Lot 1507 Eighty Road, Baldivis
Local Structure Plan

December 2012

Prepared for
Rockingham Park Pty Ltd

Taylor Burrell Barnett
Town Planning & Design

DOCUMENT HISTORY AND STATUS

Lot 1507 Eighty Road, Baldivis - Local Structure Plan 00/075	Revision	Reviewer	Date Issued
Prepared By: **Taylor Burrell Barnett Town Planning and Design** 187 Roberts Road SUBIACO WA 6008 Phone: 9382 2911 Fax: 9382 4586 admin@tbbplanning.com.au	0	BDM	14.07.2011
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	2	DR	05.04.2012
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In association with: **Emerge Associates:** Landscape Architect **ENV Australia** : Environment & Urban Water Management **Serling Consulting**: Civil Engineering **Transcore:** Transport Planning **Whelans:** Mapping & Survey	4	DR	18.12.2012

CERTIFICATION OF AGREED STRUCTURE PLAN

CERTIFIED THAT THIS LOCAL STRUCTURE PLAN

WAS ADOPTED BY RESOLUTION OF

THE WESTERN AUSTRALIAN PLANNING COMMISSION ON

…… Date

Signed for and on behalf of the Western Australian Planning Commission

……

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

……. Witness

…….. Date

AND BY

RESOLUTION OF THE COUNCIL OF THE CITY OF ROCKINGHAM ON

……. Date

AND PURSUANT TO THE COUNCIL'S RESOLUTION HEREUNTO

THE SEAL OF THE MUNICIPALITY WAS AFFIXED IN THE PRESENCE OF:

…….
Mayor, City of Rockingham

…….
Chief Executive Officer, City of Rockingham

……. Date

This Structure Plan is prepared under Part 4 of the City of Rockingham Town Planning Scheme No.2

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APPENDICES

Appendix No.	Document Title	Approval Required or Support Document Only	Approval Status	Approval Agency
A	Pre-Lodgement Consultation Table	Support Document	-	-
B	Certificate of Title	Support Document	-	-
C	Environmental Assessment Report	Support Document	-	-
D	Supplementary Tree Information	Support Document	-	-
E	Fire Management Plan	Support Document	APPROVED	City of Rockingham
F	DoE Acceptance of Primary School Site	Support Document	-	-
G	Public Open Space Concepts	Support Document	-	-
H	Transport Assessment	Support Document	-	-
I	Nairn Drive Access Strategy	Support Document	-	-
J	Local Water Management Strategy	Approval Required	APPROVED	Department of Water
K	Service Infrastructure Report	Support Document	-	-

1 PLANNING BACKGROUND

1.1 BACKGROUND

This Local Structure Plan (LSP) has been prepared on behalf of Rockingham Park Pty Ltd, the owners of Lot 1507 Eighty Road, Baldivis and developer of Parkland Heights Estate.

An approved Comprehensive Development Plan (CDP) currently exists over approximately half of the site (west of Nairn Drive), with two stages of subdivision and a display home village currently under construction in accordance with that plan.

Due to the length of time since the original CDP's 2002 adoption, and the significant change in planning policy and market acceptance that has occurred since it was designed, Rockingham Park now wish to proceed with a comprehensive review of the total landholding including all undeveloped land either side of Nairn Drive.

1.2 INTRODUCTION & PURPOSE

Local Structure Plans are forward-planning documents that resolve regional and/or localised issues concerning land use and infrastructure and are often prepared as a precursor to extensive subdivision and development.

This Structure Plan has been prepared in accordance with Section 4.2 of Council's Town Planning Scheme in order to facilitate urbanisation of the subject site, being the site's transition from a rural to urban use. Through the use of graphics and supporting technical data, the Structure Plan recommends the preferred:

- pattern of land use;
- network and hierarchy of roads;
- public open space network; and
- servicing strategy for the precinct.

Once endorsed, the LSP will become the new reference document for all future subdivision and development within the subject site. It has been prepared with due regard to the requirements of Council's Scheme and is supported by a range of technical reports including environmental, traffic, hydrological and servicing analysis that can be found as Appendices to the rear of the report.

As required by the Department of Planning, the LSP has been prepared in accordance with the requirements of *Liveable Neighbourhoods Edition 3*, and has been structured having regard for both the City's Planning Procedure 1.6 (*Preparation and Assessment of Structure Plans*), and the Western Australian Planning Commission's *DRAFT Structure Plan Preparation Guidelines (August 2011)*.

1.3 PROJECT TEAM

This Local Structure Plan has been prepared by Taylor Burrell Barnett (TBB) in collaboration with the following team of specialist consultants:

ENV Australia
Environment &
Urban Water Management

Emerge Associates
Landscape Architect

Transcore
Transport Planning

Serling Consulting
Civil Engineering

Whelans
Mapping & Survey

Formulation of the LSP has involved consultation with the City of Rockingham, relevant Service Authorities and the Department of Planning, as summarised in the Pre-Lodgement Consultation Table attached as **Appendix A**.

LOCATION PLAN

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Pty Ltd Project

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figure 01

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1.4 LAND DESCRIPTION

1.4.1 LOCATION

Lot 1507 lies 10 km south east of the Rockingham Strategic Metropolitan centre and 45 km south of the Perth Central Business District (refer **Figure 1**). The Kwinana Freeway lies approximately 4 km to the east of the site providing convenient access to the rest of the Perth Metropolitan Region and beyond.

