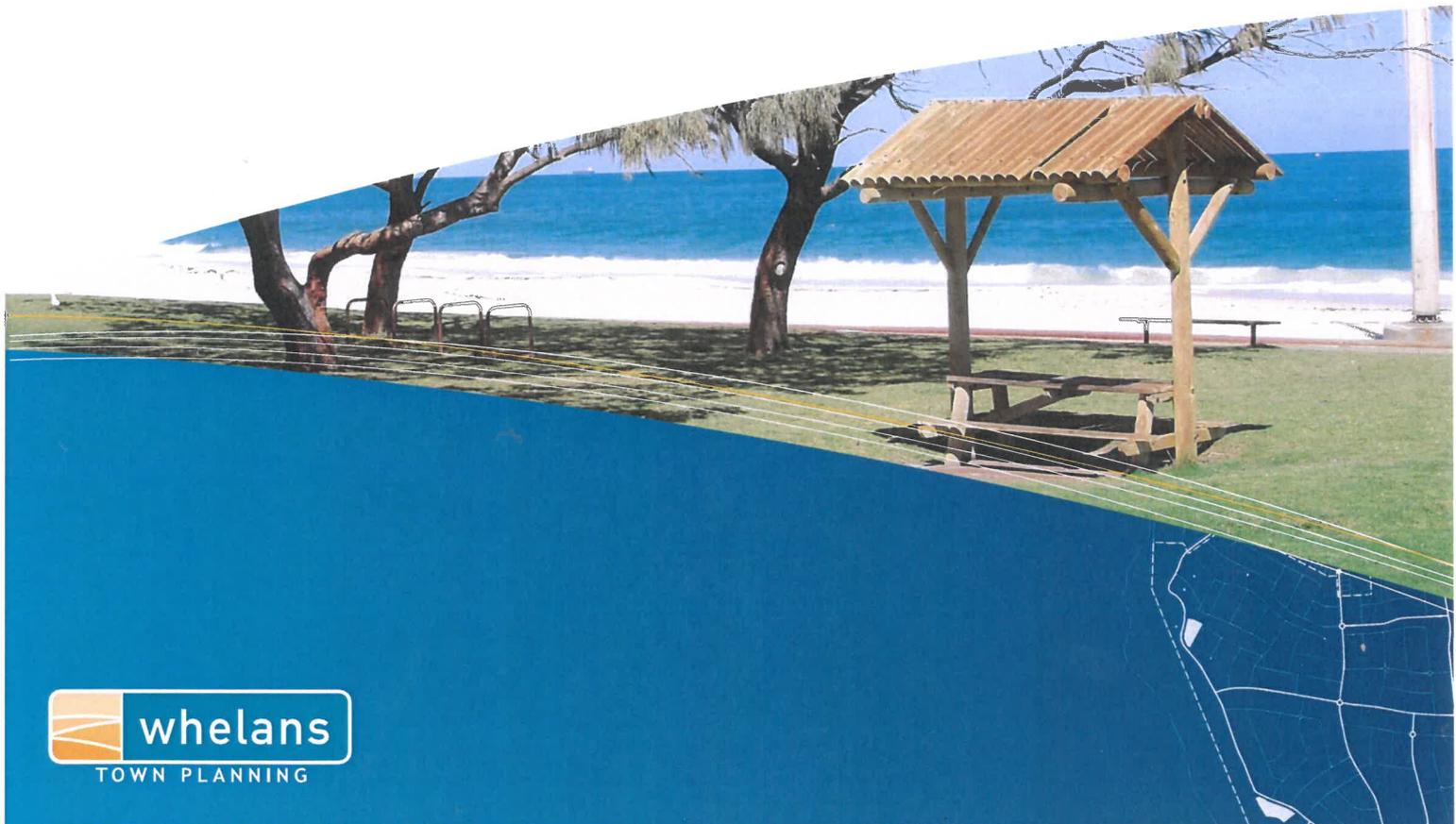


OCEAN CREST LOCAL STRUCTURE PLAN

**LOTS 29 - 32 OCEAN ROAD AND LOTS 23 – 28
HAMILTON ROAD, COOGEE**

**LOTS 500 & 501 HAMILTON ROAD AND LOTS 1, 2, 5,
6, 8, 26, 305, 310, 311 & 482 MELL ROAD,
SPEARWOOD**

Updated March 2016



LOCAL STRUCTURE PLAN

LOTS 29 - 32 OCEAN ROAD AND LOTS 23 – 28 HAMILTON ROAD,
COOGEE

LOTS 500 & 501 HAMILTON ROAD AND LOTS 1, 2, 5, 6, 8, 26,
305, 310, 311 & 482 MELL ROAD, SPEARWOOD

CITY OF COCKBURN

PREPARED FOR
TERRANOVIS

BY

WHELANS TOWN PLANNING

ORIGINAL REPORT 26 APRIL 2012

UPDATED 21 MARCH 2016 (AMENDMENT NO. 1)

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SURVEYING

MAPPING

TOWN PLANNING

CERTIFICATION OF APPROVED STRUCTURE PLAN

This Amendment No. 1 to Ocean Crest Local Structure Plan is prepared under the provisions of the City of Cockburn Town Planning Scheme No. 3.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN
WAS APPROVED BY RESOLUTION OF
THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

14 MARCH 2016 Date

Signed for and on behalf of the Western Australian Planning Commission



An officer of the Commission duly authorised by the Commission pursuant to section 16 of the *Planning and Development Act 2005* for that purpose, in the presence of:

 Witness

17 MARCH 2016 Date

14 MARCH 2016 Date of Expiry of this Structure Plan

TABLE OF CONTENTS

1.0	INTRODUCTION	5
1.1	BACKGROUND	6
1.2	AMENDMENT NO. 1 - LOTS 662, 663 & 664 HAMILTON ROAD (MARCH 2016)	6
2.0	SITE DESCRIPTION	8
2.1	LOCATION	8
2.2	LANDOWNERSHIP	8
2.3	EXISTING LAND USE	10
2.4	SURROUNDING CONTEXT	11
2.5	TOPOGRAPHY	11
2.6	LANDFORMS AND SOILS	14
2.7	WETLANDS	14
2.8	ACID SULPHATE SOILS	15
2.9	HYDROLOGY	15
2.10	VEGETATION, FLORA AND FAUNA	17
2.11	POTENTIAL SITE CONTAMINATION	17
2.12	INDIGENOUS & EUROPEAN HERITAGE	17
3.0	KEY PLANNING FRAMEWORK	18
3.1	DIRECTIONS 2031	18
3.2	METROPOLITAN REGION SCHEME	18
3.3	DRAFT OUTER METROPOLITAN PERTH AND PEEL SUB-REGIONAL STRATEGY	18
3.4	COCKBURN COAST DISTRICT STRUCTURE PLAN	19
3.5	PACKHAM NORTH DISTRICT STRUCTURE PLAN	19

3.6	LIVEABLE NEIGHBOURHOODS	19
3.7	CITY OF COCKBURN TOWN PLANNING SCHEME NO. 3	21
3.8	CITY OF COCKBURN LOCAL PLANNING STRATEGY	21
3.9	WATSONS FOOD PLANT LOCAL STRUCTURE PLAN	21
3.10	CITY OF COCKBURN LOCAL SCHEME AMENDMENT NO. 87	21
4.0	INFRASTRUCTURE & SERVICING	23
4.1	RETICULATED SEWERAGE	23
4.2	WATER SUPPLY	23
4.3	POWER	23
4.4	TELECOMMUNICATIONS	24
4.5	GAS	24
4.6	UPGRADING OF EXISTING ROADS	24
4.7	TRAFFIC FLOWS AND ROAD REQUIREMENTS	24
4.8	DRAINAGE	25
4.9	EARTHWORKS	25
5.0	LOCAL STRUCTURE PLAN	26
5.1	DESIGN RATIONALE AND PROPOSED LAND USES	26
5.2	RESIDENTIAL DENSITY, LOT LAYOUT AND LOT YIELD	26
5.3	ROAD NETWORK	27
5.4	SEWER EASEMENT CORRIDOR	33
5.5	PUBLIC OPEN SPACE	36
5.6	BICYCLE & PEDESTRIAN MOVEMENT	40
5.7	PEDESTRIAN ACCESS WAY SURVEILLANCE	40
5.8	POPULATION & EMPLOYMENT	41
5.9	LOCAL STORMWATER DRAINAGE	41

5.10	EDUCATION & COMMUNITY INFRASTRUCTURE	42
5.11	DIRECTIONS 2031 – TARGET DENSITY	42
5.12	PROXIMITY TO EXISTING MARKET GARDEN	44
5.13	RESIDENTIAL LOTS ADJOINING HAMILTON ROAD	45
5.14	BUSH FIRE MANAGEMENT	46
5.15	LANDSCAPING	47
6.0	IMPLEMENTATION AND STAGING	49
6.1	ANTICIPATED TIMEFRAMES	49
6.2	STAGING	49
6.3	DEVELOPMENT CONTRIBUTIONS	50
7.0	CONCLUSION	52

APPENDICES

1	Acid Sulfate Soil Report DSP
2	Peat Report
3	Servicing Report
4	Fire Assessment
5	Engineering Cross Section (Beeliar Park)
6	Transport Assessment
7	Landscaping Strategy
8	Amendment No. 1- Lots 662 - 664 Hamilton Road (R-Code Amendment)

- NOTES**
- (1) Roundabout at intersection of Ocean/Hamilton Roads in accordance with Packham North District Structure Plan and Figure 10 of the Ocean Crest Local Structure Plan Report.
 - (2) Development within sewer pressure main corridor (easement) restricted to landscaping only. Corridor not part of 10% POS requirement.
 - (3) Elevated R30 lots overlooking parkland.
 - (4) Detailed fire management plan required at subdivision stage to address Parks and Recreation Reserve fire risk.
 - (5) Buildings located within 100m of the Parks and Recreation Reserve are recommended to be constructed in accordance with AS 3959-2009. This is to be confirmed by preparation of a fire management plan at subdivision stage.
 - (6) Location and design of visitor parking for laneway lots to be resolved at subdivision stage.
 - (7) Hamilton Road and Ocean Road pavement to be widened in accordance with the City of Cockburn's requirements.
 - (8) Proposed pathway to be constructed by others.
 - (9) Dry basin areas (1:5yr ARI) shown are indicative only subject to detailed engineering design.
 - (10) Perimeter swales (1:1yr ARI) around POS areas provided in addition to 10% POS requirement.
 - (11) Approximate location of sewer pumping station subject to final design with 30m buffer to houses.
 - (12) Landscaping above the existing waste water pressure main is to be undertaken by developer.
 - (13) Rear laneway lots are to be provided with visitor parking directly at the front of lots at the rate of 1 bay for every 2 lots.
 - (14) Footpaths are to be provided on all streets in accordance with the requirements of Liveable Neighbourhoods.



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 Sheet Name: 13700-21
 Scale: 1:3000 @ A3
 Date: 21/07/2015
 Drawn By: SJF
 Checked by: JEP
 File: s:\Projects\13\13700\planning\drafting & design\110420 structure plan OPTION 2.dgn
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LEGEND

- R30 lots with mandatory two storey dwellings
- Area subject to fire management and further consultations with City of Cockburn
- Lots to be retained for waste servicing until development of neighbouring Land
- Lots with double crossover for waste servicing
- Transmission power lines
- Transmission power line easement

- Indicative planning over land outside of structure plan subject to future investigation
- Local Structure Plan boundary
- Properties affected by Market Garden buffer (300m)
- Pedestrian access
- Lots that require Area Specific Plans (or DAPs)

ZONES AND RESERVES

- Public Open Space
- R20 Residential
- R25 Residential
- R30 Residential
- R40 Residential

OCEAN CREST LOCAL STRUCTURE PLAN
LOTS 29 - 32 OCEAN ROAD
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1.0 INTRODUCTION

This report provides justification for the Local Structure Plan (LSP) prepared for the various landholdings being Lots 29 - 32 Ocean Road and Lots 23 – 28 Hamilton Road, Coogee and Lots 500 & 501 Hamilton Road and Lots 1, 2, 5, 6, 8, 26, 305, 310, 311 & 482 Mell Road, Spearwood (herein referred as the “LSP landholdings”), see **Figure 1 – Location Plan**.

The LSP has been prepared in conjunction with the City of Cockburn’s Packham North District Structure Plan (DSP). The majority of the land to the north of the LSP within the DSP is in single ownership and will be subject to future structure planning. Some of the landowners adjoining the LSP, in the DSP, have chosen not to participate in the preparation of this LSP. These landowners have therefore not been included in the LSP and will be subject to future investigation and a separate structure planning process. Notwithstanding, the indicative structure planning shown in the LSP over these adjoining lots demonstrates that the LSP will not adversely impact or prejudice future development/subdivision of adjoining land.



Figure 1. Location Plan of local structure plan area in the Perth Southern Metropolitan localities of Coogee and Spearwood (Source: Landgate, 2010 - modified)

1.1 BACKGROUND

The area within the LSP was previously affected by the Watsons food processing plant odour buffer, which was one of the main reasons that the area could not be rezoned to 'Development' for urban land use under the City of Cockburn Town Planning Scheme No. 3 (TPS 3). With the closure of the food plant in April 2009, Council at its meeting held on 12 February 2009 resolved to initiate a Scheme Amendment (Amendment No. 70) to rezone the special use food plant site and surrounding rural zoned land (previously affected by the odour buffer), for residential development. Local Scheme Amendment No. 70 was gazetted on 10 November 2010.

The land area (including the LSP area) the subject of Amendment No. 70 is shown in **Figure 2 – Scheme Amendment No. 70**. Council has prepared a District Structure Plan and District Water Management Strategy for the land to be rezoned 'Development', which sets the foundational town planning framework for consideration of this LSP.

In addition, the Council has prepared Scheme Amendment No. 87 by including the Packham North District Structure Plan area as DCA 12 – Packham North. This will provide a guide for development contributions from the respective landowners within the DSP.

Once approved, this LSP will provide guidance for development of the LSP landholdings and establish a context for the consideration and eventual approval of subdivision applications for each of the various lots.

1.2 AMENDMENT NO. 1 – LOTS 662, 663 & 664 HAMILTON ROAD (MARCH 2016)

Amendment No. 1 to Ocean Crest Local Structure Plan has been prepared for Lots 662, 663 & 664 Hamilton Road, Spearwood. The WAPC endorsed *Ocean Crest Local Structure Plan* was approved by WAPC date stamped 24 April 2012. Under the Ocean Crest Structure Plan, the subject Lots 662 – 664 are zoned 'Residential – R25'. Amendment No. 1 to the approved LSP recodes Lots 662 – 664 from the R25 low density code band to the R40 medium density code band.

The proposed change in density code is consistent with proper and orderly planning. The R40 density provides for increase in housing diversity and accommodation choice for the subject land, which is located within 400m of two nearby local commercial centres. The planning rationale for Amendment No. 1 and a copy of the WAPC endorsed Amendment No. 1 is included as **Appendix 8**. Amendment No. 1 is endorsed under the *Planning and Development (Local Planning Schemes) Regulations 2015*.

Note: Amendment No. 1 thus supersedes any reference in this document which refers to Lots 662, 663 & 664 as being R-Coded R25.



Figure 2. Local structure plan area (yellow boundary) in the context of Scheme Amendment No. 70 area (white dotted boundary) (Source: City of Cockburn – modified)

2.0 SITE DESCRIPTION

2.1 LOCATION

The land the subject of this Local Structure Plan (LSP) comprises 22 lots located approximately 19 kilometres south-east of Perth Central Business District and approximately 0.5 kilometres to the east of the new Port Coogee marina development. The LSP area is within the Metropolitan South-West Corridor and is situated wholly within the municipality of the City of Cockburn. The locality boundary of Spearwood and Coogee runs through the LSP area, such that the land west of Hamilton Road is in the locality of Coogee and east of Hamilton Road is the locality of Spearwood.

2.2 LANDOWNERSHIP

The LSP area contains 22 land parcels in various ownership as set out in Table 1 below.

Property	Landowner	Area (ha)
Lot 29 Ocean Road, Coogee	Palmina Separovich	1.2141
Lot 30 Ocean Road, Coogee	Palmina Separovich	0.8094
Lot 31 Ocean Road, Coogee	Anthony Ceniviva as executor of Santo Lanza (deceased)	0.8094
Lot 32 Ocean Road, Coogee	Marin & Anka Sokol	0.8094
Lot 23 Hamilton Road, Coogee	Dominico Nik, Phillip Joseph & Cristina Sepede	0.4047
Lot 24 Hamilton Road, Coogee	Lindsay Gordon & Shirley Helen Lee	0.8034
Lot 25 Hamilton Road, Coogee	Joanna Maria Wendy Abbott	0.8094
Lot 26 Hamilton Road, Coogee	Jose Agostino & Maria Fatima Da Silva & Lee Accounting Co Pty Ltd	0.8094
Lot 27 Hamilton Road, Coogee	Filippa Rasano	0.8094
Lot 28 Hamilton Road, Coogee	Salvatore Rasano, Carmela Palladino, Paola Blogna & Maria Caiulo	0.8081

Lot 500 Hamilton Road, Spearwood	Jadrana Orina Surjan & Marko Nadilo	0.8424
Lot 501 Hamilton Road, Spearwood	Ante & Marija Nadilo	0.7775
Lot 1 Mell Road, Spearwood	Amy, John Henry & Peppino Della Maddalena	1.6794
Lot 2 Mell Road, Spearwood	Jakov & Rina Josephine Lovreta	0.6055
Lot 5 Mell Road, Spearwood	Lloyd Casare Marchesi & Diana Vitali	2.3118
Lot 6 Mell Road, Spearwood	Lloyd Casare Marchesi & Diana Vitali	2.1982
Lot 8 Mell Road, Spearwood	Frank Peter Yakas & Nelle Barbarich (as executor of will of Maria Yakas)	1.2065
Lot 26 Mell Road, Spearwood	Kathleen Frances Bacich (as executor of will of Teresa Della Maddalena) c/o - Greg Russo The Roman Catholic Archbishop of Perth	0.7085
Lot 305 Mell Road, Spearwood	Boris Tony & Kevin George Yakas & Lorraine Katherine Bennett (as executors of will of Elsie Yakas)	0.9579
Lot 310 Mell Road, Spearwood	The Roman Catholic Archbishop of Perth	0.9800
Lot 311 Mell Road, Spearwood	Maria & Tomislav Bacich	1.2972
Lot 482 Mell Road, Spearwood	Sell-Buy Pty Ltd atf The Marcus Trust	0.9776
TOTAL AREA OF LSP		22.6293

2.3 EXISTING LAND USE

Most of the LSP area has been previously cleared for residential development and small scale agriculture, including semi-rural and market gardens (refer to **Figure 3 – Aerial View of LSP area**). Pastures of exotic grasses, weeds and remnants of existing crops, lupin and large spice plants have mostly replaced the original vegetation.

Most lots within the LSP area comprise of a single dwelling on a large lot (generally 7,000m² – 8,000m²), with the rear of the lot cleared and vacant with in some instances, one or two relatively small outbuildings.

The majority of the LSP area is currently vacant undeveloped land, which makes structure planning less cumbersome in terms of retention of development, such as existing houses.

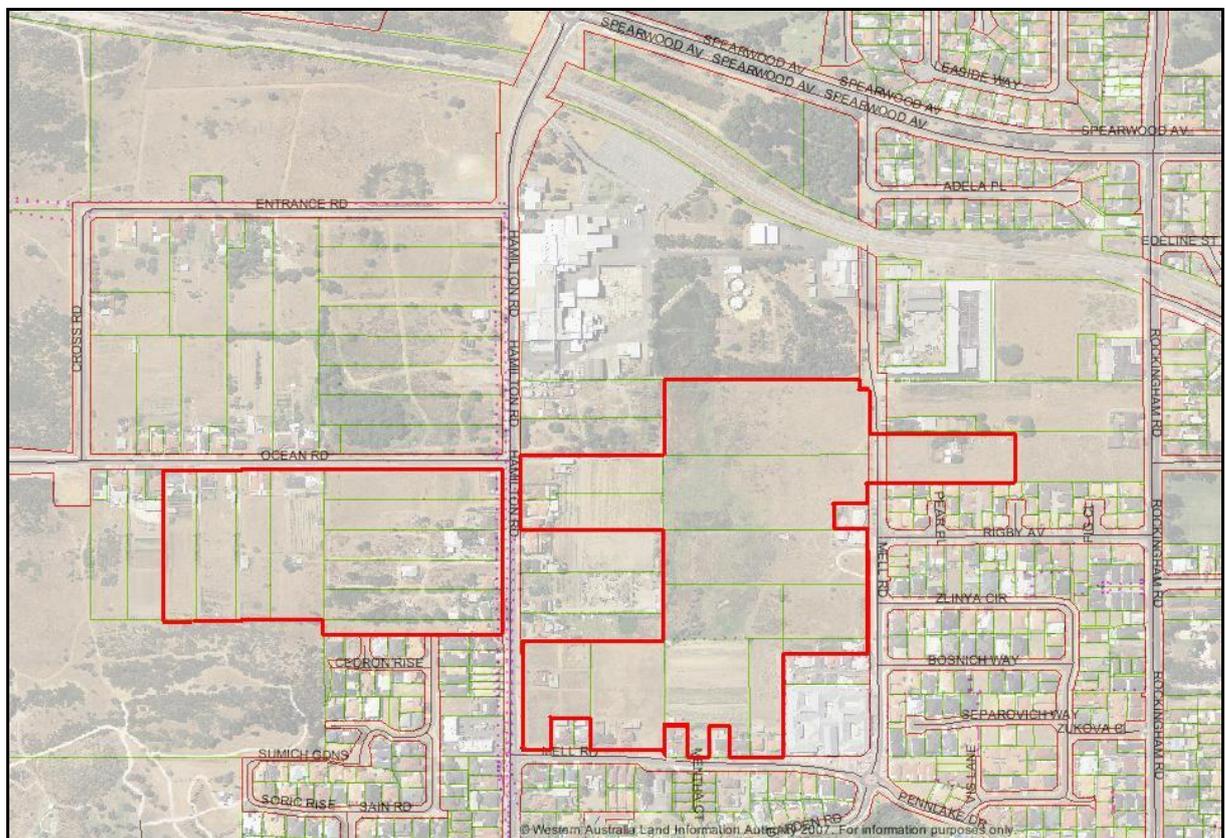


Figure 3. Aerial view of local structure plan area with cadastral boundary underlay (Source : Landgate, 2010 - modified)

Some limited market gardening has been undertaken in the structure plan area in the past. Accordingly, prior to any subdivision and development, a preliminary site investigation is required to identify any potential soil contamination. This is due to the potential use in the past of fertilisers and pesticides associated with agricultural activities.

Most of the existing dwellings are original dwellings constructed circa 1950s to early 1970s with some constructed more recently. Many of the dwellings are in good condition and some are proposed to be retained by landowners (at least in the short - medium term) as part of the subdivision and development of the land. Some dwellings are considered outdated and undesirable to be retained. These are likely to be demolished as part of subdivision. The decision to retain or demolish buildings and improvements on the land can be made by the various individual landowners at the time of preparing detailed plans of subdivision. Existing dwellings could be retained on larger superlots until such time as demolition to make way for further subdivision.

2.4 SURROUNDING CONTEXT

The LSP area is within the localities of Coogee and Spearwood. **Figure 4 – Surrounding Land Use Context** provides an overview of the LSP in relation to surrounding land use and environment. The LSP area is predominantly adjacent to established residential areas to the south and east. To the north is the now closed food processing plant and surrounds, which is also proposed to be developed for future residential use. To the west, the LSP development site is adjacent to reserved land owned by the Western Australian Planning Commission (and managed by the City of Cockburn), with the coast approximately 650 metres further west.

2.5 TOPOGRAPHY

The topography of the LSP varies in the range of 1.0 AHD to 25.0 AHD. The most distinctive landforms within the LSP is the low wetland depression (i.e. 1.0 AHD) in the central area at the rear of Lots 1, 5 & 6 Mell Road and the coastal dune high ground (i.e. 25.0 AHD) in the western portion of the LSP at the rear of Lots 30 & 32 Ocean Road (refer to **Figure 5 – Contour Plan**)

The low depression area in the LSP on the eastern side of Hamilton Road characteristically forms part of a central spinal low depression between Hamilton Road and Mell Road primarily at the rear of Lots 132, 5 – 6, 1 and 310. These low areas form part of an interdunal wetland chain in the district, which includes Lake Coogee to the south and wetlands within Parks & Recreation Reserve.

