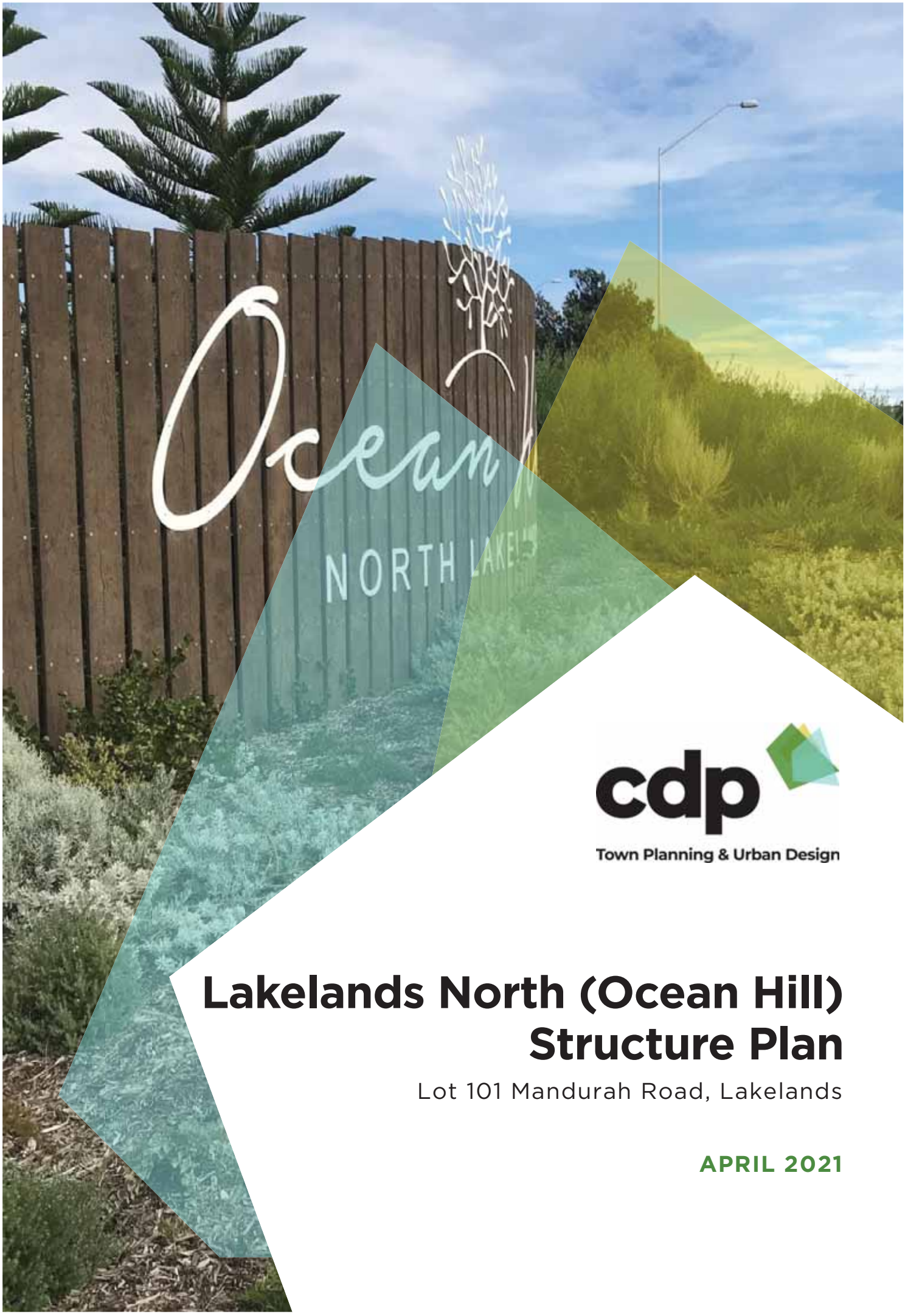

cdp
Town Planning & Urban Design

Lakelands North (Ocean Hill) Structure Plan

Lot 101 Mandurah Road, Lakelands

APRIL 2021

Lakelands North (Ocean Hill) Structure Plan.

Lot 101 Mandurah Road, Lakelands

FEBRUARY 2016 (AS AMENDED APRIL 2021)

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Prepared for. CP Land Pty Ltd
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In Collaboration with.
JDSi Consulting Engineers
Emerge Associates
Bushfire Safety Consulting
Lloyd George Consulting
GTA Consulting
McMullen Nolan Group

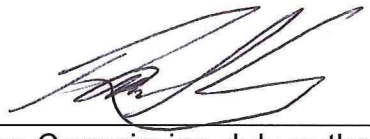
DOCUMENT STATUS

Version	Comment	Prepared	Reviewed	Issued
6	WAPC Schedule of Modifications (Approved LSP)	TV	JH	24.02.2016
7	Structure Plan Amendment 1 (Client Review)	TV	JH	28.11.2019
7a	Structure Plan Amendment 1 (Client Updates)	TV	JH	06.03.2020
7b	Structure Plan Amendment 1 (Re-format)	MT	JH	26.05.2020
8	WAPC Schedule of Modifications	TV	JH	16.04.2021

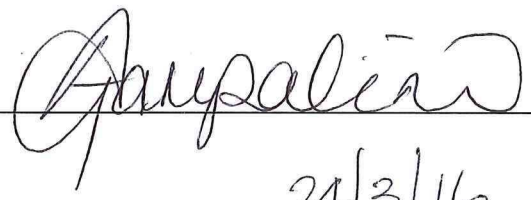
This structure plan is prepared under the provisions of the City of Mandurah Town Planning Scheme No.3

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON: 24 March 2016

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

24/3/16

Date

Date of Expiry: 24 March 2026

Table of Modifications.

Modification	Description	Endorsed by City	Endorsed by WAPC
1	Introduction of base coding of R25 (in lieu of R30) and a density range of R25 – R80 based on revised locational and performance criteria. Re-alignment of Primary Road network and adjacent residential and public open space cells pursuant to WAPC Subdivision Approval 158359, issued November 2019 (Estate Stages 5 – 7).	Standard	16 June 2021

Table of Density Plans.

Modification	Description	Endorsed by City
1	WAPC 153039 for Ocean Hill Estate (Stage 1 - 4)	March 2016
2	WAPC 154930 for Ocean Hill Estate (Stage 5 - 9)	June 2017
3	WAPC 158359 for Ocean Hill Estate (Stage 5 - 7) *NB. Supersedes portion of Density Plan No. 2*	November 2019

Executive Summary.

The *Lakelands North (Ocean Hill) Structure Plan* has been prepared to guide the subdivision and development of some 120 hectares of land on Lot 101 Mandurah Road, Lakelands, within the City of Mandurah municipality.

CP Land Pty Ltd is the sole owner of the subject land.

The Structure Plan has been prepared on behalf of CP Land Pty Ltd by the following specialist consultant team:

- Satterley – Project Management
- CDP – Urban Design and Town Planning
- JDSi Consulting Engineers – Engineering
- Emerge Associates – Environment, Landscaping, Hydrology
- Bushfire Safety Consulting – Bushfire Management
- Lloyd George Acoustics – Noise Management
- GTA Consultants – Traffic and Transport Analysis
- McMullan Nolan Group (MNG) – Surveying

Purpose

This Structure Plan provides an overarching planning framework to guide and facilitate the development of 120 hectares of land at Lot 101 Mandurah Road, for urban purposes.

The Structure Plan provides for an integrated and coordinated approach to an appropriate mix of residential land uses and infrastructure, necessary to create a strong and vibrant community in the Peel Region.

The Structure Plan has been submitted for approval by the Western Australian Planning Commission.

Design Approach

The design approach has been a rigorous multidisciplinary process with continuous reflection upon the purpose of the Structure Plan and improving project outcomes. Design principles and considerations which have informed the design approach include:

- Public open space allocation, including retention of quality remnant vegetation and community creation;
- Urban structure and place making;
- Movement systems and connectivity;
- Leading and innovative built form; and
- Landform and environment.

Project Overview

The Structure Plan will create a framework for the future urban subdivision development of an anticipated 1,920+ dwellings, which will ultimately house a new community in the vicinity of 5,376+ people within a variety of lot product and dwelling types. The Structure Plan will also provide land for the purposes of a Primary School and part contribution to a High School and District Playing Field.

Item	Data	LSP Reference
Total Structure Plan Area	120.21 ha	
Area of each land use proposed: • Residential (Nett) • Roads • Public Open Space • Primary School • High School (portion of) • Mandurah Landscape Buffer	 67.32 ha 34.39 ha 12.79 ha 3.5 ha 1.5 ha 0.71 ha	Part 2 Section 4.3 *Land Composition*
Estimated Lot Yield	1,881+ lots	Part 2 Section 4.4 *Dwelling Forecast*
Estimated Dwelling Yield	1,920+ dwellings	
Estimated Residential Density	~16 dwellings/gross urban zone[1] ~28 dwellings/site hectare[2]	
Estimated Population	5,376+ people	
Number of High Schools	1 (part contribution)	Part 2 Section 4.2.4 *Education & District Playing Fields*
Number of Primary Schools	1	
Estimated Number and % of Public Open Space: • Regional Open Space • District Open Space	 0 ha 1 park @ 4.43 ha (35%)[3]	Part 2 Section 4.8 *Public Open Space*
Estimated area and number: • Neighbourhood Parks • Local Parks	 9 parks @ 7.74ha (60%) 3 parks @ 0.62 ha (5%)	
Estimated number and area of natural area and biodiversity assets	0 ha[4]	

Footnotes:

1. 'Gross urban zone' refers to the definition under WAPC's *Directions 2031* and supporting documents.
2. 'Residential site hectare' refers to the definition under Element 1 of WAPC's *Liveable Neighbourhoods*.
3. District Playing Fields are incorporated in the Structure Plan design, thus, such areas are allocated within the 10% POS contribution.
4. All natural areas (remnant vegetation) are retained within designated Public Open Space areas.

Abbreviations.

AAMGL	Average Annual Maximum Groundwater Level
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soils
AS	Australian Standard
BGL	Below Ground Level
BMP	Bushfire Management Plan
BRA	Bio-Retention Areas
CBD	Central Business District
CCW	Conservation Category Wetland
DEC	Department of Environment and Conservation
DIA	Department of Indigenous Affairs
DPaW	Department of Parks and Wildlife
DoP	Department of Planning
DoW	Department of Water
DWMS	District Water Management Strategy
DSP	Mandurah North District Structure Plan
EPA	Environmental Protection Authority
FSA	Flood Storage Areas
Ha	Hectare
LILO	Left-in /Left-Out Road Intersection
LDP	Local Development Plan
LWMS	Local Water Management Strategy
MGL	Maximum Groundwater Level
MRWA	Main Roads Western Australia
NCA	Neighbourhood Connector A
NCB	Neighbourhood Connector B
OMSRS	Draft Outer Metropolitan Perth & Peel Sub Regional Structure Plan
POS	Public Open Space
PRS	Peel Region Scheme
PTA	Public Transport Authority
RMD Codes	Residential Medium Density Codes
TPS 3	City of Mandurah Town Planning Scheme No. 3
UWMP	Urban Water Management Plan
WAPC	Western Australian Planning Commission
WSUD	Water Sensitive Urban Design

Contents.

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Part Two - Explanatory Section

Technical Appendices

Plans

Figures

DISCLAIMER - FIGURES

LSP Plan 1 and Figures 11 (Master Plan) and 21 (Public Open Space Plan) have been updated to correspond to Amendment 1 to the Structure Plan (April 2021).

All other report figures and Technical Appendices correspond to the 2016 approved LSP as they generally reflect the design objectives and intent of the LSP, inclusive of any Amendments.

Part One - Implementation

LAKELANDS NORTH (OCEAN HILL)
STRUCTURE PLAN

Part One - Implementation

LAKELANDS NORTH (OCEAN HILL) STRUCTURE PLAN

1. Structure Plan Area

This Structure Plan shall apply to Lot 101 Mandurah Road, Lakelands being the land contained within the inner edge of the line denoting the Structure Plan boundary on the Structure Plan (**Plan 1**).

The Structure Plan is identified as the Lakelands North (Ocean Hill) Structure Plan.

2. Operation

This Structure Plan comes into effect on the date it is approved by the Western Australian Planning Commission (WAPC).

The Structure Plan is to be given due regard when considering development of subdivision applications.

3. Staging

The development of the Structure Plan area will be implemented in multiple stages. The staging plan is indicative as timing, location and composition of the future stages will be dependent on market demand.

The staging will commence in the southern portion of the estate, namely the south-central and south-eastern portions for Display Village, Sales Office and 'first release' residential purposes. The development will move northwards and westwards before completion in the north-eastern portion of the site.

The provision of traffic signalisation with Mandurah Road, engineering infrastructure and primary internal road network will also need to be staged to suit development demand and/or suitable access at an early stage. A detailed program for this will prepared as part of ongoing detailed planning and design of service infrastructure.

The Coastal Lakes College high school opened at the beginning of 2019. Development of the primary school is subject to local demand, namely in excess of 1,000 residential lots.

4. Subdivision & Development Requirements

4.1 Land Use Permissibility

a) Land use permissibility within the structure plan area is to be in accordance with the corresponding zone or reserve under the City of Mandurah Town Planning Scheme (the 'Scheme').

4.2 Hazards & Separation Distances

a) Residential lots identified within the Bushfire Prone Area as designated under the Department of Fire and Emergency Services Mapping of Bushfire Prone Areas will require a Bushfire Attack Level assessment to be undertaken at subdivision stage.

b) A Detailed Noise Management Plan is to be prepared and implemented in accordance with State Planning Policy 5.4 Road and Rail Noise and the associated implementation guidelines for lots identified as affected by noise in the Lot 101 Mandurah Road Structure Plan Transportation Noise Assessment.

4.3 Public Open Space

a) The Structure Plan (**Plan 1**) nominates a provisional area of 11.94ha as creditable Public Open Space. The proposed Public Open Space meets the minimum 10% requirement as outlined in Part Two of this report.

b) An updated Public Open Space schedule is to be provided at the time of subdivision for determination by the WAPC upon advice of the City of Mandurah.

4.4 Density Plans

a) A residential density code plan is to be submitted to the WAPC at the time of subdivision, unless exempt from this requirement by clause 4.4(d) of this structure plan. This plan is to identify the residential density code applicable to each proposed lot, in accordance with the locational criteria set out below.

b) The residential density code plan is to include a summary of the proposed dwelling yield and demonstrate how the density target, as specified in section 4.5, is progressively being achieved.

c) The WAPC is to determine the residential density code plan together with the related subdivision application. If approved, the residential density code plan will then form part of the Structure Plan and shall be used to assess and determine any future application for development approval.

d) A residential density code plan is not required if the purpose of the subdivision application is to:

i. amalgamate lots;

ii. create a lot or lots for the purposes of facilitating the provision of access, services or infrastructure;

iii. create a lot or lots which cannot be developed for residential purposes; or

iv. create residential lots in accordance with a previously approved residential density code plan.

e) As each stage of subdivision is finalised and a deposited plan depicting the lot(s) is submitted to the WAPC for its endorsement, a consolidated residential density code plan is to be prepared and forwarded to the local government and WAPC, and this shall supersede each previous residential density code plan(s).

4.5 Residential Density Targets

a) The subdivision of land zoned urban in the Peel Region Scheme should aim to achieve a density of 15 dwellings per hectare.

4.6 Locational Criteria

a) The allocation of a specific residential density code to a lot shall be consistent with the residential density range identified on the structure plan map and the following locational criteria:

Density Code	Locational Criteria
R25 (R-MD)	The base residential density code shall be R25 unless an R40, R60 or R80 residential density code is applied in accordance with the locational criteria set out below.
R30 (R-MD)	Lots already titled with a R30 density coding, prior to the endorsement of this Structure Plan - Amendment 1, shall retain a base code of R30.

Density Code	Locational Criteria
R40 (R-MD)	An R40 residential density code may only be applied where a lot is: i. provided at the end of a street block and with rear laneway access; **and/or** ii. located within 100 metres (walking distance) of public open space and key distributor roads.
R60 (R-MD)	An R60 residential density code may only be applied where a lot is: i. located at the end of a street block and with rear laneway access; **and** ii. located abutting or adjacent to (that is, separated by no more than a constructed and dedicated public road), public open space; **or** iii. located abutting a key public transport node or route.
R80	An R80 residential code may only be applied where a lot is: i. contiguous with R80 lots with a combined minimum area of 800m2; **and** ii. located at the end of a street block with direct frontage to two intersecting roads, and/or with rear laneway access; **and** iii. located adjacent to (that is, separated by no more than a constructed and dedicated public road) public open space; **or** iv. located abutting a key public transport node or route.

5. Local Development Plans

a) The WAPC may require, as a condition of subdivision approval, that a local development plan(s) be prepared in accordance with Part 6 of Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015, prior to the creation or development of lots:

i. of irregular shape or less than 260m^2 in area;

ii. affected by road or rail noise exceeding the targets set out in *State Planning Policy 5.4: Road and Rail Noise* and the associated implementation guidelines;

iii. where vehicular access is obtained from a rear laneway or right of way or is otherwise constrained;

iv. abutting areas of public open space; and/or

v. intended to accommodate grouped or multiple dwellings.

b) Local development plans are to address the following matters, as required:

i. street and boundary setbacks;

ii. dwelling orientation;

iii. uniform fencing requirements;

iv. open space requirements;

v. garage setbacks and width;

vi. vehicular and pedestrian access;

vii. parking requirements;

viii. overshadowing;

ix. visual privacy;

x. quiet house design and/or construction requirements; and

xi. any variations to the residential design codes which may be required.

6. Other Requirements

6.1 Notifications on Title

a) Notifications are to be placed on titles of all affected lots to advise of:

i. that the lot is located near a transport corridor and higher construction standards may be required to reduce transport noise to acceptable levels in accordance with *State Planning Policy 5.4 Road and Rail Noise*;

ii. that the lot is located within an area which has been declared bushfire prone and may be subject to a bushfire management plan and additional construction requirements may apply in accordance with *Australian Standard AS3959: Construction of buildings in bushfire prone areas* (as amended).

6.2 Developer Contributions

a) The proposed development is not encompassed by a Development Contributions Plan area.