1.4.2 AREA & LAND USE

Measuring 120.8249 ha, research indicates that the site was not subject to any specific land use prior to 1963. Sometime between 1963 and 1974 the land was cultivated for forestry product purposes. There is no indication that the site was utilised for any other land use between 1973 and 2000. The Forest Products Commission began harvesting at the site sometime between 2001 and 2004 and completely withdrew from the land in 2010.

Prior to the commencement of the Stage 1 works, infrastructure associated with the site is limited to unsealed roads which run through the site and along the site perimeter. No other man-made infrastructure or dwellings were located on the site.

1.4.3 LEGAL DESCRIPTION & OWNERSHIP

The land is described as Peel estate Lot 1507 on Diagram 94627 being the whole of the land in Crown Title Volume 3115 Folio 948. The land is wholly owned by Rockingham Park Pty Ltd, with the only encumbrance being an existing 18m wide power line easement running along the western boundary of the property. A copy of the Certificate of Title is included as **Appendix B**.

1.5 PLANNING FRAMEWORK

1.5.1 METROPOLITAN REGION SCHEME

Lot 1507 is predominantly zoned 'Urban' under the Metropolitan Region Scheme (MRS). The only exception is the future alignment of Nairn Drive, which divides the site diagonally in half and is identified as an 'Other Regional Road' within a 40m wide reservation (refer **Figure 2**).

1.5.2 CITY OF ROCKINGHAM - TOWN PLANNING SCHEME NO.2

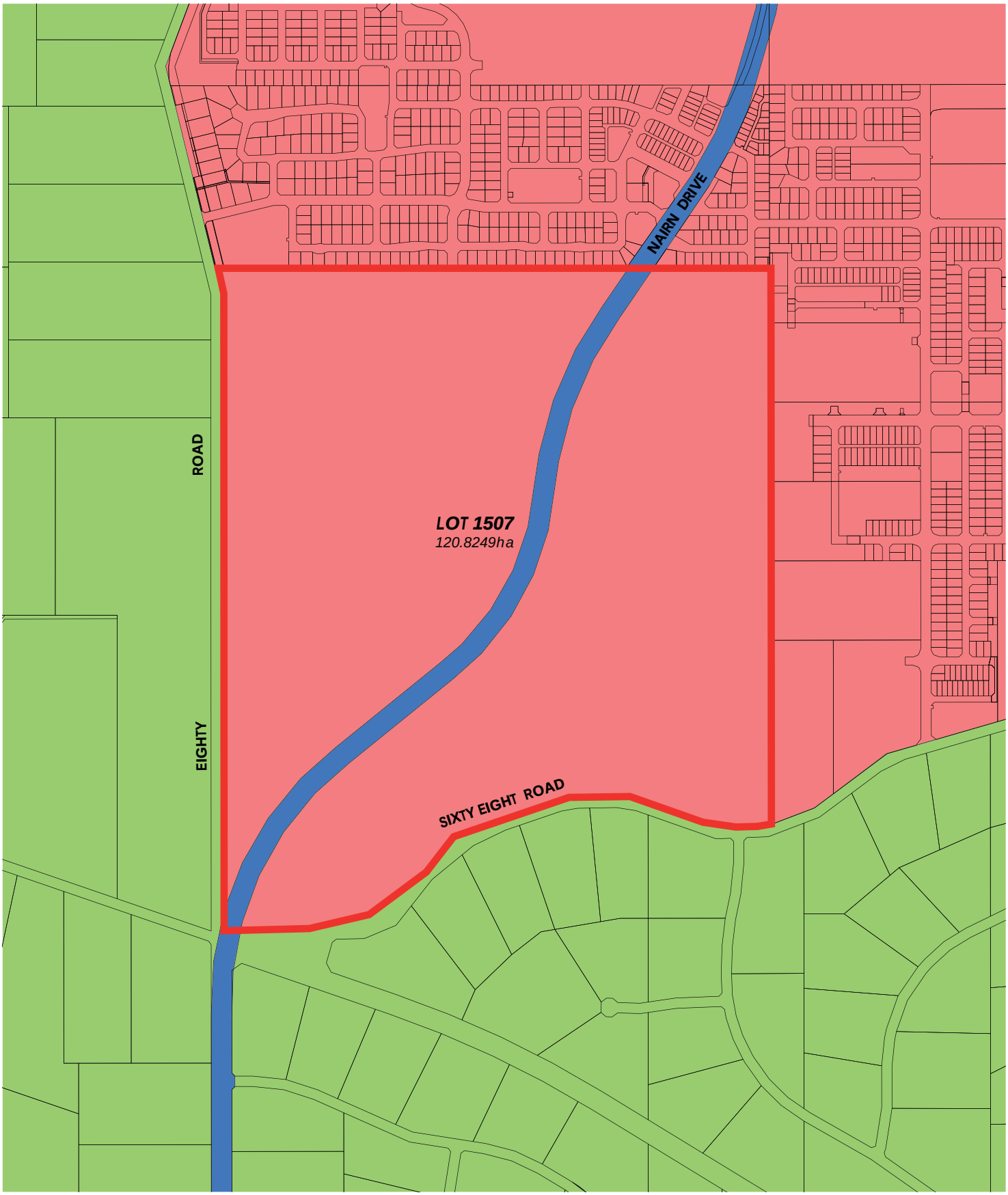
Aside from the MRS 'Other Regional Road' reservation the entirety of Lot 1507 is zoned 'Development' under the City of Rockingham's Town Planning Scheme No. 2 (TPS2 - refer **Figure 3**).

Clause 4.2.3 of the TPS2 defines the purpose of the Development Zone as follows:

- To identify areas requiring comprehensive planning prior to subdivision and development; and
- To coordinate subdivision, land use and development in areas requiring comprehensive planning.