The western boundary contains the highest elevations within the LSP, where the topography generally slopes upward from Ocean Road at 4.0 – 8.0 AHD to 25.0 AHD at the south-west corner. The upward sloping gradient ranges between 10 – 20 degrees. The western portion of the structure plan area forms part of the sand dune system. This system

continues to rise to the west outside of the LSP area to a maximum height of approximately 37.0 AHD, then slopes down towards the coast (Port Coogee Marina).

On the eastern side of Hamilton Road, the topography slopes down (less than 10 degrees) from Hamilton Road (4.0 – 8.0 AHD) into the central wetland spine (1.0 – 2.0 AHD), then from the wetland slopes upwards to higher ground east of Mell Road, whereby Lot 482 is approximately midway on the upward slope which plateaus at 12.0 – 13.0 AHD east of Lot 482.

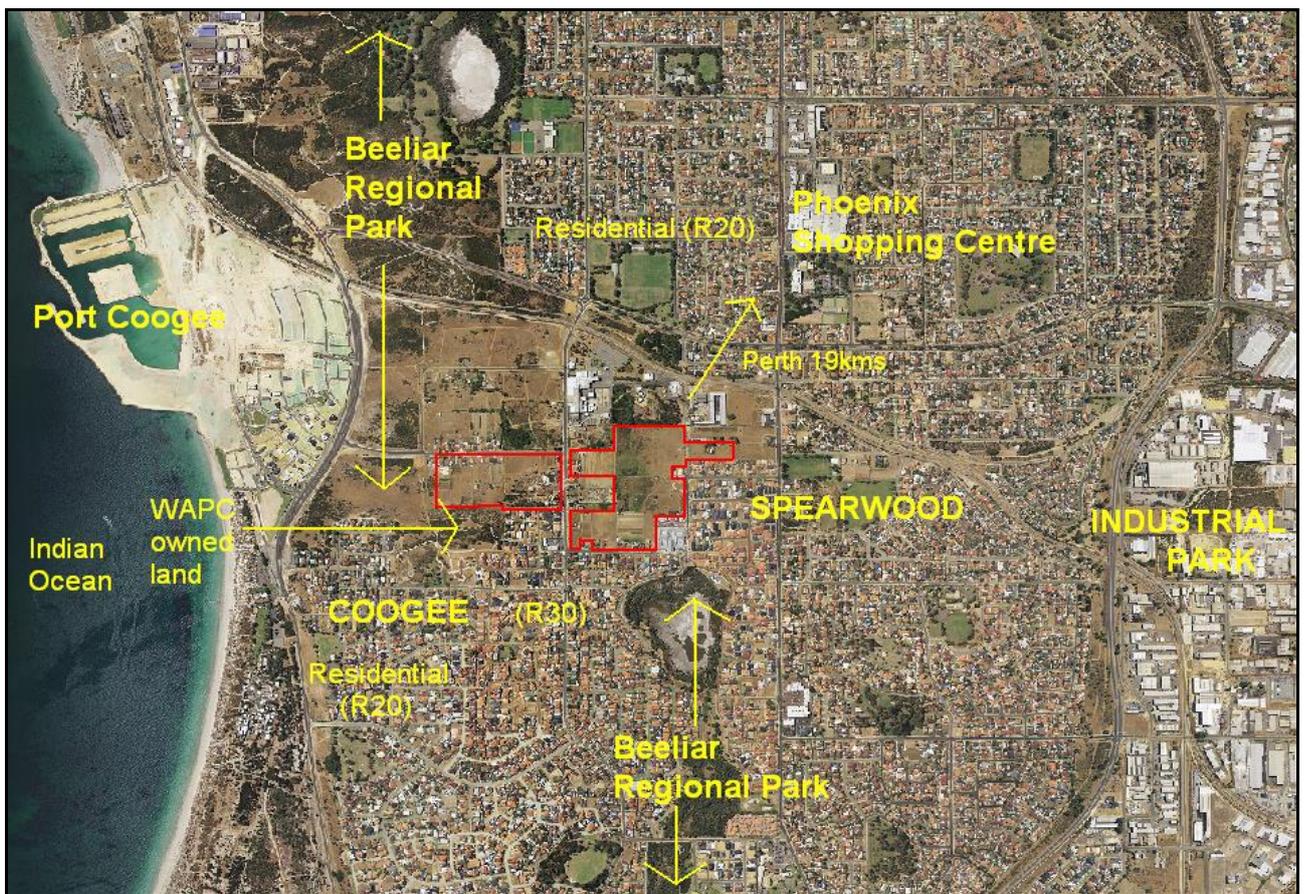


Figure 4. Local structure plan area [red] and aerial view of surrounding land use context

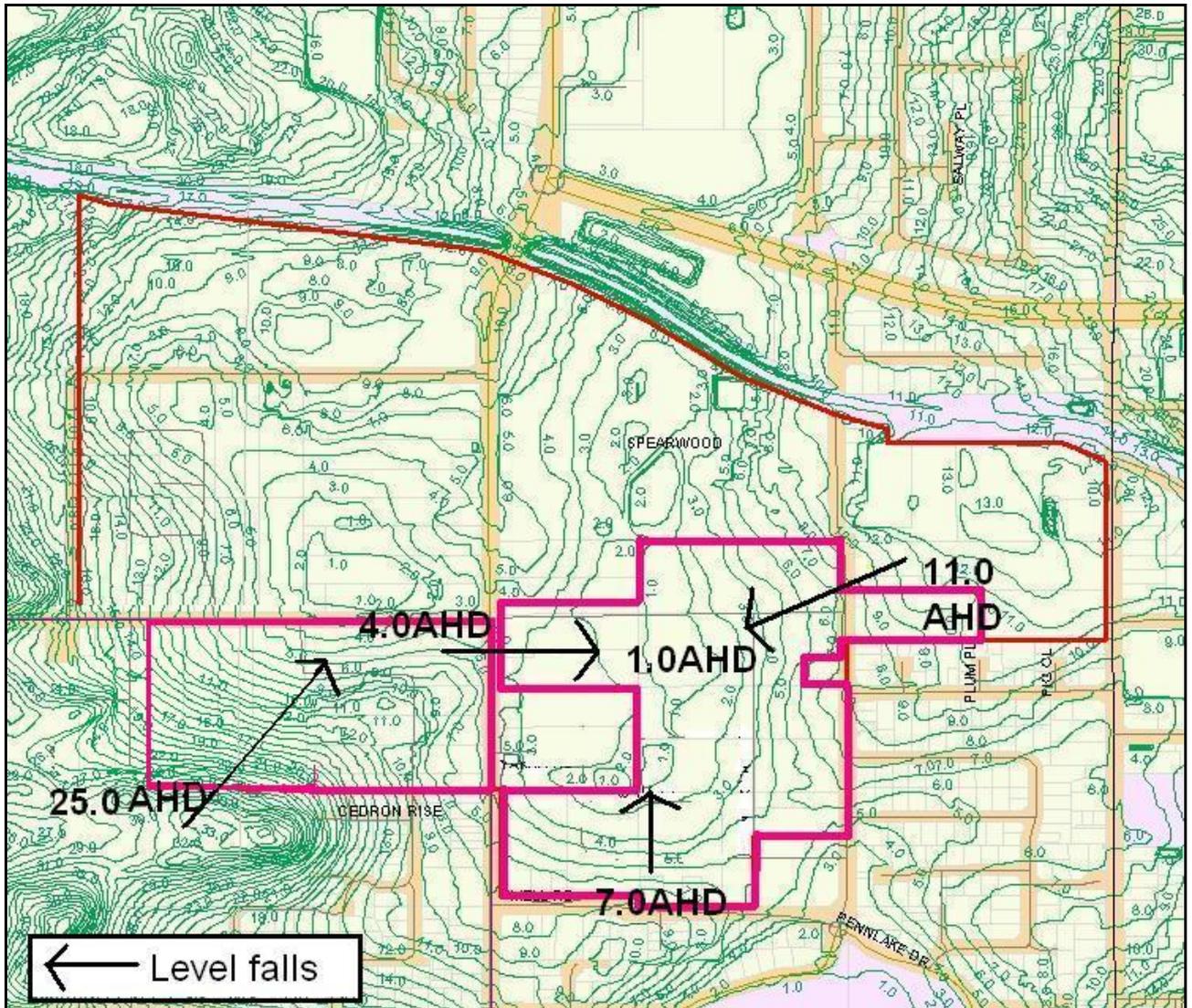


Figure 5. Contour plan (AHD) showing general falls across the local structure plan area (Source : Water Corporation, 2010 - modified)

2.6 LANDFORMS AND SOILS

The structure plan area is located on the Swan Coastal Plain within the Aeolian Deposits of the Cottesloe Dune System. This System is generally described as low hilly landscape with shallow brown sands over limestone with exposed limestone outcropping (Department of Agriculture, 2003).

Geomorphologic classification for the structure plan area reported in the *Perth Metropolitan Region 1:50,000 Environmental Geology Series, Rockingham (Part of Sheets 2033 I and 2033 IV)* (Gozzard 1983) indicates that the general geology of the area consists primarily of the following soil types:

- (i) Spearwood Sand formed during the Pleistocene era. This sand is described as a pale yellowish brown, medium to coarse-grained, sub-angular quartz, trace of feldspar, moderately sorted and of residual origin (Gozzard 1983). Tamala limestone (quartz) is the potential origin of the sand. The Spearwood Sand is considered to have high permeability, with a low to moderate load bearing capacity (Gozzard 1983); and
- (ii) Limestone soil types also formed during the Pleistocene era described as pale yellowish brown, fine to coarse grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris, variably lithified, surface kankar and of aeolian origin (Gozzard 1983). The permeability of limestone is described as high, with a variable load bearing capacity (Cardno BSD, 2009).

A further review of geological mapping suggest there are small pockets within the structure plan area which form part of a interdunal wetland chain. The wetland areas are composed primarily of silt formed in the Holocene era. The silt is described as brownish grey, calcerous in part, soft, some fine sand content in places and of lacustrine origin (Gozzard 1983). The permeability of the silt is low, with a low load bearing capacity. This soil unit is strongly related in areas of lower elevation and wetland within the structure plan (Cardno BSD, 2009).

2.7 WETLANDS

The natural depression of low elevation (1.0 – 2.0 AHD) within the LSP forms part of a wetland which has been mapped by the Department of Environment & Conservation as DEC Wetland Identifier No. 6364 with an assigned management category of “Multiple Use” Wetland (refer to **Figure 6 – DEC Wetland Mapping**). In this area, generally the watertable is in close proximity to the surface resulting in seasonal dampland. There is some wetland tolerant vegetation growing within the wetland area, however, much of the wetland area is considered to be severely degraded. This is due to human disturbance and clearing of vegetation.

2.8 ACID SULPHATE SOILS

Within the lower lying area or depression of the LSP area, it is possible that this area could contain peaty or clayey materials with potential Acid Sulphate Soils (refer to **Appendix 1 - Acid Sulphate Soil Desktop Assessment, Cardno 2009** and **Appendix 2 – Peat Delineation Report, Cardno 2009**). In these areas detailed geotechnical investigations will need to be undertaken prior to subdivision and or development and appropriate remediation works completed as part of the development works. Geotechnical investigations will also be required for construction of roads, retaining walls, sewer pump stations works and other infrastructure, particularly in areas where there may be shallow limestone outcropping.

2.9 HYDROLOGY

There are no permanent surface water bodies within the LSP area. The *Perth Groundwater Atlas* (Department of Water, 2003) identifies the LSP area as being within an area where groundwater table contours are at 1.0 metre below surface level. In the lower lying depression (i.e. 1.0 – 1.5 AHD) of the LSP area the water levels can seasonally be at or near the surface. Accordingly, there may be a need for bulk earthworks within parts of the structure plan area to achieve the required 1.2 metre minimum separation distance between the finished lot levels and the highest known groundwater table level.

As part of the preparation of the City of Cockburn draft Packham North District Structure Plan, groundwater monitoring has been undertaken and the report “Packham North Groundwater Monitoring Report” (Cardno, 2010) provides a basis as to pre-development hydrological studies, which can be utilised to assist in future planning of proposed development. A Local Water Management Strategy has also been prepared for the Packham North District Structure Plan, which is included as an Appendix to the District Structure Plan report.

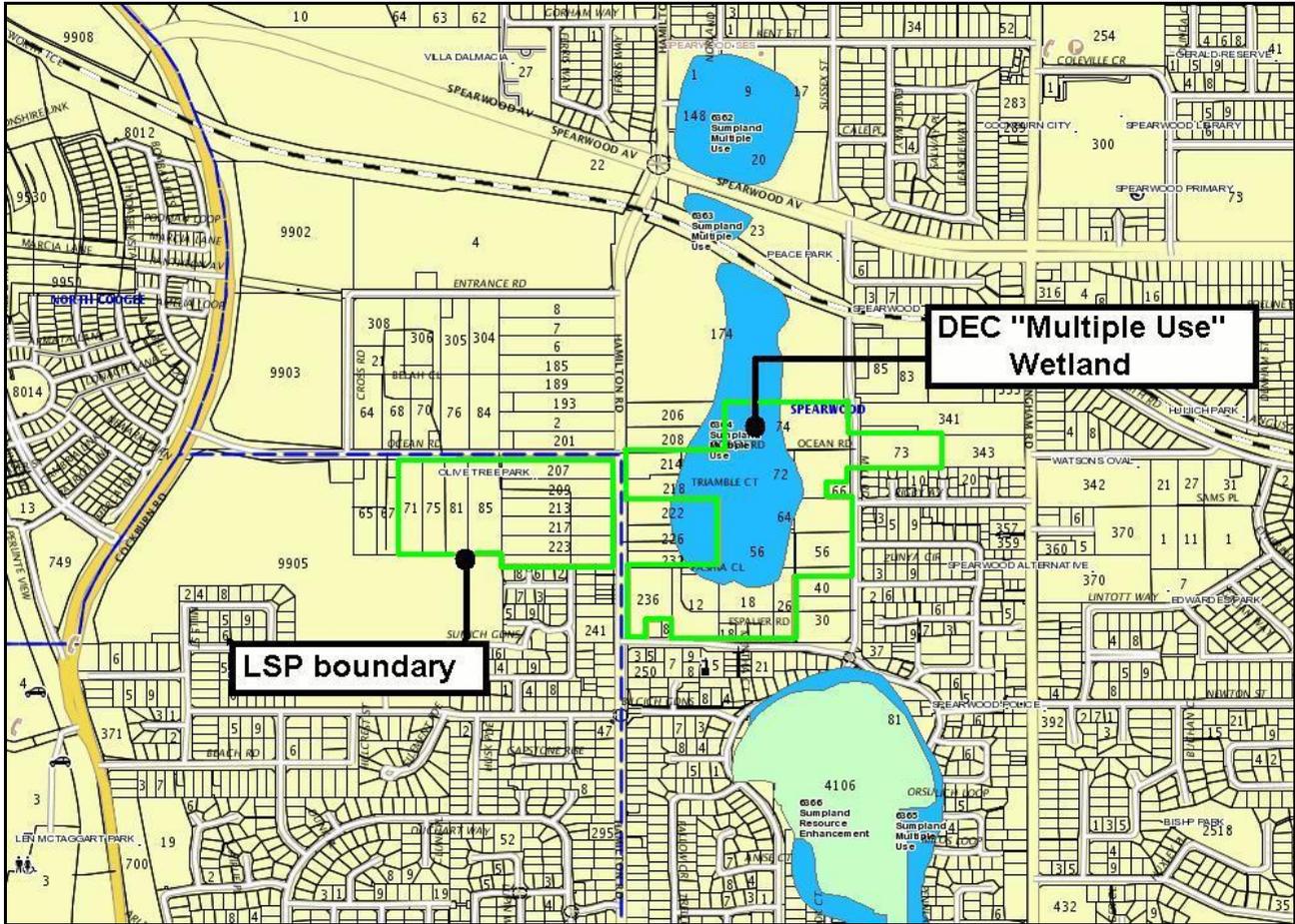


Figure 6. DEC Wetland Mapping of "Multiple Use" wetland within LSP area (Source: WA Atlas, 2010 – modified)

2.10 VEGETATION, FLORA AND FAUNA

Wetland vegetation found in the low depressions include sedges, reeds, rushes and Melaleuca paperbarks. The vegetation within the lots as part of the LSP have largely been disturbed in the past for a variety of purposes, including semi-rural pursuits and market garden activities that have been undertaken over the land. Initial discussions with Council officers indicate that a Flora & Fauna Survey is not required as the land has previously been extensively cleared and used for market gardening.

2.11 POTENTIAL SITE CONTAMINATION

A search of the Department of Environment & Conservation Contaminated Sites Database indicates that there are no recorded contaminated sites within the LSP area. Notwithstanding, there will be a need for further investigations, such as a preliminary site investigation. However, it is unlikely that any significant residual contaminants would be found due to the lapse in time. Most of the small scale market gardens have ceased operation over 30 years ago.

2.12 INDIGENOUS & EUROPEAN HERITAGE

Indigenous Heritage

A search of the Department of Indigenous Affairs Aboriginal Heritage Inquiry System indicates that there are no recorded sites in the LSP area.

It is important to note that the database of heritage sites held by the DIA is not comprehensive and there exists the potential for unknown sites of Indigenous heritage significance to be located inside or within close proximity to the subject land. Due to the level of disturbance to the subject land as a result of development activities and clearing over the past years, an archaeological survey is not considered necessary, however, archaeological monitoring is recommended for any eventual excavation works as part of subdivision and development. The process for protecting Indigenous heritage sites and considering proposals that may impact a known site is set out under the *Aboriginal Heritage Act 1972*. The Act protects all Aboriginal sites in WA whether they are known to the DIA or not. The Act provides for a clear process for addressing these issues as they relate to the proposed structure planning.

European Heritage

There are no places or sites of cultural significance within the LSP area under the City of Cockburn Municipal Heritage Inventory and State Heritage Register.

3.0 KEY PLANNING FRAMEWORK

STATE & REGIONAL PLANNING

3.1 DIRECTIONS 2031

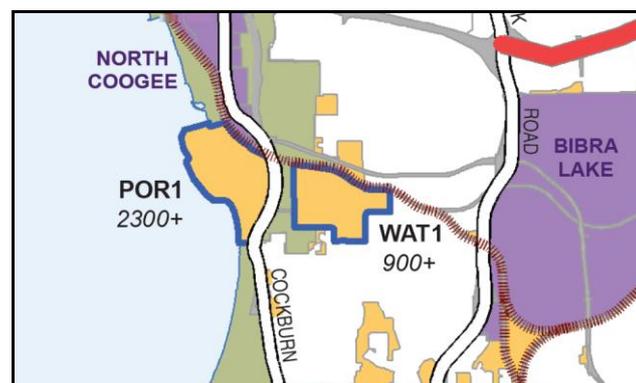
The recently released Directions 2031 establishes the vision for the future growth of Perth and Peel regions. It provides a framework in which population growth is to be accommodated. Directions 2031 seeks a 50% increase in the current average residential density 10 dwellings per gross urban zoned hectare; and has set a target of 15 dwellings per gross urban zoned hectare of land in new development areas. This proposed local structure plan achieves the targets set by Directions 2031.

3.2 METROPOLITAN REGION SCHEME

The LSP area is zoned 'Urban' under the Metropolitan Region Scheme (MRS). Land owned by the WAPC adjoins the LSP to the west. The WAPC land is reserved as 'Parks and Recreation' and is managed by the City of Cockburn. Land surrounding the LSP to the north, south and east is also zoned 'Urban' under the MRS.

3.3 DRAFT OUTER METROPOLITAN PERTH AND PEEL SUB-REGIONAL STRATEGY

The Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy identifies the subject land (including Watsons Land to the north) as "WAT1" with an estimated potential for future 900+ lots [see below extract]. It should be noted that this is an indicative estimate based on 75% of the land being able to be developed.



Extract from Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy [p.93]

3.4 COCKBURN COAST DISTRICT STRUCTURE PLAN

Cockburn Coast District Structure Plan area and Improvement Plan No. 33 area refers to land bounded by Port Coogee, South Beach and land reserved under the MRS for 'Parks and Recreation'. The structure plan identifies new areas for living, employment and recreation and aims to create a significant coastal node around the historic power station and Port Coogee marina. The proposed LSP will not have an adverse impact on the Cockburn Coast District Structure Plan and will compliment its vision by providing the framework for transition from current semi-rural land use to urban development.

3.5 PACKHAM NORTH DISTRICT STRUCTURE PLAN

The LSP has been prepared in conjunction with the preparation of the City of Cockburn Packham North District Structure Plan (DSP). The purpose of the DSP is to guide development of the former food processing plant and surrounding land that was included in the odour buffer for residential development. The DSP will set out an overall strategic planning framework providing the direction for preparation of local structure plans and future applications for subdivision and development. The LSP has been prepared in accordance with the planning objectives set out in the DSP, which includes allocation of public open space, access, interfacing with adjoining land uses, movement linkages and areas for residential living (refer to **Figure 7 Packham North District Structure Plan**).

3.6 LIVEABLE NEIGHBOURHOODS

Liveable Neighbourhoods has been prepared to guide the sustainable development of communities. It addresses both strategic and operational aspects of structure planning and subdivision for both 'greenfield' and urban infill sites.

The LSP has been designed in accordance with the principles of Liveable Neighbourhoods, in particular, the layout of roads and public open space. Consistent with Liveable Neighbourhoods, the LSP provides a high level of connectivity with good external linkages to cycle, pedestrian and public transport networks. The road design in the LSP is legible and reduces car travel distances by creating alternative routes and minimising use of cul-de-sacs where possible. These aspects are further addressed in Section 5.3 'Road Network' and Section 5.6 'Bicycle & Pedestrian Movement'.

Liveable Neighbourhoods encourages walkable access to activity nodes and public open space. Within the LSP, all lots are within 400 metres walking distance from POS areas. This provides residents in the LSP with opportunities for active lifestyle and recreation within 5 minutes walking distance from residences. This is further addressed in Section 5.5 'Public Open Space'.

According to Liveable Neighbourhoods it is important for the LSP design to respond to site characteristics and site context. The LSP design has taken into consideration the natural topography, vegetation, surrounding land uses, solar orientation and existing developments. Public open space has been located strategically in lower lying areas where drainage can be incorporated with public open space use making more efficient use of land.

Existing vegetation worthy of retention also will be incorporated into POS. Consistent with Liveable Neighbourhoods, within the LSP, lots that face parkland increase opportunity for passive surveillance and interaction with public spaces. Roads have also been designed to provide opportunities to array lots to maximise building design potential for solar orientation (north-south and east-west) and energy efficiency.

Lot shape and proportion of width to depth is considered important in Liveable Neighbourhoods. Lots in the LSP have been designed to be rectangular in shape with a greater depth than width. This ensures ability to develop the lots with high quality housing and builtform and conformity with the Residential Design Codes of Western Australia. Other aspects of Liveable Neighbourhoods principles, such as local water management and, diversity of lot sizes and target residential density are addressed further in the LSP report under Section 5.0.

