackish water bodies) (Van Dyck and Strahan, 2008).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Myrmecobiidae	*Myrmecobius fasciatus fasciatus*	Numbat, Walpurti	EN	EN	x		5			Low	Five historic DBCA records within 20 km of the Survey Area, including 15.4 km east in 1984 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area may contain suitable habitat (Jarrah forests, Wandoo woodlands ; requires hollow logs and branches for shelter and termintes for food) (Van Dyck and Strahan, 2008).
Otariidae	*Arctocephalus tropicalis*	Sub-Antarctic Fur Seal	VU	EN, MA	x					Low	No DBCA records. One NatureMap record. No suitable habitat present.
Otariidae	*Neophoca cinerea*	Australian Sea Lion	EN	EN, MA		x				Low	No DBCA records. Four PMST search results. Outside taxon distribution. Breeding colonies are found on islands or remote sections of coastline, from Kangaroo Island, SA to the Houtman Abrolhos Islands, WA. No breeding colonies are known from the Perth region (Department of Sustainability Environment Water Population and Communities, 2013).
Peramelidae	*Isoodon fusciventer*	Quenda	P4	-	x		1598	1398	x	Recorded	1598 DBCA records within 20 km of the Survey Area.The species was previously recorded inside the Survey Area multiple times in 2013 (Department of Biodiversity Conservation and Attractions, 2022a).
Potoroidae	*Bettongia penicillata ogilbyi*	Brush-tailed Bettong, Woylie	CR	EN	x		97	86		Low	97 DBCA records within 20 km of the Survey Area, including 16 km north in 2017 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (areas dominated by Gastrolobium thickets) (Van Dyck and Strahan, 2008).
Pseudocheiridae	*Pseudocheirus occidentalis*	Western Ringtail Possum	CR	CR	x		1			Low	One historic DBCA record within 20 km of the Survey Area 8.3 km north in 1958 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (Agonis forest and woodland, Tuart forest with Agonis mid storey) (Van Dyck and Strahan, 2008).
Thylacomyidae	*Macrotis lagotis*	Bilby, Dalgyte	VU	VU	x		1			Low	One historic DBCA record within 20 km of the Survey Area 18.8 km north in 1925 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not conatin suitable habitat (Mitchell grass and stony downs country of cracking clays, desert sandplains and dune fields sometimes containing laterite, hummock grassland and massive red earths with Acacia shrubland) (Van Dyck and Strahan, 2008).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Vespertilionidae	*Falsistrellus mackenziei*	Western Falsistrelle	P4		x					Low	No DBCA records. One NatureMap search result. Survey Area does not contain suitable habitat (mature Karri forests, wetter stands of Jarrah and Tuart, and woodlands on Swan Coastal Plain) (Van Dyck and Strahan, 2008).
REPTILIAN											
Chelidae	*Pseudemydura umbrina*	Western Swamp Tortoise	CR	CR	x		6	1		Low	Six DBCA records within 20 km of the Survey Area, including 3.7 km west in 2013 (Department of Biodiversity Conservation and Attractions, 2022a). Restricted to small clay-based swamps at Bullsbrook, WA (Wilson and Swan, 2017).
Cheloniidae	*Caretta caretta*	Loggerhead Turtle	EN	EN, MI, MA		x				Low	No DBCA records. Three PMST search results. Outside taxon distribution. No breeding stocks are known from the Perth region (Department of the Environment and Energy, 2017).
Cheloniidae	*Chelonia mydas*	Green Turtle	VU	VU, MI, MA	x	x				Low	No DBCA records. Three PMST search results. Outside taxon distribution. No breeding stocks are known from the Perth region (Department of the Environment and Energy, 2017).
Cheloniidae	*Natator depressus*	Flatback Turtle	VU	VU, MI, MA		x				Low	No DBCA records. Three PMST search results. Outside taxon distribution. No breeding stocks are known from the Perth region (Department of the Environment and Energy, 2017).
Dermochelyidae	*Dermochelys coriacea*	Leatherback Turtle	VU	EN, MI, MA	x	x				Low	No DBCA records. Three PMST search results. Outside taxon distribution. No breeding stocks are known from the Perth region (Department of the Environment and Energy, 2017).
Elapidae	*Acanthophis antarcticus*	Southern Death Adder	P3		x		13			Low	13 historic DBCA records within 20 km of the Survey Area, including 11 km southeast in 1977 (Department of Biodiversity Conservation and Attractions, 2022a). Habitats range from rainforest to shrublands and heath.
Elapidae	*Neelaps calonotos*	Black-striped Snake	P3	-	x		32			Medium	32 DBCA records within 20 km of the Survey Area, including 16.6 km southwest in 2011 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area contains suitable habitat (dunes and sandplains vegetated with heaths and eucalypt/banksia woodlands) (Wilson & Swan, 2021).
Scincidae	*Ctenotus delli*		P4		x		1			Low	One historic DBCA record within 20 km of the Survey Area 11.5 km east in 1970 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not fall within species distribution (restricted to the Darling range; Jarrah and Marri woodlands over shrubs on lateritic, sandy, and clay soils) (Wilson & Swan, 2021).

Family	Scientific Name	Common Name	Conservation Status		Source					Likelihood of Occurrence	Justification
			State	Federal	NM	PMST	DBCA	DBCA 15 yrs	Field Survey		
Scincidae	*Ctenotus gemmula*		P3 (Swan Coastal Plain subpop.)		x					Low	No DBCA records. One NatureMap search result. Survey Area does not contain suitable habitat (pale sand-plains supporting heaths in association with Banksia or mallee woodlands) (Wilson & Swan, 2021).
Scincidae	*Ctenotus ora*	Coastal Plains Skink	P3		x					Low	No DBCA records. One NatureMap search result. Open eucalypt woodland over Banksia and low vegetation on sandy coastal plain and coastal dunes south of Perth, from Pinjarra south to Yallingup Brook.
Scincidae	*Egernia stokesii badia*	Western Spiny-tailed Skink	VU	EN		x				Low	No DBCA records. One PMST search result. Species occupies rock crevices and hollow timber in southwest interior of WA and on Dirk Hartog Island, Shark Bay.
Scincidae	*Lerista lineata*		P3		x		12			Low	12 historic DBCA records within 20 km of the Survey Area, including 8 km west in 1975 (Department of Biodiversity Conservation and Attractions, 2022a). Survey Area does not contain suitable habitat (sandy coastal shrubland and heathland) (Van Dyck and Strahan, 2008).

Appendix H
Fauna Habitat Site Sheets

Fauna Habitat Assessment Site 1

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	407054.012	**Northing**	6462981.830
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	Laterite	
Aspect			**Surface stone cover**	0 - 5%	
Soil type	Sand		**Surface stone size classes present**	Pebbles (<0.6 cm)	
Soil colour	Grey, White				
Condition			**Habitat Features**		
Quality	Good		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Leaf litter, Peeling bark, Woody debris	
Disturbance	Infrastructure, Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	*Eucalyptus marginata*		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	*Adenanthos cygnorum and Xanthorrhoea sp.*		
Ground stratum	Mid (0.5-1 m)	Tussock grassland (50-80%)	*Adenanthos cygnorum, Xanthorrhoea sp., Mesomelaena pseudostygia*		

Fulcrum photo ID	c9d0c5ad-b427-4fcc-8365-d9c07751ff9b

Fauna Habitat Assessment Site 2

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	406939.404	**Northing**	6462207.986
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Brown				
Condition			**abitat Features**		
Quality	Good		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Hummocks, Leaf litter, Woody debris	
Disturbance	Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Low (<10 m)	Woodland (20-50%)	*Eucalyptus marginata and Corymbia calophylla*		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	*Acacia pulchella, Xanthorrhoea preissii, Allocasuarina humilis*		
Ground stratum	Mid (0.5-1 m)	Tussock grassland (50-80%)	*Xanthorrhoea preissii and other mixed weeds and grasses*		

Fulcrum photo ID	14809a3d-f40a-4c0a-b1b8-819ec1d5049b

Fauna Habitat Assessment Site 3

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	407080.436	**Northing**	6463627.240
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	Laterite	
Aspect			**Surface stone cover**	50 - 75%	
Soil type	Sand		**Surface stone size classes present**	Pebbles (<0.6 cm), Small Stones (0.6 - 2 cm), Stones (2 - 6 cm)	
Soil colour	Orange				
Condition			**Habitat Features**		
Quality	Disturbed		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Leaf litter, Woody debris	
Disturbance	Clearing, Infrastructure, Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Absent	0		*0*	
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)		*Callistemon sp., Leptospermum sp.*	
Ground stratum	Low (>0.5 m)	Sparse tussock grassland (0.25-20%)		*Mixed understorey of natives and weeds*	

Fulcrum photo ID	ba4a9b0f-a827-48a4-8819-b1968f23af6d

Fauna Habitat Assessment Site 4

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	406686.005	**Northing**	6463316.857
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Brown, White				
Condition			**abitat Features**		
Quality	Highly degraded		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Hummocks, Leaf litter	
Disturbance	Clearing, Infrastructure, Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)		*Allocasuarina sp.*	
Mid stratum	Absent	0		*0*	
Ground stratum	Low (>0.5 m)	Closed tussock grassland (>80%)		*Mixed understorey of natives and weeds*	

Fulcrum photo ID	063c9ce8-36f7-4ea6-8eee-a7d41de170b5, f1d30449-9fb5-4ee1-a3c1-

Fauna Habitat Assessment Site 5

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	407465.264	**Northing**	6462699.814
Landform and Soil			**Rock**		
Landform	Drainage line		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Brown				
Condition			**Habitat Features**		
Quality	Disturbed		**Water Source**	Present	
Fire History	Unknown		**Microhabitats**	Hummocks, Leaf litter, Peeling bark, Woody debris	
Disturbance	Clearing, Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Low (<10 m)	Open woodland (0.25-20%)	*Corymbia calophylla and mixed Eucalypts*		
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	*Macrozamia riedlei*		
Ground stratum	Low (>0.5 m)	Open tussock grassland (20-50%)	*Mixed understorey of natives and weeds*		

Fulcrum photo ID	b6a030d8-a17e-4e36-9f60-b016e94d6ca5, 82fc2a3b-eeb2-4dc1-81b3-

Fauna Habitat Assessment Site 6

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	407251.265	**Northing**	6461922.300
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Black, Brown				
Condition			**abitat Features**		
Quality	Highly degraded		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Hummocks, Leaf litter	
Disturbance	Clearing, Infrastructure, Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Absent	0	*0*		
Mid stratum	Absent	0	*0*		
Ground stratum	Low (>0.5 m)	Closed tussock grassland (>80%)	*Mixed understorey of natives and weeds*		

Fulcrum photo ID	07583a79-5712-495c-a7d8-a58cd0e31152

Fauna Habitat Assessment Site 7

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	406812.370	**Northing**	6462337.752
Landform and Soil			**Rock**		
Landform	Drainage line		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Black, Brown, White, Yellow				
Condition			**Habitat Features**		
Quality	Good		**Water Source**	Present	
Fire History	Unknown		**Microhabitats**	Leaf litter, Peeling bark, Woody debris	
Disturbance	Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	*Corymbia calophylla and mixed Eucalypts*		
Mid stratum	Mid (1-2 m)	Sparse shrubland and/or heathland (0.25-20%)	*Xanthorrhoea sp.*		
Ground stratum	Low (>0.5 m)	Hummock grassland (50-80%)	*Mixed understorey of natives and weeds*		

Fulcrum photo ID	348cb630-fdd0-4d52-b296-31641b6fdbf1

Fauna Habitat Assessment Site 8

Project:	5525 - Maida Vale Amendment				
Date	2022-08-23		**Personnel**	LG	
Zone	50	**Easting**	406797.358	**Northing**	6462749.374
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Black, Brown				
Condition			**abitat Features**		
Quality	Disturbed		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Leaf litter, Logs > 10 cm, Woody debris	
Disturbance	Clearing, Infrastructure, Vehicle tracks, Weeds				
Introduced fauna	0		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	*Corymbia calophylla and mixed Eucalypts*		
Mid stratum	Absent	0	*0*		
Ground stratum	Low (>0.5 m)	Hummock grassland (50-80%)	*Xanthorrhoea preissii and other mixed weeds and grasses*		

Fulcrum photo ID	3811339f-f005-4227-8ff5-c4d0e4e16e68

Fauna Habitat Assessment Site 9

Project:	5525 - Maida Vale Amendment				
Date	2022-09-01		**Personnel**	LG	
Zone	50	**Easting**	406812.571	**Northing**	6462372.708
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Grey, White				
Condition			**Habitat Features**		
Quality	Very good		**Water Source**	Present	
Fire History	Unknown		**Microhabitats**	Leaf litter	
Disturbance	None observed				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	*Corymbia calophylla*		
Mid stratum	Mid (1-2 m)	Shrubland and/or heathland (50-80%)	*Acacia pulchella, Banksia dallanneyi, Allocasuarina humilis*		
Ground stratum	Low (>0.5 m)	Tussock grassland (50-80%)	*Hakea sp. and Tertraria octandra*		

Fulcrum photo ID	c2627224-423a-4793-b207-53730a78ef14

Fauna Habitat Assessment Site 10

Project:	5525 - Maida Vale Amendment				
Date	2022-09-01		**Personnel**	LG	
Zone	50	**Easting**	406999.178	**Northing**	6462276.186
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Brown				
Condition			**abitat Features**		
Quality	Good		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Leaf litter, Woody debris	
Disturbance	Infrastructure, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	*Eucalyptus marginata and Corymbia calophylla*		
Mid stratum	Mid (1-2 m)	Open shrubland and/or heathland (20-50%)	*Acacia pulchella, Xanthorrhoea preissii, Allocasuarina humilis*		
Ground stratum	Mid (0.5-1 m)	Tussock grassland (50-80%)	*Xanthorrhoea preissii and other mixed weeds and grasses*		

Fulcrum photo ID	d1e68f9c-46b0-416e-886e-aec485d06671

Fauna Habitat Assessment Site 11

Project:	5525 - Maida Vale Amendment				
Date	2022-09-16		**Personnel**	LG	
Zone	50	**Easting**	407203.199	**Northing**	6463552.888
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	Laterite	
Aspect			**Surface stone cover**	25 - 50%	
Soil type	Sand		**Surface stone size classes present**	Pebbles (<0.6 cm), Small Stones (0.6 - 2 cm), Stones (2 - 6 cm)	
Soil colour	Brown, Orange				
Condition			**Habitat Features**		
Quality	Good		**Water Source**	Absent	
Fire History	Unknown		**Microhabitats**	Leaf litter, Peeling bark, Woody debris	
Disturbance	Infrastructure, Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Woodland (20-50%)	*Corymbia calophylla and Eucalyptus marginata*		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	*Acacia sp. and other mixed species*		
Ground stratum	0	Closed tussock grassland (>80%)	*Mixed understorey of natives and weeds*		