Clause 4.2.4 goes on to specify the requirement for an LSP to be adopted over Development zoned land prior to substantive subdivision or development.

This requirement is then reiterated within Schedule 9 of TPS2, which identifies the land as Development Area No.19 for which an approved Structure Plan is required to guide future subdivision and development. The purpose of this LSP is to fulfil these requirements of TPS2.



LEGEND

RESERVES

OTHER REGIONAL ROAD

ZONES

URBAN

RURAL

OTHER

SUBJECT SITE

EXISTING ZONING METROPOLITAN REGION SCHEME

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Pty Ltd Project

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figure **02**

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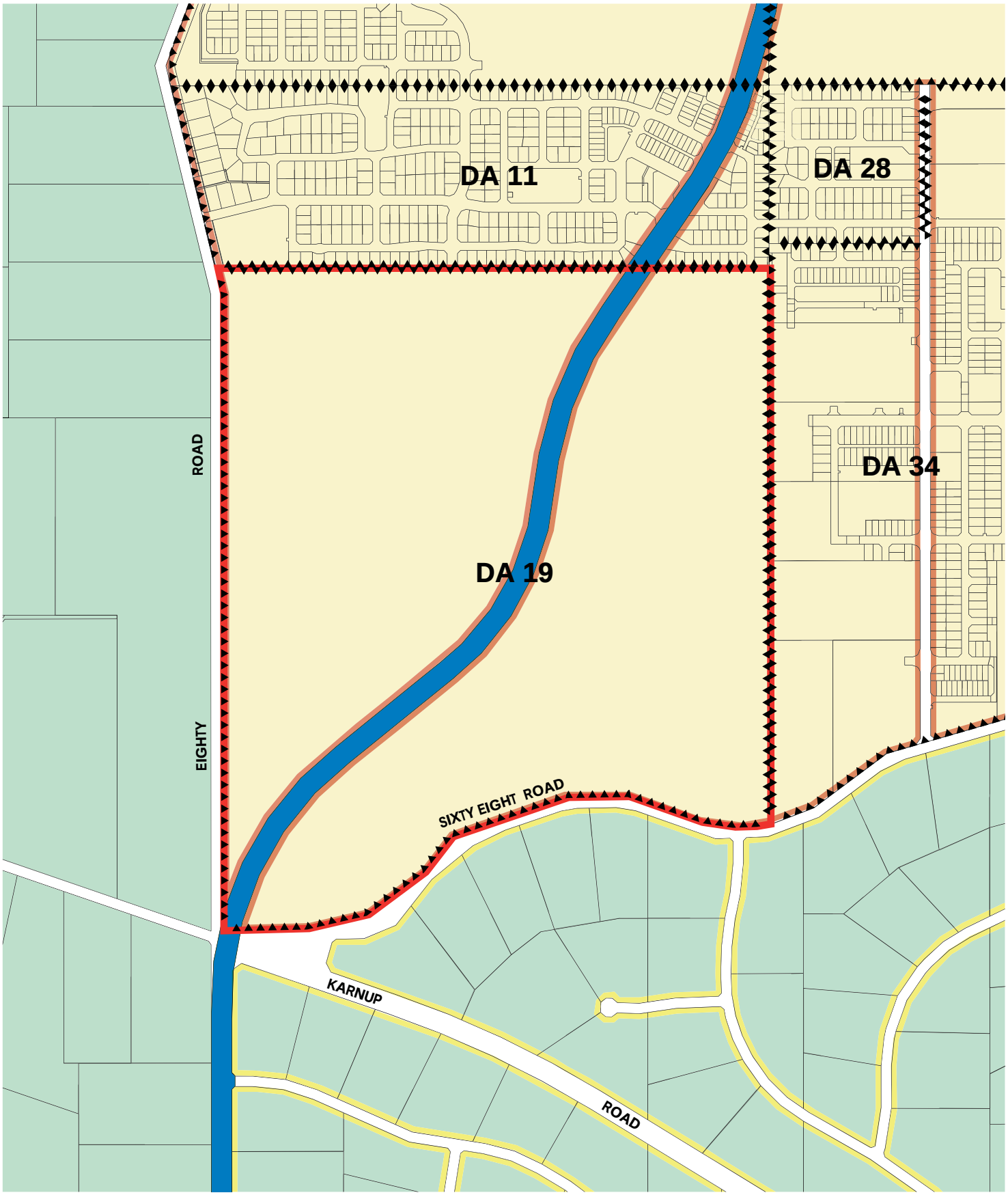