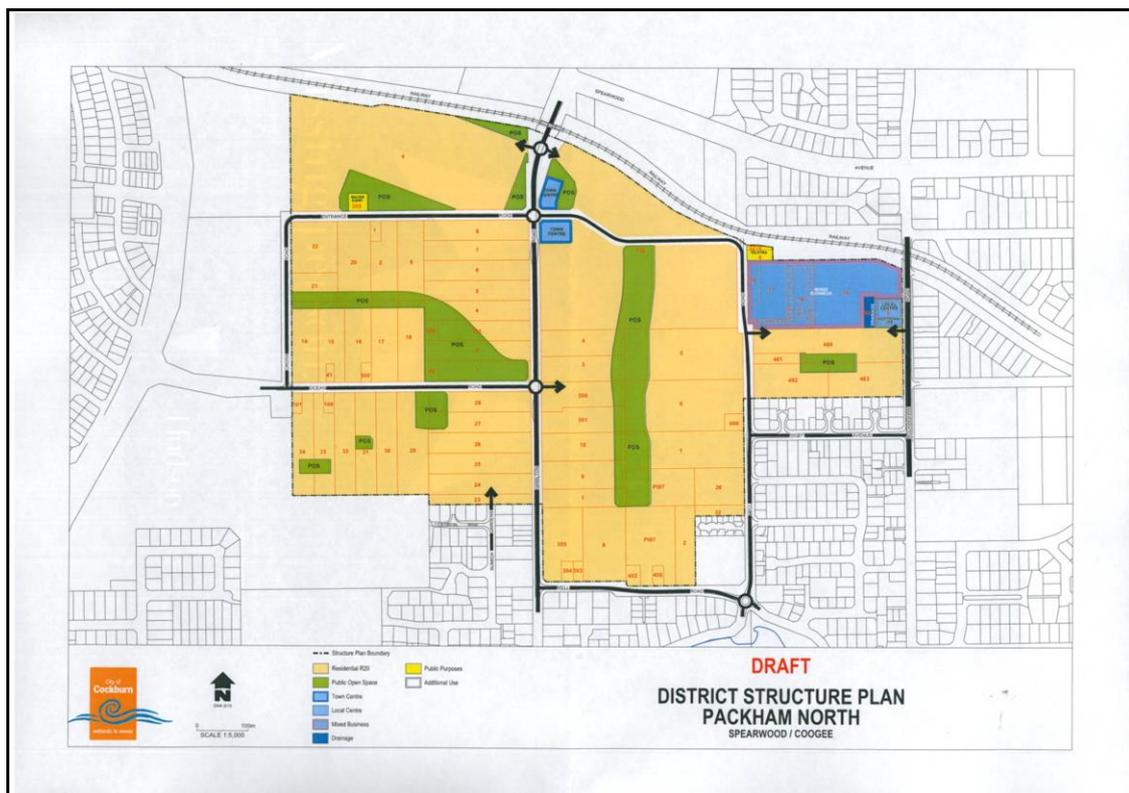


Figure 7 Packham North District Structure Plan (Source: City of Cockburn, 2010)

LOCAL PLANNING

3.7 CITY OF COCKBURN TOWN PLANNING SCHEME NO. 3

The LSP area is zoned 'Development' under the City of Cockburn TPS 3 as part of Local Scheme Amendment No. 70. The provisions of Local Scheme Amendment No. 70 require preparation and approval of a local structure plan prior to any subdivision and development. A separate amendment [Amendment No. 87] to TPS 3 will provide for development contributions and will include the LSP area within a Development Contribution Area.

3.8 CITY OF COCKBURN LOCAL PLANNING STRATEGY

The City of Cockburn Local Planning Strategy (LPS) promotes, amongst other things, urban development to include a range of housing densities and opportunities and strategies to reduce car use and encourage walking, cycling and public transport use. The proposed LSP is consistent with this philosophy in that it provides for a range of dwelling types, public open spaces that are within walking distance and a permeable road network.

3.9 WATSONS FOOD PLANT LOCAL STRUCTURE PLAN

A design concept has been prepared for the former food processing plant and rural land that has previously been affected by the food plant odour buffer. Various meetings and discussions have taken place with the landowner's consultants who are undertaking structure planning for the Watsons food plant and land to the north of the LSP. To this end, an appropriate interface "zipper" has been created between the land to the north and the LSP area. This is shown in **Figure 8 – Combined Structure Plans**.

3.10 CITY OF COCKBURN LOCAL SCHEME AMENDMENT NO. 87

This Local Scheme Amendment proposes to apply DCA provisions by including the Packham North District Structure Plan area as DCA 12 – Packham North. This aims to ensure, through the provisions of TPS 3 that all landowners equitably contribute to associated infrastructure development costs that are necessary to coordinate the orderly planning for the multiple landholdings within the Packham North area. DCA 12 costs include drainage, servicing, engineering and environmental studies prefunded by Council and other common costs that arise through the structure plan process.



Figure 8. Combined Structure Plans of former Watsons food plant [red] and LSP area [green]

4.0 INFRASTRUCTURE & SERVICING

4.1 RETICULATED SEWERAGE

Investigations during the preparation of the Packham North District Structure Plan indicates the availability of the LSP area being serviced by Water Corporation reticulated sewerage (**refer to Appendix 3 – Servicing Report**). Lot 482 Mell Road can be provided to from the existing gravity reticulated sewerage infrastructure and via extensions to the existing sewer infrastructure. All lots within the LSP bounded by Mell Road, Hamilton Road and the former food processing plant fall into the future (Type 40) Spearwood (J-066) wastewater pumping station. This pumping station is proposed to be located adjacent to the Fremantle Mount Pleasant Diversion Pressure Main on Lot 6 Mell Road.

The pumping station would be constructed under a prefunded private arrangement between the developer, the landowner to the north and the Water Corporation (and not as a DCA item). The pump station is proposed to be located within public open space as shown on the LSP within an easement granted to the Water Corporation. The exact location of the pumping station and its design will be determined at the detailed design stage of subdivision.

All lots within the LSP which are located on the western side of Hamilton Road fall into the future (Type 40) Spearwood (J-066) wastewater treatment pumping station. Verification and confirmation of various catchment boundaries are required at the detailed design stage. The Water Corporation advises that the pump station will require a 30m buffer separating sensitive land uses, such as residential. Preliminary investigations indicate that the 30m buffer can be provided for within proposed public open space and proposed subdivision roads.

4.2 WATER SUPPLY

Preliminary investigations indicate that the LSP area is located within the boundary of the Water Corporation's Water Supply Scheme. The subject land could be served by connection to the existing DN300 distribution water main that currently terminates at the intersection of Hamilton Road and Mell Road.

4.3 POWER

The LSP area can be adequately serviced by existing power infrastructure. There is an existing dual circuit 132kV overhead powerline located within the road reserves on the northern side of Entrance Road and the western side of Hamilton Road. Three existing 22kV overhead powerlines are also located within the road reserves on the northern side of Ocean Road, the eastern side of Hamilton Road and the eastern side of Mell Road. These existing overhead 22kV lines will need to be removed and replaced with new underground cable at subdivision/development stage. The developer is undertaking a feasibility study for the area for Western Power and initial discussions with Western Power

has indicated that there is sufficient capacity in the grid for the residential development as part of the proposed LSP.

4.4 TELECOMMUNICATIONS

The LSP area can be serviced by the existing telecommunications infrastructure within Mell Road. This includes the potential for extension of the existing telecommunications exchange in Mell Road.

4.5 GAS

Preliminary advice from Alinta Gas indicates that the LSP area can be supplied with reticulated gas via an extension from existing reticulated gas mains in Hamilton Road, Ocean Road and Mell Road.

4.6 UPGRADING OF EXISTING ROADS

Some minor upgrading of existing roads may be required where proposed lots front existing roads. Any required upgrades to existing roads as a result of the LSP proposal will be determined by Council at the subdivision stage.

4.7 TRAFFIC FLOWS AND ROAD REQUIREMENTS

A preliminary traffic investigation has been undertaken by the developer (**Appendix 6 – Traffic Flows & Road Requirements**). The preliminary traffic investigation indicates that with an estimated 345 dwellings, the LSP area could generate up to 2,700 vehicle trips per day, with approximately 800 to 1,000 trips generated by areas west of Hamilton Road and up to 1,800 trips east of Hamilton Road. It is therefore estimated that all roads will carry less than 1,000 vehicles per day (apart from Hamilton Road, Ocean Road and Mell Road). All internal roads can therefore be classified 'Access Street D' under Liveable Neighbourhoods, with the proposed 15.0 metre road reserves generally acceptable.

With Hamilton Road expected to carry up to 13,000 vehicles per day in the long term, it is important to provide sufficient spacing between intersections, particularly if all turning movements are proposed. It is therefore suggested that a minimum intersection spacing of 120 metres should be adopted along Hamilton Road. This makes it possible to provide two local road connections to Hamilton Road between Mell Road and Ocean Road.

4.8 DRAINAGE

A District Water Management Strategy (DWMS) for the Packham North District Structure Plan was prepared by the City of Cockburn. The DWMS aims to put in place strategies for water management that will protect water resources and minimise environmental impacts. The DWMS covers the LSP area and has provided sufficient information to determine the location of drainage infrastructure (i.e. swales) within public open space. The location and size of public open space as shown in the DSP has been based on the DWMS. The LSP has been prepared consistent with the DWMS and DSP and reflects the areas required for drainage. The details for stormwater drainage Urban Water Management flows for the proposed residential development of the LSP area will be undertaken at the subdivision and development stage.

4.9 EARTHWORKS

Earthworking of the site will be required in areas to create level lots for dwelling construction. Changes in elevation will be provided for by construction of retaining walls. The height of retaining walls will vary due to natural ground level differences and wherever possible, the natural topography will remain, though benched. This is more of the case on the western side of Hamilton Road. Retaining walls will also be used in other areas of the development to create a terrace product. For example, retained lots adjacent and overlooking parkland. It is not envisaged that retaining walls will be significantly high, with most walls approximately 1.0 metre.

Due to its coastal location, there may be isolated pockets of limestone found, particularly in the western part of the LSP area. If any limestone is encountered, it will be broken up prior to use as potential structural fill and replaced with sand. Sand will be used to fill other required areas.

The interface between the 'Parks and Recreation' reserved land and the LSP area requires careful planning and earthwork design. A preliminary siteworks plan has been prepared by the developer and is included in **Appendix 5 – Preliminary Site Works 'Parks & Recreation' Reserve Interface**.

5.0 LOCAL STRUCTURE PLAN

5.1 DESIGN RATIONALE AND PROPOSED LAND USES

The LSP provides for two major land uses being residential (with mixed densities) and local parkland. The LSP has been prepared to provide a comprehensive strategic plan to guide the future subdivision and development of the fragmented landholdings, which until the closure of the former food processing plant, had limited potential for urban development.

The LSP seeks to create an urban environment that is based on a logical and permeable network of streets that combine to create a pleasant walking/cycling environment. The modified grid pattern design provides a range of route alternatives linking destinations, in particular the public open spaces. The design of the plan provides for open and interactive urban spaces that balances residential lots against appropriate interfacing, road layout, open space, servicing and drainage.

5.2 RESIDENTIAL DENSITY, LOT LAYOUT AND LOT YIELD

The LSP contains both low density (R20 & R25) and medium density (R30) residential lots. Wherever possible, lots have been designed to achieve solar orientation through the design of roads to create mainly north-south and east-west facing lots.

In some instances, it has been necessary to orientate lots towards public open space to maximise opportunities for passive surveillance. It is considered that the overlooking of public open space is a desirable planning outcome and is reflected in the LSP lot layout.

The LSP proposes superlots (including existing lots containing dwellings) of which are proposed to be R25. It is envisaged that for the short – medium term, the dwellings on these lots will be retained. Eventually, the dwellings could be demolished with redevelopment to a density of R25. In most instances, superlots can be further subdivided into 2 – 3 lots.

Choice of dwelling design is provided through the mixture of low and medium density lots provided in the LSP. Medium density lots have been provided in high-amenity areas such as surrounding public open space, along the interface with the 'Parks and Recreation' Reserve and in close proximity (i.e. 400m walking distance) of the local neighbourhood centre in Hamilton Road (Coogee).

- NOTES**
- (1) Roundabout at intersection of Ocean/Hamilton Roads in accordance with Packham North District Structure Plan and Figure 10 of the Ocean Crest Local Structure Plan Report.
 - (2) Development within sewer pressure main corridor (easement) restricted to landscaping only. Corridor not part of 10% POS requirement.
 - (3) Elevated R30 lots overlooking parkland.
 - (4) Detailed fire management plan required at subdivision stage to address Parks and Recreation Reserve fire risk.
 - (5) Buildings located within 100m of the Parks and Recreation Reserve are recommended to be constructed in accordance with AS 3959-2009. This is to be confirmed by preparation of a fire management plan at subdivision stage.
 - (6) Location and design of visitor parking for laneway lots to be resolved at subdivision stage.
 - (7) Hamilton Road and Ocean Road pavement to be widened in accordance with the City of Cockburn's requirements.
 - (8) Proposed pathway to be constructed by others.
 - (9) Dry basin areas (1:5yr ARI) shown are indicative only subject to detailed engineering design.
 - (10) Perimeter swales (1:1yr ARI) around POS areas provided in addition to 10% POS requirement.
 - (11) Approximate location of sewer pumping station subject to final design with 30m buffer to houses.
 - (12) Landscaping above the existing waste water pressure main is to be undertaken by developer.
 - (13) Rear laneway lots are to be provided with visitor parking directly at the front of lots at the rate of 1 bay for every 2 lots.
 - (14) Footpaths are to be provided on all streets in accordance with the requirements of Liveable Neighbourhoods.



Job Number: 13700
 Sheet Name: 13700-21
 Scale: 1:3000 @ A3
 Date: 21/07/2015
 Drawn By: SJF
 Checked by: JEP
 File: s:\Projects\13\13700\planning\drafting & design\110420 structure plan OPTION 2.dgn
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LEGEND

- R30 lots with mandatory two storey dwellings
- Area subject to fire management and further consultations with City of Cockburn
- Lots to be retained for waste servicing until development of neighbouring Land
- Lots with double crossover for waste servicing
- Transmission power lines
- Transmission power line easement

- Indicative planning over land outside of structure plan subject to future investigation
- Local Structure Plan boundary
- Properties affected by Market Garden buffer (300m)
- Pedestrian access
- Lots that require Area Specific Plans (or DAPs)

ZONES AND RESERVES

- Public Open Space
- R20 Residential
- R25 Residential
- R30 Residential
- R40 Residential

OCEAN CREST LOCAL STRUCTURE PLAN
LOTS 29 - 32 OCEAN ROAD
LOTS 23 - 28, 500 & 501 HAMILTON ROAD
LOTS 1, 2, 5, 6, 8, 26, 305, 310, 311 & 482 MELL ROAD
SPEARWOOD/COOGEE

133 Scarborough Beach Road, Mount Hawthorn WA 6016
 PO Box 99, MOUNT HAWTHORN WA 6915
 T: 08 9443 1511 F: 08 9444 3901
 E: whelans@whelans.com.au W: www.whelans.com.au

The following table is an estimate of the residential lot yield of the LSP:

RESIDENTIAL LOT TYPE	DENSITY	YIELD
Low density residential	R20	167
Low density residential	R25	52 (includes superlot potential)
Medium density residential	R30	106
Grouped Housing	R30	20
Total Yield		345

5.3 ROAD NETWORK

Ocean Road, Hamilton Road and Mell Road are existing constructed roads which bound the LSP area. In some areas proposed lots will front onto these existing roads. New subdivision roads are proposed connecting these existing roads. Hamilton Road is an important road route linking the localities of Spearwood and Coogee.

Ocean Road

Ocean Road is the main east-west road connecting Hamilton Road with Cockburn Road to the west and is expected to carry approximately 3,500 vehicles per day. Ocean Road inside the LSP is not proposed as a 'Primary Regional Road' but will be retained as a 'Neighbourhood Connector B' road linking Hamilton Road with Cockburn Road. The MRS reservation [Figure 9 – Ocean Road MRS reservation] refers to the future intersection realignment with Cockburn Road and inclusion of a drainage sump adjacent to Lot 34 Ocean Road to accommodate stormwater drainage. This realignment of Ocean Road is under the control of Main Roads WA.

MRS reservation of the remainder of Ocean Road for inclusion as 'Primary Regional Road' is not required as it will not serve this hierarchical function. As part of subdivision, it is likely that the Ocean Road pavement will be required to be upgraded from its current 6 metre pavement width to a pavement width of 7.2 metres. This would be consistent with the recently upgraded Ocean Road pavement to the west at 7.2 metres in width. The details of the widening of the road pavement would be undertaken at the subdivision stage in consultation with the local authority.

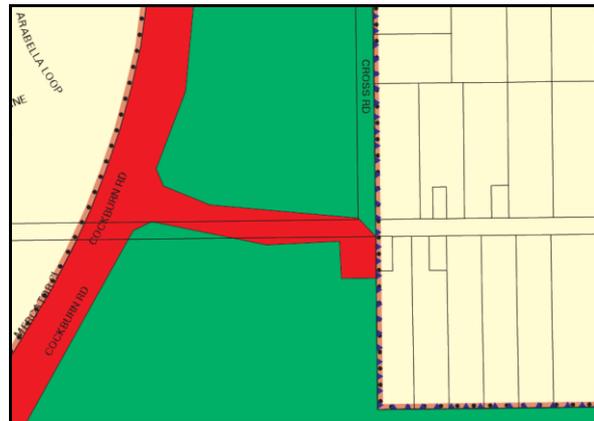


Figure 9. Ocean Road MRS reservation refers mainly to a future realignment to provide for a new intersection with Cockburn Road and land required for drainage.

Hamilton Road/Ocean Road Intersection

The LSP proposes a 15m wide subdivision road being an extension of Ocean Road east of Hamilton Road. This will result in a cross intersection at Hamilton Road with Ocean Road. The proposed local structure plan identifies this intersection as a roundabout as agreed to by the City and consistent with the Packham North District Structure Plan. Discussions have been undertaken with the City of Cockburn regarding the design of the roundabout (see **Figure 10 – Roundabout Design**) to provide suitable deflection for vehicles, separation to the AC pressure main, maneuvering for buses and suitable offset to the power line tower. These issues must be accommodated in the detailed design of the roundabout.

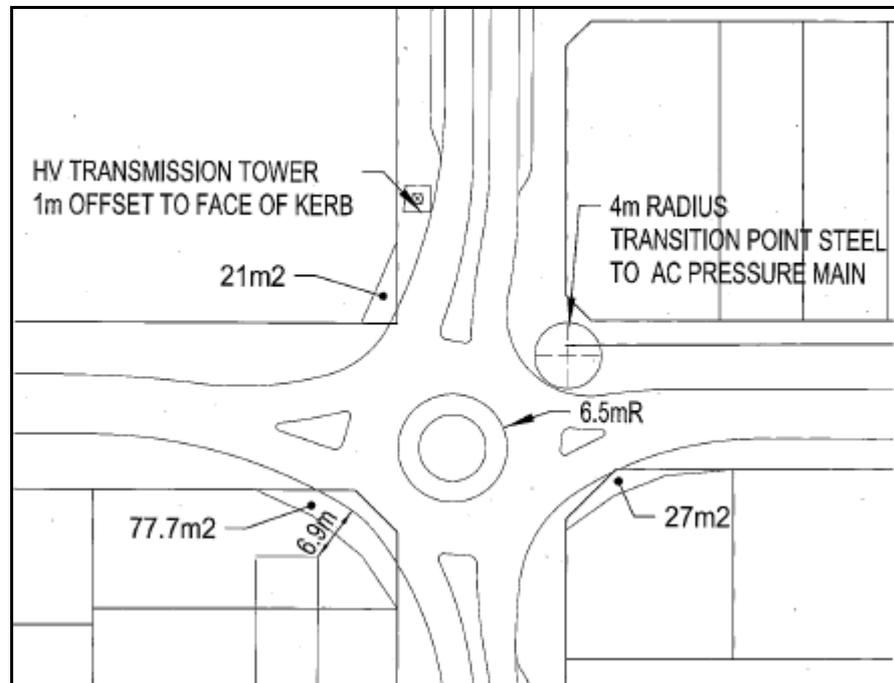
Hamilton Road Upgrading

Liveable Neighbourhoods specifies ‘Neighbourhood Connector’ roads as having maximum traffic volumes of 7,000 vehicles per day. Hamilton Road already carries over 8,000 vehicles per day (MRWA 2007/08) and is expected to increase to between 11,000 – 13,000 vehicles per day in the future. The traffic assessment report (Appendix 6) suggests that Hamilton Road should be classified as an ‘Integrated Arterial B’ under Liveable Neighbourhoods.

At present Hamilton Road contains a 9 metre wide pavement, containing two lanes 3.3 metres wide and a 1.2 metre wide cycle lane on each side. Under Liveable Neighbourhood standards, upgrading of Hamilton Road should already have occurred as the road is accommodating over 8,000 vehicles per day.

It is recommended that Hamilton Road pavement be increased to provide for 4.5m traffic/cycle lanes on either side of a 2m painted medium. The increase in width to the pavement would only occur on the eastern side of Hamilton Road due to the existing

power transmission line infrastructure (see **Figure 11 – Hamilton Road South of Ocean Road Cross Section**).



(Source : Wood & Greive Engineers, 2011)

Figure 10. Roundabout design for intersection of Hamilton/Ocean Roads

Proposed New Roads

All proposed new roads within the LSP are either local access roads or laneways. The width of new subdivision roads within the LSP ranges indicatively from 10m - 15m, depending on the function and hierarchy of the proposed road. Most of the proposed roads are 15m in width. In some places, the road reserve width has been reduced to 10m – 13.5m to provide for special functions, such as a minor street as a hard edge interface with public open space or the slip road abutting the sewer easement corridor. Laneways are proposed at the rear of R30 cottage lots, which will provide vehicular access for the narrow lots as depicted on the LSP plan. The width of proposed roads will be determined at the detailed engineering design stage of subdivision.

Within the LSP, there are approximately 39 lots (including grouped dwellings) that will be served by a cul-de-sac. This proportion is consistent with Liveable Neighbourhoods, which states that no more than 15% of lots should be served by cul-de-sacs. The proportion of lots within the LSP that are served by cul-de-sacs is approximately 12%. In addition, all cul-de-sacs are less than the maximum cul-de-sac length of 120m under Liveable Neighbourhoods.

In some instances, there will be temporary “cul-de-sacs” where roads extend into adjoining properties subject to future planning. For instance, Lots 500 & 501 contain a road which extends southwards into neighbouring land that will in future be subject to residential subdivision. Until this road is extended, a temporary turning circle will need to be provided for waste servicing. This will be implemented by the developer through holding one lot and construction of a temporary turning circle until the road is extended (as shown in **Figure 12 – Concept Plan Lots 500 & 501 Mell Road**).

Local streets have been designed on a modified grid pattern to support short trips for local traffic moving in and between neighbourhoods. The road network design also allows for the spreading of traffic so that high volume traffic is not necessarily concentrated in any given area. All proposed roads are to be constructed to the satisfaction of the local authority.

Wherever possible, the LSP has been designed to provide the opportunity for each of the individual landowners to subdivide and develop their respective land parcels independently. However, due to the layout and fragmentation of the existing LSP area, there are instances where in order to complete development (as per the LSP), some landowners would need to rely on the construction of roads through neighbouring lands to provide access and servicing to lots. Ocean Road, Hamilton Road and Mell Road are existing constructed roads which bound the LSP area. In some areas proposed lots will front onto these existing roads.