Fulcrum photo ID	584a47ec-f75f-4c9e-9c71-14cf1fab2d97, 49b30b5c-d569-4c52-9ae5-

Fauna Habitat Assessment Site 12

Project:	5525 - Maida Vale Amendment				
Date	2022-09-16		**Personnel**	LG	
Zone	50	**Easting**	406964.285	**Northing**	6462470.791
Landform and Soil			**Rock**		
Landform	Plain		**Rock type/s**	None	
Aspect			**Surface stone cover**	0	
Soil type	Sand		**Surface stone size classes present**	0	
Soil colour	Brown				
Condition			**abitat Features**		
Quality	Very good		**Water Source**	Present	
Fire History	Unknown		**Microhabitats**	Leaf litter, Peeling bark, Woody debris	
Disturbance	Infrastructure				
Introduced fauna	0		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	*Corymbia calophylla and Eucalyptus marginata*		
Mid stratum	Tall (>2 m)	Open shrubland and/or heathland (20-50%)	*Xanthorrhoea sp,. Eucalyptus sp. and Grevillea sp.*		
Ground stratum	Low (>0.5 m)	Closed tussock grassland (>80%)	*Mixed understorey of natives and weeds*		

Fulcrum photo ID	104fd6d9-938e-4935-8a4b-b7844a03eb7f, 961ee34e-4d15-46f2-b410-

Fauna Habitat Assessment Site 13

Project:	5525 - Maida Vale Amendment				
Date	2022-09-16		**Personnel**	LG	
Zone	50	**Easting**	407256.314	**Northing**	6462581.753
Landform and Soil			**Rock**		
Landform	Drainage line		**Rock type/s**	Laterite	
Aspect			**Surface stone cover**	0 - 5%	
Soil type	Sand		**Surface stone size classes present**	Pebbles (<0.6 cm), Small Stones (0.6 - 2 cm)	
Soil colour	Brown, Red				
Condition			**Habitat Features**		
Quality	Very good		**Water Source**	Present	
Fire History	Unknown		**Microhabitats**	Hollows - logs, Hummocks, Leaf litter, Logs > 10 cm, Peeling bark, Woody debris	
Disturbance	Vehicle tracks, Weeds				
Introduced fauna	None observed		**Ground Cover**	0	
Vegetation					
Upper stratum	Mid (10-30 m)	Open woodland (0.25-20%)	*Mixed Eucalypts and Corymbia calophylla*		
Mid stratum	Mid (1-2 m)	Closed shrubland and/or heathland (>80%)	*Xanthorrhoea sp. and mixed native species*		
Ground stratum	Low (>0.5 m)	Closed tussock grassland (>80%)	*Mixed understorey of natives and weeds*		

Fulcrum photo ID	081b3c84-283d-4a57-9dd5-34bff409812e, cbee2b5c-2209-4c77-a6d8-

Appendix G
BPP Bushfire Management Plan 2017

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Maida Vale Rezoning		
Suburb: Maida Vale	**State:** WA	**P/code:** 6057
Local government area: Shire of Kalamunda		
Description of the planning proposal: Change of Landuse application		
BMP Plan / Reference Number: 168859	**Version:** Ver1.0	**Date of Issue:** 20/03/2017
Client / Business Name: Burgess Design		

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☐	☒
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☒
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☒
Strategic planning proposal (including rezoning applications)	☒	☐
Minor development (in BAL-40 or BAL-FZ)	☐	☒
High risk land-use	☐	☒
Vulnerable land-use	☐	☒

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Land use change application

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Alex Aitken	Level 2	BPAD37739	01/02/2018
Company Bushfire Prone Planning		**Contact No.** 6477 1144	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner **Date** 20/03/2017

BPP Group Pty Ltd | ABN: 39 166 551 784
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PO Box 3489 Midland WA 6936
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Bushfire Management Plan (Hazard Level Assessment)

Maida Vale Rezoning

Shire of Kalamunda

Project Number:	168859
Assessment Date:	2 March 2017
Report Date:	17 March 2017

Plan Details

BMP Template v5.7	*©2017 BPP Group Pty Ltd*

Plan Version	Submitted to	Submitted Date
v1.0	Planner	20-Mar-17

Plan Version	Amendment Record	Submitted Date
-		

Compliance Statement

This Bushfire Management Plan (the Plan) meets the requirements of both the *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) and the supporting *Guidelines for Planning in Bushfire Prone Areas* (WAPC v1.1 2017; the 'Guidelines').

Author	Bushfire Planning and Design (BPAD) Accreditation		Signature
Alex Aitken	Level 2 Bushfire Planning Practitioner	BPAD37739	

BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

Reviewed/Approved	Bushfire Planning and Design (BPAD) Accreditation		Signature
Mick Whitelaw	Level 2 Bushfire Planning Practitioner	BPAD37265	

BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

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Disclaimer

The measures contained in this Bushfire Management Plan are considered to be minimum standards and they do not guarantee that a building will not be damaged in a bushfire. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions. Additionally, the achievement of and level of implementation of bushfire management measures will depend, among other things, on the actions of the landowners or occupiers over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the project are made in good faith on the basis of information available to Bushfire Prone Planning at the time.

All maps included herein are indicative in nature and are not to be used for accurate calculations.

Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences (whether or not due to the negligence of their consultants, their servants or agents) arising out of the services provided by their consultants.

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1 Executive Summary

This Bushfire Management Plan (the Plan) has been prepared to accompany a change of land use with respect to the Metropolitan Regional Scheme for an area in Maida Vale within the Shire of Kalamunda.

The subject site of approximately 170 ha is within a designated bushfire prone area and the Proposal requires the application of *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7). The assessed bushfire risk is considered to be manageable and will be achieved by the identified stakeholders implementing and maintaining the bushfire risk management measures that are presented in this Plan.

This bushfire hazard level assessment demonstrates that compliance against the four elements of the Bushfire Protection Criteria can be achieved in subsequent planning stages.

During future planning stages, any future buildings will be constructed to comply with AS3959-2009 and the appropriate BAL rating determined at the time of development.

There are several dead end roads existing within the subject site and these were implemented prior to the development of SPP3.7, with future planning stages to address the removal of the existing dead end roads to establish two way access for public and residents within the area.

All future developments will establish an asset protection zone surrounding building that complies to a BAL rating of BAL-29 or lower.

There is an existing reticulated water source within the subject site with numerous hydrants located in the area. All future plans will need to comply with Water Corp and DFES standards for hydrant location including DS63.

2 Application of SPP 3.7

The *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) provides the foundation for land use planning to address bushfire risk in Western Australia.

This Proposal must consider SPP 3.7 and, if required, comply with its policy measures. The determination of this requirement is presented below.

Application of SPP 3.7 Policy Measures – Primary Triggers	
The subject Proposal is a higher order strategic planning document, a strategic planning proposal or a subdivision or development application:	✓
The project site is in a designated bushfire prone area on the WA Map of Bushfire Prone Areas:	✓
The project site is not located in a designated bushfire prone area on the WA Map of Bushfire Prone Areas but the existing vegetation type and condition dictate that it should be:	
The project site is in an area not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017 s3.2.2*):	
Application of SPP 3.7 Policy Measures – Secondary Trigger/s	
The Proposal is a strategic planning proposal, subdivision or development application relating to land that has or will have a Bushfire Hazard Level above low and/or where a Bushfire Attack Level rating above BAL-LOW applies (SPP 3.7 s6.2):	✓
The subject Proposal is a development application for the construction or/and use of a single house or ancillary dwelling on a lot or lots greater than 1100m^2 and subject to BAL-40 or BAL-FZ (LPS Amendment Regulations 2015):	
The subject Proposal is a development application for the construction or/and use of a habitable building (other than a single house or ancillary dwelling), or a specified building on any lot size and subject to a BAL rating above BAL-LOW (LPS Amendment Regulations 2015):	

3 Commissioning and the Land Use Proposal

Bushfire Prone Planning (BPP Group Pty Ltd) has been commissioned to carry out the assessments and prepare the required bushfire planning documentation to accompany the proponent's planning submission associated with their proposed land use project.

Commissioning Record	
Landowner / Proponent:	Maida Vale Land Holdings Ltd
BPP Commissioned by:	Burgess Design
Purpose:	To accompany a re-zoning application
Project Location	
Subject Site and Address:	See Figure 3.1 & 3.2 for site location
Local Government:	Shire of Kalamunda
Zoning and R-Code:	Special Rural
Project Description	
Description:	Rezoning of the subject site area.

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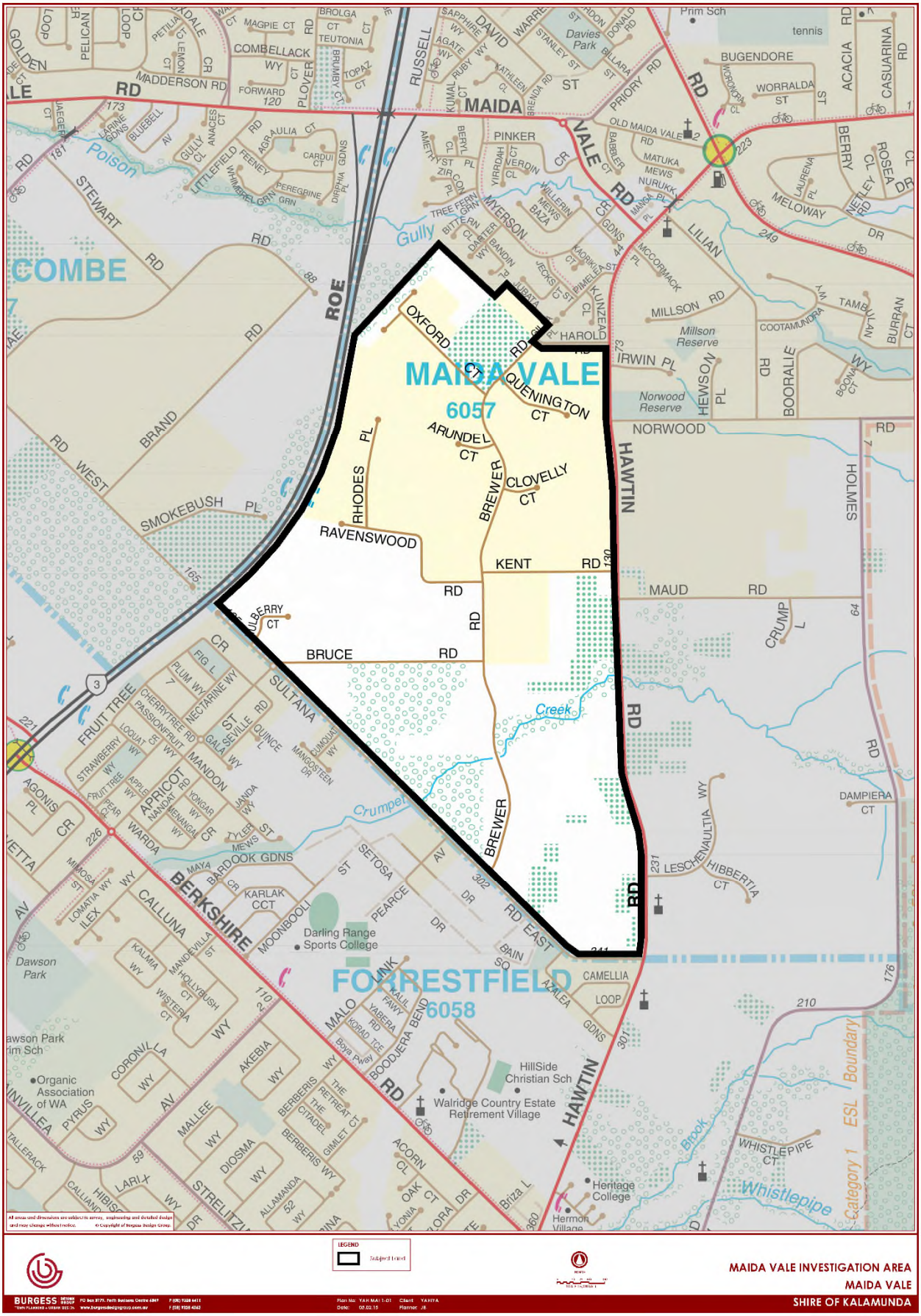


Figure 3.1: Proposal area site plan (Source: Burgess Design)

Figure 3.2

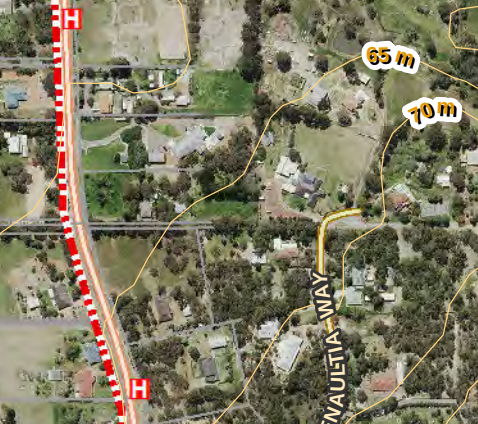
Development Site Plan

Maida Vale Rezoning Area
Maida Vale

LEGEND

- Subject Site
- Other Lots
- Existing Hydrant

LOCALITY



SCALE (A3)

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Metres

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4 The Planning Submission and the Documents Required

Policy measures in *SPP 3.7* (and further instruction in the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*) set out the bushfire planning information (including bushfire risk assessments) that are to accompany a planning submission. It is dependent on the type of proposal and stage of the development process. In most circumstances this information is to be presented in the form of a Bushfire Management Plan (BMP).

The Planning Submission – Stage and Specific Land Use or Development	
Planning Stage:	Strategic - local planning strategy
For Submission to:	Shire of Kalamunda
Project Type:	Change of land use
'Vulnerable' Land Use:	N/A
'High Risk' Land Use:	N/A
'Minor' Development:	N/A
'Unavoidable' Development:	N/A

This Bushfire Management Plan will include the information indicated by the check mark. If an item is checked it is required by either: SPP 3.7 or by a local government variation. It may also have been prepared at an earlier planning stage and therefore re-included or included by the assessor as it improves the information presented in this Bushfire Management Plan.

Bushfire Hazard Level Assessment	Bushfire Attack Level Contour Map	Bushfire Attack Level Assessment	Identify any issues arising from the BAL contour map or BAL assessment	Identify and specifically address the list of issues related to strategic level planning and defined in the *Guidelines s5.2*	Demonstrate compliance with the Bushfire Protection Criteria can be achieved in subsequent planning stages	Demonstrate compliance with the Bushfire Protection Criteria
✓	✓			✓	✓	

5 Assessment of Bushfire Risk

5.1 Vegetation Assessment/Classification and Ground Slope

5.1.1 Existing Vegetation

All vegetation within 100 metres of the subject site has been identified and classified or excluded and presented in Table 5.1.1. This has been done with accordance with *AS 3959-2009* and reference to the *Visual Guide for Bushfire Risk Assessment in WA* (WAPC February 2016).

The vegetation has been assessed as it will be in its mature state and where deemed appropriate, in its unmanaged state. The areas of classified vegetation that will determine bushfire risk are defined on the topography and vegetation map Figure 5.1. Representative photos of each vegetation area is presented after the table.