LEGEND

METROPOLITAN REGION SCHEME RESERVES

- OTHER REGIONAL ROADS
- LOCAL ROADS

ZONES

- DEVELOPMENT
- RURAL
- SPECIAL RURAL

OTHER

- DEVELOPMENT AREA (see scheme text)
- SUBJECT SITE

EXISTING ZONING TOWN PLANNING SCHEME No. 2

Lot 1507 Eighty Road, Baldivis

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LEGEND

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Department of Planning, WA
On behalf of:
Western Australian Planning Commission
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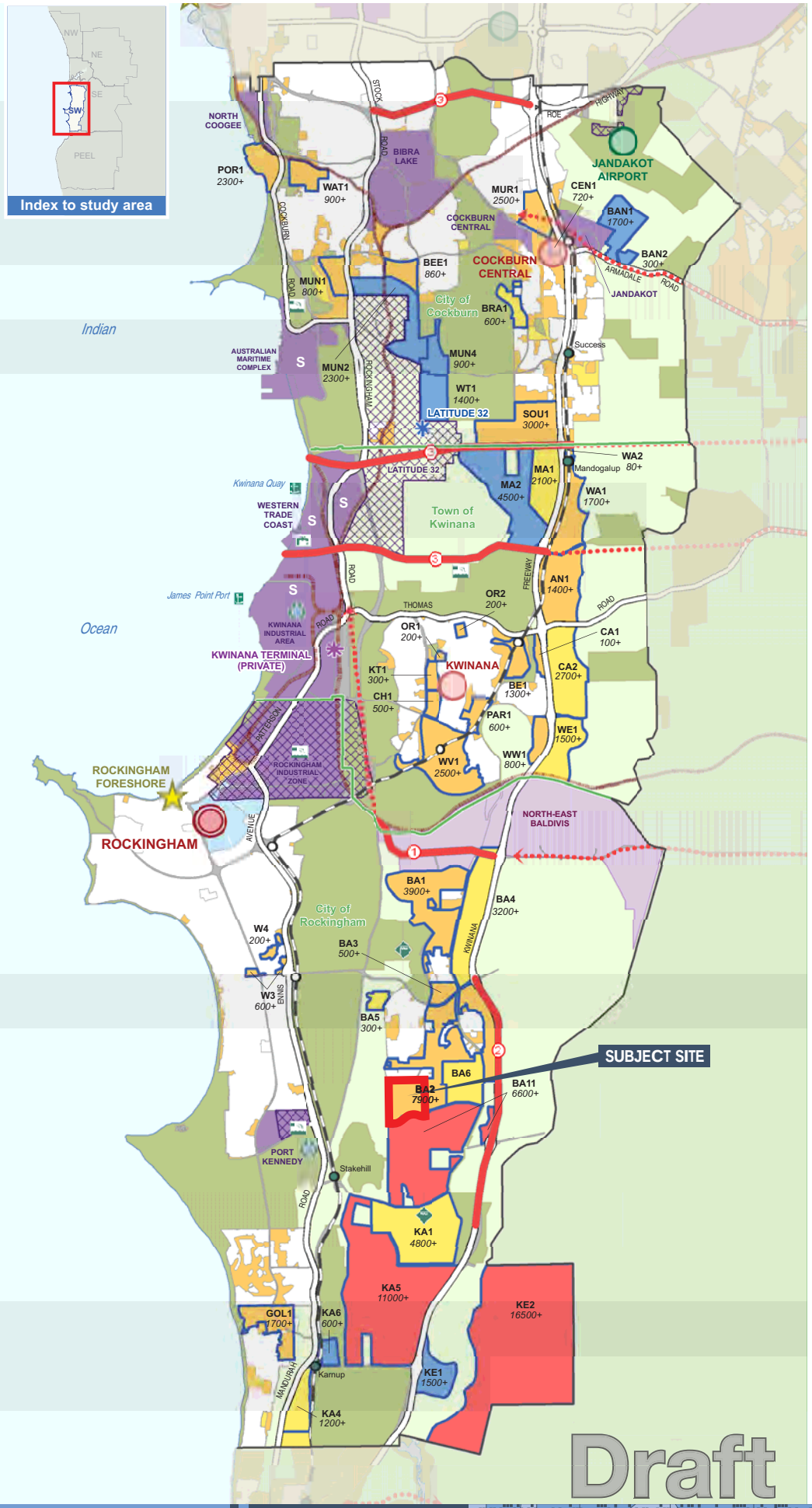
Nts-per\MapGis\Projects\perth\2031\
Outer_Region\mxd\PublicationMaps\
Fig64_SouthWestSubRegionSpatialFrameworkMap.mxd

Base information supplied by:
Western Australian Land Information Authority
LI 430-2009-4
Railways supplied by:
Geoproject Solutions Pty Ltd

Note:
Map is based on Region Scheme zones and
does not include redevelopment authority areas.

- S — strategic industrial centre
- existing industrial centre
- priority industrial site - subject to investigation
- 2009 draft industrial land strategy area
- existing developed area
- central city area
- road or rail reservation
- region scheme reserves
- rural
- waterways
- urban expansion area 2011-2015
- urban investigation area 2011-2020
- urban zoned undeveloped
- urban deferred zoned undeveloped
- rural land being rezoned
- ABC1 — area identifier
- 1234+ — connected city scenario dwelling yield
- strategic metropolitan centre
- secondary centre
- specialised centre
- metropolitan attractor
- intermodal freight terminal
- planned intermodal freight terminal
- proposed water treatment plant
- major water storage / reservoir
- proposed water recycling plant
- proposed waste water treatment plant
- proposed port facility
- existing passenger railway station
- proposed passenger railway station
- existing metropolitan railway (indicative)
- existing freight railway
- major roads
- new road construction (MRWA)
- road upgrading (MRWA)
- road planning (MRWA)
- strategic road planning
- local government boundary
- sub-region boundary



DRAFT SOUTH WEST SUB-REGIONAL SPATIAL FRAMEWORK

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Pty Ltd Project

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1.5.3 STRUCTURE PLANNING

1.5.3.1 *DRAFT* OUTER METROPOLITAN SUB REGIONAL STRATEGY

Sub-Regional strategies provide a framework for delivering the objectives of Directions 2031 (the highest level of strategic metropolitan planning in Western Australia). They identify a strategic plan of actions, stakeholder responsibilities and timeframes for delivery. Importantly, they also express dwelling targets based on defined areas that strive to improve land efficiency and counter the trend towards urban sprawl.