6.3 Miscellaneous

Additional Information	Approval Stage	Approval/Consultation Required
Density Plans	Subdivision application	WAPC City of Mandurah
Public Open Space	Subdivision application	WAPC City of Mandurah
Detailed Noise Management Plan	Subdivision application/condition of subdivision for identified lots; or Development application for identified lots	City of Mandurah Main Roads Western Australia Dept. Water and Environmental Regulation
Bushfire Attack Level Assessment	Subdivision application/condition of subdivision for identified lots; or Development application for identified lots	City of Mandurah Dept. Fire and Emergency Services

City of Rockingham
City of Mandurah

807

City of Rockingham
City of Mandurah

8202

MANDURAH ROAD

PERTH - MANDURAH RAILWAY

9100

101

1587

9009

District Playing Fields

Primary School

High School

8009

2600

3001

53

BADGERUP AVENUE

MALATA RIDGE

1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1037 1036

LEGEND

- STRUCTURE PLAN BOUNDARY
- LOCAL AUTHORITY BOUNDARY
- RESIDENTIAL R25 - R80
- PRIMARY SCHOOL/HIGH SCHOOL
- PUBLIC OPEN SPACE
- VEGETATED BUFFER (TO MANDURAH ROAD)
- NEIGHBOURHOOD CONNECTOR
- LOCAL ROADS
- TRAFFIC LIGHTS

Lakelands North (Ocean Hill) Structure Plan (As Amended)

Plan 1

NORTH

Scale: 1:5000 @ A3

0 50 100 150m

PLAN: CPLOH-2-001 REVISION: A
DATE: 12/04/2021 DRAWN: JP
PROJECTION: PCG 94 PLANNER: TV
DATUM: AHD CHECK: JH

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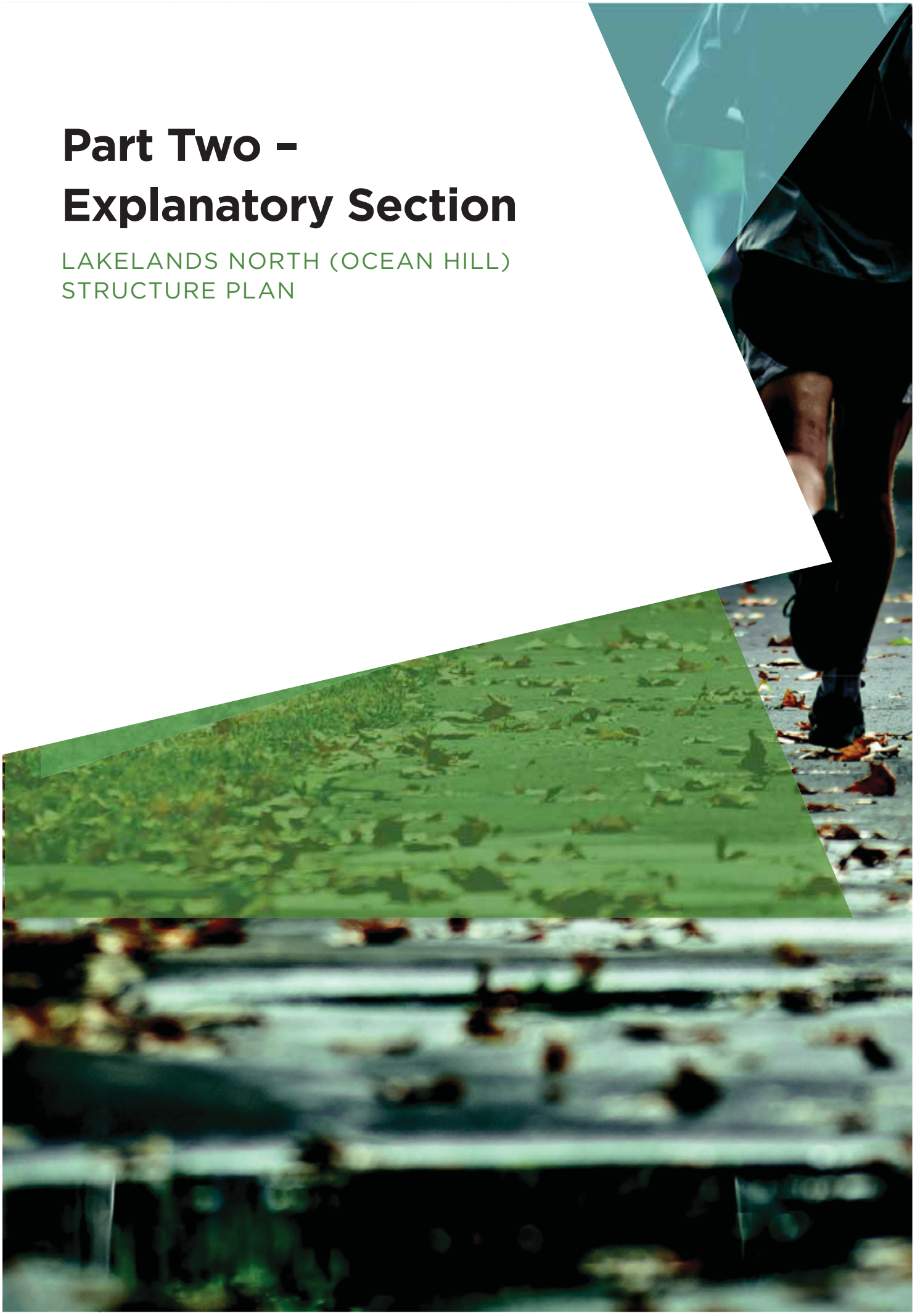
Part Two – Explanatory Section

LAKELANDS NORTH (OCEAN HILL)
STRUCTURE PLAN



Part Two - Explanatory Section

LAKELANDS NORTH (OCEAN HILL) STRUCTURE PLAN

1. Planning Background

1.1 Purpose

The purpose of the Lakelands North (Ocean Hill) Structure Plan report is to provide for the orderly and proper subdivision and development of the Structure Plan area for 'Urban' purposes.

The information contained in this section provides justification and support for the comprehensive and co-ordinated design response provided for the Structure Plan.

1.2 Land Description

1.2.1 Location

The Structure Plan area is located on the eastern side of Mandurah Road and the northern most part of the Peel Region Scheme jurisdiction boundary. Approximately 1.2km east of the Indian Ocean, the site is approximately 9km north of the Mandurah Strategic Metropolitan Centre and 55km south of the Perth CBD.

1.2.2 Area & Land Use

The Structure Plan area is 120.21ha in area. The historical use as a quarry site has rendered a large portion of the Structure Plan area completely cleared of vegetation.

1.2.3 Legal Description & Ownership

The Structure Plan area is identified as Lot 101 on Deposited Plan 37823, Volume 2616, Folio 591 (**Appendix 1** refers). The registered owner is CP Land Pty Ltd.

1.3 Planning Framework

1.3.1 Zoning & Reservations

Peel Region Scheme

On the 8 December 2015, the Minister for Planning approved and gazetted Amendment 039/57 (Lakelands North) to the Peel Region Scheme (PRS); this amending the western portion of the site to 'Urban' under the PRS.

Pursuant to the PRS, the entire site is now zoned 'Urban' (**Figure 2** refers).

The Structure Plan area also abuts Mandurah Road to the west, classified as 'Primary Regional Roads' under the PRS and 'Railways' to the east, being the Perth-Mandurah Rail Line.

City of Mandurah Town Planning Scheme No. 3

Pursuant to section 126(3) of the *Planning and Development Act 2005*, the City of Mandurah Town Planning Scheme No. 3 (TPS3) was amended to include the land subject of Amendment 039/57 within the 'Urban Development' Zone.

Accordingly, the entire site is now zoned 'Urban Development' under TPS3 (**Figure 3** refers).

1.3.2 Regional & Sub Regional Structure Plans & Strategies

Directions 2031 and Beyond

Directions 2031, the WAPC's strategic planning framework document for Metropolitan Perth and Peel, is a high level strategic plan that establishes a vision for the future growth of the Perth and Peel region. It provides a framework to guide the detailed planning and delivery of housing, infrastructure and services necessary to accommodate that growth.

The Structure Plan area is identified within the 'Peel Sub-region', which is expected to grow by 45,000 people, to a total population of 133,000. Based on a 'Connected City' scenario, a growth target

of 15 dwellings per gross urban zoned hectare is set by Directions 2031.

Draft Outer Metropolitan Perth & Peel Sub-Regional Strategy

The Outer Metropolitan Perth and Peel, Sub-Regional Strategy (OMSRS) (**Figure 4** refers) provides a framework for delivering the objectives of Directions 2031. The document provides a more detailed analysis in terms of strategic plans of action, stakeholder responsibilities and timeframes for delivery of development within the metropolitan corridors.

Situated within the 'Peel Sub-region', the Structure Plan area is identified as follows:

- Portion zoned 'Rural' under TPS3 – is classified as 'urban investigation area 2011-2020' and forecast to provide approximately 600+ dwellings; and
- Portion zoned 'Urban Development' under TPS 3 – is classified as 'Urban Zoned Undeveloped', and together with land to the south (Peet Ltd's Lakelands Estate) and on the eastern side of the Freeway, is forecast to provide approximately 3,400+ dwellings.

Planning Bulletin 112/2015 Medium Density Single House Development Standards

This Planning Bulletin, current version released in 2016, provides the medium-density single house standards which can vary the 'Deemed to Comply' R-Codes provisions of the Residential Design Codes. Said provisions now adopted under the City's Local Planning Policy 1 (LPP1) – Residential Design Codes Policy.

1.3.3 City of Mandurah Structure Planning, Strategies & Policies

The following City of Mandurah Structure Plans, Strategies, and Local Planning Policies pursuant to Clause 9.6 of TPS3, are relevant to the Structure Plan.

Mandurah North District Structure Plan

The *Mandurah North District Structure Plan* (DSP) was adopted by the Council in June 2006 (**Figure 5** refers). It was prepared to assist the assessment of landowner/developer proposals over the City's northern-western development cell by ensuring that an overall design framework was established.

The DSP plan identified an 'Active Recreation Facility', 'High School' and 'Low Density Residential (R10)' over the Structure Plan area.

The DSP planned for a large 10ha 'Active Recreation Facility' (i.e. District level facility) be provided within the south-western portion of the Structure Plan area. This facility to be co-located with the proposed High School to maximise joint-use of facilities.

For the portion of the Structure Plan area identified as 'Low Density Residential (R10)' the DSP notates "Future Urban Development with final road, lot and land use layouts subject to further design, assessment and relevant Outline Development Plan and Rezoning".

Subsequent to the DSP, in March 2013, the City endorsed the 'Lakelands School and Recreation Master Plan', this providing a more detailed development framework for the High School and co-located recreation facilities for the City's north-western development cell (**Figure 10** refers).

The adopted Master Plan saw the majority of the recreation facilities shifted south to within the Peet landholding, and provided in a linear configuration with playing fields positioned between the High School and Mandurah Road. The proposed land uses within the Structure Plan area were amended to include a portion (~one-third) of the proposed playing fields, a portion of the High School in the new eastern

configuration and the addition of a Primary School at the northern end of the precinct adjacent the third playing field.

This Master Plan has been duly considered as part of preparation of the Structure Plan.

Draft Mandurah Planning Strategy

In September 2013, the Council resolved to adopt the draft *Mandurah Planning Strategy* for the purposes of forwarding to the Western Australian Planning Commission for certification and consent to advertise. This Strategy is intended to provide an overarching planning framework and strategic basis for the Local Planning Scheme, which Council resolved to prepare in July 2013.

As an overarching summary of the Strategy, the *Mandurah Structure Plan* was prepared to provide an overview of the key outcomes arising from the structural elements addressed; being urban form and activity centres, transport and movement, environment and landscapes and social infrastructure.

Pursuant to the *Mandurah Structure Plan* the Structure Plan area is identified as 'Suburban (Future)' (**Figure 6** refers).

The City's Biodiversity Strategy and Urban Form and Housing Strategy both form a sub-component of the Strategy.

Biodiversity Strategy

In November 2013, a Biodiversity Strategy was adopted by Council and forwarded to the WAPC for endorsement. The Biodiversity Strategy will be incorporated into the local planning framework and includes the following information relevant to the Structure Plan area:

Precinct N3: Lakelands North

Sub-section 5.1.3 of the Biodiversity Strategy identifies the biodiversity protection requirements for each precinct.

A summary of the recommendations for this Precinct is provided below:

- a 'Biodiversity Protection Target' of 4.0ha has been identified, and is subject to an on-site ecological survey and analysis;
- this corridor should be, on average 40m wide, and extend 1000m east-west length of the Precinct;
- the linkages should be closely integrated into the development and provide recreational opportunities, including playgrounds and informal parks;
- future Structure Plans for the Precinct are to be prepared consistent with this 'Biodiversity Protection Target', subject to ecological assessment; and
- areas of POS that seek to retain areas covered by the 'Biodiversity Protection Target' are included in a 'Passive Recreation and Conservation Reserve' in the future Structure Plan.

Urban Form & Housing Strategy

In June 2014, the Council adopted the *Urban Form and Housing Strategy*, and has since been referred to the WAPC for endorsement. The *Urban Form and Housing Strategy* outlines the approach to the future housing, density and scale of development across Mandurah with the aim to inform and maintain the City's TPS3 to ensure that it remains up to date and relevant to planning decision making within Mandurah.

The Structure Plan area is within the Mandurah North Precinct and is identified as 'Suburban (Future); this projecting a dwelling yield of 5,560. The Structure Plan area will significantly contribute to this projection.

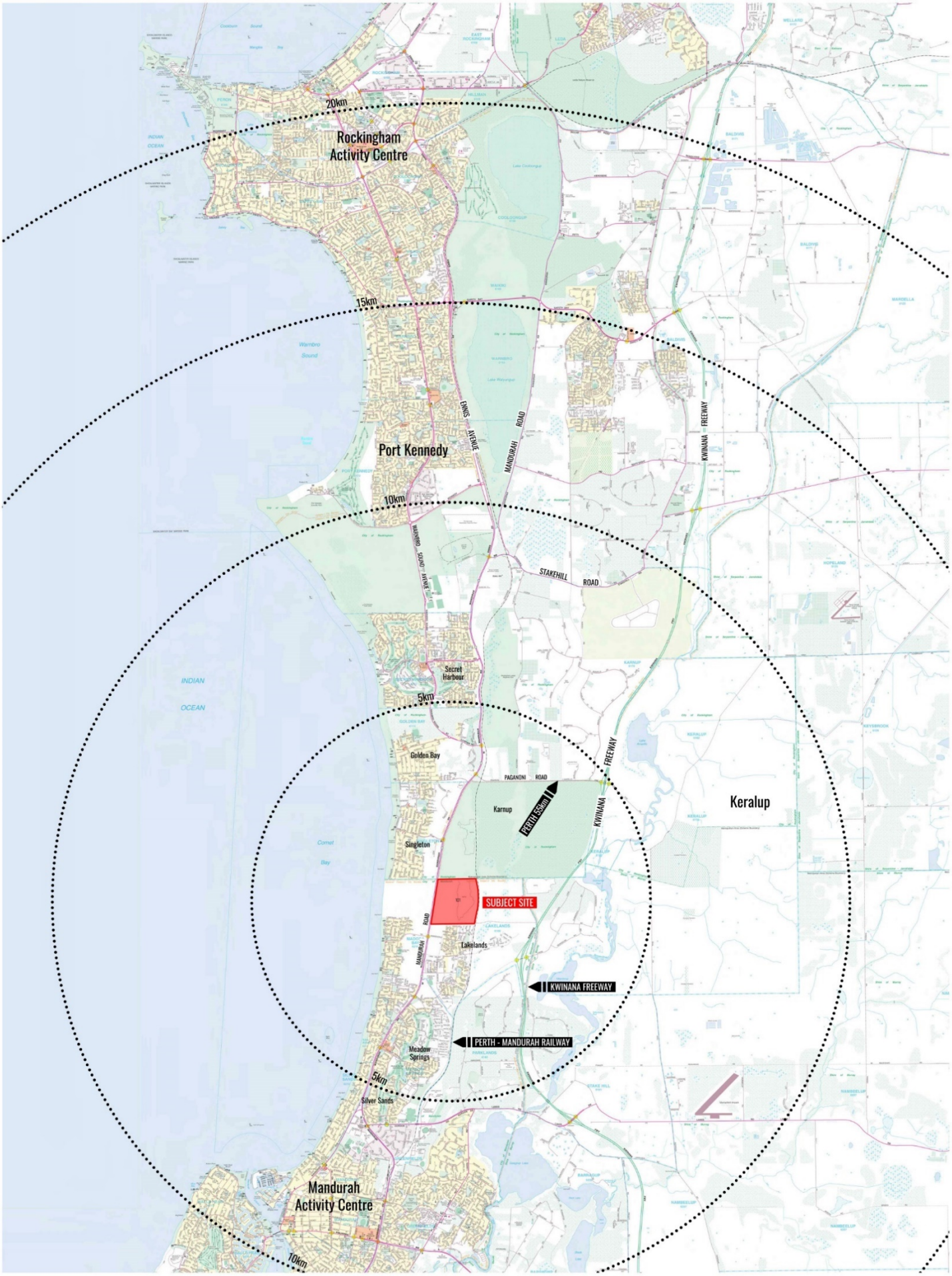
Urban Design Policy

The Urban Design Policy sets out the urban design parameters that the City, in liaison with developers and the public to

utilise when land is developed in Mandurah. The policy should be used in the preparation of urban design requirements for draft Structure Plans.

Local Planning Policy (LPP1) – Residential Design Codes Policy

This policy provides further interpretation of the R-Code provisions for residential development within the City of Mandurah. It provides for consistent assessment and decision making by the City. The proposed Structure Plan design has been formulated to facilitate the creation of lots that will be able to achieve the criteria required by the policy, inclusive of RMD Codes provisions pursuant to WAPC's *Planning Bulletin 112/2015 – Medium Density Single House Development Standards*.