Table 5.1.1: Vegetation types identified, the applied classification and effective slope

All Vegetation Within 100 metres of Subject Site			
Vegetation Area	**Identified Types (AS3959) or Description if 'Excluded'**	**Applied Classification**	**Effective Slope Under Classified Vegetation (degrees)**
1	Woodland B-05	Class B Woodland	0-5
2	Open Woodland B-06	Class B Woodland	0-5
3	Woodland B-05	Class B Woodland	0-5
4	Open Scrub D-14	Class D Scrub	0-5
5	Open Woodland B-06	Class B Woodland	0-5
6	Woodland B-05	Class B Woodland	0-5
7	Open Herbfield G-27	Class G Grassland	0-5
8	Open Forest A-03	Class B Woodland	0-5
9	Open Forest A-03	Class B Woodland	0-5
10	Woodland B-05	Class B Woodland	0-5
11	Woodland B-05	Class B Woodland	0-5
12	Tussock Grassland G-22	Class G Grassland	0-5
Note: When more than one vegetation type is present each type is classified separately with the worst case scenario being applied. The predominant vegetation is not necessarily the worst case scenario.			

Vegetation Area 1 **Classification Applied:** Class B Woodland

Assessment Comment: remanent woodland vegetation, eucalypt trees ~12m height, sparse surface and near surface fine fuel, creek line with revegetation program

Photo ID: 1a

Photo ID: 1b

Vegetation Area 2 **Classification Applied:** Class B Woodland

Assessment Comment: open woodland in background of photos 2a, tree height ~12m, grass understorey, Area 4 grassland in foreground of 2a

Photo ID: 2a

Photo ID: 2b

Vegetation Area 3 **Classification Applied:** Class B Woodland

Assessment Comment: woodland associated with Roe Highway, grass and minor shrub understorey

Photo ID: 3a

Photo ID: 3b

Vegetation Area 4 **Classification Applied:** Class D Scrub

Assessment Comment: HV powerline corridor, acacia scrub, sparse surface fuel, shrub height ~4-5m

Photo ID: 4a

Vegetation Area 5 **Classification Applied:** Class B Woodland

Assessment Comment: open woodland, eucalypt canopy, grass and minor shrub understorey with variable foliage cover.

Photo ID: 5a

Photo ID: 5b

Vegetation Area 5 **Classification Applied:** Class B Woodland

Assessment Comment: partly managed residential lots with grass understorey

Photo ID: 5c

Vegetation Area 6 **Classification Applied:** Class B Woodland

Assessment Comment: HV powerline corridor, woodland, shrub understorey, connected to unmanaged lots

Photo ID: 6a

Photo ID: 6b

Vegetation Area 6 **Classification Applied:** Class B Woodland

Assessment Comment: onsite woodland areas with shrub understorey, tree height ~9-10m

Photo ID: 6c

Photo ID: 6d

Vegetation Area 7 **Classification Applied:** Class G Grassland

Assessment Comment: Onsite managed and unmanaged grassland

Photo ID: 7a

Photo ID: 7b

Vegetation Area 7 **Classification Applied:** Class G Grassland

Assessment Comment: Onsite partly managed and unmanaged cleared areas of residential lots

Photo ID: 7c

Photo ID: 7d

Vegetation Area 8 **Classification Applied:** Class A Forest

Assessment Comment: open forest associated with Crumpet Creek reserve, shrub understorey, public open space, tree height ~10m with foliage cover ~30-40%

Photo ID: 8a

Photo ID: 8b

Vegetation Area 8 **Classification Applied:** Class A Forest

Assessment Comment:

Photo ID: 8c

Vegetation Area 9 **Classification Applied:** Class A Forest

Assessment Comment: offsite forest, Norwood Reserve, shrub& dryandra understorey, tree height ~9m

Photo ID: 9a

Vegetation Area 10 **Classification Applied:** Class B Woodland

Assessment Comment: woodland on road reserve, recently partially burnt, minor shrub understorey, tree height ~10m

Photo ID: 10a

Photo ID: 10b

Vegetation Area 11 **Classification Applied:** Class B Woodland

Assessment Comment: offsite western side of Roe Highway road reserve, shrub understorey

Photo ID: 11a

Photo ID: 11b

Vegetation Area 12 **Classification Applied:** Class G Grassland

Assessment Comment: offsite grassland

Photo ID:12a

Photo ID:12b

5.1.2 Vegetation Excluded from Classification

Certain areas and vegetation within 100m of the subject site may be assessed as 'low threat or non-vegetated'. These are to be excluded from classification and are therefore rated BAL-LOW. They must be managed to maintain the specifications set out in AS3959-2009 s2.2.3.2 in perpetuity (refer to Appendix 3 'Vegetation Classification Exclusions').

For this assessment, there have been several orchards within the subject site that has been excluded as per AS3959-2009 s2.2.3.2(f). Additionally, residential areas outside of the subject site have been excluded as low threat.

5.1.3 Expected On-site Vegetation Changes Due to Proposed Subdivision or Development

In assessing vegetation for bushfire threat, consideration must be given to possible future vegetation changes likely on the site that is being assessed, particularly those that would have the potential to increase the bushfire risk.

This may be due to growth of existing vegetation or growth of planned landscape plantings, including future roadside or water course re-vegetation. There must be careful consideration of the creation of vegetation corridors where they join offsite vegetation and may provide a route for fire to enter an area of future development.

For this Proposal, the future onsite vegetation has been considered and is expected to be maintained as "low threat" with a BAL rating of BAL-Low. It will meet *AS 3959-2009 s2.2.3.2* requirements (refer Appendix 3 'Vegetation Classification Exclusions'). These areas include the

existing residential areas that have been classified as open woodland and woodland within the subject site.

For this assessment, the areas of Public Open Space (POS) that is classified as forest associated with the Crumpet Creek and Woodland associated with Poison Gully will be maintained as classified vegetation. The vegetation that is also associated with the high voltage power lines that runs within the subject site is assumed to be maintained as classified vegetation into the future.

Figure 5.1

Topography & Classified Vegetation

Maida Vale Rezoning Area
Maida Vale

LEGEND

- Subject Site
- Other Lots
- Photo Locations
- Area of Interest - 150m extent
- Class (A) Forest
- Class (B) Woodland
- Class (D) Scrub
- Class (G) Grassland
- Exclusion - 2.2.3.2

SCALE (A3)

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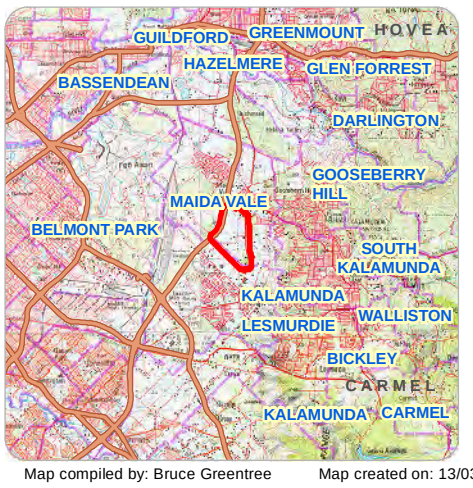
Metres

LOCALITY



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5.2 Bushfire Hazard Level (BHL) Assessment

"A Bushfire Hazard Level assessment provides a 'broad-brush' means of determining the potential intensity of a bushfire for a particular area. The Bushfire Hazard Level assessment assists in informing the suitability of land contained within strategic planning proposals for future subdivision and development.

The Bushfire Hazard Level assessment categorises land within a designated bushfire prone area as having a low, moderate or extreme bushfire hazard level. Different hazard levels may be assigned to different parts of individual lots.

Bushfire Hazard Level assessments allow for early strategic consideration of bushfire risk which can then be used to inform the more detailed stages that follow, ensuring all issues are considered, identified and properly addressed at the earliest possible time ('Guidelines' s4.1)".

For a summary of the assessment methodology refer to Appendix 2. BHL assessments are required to accompany all strategic planning proposals unless the future lot layout of the Proposal is known in which case a BAL Contour Map is more appropriate (SPP 3.7 s6.3).

Assessment Results

The results of the Bushfire Hazard Level assessment detailing the vegetation type, class and the hazard levels assigned, are presented in Table 5.2.1 and visually in Figure 5.2 as a Bushfire Hazard Level Map. If additional assessment inclusions are required in this Plan, they are identified in Table: 5.2.2

Table 5.2.1: BHL assessment

Bushfire Hazard Level Assessment	
Data Used (methodology as per the 'Guidelines' Appendix 2):	**site inspection + aerial map data**
Assessed Area	**Bushfire Hazard Level**
Land inside the external boundary of the subject site:	**Moderate + Extreme**
Land within 100 metres of external boundary of the subject site:	**Low + Moderate + Extreme**

The Bushfire Hazard Level mapping demonstrates that the Bushfire Hazard Level to which future and existing residences will be exposed, will be reduced after development, see Figure 5.3 for post development hazard level assessment.

Table 5.2.2: Required additional assessment.

Required Additional Assessment	
If any of the assessed area is determined to have an Extreme BHL this will trigger further considerations. Can the extreme hazard level be initially reduced to low or moderate and then maintained for the life of the development?	**No**
A 'Yes' response requires that Section 7 of this Plan 'Bushfire Risk Management Measures' will outline how this will be achieved. A 'No' response requires that the indicative Bushfire Attack Levels for the subject site will need to be BAL-29 or lower in order to be considered suitable for development – unless the development meets the definition of 'unavoidable' development.	
Are the indicative Bushfire Attack Levels for the subject site BAL-29 or lower?	**Yes**
Is this proposal for 'minor' or 'unavoidable' development?	**No**

5.2.1 Identification of Specific Issues Arising from BHL Assessment

Within the subject site the vegetation associated with Crumpet Creek is currently public open space and will be retained as classified vegetation and therefore will remain as an extreme risk. In future planning stages the appropriate separation distances need to be applied to any future development plans with the inclusion of low threat areas such as roads, managed parklands or carparks.

The vegetation associated with the Roe Highway and the high voltage power line will be retained as unmanaged woodland or scrub as will require the appropriate separation distances incorporated into any future plans.

Figure 5.2

Bushfire Hazard Level

Pre - Development

Maida Vale Rezoning Area
Maida Vale

LEGEND

- Subject Site
- Other Lots
- Area of Interest - 150m extent

Bushfire Hazard Mapping

- Extreme Bushfire Hazard
- Moderate Bushfire Hazard
- Low Bushfire Hazard

LOCALITY

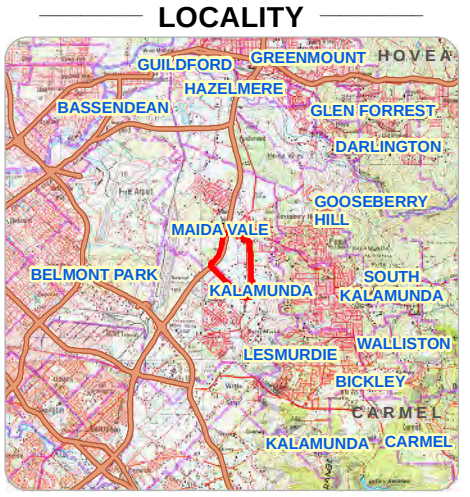

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Figure 5.3

Bushfire Hazard Level

Post - Development

Maida Vale Rezoning Area
Maida Vale

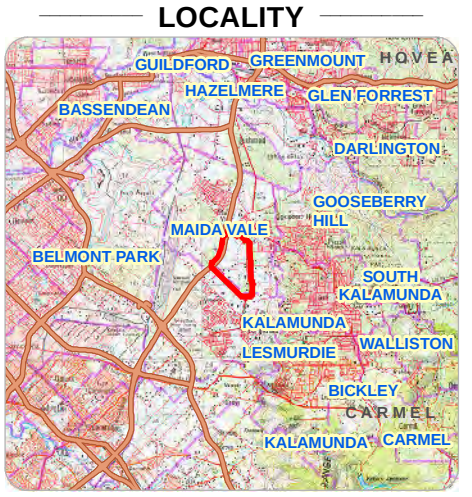
LEGEND

- Subject Site
- Other Lots
- Area of Interest - 150m extent

Bushfire Hazard Mapping

- Extreme Bushfire Hazard
- Moderate Bushfire Hazard
- Low Bushfire Hazard

LOCALITY



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5.3 Bushfire Attack Level (BAL) Assessment – BAL Contour Map

Bushfire Prone Planning's BAL Contour Map Guide

Description and Purpose of the BAL Contour Map ('Guidelines')

A Bushfire Attack Level (BAL) Contour Map identifies land suitable and unsuitable for development and guides the location of building envelopes within a development site. The BAL Contour Map is a scale map of a development site (which can include proposed or an existing lot layout), which identifies indicative BAL ratings across the development site and within the immediate surrounding area. The map illustrates potential bushfire attack levels and radiant heat impacts in relation to any classified vegetation that will remain within 100 metres of the assessment area once development is constructed i.e. when the land has been cleared and all the subdivision works have been undertaken. It needs to take into account any vegetation that will remain or will be introduced when the works are complete (source: *WAPC Factsheet "BAL Contour Maps" Version 2 January 2016*).

BAL Contour Map Interpretation

The contour map will present different coloured contour intervals constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels (BAL's) that exist as the distance increases away from the classified vegetation. Each BAL represents a set range of radiant heat flux (refer to Appendix 2) that can be generated by the bushfire in that vegetation. The width of each shaded contour interval (i.e. the applicable vegetation separation distances corresponding to a BAL rating) will vary and is determined by calculations involving vegetation type, fuel structure, ground slope, and climatic conditions (i.e. the expected fire behaviour). They are unique to a site and can vary across a site.

The Primary Use of BAL Contour Mapping - Planning

BAL contour mapping is primarily a planning tool that can give an overview as to the suitability of a site for development with respect to the extent to which bushfire is a potential threat to future buildings and persons on the subject land.

The mapping considers the development site (i.e. all existing or proposed lots) and does not consider the bushfire risk at an individual lot level or over different development time frames. Rather it is assessing the situation that will exist when the entire development has been completed, including any vegetation management that would reasonably be expected to take place as part of establishing buildings on the lots. On this basis, it helps decision makers determine the suitability of the proposed development for planning approval.

As a result, there will be situations where, for the purposes of planning, classifiable vegetation is not contoured (e.g. e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). However, at a specific point in time (prior to full completion of a development) this vegetation may impact on a proposed buildings BAL rating.

A Secondary Use of BAL Contour Mapping - Building

Building approval (and the issue of a building permit) requires that a BAL rating is determined for an actual building and not just a lot or a building envelope (i.e. an 'area'). Determination of this BAL rating must consider the actual location of a building within an individual lot and its separation distance from any classified vegetation at the actual time of applying for building approval. It is a site-specific assessment based on the buildings design and location at a given point in time.

This specific assessment (BAL report and BAL certificate) required for a building application cannot always be derived from an assessment that is primarily designed to inform planning decisions. As a result, there are limitations to obtaining a single BAL rating for a future building of unknown location, from a BAL contour map assessment.

Nonetheless, there are limited specific situations where the required building application information (i.e. a BAL Certificate) might be obtained quickly and cost effectively from a BAL contour map assessment. When these 'determined' BAL's can be derived is explained in Section 5.3.2 'BAL's As Indicated / Determined by the BAL Contour Map'.