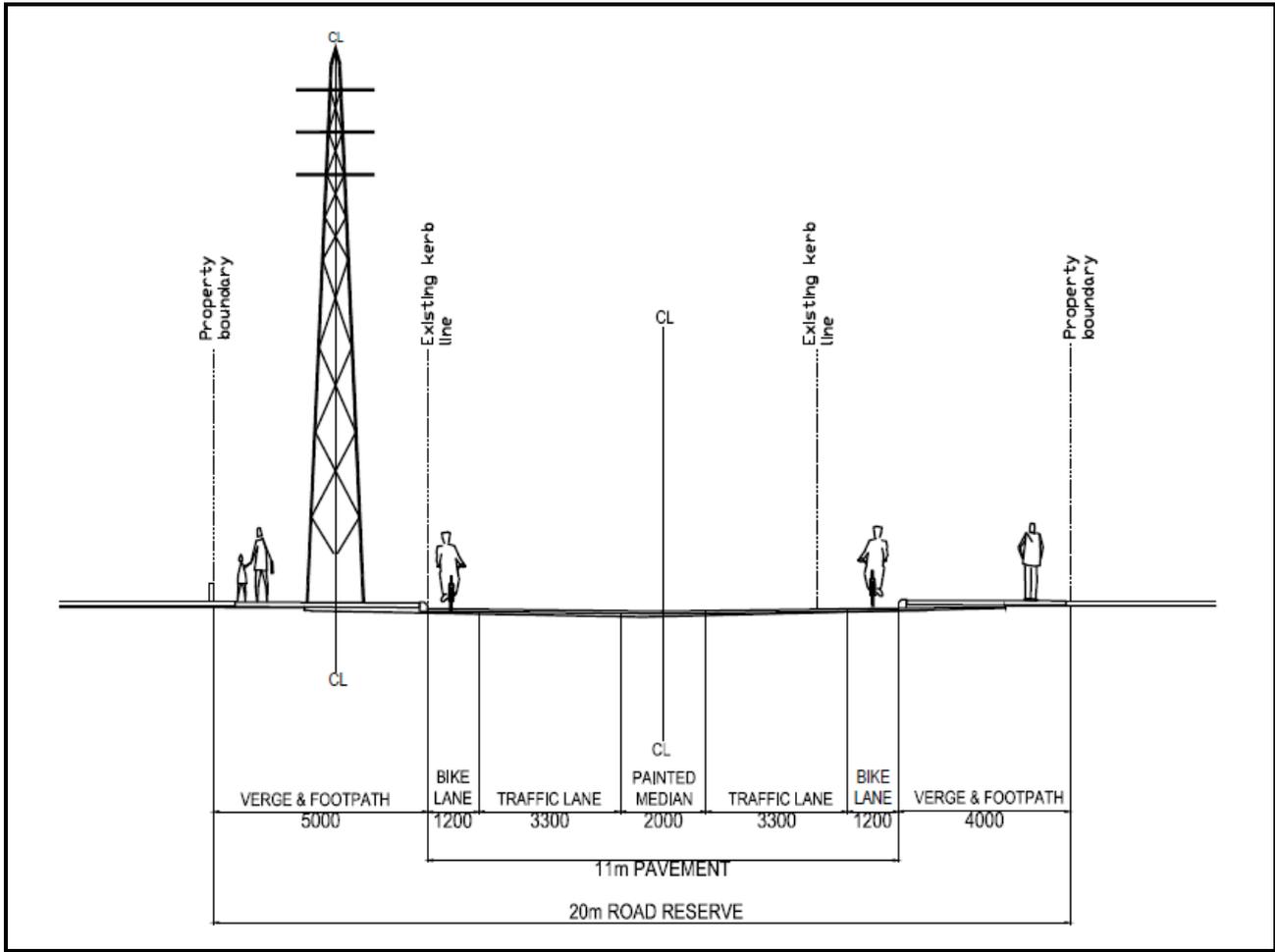


Figure 11 – Hamilton Road South of Ocean Road Cross Section (Uloth, 2011)



Figure 12. Concept Plan Lots 500 & 501 showing lot to be withheld for waste servicing until future extension of roads through to neighbouring land

5.4 SEWER EASEMENT CORRIDOR

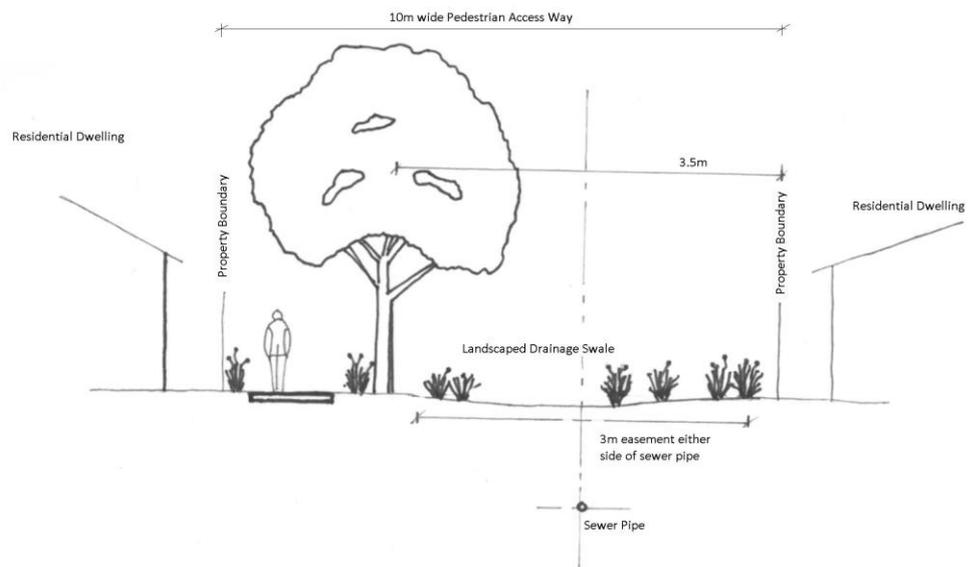
In the eastern portion of the LSP, the proposed subdivision road accessing Mell Road (through existing Lot 6 Mell Road) has been specifically designed to accommodate the existing sewer main.

Consultation with the Water Corporation indicates that no development is permitted within the sewer pressure main corridor. If development is desirable, such as roads, footpaths, car parking, which will require filling of the land, then the Corporation has requested the pipe be upgraded for strengthening. If the land above the existing sewer pressure main is left unaltered, then no upgrading of the sewer main infrastructure is necessary. The Corporation would allow landscaping within the sewer easement corridor. The corridor is effectively 6.0 metres wide.

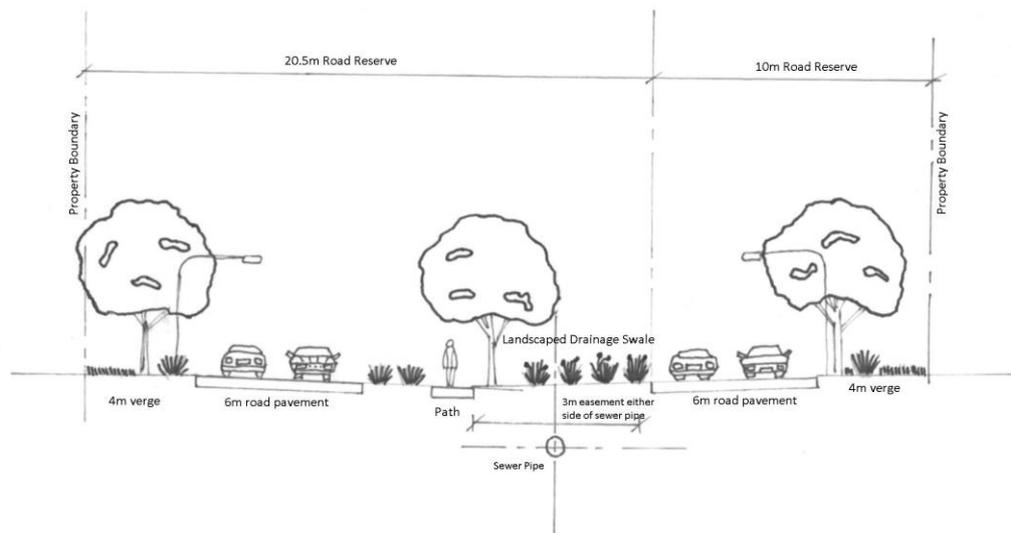
It is proposed that the corridor be landscaped and used as a drainage swale. Development is oriented to provide for passive surveillance of the corridor, which will be utilised as a landscaped thoroughfare. **Figure 13 – Concept Plan Lots 5 & 6 Mell Road** and **Figure 14 – Proposed Local Road Cross Sections** shows an indicative design to accommodate and protect the existing sewer main within road reserve as required by Water Corporation.



Figure 13. Concept plan Lots 5 & 6 Mell Road showing sewer corridor landscaped drainage swale and pedestrian accessway



PEDESTRIAN ACCESS WAY INDICATIVE CROSS SECTION Scale 1 : 100



SEWER CORRIDOR INDICATIVE CROSS SECTION Scale 1 : 200

Figure 14. Proposed Local Road Cross Sections for Lots 5 & 6 Mell Road

5.5 PUBLIC OPEN SPACE

General

Local neighbourhood parks can contribute towards legibility, identity and sense of place that helps build community. Within the LSP, almost half of the structure plan area is vacant undeveloped land, which provides opportunity to strategically locate public open space areas within the design. Given that much of the land is vacant and cleared, this provides ability to erect playground equipment without the need for clearing of existing bushland and vegetation.

The natural features, such as the low lying depression in the central area can provide opportunity to create multiple use drainage and public open space areas for both passive and active recreation. The central low lying depression between Hamilton Road and Mell Road is proposed to be utilised to create a large central spine of public open space, incorporating grassed swale areas for drainage function.

The Packham North District Structure Plan does not identify any requirement for regional open space and as such, there is no provision for regional open space within the LSP. A series of local neighbourhood parks have been shown throughout the residential areas on the District Structure Plan. These have been accommodated for in the LSP, which includes the central main north-south orientated POS and pocket park in the western portion on Ocean Road.

10% POS Requirement

Overall, the 10% POS requirement has been provided for in the LSP for the represented landholdings. Some landowners have provided more than the required 10% POS from their own land holding. A number of lots within the LSP have no POS shown.

If each individual landowner provided 10% from each of their respective lots, the provision of POS from each of the lots in the LSP would result in small fragmented areas that would be disjointed and would compromise the ability to coordinate roads and servicing. The POS proposed in the LSP (which is consistent with the DSP) reflects a more logical design for the provision of POS.

It is envisaged that landowners within the LSP landholdings that provide more than the required 10% POS will receive a cash in lieu contribution from those landowners who contribute less than the required 10% POS amount. Those lots providing more than the 10% POS requirement for the benefit of other landowners in the LSP include Lot 29 Ocean Road, Lots 1, 5, 6 & 305 Mell Road and Lots 27 & 28 Hamilton Road. In particular, these landowners will receive the respective reimbursement from other landowners in the LSP who are not providing the 10% POS requirement from their respective landholdings.

POS, credits and expenditure of cash in lieu for POS will be determined in accordance with the relevant Western Australian Planning Commission policies, practices and legislation at local structure planning and subdivision stage. Table No. 1 forms the **Public Open Space Schedule** for the LSP.

Surveillance of Public Open Space

In certain areas of the LSP design, lots are proposed to directly adjoin public open space areas, either by fronting, backing or siding onto POS. To provide opportunities for passive surveillance and address the interface between lots and POS, in each circumstance, a Detailed Area Plan (DAP) is proposed to be prepared to the satisfaction of Council. The DAPs will be required as part of conditions of subdivision approval for the respective lots. Lots which will be required to have a DAP prepared have been shown on the LSP plan.

Water Corporation Pump Station

The proposed Water Corporation pump station site will be located in the central POS spine east of Hamilton Road. The approximate size of the pump station site will be 640m² equating to an area 20m x 32m, which is a similar size to the Kent Street pump station site to the north in Beale Park (Kent Street), Spearwood.

The hard infrastructure for the pump station will generally comprise of the concrete lid/s, services and hardstand accessway. Water Corporation has advised that the pump station site could require only an easement and would not have to be a separate site in ownership of Water Corporation. In this instance, the pump station site would be located on parkland and would not be fenced around its perimeter, however, the hardstand accessway would likely to have bollards to discourage any unauthorised access. The pump station tanks would be underground and the surface around the hard infrastructure could be grassed and/or landscaped. Approximately 50% of the pump station site would comprise of 'hard infrastructure' with the residual 50% utilised as public open space. An example is shown in **Figure 15 – Kent Street Pump Station Site in Beale Park**.

Table 1. Public Open Space Schedule for Ocean Crest Estate, Coogee/Spearwood

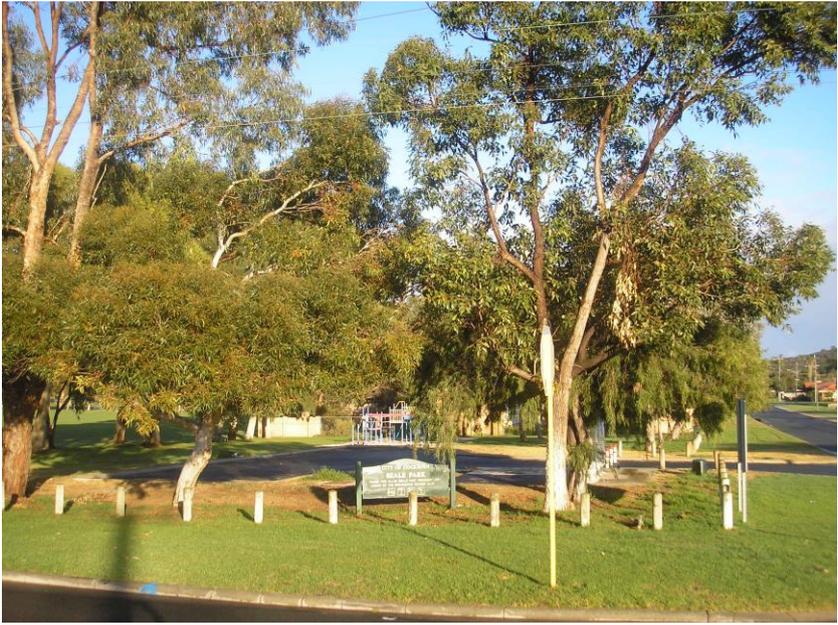
LSP Site Area			22.6293 ha
Less			
Area of Lot 305 as landowner has already provided Council with 10% POS cash in lieu for previous subdivision	0.9579 ha		
Total Net site area			21.6714 ha
Deductions (LN Element 4 – R43)			
Water Corporation Pump Station ‘hard infrastructure’	0.0320 ha		0.0320 ha
Gross Subdivisible area (GSA)			21.6394 ha
Public open space @ 10 per cent required			2.1639 ha
Public open space contribution			
May comprise:			
- minimum 80 per cent unrestricted POS	1.7311 ha		
- Maximum 20 per cent restricted use POS	0.4328 ha		2.1639 ha
<i>Unrestricted POS area (Non-Drainage Areas > 5yr ARI)</i>			
Neighbourhood park (Ocean Road)		0.4036 ha	
Neighbourhood park (Central Main Parkland)		1.2296 ha	
Portion of Neighbourhood Park (Mell Road East – Lot 482)		0.0979 ha	1.7311 ha
<i>Restricted use POS area (1:5 yr ARI)</i>			
Neighbourhood park (Central Main Parkland)			
Dry Basin No. 1	0.0942 ha		
Dry Basin No. 2	0.1886 ha		
Dry Basin No. 4	0.0500 ha	0.3328 ha	0.4328 ha
Neighbourhood park (Ocean Road) – Dry Basin No. 3	0.1000 ha	0.1000 ha	
Public open space provision provided			2.1639 ha (10%)

Notes:

(1) The total area provided for POS/Drainage in the LSP is:

Total POS/Drainage Area provided in LSP	2.4365 ha
less WC pump station ‘hard infrastructure’	- 0.0320 ha
	<u>2.4045 ha (11.11% of GSA)</u>

(2) In addition to the 10% POS requirement, approximately 2,406m² of extra land has been provided for 1:1 yr drainage. This includes the perimeter drainage swales around POS areas. In general the 2,406m² breakdown is Ocean Rd POS 1:1yr drainage allowance is 550m² and Central POS 1:1yr drainage allowance is 1,856m².



South West view at intersection



Figure 15 – Kent Street Pump Station Site in Beale Park

5.6 BICYCLE & PEDESTRIAN MOVEMENT

The LSP provides opportunity for provision of a safe, convenient and legible bicycle and pedestrian movement network. A network of pathways is shown on the LSP, principally along the street network. This creates accessibility between residences and safe access to destinations, such as parkland.

The proposed pathway network in the LSP connects into existing pathways in the surrounding development, particularly along Mell Road and Ocean Road. It is the developer's intention to ensure that all pathways connect, in a coordinated manner, with the surrounding existing established residential areas and future urban development to the north.

5.7 PEDESTRIAN ACCESS WAY SURVEILLANCE

A Pedestrian Access Way (PAW) is proposed as part of a pedestrian/cyclist link connecting Mell Road and the central spine public open space. The PAW also serves as part of the infrastructure sewer pressure main corridor (see Figure 13). The design of the PAW is consistent with the principles contained in WAPC DC Policy 2.6 and WAPC Planning Guidelines *Reducing Crime and Anti-Social Behaviour in Pedestrian Access Ways*. DC Policy 2.6 states:

"Where pedestrian links between property boundaries are unavoidable, the design of the pedestrian access way should limit the opportunities for anti-social behaviour. For this reason, the width of the pedestrian access way should not be less than (8) eight metres and the design should be straight and open to view from other residences, street or public open space."

The width of the PAW is approximately 10 metres (subject to survey) and is above the minimum 8.0 metre width required under DC Policy 2.6. Furthermore, in accordance with the WAPC Planning Guidelines, surveillance of the PAW is increased through the following measures:

- PAW is overlooked at either of its ingress/egress points;
- PAW has passive surveillance along its route through the orientation of northern lots abutting the PAW. Detailed Area Plans will be prepared to provide for at least open style fencing along the rear boundary of the northern lots;
- Landscaping within the PAW is proposed to be low to increase surveillance and limit entrapment or hiding spots along the length of the PAW;
- PAW is sufficiently wide to allow pedestrians to pass each other easily and increase surveillance; and
- The proposed subdivision road on Lot 482 Mell Road opens up directly opposite the PAW, thereby increasing surveillance and maintaining an open link route.

5.8 POPULATION & EMPLOYMENT

Based on an average household size of 2.3 persons per dwelling, the LSP would result in a residential population of approximately 793 persons for the proposed 345 lots.

The LSP is not in a new growth area and therefore the expectation for the LSP to provide for opportunities for significant local employment [promoting concepts of self-sufficiency as those stated in Liveable Neighbourhoods] is reduced. No commercial or mixed use land is proposed in the LSP as this has not been provided for in the Packham North District Structure Plan.

Major locally available employment opportunities would be provided in the proposed DSP mixed business precinct on Rockingham Road, the local neighbourhood centres along Hamilton Road, nearby industrial areas and other district and regional centres. Opportunities for home-based employment within the LSP would exist under the provisions of TPS 3.

5.9 LOCAL STORMWATER DRAINAGE

A key principle of the LSP is to ensure that all stormwater drainage is contained on-site within the LSP. Drainage is to be provided for through appropriately designed and located infiltration and soakage [swale] areas within public open space. The underlining strategy is to maximise infiltration into groundwater with dry, landscaped swale basins. These swale areas will provide for 1:100 year storm events. Further infiltration would be assisted by features such as grassed/vegetated swale drains and flush-kerbed roads, where considered appropriate.

All lots in the LSP shall be appropriately earth-worked to ensure stormwater drainage requirements are achieved to the satisfaction of the local authority. The designing and implementation would be undertaken at the subdivision and development stage.

The central low lying public open space area will be the predominant area for installation of stormwater dry basins. The existing low lying depression [wetland] area on the northern side of Ocean Road in the vicinity of Lots 28 & 29 Hamilton Road (corner Ocean Road) will be utilised for stormwater drainage.

Overall, the total area of land set aside for public open space and drainage is 2.43 hectares, of which, 2.1251 hectares has been allocated as dual purpose restricted and unrestricted public open space. The LSP has provided for the 10% POS requirement, with approximately 20% of the POS land being utilised as *restricted public open space* for dry basin drainage purposes as provided for by Liveable Neighbourhoods. In total, approximately 11% of the total LSP area has been set aside for POS/drainage.

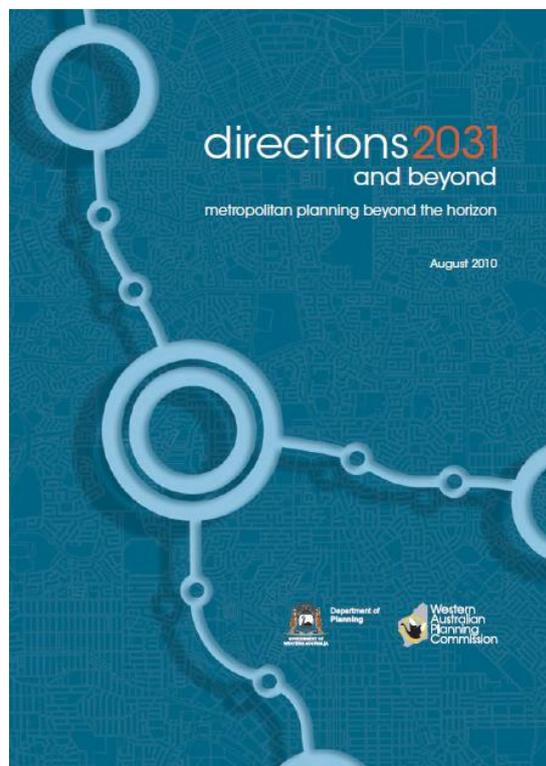
5.10 EDUCATION & COMMUNITY INFRASTRUCTURE

No community purpose sites, for land uses such as community centres, child day care centres, meeting halls and kindergartens have been provided for in the LSP. The primary reason for this is because there is already adequate established community infrastructure in the locality to cater for demand.

Similarly, no primary or high schools have been provided for in the LSP. There is already considered to be sufficient education facilities in the surrounding established localities to accommodate the increase population resulting from the LSP. This is consistent with the Packham North DSP.

5.11 DIRECTIONS 2031 – TARGET DENSITY

Directions 2031 proposes a 50% increase in the current average residential density of 10 dwellings per gross urban zoned hectare and has set a target of 15 dwellings per gross urban zoned hectare of land in new development areas. Under Directions 2031, 15 dwellings per gross urban hectare is considered to be medium density development, whereas 10 dwellings per gross urban hectare is identified as low density development.



The Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy identifies the subject land (including Watsons Land to the north) for a future 900+ lots. It should be noted that this is an indicative estimate based on 75% of the land being able to be developed. Only approximately 68% of the LSP landholdings has been able to be developed for new residential lots, with the remaining 32% required for roads, public open space and drainage. However, the Directions 2031 target density of 15 dwellings per gross urban hectare is achieved by the proposed LSP.

Proposed Local Structure Plan – Estimated Lot Yield and Density v Directions 2031

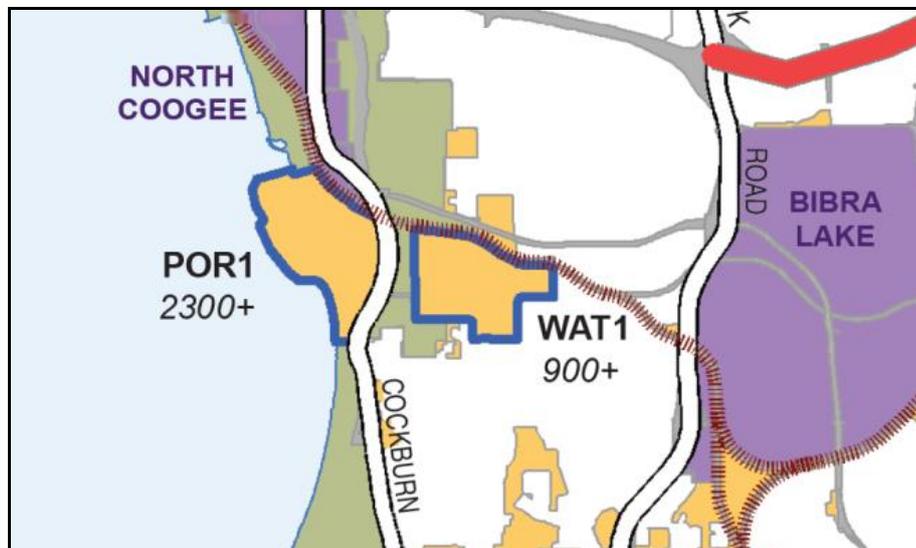
Gross Total Area of LSP	22.6292 ha
Estimated Ultimate Lot Yield	345 lots
Estimated Density	15.25 lots per gross urban hectare
Target Density	15.00 lots per gross urban hectare

Note: Area of roads, drainage and public open space = 7.1575ha (or 31.63% gross LSP area)

Although the LSP landholdings achieves the proposed Directions 2031 target density of 15 lots/ha, this could not be substantially increased due to the following limitations:

- Difficulties with planning fragmented landownership and the need to coordinate proposed road and lot boundaries with landownership boundaries as much as possible;
- Short term planning for retention of existing substantial houses;
- Irregular shape of the LSP area;
- Watson’s land to the north is proposing a higher lot yield as shown on the “Composite Whelans/RDG plan” (Figure 8) which will substantially raise the target density for the overall Packham North DSP;
- A range of lot sizes is considered necessary which is site specific to the topographical and environmental attributes of the LSP area and responsive to market demand;
- The diversity of lot sizes is considered appropriate for the location, market demand and interface with surrounding established residential areas;
- Approximately 31.63% of land is required for roads, laneways, drainage and public open space, which has a bearing on estimated lot yield;

- The proposed LSP landholdings comprises a portion of the Packham North District Structure Plan (totaling 79 hectares), which is identified as “WAT1 900+” in the Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy. The LSP (22.6292 hectares) thus represents 28.64% of the Packham North DSP area. The Strategy identifies the Packham North DSP area for a future 900+ lots. Accordingly, the LSP proportion of the target 900 lots should be a minimum of 258 lots (being 28.64% of 900). The LSP proposes approximately 345 lots, which is substantially above what is anticipated in the draft Strategy. The LSP therefore provides a significant contribution of target lots under the draft Strategy. The remaining lots (i.e. 561 lots) to make up the target 900 lots in “WAT 900+” fall within the balance areas of the Packham North DSP.