LOCATION PLAN

Figure 1

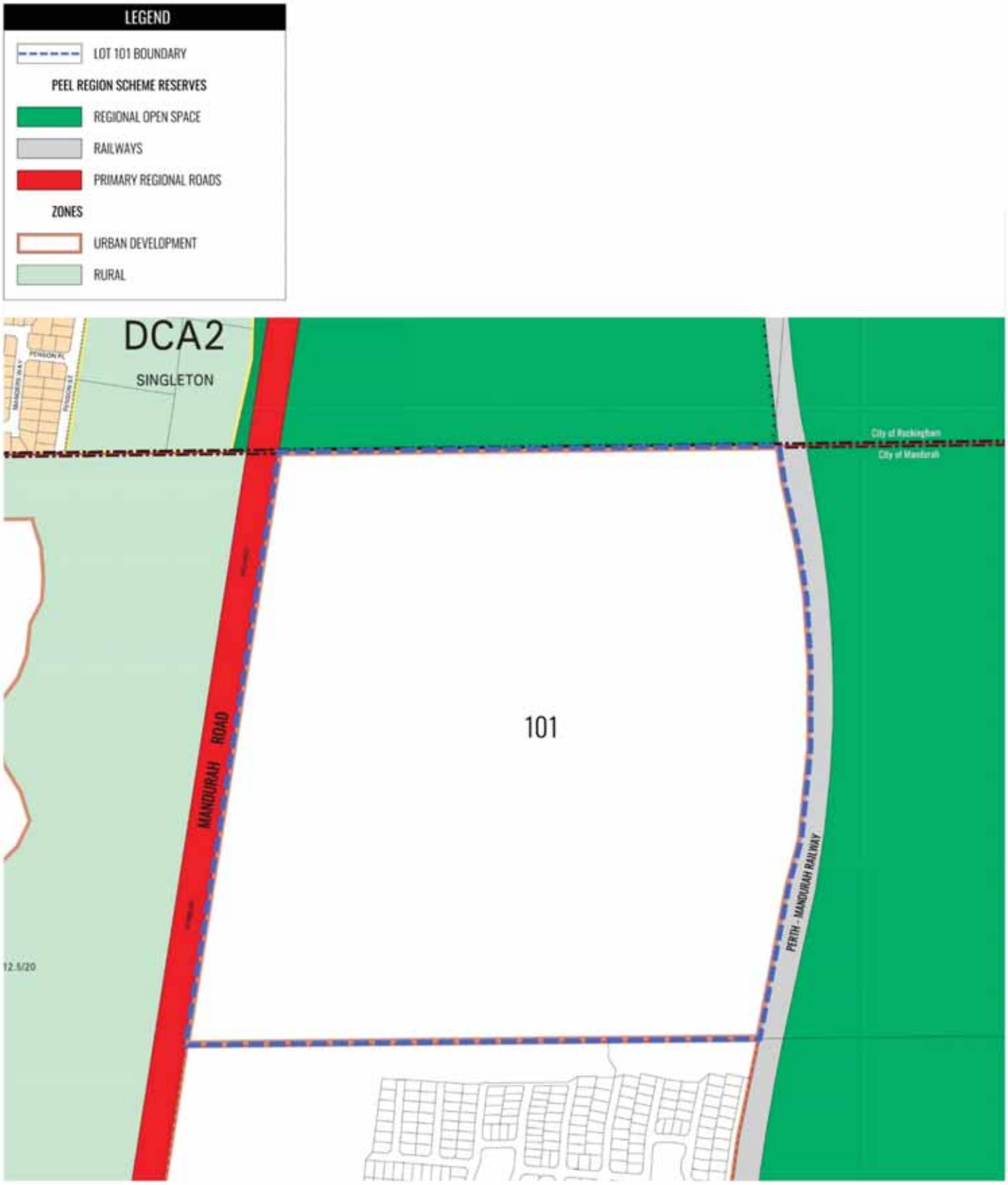
NORTH

Not to Scale @ A4

Date: 26/05/2020 **Plan:** CPLOH-5-010

PEEL REGION SCHEME ZONING MAP

Figure 2



CITY OF MANDURAH
Town Planning Scheme No.3 Zoning Map

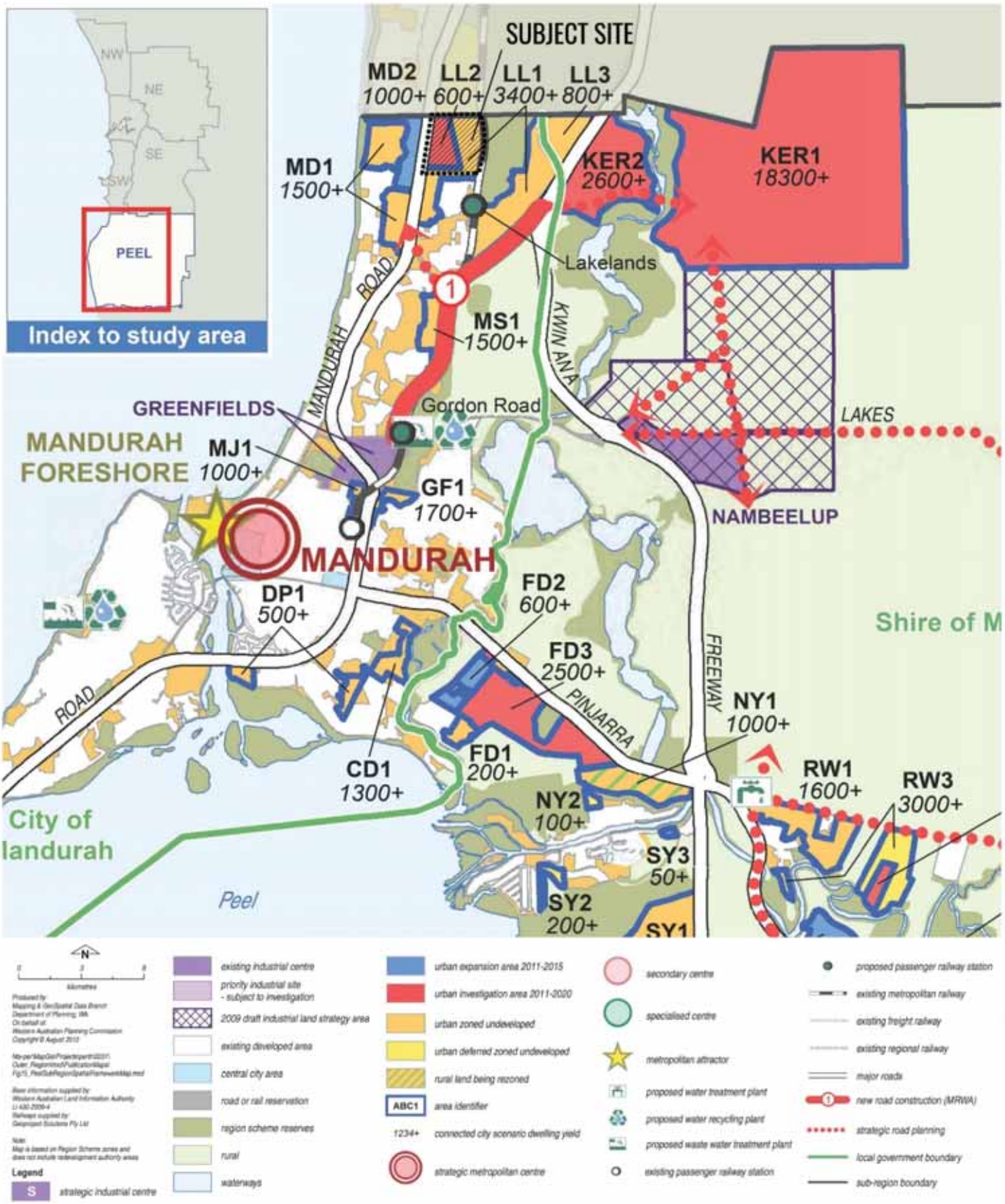
Figure 3

NORTH

Scale: 1:10 000 @ A4

0 100 200 300m

Date: 26/05/2020 Plan: CPLOH-5-012



OUTER METROPOLITAN PERTH & PEEL SUB-REGIONAL STRATEGY

NORTH

Not to Scale @ A4

Date: 26/05/2020 Plan: CPLDH-5-013

Figure 4

KEY PRINCIPLES

1. CREATION OF A VIBRANT RETAIL AND COMMUNITY BASED TOWN CENTRE
2. PROVISION OF ACTIVITY NODE BASED ON REGIONAL BEACH FACILITIES
3. TRANSIT ORIENTATED DEVELOPMENT AROUND LAKELANDS RAIL STATION
4. ACCESS POINTS TO MANDURAH ROAD TO BE BASED ON INTRA-REGIONAL TRAFFIC MOVEMENTS TO ENSURE SUITABLE EAST-WEST ACCESS
5. DEVELOPMENT TO FRONT / ADDRESS REGIONAL ROADS WITH FRONTAGE VIA SERVICE ROADS (WITH SUITABLE ACCESS). NO DEVELOPMENT TO BACK ONTO THESE ROADS (REFER ELEMENT 2 'R4' & ELEMENT 3 'R32 & 'R34' OF LIVEABLE NEIGHBOURHOODS 3

STRUCTURE PLAN NOTES

1. MADORA BAY REGIONAL BEACH

   REGIONAL BEACH FACILITIES (CLUB, CAR PARKING, KIOSK ETC) COMBINED WITH MIXED USE COMMERCIAL, DESIGNED TO FOCUS ON COAST WITH MAIN-STREET PRINCIPLES.

   OPPORTUNITIES FOR MULTI-STOREY DEVELOPMENT TO REINFORCE NODAL DEVELOPMENT AND TOURISM POTENTIAL TO BE MAXIMISED.

2. ENVIRONMENTAL / LANDSCAPE ASSESSMENT AREA

   LAND CURRENTLY ZONED RURAL IN TOWN PLANNING SCHEME NO 3 AND PEEL REGION SCHEME.

   PRIOR TO ANY CONSIDERATION TO MODIFY THIS ZONING, ASSESSMENT ON ENVIRONMENTAL AND LANDSCAPE QUALITY TO BE UNDERTAKEN TO DETERMINE APPROPRAITE DEVELOPMENT (IF ANY) BASED ON TOPOGRAPHY AND PROXMITY TO REGIONAL BOUNDARIES.

3. NORTHERN ACCESS POINTS AND INTERSECTIONS TO MANDURAH ROAD

   EAST-WEST LINKAGE REQUIRED BETWEEN MADORA NORTH AND EASTERN SIDE OF MANDURAH ROAD REQUIRED, WITH LONG TERM PLANNING TO PROVIDE FOR FOUR-WAY SIGNALISED INTERSECTION. STAGGERED 'T' INTERSECTIONS TO BE PROVIDED FOR INITIALLY.

4. ACTIVE RECREATIONAL FACILITIY TO BE PROVIDED WITHIN LAND CURRENTLY ZONED RURAL IN PEEL REGION SCHEME AND TO BE A MINIMUM OF 10 HECTARES AND LOCATED ADJACENT TO PUBLIC HIGH SCHOOL TO MAXIMISE JOINT-USE OF FACILITIES (REFER PEELWOOD RESERVE / HALLS HEAD RECREATION CENTRE MODEL)

   PREVIOUS STRATEGIC RECREATION PLANNING TO BE CONFIRED AND / OR FURTHER STUDIES TO BE UNDERTAKEN BY DEPARTMENT FOR SPORT AND RECREATION / CITY OF MANDURAH TO DETERMINE REGIONAL OR DISTRICT NATURE OF FACILITY AND TO BE UNDERTAKEN PRIOR TO ANY CHANGE TO EXISTING ZONING. FINAL LAND REQUIRED TO BE RESERVED UNDER PEEL REGION SCHEME.

5. THE LAND IS LARGELY ZONED RURAL IN TPS NO 3 AND URBAN DEFERRED IN THE PEEL REGION SCHEME. SUBJECT TO THE WAPC AGREEING TO LIFT THE URBAN DEFERRED ZONING ON MADORA BAY EAST, ANY FUTURE DEVELOPMENT SHALL BE DESIGNED AND DEVELOPED IBASED ON AN APPROPRIATE ASSESSMENT OF THE ENVIRONMENT AND LANDSCAPE QUALITY, RECOGNISING THE LAND'S INHERENT CHARACTER AND REGIONAL SIGNIFICANCE OF THE LAND, HAVING PARTICULAR REGARD TO THE LANDSCAPE, VEGETATION AND TOPOGRAPHY.

6. LAKELANDS TOWN CENTRE

   A COMMUNITY FOCUSED TOWN-CENTRE, BASED ON MAIN STREET RETAIL (ACTIVE STREETS AND EDGES, SHARED SPACES, ON STREET PARKING), WITH MANDURAH ROAD BEING AN INTEGRAL PART OF THE CENTRE, COMBINED WITH COMMUNITY FACILITIES, MIXED USE RESIDENTIAL AND TOWN SQUARE / PUBLIC OPEN SPACE.

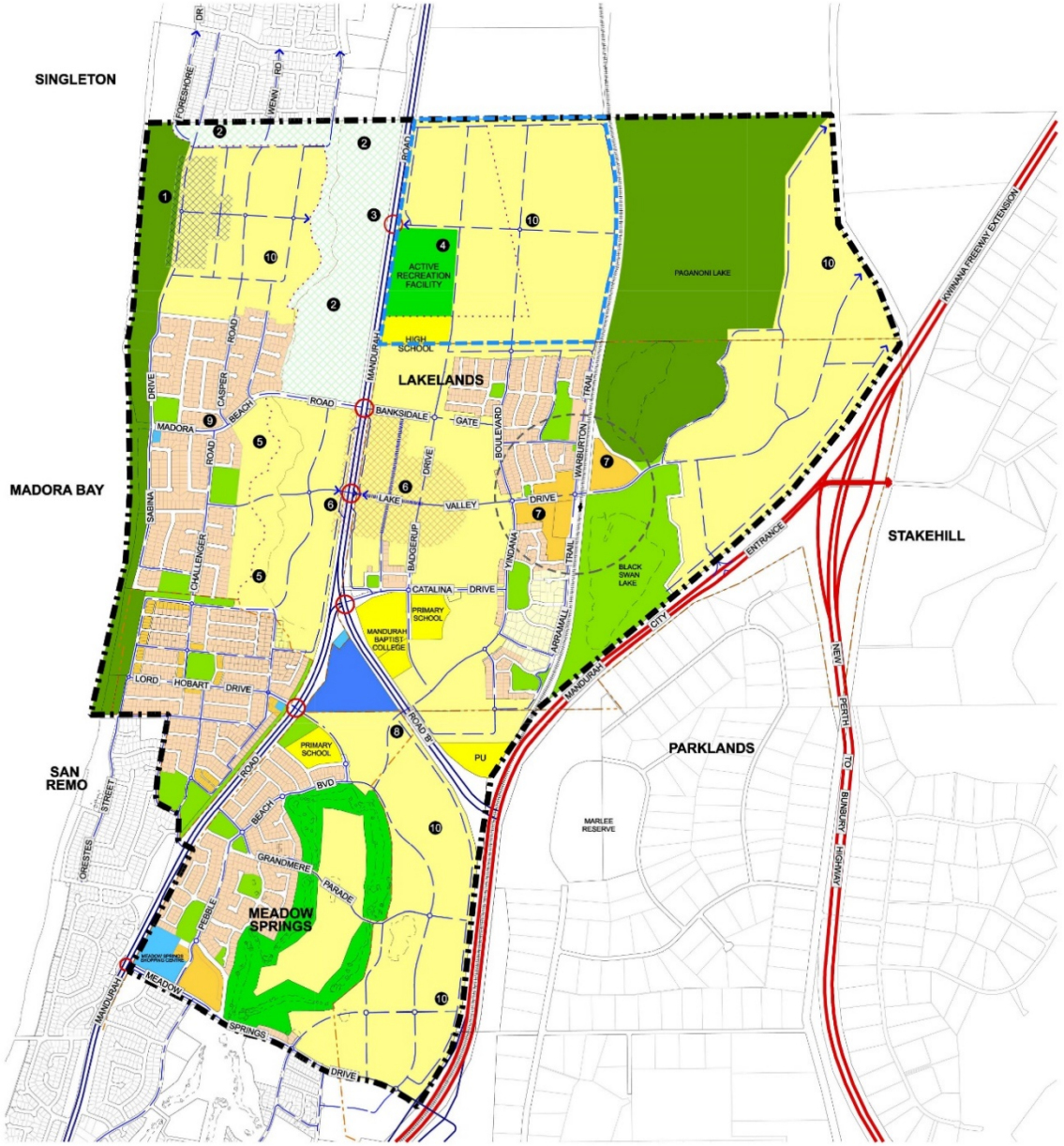
   A DETAILED PRECINCT PLAN TO BE PREPARED IN ACCORDANCE WITH THESE PRINCIPLES AND TO BE REFLECTED IN LAKELANDS ODP.

7. TRANSIT ORIENTATED DEVELOPMENT TO BE APPLIED AROUND FUTURE LAKELANDS RAILWAY STATION, WITH RESIDENTIAL DENSITIES TO BE MAXIMISED, WHILST MAINTAINING SITE'S AMENITY AND NATURAL FEATURES.

8. IMPORTANT LOCAL CONNECTION CONSTRUCTED AS AN UNDERPASS UNDER ROAD 'B'

9. POTENTIAL CONNECTION OF CHALLENGER ROAD AND CASPER ROAD, MADORA BAY (SUBJECT TO FURTHER REVIEW AND DESIGN)

10. FUTURE URBAN DEVELOPMENT WITH FINAL ROAD, LOT AND LAND USE LAYOUTS SUBJECT TO FURTHER DESIGN, ASSESSMENT AND RELEVANT OUTLINE DEVELOPMENT PLAN AND REZONINGS



ZONING LEGEND

- LAKELANDS TOWN CENTRE
- MADORA BAY REGIONAL BEACH
- RETAIL - COMMERCIAL (EXISTING)
- MIXED BUSINESS - SERVICE COMMERCIAL
- MEDIUM DENSITY RESDIENTIAL (R30 / R40)
- EXISTING RESIDENTIAL (R20)
- LOW DENSITY RESIDENTIAL (R10)
- NEW URBAN DEVELOPMENT (SUBJECT TO DESIGN AND APPROVALS)
- ENVIRONMENTAL / LANDSCAPE ASSESSMENT AREA
- REGIONAL OPEN SPACE
- DISTRICT OPEN SPACE / ACTIVE RECREATION
- LOCAL OPEN SPACE
- PUBLIC / COMMUNITY PURPOSE
- PRIMARY REGIONAL ROADS
- IMPORTANT REGIONAL ROADS
- KEY LOCAL ROAD CONNECTIONS
- TOWN CENTRE - MAIN STREETS
- PERTH - MANDURAH RAILWAY
- TRAFFIC SIGNALS
- 400m WALKABLE CATCHMENT TO RAIL STATION
- EXISTING RURAL ZONE BOUNDARY
- RIDGE LINE (APPROXIMATE)
- APPROVED ODP BOUNDARY
- STRUCTURE PLAN BOUNDARY
- SUBJECT SITE

City of MANDURAH

SUSTAINABLE DEVELOPMENT DIRECTORATE

NORTH

Scale: 1:25 000 @ A3

0 250 500 750m

Date: 26/05/2020 Plan: CPLOH-5-014

MANDURAH NORTH DISTRICT STRUCTURE PLAN

ADOPTED BY COUNCIL (20 JUNE 2006) AS A LOCAL STRUCTURE PLAN IN ACCORDANCE WITH CLAUSE 9.6 OF TOWN PLANNING SCHEME NO.3

Figure 5

MANDURAH STRUCTURE PLAN (Extract)

Figure 6

NORTH

Scale: 1:50 000 @ A4

0 500 1000 1500m

Date: 26/05/2020 **Plan:** CPLOH-5-015

2. Site Analysis

An Environmental Assessment and Management Strategy has been prepared by Emerge Associates (November 2014) (**Appendix 2** refers) and a summary of the key findings are in the sections below.

2.1 Landforms & Soils

2.1.1 Topography

Based on a topographical survey of the Structure Plan area undertaken by McNullen Nolan Group in 2014, the topographical features and contour levels were found to be quite diverse, with elevations ranging from approximately 2m Australian Height Datum (m AHD) to 23m AHD. This is primarily due to limestone quarrying that has been undertaken historically throughout sections of the subject land, altering the natural contours (**Figure 7** refers).

The western half of the Structure Plan area is generally flat with the majority of the site ranging between an average of 8 – 12m AHD. A north-south ridge line extends throughout the centre of the subject land, reaching a maximum elevation of approximately 23m AHD. The eastern face of the ridgeline has been significantly impacted by historical limestone quarrying, resulting in a sharp drop off from an elevation of 23m AHD to approximately 9m AHD on the eastern side. Continuing east, the elevation rises to around 15m AHD and then steeply declines to approximately 2m AHD along the eastern boundary.

2.1.2 Regional Geomorphology

The Structure Plan area is located on the Swan Coastal Plain, which forms the central portion of the Perth basin. The Perth basin extends from the Darling Fault in the east to the continental slope west of Rottnest Island, and from the Murchison River in the north and the Southern Ocean in the south. The Perth basin is sedimentary in original and is marginal to the west of the Australian Shield (Seddon 2004).

The Swan Coastal Plain is generally flat and is approximately 20 – 30km wide, consisting of a series of geomorphic entities running parallel to the coastline. The Structure Plan area is situated within the Spearwood Dunes system, which consists largely of yellow-brown siliceous sands over limestone and ranges from hilly to gently undulating terrain (Seddon 1974).

2.1.3 Limestone Formations

Exposed limestone formations were observed along the eastern boundary of the Structure Plan area. The geotechnical investigation identified shallow sub-soil to outcropping Tamala limestone formations across the Structure Plan area and the sand encountered between formations was found to be typically very loose. These formations are associated with the underlying Tamala limestone and sand landforms of the region and are therefore quite common. The geotechnical investigation identified the pinnacle formations as a geotechnical hazard and recommended the following as part of future development earthworks:

- All exposed formations must be broken at ground level and removed from the Structure Plan area or alternatively crushed and reused as engineered fill; and
- The pinnacle cliffs must be excavated back to a fresh limestone face which is suitable for benching.
- The pinnacle features were determined to not have any specific environmental or heritage values. Specifically, the formations were not identified as:
- A State Geoheritage Site under the Land Administration Act 1997;

- A Registered Aboriginal Heritage Site under the Aboriginal Heritage Act 1972; or
- A Registered Heritage Site under the Heritage of Western Australia Act 1990.

2.1.4 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the name commonly given to naturally occurring soils and sediment containing iron sulphide (iron pyrite) materials. In their natural state ASS are generally present in waterlogged anoxic conditions and do not present any risk to the environment. When oxidised, ASS produce sulphuric acid, which can pose risks to the surrounding environment, infrastructure and human health.

Available information (DEC 2006) indicates that the Structure Plan area has been classified as having no known risk of ASS occurring within three metres of the natural soil surface.

2.2 Groundwater & Surface Water

2.2.1 Groundwater

The Department of Water Online Water Register (DoW 2014) indicates the Structure Plan area is located in the South West Coastal groundwater area and the Mandurah subarea. Groundwater beneath the Structure Plan area is a multi-layered system comprised of the following:

- Perth - Superficial Swan (unconfined) aquifer;
- Perth - Leederville (confined) aquifer; and
- Perth - Cattamarra Coal Measures (confined) aquifer.

The Superficial Swan aquifer is considered to be the primary aquifer of interest as this is the aquifer most likely impacted by water management practices within the subject land.

Site specific groundwater monitoring is currently being conducted by Emerge to confirm the depth to groundwater and groundwater flow direction across the subject land. Six monitoring bores have been installed across the eastern half of Structure Plan area to identify groundwater levels. Monitoring is currently being carried out over an 18 month period with ground water levels being measured monthly and water quality samples taken every three months.

Initial groundwater levels indicate that the Structure Plan area experiences a Maximum Groundwater Level (MGL) of 1.27m AHD, implying that groundwater ranges between 1.73m and 21.82m Below Ground Level (BGL) across the subject land. The Structure Plan area is comprised of highly permeable sandy soils and limestone, meaning there is limited to no surface runoff and significant infiltration. Groundwater flows west towards the Indian Ocean.

Initial groundwater quality analyses indicate that the local groundwater pH is 'neutral' across the Structure Plan area (pH 7.7, within the default trigger values (for lowland rivers in south – west Australia) (ANZECC 2000).

2.2.2 Surface Water

There are no surface water bodies or channels within the Structure Plan area. Surface water infiltrates freely across the Structure Plan area due to the underlying, highly permeable sands and limestone. With infiltration occurring locally, almost all surface runoff remains on site.

2.2.3 Wetlands & Waterways

Based on Department of Parks and Wildlife's (DPaW) Geomorphic Wetland series mapping, there are no wetlands in the Structure Plan area.

The closest wetland is situated adjacent to the eastern Structure Plan area boundary, on the far side of the Perth-Mandurah railway (**Figure 8** refers), which is known as Paganoni Swamp and is classified as a 'Conservation Category Wetland' (CCW). CCWs are defined as supporting high levels of attributes and function, with management objectives to preserve wetland attributes and functions through reservation in national parks, crown reserves and state owned land (WAPC 2005). CCWs are provided protection under environmental protection policies. Paganoni Swamp CCW will not be impacted upon by development of the Structure Plan area, emphasised by the established and permanent physical buffer in the Perth-Mandurah railway.

2.2.4 Monitoring

The post-development monitoring would be consistent with the pre-development monitoring of hydrological conditions (as documented in earlier sections), with the addition that the best management practices should also be monitored to ensure their continued effectiveness. It will be necessary to confirm that the structural management measures that are implemented are able to fulfil their intended management purpose and are in a satisfactory condition at a point of management hand over to the City. These monitoring programs will be further detailed at the Urban Water Management Plan (UWMP) stage.

The pre-development groundwater monitoring was conducted at six locations within the subject land. The data collected included groundwater levels, sampling of physiochemical parameters in situ and laboratory analysis of nutrients. Monitoring was started in July 2014, and will be carried out over an 18 month period with monthly groundwater levels and water quality sampling every 3 months. The results of this monitoring will provide adequate baseline data that will assist in verification of future detailed designs at the subdivision stage.