The *Draft Outer Metropolitan Sub-Regional Strategy* (2010) identifies Lot 1507 as being located within the Cell 'BA2' area, being undeveloped land within the existing Urban zone. Encompassing the undeveloped balance of the Baldivis South District Structure Plan area and small portions of surrounding land, a target of an additional 7,900 dwellings is identified in the Draft Strategy for this cell (refer **Figure 4**).

A finalised version of the Strategy was due to be released by the Department of Planning in late 2011.

1.5.3.2 SOUTH WEST CORRIDOR STRUCTURE PLAN

The *South West Corridor Structure Plan* (1993) provides the current framework for urban development within the South West corridor. The Structure Plan also identifies the location and hierarchy of activity centres, major employment areas and proposals for regional open space and regional roads.

The SWCSP classifies the subject site as Category 'A1 – Future Urban', being land that has no constraints to urban development within the short-term future (refer **Figure 5**).

1.5.3.3 SOUTH BALDIVIS DISTRICT STRUCTURE PLAN

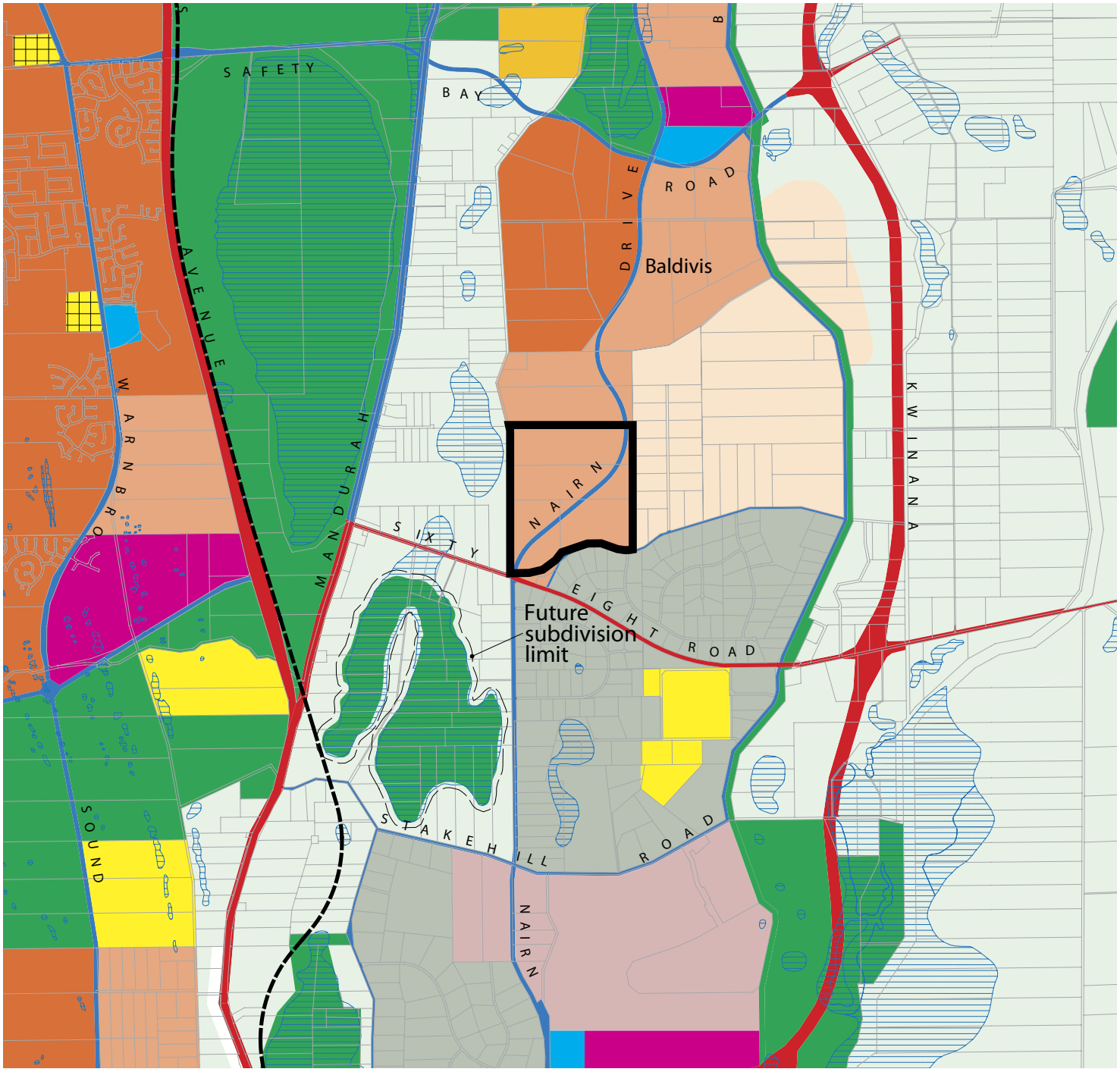
The South Baldivis District Structure Plan (DSP) provides the strategic framework for the coordination and preparation of LSP's in this locality. The subject land is identified as being located within Precinct 2 of the DSP (refer **Figure 6**), for which the following development parameters are attributed:

- Gross area of 193.68 ha, with a predominant zoning of 'Urban';
- Approximate yield of 1,593 lots with an ultimate population of 4,301 people;
- A Neighbourhood Centre with a maximum Retail NLA of 2,070m2;
- Approximately 22.76 ha of Public Open Space (POS) and Drainage; &
- A government Primary School.