Extract from Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy

5.12 PROXIMITY TO EXISTING MARKET GARDEN

An existing small scale market garden is located at the rear of Lot 33 Ocean Road, which will be in proximity to proposed residential development. The LSP shows proposed lots [on Lot 32 Ocean Road] opposite the existing market garden. In such cases, it is generally accepted that a specially designed fence be provided by the developer, to minimise the impact of the existing market garden on proposed residential development. An example of a specially designed fence is a minimum 1.8m high solid fence with the top 300mm constructed from porous material, such as lattice work (refer to **Figure 16 – Market garden boundary fencing**). The fence should be constructed on the eastern property boundary of Lot 33 Ocean Road for the length of the market garden. In addition,

memorials are to be included on titles of all residential lots within 300m of the boundary of the market garden advising of the location and potential impacts of the market garden on amenity. Once the market garden ceases to operate, the fence and memorials may be removed. This is consistent with WAPC planning policy for dealing with potential conflicts between residential subdivision and market gardens.



Figure 16. Market garden boundary fencing example in Sinagra, City of Wanneroo

5.13 RESIDENTIAL LOTS ADJOINING HAMILTON ROAD

In relation to the road category and current and future traffic projections for Hamilton Road, Liveable Neighbourhoods Element 3 (R30) states that on streets with vehicle volumes greater than 5000vpd, lot layout must ensure that vehicle egress will not involve reversing into the street. This requirement has been considered in discussions with the developer and the local authority. Following discussions and investigations, it is considered that the requirement is not essential for the following:

- there would be sufficient maneuvering width to negotiate around a vehicle entering Hamilton Road provided by the widening of the Hamilton Road pavement width, provision of cycle lane and creation of a 2 metre painted medium;

- The creation of lots along Hamilton Road is not a 'greenfield development' due to the retention of numerous existing dwellings along Hamilton Road within the LSP. This limits the ability to create a new slip road and/or provide DAP provisions for those lots;
- The majority of existing development along Hamilton Road do not have reversing bays or slip roads and the provision of so many hardstand areas for vehicle reversing is likely to have a negative impact on the streetscape;
- The length of Hamilton Road adjacent the LSP area is straight and level, providing adequate sight lines for traffic safety. In addition, the ingress/egress of vehicles to and from the Coogee Plaza neighbourhood centre provides a slowing point for traffic flow along Hamilton Road.

5.14 BUSH FIRE MANAGEMENT

A preliminary fire assessment has been undertaken by a qualified consultant to inform the LSP design and recommend fire management (**Appendix 4 – Fire Management Planning**). The LSP area is rated as 'Low' fire risk as there is substantial areas of low grassland, cleared and developed housing. Land reserved under the MRS for 'Parks and Recreation' adjoins the LSP area at the rear of Lots 29 – 32 Ocean Road, where this interface presents more substantial fire risks.

The major vegetation community within MRS reserved land comprises of coastal heath and tall shrubland (i.e. up to 3 metres). The majority of this area is classified as 'Extreme' fire risk following assessment as per Appendix 1 of the *Planning for Bush Fire Protection Guidelines*. Along the interface with the LSP area, there are pockets of cleared or 'low' fire risk areas. In particular, the fire risk for the LSP area associated with MRS reserved land is predominantly affected by introduced species and weeds and not remnant native vegetation. At the interface with the LSP area, there is a reduced fire risk as vegetation consists of patches of grassland interspersing shrubs 1.5 – 3.0 metres high rather than a continuous canopy of tall shrubs, which is characteristic of an 'extreme' fire risk area.

Proposed lots in the LSP are located downslope relative to MRS reserved land (refer to **Figure 17 – Interface with MRS 'Parks and Recreation' Reserve**). The slope is approximately 10 – 15 degrees, with the fire hazard located upslope from future lots. The intensity of a fire downslope is reduced in wildfire conditions, however this is also dependant also upon weather conditions. The risk of bushfire is managed in terms of the following recommendations:

- A detailed Fire Management Plan (FMP) being prepared and endorsed at the subdivision stage;
- Building construction standard (AS 3959-2009) of future housing within proximity to the MRS reserved land to be considered as part of the FMP;
- Section 70A notifications on title be considered advising prospective residents of the LSP Fire Management Plan;

- A building protection zone (i.e. low fuel loading) of 20 metres is recommended from any external housing walls; and
- Discussions with DEC as to implementation of firebreaks within the park and control/management of weeds to reduce fuel loading within a 20m – 30m distance from proposed housing.

The Bush Fire hazard assessment suggests a Bushfire Attack Level of BAL 12.5 be applied to any building located within 100m of the MRS reserved land. Under the WAPC *Planning for Bush Fire Protection Guidelines*, this would require buildings to be constructed in accordance with AS 3959-2009. A more detailed Fire Management Plan would be prepared as a condition of subdivision approval and the BAL 12.5 requirement for construction to AS 3959-2009 standards for buildings within 100m can be further considered.

5.15 LANDSCAPING

A Landscaping Strategy Report has been prepared for the LSP and is contained in **Appendix 7 – Landscaping Report**. The underlining concepts guiding the landscape design within the streets and public open space areas of the LSP are:

- Provision of public facilities which cater primarily for recreational activities to suit the predicted demographic for the locality, including but not limited to active uses and passive uses such as picnics, nature observation, passive contemplation, walking exercise etc;
- Stormwater detention in POS areas to minimise downstream overflows following major storm events catering for 1:1yr, 1:5yr and 1:100yr events;
- Bio retention swales to collect stormwater runoff, planted with reed and fringing vegetation to provide a nutrient stripping function. The use of bio retention basins will enable larger areas of open space to remain dry during the winter months;
- The variability of the topography and the requirement for the POS to cater for stormwater retention will create multiple tiered public open spaces;
- Integrated path systems and boardwalks to link and create areas suitable for walking, dog walking, cycling, skating and similar;
- Planting in POS will consist of a mixture of turf, native and exotic species, with an emphasis wherever possible on using indigenous plantings;
- Diversity of street tree plantings to form strong avenue and high amenity streetscapes.

A more detailed landscaping design and management plan will be provided as a condition of subdivision approval.



Figure 17. Interface with MRS 'Parks and Recreation' Reserve land

6.0 IMPLEMENTATION AND STAGING

6.1 ANTICIPATED TIMEFRAMES

Subdivision and development is likely to occur as soon as practicable once the local structure plan has been approved. Conditional subdivision approval for Stage 1 could be obtained as early as April 2012. Construction of lots could commence with some lots being constructed by the end of 2012. Lot 482 Mell Road could be subdivided independently much earlier, as it already can be serviced by existing infrastructure in Mell Road. Subdivision of Lot 482 Mell Road could be completed by the middle of next the year.

6.2 STAGING

It is anticipated that the lower areas will be developed in the initial stage allowing the POS areas incorporating drainage storage to be provided upfront. It is expected that all roads and lots will be constructed with the ultimate drainage relief provided in the first stage of development, without necessitating any temporary drainage storage or temporary overflow structures.

Consequently all sewer infrastructure is expected to be built from the downstream end, ensuring the initial stage of development incorporates the ultimate sewer relief. There are limited areas where proposed sewer needs to be constructed through future development. Where this is the case, the planning and land tenure is proposed to be secured. The commissioning of the required sewer pump station will meet standard Water Corporation requirements, with road frontage and servicing being provided within the initial stage. All other services are generally non-gravity infrastructure not specifically affecting staging.

Access/egress to proposed lots in the initial stage will be provided from the established peripheral roads and some temporary turnarounds will need to be provided to suit staging.

Figure 18 – Indicative Stage 1 is indicative at this point as to likely first stage of development. The balance area would form future staged development. In some areas, there will need to be cooperation between landowners for provision of roads (i.e. Lots 23 – 28 Hamilton Road). Landowners within the LSP area have indicated a willingness to subdivide immediately upon LSP approval.

6.3 DEVELOPMENT CONTRIBUTIONS

Local Scheme Amendment No. 87 will provide for DCA 12 for the multiple landholdings within the Packham North area. DCA 12 costs include, but not limited to drainage, servicing, engineering and environmental studies prefunded by Council and other common costs that arise through the structure plan process.

Wherever possible, lots have been designed to allow development by respective landowners to be undertaken independently. Where this cannot be achieved, landowners will coordinate sharing of costs for provision of infrastructure (i.e. POS, drainage, roads etc) and servicing under a cost sharing agreement. This agreement will be entered into by each landowner and managed by the landowners' project manager as part of the land subdivision process.

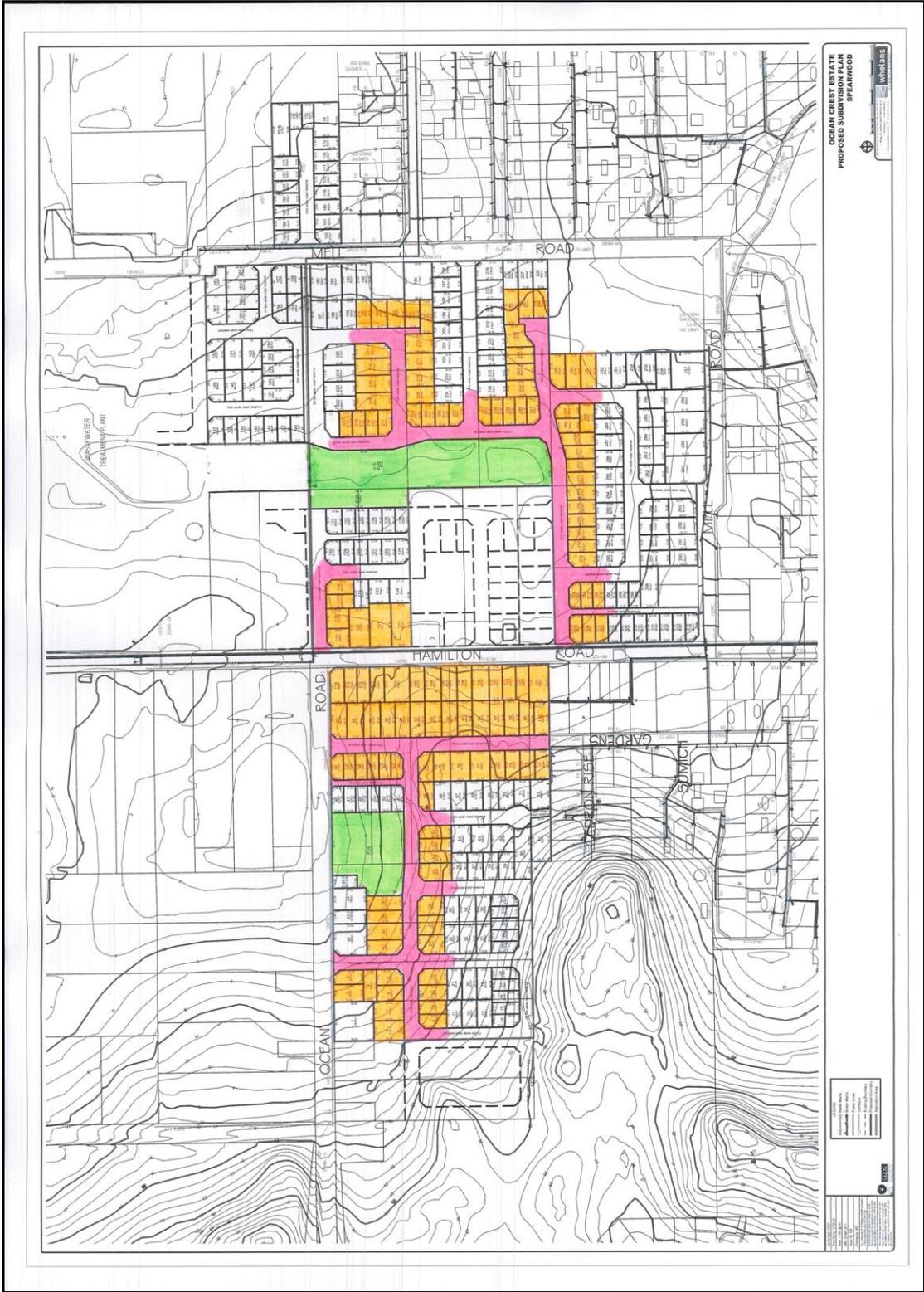


Figure 18. Indicative Stage 1 area [coloured] with balance land as future Stage 2

7.0 CONCLUSION

The proposed LSP demonstrates that the 22 landholdings to the south of the former food processing plant can be developed in a coordinated manner, consistent with the Packham North District Structure Plan. The LSP seeks to create approximately 345 low density and medium density residential lots. The LSP balances the environmental attributes of the site with appropriate urban design relative to its surrounding context.

The LSP area can be adequately serviced and urban development can be carried out in a sustainable manner, utilising contemporary urban water management methods. It is intended that the LSP and the Packham North District Structure Plan be considered for approval simultaneously.

REFERENCES

Soils and Landforms of the Perth Area, Department of Agriculture, 2003

Acid Sulphate Soil Desktop Assessment, Cardno BSD, May 2009

Perth Metropolitan Region 1:50,000 Environmental Geology Series, Rockingham (Part of Sheets 2033 I and 2033 IV, Geological Survey of Western Australia) (Gozzard J.R 1983)

Perth Groundwater Atlas, Department of Water, 2003

Hamilton Road/Mell Road Coogee Servicing Report, Cardno BSD, 2008

APPENDIX 1

ACID SULPHATE SOIL DESKTOP ASSESSMENT (CARDNO, 2009)



LOTS 1, 5, 6, 8, 310, & 311, MELL ROAD, SPEARWOOD

ACID SULFATE SOIL DESKTOP ASSESSMENT

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**LOTS 1, 5, 6, 8, 310 & 311, MELL ROAD, SPEARWOOD
ACID SULFATE SOILS DESKTOP ASSESSMENT**

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1. INTRODUCTION 3

 1.1 Objective 3

2. SITE IDENTIFICATION 4

 2.1 Location 4

 2.2 Site Details 4

 2.3 Proposed Development 4

3. ENVIRONMENTAL ATTRIBUTES 5

 3.1 Topography 5

 3.2 Geological Map 5

 3.2.1 ASS Risk Map 6

 3.3 Hydrogeology 6

 3.3.1 Groundwater 6

 3.3.2 Wetlands, Surface Water and Drainage Patterns 7

 3.4 Vegetation 8

4. SITE INSPECTION 9

 4.1 General Observations 9

 4.2 Soil Profile Observations 9

 4.3 Surface Water/Hydrology 9

 4.4 Vegetation Characteristics 10

 4.5 Summary 10

5. ASS RISK 11

 5.1 ASS Disturbance Risk Assessment 11

 5.2 ASS Risk Review 11

 5.3 ASS Investigation Strategy 12

6. CONCLUSIONS AND RECOMMENDATIONS 13

7. REFERENCES 14

LIST OF TABLES

Table 1	Wetlands management categories	7
Table 2	Wetlands in proximity of Mell Road, Spearwood	7
Table 3	A checklist for disturbance activities and ASS risk areas	11

LIST OF FIGURES

Figure 1	Locality Plan
Figure 2	Site Plan
Figure 3	Topography & Groundwater Contours
Figure 4	ASS Risk Mapping

APPENDICES

APPENDIX A	Soil Bore Logs
APPENDIX B	Certificates of Title

EXECUTIVE SUMMARY

Cardno (WA) Pty Ltd (Cardno) was engaged by SPM Project Marketing Pty Ltd (SPM) to provide environmental services to support the development of Lots 1, 5, 6, 8, 310 and 311, Mell Rd, Spearwood, into a residential subdivision.

Cardno has prepared this Acid Sulfate Soil (ASS) Desktop Assessment to determine if the site is at risk of ASS and if further detailed ASS investigations are required. The assessment involved a review of the site's landform, environmental attributes and previous investigation reports to determine locations where ASS is most likely to be present and could be potentially disturbed during future subdivision works. Fieldwork also involved 16 soil bores positioned primarily in the lower elevations of the site for an assessment of the site soil types. Two predominant soil types were identified from observation of the soil bores: a free draining sand of varying colours, and variations of sand and clay soil types with high levels of organic and peat material. There is a strong possibility that soils identified with organic and peat material are at high risk of ASS.

Broad-scale ASS risk mapping for the site identified the site as having a 'low to no risk' of Potential Acid Sulfate Soils (PASS) and Actual Acid Sulfate Soils (AASS) occurring deeper than 3 m from the natural soil surface. However, there were environmental indicators observed primarily on the western margins of Lots 1, 5, 6, and 310 that provided evidence of the existence of ASS within the shallow soil profile (<3.0 mBGS) indicating the ASS risk is likely to be higher than indicated in the risk map. Visual indications of ASS conditions observed are as follows;

- Site elevations below 5.0 mAHD;
- Groundwater levels in close proximity to the surface;
- Soils with evidence of regular water logging;
- Soils with high organic content;
- The presence of wetland dependant vegetation; and
- The presence of wetland areas adjacent to the site.

Further review of the risk maps reveals that there is a "High" risk area located within 500m of the site which is consistent with the location of a "Resource Enhancement Wetland" according to the *Geomorphic Wetlands of the Swan Coastal Plain* dataset. Observations during field inspection failed to identify any definitive indicators of Actual ASS (AASS) on site. However evidence of waterlogged soils, and wetland dependant vegetation in the 'sumpland' of the sites western margin; Lots 1, 5, 6, and 310; and the rear of Lots 8 and 311 suggested conditions were suitable for the presence of Potential ASS.

Areas identified in the desktop assessment as 'high' risk of ASS and where ASS soils may be disturbed during the proposed site works are required under DEC guidelines to undertake further detailed ASS investigations. The investigations which comprise of soil sample collection and laboratory analysis with the aim of evaluating if ASS is present onsite, and if so to delineate the vertical and lateral extent of ASS horizons. Furthermore the detailed investigations aim to quantify the maximum amount of existing and potential acidity, as well as gather data upon which to develop management strategies to mitigate ASS disturbance.

Further detailed onsite investigations of ASS will be required where visual indications and the desktop site assessment have highlighted the possible presence of ASS or where disturbance is expected to intersect groundwater or soils immediately above the groundwater. The investigation should include areas where the following indicators persist;

- Low surface elevations;
- Wetland dependant vegetation;
- Groundwater tables present within the shallow soil profile (>3.0 mBGS);
- Waterlogged or highly organic soils; and
- Disturbance intersecting and continuing below the groundwater table.

Detailed ASS investigations involve the collection and laboratory analysis of soil samples from the site, as well as the interpretation of these results. The number of sampling locations and depth of sampling points is to be based on the disturbance type and extent. In addition to the detailed ASS investigation, a groundwater investigation is necessary where dewatering is required, to establish groundwater conditions prior to disturbance.

Findings from this desktop assessment indicate that there is a strong possibility of ASS being present at the site. Where the required subdivision works involve the removal of organic soils, dewatering, and or soil disturbance immediately above or below the groundwater table; further investigations are necessary.

INTRODUCTION

SPM Project Marketing Pty Ltd (SPM) is managing the redevelopment of Lots 1, 5, 6, 8, 310 and 311 Mell Road, Spearwood into a residential subdivision. The Western Australian Planning Commission (WAPC) requires proponents proposing to disturb soil for development purposes in areas susceptible to ASS carry out investigations to determine whether or not ASS is present on site and if so; to characterise their nature and extent (WAPC 2008).

SPM commissioned Cardno (WA) Pty Ltd (Cardno) to undertake a Desktop Assessment providing a preliminary appraisal of ASS risk within the proposed development area. The appraisal process involved the systematic review of environmental attributes and existing environmental reports to assess the likelihood of ASS occurrence. A site visit was conducted to confirm the findings from the review, and to observe the presence of any visual indicators of ASS.

In order to address ASS conditions for future development requirements Cardno has undertaken this Desktop Assessment with the ultimate aim of providing SPM with an outline of the areas that may be susceptible to the formation and persistence of ASS. Furthermore, Cardno has attempted to indicate areas where development activities are at risk of disturbing Actual ASS (AASS) and Potential ASS (PASS). In the absence of a subdivision framework design, generalised recommendations and requirements for future detailed ASS investigations have been provided.

1.1 Objective

The desktop appraisal process involves the systematic review of environmental attributes, landforms and previous investigation reports to determine the locations where ASS might be present and where these soils may be disturbed during future subdivision works. Although at the time of writing the subdivision design for the development is not known, Cardno assumes a similar extent of disturbance that would occur in a standard residential development.

Information gained through this appraisal process will be evaluated against the Department of Environment and Conservation (DEC) guideline *Draft Identification and Investigation of Acid Sulfate Soils* (DoE 2006) which details a number of circumstances related to the presence of ASS and factors used to indicate the need for ASS investigations. Outcomes from this assessment will be used to determine the requirement for further ASS investigations in future stages of the development.

2. SITE IDENTIFICATION

2.1 Location

The future subdivision is proposed for Lots; 1, 5, 6, 8, 310 and 311 which are located along Mell Road in Spearwood. The site is located within the City of Cockburn, directly east of the town of Coogee, bounded by Hamilton Road to the west, and Mell Road to the south and east. The site is comprised of six lots with a combined area of approximately 9.67 hectares. The regional location of the site is shown in **Figure 1**.

2.2 Site Details

All lots now consist of cleared agricultural land, and contains minimal amounts of native vegetation. At the time of writing this report Lot 311 is still actively engaged in agricultural activities. The sites current conditions and cadastral boundaries are illustrated in an aerial photograph shown in **Figure 2**.

The study site is currently zoned 'Urban' in the City of Cockburn *Town Planning Scheme (TPS) No.3* (CoC 2007).

2.3 Proposed Development

The six lots are intended to be subdivided into smaller residential lots however the framework design of the development is yet to be determined. This assessment has assumed that development will be subject to typical residential earthworks to obtain required building elevations. Most commonly this involves cut and fill operations, however the sloped topography of the site, which will be discussed later in the report, suggest that works will most probably consist of fill operations. Earthworks of this nature typically occur in the shallow soil profile.

Further civil works will be required to service residential lots through the installation of underground infrastructure. These include the installation of stormwater drainage which commonly requires only shallow soil disturbance; and gravity sewers which typically require the deepest excavation. The depth of disturbance will be dependant upon the location of the sewers on site and existing connections external to the site.

3. ENVIRONMENTAL ATTRIBUTES

3.1 Topography

Topographic contours of the site show a gentle slope from Mell Road in the east at approximately 7.0 m Australian Height Datum (AHD), down to the west at 1.0 mAHD. A smaller relief is also present to the south of the site that slopes from approximately 5.0 mAHD in the south (also bounded by Mell Road) to approximately 2.0 mAHD in the northern boundary of Lots 8 and 311. Closer inspection of Lots 8 and 311 confirm that fill is present and has raised the elevations on the northern half the lots. The topography of the site is shown in **Figure 3**.

Land with elevations less than 5.0 mAHD is at higher risk of containing ASS in the shallow soil profile <3.0 mBGS (Below Ground Surface) (DoE 2006). A large proportion of the site has a surface elevation below 5.0 mAHD and therefore conditions may be suitable for ASS in the shallow surface profile.

3.2 Geological Map

Geomorphologic classification for the site reported in the *Perth Metropolitan Region 1: 50,000 Environmental Geology Series, Rockingham (Part of Sheets 2033 I and 2033 IV)* (Gozzard 1983) indicates that the geology of the site consists primarily of Spearwood Sand formed during the Pleistocene era. This sand is described as a pale yellowish brown, medium to coarse-grained, sub-angular quartz, trace of feldspar, moderately sorted and of residual origin (Gozzard 1983). Tamala limestone (quartz) is the potential source of the sand. The permeability of the Spearwood Sand is considered to be high, with a low to moderate load bearing capacity (Gozzard 1983).

Surrounding and adjacent areas in close proximity to the boundaries of the site were found to consist primarily of limestone soil types also formed during the Pleistocene era. The limestone is described as pale yellowish brown, fine to coarse grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris, variably lithified, surface kankar, and of eolian origin (Gozzard 1983). The permeability of limestone is described as high, with a variable load bearing capacity.

Further review of geological maps suggest that the site is located in an interdunal wetland chain. A wetland area that extends in a southern direction for several hundred metres is shown as being composed of silt formed in the Holocene era. The silt is described as brownish grey, calcareous in part, soft, some fine sand content in places, and of lacustrine origin (Gozzard 1983). The permeability of the silt is low, with a low load bearing capacity. This soil unit is strongly related with the location of low elevation and wetland.