The groundwater levels measured in 2014 provide an indication of groundwater levels across the subject land. The measured groundwater levels indicate that the Structure Plan area experiences a MGL of 1.27m AHD. Ongoing monitoring will be conducted to confirm groundwater levels across the subject land. However, given that the minimum site levels will be ~ 6m AHD, there is sufficient data to proceed with detailed design. All additional data will be provided in future UWMPs. Water quality monitoring has been carried out to identify the existing groundwater quality beneath the Structure Plan area.

2.3 Environmental Assets & Constraints

2.3.1 Flora

Two botanists and an environmental consultant visited the Structure Plan area on the 21 and 26 November 2013 and 11 September 2014 to undertake field surveys across the Structure Plan area in accordance with EPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2004). The findings of the flora and vegetation survey are contained within **Appendix 2**, with a brief summary below.

The key findings of the most recent detailed flora and vegetation survey were as follows:

- Remnant vegetation within the Structure Plan area is consistent with mapped vegetation complexes (Heddle et al. 1978). Both were to be above the 30% pre-European extent remaining threshold;

- Four native plant communities and two disturbed weed dominated communities were recorded;
- Vegetation condition ranges from 'Completely Degraded' to 'Good', with 95% of the total area containing 'Completely Degraded' or 'Degraded' vegetation;
- One Priority 4 Flora species, Jacksonia sericea, was recorded in one location during the survey, amongst 'Completely Degraded' vegetation surrounded by weed species;
- Plant community MhTrMsS was inferred to represent FCT 27, which is listed as a Priority 3 Ecological Community and is considered to be 'well reserved' but 'susceptible';
- No TECs, TF species or MNES were identified; and
- Loss of vegetation cover has allowed the introduction of grassy weeds, with two Declared Pest flora species recorded during the survey

2.3.2 Bush Forever

No Bush Forever Sites occur within the Structure Plan area (as it is outside the MRS). However, the northern boundary of the Structure Plan area is shared with Bush Forever Site Number 395 – Paganoni Swamp and Adjacent Bushland, Karnup (BF 395).

2.3.3 Fauna

A level 1 fauna survey (as defined by the EPA) was undertaken on 30 August 2014 by Greg Harewood (B.Sc. Zoology) on behalf of Emerge Associates (refer **Appendix 2** for complete assessment). The survey was expanded to include a targeted assessment for three listed threatened species of black cockatoo.

A total of 27 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) during the one day survey period. Three introduced species were also recorded. One listed threatened species was opportunistically observed; being Carnaby's Black Cockatoo flying overhead, however no associated potential breeding, roosting or quality foraging habitat was identified on site.

The habitat tree assessment identified 49 trees (all of which were Tuart species) with a diameter at breast height (DBH) of greater than 50 centimetres (cm). Fifteen of these contained relatively small hollows, considered by the zoologist not to be suitable for black cockatoos to use for nesting purposes. Two trees appeared to contain hollows with large enough entrances for black cockatoos to use, though neither showed any evidence of use. The remaining 32 trees appeared to contain no hollows whatsoever.

The Structure Plan does not represent an area that could be regarded as containing quality black cockatoo foraging habitat, given the almost total absence of favoured foraging plant species. This conclusion supported by the fact that no actual evidence of black cockatoos foraging onsite was observed during the field assessment. Furthermore, government mapping does not identify vegetation within the Structure Plan area as 'Potential feeding vegetation' (DoP 2011). Tuarts are only fed upon rarely and therefore only make up a very small proportion of any one bird's diet.

2.4 Heritage

2.4.1 Indigenous Heritage

Based on a review of the Department of Aboriginal Affairs Aboriginal Heritage Inquiry System online database (DIA 2014), there are no Registered Aboriginal Heritage Sites within the Structure Plan area.

Approximately 200m east of the Structure Plan boundary a Registered

Aboriginal Heritage Site was identified (ID 17307); this associated with Paganoni Swamp (Berong), as illustrated in **Figure 8**. It is recorded as being a significant 'Hunting Place, Camp, Water Source and Mythological Area'. Given the distinct separation resultant of the Perth-Mandurah rail line, the Structure Plan will not adversely impact this Heritage Site.

2.4.2 Non-Indigenous Heritage

A desktop search of the State Heritage Office database (Heritage Council 2012) and the Australian Heritage Database (Department of the Environment 2013) indicated there are no Registered Heritage Sites on site.

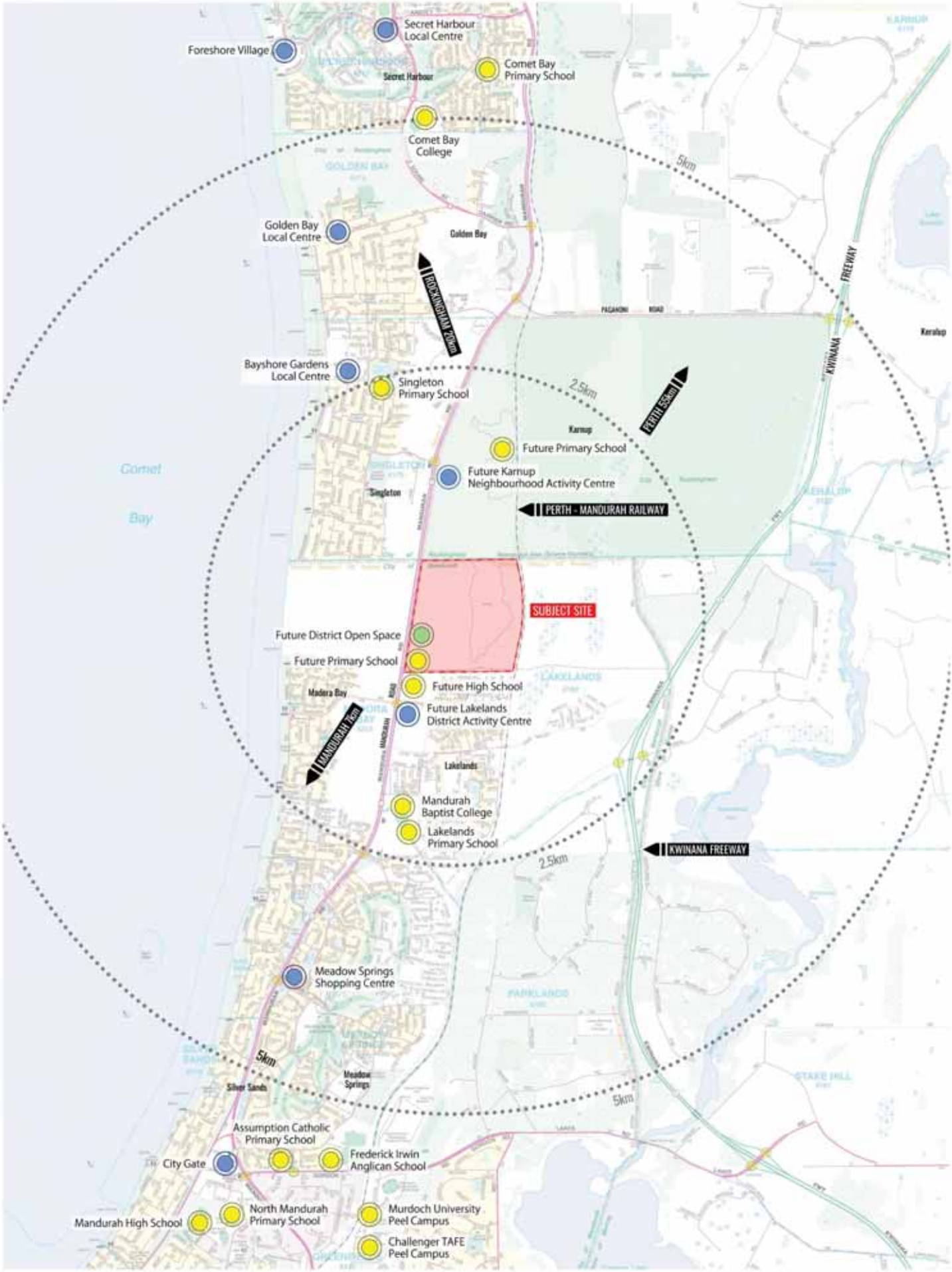
A federally listed Heritage Site, Paganoni Swap and Adjacent Area (19648) is situated to the east of the subject land, associated with the greater Paganoni Swamp area. This heritage site is included in the Register of the National Estate. This site will not be impacted upon by the Structure Plan for reasons as identified above.

2.4.3 Context Analysis

A Context Plan is included as **Figure 8** providing an illustration of the following section, and **Figure 9** illustrates the overall 'site analysis' for the Structure Plan area.

AERIAL PHOTO

Figure 7



DISTRICT CONTEXT PLAN

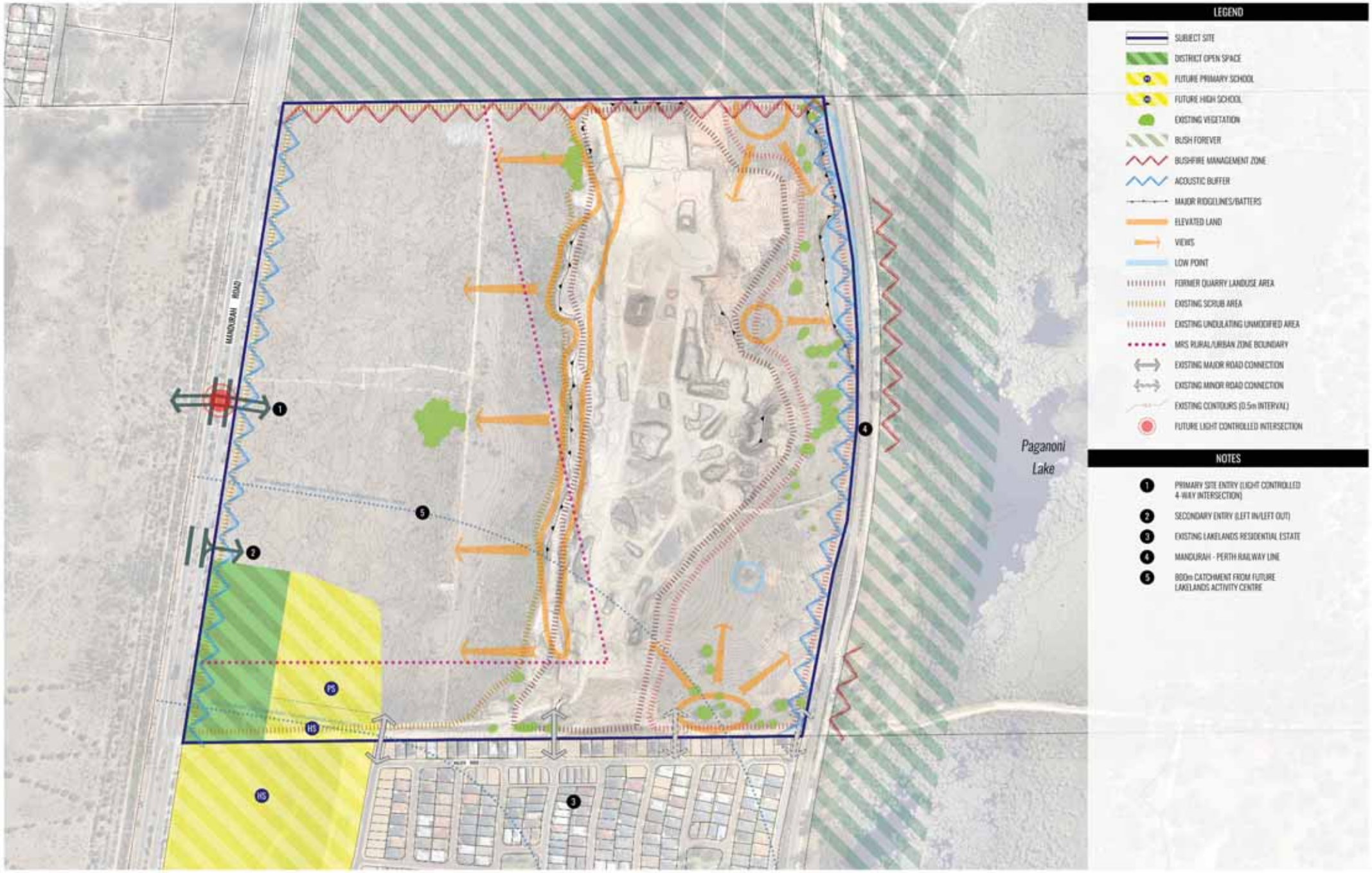
Figure 8

NORTH

Scale: 1:50 000 @ A4

0 500 1000 1500m

Date: 26/05/2020 Plan: CPLDH-5-017



SITE ANALYSIS

Figure 9

3. Local Context

The surrounding land uses adjacent the Structure Plan area include:

- Due west is land currently zoned for 'Urban' purposes as part of the Madora Bay North Structure Plan. This Structure Plan is generally for 'Residential' purposes with a Private Primary School earmarked abutting Mandurah Road.
- The land directly north, is Bush Forever Site 395 – Paganoni Swamp and Adjacent Bushland, Karnup (BF 395). 'The Vista' Residential Estate is on the northern side of BF 395 and will accommodate a Neighbourhood Activity Centre of ~5,200m2 NLA and a Primary School.
- Northeast of the Structure Plan area on the western side of Mandurah Road is the long established Singleton town site.
- Directly south of the Structure Plan area is the existing Lakelands Residential Estate, developed by Peet Limited. The Estate accommodates a District Activity Centre, portion of the Secondary School, Primary School and District Playing fields in collaboration with this Structure Plan.

3.1 Movement Network

A Transport Assessment has been prepared by GTA Consultants, **Appendix 3** refers. The key findings of the existing movement network include as follows:

3.1.1 Mandurah Road

Mandurah Road is classified as a Primary Distributor Road in the MRWA road hierarchy and operates under the administration of MRWA. Mandurah Road forming the western boundary of the Structure Plan area is a four lane, two-way divided road with a 37m wide carriageway inclusive of median (approx.) set within a 70m wide road reserve (approx.). The posted speed limit on Mandurah Road is currently 80km/h in the vicinity of the Madora Beach Road intersection, and 100km/h along the Structure Plan frontage.

3.1.2 Yindana Boulevard

Yindana Boulevard provides a strategic north-south link between Lakelands Estate and the Structure Plan area. It is classified as a Local Distributor in the MRWA road hierarchy and operates under the administration of City. Yindana Boulevard is a two lane, two-way undivided road with a 7.4m wide carriageway servicing up to 3,000 vehicles per day and a public bus route.

3.1.3 Badgerup Avenue

Badgerup Avenue also provides a north-south link between Lakelands Estate and the Structure Plan area, this road forming the eastern boundary of the imminent Lakelands District Activity Centre, High School District Playing Fields and Primary School. It is classified as an Access Road in the MRWA road hierarchy and operates under the administration of City. Badgerup Avenue is a two lane, two-way undivided road with a 7.2m wide carriageway (north of Banksiadale Gate).

It is noted that the carriageway width of Badgerup Avenue is consistent with that of an Access Street Type C as per the *Liveable Neighbourhoods* design guidelines. As per these guidelines, this street type has an indicative volume capacity of up to 3,000 vpd.

3.1.4 Other

Two other north-south road links provide connection between Lakelands Estate and the Structure Plan area, these being Malata Ridge and Warburton Trial. Extension of these Access Streets is incorporated into the Structure Plan road design.

3.1.5 Existing Public Transport

The public transport services available within the vicinity of the Structure Plan area are summarised in Table 1.

Table 1: Existing Public Transport Provisions

Bus Route/ Description	Location of Nearest Stop	Frequency On/Off Peak
#558 Rockingham Stn - Mandurah Stn via Warnbro Stn	Mandurah Rd, near Banksiadale Gate	20 mins. peak 30 mins. off-peak
#584 Mandurah Stn - Madora Bay via Peel St & Mandurah Tce	Yindana Blvd, near Lake Valley Drive	

It is also noted that the Perth – Mandurah Railway Line passes the eastern boundary of the Structure Plan, although at present the nearest stations on this line are located several kilometres away in Mandurah and Warnbro, respectively.

3.1.6 Existing Pedestrian & Cyclist Network

Pedestrian infrastructure is well developed in the Lakelands Estate to the south of the Structure Plan area. Pedestrian paths are provided on both sides of Yindana Boulevard and Badgerup Avenue, as well as on one or both sides of most other streets in this Estate.

The cycling facilities in the vicinity represented in City's Cycle and Walk Information, is illustrated in **Appendix 3**.

In addition to the facilities shown on this map, a shared path is provided along the western side of Mandurah Road for use by pedestrians and cyclists. This path connects to the existing shared path network to the south at Madora Beach Road, and to a similar path within the City of Rockingham to the north. Mandurah Road also has sealed shoulders in both directions.

3.2 Activity & Employment Centres

The Structure Plan area is located approximately 9km north of the Mandurah Strategic Metropolitan Centre and 21km south of the Rockingham Strategic Metropolitan Centre.

A number of District, Neighbourhood and Local Centres exist or are imminent in the surrounding areas which will conveniently service the residents of the development.

The Structure Plan area is well located for local employment opportunities, including the following employment nodes:

- Mandurah Strategic Metropolitan Centre;
- Rockingham Strategic Metropolitan Centre;
- Gordon Road Industrial Area;
- Rockingham/Kwinana Industrial Area
- Peel Health Campus;
- Rockingham General Hospital;
- Murdoch University, Rockingham and Peel Campuses; and
- Challenger Tafe, Rockingham and Peel Campuses.

In addition to the above, 'on-site' employment opportunities will be provided through the proposed Primary School and High School.

3.3 Education

Several education facilities exist in close proximity to the Structure Plan area. Nearby existing (or under construction) Public Primary Schools include those in Singleton and Lakelands.

Following discussions with Department of Education (DoE) and the City, as part of preparation of the 'Lakelands School and Recreation Master Plan', the south western portion of the Structure Plan area will accommodate a future Primary School and portion of the High School and District Playing Fields (**Figure 10** refers). The size and location of this precinct has been agreed with both DoE and the City (**Figure 12** refers).

Several options for private education exist in the locality including Mandurah Baptist College, Frederick Irwin Anglican

School, Assumption Catholic Primary School, Foundation Christian College, Mandurah Catholic College and Living Waters Lutheran College.

Murdoch University (Peel Campus) and Challenger TAFE (Peel Campus) are also situated approximately 6km south of the Structure Plan area offering tertiary education facilities in the local context.

3.4 District & Regional Open Space

To the north of the Structure Plan area is a large area of bushland protected by its Bush Forever designation, therefore providing a passive recreation option for future residents.

The Structure Plan area is located approximately 8km south of the Larkhill Regional Sporting complex and approximately 12km north-east of the district playfields located at Halls Head.

The Structure Plan area, in collaboration with the Lakelands Estate to the south allocates land for District Playing Fields co-located with the Coastal Lakes College Secondary School and future Primary School.

LAKELANDS SCHOOL & RECREATION MASTER PLAN

NORTH

Not to Scale @ A4

Date: 26/05/2020 Plan: CPLDH-5-019

Figure 10

MASTER PLAN (AS AMENDED)

Figure 11

Unit 2, 464 Murray Street
Perth WA 6000
(08) 6333 1888
info@cdpaus.com.au
www.cdpaus.com.au

EDUCATION PRECINCT CONCEPT

Figure 12

4. Structure Plan

4.1 Design Philosophy

The built form design objectives and external and internal physical constraints assist to inform the design philosophy for the Structure Plan area.

The Structure Plan proposes an urban layout utilising an interconnected road network and open space system. The design of the Structure Plan has been designed in a manner to encourage pedestrian movement and circulation thus public interaction between various community nodes. These nodes, whilst generally internalised, also provide legible opportunities for movement and circulation beyond the extent of the Structure Plan enroute to strategic community nodes including the Education Precinct, District Playing Fields and Lakelands District Activity Centre.

The Structure Plan design provides opportunity for the fostering of community creation within the Estate, offering specific local identities within various residential precincts, and with the large central POS to function as the main community hub ('drawcard') for all future residents.

The Structure Plan design has taken into consideration the environmental and physical attributes of the Structure Plan, as well as acknowledging abutting land uses and how these can best be addressed with regard to interfacing with future residential land uses.

The design philosophy has been predicated upon the following objectives:

- to provide a range of residential densities according with the density targets of Directions 2031 to encourage diversity of lot product, built form and affordability measures;
- to provide suitable interface to Mandurah Road and Rail Reserve for noise mitigation and the adjoining Bush Forever sites for mitigation of fire threat;
- provide suitable location and amenity within public open space areas to ensure accessibility, a strong emphasis on tree retention where possible, visual aesthetics and view corridors to foster a local sense of identity and community for specific internal precincts and the Estate as a whole;
- to deliver a safe pedestrian and cyclist environment with pathways linking residential precincts and associated local parks as well as providing for external connectivity to strategic community nodes; and
- to implement sound engineering and drainage solutions for the Structure Plan area.