On a proportional basis the LSP satisfies the requirements of the DSP as demonstrated in the following table:

Category	DSP Target	LSP	Relative Proportion
Gross Area	193.68 ha	120.82 ha	62.4%
Dwelling Yield	1593	1447	90.8%
Population (@ 2.7 persons / dwelling)	4301	3907	90.8%
Neighbourhood Centre (2,070m^2 NLA)	✓	(Lot 731)	-
POS & Drainage	22.76 ha	13.01 ha	57.2%
Primary School	✓	✓	-

The LSP is therefore consistent with strategic direction provided by the DSP and the nominal requirements pertaining to the land. The higher than expected yield is a direct response to the targets set in the Outer Metropolitan sub-Regional Strategy. Its performance against the criteria expressed in Liveable Neighbourhoods is outlined in **Section 3.4.1**.



LEGEND

- SUBJECT SITE
- MRS Urban and Urban Deferred
- Category A1 Future Urban
- Category A2 Future Urban
- Category B Future Urban
- Major Commercial/Institutional and Employment C
- Industrial
- Mixed Business Areas
- Institutional
- Tourist and Recreational Development
- Public Utilities
- Open Space
- Rural
- Rural Living - Ultimate Urban
- Area subject to further study
- Basic Raw Materials
- Mining Related Activities
- Wetlands
- Primary Road
- District (Distributor)Road
- Existing Railway Reserve
- Proposed Rapid Transport Route
- Air Pollution Shadow

* Refer to the Urban Expansion Policy Statement (1990)

Note: All alignments and boundaries are indicative only

EXTRACT OF SOUTH WEST CORRIDOR STRUCTURE PLAN

Lot 1507 Eighty Road, Baldivis

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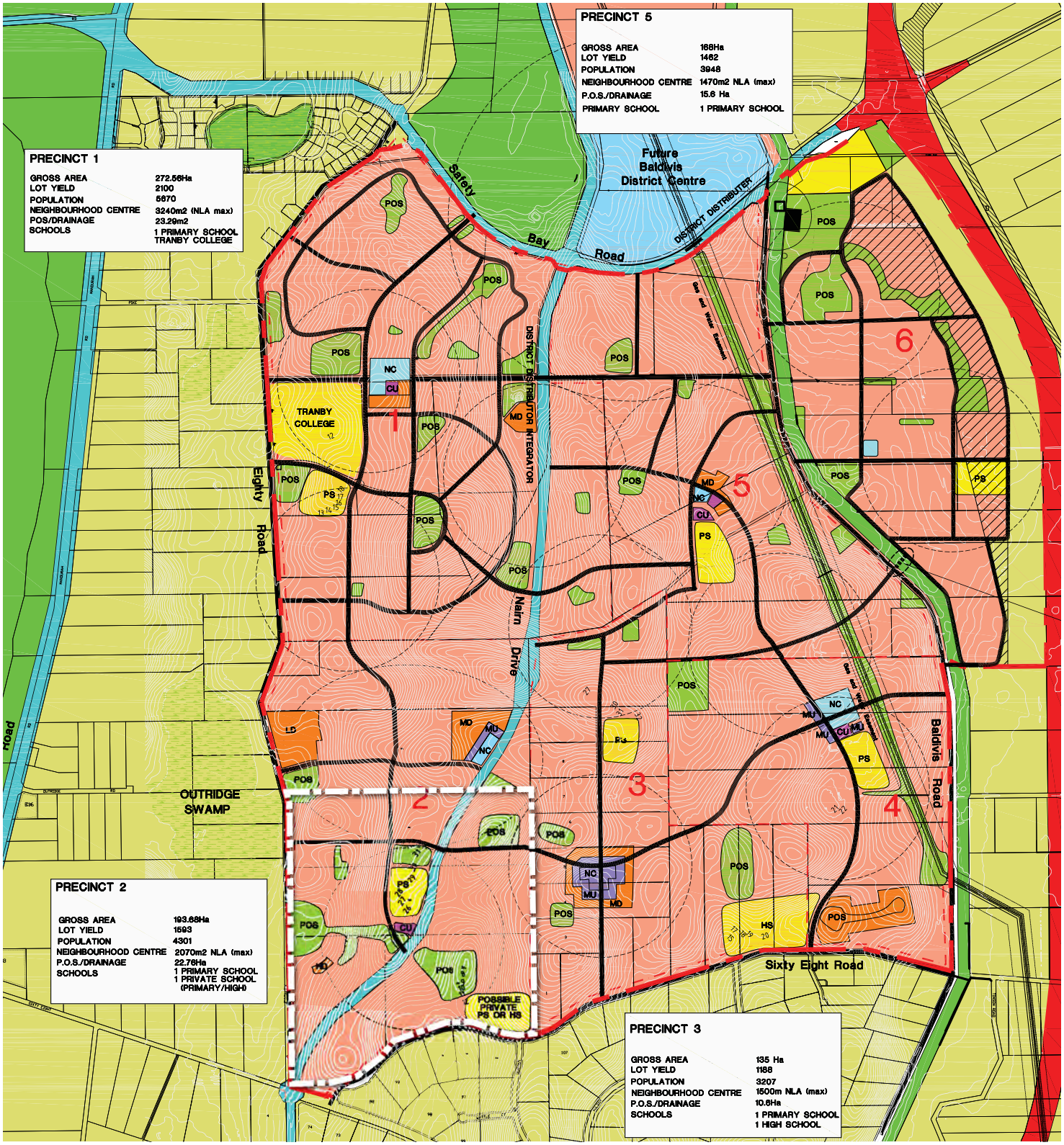