Site observations of soil types recorded by Cardno BSD (CBSD 2008) during the installation of numerous groundwater monitoring wells in and around the site, for the development of a groundwater monitoring plan. This investigation reported soil profiles consisting predominantly of dark brown sandy loam topsoil, orange/brown sands, over pale yellow/brown sands to depths up to and below the observed groundwater level. Some sands were found to contain limestone fragments with limestone layers also found to underlie these soil types, although these were commonly at more than 3.0 mBGS. Although the observed sand types vary slightly in colour, they are consistent with the Spearwood Sand soil type and the nearby limestone rock types of surrounding areas as predicted by the geological maps.

3.2.1 ASS Risk Map

A broad scale map of the ASS risk for the Swan Coastal Plain is provided in the WAPC *Planning Bulletin Number 64* (WAPC 2007). The ASS risk maps published in this bulletin predict areas susceptible to the formation of ASS based on the presence of environmental indicators drawn from the review of existing geological, geomorphological, and hydrological attributes. The risk maps are intended to provide an indication of areas susceptible to ASS.

The WAPC ASS risk map *Figure 3: Central Metropolitan Region Scheme Acid Sulfate Soils* (WAPC 2003) indicated the site as having a 'low to no risk of PASS and AASS occurring at depths of greater than 3.0 m from the natural soil surface'. This classification is consistent with the geological mapping that states the predominant soil type in the area is likely to be free draining Spearwood sands. ASS is commonly associated with soils formed during the Holocene period after the last major sea level rise when waterlogged environment facilitated the formation of iron sulfides (DoE 2006). Older Spearwood sands, particularly those above the water-table, do not provide the water logged anoxic conditions required for ASS to be present and sustained. The WAPC ASS risk map of the site is presented in **Figure 4** ASS Risk Mapping Figure . The ASS risk map does not seem to take into account the former wetland chain through the site that is clearly visible in the aerial photograph.

Further review of the ASS risk maps (WAPC 2003) indicates an area of 'High risk PASS and AASS occurs within 3m from the natural surface' occurring approximately 100m south of the site. The location of a wetland extension of Beeliar Regional Park is directly related to this high risk area which is likely to contain silt formed in the Holocene era.

3.3 Hydrogeology

3.3.1 Groundwater

Groundwater levels for the site reported in the *Perth Groundwater Atlas* (DoW 2007) indicate that at the lowest point in the seasonal cycle, the groundwater table underlying the site is approximately 1.0 mAHD (as reported in May 2003). When considering the elevation of the site, groundwater levels may vary between; approximately 0.0-1.0 mBGS on the western margins of Lots 1, 5, 6, and 310; and approximately 3.0-6.0 mBGS to the east and south of the site bound by Mell Road. Based on this information we would expect the western margins of the site with lower surface elevations to become waterlogged when the watertable is at its highest. As the predicted groundwater height is approximately 1.0 mAHD across the site, there is not enough height variation to display groundwater contours in a site diagram. As a result groundwater contours were not included in site diagrams.

Groundwater quality and water levels for the site were previously monitored by Cardno in 2008 during the development of an urban water management strategy report (CBSD 2008). Three monitor-wells were installed to monitor groundwater levels in the eastern half of Lots 1, 5, and 310. Groundwater quality was recorded once a month from November 2008 to February 2009, and a mean value for water quality parameters calculated for this time period. Groundwater was reportedly fresh, and had a neutral to slightly alkaline pH (6.95 to 8.15).

3.3.2 Wetlands, Surface Water and Drainage Patterns

The *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (1992 EPP) dataset identified surface water bodies that contained over 1,000 m² of water on the Swan Coastal Plain during the 1 December 1988. The *Geomorphic Wetlands of the Swan Coastal Plain* dataset was subsequently developed to address many of the shortcomings associated with the 1992 EPP dataset, and is continually updated with site-specific wetland surveys providing new and relevant information. The dataset categorises individual wetlands into management categories outlined below in **Table 1**.

Table 1 Wetlands management categories

Management Category	Description of Wetland	Management Objectives
Conservation Category Wetland (CCW)	Wetlands, which support high levels of attributes and functions.	To preserve wetland attributes and functions through reservation in national parks, crown reserves, state owned land and protection under environmental protection policies
Resource Enhancement Wetland (REW)	Wetlands, which have been partly modified but still support substantial functions and attributes.	To restore wetlands through maintenance and enhancement of wetland functions and attributes by protection in crown reserves, state or local government owned land and by environmental protection policies, or in private property by sustainable management
Multiple Use Wetland (MUW)	Wetlands with few attributes, which still provide important wetland functions.	Use, development and management should be considered in the context of water, town and environmental planning through Landcare

Wetland environments provide ideal waterlogged carbon rich conditions that are required for the formation of ASS soils (DEC 2006). Wetlands are therefore strongly tied to the presence of ASS. Review of the *Geomorphic Wetlands of the Swan Coastal Plain* dataset indicates that a ‘Multiple Use Wetland’ is the only defined wetland found within the boundaries of the site. Six other wetlands exist to the north and the south, confirming that the site is located along an interdunal wetland chain. The ‘Resource Enhancement Wetland’ to the south of the site is considered to be the closest environmental receptor that may potentially experience adverse groundwater impacts as a result of development at the site. Details of the wetlands within and in close proximity to the site are outlined in **Table 2**.

Table 2 Wetlands in proximity of Mell Road, Spearwood

Classification	Evaluation	UFI
Sumpland*	“Multiple Use Wetland”	0364
Sumpland	“Multiple Use Wetland”	0361
Sumpland	“Multiple Use Wetland”	0365
Sumpland	“Resource Enhancement Wetland”	0366
Lake	“Multiple Use Wetland”	0217
Lake	“Multiple Use Wetland”	0218
Lake	“Conservation Category Wetland”	0216

Notes: 1. ‘*’ indicates wetlands present within site boundaries.

There is no defined drainage within the site. However the slope downwards from the eastern and southern boundaries suggests that surface water will flow towards the lower elevations of the rear of lots facing east, and the rear of the lots facing north. These lower elevations form part of the "Sump-land" present on site and are the likely to be the discharge point where surface water accumulates before infiltration.

3.4 Vegetation

All six lots have been parkland cleared for agricultural purposes, specifically market gardens. All lots except for Lot 311 no longer engage in active agricultural activities. Only minimal remnant vegetation remains along the western margins of Lots 1, 5, 6 and 310. The remaining vegetation is mainly comprised of wetland dependant vegetation such as rushes, sedges and 'swamp' trees such as the paperbark (*Melaleuca*).

4. SITE INSPECTION

An inspection of the site was undertaken on 17 of March 2009. The inspection aimed to locate visual environmental attributes commonly associated with the presence of ASS. A further investigation to ascertain the soil types and the extent of peat on site was also undertaken. Relevant site observations are detailed below.

4.1 General Observations

Site topography was found to be consistent with the topographical data reviewed during this desktop assessment. Site observations indicate that the site is located between two north-south orientated dunes. The lots are located on the lower half western face of the easternmost dune.

The points of highest site elevation were to the south and the east where the site boundaries met with Mell Road. From these points there was a gentle sloping gradient down towards the western margins of the site. The area of lowest elevation was to the west of Lots 1, 5, 6, and 310. These areas appeared to be the lowest elevation between the existing dunes. This is consistent with the topographical information gathered during the desktop assessment, and suggests that the site lies within a coastal alluvial valley.

Observations of the soil bores confirm that fill is present and has raised the elevation in the northern half of the Lots 8 and 311. The fill reaches a maximum thickness of 1 m on the northern boundary of these lots, and progressively decreases to natural surface approximately 50 m upslope. The elevations of Lots 8 and 311 have been raised to avoid inundation; however the natural surface that lies beneath the fill may continue to be waterlogged and therefore may be at risk of containing ASS. Further investigation of the soil that lies below the fill may be needed to confirm the nature and extent of ASS in these lots.

4.2 Soil Profile Observations

A total of 16 soil bores drilled to depths of between 1.5 and 2.0 mBGS. The soil bores were placed predominantly along the low lying margins of the site where peat was most likely to exist in the soil profile. Some soil bores were also placed in areas of higher elevation. Two particular soil types were encountered. The first of the soil types was generally found in the areas with a deeper groundwater table and higher elevation, and generally consisted of a free draining topsoil sand of fine to coarse grain, brown in colour, which proceeded to change in colour as depth increased from a red/orange, to an orange brown, through to a pale yellow brown. This soil type was generally encountered in the wells at higher elevations (SB1, SB9, SB11, and SB12) and is consistent with the Spearwood sand described in the geological maps, and is not a soil type considered to be high risk for the formation and persistence of ASS as the free draining nature of the sand minimises water logging (DoE 2006). Soil bore logs presenting the soil types encountered are presented in **Appendix A**; the location of soil bores is presented in **Figure 2**.

The second soil type was encountered at the level of the water table in the lower elevations of the site generally towards the western margins of the site. The soil profile generally consisted of black/brown or black/grey clay of low to medium plasticity containing sands of fine to coarse grain. A black/grey or black/brown sand of fine to coarse grain was observed immediately below the clay layer. High levels of organic matter, bottom sediments and thin layers of peat or peat-like material were present in these clay and sand profiles. Such soil characteristics were observed in wells of lower elevation (SB2, SB3, SB4, SB5, SB6, SB7, SB10 and SB13) and suggest that the soil experiences water logging, and is at risk of containing ASS.

4.3 Surface Water/Hydrology

There was no visible surface water on site at the time of inspection aside from a constructed water pond in the south west, and in a depression made by a tractor near a lowland area in the

west of Lot 310. Soil along the lower elevation of the western margins was moist but became increasingly dry heading eastwards.

The soil bores indicated approximate watertable levels based on the moisture content in the soil. The watertable was closest to the surface in the lower elevations to the west and ranged from 0.3-0.8 mBGS. Maximum depth to groundwater was recorded in the soil bores of Lots 8 and 311 as being between 0.9 to 1.3 mBGS. It must be noted however that fill thickness observed in the soil bores was between 0.5 m and 0.9 m. The approximate depths to groundwater derived from each of the soil bores are shown in **Appendix A**

There was evidence of seasonally inundated surface soils, along the western margins, which was confirmed by verbal communication with the landowner west of Lot 6 who stated that 'water would often flood the area with reeds and rushes to the north (rear of Lot 5) in winter'. Perennial rushes that require the soil to be water logged for at least part of the year provide further evidence suggesting that seasonal inundation occurs on site.

The shallow depths to the watertable observed in the soil bores; the presence of water dependant vegetation and the low elevations of the western margins; along with anecdotal information of inundation from landowners; strongly indicate that there is a seasonal fluctuation of groundwater levels within the site. This fluctuation in groundwater height, results in the inundation of at least part of the site in winter.

4.4 Vegetation Characteristics

The site has been parkland cleared for agricultural purposes. Pastures of exotic grasses, weeds and remnants of existing crops; lupin and large spice plants have replaced the original vegetation in Lots 1, 5, 6 and 310. Lot 8 was completely bare and predominantly covered by grass, whilst Lot 311 had bare soil prepared for use as a market garden.

A number of wetland dependant species were identified along the western margins of the eastern facing lots, at the lower elevations. This is consistent with the findings from the desktop assessment, which places wetland dependant species along the areas of lower elevation where the watertable is closer to the natural soil surface. Species composition consisted of sedges and rushes in western regions of Lot 5 and 6, whilst sedges, reeds, and paperbarks (*Melaleuca*) were present in the western region of Lots 1 and 310.

The site inspection did not find any visual vegetation indicators associated with the presence of AASS. No dead, dying, stunted vegetation or scalded/bare low lying areas were observed within the site.

4.5 Summary

The site investigation revealed that there was visual evidence to suggest the probable presence of ASS along the western boundary of Lots 1, 5, 6, and 310. The strongest evidence for this was the low elevations, soils with high organic matter content, and presence of wetland dependant vegetation.

The lower elevations (<5.0m AHD) of the western margins in comparison to surrounding areas suggests that this area may be a natural drainage basin where water collects, and that certain areas become seasonally inundated. The watertable is therefore close to the natural surface of the soil which again is a likely indicator of the presence of ASS. There was no evidence of surface water logged soils, salt scalds or other evidence of AASS at the time of site inspection.

5. ASS RISK

In order to determine whether an ASS investigation is needed at a development site in Western Australia, the DEC set out a list of conditions that outlines activities and circumstances which present a high risk of disturbing ASS. Further investigation is dependant on the type of activities and circumstances that the site may experience as a result of development.

5.1 ASS Disturbance Risk Assessment

An assessment of the site characteristics and the proposed disturbance (as detailed in the preceding sections) against the DEC criteria has been undertaken. As the subdivision framework design needed to assess the actual extent of disturbance activities on site is not yet known, the following table assessed site disturbance in relation to the probable earthworks that would be expected in a typical residential subdivision. Typically this would involve excavations to <5.0 mBGS for sewers and in this instance removal of peat and organic soils. The results are summarised below in **Table 3**.

Table 3 A checklist for disturbance activities and ASS risk areas

Proposed Activity or Disturbance	Yes	No
Is soil or sediment disturbance greater than 100 m ³ in ASS 'high risk' areas?		x
Is lowering of the water table, whether temporary or permanent, required in:		
• Areas depicted as 'high risk' of ASS?		x
• Areas depicted as 'low to moderate' risk of ASS within 500 m of a 'high risk' area?	x	
Is any disturbance likely to exceed 3.0 m below natural surface in ASS 'moderate to low risk' areas?	x	
Are dredging operations proposed or required?		x
Are flood mitigation works, including the construction of levees proposed?		x
Are the works in any areas:		
• Depicted on geology and/or geomorphological maps as geologically recent (Holocene)?		x
• Depicted on vegetation mapping as mangroves, wetland dependant vegetation or areas where the vegetation is dominated by salt, acid or water logging tolerant plant species?	x*	
• Depicted in geological descriptions or maps as bearing sulphide minerals, former marine or estuarine shales or sediments or mineral sands deposits?		x
• Known to contain peat or a build up of organic matter?	x*	
• Where the highest known water table is within 3.0 m of the surface?	x*	
• In Western Australia (including inland areas) where <u>all</u> of the following pre-disposing factors exist – a) Organic matter, b) Iron minerals, c) Waterlogged conditions or high water table, d) Sulfidic minerals and e) Deep estuarine sediments below ground surface?		x

Notes: 1. '*' indicates in selected areas of the site.

The summary presented above indicates that the earthworks activities involved in a standard residential development may lead to the disturbance of ASS soils, if present on site. The deepest depth of disturbance for residential subdivisions is normally associated with gravity sewers which can typically require installation depths between 3.0-6.0 mBGS. Further disturbance may be caused from the removal of peat and organic soils in the lower elevations. DEC guidelines require further detailed ASS soil investigations be conducted where the disturbance may intersect these areas.

5.2 ASS Risk Review

Review of the landform, environmental attributes and previous investigations, indicates that ASS, particularly PASS, may exist in the shallow soil profile (<3.0mBGS). Visual indications of this are given by:

- Site elevation below 5.0 mAHD;
- The presence of a shallow water table;
- The presence of wetland dependant vegetation;
- Evidence of seasonally waterlogged soils and wetland areas;
- Evidence of highly organic soils and peat like material; and
- Proximity to wetlands.

The shallow soil profiles of the site show strong evidence of the likely occurrence of ASS, however this is limited to areas that have a watertable close to the natural surface (<3.0mBGS). The low lying western margins of Lots 1, 5, 6, and 310 are representative of these areas which can be attributed to the close proximity of groundwater to the surface. The northern half of Lots 8 and 311 may also present a high risk of ASS, as the natural soil surface below the fill is also low lying and has shallow ground water.

Areas considered to be susceptible to ASS are those that exist in the zone of watertable fluctuation. Areas immediately above the groundwater are associated with AASS whilst areas below the groundwater are normally associated with PASS. Areas of higher elevation that have groundwater at depths greater than (>3.0 mBGS) therefore present a lower risk of containing ASS in the shallow soil profile. The deeper profiles (>3.0 mBGS) of these higher elevations however may be susceptible to ASS where groundwater is encountered. Further investigation of the deeper soil profiles is necessary where soils are likely to be disturbed immediately above and below the groundwater table.

5.3 ASS Investigation Strategy

Further detailed ASS investigations are necessary at the site to determine the actual presence and extent of ASS within the site. The investigations should target areas where subdivision works will disturb soils immediately above or below the groundwater level, especially in the western portions of Lots 1, 5, 6, and 310 and the northern portions of Lots 8 and 311.

CONCLUSIONS AND RECOMMENDATIONS

Review of the available data for the site has found that there has been and continues to be environmental and geological conditions that are suitable to the formation and persistence of ASS in the shallow soil profile (<3.0mBGS) at the site. Low surface elevation (<5.0mAHD); groundwater levels in close proximity to the surface; soils with evidence of regular water logging; highly organic soils; the presence of wetland dependant vegetation and the presence of wetland areas adjacent to the site provide strong evidence suggesting the likely presence of ASS on site. Visual indicators of ASS were limited to the western margins of Lots 1, 5, 6, and 310. There were no visible indications of such conditions in Lots 8 and 311, however the more susceptible areas of the site had been covered with fill. Areas immediately above and below the watertable are also at risk of ASS in both shallow and deep soil profiles.

DEC guidelines require that further detailed ASS investigations involving soil sample collection and analysis be undertaken in areas where the desktop assessment has highlighted where ASS may persist and where ASS soils may be disturbed during proposed site works. The aim of such investigations is to determine if ASS is present onsite, and if so to delineate the vertical and lateral extent of ASS horizons. Furthermore the detailed investigations aim to quantify the maximum amount of existing and potential acidity, as well as gather data upon which to develop management strategies to mitigate ASS disturbance.

Further detailed onsite investigations of ASS will be required where visual indications and the desktop site assessment have highlighted the possible presence of ASS or where disturbance is expected to intersect groundwater or soils immediately above the groundwater. The investigation should include areas where the following indicators persist;

- Low surface elevations;
- Wetland dependant vegetation;
- Groundwater tables present within the shallow soil profile (>3.0 mBGS);
- Waterlogged or highly organic soils; and
- Disturbance intersecting and continuing below the groundwater table.

Detailed ASS investigations involve the collection and laboratory analysis of soil samples from the site, as well as the interpretation of these results. The number of sampling locations and depth of sampling points is to be based on the disturbance type and extent. Sampling plans and laboratory analysis generally include:

- Field pH testing at 0.25 m intervals;
- Continuation of soil bores to a depth of 1.0m below proposed disturbance depth;
- Collection of soil samples at 0.5 m intervals; and
- Submission of a soil samples for laboratory analysis.

A groundwater investigation is also required during the detailed ASS investigation to establish groundwater conditions and the sensitivity of groundwater to adverse impacts.

Based upon the findings of this investigation there is a strong possibility of ASS being present at the site and further investigations are necessary where the required subdivision works involve removing the organic soils, dewatering and or soil disturbance immediately above or below the groundwater table.

6. REFERENCES

Cardno BSD (CBSD) 2008, *Hamilton Road, Spearwood*, Initial Groundwater Monitoring Report, in-press.

City of Cockburn (CoC) 2007. *Town Planning Scheme No. 3*.

Department of Environment (DoE), 2006, *Draft Identification and Investigation of Acid Sulfate Soils*, Acid Sulfate Soils Guideline Series.

Department of Water (DoW) 2007, Perth Groundwater Atlas,
<http://apostle.environment.wa.gov.au/idelve/gwa/>.

Gozzard, J. R. 1983, *The Perth Metropolitan Region 1: 50,000 Environmental Geology Series, Rockingham (Part Sheets Sheet 2033 I and 2033 IV)*, Geological Survey of Western Australia.

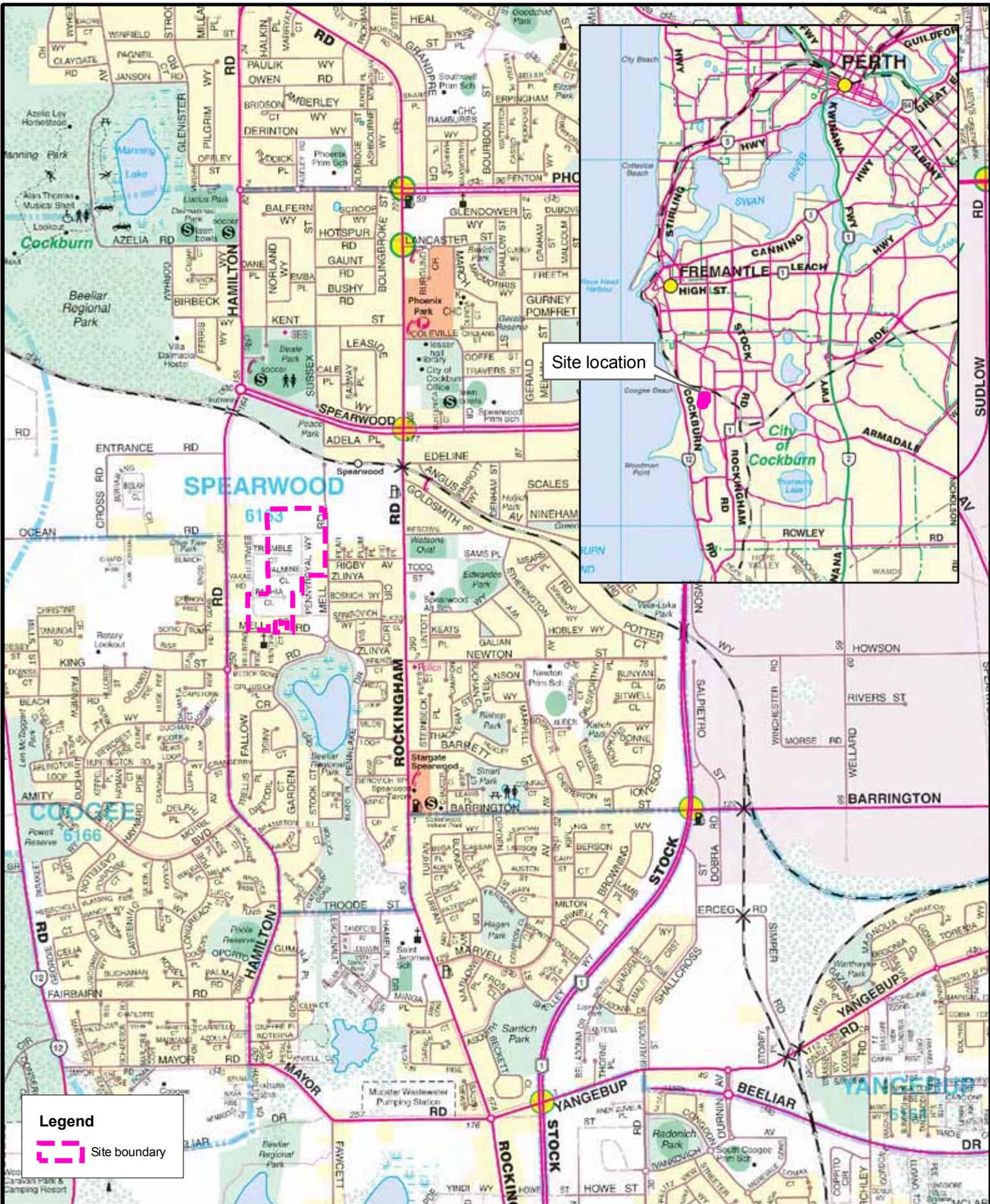
Western Australian Planning Commission (WAPC) 2002, *Metropolitan Regional Scheme Map: Metropolitan Region Scheme zones and reservations amended to: 18 October 2002*, Government of Western Australia.

Western Australian Planning Commission (WAPC) 2003 *Planning Bulletin No. 64 – Acid Sulfate Soils*, revised 2007.

Western Australian Planning Commission (WAPC) 2008, *Metropolitan Regional Scheme Map: Metropolitan Region Scheme zones and reservations amended to: 29th February 2008*, Government of Western Australia.