4.2 External Design Influences

Lloyd George Acoustics as sub-consultants to Emerge Associates prepared a *Transportation Noise Assessment* for Mandurah Road and Perth – Mandurah Rail line (Appendix C under **Appendix 2** refers).

The assessment was undertaken in accordance with the WAPC's State Planning Policy 5.4 – *Road and Rail Transportation Noise and Freight Considerations in Land Use Planning*, with the key findings as follows.

4.2.1 Mandurah Road

The assessment recognised that for development fronting or adjoining Mandurah Road:

- modelling indicated that future noise levels will exceed the SPP 5.4 Target criteria at all lots adjacent to Mandurah Road;
- the majority of lots in the second row would achieve the SPP 5.4 Target criteria.

As noise levels exceed the SPP 5.4 *Target Criteria*, noise mitigation needs to be considered. The mitigation options considered appropriate under the assessment include a 2.5m noise wall along the Mandurah Road development boundary combined with 'Package B' architectural **treatments to the facades of properties exceeding** the *Target criteria*. Affected lots are illustrated under Figure 5-1 of the *Transportation Noise Assessment*.

4.2.2 *Perth-Mandurah Rail*

The assessment recognised that for development fronting or adjoining the Perth – Mandurah Rail line:

- modelling indicated that future rail noise levels would exceed the Target criteria at a number of lots adjacent to the Rail line; and
- the majority of lots in the second row achieve the Target criteria.

As noise levels exceed the SPP 5.4 *Target Criteria*, noise mitigation needs to be considered. The mitigation options considered appropriate under the assessment include a 1.5m high noise wall in sections of the Rail line interface, combined with 'Package A' and 'Package B' architectural treatments to affected dwellings as illustrated in Figure 5-2 of the *Transport Noise Assessment*.

The Structure Plan has been designed to provide a road interface along the majority of the Structure Plan's eastern boundary adjacent the Perth – Mandurah Rail line. The only exclusion is where POS fronts the Rail line. More robust 'Package B' treatments are specified to the southernmost lots as the wall is assumed to not be continued into the adjoining subdivision area (Lakelands Estate). Lots requiring façade protection packages are to have notifications on titles in line with SPP 5.4.

4.2.3 *Bushfire Management*

A Bushfire Management Plan (BMP) (Appendix D under **Appendix 2**) has been prepared by Emerge Associate's sub-consultant Bushfire Safety Consulting Pty Ltd (BSC). The BMP has been prepared in accordance with the WAPC's *Planning for Bush Fire Protection (2010)* and the Australian Standard *AS3959-2009 Construction of buildings in bushfire prone areas* (AS3959) (Standards Australia 2009). The BMP aims to assess bushfire hazard levels and to ensure the threat posed by bushfire hazard can be mitigated to acceptable levels appropriate with residential land intensification.

Existing vegetation within the Structure Plan area and in the surrounding 100m assessment areas was classified in accordance with AS3959. The bushfire hazard assessment levels were determined using Appendix 1 of the *Planning for Bushfire Protection Guidelines - Edition 2* (WAPC et al. 2010).

The majority of the Structure Plan area has a 'moderate' bushfire hazard rating due to the presence of shrubland and weedy grassland with isolated small areas of extreme bushfire hazard comprised of low woodland and scrub vegetation.

Vegetated areas surrounding the Structure Plan area pose the majority of the bushfire hazard. These areas are concentrated mainly to the west, north and east of the site. The majority of the southern interface does not pose a bushfire hazard due to the existing Peet Lakelands West with the exception of small area of scrub and shrubland vegetation in the south-western corner of the assessment area.

To the west of the Structure Plan area are narrow strips (less than 20m wide) of managed vegetation within the Mandurah Road reserve. The vegetation is

comprised of single rows or clumps of low woodland trees and shrubs over slashed grass, maintained on a regular basis by Main Roads Western Australia (MRWA) thus posing a 'low' bushfire hazard. Further west beyond the Mandurah Road reserve is low woodland vegetation within the future Madora Bay North development; this assigned an 'extreme' threat. The Perth-Mandurah railway to the east of the Structure Plan area is bound by strips of Acacia scrub vegetation with patches of pasture grasses and areas of woodland; this posing a 'moderate' and 'extreme' hazard respectively.

4.2.4 *Education & District Playing Fields*

The Structure Plan area accommodates a Primary School and the northern portion of the Coastal Lakes College Secondary School – opened in 2019; these land uses being situated in the south-western portion of the Structure Plan area.

The projected yield of the Structure Plan, being in the order of 1,920+ dwellings provides a virtual 'self-sufficient' school catchment for the area, however recognising the student catchment will generally extend to the south to encompass the northern portion of Lakelands Estate. The future Primary School will be ~1.5km due north of the Lakelands Primary School, situated on Catalina Drive.

The Department of Education sites will be co-located with a District Playing Fields facility, incorporating three football/cricket fields (or 6 rectangle pitches).

Community facilities by means of sports pavilion/clubhouse(s) are currently being explored by both the City of Mandurah and Department of Education; and noting the High School development and associated community facilities has been undertaken under a public-private partnership arrangement.

Positioned in the south-west portion of the subject land, the 400m walkable catchment to the Primary School is limited to the future central-southern and central-western residential areas, with the furthest journey some 1.2km to/from the north-eastern periphery of the subject land.

For those students being dropped off/collected by car, it is suggested that circulation of vehicles and drop off areas around the site will be encouraged in an anti-clockwise direction; to provide a safe environment for children exiting and entering vehicles. Circulation of vehicles may be influenced by the location of the approved internal student drop-off areas, street signage (e.g. no-standing on nominated sides of the street), as well as local advertising and community education.

A concept plan prepared by CDP for the Education and District Playing Fields Precinct is provided under **Figure 12**. Whilst requiring detailed review by both the City of Mandurah and Department of Education, the concept plan provides guidance and general design parameters (access, positioning of playing fields, car parking, community facilities) for further discussion.

4.3 Land Composition

The Structure Plan area will be predominantly developed for 'Residential' purposes. The other uses will include a Primary School, portion of a High School and co-located District Playing Fields. The land use composition including POS provision is outlined over-page:

Table 2: Land Composition

Land Use	Area (ha)	Percentage
Residential	67.32	56.00
Public Open Space	12.79	10.64

Land Use	Area (ha)	Percentage
Primary School	3.5	2.91
High School	1.5	1.25
Mandurah Rd Landscape Buffer	0.71	0.59
Road Reserve	34.39	28.61
Total	**120.21**	**100**

4.4 Dwelling Forecasts

4.4.1 *Directions 2031 and Beyond*

Situated within the Peel sub-region, the Structure Plan is identified as part 'Urban Zoned Undeveloped' and part 'Urban Investigation Area 2011 – 2020'. The Structure Plan area is referenced as 'LL2' and the northern portion of 'LL1' in the Peel Sub-Region Spatial Framework Map. The *Directions 2031* and accompanying OMSRS sets the following dwelling target rates for the broader Lakelands area:

Table 3: Directions 2031 Targets (Lakelands Area)

Directions 2031 Scenarios	Projected Dwellings
'Connected City' @ **15 dwellings** per *gross urban zone*	LL1: 3,400+ dwellings LL2: 600+ dwellings
'Business as Usual' @ **10 dwellings** per *gross urban zone*	LL1: 2,200+ dwellings LL2: 300+ dwellings

The Structure Plan area itself comprises 120.21ha site, thus minus the 1.5ha portion of the 'Public Purpose - High School', the 'Urban' portion of the Structure Plan area equates to a gross urban zone of 118.72ha.

Based on the dwelling projections of Directions 2031 and accompanying OMSRS, the Structure Plan is projected to generate the following dwelling yields:

Table 4: Directions 2031 Targets (Structure Plan)

Directions 2031 Scenarios	Projected Dwellings
'Connected City' @ **15 dwellings** per *gross urban zone*	1,781+ dwellings
'Business as Usual' @ **10 dwellings** per *gross urban zone*	1,187+ dwellings

The Structure Plan indicates in the order of 1,881+ lots (or 1,920+) dwellings based on the project team's lot mix and yield projections.

The dwelling yield projections thus well exceeds the 15 dwellings per gross urban zone targets of Directions 2031 and will potentially accommodate a population in the order of 5,376+ people, at a rate of 2.8 persons per household.

The proposed forecast across the Structure Plan area is subject to the final design for respective subdivision stages; this based on detailed drainage and environmental constraints, including preference for retention of good quality remnant native vegetation in POS areas. Preferred lot mix and market demand at the time of land release will also influence final dwelling yields.

4.4.2 *Liveable Neighbourhoods*

Based on the *Liveable Neighbourhoods* 'Site Hectare' definition, the Structure Plan's 'developable area' equates to 114.03ha, of which ~66.86ha relates to residential cells. As such the overall LN density for the Structure Plan will be in the order of:

- 1,920 dwellings = 28 dwellings per *site hectare*.

The projected densities will fulfil the *Liveable Neighbourhoods* targets of average 22 dwellings per site hectare for the overall development, and 20 – 30 dwellings per site hectare target range for development within 400m of a Town

Centre, with the Structure Plan being on the fringe the Lakelands District Activity Centre catchment.

The Structure Plan has been assigned a base coding of 'Residential RMD-25'; with the RMD-30 densities commensurate with lots titled under the original 'base coding' of the Structure Plan. 'Residential RMD-40' development and 'density bonus' provisions to maximum R80 density will be distributed throughout the Structure Plan area.

The R25–R80 density range offers a flexible minimum and average lot product for this location on the Peel and Perth Metropolitan fringe; resulting in lot product generally 180m2 – 700m2 in area, however with flexibility to develop higher density product (i.e. ~110m2) subject to addressing locational criterion. Estimate dwellings yields are in the order of:

- 'Residential RMD-25 (and RMD30): ~1100+ dwellings; and
- 'Residential RMD-40' or greater: ~820+ dwellings, which includes provision for higher density lot product to maximum R80.

4.5 Streetscapes & Built Form Environment

4.5.1 General Overview

The Structure Plan provides for an urban structure which enables precincts to be developed; potentially each with its own character and sense of place, and highly connected to all internal and external community nodes by a comprehensive road, pedestrian and cycle path network.

There are a number of ways in which precincts may be developed, including but not exclusive to:

- the prevailing design of the general streetscape (i.e. variation in road reserve widths and verge and median treatments, materials used within the road reserves and verges, landscaping, retaining and fencing);
- the prevailing built form (i.e. number of storeys, lot widths, front and rear loaded, setbacks etc); and
- the prevailing Public Open Space design (i.e. retention of remnant vegetation, compared to newly created POS areas, usability, function and configuration of POS areas).

The housing typologies envisaged in the Structure Plan area will include Single and Double-Storey; Traditional Front Loaded and Rear Loaded Cottages; Terraces - Attached and Semi-Detached and Multi-Storey dwellings, including potential maisonette and apartment style dwelling product.

The character of these typologies will differ depending on the nature of the lot and surrounding physical environment and 'precinct based' character.

All such design measures will be further explored as part of the subdivision design phase, Estate branding, Covenants and Guidelines, and Detailed Area Plan preparation.

4.5.2 Neighbourhood Character - Density & Lot Distribution

Reflecting the Structure Plan area's physical characteristics, market research relating to likely future purchasers and sound planning principles, a precinct based approach to lot distribution is proposed.

Lot sizes will be distributed evenly. The spread of lot types across the majority of the project will provide budget and lifestyle choice for future residents.

In addition, certain precincts will be specifically designed to appeal to particular purchaser groups. The two primary choices will be denser, 'urban' lots or larger 'suburban' lots allowing for spacious homes.

Even with the differences in lot size or 'product choice' the project will present as an integrated community. Parklands, connections and common streetscape elements will reinforce the holistic nature of the project.

The distinct yet complimentary components will broaden purchaser appeal and allow the site's various attributes to be expressed through product and landscapes creating visual interest and authenticity.

R-MD 40 - R80 Urban Clusters

Rather than small lots being sporadically placed or isolated, the proposed Structure Plan provides opportunity for a range of dense housing options together, set within a traditional suburban context. Located on flat land in close proximity to parklands and transport routes, the clusters will provide a genuine, attractive alternative.

The key characteristics of the clusters are:

- distinct streetscapes comprising reduced setbacks, generous landscape treatments and on-street car parking;
- quality common green spaces, proximity and linkages to large parklands;
- primarily first home, downsizer and investor buyers;
- primarily single, couple, young family and mature residents;
- Strata and Green Title options including:
  - 1 - 3 bedroom units (grouped and multiple dwellings) based on an upcoding to maximum R80; and
  - 112.5 – 375sqm residential lots (ave. <300sqm);
- 7.5m, 10m, 12.5m and 15m lot frontages;
- 20m, 25m & 30m lot depths (thus 40m, 45m, 50m and 55m street cells);
- 1 and 2 cars per dwelling options;
- 1 – 3 storey structures; and
- 'custom' built form provisions/R-Codes variations.

Street alignments and lot types may be arranged in a number of ways depending on the surrounding road network and interfaces.

Figure 13 demonstrates a conceptual urban cluster configuration.

The clusters are a considered way of increasing overall density (to reflect State Planning Policy) and provide for buyers with limited budgets. With distinct built form character, quality embellishments and urban lifestyle focus, the clusters will be both affordable and aspirational.

The clusters will allow streetscape elements, amenities and provisions relevant to small lot housing to be consolidated. Clusters will be specifically designed for denser forms of housing to benefit likely buyer types/future residents. Street rhythm will be consistent as similar characteristics will be grouped.

DENSITY CLUSTERS

Figure 13

Not to Scale @ A4

Date: 26/05/2020 **Plan:** CPLDH-5-021

R-MD 25 & R-MD 30 Suburban Mix

The majority of the project will allow for a more traditional or 'suburban mix' of lot types and sizes. Within this however, up to four sub-precincts may have fewer small to medium sized lots allowing these areas to become more generous or spacious in character.

Frequently in other green-field developments the design requirements of 'upgrade' purchasers are compromised by the prevalence of smaller lots or lower quality housing. In this case the concept being explored for the Structure Plan area is to 'provide something for everyone' across the Estate, but not necessarily all in the same location.

The key characteristics of the 'suburban mix' are:

- traditional open space distribution and streetscapes;
- all purchaser / resident types;
- primarily Green Title lots;
- 300 – 450m2 lots (average ~ 400m2);
- 10m, 12.5m and 15m lot frontages; and
- 25m and 30m lot depths (thus 50m, 55m and 60m street cells).
- The key characteristics of the larger lot areas are:
- located on higher land with views and/or adjacent to major parklands;
- quality streetscape treatments;
- Green-titled lots;
- 375 – 600m2 lots;
- 12.5m, 15m, 17m and 20m lot frontages; and
- 30 – 32m lot depths (thus 60m and 64m street cells).

Additional car parking spaces for residents and visitors will be built into streetscapes. Street trees and verge plantings will have greater emphasis than suburban streets. Narrower roadways, alternate treatments and interesting break-out spaces with seating and/or shelters will provide relief and differentiate from traditional streets. Site cover and setbacks provisions will relate to smaller lot types and dense housing.

4.5.3 Parking

Parking and garage provision will be addressed on merit, depending on density and site location. On-street visitor parking bays are promoted in a variety of street settings in the Structure Plan area, as further addressed in the Movement Section. The focus on on-street visitor parking will alleviate concerns of cars parking over footpaths, thus minimising pedestrian-vehicle conflict, particularly in the preferred higher density urban settings where small and narrow lot product may prevail.

4.5.4 Landscaping of Front Gardens

A development intent is to create front lot landscape packages which will be integrated into the streetscapes. Front lot retaining walls and fencing will be limited and grade change will be accommodated on lot, through the use of either low walls or sloping front landscape design planted with local plant species. This will create a seamless streetscape vision as the verge planting palette is intended to also be used in the Front Lot Package planting style.

Plant species within the Front Lot Packages will be predominantly native water wise species which is consistent with the broader development.

4.5.5 Solar Orientation

Where the orientation of the lot makes it possible, dwellings will be orientated north for good solar passive design.

However, where contours and landform have taken priority in determining lot orientation, northern orientation cannot always be achieved. In these cases, dwellings will be individually designed

incorporating sun control elements such as solar shading devices for harsh summer sun, or the appropriate location of living spaces to maximise access to winter sun.

4.6 Local Development Plans

4.6.1 Overview

In September 2018, the City of Mandurah adopted a revision to its Policy *LPP1 – Residential Design Codes Policy* to include provisions for Medium Density Single Houses in Structure Plan Areas ('RMD Codes'); these provisions being consistent with WAPC's Planning Bulletin 112/2016 Medium-density single house development standards – Structure Plan areas ('RMD Codes').

As the Structure Plan has been developed in accordance with RMD Codes provisions, Local Development Plans generally need not apply for conventional front-loaded R25 and R30 density lot product.

4.6.2 Circumstances where LDP's may apply

Notwithstanding the above RMD Codes variations, there will be instances where LDPs will be required; this generally relating to development comprising one or more of the following attributes:

- Lots of irregular shape or less than 260m^2 in area;
- Lots affected by road or rail noise exceeding the targets set out in *State Planning Policy 5.4: Road and Rail Noise* and the associated implementation guidelines.

  NB. Affected lots may be identified spatially in the accompanying *Noise Impact Assessment*, under Part Three – Appendix C of **Appendix 2** of the Structure Plan; this to be updated subject to finished ground levels adjacent or type of built form design being developed;
- Lots where vehicular access is obtained from a rear laneway or right of way or is otherwise constrained;
- Lots directly abutting areas of public open space; and/or
- Lots intended to accommodate grouped or multiple dwellings.

Local Development Plans are to address the following matters, as required:

- street and boundary setbacks;
- dwelling orientation;
- uniform fencing requirements;
- open space requirements;
- garage setbacks and width;
- vehicular and pedestrian access;
- parking requirements;
- overshadowing;
- visual privacy;
- quiet house design and/or construction requirements; and
- any variations to the residential design codes which may be required.

4.6.3 *Guidance for Higher Density Development in 'R80' Coded Areas*

To further promote lot product and housing diversity throughout the Structure Plan area, Part One provisions allow for development of up to 'Residential R80' to achieve this objective. Under this scenario, the City may permit lots to develop to a maximum density 'R80' subject to a City of Mandurah approved Local Development Plan. The following criteria should be duly considered as part of any high-density development proposal:

A minimum lot size of 800m²

The preferred minimum lot size has been determined based on an anticipated high density development cell of 15m x 55m (825m2); this to accommodate specific lot and house product currently being explored by the Perth building industry.

Higher density development on larger lots based on 20m and 25 – 30m+ deep cells is also anticipated and encouraged to provide lot and housing diversity for this green-field development.

Lot has more than one road frontage

'Roads' are defined as Access Streets or greater under WAPC's Liveable Neighbourhood. 'More than one frontage' means development sites that are immediately adjacent to two intersecting roads.

Frontage to two intersecting roads will enforce higher density development to be positioned generally on the 'book-ends' of residential cells. This is to assist higher density development to achieve:

- better built form outcomes for street interface and interaction (i.e. balconies fronting the dedicated street as opposed to internal communal driveways);
- minimising any adverse impacts on adjoining properties (i.e. alleviates overshadowing and visual privacy constraints compared to 'mid-cell' developments); and
- parking arrangements to be at the rear of lots in the case of Grouped and Multiple Dwellings (albeit not mandatory).

A development site with a boundary to an area of Public Open Space may be substituted as a 'road frontage'.

A rear or siding Laneway may also be considered as 'road frontage' at the discretion of the City of Mandurah; this subject to review by the City in regard to potential adverse impacts on the adjoining property(s).

Development being undertaken by a single developer/partnership and with all dwellings constructed concurrently

This preferred (not mandatory) criterion ensures that high density development is not ad hoc and promotes development by a single landowner or partnership. This will avoid lots being further subdivided and to avoid scenarios whereby single narrow lots are positioned between other developments; this resulting in construction constraints particularly for narrow frontage lots with a boundary to boundary design.

4.7 Movement Networks

A Transport Assessment has been prepared by GTA Consultants to identify projected traffic volumes and suggested road hierarchies in and adjacent to the Structure Plan area (**Appendix 3** refers). The key findings are summarised in the following section.

Based on GTA's report recommendations, broad cross-section concepts have been prepared to establish a general road hierarchy, pedestrian network and preferred streetscape character.

4.7.1 Primary External Road Network

The anticipated ultimate form of the road network in the Lakelands region is detailed in the Mandurah North Structure Plan (2006).