Figure 5.4

BAL Contour Map

Maida Vale Rezoning Area
Maida Vale

LEGEND

- Subject Site
- Other Lots
- Area of Interest - 150m extent

Bushfire Attack Levels (Method 1)

- BAL FZ (Indicative only)
- BAL 40 (Indicative only)
- BAL 29 (Indicative only)
- BAL 19 (Indicative only)
- BAL 12.5 (Indicative only)
- BAL LOW (Indicative only)

SCALE (A3)

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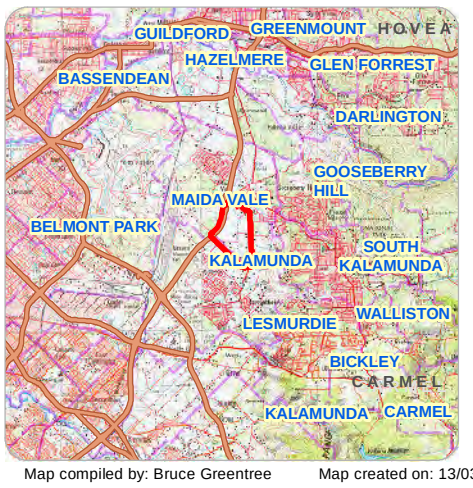
Metres

LOCALITY



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5.3.1 Construction of the BAL Contours - Statement of Site Data and 'Separation Distance Range' Applied

For the subject site, the vegetation separation distance range that corresponds to each Bushfire Attack Level (and represented by Figure 5.4, the BAL Contour Map), has been derived from:

1. An AS3959-2009 Method 1 assessment and sourced from AS3959-2009 Table 2.4.3; and/or
2. An AS3959-2009 Method 2 assessment as per AS3959-2009 Appendix B.

The separation distances for the classified vegetation that is shown to be retained as part of the development in Figure 5.4 has utilised Table 2.4.3 from AS3959-2009 Method 1. The separation distances for the applicable BAL rating can be utilised to assist future planning stages in developing appropriate plans with respect to reducing the bushfire risk in the area.

5.3.2 BAL's as Indicated / Determined by the Contour Map

Bushfire Prone Planning's Interpretation of Deriving BAL Ratings from the BAL Contour Map

Indicative BAL Ratings

If the assessed BAL for a lot or building envelope (the 'area') is stated as being 'indicative', it is because that 'area' is impacted by more than one BAL contour interval and/or classifiable vegetation remains on the lot, or on adjacent lots, that can influence a future building's BAL rating (and this vegetation may have been omitted from being contoured for planning purposes e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). In this report the indicative BAL is presented as either the highest BAL impacting the 'area' or as a range of achievable BAL's within the 'area' – whichever is the most appropriate.

The BAL rating that will apply to any future building within that 'area' will be dependent on:

1. vegetation management onsite; and/or
2. vegetation remaining on adjacent lots; and/or
3. the actual location of the future building within that 'area'.

A BAL Certificate cannot be provided for future buildings within an 'area' with an indicative BAL until the location of any future building has been determined. It usually requires an onsite visit and a BAL assessment report to be produced before the certificate can be issued.

Determined BAL Ratings

If the assessed BAL for a Lot or building envelope (the 'area') or existing building, is stated as being 'determined' it is because that 'area' or building is impacted by a single BAL contour interval. This has been determined by offsite classified vegetation, and no classifiable vegetation currently exists on the lot or on adjacent lots (i.e. it has been cleared to a minimal fuel, low bushfire threat state).

As a result, a determined BAL can be provided in this limited situation because:

1. No classified vegetation is required to be removed or modified to achieve the determined BAL, either within the lot or on adjacent lots (or if vegetation is excluded from classification, it is reasonable to assume it will be maintained in this state into the future); and
2. A future building can be located anywhere within the 'area' and be subject to the determined BAL rating; and
3. The degree of certainty is more than sufficient to allow for any small discrepancy that might occur in the mapping of the BAL contours.

A BAL Certificate (referring to the BAL Contour Map assessment) can be provided for a future building on those 'areas' assessed as having a determined BAL as long as the assessment is still valid and there is no requirement reassess the vegetation and update the contour map (this is a dependant on the time that has passed since the original assessment). Note also that a BAL Certificate will only remain valid for one year).

5.3.3 Identification of Specific Issues Arising from BAL Contour Map

Onsite Vegetation

Vegetation onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to any approval being required by a local government.

As stated in the sections above the onsite vegetation associated with the power lines and Crumpet creek will be retained into the future development plans.

Offsite Vegetation

Vegetation offsite is not within the control of the subject site's landowner and therefore the vegetation cannot be removed or modified by the landowner and as a result the assessed BAL's determined by this vegetation are unable to be reduced.

6 Environmental Considerations

"Many bushfire prone areas also have high biodiversity values. SPP 3.7 Policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values" ('Guidelines' s2.3).

"Clearing of native vegetation in Western Australia requires a clearing permit under Part V, Division 2 of the Environmental Protection Act 1986 unless clearing is for an exempt purpose. Exemptions from requiring a clearing permit are contained in Schedule 6 of the Act or are prescribed in the Environmental Protection Regulations" ('Guidelines' s2.3).

Existing conservation areas that are potentially affected by the development proposal are required to be identified. This may result in vegetation removal/modification prohibition or limitations. These areas include:

- National Parks;
- Nature Reserves; and
- Bush Forever sites.

Further, the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), administered by the Australian Government Department of Environment, provides a national scheme of environment and heritage protection and biodiversity conservation. The objectives of the of the EPBC Act include the protection of the environment with respect to matters of national environmental significance and conservation of Australian biodiversity.

Nationally threatened species and ecological communities are a specific matter of significance. Areas of vegetation can be classified as a Threatened Ecological Community (TEC) under the EPBC Act and consequently have removal restrictions imposed.

6.1 Native Vegetation and Re-vegetation

Protection of Native Vegetation

For the proposed development site, have any existing conservation areas been identified?	No
Type of existing conservation classification:	N/A
Other identified conservation issue to be considered:	Proximity to Watercourse
For the proposed development site, have any areas of native vegetation been identified as species that might result in the classification of the area as a Threatened Ecological Community (TEC)?	No
Potential TEC species identified:	N/A

Minimising Removal of Native Vegetation

Establishing development in bushfire prone areas can adversely affect the retention of native vegetation through clearing associated with the creation of Asset Protection and Hazard Separation Zones. Where loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, it will be necessary to consider available options to minimise the removal of native vegetation.

Options to Minimise Removal of Native Vegetation	Considered and Implemented in this Proposal
Reduce lot yield	N/A
Cluster development	Yes
Construct building to a higher standard as per BCA and AS 3959-2009	Yes
Modify the development location	No

Comment: All future development will be required to incorporate bushfire planning guidelines and to construct to AS3959-2009 standards where appropriate.

Riparian Vegetation Maintenance and Re-vegetation

Where, as part of the Proposal, revegetation of waterway foreshore, wetland or coastal buffers is necessary for their protection or management, this bushfire management plan assesses the ability and practicality of maintaining vegetation separation distances corresponding to determined BAL's.

Maintenance and/or re-vegetation of riparian and/or coastal areas is part of this Proposal?	Yes
Can the required BAL separation distance be maintained into the future?	Yes

Comment: The vegetation areas associated with Poison and Crumpet Creeks will be retained and will require management with respect to the waterways and any future development adjacent to these areas.

Impact on Adjoining Land

Does this planning proposal satisfy bushfire protection requirements within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes

7 Bushfire Risk Management Measures

7.1 The Bushfire Protection Criteria – Assessment of Compliance

State Planning Policy 3.7 Planning in Bushfire Prone Areas (DoP 2015) requires an assessment against the bushfire protection criteria requirements contained in the Guidelines for Planning in Bushfire Prone Areas (*WAPC v1.1 2017*) Section 4.5 and Appendix 4.

This assessment is to accompany any strategic planning proposal, subdivision application or development application.

Strategic planning proposals need to demonstrate that compliance can be achieved in subsequent planning stages. Subdivision and development applications must demonstrate compliance within the boundary of the subject site or provide justification for those criteria that are not able to be fully met.

The bushfire protection criteria are divided into four elements location, siting and design, vehicular access and water.

For each element, there is:

1. An intent stating the required outcome (overall aim);
2. A performance principle that is a general statement of how best to achieve the intent; and
3. One or more specific criteria to be addressed and for which an acceptable solution is provided as an example of one way of meeting the criteria (and therefore the elements intent).

A proposals compliance with each element is determined by either one or a combination of the following:

1. For each relevant criterion, fully meeting the requirements of the acceptable solution (which automatically achieves the intent for that criteria); and/or
2. For one or more relevant criteria, not fully meeting the requirements of the acceptable solution but achieving the requirements of the performance principle by employing a relatively minor variation on the acceptable solution; and/or
3. For one or more relevant criteria, developing an alternative solution that will achieve the performance principle.

Bushfire Prone Planning presents the required assessment against all the bushfire protection criteria as a separate table for each element and includes the intent, the performance principle and acceptable solution examples, for convenient reference.

Summarised Outcome of the Assessment Against the Bushfire Protection Criteria							
Element *each element consists of one or more applicable 'acceptable solutions'*	**Complies With All Applicable 'Acceptable Solutions'** *or will comply*	**Achieves the Intent of the Element for All Applicable 'Acceptable Solutions'** *or will achieve*	**Required Basis of the Planning Assessment**				**Notes**
			Acceptable Solutions		**Performance Principle**		
			Complies With All Applicable 'Acceptable Solutions' *or will comply*	**Achieves the Intent of the Element** *(or will achieve)* *For one or more applicable 'acceptable solutions' the solution is not fully met. A variation of the solution is provided and justified.*	*An Alternative Solution is Developed and Presented*	**As Minor or Unavoidable Development**	
Location	Will in the Future		✓			N/A	
Siting and Design of Development	Will in the Future		✓				
Vehicular Access	Will in the Future		✓				
Water	Yes		✓				

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Bushfire Protection Criteria - Element 1- Location			
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.			
Performance Principle P1 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the strategic planning proposal, subdivision or development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low **OR** a BAL-29 or below applies **AND** the risk can be managed. For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of DFES and the decision-maker.			
Acceptable Solution	**Further Explanation**	**Compliance**	**Assessment Statements**
A1.1 Development Location The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low; **OR** Be subject to BAL-29 or below; **AND** the risk can be managed.	Land is most suitable for land use intensification where hazard levels are low. Where there is an extreme bushfire hazard level or requirements for use of BAL-40 or BAL-FZ construction standards, the land is not considered suitable for development unless it meets the definition of minor or unavoidable development. Minor development requires local government planning approval. Unavoidable development requires demonstrating that risk can be managed to the satisfaction of DFES, WAPC and local government.	Will Fully Comply with the Acceptable Solution	The subject site is located within a designated bushfire prone area. By implementing the positioning and vegetation management measures identified in this Plan any future development can meet the acceptable solution of being subject to BAL-29 or below and result in the bushfire risk being able to be managed. It does not require the use of BAL-40 or BAL-FZ construction standards.

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Bushfire Protection Criteria - Element 2 - Siting and Design of Development

Intent: To ensure that the siting and design of development minimises the level of bushfire impact *(note: not related to construction standards to apply).*

Performance Principle P2 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire risk that applies to the site. That it incorporates a defendable space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS3959 if appropriate.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
A2.1 Asset Protection Zone (APZ) Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements: **Width:** Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29 kW/m^2 (BAL-29) in all circumstances. **Location:** The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot/s will be managed in a low-fuel state on an ongoing basis, in perpetuity. **Management:** The APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' ('Guidelines' Appendix 4, Element 2 Schedule 1). Also, refer to Appendix 3 and 4 of this Plan/Report.	The APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level by reducing fuel loads (predominantly combustible vegetation). The required width of the APZ varies with the vegetation impacting the site and ground slopes. The APZ is to include a defendable space (minimum 3m width) – an area adjoining the asset in which vegetation is kept to an absolute minimum and free from combustible items and obstructions – to facilitate fire fighting operations. Where the loss of vegetation is not acceptable or causes conflict with landscape and environmental objectives, then the development may need to be modified.	Will Fully Comply with the Acceptable Solution	Any future development will meet the acceptable solution by: • Being able to establish an APZ of the required dimensions (as determined by the classified vegetation impacting the Site and the relevant ground slopes) within the lot/s boundary. The required and achievable APZ dimensions will meet BAL-29 rating; and • The landowner/s having the responsibility of implementing the requirements of the 'Standards for APZ's' and continuing to manage the APZ to the required specifications, maintaining it in a low fuel state.

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Bushfire Protection Criteria - Element 3 - Vehicular Access			
Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.			
Performance Principle P3 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.			
Acceptable Solution	**Further Explanation**	**Compliance**	**Assessment Statements**
A3.1 Two access routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents and the public at all times and under all weather conditions.	This is to apply to access routes leading into a subdivision as well as those within a subdivision. All access should accommodate type 3.4 fire appliances (4WD 7t chassis). Two-way access should be provided as a public road, however, where a public road cannot be provided (and this will need to be demonstrated by the proponent providing justification), an emergency access way may be considered.	Will Fully Comply with the Acceptable Solution	The subject site has several dead end roads as part of the legacy development design.

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Bushfire Protection Criteria - Element 3 - Vehicular Access (continued)

Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

Performance Principle P3 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
A3.2 Public Road Minimum trafficable surface of 6m. Constructed to meet the technical requirements stated in Appendix 5.	In special circumstances, where ≤8 lots serviced, a minimum 4m trafficable surface for a maximum of 90 might be approved.	Will Fully Comply with the Acceptable Solution	All future public roads will comply with the technical requirement of the Guidelines.
A3.3 Cul-de-sacs - (includes dead-end roads). A maximum length of 200m with a 17.5m turnaround. 600m length if cul-de-sacs services ≤8 lots and is joined to another cul-de-sac by an emergency access way of <600m). Constructed to meet the technical requirements stated in Appendix 5.	Should be avoided in bushfire prone areas as they do not provide access/egress in different directions. Where no alternative exists this will need to be demonstrated by the proponent including if the lot layout already exists. Cul-de-sac is to connect to a public road.	Will Fully Comply with the Acceptable Solution	Several of the existing cul de sac roads do not comply with the Guidelines and future plans should attempt to remove dead end roads from the site by linking into existing or future road networks
A3.4 Battle-axe Maximum length 600m, minimum width 6m, passing bays @ 200m, turnaround area @ 500m and at house site. Constructed to a minimum of private driveway standards. Constructed to meet the technical requirements stated in Appendix 5.	Should be avoided in bushfire prone areas If no alternative exists this will need to be demonstrated by the proponent.	Will Fully Comply with the Acceptable Solution	Any future battle axe lots will comply with the technical requirements of the Guidelines.