LEGEND

- SUBJECT SITE
- STRUCTURE PLAN BOUNDARY
- PRIMARY DISTRIBUTOR ROAD
- DISTRICT DISTRIBUTOR ROAD A & B
- NEIGHBOURHOOD CONNECTOR ROADS
- REGIONAL OPEN SPACE
- PUBLIC OPEN SPACE & DRAINAGE
- RURAL
- LOCAL CENTRES (LC)
- URBAN
- POTENTIAL URBAN LAND
- SCHOOLS
- NEIGHBOURHOOD CATCHMENTS
- WALKABLE CATCHMENTS
- PUBLIC PURPOSE

NC	Neighbourhood Centre
LD	Low Density
MD	Medium Density
MU	Mixed Use
CU	Community Use

* Home Stores not included, refer to Retail Strategy

SOUTH BALDIVIS DISTRICT STRUCTURE PLAN

Lot 1507 Eighty Road, Baldivis

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figure 06

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ENDORSED COMPREHENSIVE DEVELOPMENT PLAN (2002)

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1.5.3.4 EXISTING COMPREHENSIVE DEVELOPMENT PLAN

A Comprehensive Development Plan (CDP) for Lot 1507 was approved by the Western Australian Planning Commission on the 27th November 2002. Limited to west of Nairn Drive, the CDP provides for conventional residential development across the site inclusive of a Primary School, community centre, POS network and limited commercial opportunities. An indicative road network is also depicted over the land east of Nairn Drive.

Clause 4.2.11 of TPS2 empowers any CDP duly approved by the Council and the Commission under Clause 5.25 of the former Town Planning Scheme No.1 as if it were approved as a Structure Plan under Clause 4.2.6.15 of TPS2. Thus, pending approval of this LSP, the CDP remains the current operational Structure Plan for Lot 1507.

On the 2nd December 2010, and again on the 21st March 2011, minor modifications to the CDP relating to Stages 1 and 2 of Parkland Heights Estate were approved by the City pursuant to Clause 4.2.7 of TPS2. A copy of the current Structure Plan is included as **Figure 7**.

1.5.4 RELEVANT PLANNING POLICIES

1.5.4.1 LIVEABLE NEIGHBOURHOODS (WAPC, 2007)

Liveable Neighbourhoods (LN) is the Western Australian Planning Commission's operational policy guiding the design and approval of structure plans for greenfield sites. The objective of LN is the delivery of new developments that provide high quality living, working and recreational environments, thereby contributing to the successful implementation of the *State Planning* and *State Sustainability Strategies*.

The LSP meets the requirements of LN, with a particular focus on the following key aims:

- An urban structure based on interconnected, safe and walkable neighbourhoods;
- Creating a sense of community, identity and a sense of place;
- Providing a variety of lot sizes and housing types to cater for the diverse housing needs of the community at density that can support local services and public transport; and
- Maximising land efficiency wherever possible.

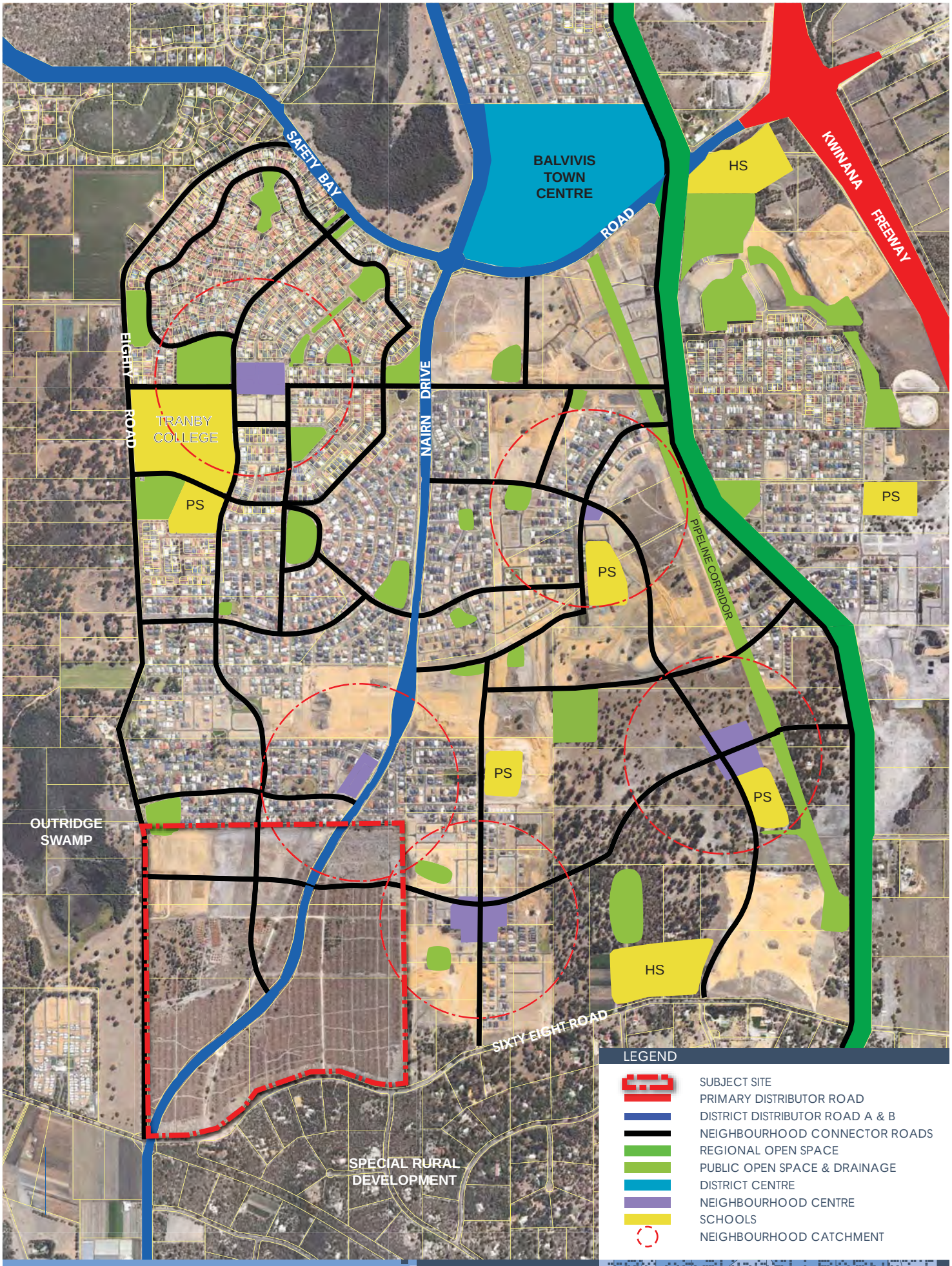
1.5.4.2 PLANNING POLICY NO 3.4.1 – PUBLIC OPEN SPACE (CITY OF ROCKINGHAM, 2009)