The Structure Plan identifies the following changes to the transport network along the Mandurah Road corridor in the vicinity of the Structure Plan area:

- Mandurah Road is to be widened to three lanes in each direction to cater for anticipated traffic volumes;
- Four-way signalised intersections are to be provided on Mandurah Road at:
- Madora Beach Road/Banksiadale Gate; and
- the access to the Madora Bay North and Lakelands North (Ocean Hill) Structure Plan areas.
- East-west linkage to be provided between Madora Bay North and Lakelands North (Ocean Hill) Structure Plan areas.

4.7.2 Site Access

Vehicle access into the Structure Plan area will be restricted to only the western and southern boundaries, this by virtue of the Bush Forever site to the north and Perth – Mandurah Rail Line to the east.

Access from the west is proposed directly via Mandurah Road at three locations:

- A four-way signalised intersection with the future future access to the Madora Bay North Structure Plan area due west;
- One left-in/left-out (LILO) intersection to be located some 250m to the south of the signalised intersection; and
- One left-in intersection at the northern boundary of the Structure Plan area (or design measures to cater for this), at the request of the City of Mandurah.

All intersections with Mandurah Road play a significant role for the Structure Plan area and surrounding developments. The southern LILO will assist with vehicle circulation around the imminent District Activity Centre, High School, District Playing Fields and future Primary School.

The northern 'left-in only' access will enable and facilitate improved pedestrian and cyclist access from public transport, beach and local commercial activities located to the west and north; and to distribute vehicular traffic to allow for improved access to the northern portion of the development.

In addition to these access points to the State controlled road network, access points to the south are directly influenced by the establish road network within Lakelands Estate; the access points include Badgerup Avenue, Yindana Boulevard, Malata Ridge and Warburton Trail.

4.7.3 Proposed Internal Road Network

The proposed road hierarchy for the Structure Plan is illustrated in **Figure 14**, this prepared under guidance of the Structure Plan's Transport Assessment (**Appendix 3**) and WAPC's Liveable Neighbourhoods.

The Structure Plan's internal road network is characterised by a higher order loop road ('ring road') provided around the middle of the site; this road strongly influenced by the existing steep

topography central to the Structure Plan area as well as external access restrictions to the west and south only. This road provides direct connection to all primary access points into the Structure Plan area, including Mandurah Road, Yindana Boulevard and Badgerup Avenue.

The remainder of the road network is based on a modified grid format, with all other roads generally a subsidiary to the primary loop road.

The road network as proposed will provide a very legible road hierarchy that offers residents well-defined directional ('way-finding') routes to key internal and external community nodes.

A description of the proposed internal roads is provided below and accompanied by concept cross-sections under **Figures 15 – 18**.

Integrator B Road

The Structure Plan's 'Main Entry' will be designed as an *Integrator B* between the Mandurah Road signalled intersection and first internal roundabout.

The *Integrator B* design is predicated on the ultimate projected traffic volumes, being in the order of 7,920 vehicles per day (vpd). The Transport Assessment recommends a minimum 29.2m reserve pursuant to *Liveable Neighbourhoods* guidance. The Structure Plan road cross-section (**Figure 16** refers) is proposed at minimum 28.2m by virtue of:

- A single lane east bound entering the Structure Plan area;
- Three lanes exiting the signalled intersection including two north-bound turn lanes and through lane. A south bound left slip lane will also be provide on approach to the intersection extending the ultimate width of the reserve for a minor extent; and
- POS adjacent to the northern verge thus a reduction in verge width is provided.

The proposed road design accommodates on-road cycle lanes in both directions, and wider verge on the southern side to accommodate intermittent on-street parking embayment, path network, infrastructure services and landscaping.

A wider reserve may be required on approach to the Mandurah Road intersection and will be subject to review by Main Roads WA at a more detailed design phase.

Neighbourhood Connectors

The primary loop road internal to the Structure Plan area is projected to service between 520 – 4,860vpd. The lesser volumes relating to the far eastern side of the Structure Plan area, and with the highest volumes logically in the north-west 'cell' of the Structure Plan area on approach to the *Integrator B* (Main entry road).

To address the higher volumes a *Neighbourhood Connector A* (NCA) is proposed, this incorporating (**Figure 16** refers):

- 2m median and 5m wide carriageways in a boulevard configuration – inclusive of on-road cycle lanes;
- 4.5 – 5.5m wide verges, the width influenced by the presence of embayment parking, shared path network and provision of service infrastructure and landscaping.

Exclusive of the north-west 'cell', the remainder of the loop road will service traffic volumes between 520 – 3,640vpd. On this basis, a *Neighbourhood Connector B* design is required to transition into the NCA (**Figure 17** refers). The road design is based on a 22m road reserve comprising:

- 7.4m wide carriageway to accommodate a future public bus route;
- 10.1m verge to one side to accommodate a pedestrian 'green-link' that incorporates a combination of shared path, landscape and drainage corridor (swales), intermittent embayment parking and service infrastructure; and
- A verge of 4.5m on the opposite side that will generally accommodate a standard footpath and service infrastructure.

The verge widths may vary depending on the number of above design elements being implemented.

Beyond the first internal round-a-bout, the *Integrator B* road south of the roundabout transitions to a *Neighbourhood Connector B* (*NCB*), this responsive to the projected traffic volumes of 3,100vpd.

Notwithstanding the lower traffic volumes, this road is proposed to be designed similarly to the 22m wide boulevard NCA cross-section; this to provide enhanced landscaping and a 'level of grandeur' being the extension of the Structure Plan's main entry (**Figure 17** refers). The 22m road design will also provide a transition between the Integrator B and the 18m wide NCB reserve to the south; this southern leg extending past the Education Precinct and connecting with Lakeland Estate's constructed portion of Badgerup Avenue.

The 18m wide NCB road reserve will generally comprise (**Figure 17** refers):

- 7.4m wide carriageway to accommodate a future public bus route; and
- Verge widths between 4.5m – 6.1m subject to parking embayment(s), shared paths, service infrastructure and landscaping.

An 18m wide NCB will also be provided as an extension to Yindana Boulevard, the central access point into Lakelands Estate (**Figure 18** refers). This road design will also be used to accommodate traffic utilising the northern left-in road off Mandurah Road.

The concept sketch adjacent illustrates how the interface between Lakelands and the Structure Plan boundary may be developed.

Sketch 1 – Yindana Blvd Landscape Concept

(Emerge Associates)

Access Streets

The typical access streets proposed are to be streets with 6.0m wide carriageways generally set within a 15m road reserve as per the design guidance for *Access Street C* and *D* (**Figure 19** refers).

Where daily traffic volumes are expected to exceed 1,000vpd, these carriageways may be widened to 7.2m and set within 16.2m wide road reserves, as per the *Access Street C* requirements (**Figure 18** refers).

The verge adjacent to the Rail Reserve may be reduced by 2m subject to sufficient space to accommodate service infrastructure, retaining wall and noise wall requirements.

Laneways

Laneways are to be 6.01m wide with the laneway occupying the entire road reserve. These laneways are of sufficient width to accommodate two-way vehicle movement, refuse collection and vehicle access into garages located at the rear of lots. Visitor parking for adjacent lots will be provided within the primary or secondary street verges.

4.7.4 *Public Transport*

Early liaison with the Public Transport Authority (PTA) has provided a sound solution for bus services to and within the Structure Plan area; this involving extending the existing bus route 584 into the Structure Plan area. This service provides connection to Mandurah station on the Perth – Mandurah Rail Line.

This route, which currently terminates at Yindana Boulevard in Lakelands Estate, may potentially continue north along Yindana Boulevard into the Structure Plan area before turning left and accessing Mandurah Road via the Structure Plan's main entry road (**Figure 19** refers). In the interim, PTA expects that a suitable bus embayment (bus terminus) be located adjacent to an area of POS and away from residential lots. In the longer term, PTA requests bus route 584 will continue along the *Integrator B* road and turn right at the Mandurah Road intersection for northbound travel.

A second route option could take advantage of the layout of the proposed loop road internal to the Structure Plan area. This would provide for excellent public transport accessibility as it would enable services to be located within 400m of all residents.

In light of the potential bus routes, all roads anticipated to accommodate routes have been designed with a minimum carriageway width of 7.4m in accordance with the *Liveable Neighbourhoods* guidance.

4.7.5 *Pedestrians & Cycle Infrastructure*

In accordance with the requirements of *Liveable Neighbourhoods*, shared paths are to be provided on all *Integrator B* and *Neighbourhood Connector* roads, with a footpath to also be provided in the opposite verge. All *Access Streets* are to have a shared path or footpath on at least one side of the carriageway subject to locational demand (**Figure 20** refers).

In addition to the shared paths, on-street cycle lanes are to be provided on the *Integrator B* and *Neighbourhood Connector A* roads.

Safe pedestrian crossing points in the form of an at-grade pedestrian light control is to be included in the design of the primary four-way signalled intersection at Mandurah Road, this comparative to that recently approved at Banksiadale Gate adjacent the Lakelands District Activity Centre.

ROAD HIERARCHY

Figure 14

INTEGRATOR B (MANDURAH ROAD APPROACH)

Notes:

- Reduction of verge permitted where abutting open space
- 2.1m – 2.5m shared path meander within verge
- Shared path and footpath on all primary roads

NEIGHBOURHOOD CONNECTOR A – 'RING ROAD'　　NEIGHBOURHOOD CONNECTOR B

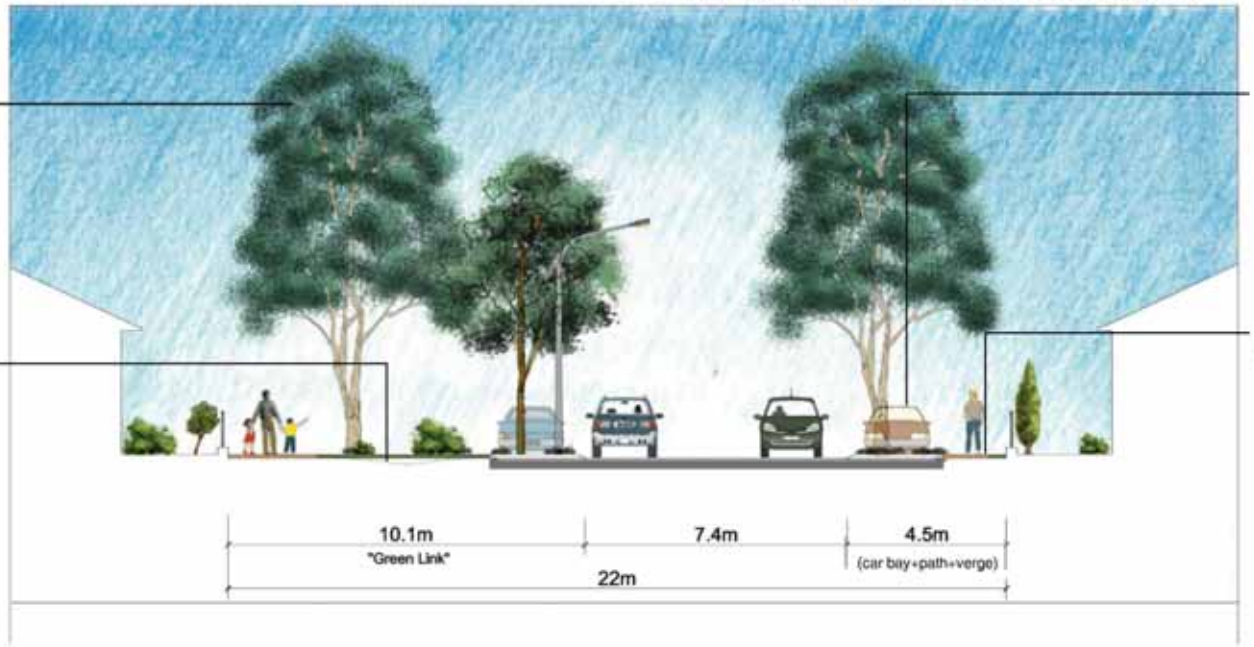
Notes:

- Reduction of verge permitted where abutting open space
- 2.1m – 2.5m shared path meander within verge
- 1.5m for footpaths

ROAD CROSS SECTIONS

Figure 15

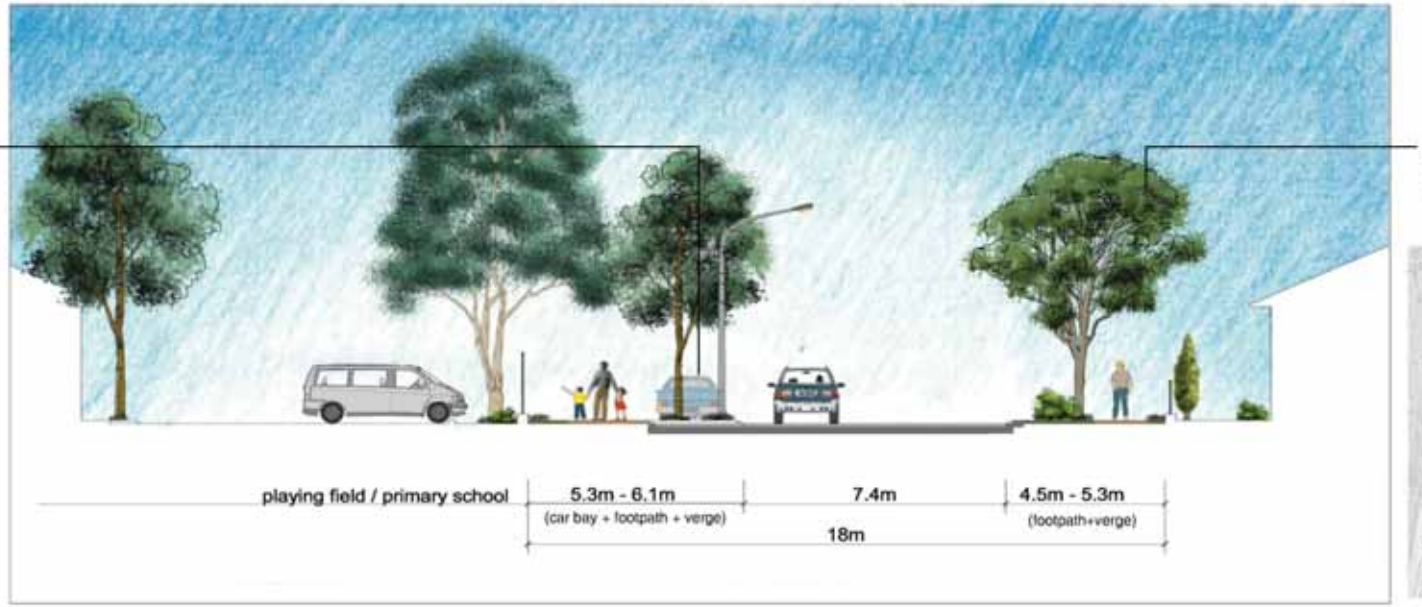
NEIGHBOURHOOD CONNECTOR B – 'RING ROAD'



Notes:

- Reduction of verge permitted where abutting open space
- 2.1m – 2.5m shared path meander within verge
- 1.5m for footpaths

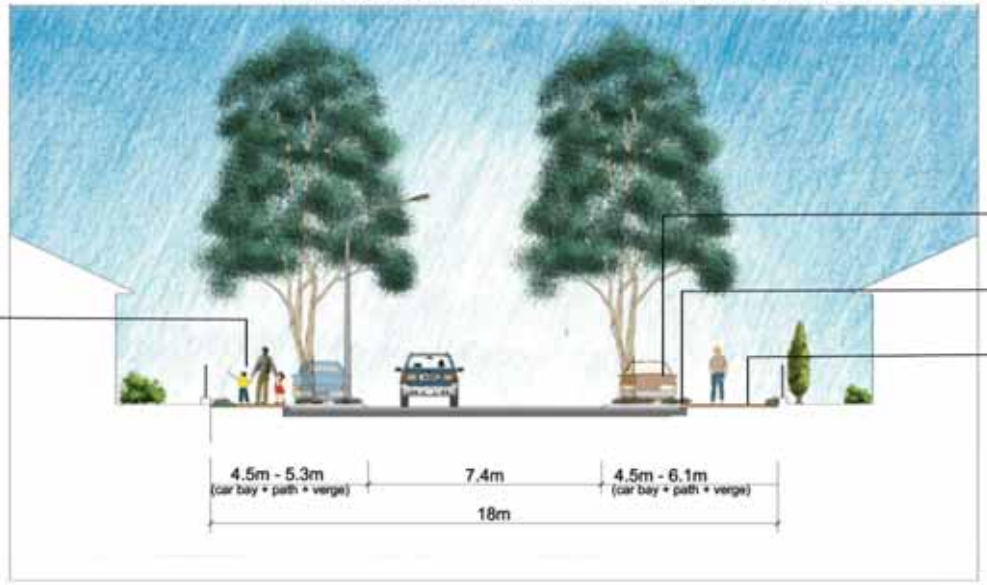
NEIGHBOURHOOD CONNECTOR B – EDUCATION / PLAYING FIELD INTERFACE



ROAD CROSS SECTIONS

Figure 16

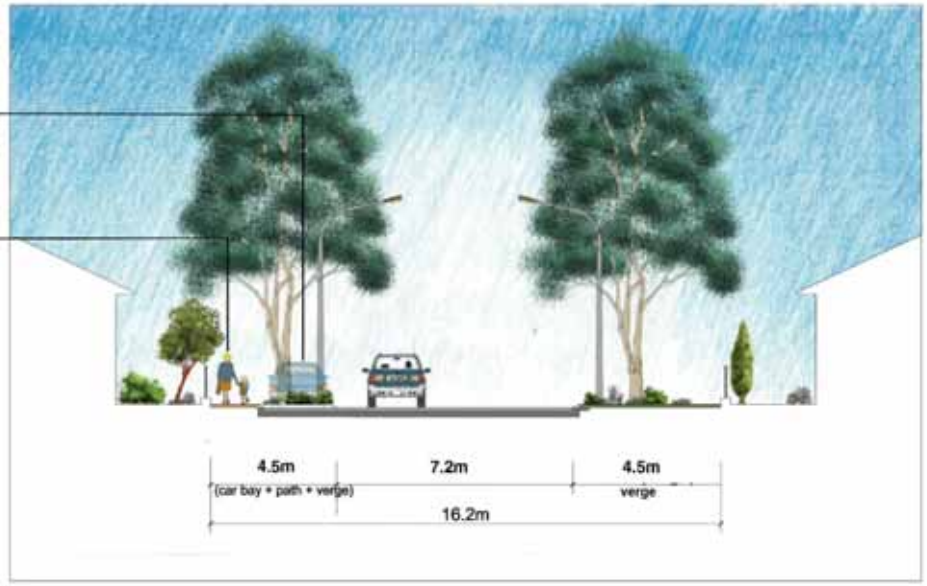
NEIGHBOURHOOD CONNECTOR B – LAKELANDS ESTATE INTERFACE



Notes:

- Reduction of verge permitted where abutting open space
- 2.1m – 2.5m shared path meander within verge
- 1.5m for footpaths

ACCESS STREET C – 16.2m ROAD RESERVE



Notes:

- Reduction of verge permitted to 2.5m where abutting railway reserve

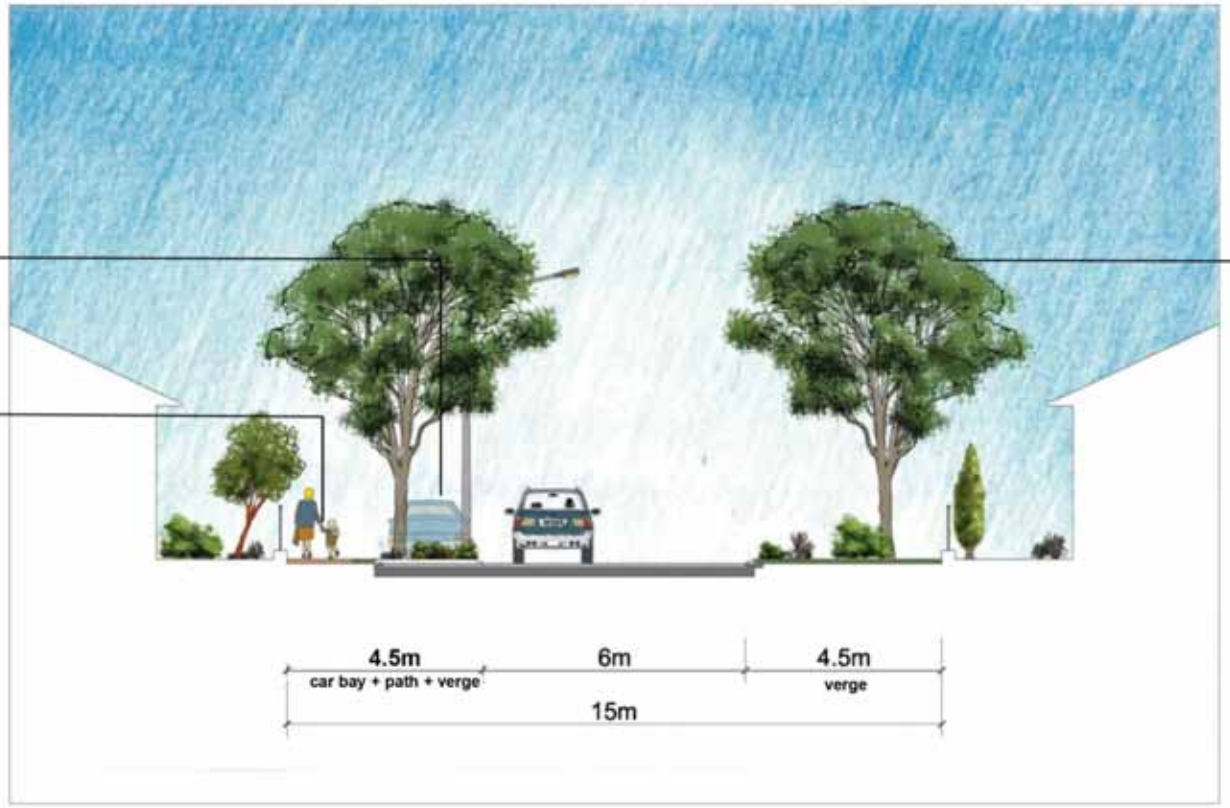
ROAD CROSS SECTIONS

Figure 17

ACCESS STREET C – 15.0m ROAD RESERVE

Car bays to be provided at intervals along road corridor with tree planting within nibs

Pedestrian footpaths to one side only



Street tree planting and low, native, water wise planting to verge and median

Notes:

- 15m Road Reserve may be reduced to 13m where abutting open space or other roads reserves
- Reduction of verge by 2.0m where abutting open space
- 2.1m – 2.5m shared path meander within verge
- 1.5m for footpaths

ROAD CROSS SECTIONS

Figure 18

PREFERRED BUS ROUTE

Figure 19

INDICATIVE PATH NETWORK

Figure 20

4.8 Public Open Space

The Structure Plan proposes a total of 14 areas of 'green space', all of which are to be credited as Public Open Space (POS). A POS contribution plan has been prepared for the Structure Plan area (**Figure 21** refers) and illustrates compliance with the 10% creditable POS requirement in accordance with *Liveable Neighbourhoods* guidance and WAPC's Development Control (DC) Policy 2.3 *Public Open Space in Residential Areas*.