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Bushfire Protection Criteria - Element 3 - Vehicular Access (continued)			
Acceptable Solutions	**Further Explanation**	**Compliance**	**Assessment Statements**
A3.5 Private Driveways Are required where a house is >50m from a public road. Passing bays @ 200m, turnaround area @ 500m and within 50m of house. Bridges/culverts to support 15t. All weather surface. Constructed to meet the technical requirements stated in Appendix 5.		Will Fully Comply with the Acceptable Solution	All private driveways will be designed and constructed to comply with the Guidelines. This is the landowner's responsibility.
A3.6 Emergency Access Way Provided as a right of way or public access easement in gross (maximum length of 600m) to ensure accessibility to the public and fire services in emergencies. It should comply with minimum standards for a public road and be signposted. Constructed to meet the technical requirements stated in Appendix 5.	An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists this will need to be demonstrated by the proponent. It is to be provided as an alternative link to a public road during emergencies.	Will Fully Comply with the Acceptable Solution	
A3.7 Fire Service Access Routes - (perimeter roads) Provided as rights of way or public access easements in gross; all weather surface and allow for two-way traffic; dead-end roads not permitted; turnarounds every 500m; less than 600m to a public road and be signposted. Constructed to meet the technical requirements stated in Appendix 5.	Fire service access routes should be established to separate bushfire prone areas from developed areas and to provide access within and around the edge of the subdivisions and related development. To be used during bushfire suppression operations and prevention work.	Will Fully Comply with the Acceptable Solution	
A3.8 Firebreak Width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level prescribed in the local firebreak notice issued by the local government.		Will Fully Comply with the Acceptable Solution	The proposed lots will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.

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Bushfire Protection Criteria - Element 4 – Water

Intent: To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

Performance Principal P4 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
A4.1 Reticulated Areas The subdivision, development or land use is provided with a reticulated water supply, in accordance with the specifications of the relevant water supply authority and DFES. Constructed to meet the technical requirements stated in Appendix 6.	The Water Corporations 'No 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply. Additionally, any local government variation must be met (s8.4).	Fully Complies with the Acceptable Solution	A reticulated water supply is available in the area of the subject site and hydrants will be required to installed to the Watercorp and DFES standard DS63.
A4.2 Non-Reticulated Areas Water tanks for firefighting purposes with a hydrant or standpipe are provided. Minimum of 50,000l/tank; minimum 1 tank/25 lots (or part thereof); house ≤2km from a tank; 20min turnaround time for 2.4 appliance; hardstand area suitable for 3.4 appliance within 3m of tank Must meet the technical requirements stated in Appendix 6. Any local government variation must also be met (s8.4).	The specification of the requirements for the proposal being assessed will be set by the water supply authority and DFES. A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity at all times, including home tanks on single lots. This could be in the form of an agreement with the local government and the fire service. Water tanks and associated facilities are vested in the relevant local government	N/A	
A4.3 Non-reticulated Areas (Individual Lots) Single lots above 500 m^2 need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres. Must meet the technical requirements stated in Appendix 6.	A4.3 is only for use if creating one additional lot and cannot be applied cumulatively.	N/A	

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7.2 Location of Buildings and Applicable BAL's

Future buildings on the proposed lots are to be located in areas where an appropriate Bushfire Attack Level rating can be achieved and where minimal removal of valuable existing native vegetation is required to achieve this rating. The intent is to have the subject land of this Proposal located in an area where the bushfire hazard level is, or will on completion, be moderate or low or be subject to a maximum Bushfire Attack Level of BAL-29.

The proposed subdivision is unlikely to be approved if the indicative BAL rating for future buildings on any proposed lots is either BAL-40 or BAL-FZ as it is unacceptable on planning grounds. The exception will be if it meets the definition of unavoidable development ('Guidelines' s5.4 and s5.7). If this applies the appropriate additional assessment and input from the relevant authorities, if required, is included in this Plan.

Any future development plans within the subject site will be required to be located appropriately to reduce the bushfire risk and building to be constructed to comply a determined BAL rating as per AS3959-2009.

7.3 Vegetation Management

Ongoing Maintenance of Assessed Vegetation

1. Where any existing or planned, re-vegetation has been assessed as "low threat" (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements (refer to Appendix 3) and enable the buildings to retain their determined BAL ratings;

2. Any classified vegetation onsite (i.e. within a subject lot) that has directly contributed to the determined BAL rating for a given building, will be managed such as to not change that vegetation to a higher risk classification; and

3. Where a local government issues an annual firebreak notice under s33 of the Bush Fires Act 1954, this will be complied with.

Bushfire Protection Zones

The *Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)* set out the requirements to create an Asset Protection Zone (APZ) and a Hazard Separation Zone (HSZ). The aim of these bushfire protection zones is to have a fire of diminishing intensity and flame length as it approaches development. These reduced fuel loads will reduce the intensity of radiant heat onto the buildings, thereby increasing their survivability. This will also be important for firefighter and occupant's safety during fire suppression activities.

Asset Protection Zone (APZ) – This is to be established, within a subject lot's boundary such that a building will not be subject to a BAL rating greater than BAL-29. On a lot size where it is possible to achieve, it is to be a minimum width of 20 metres and increased when directed to the width required such that such that a building will not be subject to a BAL rating greater than BAL-29.

The APZ must be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning "there is insufficient fuel available to significantly increase the severity of the bushfire attack" and being "recognisable as short cropped grass for example to a nominal height of 100mm."

Refer to Appendix 3 and Appendix 4 for specific technical requirements.

Establishing the APZ

An Asset Protection Zone (APZ) creating a low fuel area will be required to be incorporated into the landscaping surrounding current and any future buildings within the subject site with a BAL rating of BAL-29 or lower with the appropriate separation distances.

Management of vegetation that is currently classified vegetation will be a major part of managing the bushfire risk within the subject site. Any retained vegetation that will not be managed will affect the separation distances required for developments. The specific separation distances and appropriate BAL

ratings will need to be assessed in future planning stages with Figure 5.4 showing an indicative BAL contour map that may provide some guidance for future planning stages but will need to be confirmed in the future.

7.4 Vehicular Access – Element 3 of the Bushfire Protection Criteria

The intent of the 'Vehicular Access' element of the bushfire protection criteria is "to ensure that the vehicular access/egress servicing a subdivision/development is available and safe during a bushfire event". The performance principle to be met is that "The internal layout, design and construction of public and private roads must allow emergency and other vehicles to move through the subdivision/development easily and safely at all times".

The required outcome is that in the event of a bushfire, personal safety must be able to be maintained when travelling on the access/egress route.

How this Proposal complies with the acceptable solutions for the vehicular access criterion and is stated in Section 7.1 'The Bushfire Protection Criteria – Assess and Demonstrate Compliance'. If additional information is required to further demonstrate compliance and/or present alternative solutions, this is presented below in this Section 7.4 'Vehicular Access'.

Vehicular Access - Acceptable Solution A3.1 - Two Access Routes

The existing road network has several dead end roads that do not comply with the requirement of two way access from some existing properties. In future development and structure plans the establishment of two way access and removal of the dead end roads is seen as achievable to reduce the bushfire risk to the public and residents in the area.

Any future public roads and emergency access ways will be developed to comply with the technical requirements of the Guidelines.

Vehicular Access - Acceptable Solution A3.1 -Private Driveways & Battle axe

Any future development within the subject site will design and construct all private driveways and battle axe lots to comply with the technical requirements of the Guidelines. See Appendix 6 for further details.

7.5 Firefighting Water Supply

The intent is to ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire. This intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.

A reticulated water supply exists for the subject site with hydrants located within and surrounding the site. Any future development plans will be required to comply with WaterCorp and DFES standards including DS63 with the placement and installation of hydrants.

7.6 Building Construction Standards

7.6.1 Future Habitable Buildings on the Subject Site

Building Classes 1, 2, 3 and 10a

The Building Code of Australia (BCA) contains bushfire construction requirements that are applied to residential buildings of Class 1, 2 or 3 and associated Class 10a buildings and decks. These are required by the BCA to be designed and constructed to reduce the risk of ignition from a bushfire, appropriate to the potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire, and the intensity of the bushfire attack on the building - as quantified by the BAL rating for the development site.

The BCA references *AS3959-2009 Construction of buildings in bushfire prone areas* or the *(NASH) Standard – Steel Framed Construction in Bushfire Prone* Areas (for Class 1a and 1b buildings only) as deemed to satisfy solutions that provide one way of complying with the Building Code's bushfire performance requirements.

Note: Higher construction standards can be either applied by a planning authority or presented as a part of an alternative solution in this Plan to enable compliance with the intent of the Bushfire Protection Criteria.

Buildings Classes 4 to 9

The BCA does not require Class 4-9 buildings to meet bushfire performance requirements. However, the responsible planning authority may condition planning approval with the requirement for the building works to be designed and constructed to reduce the risk of ignition from a bushfire - or a proponent might voluntarily adopt this approach.

The required bushfire performance measures will be those necessary to reduce the potential risk of ignition caused by burning embers, radiant heat or flame generated by a bushfire, and the intensity of the bushfire attack on the building - as quantified by the assessed BAL rating for the development site.

These measures would need to be determined by a Fire Engineer (with reference to AS3959-2009), certified in working drawings and approved by the responsible authority.

Bushfire Prone Planning Recommendation - When the subject site is in a designated bushfire prone area and the determined BAL is BAL-LOW, AS3959-2009 does not provide any specific construction requirements. However, Bushfire Prone Planning considers a building in this situation to still be at some risk of an ember attack. To improve the protection for occupants as well as the building itself, we recommend that consideration be given to constructing the proposed building works to the standard corresponding to BAL-12.5.

Bushfire Prone Planning Recommendation – in line with the intent of State Planning Policy 3.7 of preserving life and reducing the impact of bushfire on property and infrastructure, we recommend that the construction of a Class 4-9 building should apply bushfire performance measures appropriate to the assessed BAL rating. The appropriate bushfire performance measures will need to be determined by a Fire Engineer and approved by the responsible planning authority.

7.6.2 Existing Habitable Buildings on the Subject Site

Building Classes 1, 2, 3 and 10a

Class 1, 2 and 3 buildings and Class 10a associated buildings and decks, constructed prior to the requirement to comply with bushfire performance requirements, do not need to meet these requirements.

The *Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)* state, "The policy measures of *SPP 3.7* and these Guidelines are not to be applied retrospectively" (Guidelines s2.2). Further, the WA Building Commission 'Building in Bushfire Prone Areas' information note states "Building standards and regulations are generally not retrospective".

Buildings Classes 4 to 9

Buildings of Class 4 to Class 9 are not required by the Building Code of Australia (BCA) to be constructed to comply with bushfire performance requirements. Although responsible authorities may require it.

Retrospectively upgrading buildings to assist in reducing bushfire risk to persons and property is a voluntary choice.

Bushfire Prone Planning Recommendation - As the existing buildings exist in a bushfire prone area and may be subject to a bushfire attack, Bushfire Prone Planning recommends that some degree of upgrading be considered to improve the protection for occupants and the building's survivability. At a minimum protection from ember attack should be considered (i.e. constructed to the standard required for BAL-12.5).

8 Compliance Statements - of the Proposal and this Plan

This section of the Plan makes statements with respect to the Proposal's compliance against the components of the WA framework for bushfire risk management. It also states how the content of this BMP satisfies the requirements of SPP 3.7.

The key components of the WA framework for bushfire risk management are summarised in Appendix 1.

8.1 State Planning Policy No. 3.7: Planning in Bushfire Prone Areas

SPP 3.7 Policy Objectives - Proposal Compliance Statement		The Proposal Meets Objectives
s5.1	Avoid any increase in the threat of bushfire to people property and infrastructure	**Yes**
Implementation of the bushfire risk management measures as set out in this Plan, including meeting the requirements of the bushfire protection criteria; will avoid any increase in the threat of bushfire.		
s5.2	Identify and consider bushfire risks in decision-making at all stages of the planning and development process (to reduce vulnerability to bushfire).	**Yes**
The bushfire risks have been identified and assessed, as relevant for the stage of this planning submission, using the tools prescribed in *SPP 3.7* (and the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*). Refer to Section 5 'Assessment of Bushfire Risk'.		
s5.3	Ensure that all stages of planning submissions take into account bushfire protection requirements and include specified bushfire protection methods.	**Yes**
The bushfire protection requirements and any specified protection methods, relevant for the stage of this planning submission, have been taken into account and presented in Section 7 'Bushfire Risk Management Measures'.		
s5.4	Achieve an appropriate balance between bushfire risk management measures; biodiversity conservation values; environmental protection and biodiversity management; and landscape amenity, with consideration of climate change.	**Yes**
The components of this objective have been considered along with the requirements set out in the 'Guidelines' s2.3. Identifying and addressing issues relevant for the stage of this planning submission is presented in this Plan in Section 6 'Environmental Considerations'.		

SPP 3.7 Policy Measures – BMP Compliance Statement		This BMP is Compliant
s6.1	Higher order strategic planning documents in bushfire prone areas	**Yes**
The requirements stated in SPP 3.7 s6.3 include provision of high level consideration of relevant bushfire hazards when identifying or investigating land for future development.		
s6.2	Strategic planning proposals, subdivision and development applications	**Yes**
Plans relating to land that has or will have a BHL above low and/or where a BAL rating above BAL-Low apply, are to comply with these policy measures. If the proposal has or will on completion have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, it may be considered for approval when the required information is provided and it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.		
s6.3	Information to accompany strategic planning proposals	**Yes**
The requirements stated in SPP 3.7 s6.3 include provision of a Bushfire Hazard Level assessment (or a BAL contour map if lots are known), identify issues arising from the relevant assessment and demonstrate that compliance with the Bushfire Protection Criteria can be achieved in subsequent planning stages. Refer to Section 5 of this Plan.		
s6.4	Information to accompany subdivision applications	**N/A**
s6.5	Information to accompany development applications	**N/A**
s6.6	Vulnerable or high risk land uses (subdivision and development applications).	**N/A**

SPP 3.7 Policy Measures – BMP Compliance Statement		This BMP is Compliant
s6.7	Strategic planning proposals, subdivision or development applications in areas where an extreme BHL and/or BAL-40 or BAL-FZ applies	**N/A**
These will not be supported unless the proposal is considered to be • Minor development (for specific development applications only, refer to s5.2 5.3) and requiring statements against the items of SPP 3.7 s6.71 (included in Section 7 of this Plan); or • Unavoidable development and requiring statements against the items of SPP 3.7 s6.72 (included in Section 7 of this Plan).		
s6.8	Advice of State/relevant authority/s for emergency services to be sought	**N/A**
For all stages of planning proposals, advice from relevant authorities has been sought, considered and is referenced in Section 7 of this Plan where: • compliance with SPP 3.7 policy measures is unlikely to be achieved; • additional/alternative measures are proposed; and/or • this application contains unavoidable development or vulnerable or high-risk land uses		
s6.9	Advice of State/relevant agencies/authorities for environmental protection to be sought	**N/A**
For all stages of planning proposals, advice from relevant authorities has been sought, considered and is referenced in Section 7 of this Plan where: • The clearing of vegetation within protected environmentally sensitive areas is proposed • Substantial clearing of native vegetation is proposed • Development abuts land managed by a State or Federal authority		
s6.10	Bushfire conditions may be imposed by the decision maker (detailed requirements including modifications and/or conditions)	**Yes**
WAPC and/or the local government may, as a condition of approval, require that a notification be placed on certificates of title and notice of the notification on the deposited plan advising that the lots are in a designated bushfire prone area and subject to a Bushfire Management Plan. This is noted in Section 9 'Responsibilities for Implementation and Maintenance'.		