FIGURES

- Figure 1 Locality Plan**
- Figure 2 Site Plan**
- Figure 3 Topography & Groundwater Contours**
- Figure 4 ASS Risk Mapping**
- Figure 5 Geomorphic Wetlands**



Site location

Legend
 Site boundary

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D
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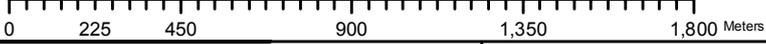


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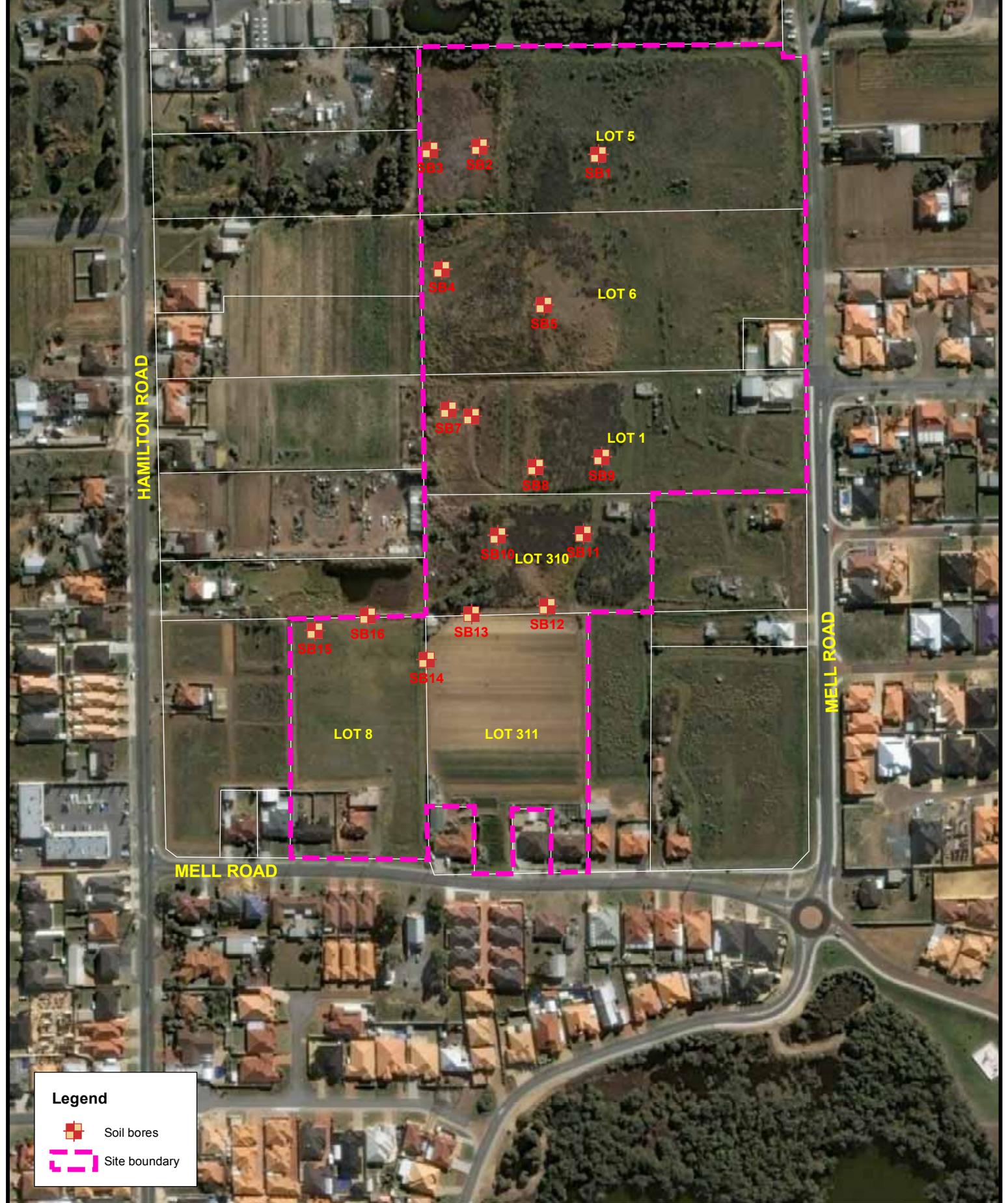
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PROJECT	Lots 1,5,6,8,310 & 311 Mell Road, Spearwood ASS Desktop Assessment	Project Number	V9010	Original	A4
DRAWING TITLE	FIGURE 1 : Locality Plan	Drawing Number	SK01	Revision	00
PRINCIPAL	SPM Project Marketing Pty Ltd	Designed JP	Checked	Drawn DTF	Approved
		Local Authority	City of Cockburn		
		Sheet 1 of 1	Date 08/04/09		



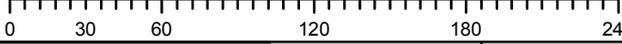
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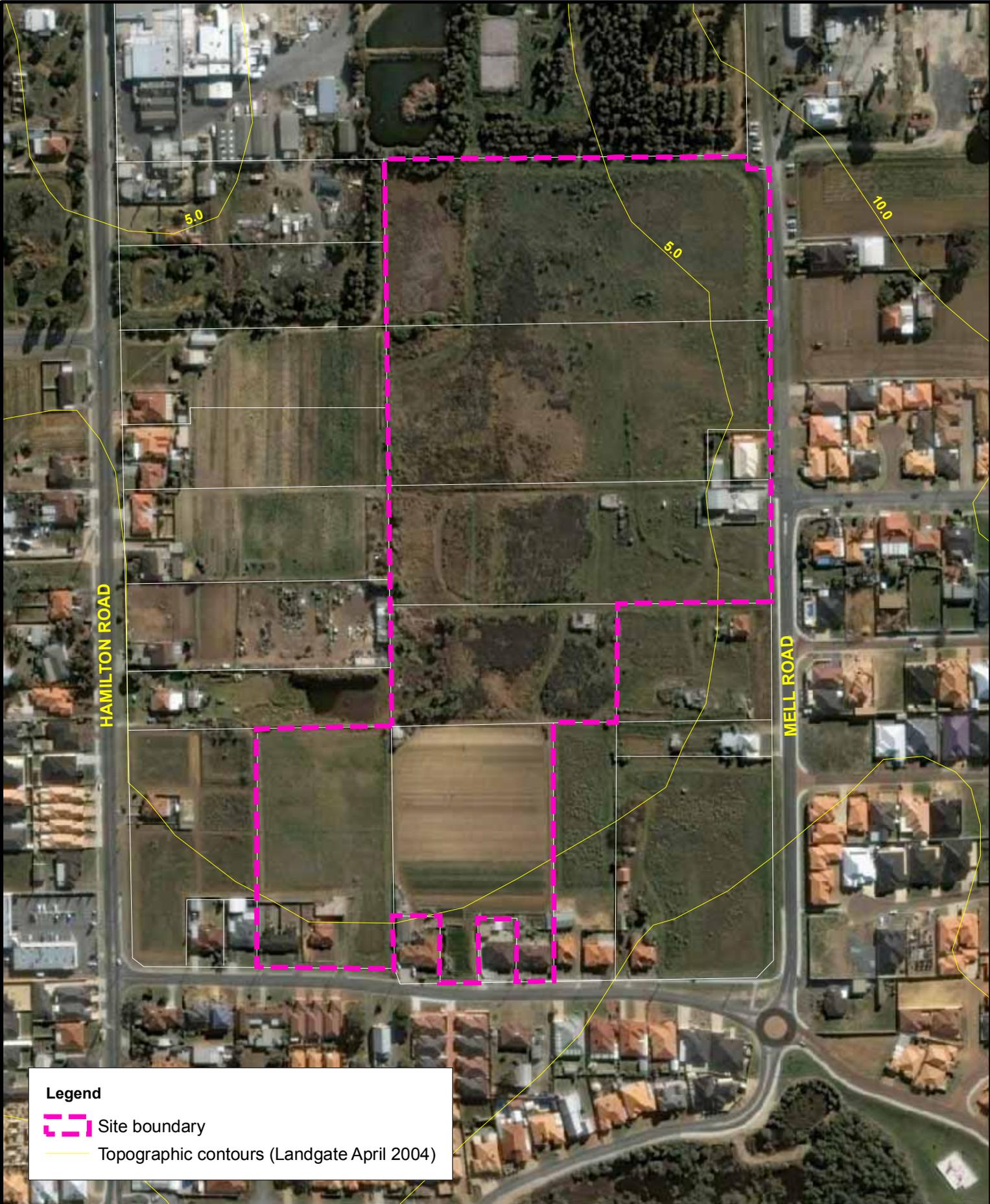


Legend

-  Soil bores
-  Site boundary

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D

 <p>CONSULTING ENGINEERS TOWN PLANNERS PROJECT MANAGERS ENVIRONMENTAL CONSULTANTS</p> <p>Cardno Centre 2 Bagot Road P.O. Box 155 Subiaco Western Australia 6904</p> <p>Telephone (08) 9273 3888 Facsimile (08) 9388 3831</p>	<p>Scale: 1:3,000</p> 		<p>Project Number V9010</p> <p>Drawing Number SK02</p> <p>Designed JP Drawn DTF</p> <p>Local Authority City of Cockburn</p> <p>Sheet 1 of 1</p>	<p>Original A4</p> <p>Revision 00</p> <p>Checked Approved</p> <p>Date 08/04/09</p>
	<p>PROJECT Lots 1,5,6,8,310 & 311 Mell Road, Spearwood ASS Desktop Assessment</p> <p>DRAWING TITLE FIGURE 2 : Site Plan</p> <p>PRINCIPAL SPM Project Marketing Pty Ltd</p> <p><small>This drawing has been prepared in accordance to Cardno Quality Management System. It remains the property of Cardno (WA) Pty. Ltd. and shall not be used without permission. The drawing shall be preliminary only and/or not for construction until signed approved.</small></p>			



Legend

- Site boundary
- Topographic contours (Landgate April 2004)

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APPD	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APPD

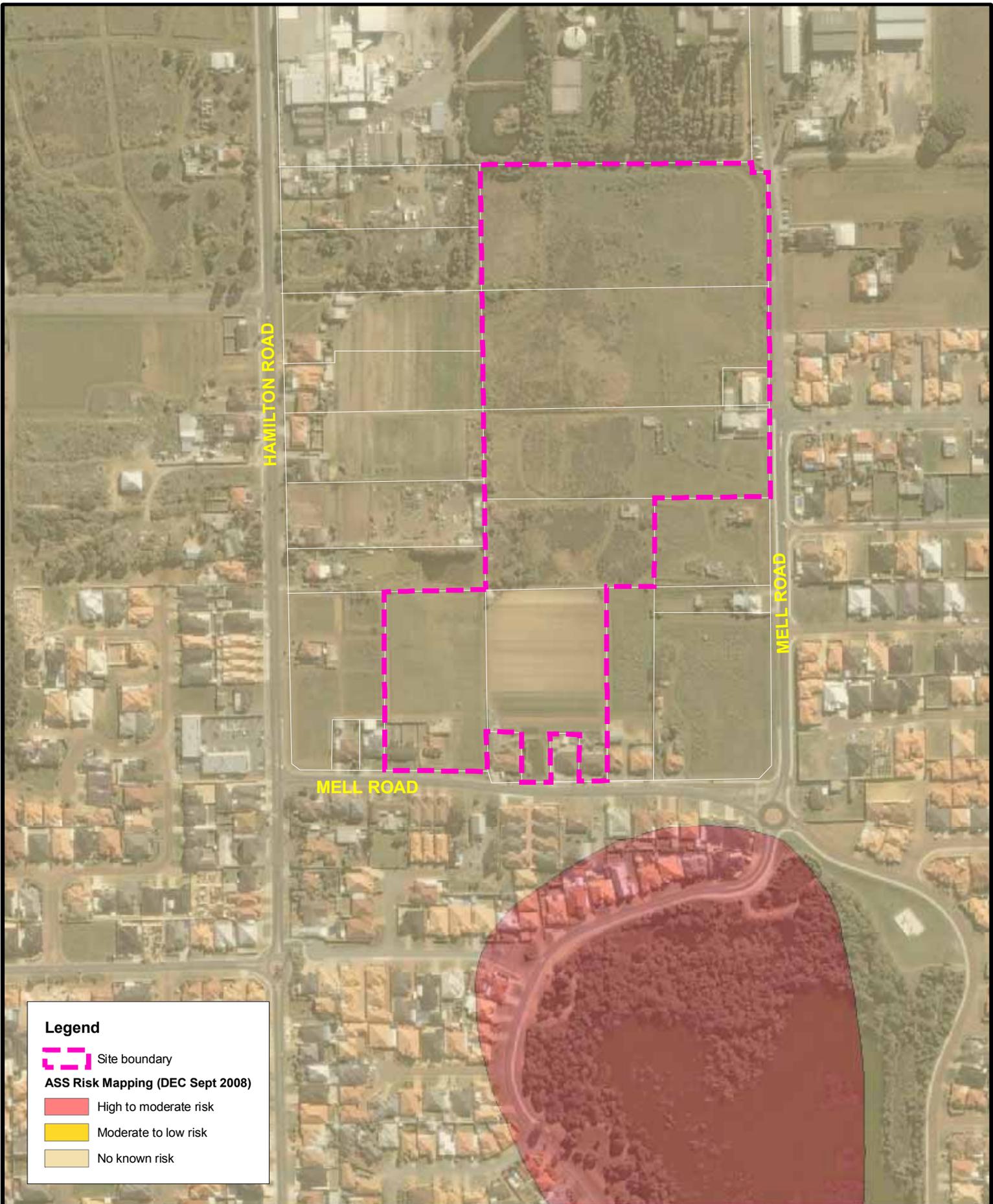
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PROJECT	Lots 1,5,6,8,310 & 311 Mell Road, Spearwood ASS Desktop Assessment	Project Number	V9010	Original	A4
DRAWING TITLE	FIGURE 3 : Topographic Contours	Drawing Number	SK03	Revision	00
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Legend

- Site boundary
- ASS Risk Mapping (DEC Sept 2008)**
- High to moderate risk
- Moderate to low risk
- No known risk

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APPD	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APPD

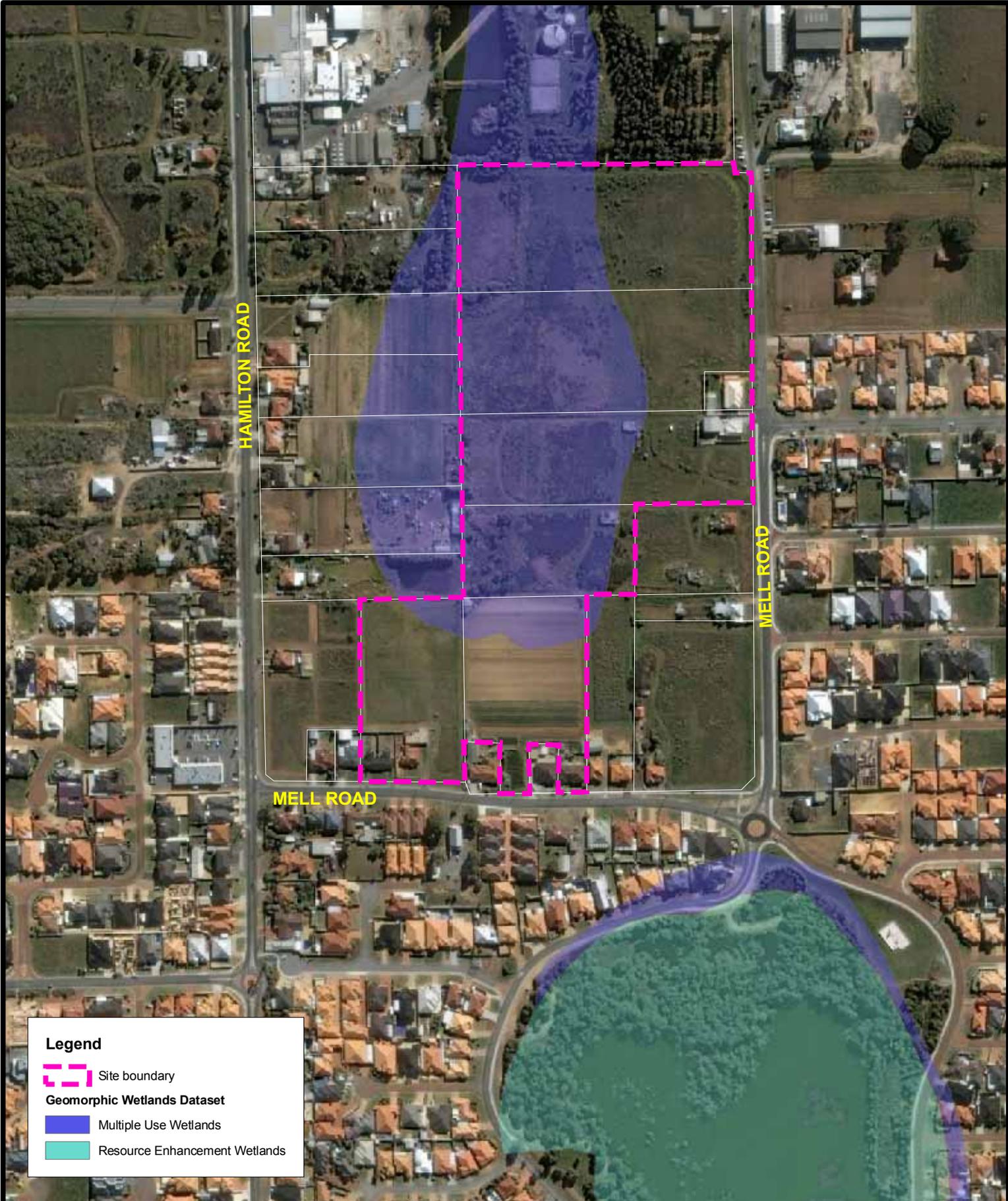
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PROJECT	Lots 1,5,6,8,310 & 311 Mell Road, Spearwood ASS Desktop Assessment	Project Number	V9010	Original	A4
DRAWING TITLE	FIGURE 4 : ASS Risk Mapping	Drawing Number	SK04	Revision	00
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		Local Authority	City of Cockburn		
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Legend

- Site boundary
- Geomorphic Wetlands Dataset**
- Multiple Use Wetlands
- Resource Enhancement Wetlands

Source : DEC Geomorphic Wetlands Swan Coastal Plain 2007

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APPD	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APPD

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PROJECT	Lots 1,5,6,8,310 & 311 Mell Road, Spearwood ASS Desktop Assessment	Project Number	V9010	Original	A4
DRAWING TITLE	FIGURE 5 : Geomorphic Wetlands Classification	Drawing Number	SK05	Revision	00
PRINCIPAL	SPM Project Marketing Pty Ltd	Designed JP	Drawn DTF	Checked	Approved
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APPENDIX 8

AMENDMENT NO. 1 – LOTS 662, 663 & 664 HAMILTON ROAD (MARCH 2016)

AMENDMENT NO. 1
OCEAN CREST LOCAL STRUCTURE PLAN

LOTS 662, 663 & 664 HAMILTON ROAD, SPEARWOOD



TABLE OF AMENDMENTS TO STRUCTURE PLAN

Amendment No.	Summary of the Amendment	Amendment Type	Date approved by the WAPC
1	Upcoding from R25 to R40 Lots 662, 663 & 664 Hamilton Road, Spearwood	Major Amendment	

EXECUTIVE SUMMARY

This amendment to Ocean Crest Local Structure Plan has been prepared for Lots 662, 663 & 664 Hamilton Road, Spearwood. The WAPC endorsed *Ocean Crest Local Structure Plan* was approved by WAPC date stamped 24 April 2012. Under the Ocean Crest Structure Plan, the subject Lots 662 – 664 are zoned 'Residential – R25'. The amendment to the LSP proposes to recode Lots 662 – 664 from the R25 low density code band to the R40 medium density code band.

The proposed change in density code is consistent with proper and orderly planning. The R40 density provides for increase in housing diversity and accommodation choice for the subject land, which is located within 400m of two nearby local commercial centres.

Item	Data	Section number referenced within the Structure Plan Report
Gross Area of Amendment No. 1 (Lots 662, 663 & 664)	0.2750 hectares	2.3
Area of each land use proposed <u>Zones</u> Residential	0.2750 hectares (100% of site)	2.3
Public Open Space	Nil – 10% required public open space is provided as per <i>Ocean Crest Local Structure Plan</i>	2.3
Estimated Lot Yield	11 lots (subject to demolition of existing dwellings)	2.3
Estimated Number of Dwellings	11 grouped dwellings	2.3
Estimated Residential Density - dwellings per gross hectare as per <i>Directions 2031</i> - dwellings per site hectare as per <i>Liveable Neighbourhoods</i>	40 dwellings per gross hectare	2.3
Estimated Population	31 people @ 2.8 people/household	2.3

TABLE OF CONTENTS

PART ONE – IMPLEMENTATION

1.0	STRUCTURE PLAN AREA	7
2.0	OPERATION	7
3.0	STAGING	7
4.0	SUBDIVISION & DEVELOPMENT REQUIREMENTS	7
4.1	Land Use & Permissibility	7
4.2	Residential Density	7
4.3	Notifications on Title	
5.0	OTHER REQUIREMENTS	8

PART TWO – EXPLANATORY SECTION

1.0	INTRODUCTION	9
1.1	Purpose	9
1.2	Background consultation with City of Cockburn	9
2.0	STRUCTURE PLAN	10
2.1	Up-coding subject site from R25 to R40	10
2.2	Assessment against Liveable Neighbourhoods	10
2.3	Estimated Residential Development	11
2.4	Other R40 Density considerations	14
2.5	<i>Proximity to Market Garden Swamp - Midge Buffer</i>	14

APPENDICES

Appendix No.	Document Title	Approval Required or Supporting Document only	Approval Status	Approval Agency
1	Pre-lodgement Consultation Table	Supporting Document	N/A	N/A

PART ONE (IMPLEMENTATION)

1.0 STRUCTURE PLAN AREA

Amendment No. 1 to the Ocean Crest Local Structure Plan (herein referred to as “the amendment to the LSP”) applies to the Lots 662, 663 & 664 Hamilton Road, Spearwood.

The area of the amendment to the LSP shall apply to the land contained within the inner edge of the line denoting the amendment to the LSP boundary on **Plan 1**.

2.0 OPERATION

The date the amendment to the LSP comes into effect is the date the amendment to the LSP is approved by the Western Australian Planning Commission as set out in the Structure Plan Certification Page.

3.0 STAGING

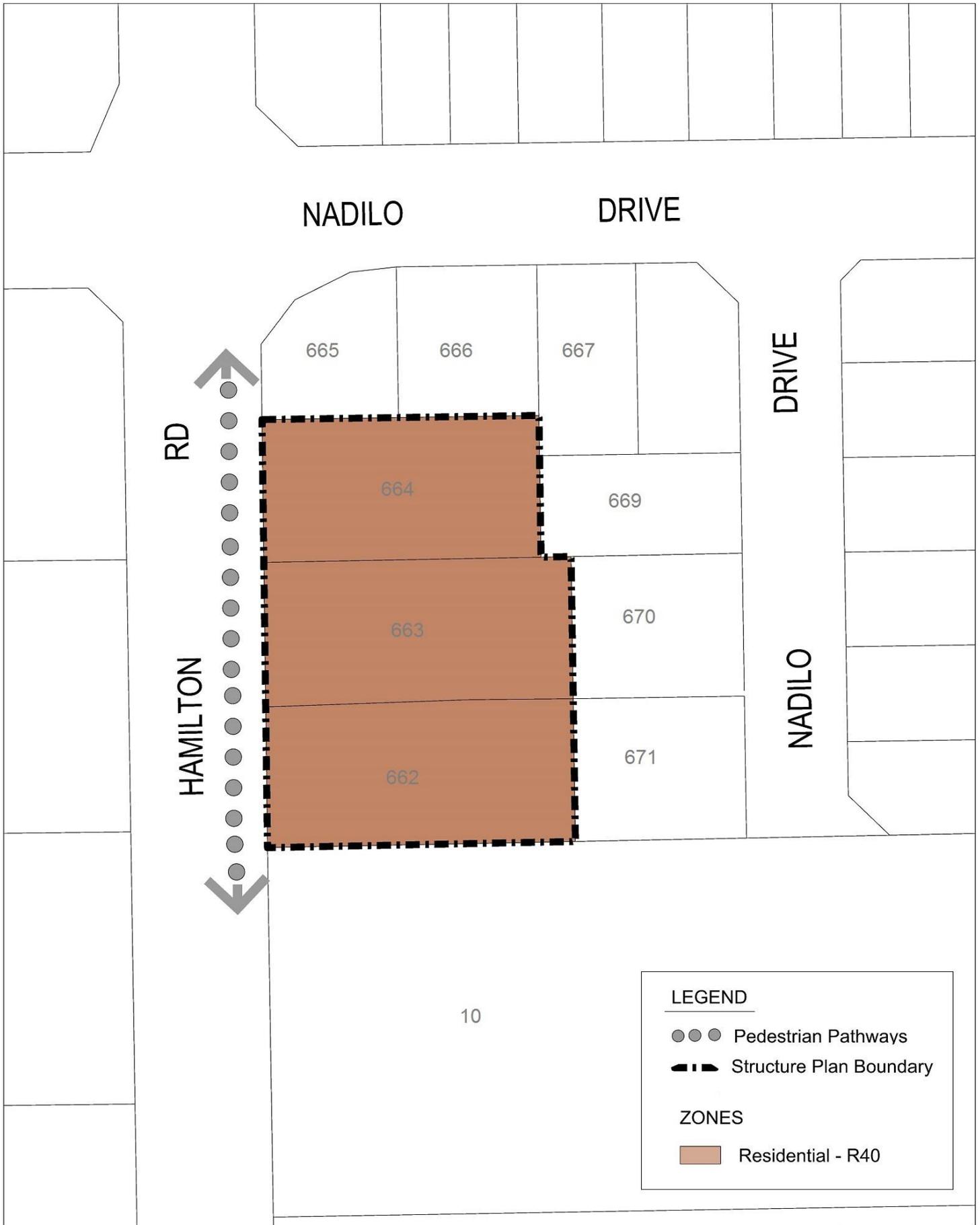
The amendment to the LSP is proposed to be developed in a single stage. There are no specific triggers for staging of development.