Based on the Structure Plan (**Plan 1**), the POS contribution currently sits above 10% in providing a 0.57ha 'surplus'. This figure excludes the 0.76ha Mandurah Road landscape buffer area provided pursuant to Clause 4.9.4(b) of TPS3, and extensive road reservation 'green links' provided throughout the Structure Plan area.

This POS contribution will be continually reviewed under the more detailed subdivision and engineering design stages, as drainage provision, earthworks and nett residential development cells are further adjusted.

A Landscape Masterplan and Street Tree Planting Strategy have been prepared by Emerge Associates in support of the Structure Plan (**Figures 22** and **23** refer).

Emerge Associates have also provided the following landscaping objectives and principles in response to the site context and Structure Plan design.

4.8.1 *Broad Landscape Approach*

The Structure Plan area is located within 1km of the Western Australian coastline, immediately adjacent a Bush Forever site and in close proximity to the Rockingham Lakes Regional Park. It is proposed that the landscape design will reflect these assets and the landscape will be defined through two distinct precincts being the 'Coastal precinct' and the 'Woodlands precinct'.

The retention of a topographical high point within the central linear open space and the retention of mature trees will be the key focal aspects for each precinct. The Coastal and Woodland precincts will be defined through material selection, colours and textures, plant selection and planting layout.

4.8.2 *Topography Influences*

The central linear open space has been designed around an existing topographical high point on the site. The high peak is proposed to reach a maximum elevation of ~23m AHD and intended surrounding levels are ~10 – 12m AHD.

The retention of this topographical feature will provide hill top views along the coast to the west and the Rockingham Lakes Regional Park to the east.

Retaining the topography within the POS reflects the dunal location, promotes the close proximity to the beach and provides a protected area of open space on the lee side of the retained dune. This POS will be protected from the coastal winds and other climatic factors.

This protected POS on the lee side of the dune is therefore the area designated for the key play space within the Structure Plan area and it is central to the whole of the project. There is potential to explore integrated water play, a play space integrated into the slope through slides, all abilities play and a lookout shelter providing 360 degree vista views at the peak. Picnic facilities will be located on the lee side of the dune to create a peaceful sanctuary for the local community.

4.8.3 *Retained Features*

There is opportunity to retain a number of mature trees. The Structure Plan area has been established to allow the retention of these trees in open space areas and

verges. The existing trees are a valuable asset to the site, creating immediate impact, shade and reflect the local flora so every effort will be made to retain them where possible. The trees will be integrated into the open space areas and the design will focus on providing seating opportunities in close proximity to the existing trees to make best use of the shade they provide.

4.8.4 *Water Management*

Water for irrigation is a limited commodity in this location and any future development will endeavour to promote cost effective water efficient practices through the open space designs. The areas of POS will be designed to limit water use through the implementation of any or all of the following broad principles:

- Where required, existing site soil may be improved with soil conditioner certified to Australian Standard AS 4454 to a minimum depth of 150mm where turf is to be planted and a minimum depth of 300mm for garden beds;
- The landscape planting design will primarily be water wise plant species with a focus on using endemic plant species (subject to availability). The planting design will be arranged not only based on form and aesthetics, but also on watering requirements. Hydrozoning of the irrigation system will allow appropriate water levels to the various soft scape treatments and planting areas;
- Garden beds will be mulched to 75mm with a product certified to Australian Standard AS 4454;
- Turf areas will be focused around facilities such as play spaces and picnic facilities, to ensure the turf is located where it will be best utilised; and
- It is proposed that the design will promote efficient water requirements during POS maintenance. This will be achieved by implementing an appropriate management and maintenance program for POS areas. The approach is to reduce irrigation rates over the long term to the planted areas promoting water savings into the future.

4.8.5 *Walkability*

Pedestrian safety and comfort will be a consideration for the overall planning and landscape design of the Structure Plan area. The POS areas are located to ensure each resident is within a 200-400m walkable catchment of a POS area, with a series of widened verges (green links) providing alternate walkable routes between the key areas of POS.

Each POS will include a 2100mm wide path which will meander around the edge of the park, which will connect into the broader pedestrian network and minor internal paths will provide informal connections within each of the POS.

Broadly, the central linear open spaces combined with the widened verges are intended to provide a safe walking zone for residents to Mandurah Road. The development on the beach side of Mandurah Road is potentially proposing a similar series of linear open spaces/widened, therefore providing a connected walkable link from the Structure Plan area to the beach.

4.8.6 *Landscape Treatments*

The proximity to the coast will be a defining factor when developing the material palette. Robust, hardwearing materials will be preferred which reflect the character of the Coastal and Woodland precincts. This detail of material specification will be established through the future detailed design and approval phase of the process.

It is proposed that a dry creek bed will meander through the POS areas to create the notion of water and movement within each POS in keeping with the coastal character. The creek beds will include planting and rockworks to the banks and to the base of the creek line. Pedestrian bridging elements will cross the dry creek bed in select locations to enhance the projects pedestrian connectivity and add a feature element.

Turf spaces will be purposefully located in select locations and sized appropriately for each open space to ensure that turf areas are well considered in regard to their function, useability, access and location. Plant species will be predominantly native species which are low in water use. This will reflect the local flora and create a landscape which will reflect the character of the Structure Plan area.

4.8.7 Water Play

The linear park play space is proposed to be located on the lee side of the dune, creating a protected community node, away from the coastal winds and climate.

The play space is intended to be all abilities, and is proposed to include a water play element. This will engage with the sensory development of the children and add a unique element to a traditional play space. The size and scale of this element is to be determined through the detailed design process, and the overarching intent will be to control water usage through a timed controller, with water only to be available during certain times of the day.

The water play will be designed to use a limited amount of water, with the water to be recirculated and limited top up to account for evaporation loss. The water play design will consider long term maintenance requirements and surfaces are to be hardwearing and non-slip.

4.8.8 Potential Parkland Café

The Structure Plan area is in close proximity to the imminent Lakelands District Activity Centre and 'Singleton Village' Neighbourhood Activity Centre in The Vista Estate, due north. As such a commercial centre of any scale is not considered viable for the Structure Plan area in the short to medium term.

Notwithstanding the above, the developer has intentions to offer a 'sprout' Café within or adjacent to the central POS area, this given the intentions to develop this parkland as a major attractor for local and surrounding residents.

The 'sprout' Café would offer visitors access to basic refreshments and amenities whilst frequenting the parkland.

Any proposal for a 'sprout' Café, whether in a temporary or permanent arrangement, will be considered through the City's Development Application process.

PUBLIC OPEN SPACE SUMMARY	Area (ha)
Site Area	120.21
Deductions	
Drainage 1:1yr (Uncredited):	0.8501
Primary School:	3.5000
High School:	1.5000
Mandurah Road Landscape Buffer:	0.7101
Total Deductions:	**6.5602**
Gross Subdivisible Area	113.6541
POS Requirement 10%	11.3654
Maximum Restricted Open Space (2%):	2.2731
Mimimum Unrestricted Open Space (8%):	9.0923

DRAINAGE PROVISION & CREDITABLE OPEN SPACE BREAKDOWN

		Non Credit	Restricted Open Space	Unrestricted Open Space	Total Credit Open Space
POS Area	Land Area (Ha)	1:1 Year (Ha)	>1:1 - 1:5 Year (Ha)	Above 1:5 (Ha)	Combined (Ha)
A	0.5574	0.0356	0.0429	0.4789	**0.5218**
B	0.5066	0.1509	0.1281	0.2276	**0.3557**
C	0.1687	0.0000	0.0000	0.1687	**0.1687**
D	1.4566	0.0834	0.1193	1.2539	**1.3732**
E	1.0040	0.0550	0.1055	0.8435	**0.9490**
F	2.4167	0.1523	0.2234	2.0410	**2.2644**
G	0.0557	0.0000	0.0000	0.0557	**0.0557**
H	0.2851	0.0245	0.0443	0.2163	**0.2606**
I	0.3215	0.0669	0.0641	0.1905	**0.2546**
J	0.4302	0.0893	0.1425	0.1984	**0.3409**
K	4.4303	0.0834	0.1148	4.2321	**4.3469**
L	0.3687	0.0110	0.0176	0.3401	**0.3577**
M	0.6769	0.0790	0.1217	0.4762	**0.5979**
N	0.1117	0.0188	0.0361	0.0568	**0.0929**
Total:	**12.790**	**0.850**	**1.160**	**10.780**	**11.940**
				10% Provisional Surplus:	**0.5746**

LEGEND

- SUBJECT SITE
- PUBLIC OPEN SPACE
- PUBLIC OPEN SPACE REFERENCE
- RESIDENTIAL R25-80
- GREEN LINK
- HIGHER ORDER ROAD
- LOWER ORDER ROAD

PUBLIC OPEN SPACE (AS AMENDED)

Figure 21

Scale: 1:5000 @ A3

PLAN: CPS34 S-003A REVISION: A
DATE: 26/05/2020 DRAWN: JP
PROJECTION: PCG 94 PLANNER: TV
DATUM: AHD CHECK: JH

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LANDSCAPE MASTER PLAN

KEY

- PLAYGROUND (LARGE)
- PLAYGROUND (SMALL)
- DRINK FOUNTAIN
- BBQ
- DOG EXERCISE CIRCUIT
- RETAINED VEGETATION
- SHELTER
- LOOKOUT
- ENTRY SIGN

INTERACTIVE PLAYGROUND

LOOKOUT SHELTER

PEDESTRIAN CONNECTIVITY

MANDURAH ROAD INTERFACE

STREET TREE MASTER PLAN

Banksia integrifolia

Eucalyptus examia

Eucalyptus leucoxylon 'Rosea'

Melaleuca leucadendra

Podocarpus elatus

4.9 Urban Water Management

A Local Water Management Strategy (LWMS) has been developed in accordance with *Better Urban Water Management* (WAPC 2008), *State Planning Policy 2.9 Water Resources* (WAPC 2006) and *Planning Bulletin 92 Urban Water Management* (WAPC 2008) (**Appendix 4** refers). Water will be managed using an integrated water cycle management approach, which has been developed using the philosophies and design approaches described in the *Stormwater Management Manual for Western Australia* (DoW 2007).

The key principles of integrated water cycle management that have guided the water management approach for the Structure Plan area include:

- Considering all water sources, including wastewater, stormwater and groundwater;
- Integrating water and land use planning;
- Allocating and using water sustainably and equitably;
- Integrating water use with natural water processes; and
- Adopting a whole of catchment integration of natural resource use and management.

The overall objective for integrated water cycle management for residential developments is to maintain the existing hydrological regime and minimise pollution. The LWMS design objectives seek to deliver best practice outcomes using a Water Sensitive Urban Design (WSUD) approach, including management approaches for:

- Water conservation;
- Groundwater management;
- Flood mitigation; and
- Stormwater quality management.

The LWMS provides a comprehensive summary of the existing environmental values of the Structure Plan area, which are based on site-specific studies undertaken and review of publicly available data. The characteristics and environmental values of the Structure Plan area and guidance provided by National and State policies and guidelines relevant to urban water management have guided the design criteria and propose a contemporary best practice approach to achieving the design objectives for water management.

The WSUD approach and measures that are proposed for the Structure Plan area include:

- Maintaining existing flow regimes by retaining all runoff within the subject land;
- Runoff retention as high in the catchment as possible;
- Treatment of surface runoff prior to infiltration to groundwater;
- Vegetated swales provided in road verge and median strips;
- Bio-retention areas incorporated into POS areas;
- Major event flood storage requirements addressed within road reserve and POS areas;
- Co-location of flood storage areas with natural landforms and native remnant vegetation where possible;
- Adopting appropriate non-structural best management practices;
- Adopting a fit-for-purpose water use approach; and
- Minimising use of both scheme and non-potable water.

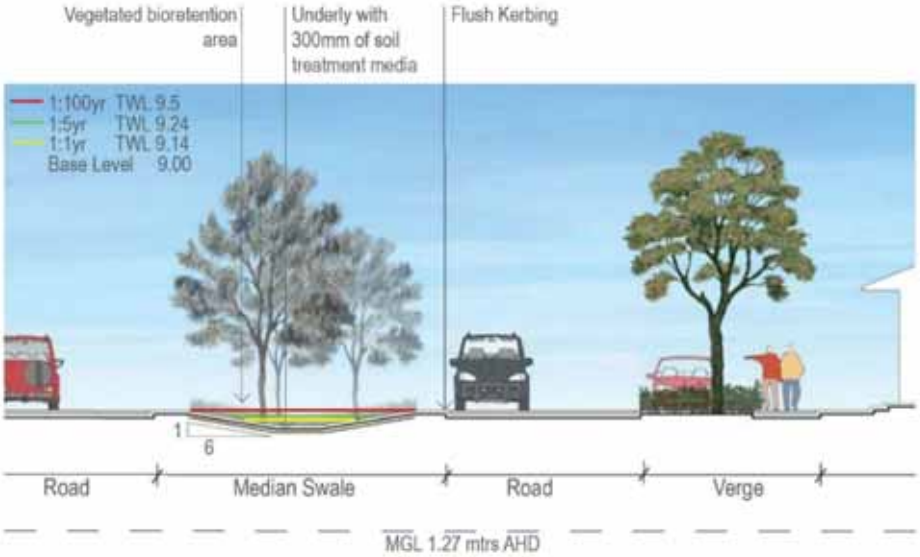
The LWMS demonstrates that the design approach for the subject is consistent with a best practice WSUD approach, that the water management objectives can be achieved within the spatial allocation of

the Structure Plan, and that the requirements of the relevant State and local government policies and guidelines will be satisfied

Refer to **Figures 24 – 25** for cross-sections of the proposed drainage within road reserves and areas of POS.

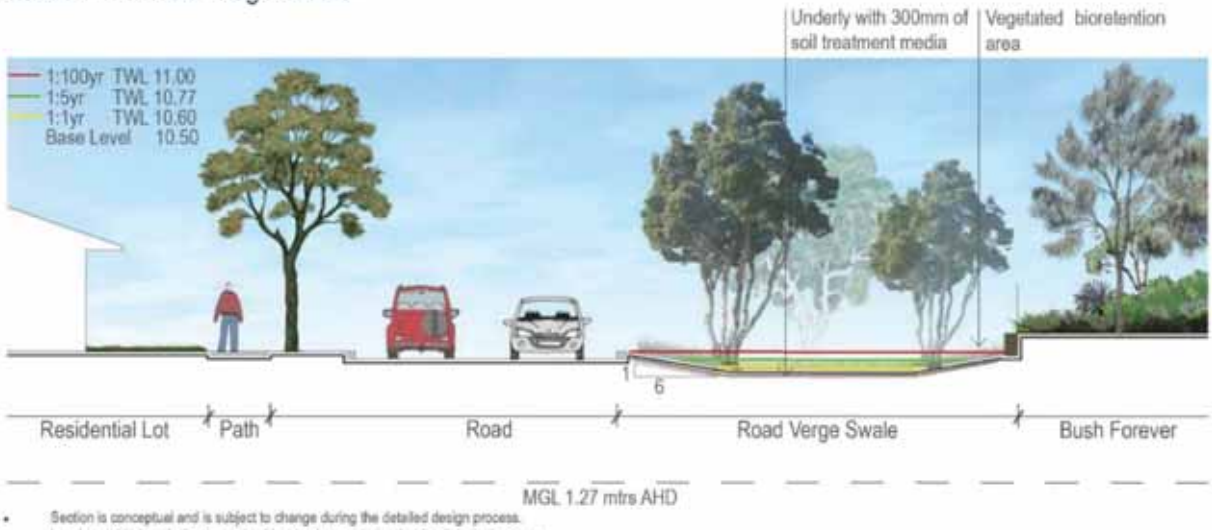
INDICATIVE SECTIONS

Section A - Median Swale



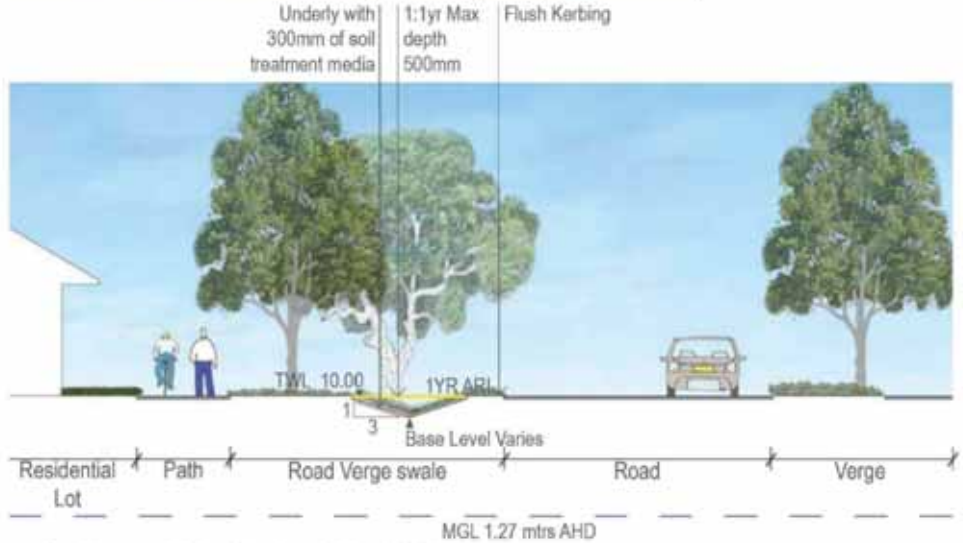
- Section is conceptual and is subject to change during the detailed design process.
- Levels provided are indicative and subject to change during the detail design process

Section B - Road Verge Swale



- Section is conceptual and is subject to change during the detailed design process.
- Levels provided are indicative and subject to change during the detail design process

Section C - Indicative Road Verge Swale (Multiple Locations)

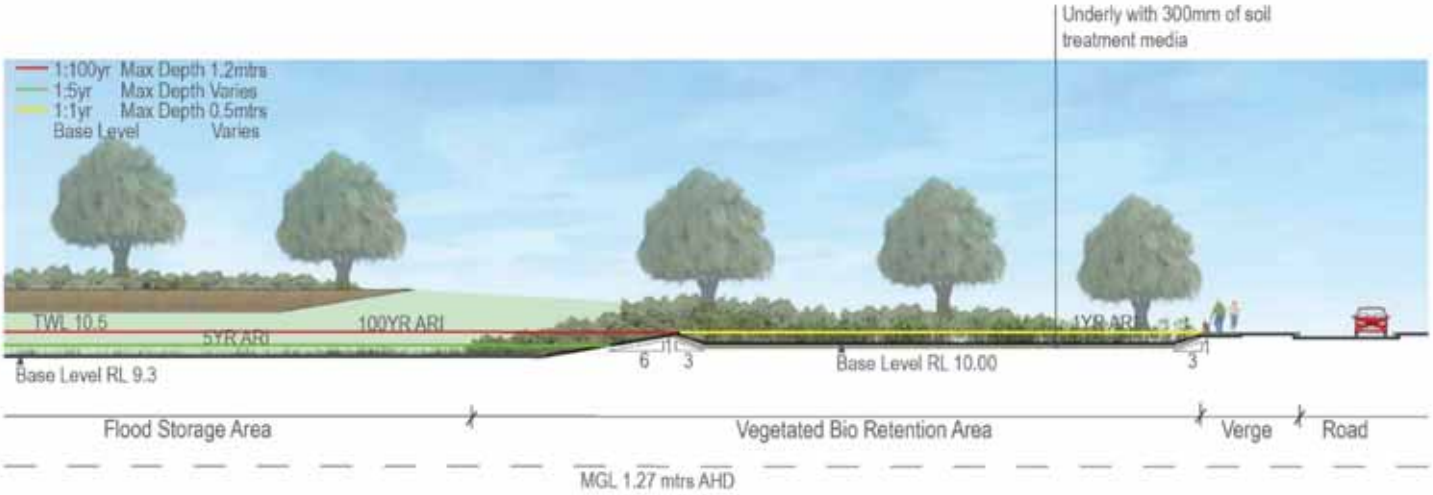


- Section is conceptual and is subject to change during the detailed design process.
- Levels provided are indicative and subject to change during the detail design process.