8.2 Guidelines for Planning in Bushfire Prone Areas (*WAPC v1.1 2017*)

The 'Guidelines' are designed to assist in the interpretation of SPP3.7's objectives and policy measures. As such they have been referenced and complied with in compiling this Bushfire Management Plan which is to accompany the planning submission. This Plan contains, as a minimum, the information required as per the 'Guidelines' checklist.

8.3 Bushfire Protection Criteria (WAPC v1.1 2017 'Guidelines')

The proposed land use has been assessed against the bushfire protection criteria. The assessment of the bushfire risk management measures (i.e. those relevant to each element) and the demonstration of how the proposal meets the criteria are presented in Section 7.1 of this Plan - 'Bushfire Protection Criteria - Assess and Demonstrate Compliance'.

Where the proposal has not been able to fully meet an acceptable solution for a given element or an alternative solution is proposed, then the appropriate sub section of Section 7 'Bushfire Risk Management Measures', demonstrates how the Proposal will comply with the performance principle and the intent of that element. Any required advice and recommendations from DFES and other referral authorities will be included.

8.4 Local Variations to Bushfire Protection Criteria

Are there any endorsed local variations to the bushfire protection criteria (e.g. through a local planning policy) that are to apply to the proposed land use and therefore addressed in Section 7 'Bushfire Risk Management Measures' of this Plan?	No
Does the proposal satisfy the local variations to the bushfire protection criteria?	N/A

8.5 WA Building Act 2011

Relevant regulations associated with the Act are the *Building Regulations 2012* and the Building *Amendment Regulations (No 3)* 2015. The legislation adopts the Building Code of Australia as the minimum technical requirement for the design and construction of buildings and certain other structures in WA and prescribes applicable building standards for certain classes of buildings located in areas designated by the Fire and Emergency Services Commissioner as bushfire prone areas (identified on the Map of Bushfire Prone Areas).

Is this land use proposal at a planning stage at which lot layout is known and construction of buildings (any class) is being proposed?	No

If the response is 'No', then this Proposal is at a planning stage where specific compliance with the Building Act 2011 is not required – rather it will apply at future planning stages. However, if a BAL Contour Map and/or BAL assessment has been provided as part of this Plan, they can apply and may be able to be used for any future planning application (at the applicable planning stage involving construction of buildings).

If the response is 'Yes', then one of the situations below will apply to this proposal.

The Nature of this Land Use Proposal	Applicable
A proposal for a single house or ancillary dwelling (Class 1); or a specified building located in a bushfire prone area on a lot less than 1100m2 or on a lot equal to or greater than 1100m2 but subject to a BAL of BAL-29 or less, does not need to lodge a development application (but will require a building permit application). However, the relevant local government can additionally require that a development application is submitted for planning approval. Bushfire construction requirements will apply in both cases.	-
A proposal for a single house or ancillary dwelling (i.e. Class 1); or a specified building located in a bushfire prone area on a lot equal to or greater than 1100m2 but subject to BAL-40 or BAL-FZ must lodge a development application and bushfire construction requirements will apply.	-
A proposal, regardless of lot size, for a habitable building other than a single house or ancillary dwelling (i.e. Class 2 or 3 residential or accommodation buildings); or a specified building, located in a bushfire prone area, must lodge a development application and bushfire construction requirements will apply.	-
A proposal, regardless of lot size, for mixed use, commercial, industrial buildings or public facilities (i.e. Class 4-9 buildings), located in a bushfire prone area, and must lodge a development application. Bushfire construction requirements will not apply (unless the local government additionally requires them to apply).	-

This Proposal is for a planning stage that does not yet require compliance with the *WA Building Act 2011.* However, the obligation for future buildings to be constructed to the standard corresponding to a determined bushfire attack levels is noted in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance'.

8.6 AS 3959 Construction of Buildings in Bushfire Prone Areas (2009 as amended)

This Proposal complies with the methodology set out in *AS 3959* to classify vegetation that is a bushfire threat and to calculate the bushfire attack levels presented as a BAL Contour Map and/or a BAL assessment in Section 5 of this Plan 'Assessment of Bushfire Risk'.

For the construction of any Class 1, 2, 3 buildings and associated Class 10a buildings and decks, this land use proposal will comply with the construction requirements, set out in *AS 3959,* that correspond to the determined bushfire attack level/s for the subject site. This obligation is stated in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance'.

8.7 Local Government Firebreak Notice

This Proposal complies with the requirements of the relevant local government notice by stating the landowner's obligations in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance.' Additionally, the obligation is noted in Section 7.3 'Vegetation Management'.

9 Responsibilities for Implementation & Maintenance

This section sets out the responsibilities of landowners/proponents (including future landowners), builders and local government in relation to the implementation and maintenance of the requirements of SPP 3.7 and the 'Guidelines'.

9.1 Landowner / Proponent Responsibilities (and those acting on their behalf)

Implementation

- Ensure anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information. This includes the landowners/proponents, local government and any other authorities or referral agencies ('Guidelines' s4.6.3).

- Construction of public roads and cul-de-sacs must comply with the standards (Appendix 5 'Vehicular Access').

- Construction of emergency access ways, fire service access routes and associated signs and gates must comply with the standards (Appendix 5 'Vehicular Access').

- Construction of private driveways and battle axes must comply with the standards (Appendix 5 'Vehicular Access').

- Installation of a reticulated water supply must comply with the standards (Appendix 6 'Water') or the requirements set out by the relevant local government.

- Implement the low fuel Asset Protection Zone (APZ) as per s7.3 'Vegetation Management' and Appendix 4 'APZ'.

- Before any of the subject lots are sold, each individual lot is to be compliant with the local government's annual firebreak notice (referenced in this Plan s7.3 'Vegetation Management' and Appendix 4 'APZ').

- Ensure all future buildings the landowner/proponent has responsibility for, are designed and constructed in full compliance with the requirements of the WA Building Act 2011 and the referenced Building Code of Australia (BCA), and with any identified additional requirements of the relevant local government. This should include due consideration of constructing any Class 4-9 buildings to the standard corresponding to their determined BAL even though not required by the BCA.

For any Class 1, 2, or 3 buildings and associated Class 10a buildings or decks this will include compliance with AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas* (2009 as amended) and/or the National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas,* whereby construction standards corresponding to the assessed BAL will be applied (Appendix 2 'Bushfire Risk Assessment – Methodology Explained').

Deposited Plan and Certificate of Title – Potential Obligation

The WAPC may condition a subdivision application approval with a requirement for the landowner / proponent to place a notification onto the certificate(s) of title and a notice of the notification onto the diagram or plan of survey (deposited plan). This will be done pursuant to Section 165 of the Planning and Development Act 2005 ('Hazard etc. affecting land, notating titles as to:') and applies to lots with a determined BAL rating of BAL-12.5 or above.

The notification will be required to state: 'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and may be subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land'.

Maintaining Compliance

- Current and future landowners/proponents must continue to apply the bushfire management measures set out in this Plan. They must inform any builders (of future structures on a Lot) of the existence of the Plan and the responsibilities it contains.

- The landowner/proponent is responsible for the ongoing review and implementation of the Bushfire Management Plan to ensure that the bushfire risk management measures remain effective. Bushfire plans do not expire and should be seen as a 'living document'. They may require updating in certain circumstances, including (but not limited to) if site conditions change, if further details are required at subsequent stages of the planning process or to reflect new technologies or methodologies in best practice bushfire risk management ('Guidelines' s4.6.4 and s4.6.5).

- Respond to and comply with fire protection or hazard management notices issued by the local government. This includes compliance with the Shire of Kalamunda Annual Fire Break Notice (the current requirements can be found on the Shire of Kalamunda website), issued under s33 of the Bush Fires Act 1954 as directed by the 'Guidelines' s6.1 and referenced in this Plan s7.3 'Vegetation Management', s8.7 'Local Government Firebreak Notice' and Appendix 4 'APZ and HSZ'.

- Maintain the low fuel Asset Protection Zone (APZ) within the Lot boundary as per s7.2 'Vegetation Management' and Appendix 4 'APZ and HSZ'.

- Where any existing or planned re-vegetation has been assessed as “low threat” (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements and enable the buildings to retain their determined BAL ratings.

- Any classified vegetation that has directly contributed to the determined BAL rating for a given Lot or building, must be managed such as to not change that vegetation to a higher risk classification.

9.2 Builder Responsibilities

The builder (generally named on the building permit) is responsible for ensuring that the building or incidental structure to which a building permit applies is, on completion, compliant with the Building Code of Australia (BCA).

For Classes 1a, 1b, 2, 3 and associated 10a buildings or decks located in a designated bushfire prone area, compliance with the BCA requires that these buildings are constructed to the requirements corresponding to their bushfire attack level rating.

The construction standards for Class 1a and 1b buildings are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas; or*
- National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas*.

The construction standards for Classes 2, 3 and associated 10a buildings or decks are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas.*

The building/s must also comply with any additional local government requirements.

For any Class 4-9 buildings the builder must comply with any construction requirements that are additional to those contained in the BCA. Of particular issue is any requirement, made by the relevant local government or the owner, to construct to the standard corresponding to the determined BAL for proposed buildings.

9.3 Local Government Responsibilities

Implementation

- Provide advice where the clearing of locally significant vegetation is proposed.

- Register this Bushfire Management Plan and keep a record of the sites referred to for the purpose of identify servicing and infrastructure gaps. ('Guidelines' s4.6.4).

Maintaining Compliance

- Develop and maintain district bushfire fighting services and facilities.

- Monitor landowner compliance with the annual firebreak notice issued under s33 of the Bush Fires Act 1954.

On land vested in their control, the local government must give due consideration to future actions, that have the potential of changing the BAL ratings an existing habitable building (or existing BAL assessed development site) will be subject to. These actions include:

1. *Any planned revegetation of an area; and/or*
2. *The reduction of any vegetation management over an area that has in the past and is currently, actively managed to a minimal fuel condition and it would be a most reasonable expectation that it would continue to be managed this way.*

Specifically, the local government should:

1. *In revegetating an area/s, give due consideration to how it would be assessed from a bushfire perspective (as per AS 3959-2009). The intent must be to not increase the current BAL rating of an existing neighbouring habitable building (or assessed development site). Important considerations include awareness of existing classifiable vegetation in the area, the new plant species proposed to be used and the landscaping design.*

2. *Continue to manage vegetation areas to a minimum fuel condition if, in aa existing Bushfire Attack Level assessment, they have been assessed as low threat vegetation. But only if:*
    a. *The vegetation area has been <u>correctly</u> excluded from classification as per AS 3959-2009 s2.2.3.2 (f); and*
    b. *If the vegetation area was to be no longer managed, this would result in the neighbouring existing habitable building (or assessed development site) being subject to a higher BAL rating.*

10 Appendices – Advisory Information Only

Appendix 1

The WA Framework for Bushfire Risk Management

This section of the Bushfire Management Plan sets out the applicable legislation, regulations, policies, guidelines, documents, and associated bushfire risk assessments that a Bushfire Management Plan will need to reference and where applicable, comply with. Statements of compliance against these requirements, as required by the 'Guidelines', are presented in Section 8 of this Plan.

The state government of WA has committed to addressing bushfire through the implementation of a risk-based system of land-use planning and development that aims to reduce the risk of bushfire.
The legislative means of facilitating this is through the ***Planning and Development Act 2005*** and its interaction with the ***Fire and Emergency Services Act 1998*** and the ***Building Act 2011***.

Planning and Development (Local Planning Schemes) Amendment Regulations 2015

These regulations are given effect under the ***Planning and Development Act 2005***. The *Planning and Development (Local Planning Schemes) Regulations 2015* are amended to introduce 'Schedule 2 Part 10A 'Bushfire Risk Management' which establishes the *deemed provisions relating to bushfire risk management.*

"The deemed provisions relating to bushfire risk management work with the State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7) and Guidelines for Planning in Bushfire Prone Areas (Guidelines); Map of Bushfire Prone Areas; Building Regulations 2012 and Building Code of Australia to guide planning and development proposals in bushfire prone areas to ensure bushfire risk is properly managed.

The deemed provisions provide a mechanism to require a development approval, and through this the application of SPP 3.7 and the Guidelines, to development on sites where BAL-40 or BAL-Flame Zone (FZ) applies. SPP 3.7 sets out the planning hierarchy and the information required at each stage of the planning process whilst the Guidelines provide information on how SPP 3.7 should be implemented" (source: WAPC Planning Bulletin 111/2015 Planning in Bushfire Prone Areas).

The ***deemed bushfire provisions***:

- Only apply to development that is proposed on a site in a designated bushfire prone area.
- Override any existing local planning scheme provisions relating to bushfire, including any inconsistent provisions, apart from special control areas.
- Are in addition to any provisions relating to development in a bushfire prone area that apply to a special control area.
- Can be supplemented by a local planning scheme (by implementing a special control area) but not varied or exempted.
- Are applied and work through the following legislation, regulations, policies, guidelines, and documents – each of which this Bushfire Management Plan will address.

Map of Bushfire Prone Areas

The Map of Bushfire Prone Areas identifies land that has been designated as being bushfire prone by the Fire and Emergency Services Commissioner under the *Fire and Emergency Services (Bushfire Prone Areas) Order 2015* as part of the ***Fire and Emergency Services Act 1998***.

Designation as a bushfire prone area (highlighted as pink on the map) reflects the potential of bushfire to affect that site. It acts as a mechanism for initiating further assessment in the planning and building process. This can involve bushfire risk assessment and management measures being required in planning submissions and activation of the bushfire construction requirements of the Building Code of Australia.

State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)

This policy is made under the ***Planning and Development Act 2005*** and provides the foundation for land use planning to address bushfire risk management in Western Australia.

SPP 3.7 applies to every stage of the planning process (i.e. all higher order strategic planning documents; strategic planning proposals; subdivision and development applications) in designated bushfire prone areas. It also applies to an area not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017 s3.2.2*).

The objectives of this policy are to:

- Ensure that all stages of land use planning (higher order strategic planning documents; strategic planning proposals; subdivision and development applications) identify and consider bushfire risk and apply specified bushfire protection measures; and
- To have an outcome that will avoid any increase in the threat of bushfire to people, property and infrastructure, preserve life and achieve an appropriate balance between bushfire risk management measures and all environmental conservation aspects.

Policy measures to achieve the objectives are defined and:

- They vary according to the type and scale of the planning proposal and stage of the development process;
- They set out the information to be prepared for each type of proposal; and
- They refer to the Guidelines *for Planning in Bushfire Prone Areas (WAPC v1.1 2017)* as supporting this policy and providing the procedural detail for assessment and presentation of the required information.

Guidelines for Planning in Bushfire Prone Areas (*WAPC v1.1 2017*)

These Guidelines are designed to supplement and assist in the interpretation of SPP3.7's objectives and policy measures. They provide advice on how bushfire risk is to be addressed when planning, designing or assessing a planning proposal.

As an endorsed standard (by the Office of Bushfire Risk Management), these Guidelines, in conjunction with SPP 3.7, are the predominant documents in the State for use by decision making authorities and referral agencies, during the consideration of strategic planning proposals, subdivisions and development applications.