4.0 SUBDIVISION & DEVELOPMENT REQUIREMENTS

4.1	Land Use & Permissibility	<p>The amendment to the LSP outlines the zone applicable within the amendment, which will guide future subdivision and development of the land.</p> <p>Land use permissibility within the amendment to the LSP shall generally be in accordance with the corresponding zone under Town Planning Scheme No. 3.</p>
4.2	Residential Density	<p>Residential densities applicable to the amendment to the LSP shall be those residential densities shown on the Structure Plan Map.</p>
4.3	Notifications on Title	<p>In respect of applications for the subdivision of land the City of Cockburn shall recommend to the Western Australian Planning Commission that a condition be imposed on the grant of subdivision approval for a notification to be placed on the Certificate(s) of Title(s) to advise of the following: -</p> <ol style="list-style-type: none"> 1. This land may be affected by midge from nearby lakes and/or wetlands. Enquiries can be made with the City of Cockburn Environmental Services.

5.0 OTHER REQUIREMENTS

5.1	Development Contribution Items and Arrangements	The developer is to make satisfactory arrangements with the City of Cockburn to provide proportional contributions toward those items of development infrastructure defined in the City of Cockburn Town Planning Scheme No. 3 for Developer Contribution Area 12 ('DCA 12') and Developer Contribution Area 13 ('DCA 13').
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Plan No. : 20762-1
 Revision : REV.0
 Scale : 1:750@A4



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Member Practice Suite 4 First Floor 40 Hasler Road Osborne Park WA 6017 www.whelans.com.au

AMENDMENT NO. 1 - OCEAN CREST LOCAL STRUCTURE PLAN
 LOTS 662, 663 & 664 HAMILTON ROAD
 SPEARWOOD
 PLAN 1

DATE DRAWN: 18/08/2015 FILE: 150818 Local Structure Plan Lots 662, 663 & 664 Hamilton road.dgn
 DRAWN BY: CdeL V DATUM: AHD
 CHECKED BY: JP H DATUM: MGA94 (50)



PART TWO (EXPLANATORY SECTION)

1.0 INTRODUCTION

1.1 Purpose

This Amendment No. 1 to the Ocean Crest Local Structure Plan relates to Lots 662, 663 & 664 Hamilton Road, Spearwood (herein referred to as "the subject site"). The subject site has a land use classification and R-Coding of 'Residential – R25' under the Western Australian Planning Commission (WAPC) endorsed *Ocean Crest Local Structure Plan* (herein referred to as the "approved SP"). The approved SP was endorsed by the WAPC on 24 April 2012.

The approved SP is shown in **Figure 1**. The landowner proposes to increase the R-Code density from 'Residential - R25' to 'Residential - R40' over the subject site. The SP subject site for the R40 re-coding is shown in **Figure 2**.

1.2 Background consultation with City of Cockburn

In pre-lodgement discussions with City of Cockburn planning officers (refer to **Appendix 1**), City officers determined that the proposed up-coding from R25 to R40 would constitute a *major amendment* to the approved SP (**Figure 3**).

The proposed up-coding of Lots 662 – 664, from the R25 low density code band, to the R40 medium density code band, constitutes a material change as the housing density, typology and amenity expectations differ between the low density and medium density bands of the Western Australian Residential Design Codes (R-Codes).

Accordingly the proposed Amendment No. 1 to the approved Ocean Crest Local Structure Plan has been referred to the relevant service authorities, agencies and has been advertised to the community.

The Applicant had provided upfront non-objection letters from neighbours (Lots 10 & 670), with further advertising to occur for the other (5) neighbouring lots as part of the amendment to the LSP.

2.0 STRUCTURE PLAN

2.1 Up-coding subject site from R25 to R40

The planning justification for the increase in density from current 'Residential – R25' to proposed 'Residential - R40' for the subject site is outlined in this section. WAPC *Liveable Neighbourhoods* (LN) is the WAPC's key operational policy for the design and assessment of structure plans and subdivision for new urban areas in the metropolitan area and country centres, on greenfield or large urban infill sites. Accordingly this proposal is assessed against the principles and objectives of LN.

2.2 Assessment against Liveable Neighbourhoods

LN promotes a site-responsive approach to urban development that supports and enhances the context in which the site is located and integrates with its context. A key objective of LN is to increase densities particularly around commercial activity centres.

This is also consistent with WAPC's *Directions 2031* vision for Perth Metropolitan area, whereby *Directions 2031* seeks a 50 per cent improvement on current infill residential development trends. The proposed amendment to the LSP will contribute towards the *Directions 2031* target of 47 per cent of all new dwellings as being generated from infill development.

The subject site is located within 400m of two local commercial centres (refer to **Figure 4**) as follows:

Local Commercial Activity Centre		
	Coogee Local Centre (Existing)	Eliza Ponds Local Centre (Proposed)
Approximate distance to centre from subject site	215 metres	265 metres

The subject site is strategically located within less than 5 minutes (safe and convenient) walkable accessibility via Hamilton Road, to existing and proposed local centres as shown in Figure 4.

The subject site is also located near (though generally non-walkable) to other commercial activity centres and employment nodes. Within 2km to the east is the Phoenix District Centre and nearby Spearwood Industrial Park. Approximately 4km to the north is the Fremantle business district and 7km to the south is the Henderson industrial and ship building precinct.

LN promotes the provision of a range of residential lot sizes, including locating smaller lots and lots capable of supporting higher density development in and around activity centres.

The LN target residential density for areas within 400m of an activity centre is 30 – 40 dwellings per hectares, which equates to an R30 – R40 density code. The subject site is within 400m of two existing and proposed local commercial activity centres and subsequently the proposed R40 density code is consistent with LN.

The existing R25 density of the subject site is not consistent with the LN expected target residential density for areas within 400m of local commercial centre catchments.

Adoption of the proposed R40 re-coding will bring the SP more into line with the principles and expectations of LN and *Directions 2031*. This is shown in **Table 3** calculation of density.

2.3 Estimated Residential Development

LN promotes a site-responsive approach to urban development that supports and enhances the context in which the site is located and integrates with its context. Under the current R25 coding the development lot yield for the subject site, compared with the proposed R40 coding, is calculated as follows in **Table 1**:

Table 1. Estimated Single and/or Grouped Dwellings of subject site

Lot No.	Residential (R25)	Residential (R40)
662	2 x Single Dwellings or Grouped Dwellings	2 x Single Dwellings, or 4 x Grouped Dwellings
663	2 x Single Dwellings or Grouped Dwellings	2 x Single Dwellings, or 4 x Grouped Dwellings
664	2 x Single Dwellings or Grouped Dwellings	2 x Single Dwellings, or 3 x Grouped Dwellings

An additional 5 grouped dwellings can be achieved if the subject site is re-coded from R25 to R40. The estimated population generated by the proposed amendment to the LSP is 31 persons based on 2.8 persons per household (single or grouped dwellings).

The proposed R40 coding would also create the opportunity for Multiple Dwelling (apartment) development. For instance, if both dwellings were demolished and Lots 662 & 663 (single landowner) were amalgamated into one development site, this would create opportunity to maximise the site for Multiple Dwelling development.

The R40 coding allows for Multiple Dwelling development and such housing accommodation would add to the variety of dwelling and household types in the local area.

An example of multiple dwelling potential for the sole landowner of Lots 662 & 663 is shown in **Table 2**. Multiple Dwelling development would be permitted by the City at its discretion with the content of *Planning Bulletin 113/2015 'Multiple Dwellings in R40 coded areas and variation to R-Codes multiple dwelling development standards'* providing guidance.

Table 2. Estimated Multiple Dwelling potential of subject site

Combined Total Site Area (Lots 662 & 663)	1,896m ²
Maximum Plot Ratio for (R40) Multiple Dwellings	0.6
Average size of apartment unit incorporating a mix of single and two bedroom apartments	70m ² - 95m ²
Typical development size/scale	Two storey walk-up apartments
Estimated Multiple Dwelling Yield	12 – 16 apartment units

Table 3. Target Density Calculations for subject site

	Site Outcomes	Target Density
Total Subject Site area	2,750m ²	-
Area for residential development (no public open space proposed) ¹	2,750m ²	-
Estimate ultimate number of dwellings	11 grouped dwellings	-
Estimated number dwellings per gross and site hectare ¹	40 dwellings/ha	Liveable Neighbourhoods 30 – 40 dwellings per site hectare for lots within 400m of a commercial centre
Subject site target density per gross and site urban hectare	40 dwellings/ha	Directions 2031 15 dwellings per gross urban hectare

Notes:

- 1 Public Open Space for the subject site is already provided for in the approved Ocean Crest Local Structure Plan

2.4 Other R40 Density considerations

The subject site is also within 400m of two substantial public open space (POS) areas that have been provided for consistent with the *Packham North District Structure Plan*. This is shown in Figure 4. LN promotes increased residential densities around community amenities such as POS and the proposal is consistent with LN principles. Furthermore, the coast & beach facilities and Port Coogee coastal activity node is approximately 1,200 metres west of the subject site accessible via Ocean Road. These would be within 15 - 20 minutes walking distance from the subject site.

Hamilton Road is a major road servicing residential areas within Coogee and Spearwood and is also a public transport bus route. There are bus stops directly opposite the subject site on both sides of Hamilton Road, south of the intersection of Ocean Road/Hamilton Road. The subject site is strategically located directly opposite these existing bus stops.

The WAPC endorsed *Lots 1, 9 & 10 Hamilton Road Structure Plan* zones Lots 1, 9 & 10 Hamilton Road as 'Residential -R40' (refer to **Figure 5**). The proposed re-coding of Lots 662 - 664 Hamilton Road from R25 to R40 would be consistent with the R40 coding of the lots to the south fronting Hamilton Road. This provides for a more consistent R40 streetscape and consolidated medium density residential pocket.

The proposed R40 coding for Lots 662 - 664 will create the opportunity for the existing dwellings to be retained and the rear of the lots to be subdivided/developed for R40 development. The R40 code development standards and minimum lot size provide for greater flexibility (compared with the R25 coding) for retention of existing dwellings on the subject site, if retention is desired by the landowner/s as part of redevelopment.

2.5 Proximity to Market Garden Swamp - Midge Buffer

The City of Cockburn's Policy APD6 – 'Residential Rezoning And Subdivision adjoining Midge Infested Lakes and Wetlands', at Clause (2), recommends notification on titles advising prospective purchasers living between 500m – 800m of a [specified] lake or wetland edge, of potential midge infestation. Notice of Notification, pursuant to Section 165 of the Planning and Development Act 2005 on titles of each new residential lot, is required to be included on the Deposited Plan and shall state the following:

This land may be affected by midge from nearby lakes and/or wetlands. Enquiries can be made with the City of Cockburn Environmental Services

Figure 6 shows a portion of the subject site is within the 500 metre midge buffer with the balance area within 800 metre midge buffer. The requirement for notification on titles is considered, at the subdivision stage, likely to be a condition of subdivision approval.

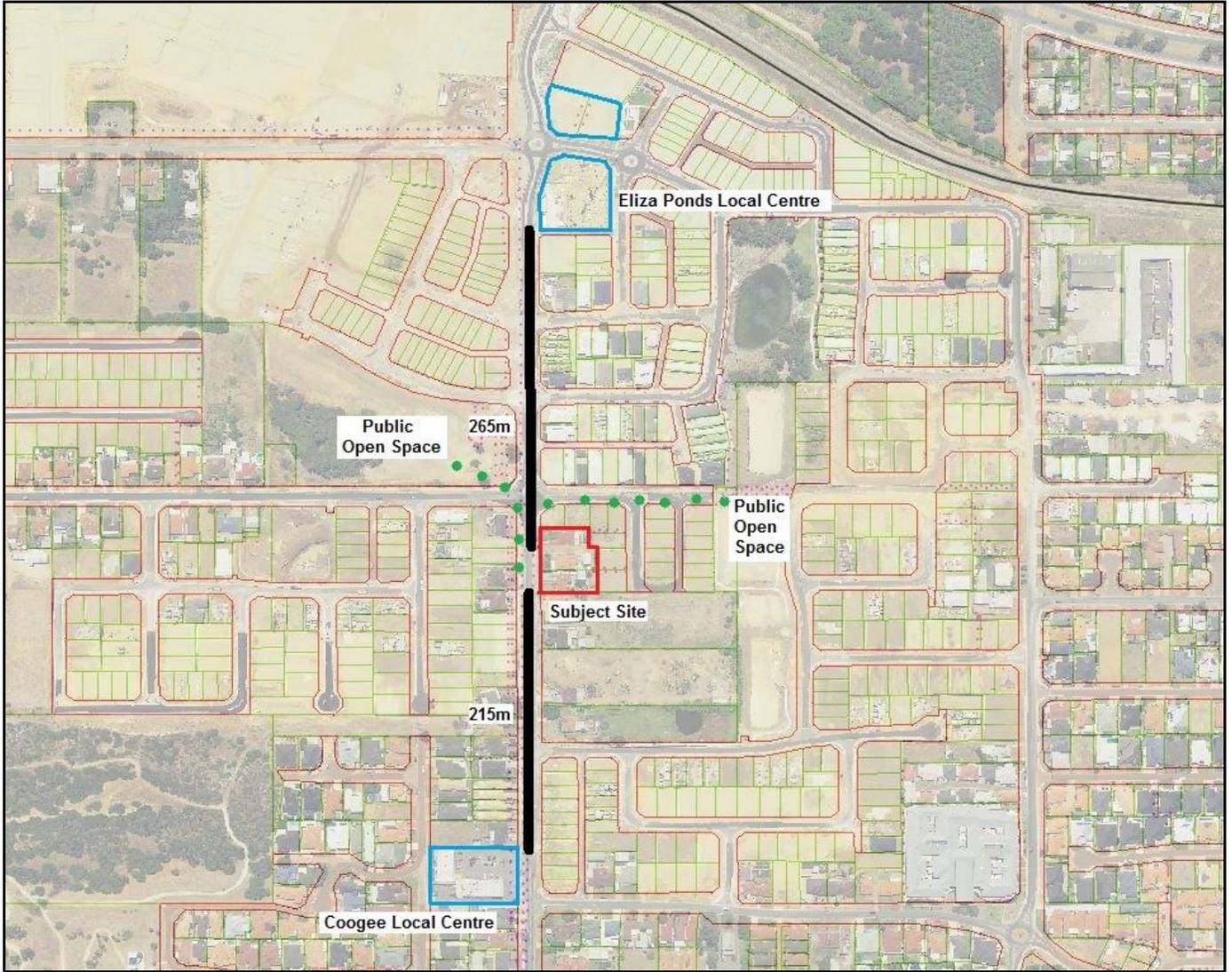
FIGURES



(Source: Landgate - modified, 2015)

FIGURE 2
CADASTRAL/AERIAL PLAN





(Source: Landgate, 2015)

FIGURE 4
PROXIMITY TO LOCAL CENTRES & POS

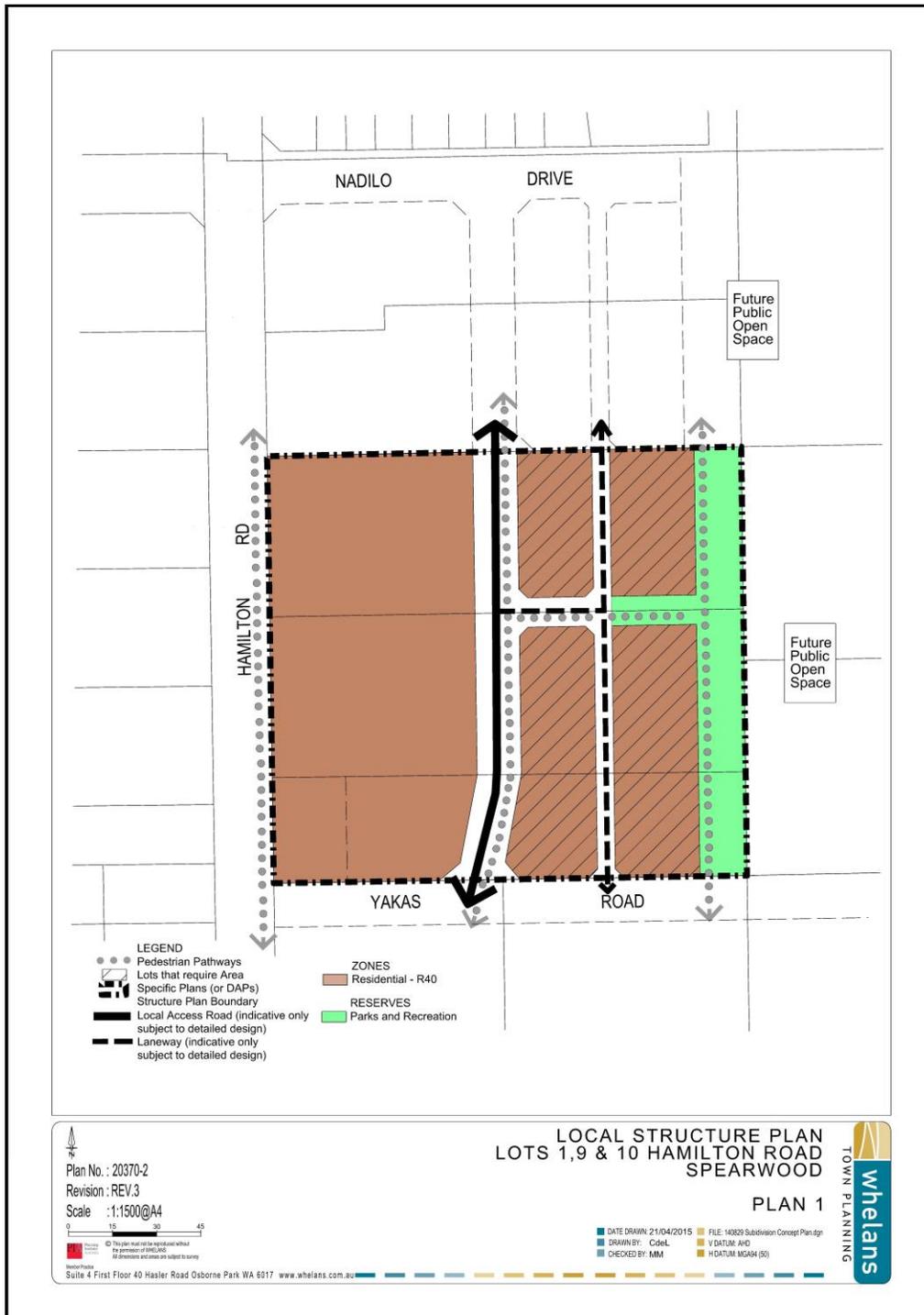


FIGURE 5
 LOTS 1, 9 & 10 HAMILTON RD LOCAL STRUCTURE PLAN

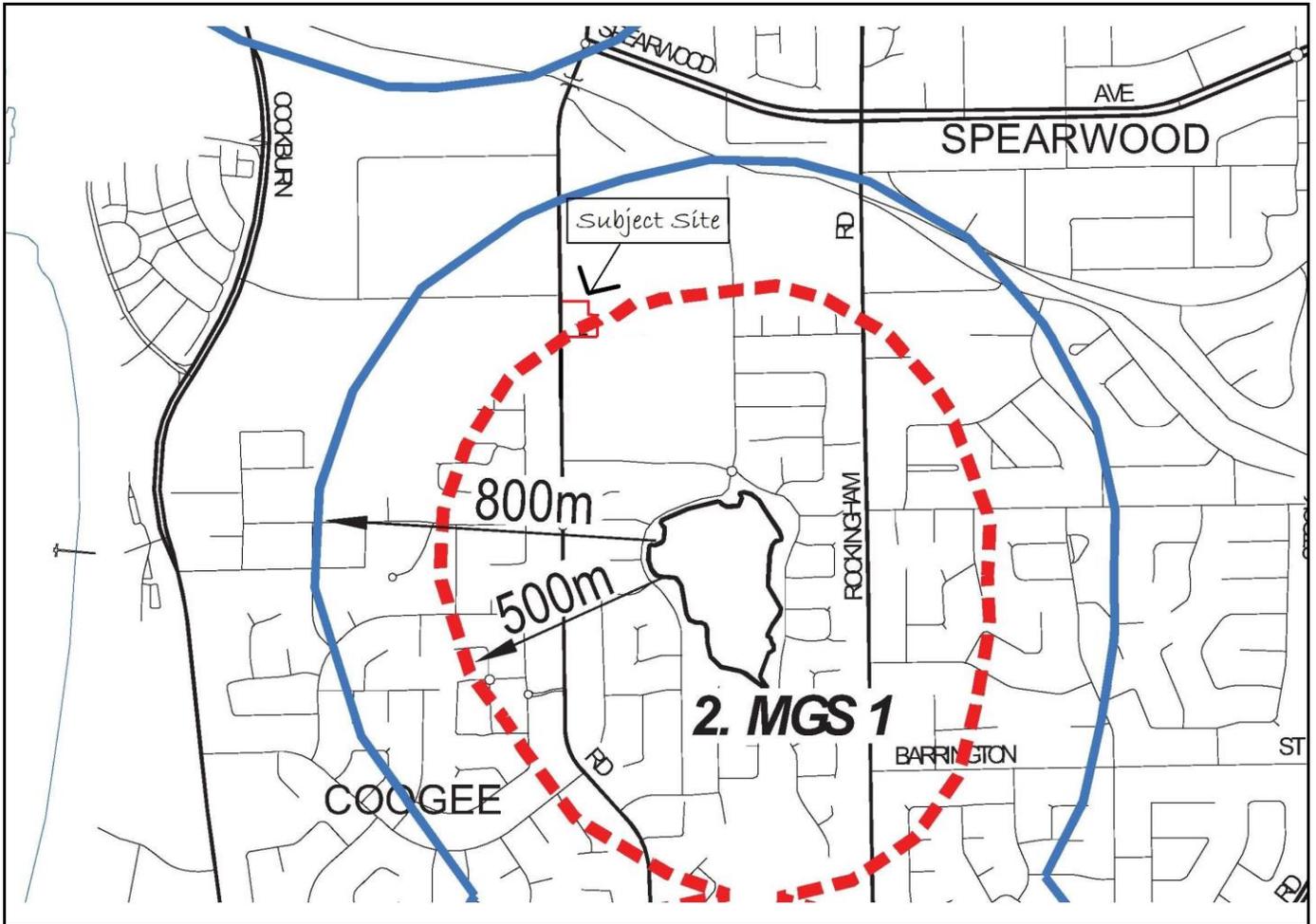


FIGURE 6
POLICY APD6 MIDGE MAPPING

APPENDIX 1

PRE-LODGEMENT CONSULTATION

AGENCY	DATE OF CONSULTATION	METHOD OF CONSULTATION	SUMMARY OF OUTCOME
City of Cockburn	<i>August 2015</i>	Emails/Telephone	<p>Preparation of a separate new structure plan for Lots 662 - 664 as <i>major amendment</i> pursuant to City's Policy APD81 requires new SP for subject site. R40 density supported in-principle.</p> <p>However this approach has not been adopted by WAPC and the proposal has been progressed as 'Amendment No. 1 - Ocean Crest Local Structure Plan'.</p>