INDICATIVE SECTIONS

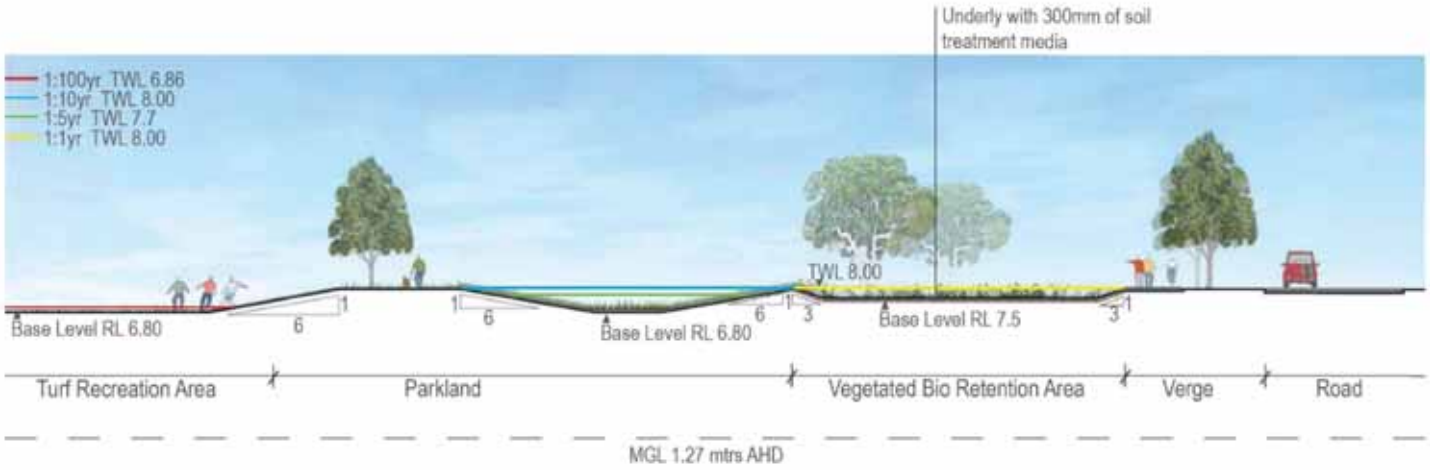
Location Plan

Section D - Indicative POS Section (Multiple Locations)



- Section is conceptual and is subject to change during the detailed design process.
- Levels provided are indicative and subject to change during the detail design process.

Section E - Recreation Playing Fields



- Section is conceptual and is subject to change during the detailed design process.
- Levels provided are indicative and subject to change during the detail design process.

5. Infrastructure Co-ordination & Servicing

An Engineering Servicing Report has been prepared by engineering consultants, JDSi, **Appendix 5** refers. A summary of the Engineering Servicing Report is provided below.

5.1 Roads

The hierarchy for the roads within the Structure Plan area and the future subdivision development together with recommendations for public transport services, pedestrian and cyclist facilities has been summarised in the Movement Section above.

The internal roads are proposed to be to the City's standards which require a minimum 6.0m pavement in a minimum 13m wide road reserve for local residential roads. The design vehicle for intersections and sweeps/corners is proposed to be a single rigid vehicle i.e. rubbish trucks or service vehicles. The subdivision roads within the Structure Plan area will need to be constructed in accordance with the IPWEA Subdivision Guidelines and read in conjunction with the City's subdivisional 'Guidelines and Standards' and AUSTRoads requirements. All internal roads are owned and maintained by the City of Mandurah.

5.2 Sewerage

Water Corporation has advised that the Structure Plan area is located inside the current scheme planning and the pump station catchment has considered the sewer flows from the site. It is important to note that the Structure Plan area is situated within the catchment of the Gordon Road Waste Water Treatment Plant (GRWWTP).

The GRWWTP plant located south of the Structure Plan area currently has spare capacity. The existing capacity at GRWWTP is 12Ml/day. Current inflow (2010) to the plant is in the order of 8.5ML/day. On current and projected growth rates in the legitimate catchment of GRWWTP, the plant is expected to reach maximum capacity some time in 2015/16. A further upgrade to 16ML/day has been provisionally planned for 2016/17. This will accommodate future development within the catchment.

The planning allows for the Structure Plan area to gravitate towards to separate catchments, both coming from the south. One is via an extension of an existing DN300 gravity main which currently terminates at the southern boundary of the Structure Plan area, to the existing Badgerup Avenue PS.

The second is via a DN225 gravity main which terminates in Warburton Trail. This also gravitates to the existing Badgerup Avenue PS. The Badgerup Avenue PS has the additional capacity to service the Structure Plan area.

The Water Corporation has confirmed that the Pebble Beach WWPS further downstream is currently running close to its maximum capacity. This is an old pump station and is prone to gas attack. An upgrade is scheduled on the Corporation's CIP around 2015.

In light of the above, sewer is available to all proposed lots within the Structure Plan area in the short, medium and long term.

5.3 Drainage & Stormwater Management

Urban Water Management (UWM) is now a key part of any development process incorporating principles of integrating water and land use planning, considering all water sources in water planning, integrating water use and natural water processes and a total catchment integration of natural resource use and management (Ref. Stormwater Management Manual for Western Australia, DoW, April 2004, State Water

Strategy 2003 and State Water Plan 2007).

Stormwater drainage management is a major component of an overall UWM strategy for which achievement of the principals of the plan may be facilitated through the application of Water Sensitive Urban Design (WSUD) techniques during planning, design and construction of urban development projects. Objectives of WSUD include:

- Detention of stormwater rather than rapid conveyance;
- Use of stormwater to conserve potable water;
- Use of vegetation for filtering purposes; and
- Water efficient landscaping.

At a District Structure Planning level the Western Australian Planning Commission's objectives for UWM are defined in its Statement of Planning Policy No. 2.9 Water Resources, 2006. These comprise the development of broad stormwater management strategies for major flood control and guidelines for water quality management at a district scale.

This assumes that more detailed implementation plans will be prepared as a part of the ongoing subdivision planning when the local level land use pattern is being defined.

The broad objectives of the policy include; to protect, conserve and enhance water resources that are identified as having significant, social, cultural and or environmental values; assist in ensuring the availability of suitable water resources to maintain essential requirements for human and all other biological life with attention to maintaining or improving quality and quantity of water resources; and to promote and assist in the management and sustainable use of water resources.

5.3.1 Stormwater Management

The maximisation of stormwater recharge to the shallow aquifer through the adoption of 'Best Management Practices', promotes the dispersion and infiltration of runoff. These include the use of porous paving for roads and carparks, the diversion of runoff into road medians and road-side swales, drainage soakwells or linear soakage units to infiltrate runoff from road reserves or building roofs and private open space areas and the disposal of road runoff into infiltration basins within POS areas.

5.3.2 Water Quality Management

The maximisation of the quality of recharge water through the adoption of 'Best Management Practices' promotes the disposal of runoff via water pollution control facilities. This includes vegetated swales and basins, detention storages and gross pollutant traps and the implementation of non-structural source controls including urban design, community education, low fertiliser landscaping regimes, etc).

The District Water Management Strategy (DWMS) prepared for the Study Area outlines the district level UWM strategies and the Local Water Management Strategy (LWMS) for the Study Area. The LWMS provides the detail to support the Structure Plan.

5.3.3 Stormwater Collection, Treatment & Disposal

The Structure Plan area has varied ground conditions where some areas will have generally free draining soils with adequate separation to ground water and other areas where the clayey soil are at the surface and infiltration of water may be more difficult.

Drainage from public roads will be collected via side entry pits, combination gullies or open swales depending on the nature of the adjacent land uses, the

extent of traffic and pedestrian activity, etc. At source infiltration will be promoted for short recurrence interval events.

The drainage collection and conveyance system will be designed to cater for the runoff from storms with up to a 1 in 5 year recurrence interval. Infiltration basins would be designed to store runoff from up to 1 in 10 year storms. In all cases roads and POS would be designed to cater for the surface overflow for more severe storms with building pad levels set at least 500mm above the 1 in 100 year flood or storage level at any location.

In areas where infiltration is not possible the attenuation of runoff in basins will minimise flooding and quantity issues in the final receiving basins. The basins will also assist nutrient removal along with other measures such as suitable vegetation planting and the use of modified soils with high phosphorous retention capacity.

The overall strategy is currently being discussed with Emerge Associates and advice will be incorporated into the preliminary design concepts and detailed designs.

5.4 Groundwater

5.4.1 Groundwater Level Management

The preliminary earthworks levels contained indicate that the proposed development will have more than 6m separation to underlying groundwater. This significant separation demonstrates that a 500mm clearance between Maximum Groundwater Level (MGL) and inverts of storage basins will easily be maintained. A minimum 1.2m clearance between MGL and habitable floor levels will be maintained across the Structure Plan area.

The levels shown in the preliminary earthworks and landscape sections provided in **Appendix 4** support Criteria GW2 and GW3 (refer Table 6). The final earthworks levels for the development will be presented within the UWMP.

5.4.2 Groundwater Quality Management

The main objective of the management of groundwater quality is to maintain or improve the existing groundwater quality. This can be achieved by reducing the total nutrient load to groundwater from sources within the development and by improving the groundwater via treatment of surface runoff prior to infiltrating to groundwater.

The reduction of nutrient loads to groundwater will be achieved by the following measures:

- Direct stormwater to vegetated Bio-retention areas (BRAs) or swales.
- BRAs and swales will be underlain with a 300mm layer of soil media suitable for nutrient removal. The soil media can be comprised of naturally occurring soils with a high PRI (>10) or an engineered media with appropriate specification (e.g. Eco media). The exact media to be used will be confirmed at UWMP stage.
- Minimising fertiliser use to establish and maintain vegetation within POS areas and road verges.
- Utilising drought tolerant turf species that require minimal water and nutrients.
- Roll-on turf will be used within POS areas to prevent the high nutrient input requirement during establishment of turf.

The above measures will improve the quality of the water prior to it infiltrating into the underlying groundwater and will assist in achieving Criteria GW1.

Table 5: Groundwater Management Criteria Compliance

Criteria Number	Criteria Description	Manner in which compliance will be achieved
GW2	Groundwater quality leaving the Structure Plan area should be the same, or better, than that entering the subject land	Direct 1-year 1-hour ARI event runoff to BRAs or vegetated swales
		BRAs and vegetated swales will be underlain with a 300mm layer of soil media suitable for nutrient removal
		Minimise fertiliser use in POS and road verges
		Use roll-on, drought tolerant turf
GW2	Maintain 500mm clearance between inverts of storage basins and MGL	The levels shown in the Landscape sections provided in Appendix B of **Appendix 4** indicate that a 500 mm clearance between inverts of storage basins and MGL will be maintained
GW3	Maintain 1.2 m between habitable floor levels and MGL	The levels shown in the preliminary earthworks provided in Appendix D of **Appendix 4** indicate that a 1.2m clearance between habitable floor levels and MGL will be maintained

(*LWMS, Emerge 2014, Appendix 4*).

5.5 Power

The existing Western Power distribution in the vicinity of the Structure Plan area comprises a 3-phase 22kv high voltage overhead aerial line on the western side of Mandurah Road. There is also a 3 phase underground cable on the western side of Mandurah Road. Either supply may be able to service the proposed development. However, a Western Power feasibility study should be requested to confirm the power supply to the development.

Based on Western Power required loading for the development, estimated total loading would be approximately 6311 KVA = 11 x 630 KVA transformers plus 4 x 2+3 high voltage switch gear kiosks.

It should be noted that as part of the development requirements (WAPC conditions) it will be expected that any existing overhead power lines that are adjacent to and on the development side of the road reserve will require undergrounding as the project develops.

As the development can potentially be supplied from the existing surrounding infrastructure it is has foreseen that the supply of electrical power to this development is not a hindrance. The above advice is however based on desktop studies and information obtained from the Western Power DFIS online database.

5.6 Telephone

As a result of the Australian Government's decision to roll out a National Broadband Network (NBN) the ownership issues of delivering the wholesale fibre to the home system have been transferred to the Government with a number of retail service providers likely to offer services over the network.

Telstra has advised there is existing telecommunication infrastructure surrounding the subject land. A fibre optic main owned by Telstra is located within the eastern side road reserve of Mandurah Road, adjacent to the

development. Optus and Amcom also own infrastructure located within the road reserve of Mandurah Road. It is assumed the connection to the Structure Plan area will be via the main located in Mandurah Road.

NBN Communications has advised they will not comment on whether the development is in their fibre footprint until an application is made for reticulation. However information obtained from Telstra indicates the Structure Plan area is earmarked for NBN infrastructure, with the implication that the existing developments in the area have also been approved for NBN reticulation.

General communication services for the development will consist of the installation of a standard pit and pipe network in accordance with NBN Co guidelines and standards. The current design practice for road reserves, pavement and verge provisions will make adequate allowance for services including broadband in accordance with the agreed Utilities Service Providers handbook. There will be some local land requirements for equipment sites, similar to current provisions which will be accommodated at detailed subdivision stage.

Developers will be required to cover the costs of trenching and ducting for the infrastructure, however NBN Co will cover the other costs of installing fibre infrastructure, including backhaul.

All communication assets within the development will remain in the ownership of the provider and easements will need to be granted in favour of the service provider.

5.7 Gas

ATCO Gas Networks has advised it has existing 200 steel high pressure mains located within the west side of Mandurah Road, road reserve. A connection from this main will be possible which will be extended to service the subject land. The internal gas network for the subdivision will be installed within the common trench at no cost to the developer. If there is an extension required to connect to the nearest high pressure gas main the developer will be required to pay for the trenching to the gas main as a headworks cost.

5.8 Water Reticulation

The Water Corporation owns and maintains an existing water reticulation system adjacent to the subject land.

Three 200P water reticulation mains presently terminate at or near the southern boundary of the Structure Plan area and are available to serve the site – at the end of Badgerup Avenue, Yindana Boulevard and Warburton Trail. These will need to be extended in a staged manner as a linked loop system of 200mm mains through the subdivision as needed. The North Mandurah zone boundary is now planned to be extended northwards to pick up this and surrounding land. Water source for this area will be from the south from the North Mandurah Tank via distribution mains on routes yet to be decided. These are external to the subject land.

There is an existing high level booster zone to cater for the higher-lying land in the Lakelands subdivisions immediately to the south. It is likely that the overall scheme planning review will indicate the need to extend this HL zone further north to pick up the higher, eastern parts of subject land.

Information obtained from the Water Corporation indicates that the development of the Structure Plan area can be supplied without further distribution mains, by way of extension from existing water mains in the area.

6. Implementation

6.1 Site Works

Based on the preliminary geotechnical advice the current earthworks concept allows for large cut to fill of existing undulating materials, with a net import of clean sand across the Structure Plan area to top dress the lots. This is consistent in Peet's Lakelands Estate where all lots are finished with 600mm of clean sand to ensure suitable drainage requirements and also builders requirements. There is an estimated import volume of 480,000m3 for the Structure Plan area (excluding filling to the Primary School site). This is subject to further assessment during the earthworks design works.

Based on the updated information provided by Emerge Associates, the recommended design criteria for drainage infiltration in conjunction with the recorded permeability testing from CMW will be adopted. Retaining walls will be necessary along the longitudinal spines of the development cells and to the side of lots to ensure level building lots. Retaining walls within the development will be generally as per the City's requirements.

The earthworks levels will also be constrained by the following:

- Further detailed Geotechnical recommendations. Detailed investigations are currently underway, the results of which will be incorporated into the civil design as necessary.
- Drainage outfall levels for the stormwater drainage systems. This is subject to further advice provided by Emerge and will be verified during preliminary design. Although the drainage systems will follow the design grade of the subject land, they generally require a free outfall above the Average Annual Maximum Groundwater Level (AAMGL).
- The invert level of the existing sewer gravity mains that the Structure Plan area will discharge into. Based on this invert and development layout, the north east corner of the Structure Plan area will require considerable fill to allow the site to gravitate at minimum sewer grades. This will be verified during preliminary design.
- The tie in levels for the adjacent Peet Lakelands Estate will need to be taken into consideration. JDSi have met with Tabec, the consulting engineers for the adjacent Structure Plan area who have provided design levels and JDSi has also received a feature survey of the existing development. The current design concept has all adjacent lot levels matching into design levels so there will be no interface walls to the existing development.
- The tie in levels for the bush forever site to the north will need to be managed by using batters and/or retaining walls. Under no circumstances will JDSi be able to batter into the existing bush forever site without prior approval. The earthworks and road design will match into the adjacent levels where possible.
- PTA have provided additional advice confirming that retaining walls will be accepted along the eastern boundary with the Rail Line, however no excavations works or wall footings will be allowed within the reserve without prior approval. As the walls will vary from 3m in the south of the Structure Plan area, and up to 10m in the north east, this will necessitate the use of alternate wall construction and materials other than limestone. This is currently being investigated and will be finalised during detailed design.

- Public Art or architectural treatments to reflect the existing artwork along the Rail Line will be provided along the proposed exposed portions of the proposed retaining wall, subject to detailed detail at subdivision stage. Refer to **Figure 26** for a cross-section of the potential retaining wall.

The bulk earthworks will need to be undertaken in accordance with recommendations from a detailed geotechnical investigation and Australian Standard AS3978-1996 "Earthworks for Residential and Commercial Developments".

6.2 Staging

The development of the Structure Plan area will be implemented in stages (**Figure 27** refers). This staging plan is indicative as timing, location and composition of the future stages will be dependent on market demand.

The staging will commence in the southern portion of the Estate, namely the south-central and south-eastern portion for Display Village, Sales Office and 'first release' residential purposes. The staging will commence in the southern portion of the Estate, namely the south-central and south-eastern portions for Display Village, Sales Office and 'first release' residential purposes. The development will move northwards and westwards before completion in the north-eastern portion of the site.

The provision of engineering infrastructure and primary internal road network will also need to be staged to suit development demand and/or suitable access at an early stage. A detailed programme for this will prepared as part of ongoing detailed planning and design of service infrastructure.

6.3 Mandurah Road Signalised Intersection

A four-way signalised intersection is required on Mandurah Road at the planned access to the Madora Bay North and Lakelands North (Ocean Hill) Structure Plan areas. The timeframe for development of Madora Bay North, west of this intersection, is subject to a third party developer, however it is projected to be a long term proposition.

In the interim, a signalised T-intersection will be provided at the main entry into the Lot 101, Lakelands North (Ocean Hill) Structure Plan area. The design of the T-intersection will be to a standard that allows for the western leg of the ultimate four-way intersection to be designed and constructed efficiently.

The initial T-intersection will be fully funded by the developer of Lot 101; with upgrade to the ultimate four-way intersection funded by the developer of the Madora Bay North Structure Plan area. Any upgrade works associated with the widening of Mandurah Road is to be undertaken and funded by Main Roads WA.

The T-intersection to service the Lakelands North (Ocean Hill) Structure Plan area at Lot 101 Mandurah Road will be constructed by (whichever is the latter):

- the completion of construction of the 281st lot; or
- the sunset date being 31 December 2020.

The legal agreement, detailing obligations to construct the subject T-intersection, was endorsed by the landowners and Main Roads WA on 21 December 2019. Endorsement of the civil construction drawings was issued by MRWA on 2 November 2020, and with construction commencing early 2021.

STAGING PLAN

Figure 27