The Guidelines set out the interrelationships between, and requirements for, various assessment tools used to assess risk in the planning context, as prescribed by SPP 3.7. These include:

- A Bushfire Hazard Level assessment;
- A Bushfire Attack Level (BAL) Contour Map;
- A Bushfire Attack Level (BAL) assessment;
- The Bushfire Protection Criteria; and
- A Bushfire Management Plan

The 'Guidelines' reference the Bushfire Attack Level descriptions and assessment methodologies that are defined in AS 3959.

Bushfire Protection Criteria

The bushfire protection criteria (set out in the 'Guidelines Appendix 4) are a performance based system of assessing bushfire risk management measures. An assessment against the criteria is to be undertaken for any strategic planning proposal, subdivision and development application for a site that has or will on completion, have a bushfire hazard level above 'Low or a BAL rating above BAL-LOW.

The protection criteria consist of four elements: Location; Siting and Design of Development; Vehicular Access; and Water.
Each element has three components: Intent; Acceptable Solutions; and a Performance Principle. How to apply the Criteria is set out in the 'Guidelines' s4.5.2.

Local Variations to Bushfire Protection Criteria

Local governments may seek to add or to modify the acceptable solutions to recognise special local or regional circumstances (e.g. topography / vegetation / climate which reinforce the intent of a particular bushfire protection element and apply across a defined locality.

These endorsed (by WAPC and DFES) variations will be in the form of a local planning scheme amendment /provision or special control area. Currently they may be in the form of a local planning policy.

WA Building Regulations 2012

These regulations exist under the **WA Building Act 2011** and adopt the **Building Code of Australia** as the minimum technical requirements for the design and construction of buildings and certain other structures in WA.

Most development in WA requires a building permit before construction can commence. This process typically occurs after the planning process.

The Regulations include the **Building Amendment Regulations (No.3) 2015** that prescribe applicable building standards for buildings located in areas designated by the Fire and Emergency Services Commissioner as bushfire prone areas (identified on the Map of Bushfire Prone Areas).

Building Code of Australia (BCA)

The BCA provides minimum technical requirements for the construction of buildings. These are presented as Volumes One and Two of the National Construction Code series.

The BCA requires an assessment of the potential intensity of bushfire attack for specific classes of residential buildings located in designated bushfire prone areas (Classes 1a, 1b, 2, 3 and associated 10a buildings or decks).

The BCA requires that these buildings are constructed to the requirements corresponding to their bushfire attack level rating.

Compliance with BCA bushfire requirements for Class 1a and 1b buildings in designated bushfire prone areas can be demonstrated by compliance with:

a. Australian Standard *AS 3959 Construction of buildings in bushfire prone areas; or*
b. National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas.*

Compliance with BCA bushfire requirements for Classes 2, 3 and associated 10a buildings or decks in designated bushfire prone areas can be demonstrated by compliance with:

a. Australian Standard *AS 3959 Construction of buildings in bushfire prone areas.*

AS 3959 Construction of Buildings in Bushfire Prone Areas (2009 as amended)

The objective of this Standard is to prescribe construction details for buildings to reduce the risk of ignition from a bushfire, appropriate to the:

a) Potential for ignition caused by embers, radiant heat or flame generated by a bushfire; and
b) Intensity of the bushfire attack on the building.

To achieve this, the Standard defines six categories of Bushfire Attack Level (BAL), details their assessment methodology and specifies constructions standards corresponding to each.

Western Australia Bush Fires Act 1954 (as amended)

'An Act to make better provision for diminishing the dangers resulting from bush fires, for the prevention, control and extinguishment of bush fires'. Matters addressed in the Act include prohibited burning times, total fire bans, bushfire control and extinguishment

The Act sets out the authority given to local government which enables them to:

- Control and extinguish bushfires
- Establish and maintain Bushfire Brigades
- Require landowners and/or occupiers to install and maintain firebreaks to their required specifications
- Require landowners and/or occupiers manage bushfire fuel loads upon the land to their required specifications

The applicable document is the annually issued ***Firebreak Notice*** published by the relevant local government that sets out the obligations for landowners and/or occupiers.

Other Applicable Local Government Documents

These may include:

- Local planning scheme provisions.
- Local planning strategy references to bushfire risk management.
- Local planning strategy references to environment.
- Applicable structure plans
- Special control area provisions
- Previous planning approvals

Other Documents

These may include:

- Any existing Bushfire Management Plan, Bushfire Hazard Level assessment or BAL assessment prepared over the site.
- Relevant landscaping plans applicable to the subject site.

Appendix 2

Bushfire Risk Assessment – Understanding the Methodology

In SPP 3.7 'bushfire risk' is defined as "the chance of a bushfire igniting, spreading and causing damage to people, property and infrastructure."

"Before a strategic planning proposal, subdivision or development application can be considered, it is necessary to understand the extent of the bushfire hazard and its potential to affect people, property and infrastructure. An assessment of bushfire risk is a key component of deciding whether a strategic planning proposal, subdivision or development application should be approved in an area with a potential bushfire threat (from the 'Guidelines')."

Policy measures in *SPP 3.7* (and the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*) prescribe the various assessment tools to be used to assess bushfire risk in the planning context. These are:

- Bushfire Hazard Level assessment;
- Bushfire Attack Level (BAL) Contour Map;
- Bushfire Attack Level (BAL) assessment;
- Bushfire protection criteria; and
- Bushfire Management Plan

The intent of this Appendix 'Bushfire Risk Assessment – Understanding the Methodology' is to provide an overview of the methodology used in assessing the Bushfire Hazard Level and the Bushfire Attack Level.

Bushfire Hazard Level Assessment Methodology

Used at a strategic planning level, this methodology rates bushfire hazards into three potential categories of low, moderate and extreme by considering the following characteristics:

- Vegetation types and areas
- Effective ground slope under the vegetation threat
- Existing land use on and around the area being assessed
- Prevailing climatic conditions when appropriate

These results are presented as a Bushfire Hazard Level Map.

Bushfire Attack Level Assessment Methodology

The Australian Standard *AS 3959-2009 Construction of Buildings in Bushfire Prone Areas* defines a Bushfire Attack Level (BAL) as:

"A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire."

AS 3959-2009 defines six categories of Bushfire Attack Level (BAL) (*AS 3959 Appendix G*); provides the assessment methodology (*AS 3959 s2 and Appendix B);* and specifies constructions standards corresponding to each BAL (*AS 3959 s3 Table 3.1*). The BAL's and corresponding descriptions of the predicted levels of exposure and heat flux exposure thresholds are contained in the table on the following page.

AS 3959-2009 provides two methods to calculate Bushfire Attack Levels:

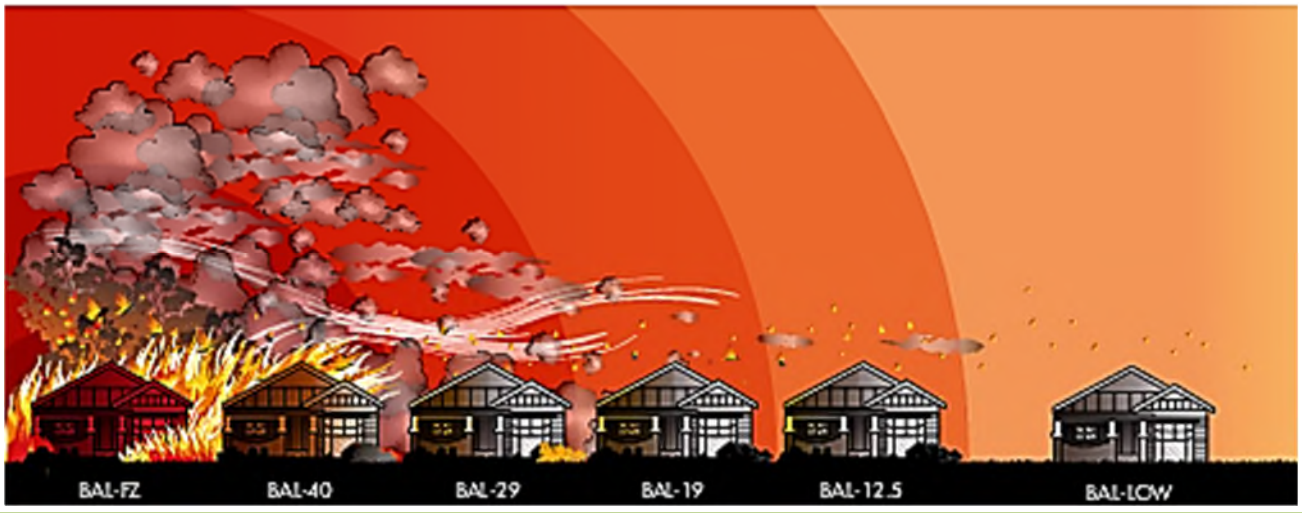
1. Method 1 **-** a simplified procedure that involves five procedural steps to determine the BAL. It is subject to some limitations of the circumstances in which it can be used.
2. Method 2 **-** a detailed procedure using calculations to determine BALs where a more specific result is sought or site conditions are outside the scope of Method 1. In particular, the use of Method 2 is to apply if the effective slope under the classified vegetation is greater than 20^0 down slope (and no more than 30^0 down slope) and the slope of the land between the site and the classified vegetation is no more than 20^0 regardless of slope type.

Method 1 – Summarised Procedure

- Determination of the area to be assessed
- Determine predominant vegetation type(s) within 100 metres of the site and classify
- Determination of distance of the site, building or building envelop from the classified vegetation type(s)
- Determination of the effective slope under the classified vegetation type(s)
- Determination of BAL's - Forest Fire Danger Index (FFDI) of 80 is used for WA

Separation Distance: *The distance from a subject site (or building) to a specific area of classified vegetation (i.e. the bushfire threat) is labelled in the tables of this Plan as a separation distance. This distance is measured to a point in the vegetation area represented by the "edge of the vegetation" as per AS 3959 -2009 s2.2.4 and the "base of the bushfire prone vegetation (not the canopy)" as per the BAL Assessment [Basic] Factsheet Version 1 December 2015 WAPC. The exact point of measurement is then decided by the assessor on the basis of the fuel structure and expected fire behaviour. If a precautionary approach is considered appropriate to a given situation the measurement will be taken at the canopy line.*

Bushfire Attack Level Definitions and Corresponding Sections Specifying Construction Requirements (Source: *AS 3959-2009, Appendix G and Table 3.1*)		
Bushfire Attack Level (BAL)	**Description of Predicted Bushfire Attack and Levels of Heat Flux Exposure**	**Construction Section of AS 3959**
BAL - LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk.	4
BAL - 12.5	There is risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m^2	3 and 5
BAL - 19	There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2	3 and 6
BAL - 29	There is an increased risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m^2	3 and 7
BAL - 40	There is a much increased risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m^2	3 and 8
BAL - FZ	There is an extremely high risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2	3 and 9



Appendix 3

Vegetation Classification Exclusions (AS 3959-2009 s2.2.3.2)

Certain vegetation can be excluded from being classified in which case the Bushfire Attack Level shall be rated as BAL-LOW and no bushfire specific construction requirements apply. Such vegetation is one or a combination of the following:

a) Vegetation of any type that is more than 100m from the site.

b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified.

c) Multiple areas of vegetation less than 0.25ha in area and not within 20m of the site or each other.

d) Strips of vegetation less than 20m in width regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified.

e) Non-vegetated areas, including waterways, roads, footpaths, buildings, and rocky outcrops.

f) Low threat vegetation, including grassland managed in a **minimal fuel condition** (i.e. insufficient fuel available to significantly increase the severity of a bushfire attack – recognisable as short cropped grass to a nominal height of 100mm for example), maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

Appendix 4

Asset Protection Zones (APZ) - Description, Establishment, Maintenance and Standards

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017) Appendix 4 Element 2

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation. The APZ should at a minimum be of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It should be lot specific.

(For subdivision planning, hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot).

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space which is available on the property, but as a minimum should be 3 metres.

Establishment: The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

Native Vegetation: APZ's can adversely affect the retention of native vegetation. Where the loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, such as waterway foreshore areas and wetland buffers, reducing lot yield may be necessary to minimise the removal and modification of remnant vegetation.

Responsibility: It is the responsibility of the landowner/proponent to maintain their APZ in accordance with Schedule 1 'Standards for Asset Protection Zones'. It is likely that this requirement is also contained in the firebreak notice issued by local government under s33 of the Bushfire Act 1954.

Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, it should be noted that fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation is unsafe.

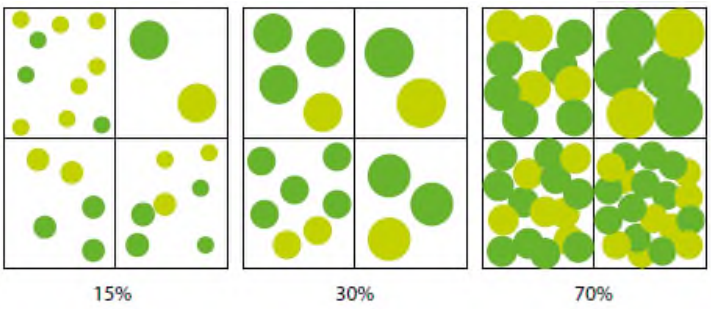
Standards for Asset Protection Zones

Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel Load: combustible dead vegetation matter less than 6 mm in thickness reduced to and maintained at an average of two tonnes per hectare. The visual guide below shows a fuel load that equates to approximately 2t/ha (source: Shire of Augusta Margaret River's Firebreak and Fuel Reduction Hazard Notice).

Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. Diagram below represents tree canopy cover at maturity.



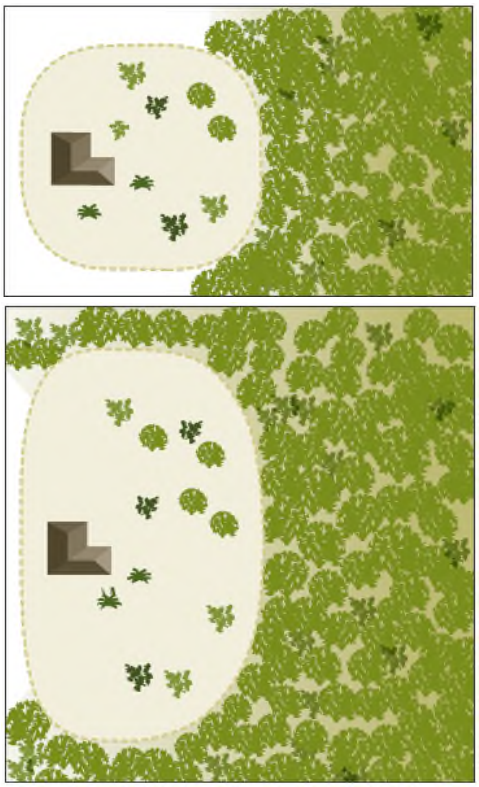
Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 mm in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 mm or less.

Note that individual local governments may increase the APZ standard compared to the standard stated above. These would be additional requirements and will be contained in their annual firebreak notice issued under s33 of the Bushfires Act 1954 and are to be complied with.

The example diagrams below illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation



Additional DFES Guidance

a) Store firewood at least 20 metres away from the building.
b) Keep gutters free of leaves and other combustible material.
c) Roof mounted evaporative coolers to be fitted with ember screens.
d) Gas cylinders to vent away from a building and be tethered to prevent falling over.
e) Driveways and access ways must allow for safe passage of a fire appliance to all buildings on the land.
f) Land owners/occupiers must maintain compliance with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Appendix 5

Technical Requirements - Bushfire Protection Criteria (Vehicular Access)

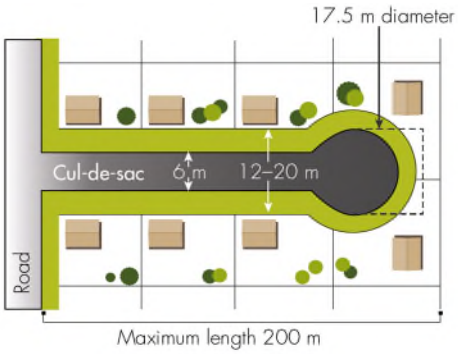
Vehicular Access – Technical Requirements of Acceptable Solutions - Part 1

Source: *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*

Acceptable Solution 3.3 Cul-de-sacs (including a dead-end road)

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

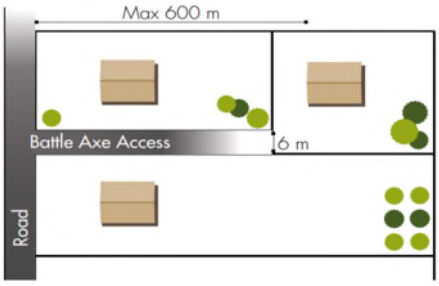
- Maximum length is 200m. If public emergency access is provided between cul-de-sac heads (as a right of way or public access easement in gross), the maximum length can be increased to 600m provided no more than 8 lots are serviced and the emergency access way is less than 600m in length;
- Turnaround area requirements, including a minimum 17.5m diameter head to allow type 3.4 fire appliances to turn around safely;
- The cul-de-sac connects to a public road that allows for travel in two directions; and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.4 Battle-axe

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

- Maximum length 600m and minimum width 6m; and
- Comply with minimum standards for private driveways.



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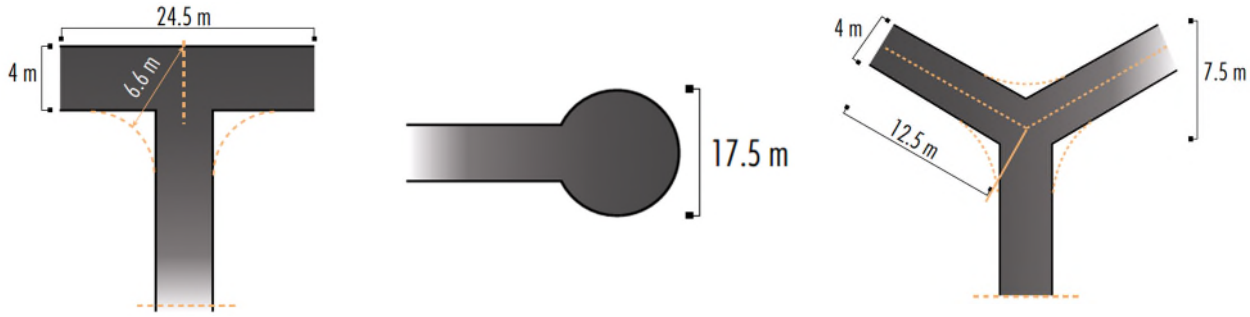
Acceptable Solution 3.5 Private Driveways

The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the house site is more than 50 metres from a public road:

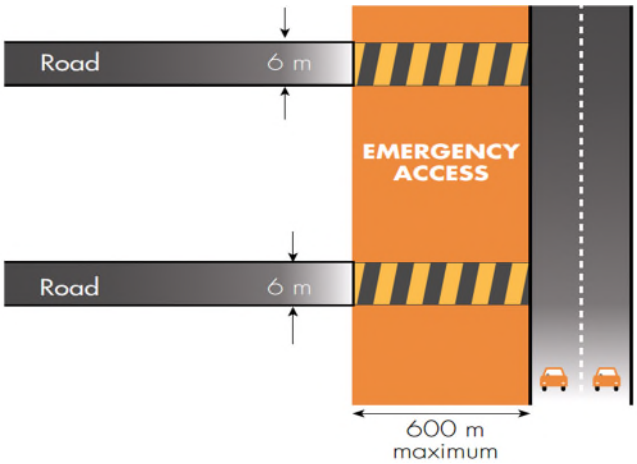
- Passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).



Acceptable Solution 3.6 Emergency Access Way

An access way that does not provide through access to a public road is to be avoided bushfire prone areas. Where no alternative exists, an emergency access way is to be provided as an alternative link to a public road during emergencies. The following requirements are to be achieved:

- No further than 600 metres from a public road;
- Must be signposted including where they ajoin public roads;
- Provided as a right of way or public access easement in gross;
- Where gates are used they must not be locked and they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix); and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.7 Fire Service Access Routes (Perimeter Roads)

Are to be established to provide access within and around the edge of subdivision and related development and to provide direct access to bushfire prone areas for firefighters and link between public road networks for firefighting purposes. Fire service access is used during bushfire suppression activities but can also be used for fire prevention work. The following requirements are to be achieved:

- No further than 600 metres from a public road (driveways may be used as part of the designated fire service access;
- Dead end roads not permitted;
- Allow for two-way traffic (i.e. two 3.4 fire appliances);
- Provide turn-around areas designed to accommodate 3.4 fire appliances and to enable them to turn around safely every 500m (i.e. kerb to kerb 17.5 metres);
- All weather surface (i.e. compacted gravel, limestone or sealed) and have erosion control measures in place;
- Must be adequately sign posted;
- Where gates are used they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix) and may be locked (use a common key system);
- Meet the additional design requirements set out in Part 2 of this appendix;
- Provided as right of ways or public access easements in gross; and
- Management and access arrangements to be documented and in place.

A3.8 Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

Vehicular Access - Technical Requirements of Acceptable Solutions - Part 2 Source: *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*					
Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	Fire Service Access Routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum cross-fall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

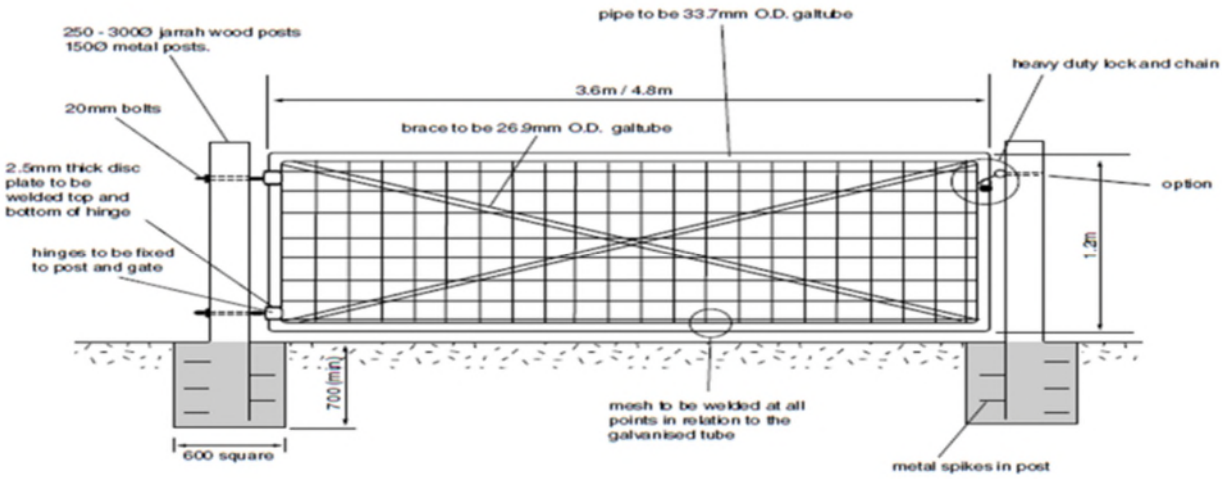
Vehicular Access - Technical Requirements of Acceptable Solutions

Gates and Signs

(example requirements – check with local government)

Gates (Bollards)

- Minimum width 3.6m
- Design and construction to be approved by relevant local government.
- Emergency access way gates must not be locked.
- Fire service access route gates may be locked but only with a common key that is available to local fire service personnel.
- Bollards will be to the relevant local government specifications



Note: Mesh to be metric mesh 46G5 and galvanised finish complete with fittings.

Signs

- Minimum height above ground of 0.9m.
- Lettering height to be 100mm.
- To display the words (as appropriate) “Emergency Access Only” or “Fire Service Access – No Public Access”.
- Design and construction to be approved by the relevant local government.
- Size 600mm x 400mm.
- Sign colour red, base (white) area is reflective background.
- Rounded corners, radius 20mm.
- White key-line 3mm wide, 3mm from outside edge.
- Suggested mounting hole six 6mm diameter.

Appendix 6

Technical Requirements - Bushfire Protection Criteria (Water)

Source: *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017* and DFES website

Acceptable Solution 4.1 Reticulated Areas

The requirement is to supply a reticulated water supply, together with fire hydrants, in accordance with the specifications set by DFES and the relevant water supply authority (WA Water Corporation or Aqwest - Bunbury or Busselton Water). The Water Corporation's 'No 63 Water Reticulation Standard' is deemed to be the baseline criteria for developments and should be applied unless local water supply authority's conditions apply. Key specifications in the most recent version/revision of the design standard include:

- ***Residential Standard*** – hydrants are to be located so that the maximum distance between the hydrants shall be no more than 200 metres.

- ***Commercial Standard*** – hydrants are to be located with a maximum of 100 metre spacing in Industrial and Commercial areas.

- ***Rural Residential Standard*** – where minimum site areas per dwelling is 10,000 m^2 (1ha), hydrants are to be located with a maximum 400m spacing. If the area is further subdivided to land parcels less than 1ha, then the residential standard (200m) is to be applied.

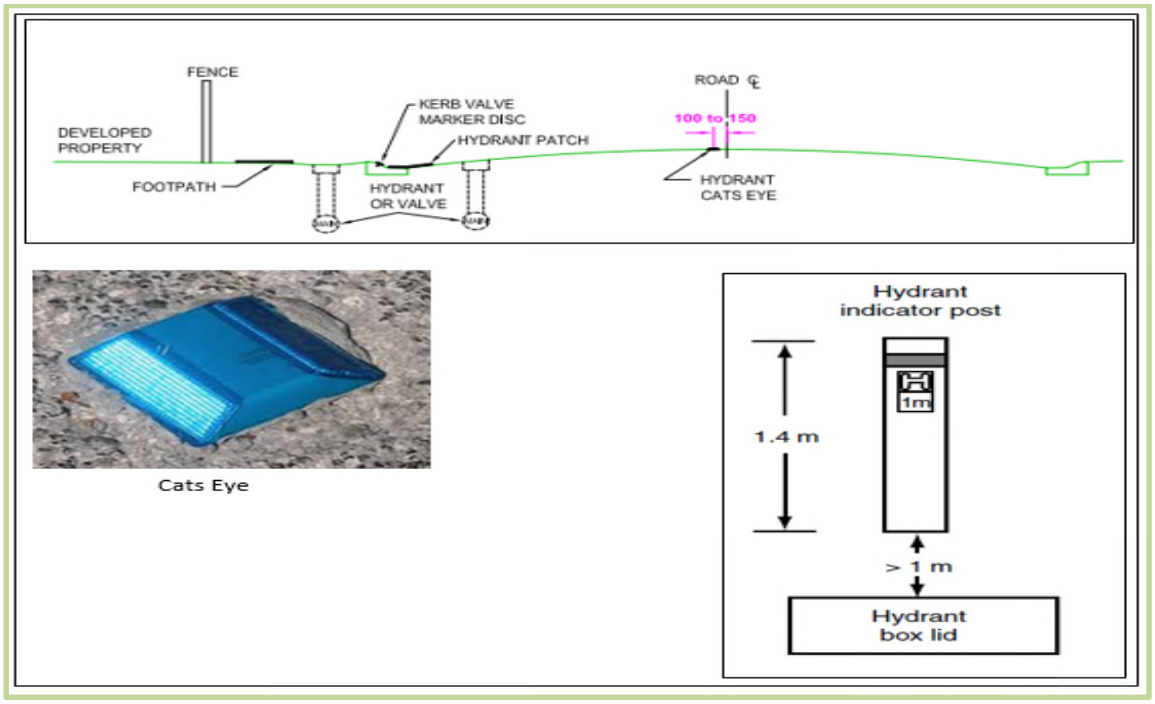


Figure A4.1: Hydrant Location and Identification Specifications

Acceptable Solution 4.2 Non-Reticulated Areas

Static water supplies are used by firefighters in areas where there is no reticulated water supply. Water tanks are the only acceptable static water source acceptable to meet Element 4 (Water) of the Bushfire Protection Criteria as per the *Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017) Appendix 4*.

The requirements for the development being assessed can be increased by the relevant local government. If a variation applies it will be noted in s7.1 and s7.5.

Volume:	50,000 litres per tank
Ratio of tanks to lots:	1 tank per 25 lots (or part thereof)
Location:	No more than two kilometres to the furthermost house site within the residential development to allow a 2.4 fire appliance to achieve a 20-minute turnaround time at legal road speeds.
Tank Construction:	Above ground tanks constructed using concrete or metal. Stands of raised tanks are constructed using non-combustible materials and heat shielding where applicable (required for metal stands).
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround areas suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) are provided within three metres of each tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 100mm cam-lock coupling of metal/alloy construction (source: DFES). Examples below:
Ownership and Responsibility:	Water tanks and associated facilities are vested in the relevant local government. A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times.

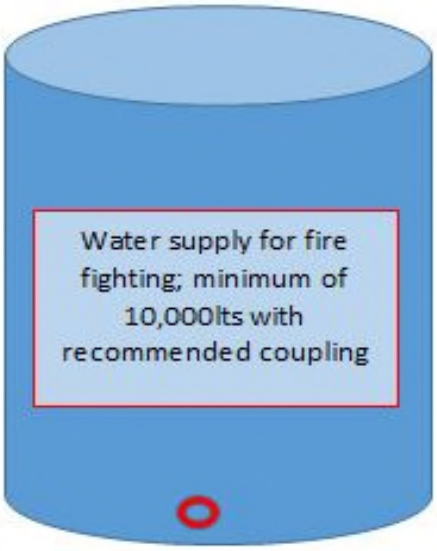
Acceptable Solution 4.3 Non-Reticulated Areas - Individual Lots

This solution is only for use if creating one additional lot and cannot be applied cumulatively (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017 Appendix 4)*.

Single lots above 500 m^2 need a dedicated static water supply on the lot that has an effective capacity of 10,000 litres (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017)*.

An Example Local Government Requirement:

Volume:	Minimum 10,000 litres (effective) per tank dedicated to firefighting purposes. The storage tank must not facilitate sharing the water for domestic use (danger of contamination).
Tank Construction:	Above ground tanks constructed using concrete or metal.
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround area suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) is provided at the tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 50mm or 100mm cam-lock coupling of metal/alloy construction. Examples below:
Responsibility:	A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times.



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