This Policy sets out "the objectives and policy provisions which the Council shall have due regard to in assessing the provision, location, design and development of POS within the City of Rockingham.

Some of the key policy statements include:

- Requirement for the lodgement of a POS Concept Plan, POS Schedule and Local Water Management Plan to accompany proposed Structure Plans;
- Criteria for the provision of restricted POS, community purpose sites and the joint use of POS;
- Criteria for the location, design, development and maintenance of POS; and
- Provisions for cash-in-lieu and urban water management.

The proposed LSP meets the requirements of the Policy other than where detailed in **Section 3.5** of this report.



LOCAL CONTEXT PLAN

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Pty Ltd Project

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figure 08

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1.6 CONTEXT ANALYSIS

Figure 8 outlines the planning context of Lot 1507 and the surrounding area. Significant elements within the locality include:

- Kwinana Freeway: Primary regional transport route connecting Baldivis with the Perth Central Business District (CBD) to the north, Mandurah to the south, and the South West Region beyond;
- Safety Bay & Karnup Roads: Primary east-west aligned regional transport routes linking Baldivis with Rockingham to the west, and existing and planned connections eastward to the Kwinana Freeway;
- Nairn Drive: Secondary north-south aligned transport route through the Centre of the Baldivis Urban Area, connecting Mundijong Road in the north to Paganoni Road in the South;
- Public Transportation: Limited to bus services from Warnbro Train Station on the South West Metropolitan Railway Line inclusive of connections to the nearest major activity centre (Baldivis District Centre), located at the convergence of Nairn Drive, Baldivis and Safety Bay Roads;
- Major Employment Areas in the Region: Rockingham and Kwinana Industrial Areas in addition to the Rockingham Strategic Metropolitan Centre and Perth CBD;
- Two Public High School sites servicing the South Baldivis Area: An existing facility located at the corner of Safety Bay and Baldivis Roads, and a second future facility to the east of Lot 1507 along Sixty-Eight Road;
- Parmelia High Pressure Gas Pipeline Corridor: Running through the Urban Area well east of Lot 1507;
- Outridge Swamp: A conservation category EPP Wetland located a short distance north west of Lot 1507;
- Rural Wedge: Land west of Eighty Road used for grazing, market gardens and lifestyle accommodation purposes. The rural character of the land is protected via its 'Rural Living' designation under the City's *Rural Landuse Strategy*;
- Rural Residential: A developed 'Special Rural' estate lies immediately to the south of the Lot 1507, although there is a strong likelihood that overtime this will change, with the land being identified as Cell 'BA11' in the Outer Metropolitan Sub-Regional Strategy – an 'Urban Investigation Area (2011-2020)'.
- Urban Fringe: Land to the north and east forms part of the rapidly developing Baldivis Urban Area.

The Context Analysis plan highlights the lack of a neighbourhood nodal point within the central part of Lot 1507, and the significant impediment Nairn Drive has the potential to be in terms of creating a cohesive and integrated residential community.

AERIAL PHOTOGRAPH

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Pty Ltd Project

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figure
09

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2 SITE CONDITIONS & ENVIRONMENT

2.1 ENVIRONMENTAL ASSETS & CONSTRAINTS

A consolidated Environmental Assessment Report for the land was prepared by ENV Australia in April 2011 (refer **Appendix C**). The report identifies that the environmental aspects of Lot 1507 are heavily influenced by its former use as a pine plantation. This component of the land's history has now ceased with the trees having reached maturity and been clear-felled. Key elements of ENV Australia's report appear in the sections below.

2.1.1 FLORA AND VEGETATION

A recent aerial photograph of the site is included as **Figure 9**. The site is mapped as the Karrakatta Complex – Central and South, which on the Swan Coastal Plain is estimated to have 29.5% of its pre-European extent. This complex remains above the 10% pre-European native retention extent threshold set by the Environmental Protection Authority for constrained areas.

On-site investigation undertaken by ENV Australia in October 2009 identified the small amount of natural remnant vegetation on-site as ranging between 'Completely Degraded' to 'Degraded' in condition, due to weed invasion, rubbish dumping, public access and the land's use as a pine plantation.

No Endangered or Vulnerable species pursuant to the *Environmental Protection Biodiversity and Conservation* Act (1999), no Declared Rare Flora pursuant to the *Wildlife Conservation* Act (1950), no Declared Plant species under the *Agriculture and Related Resources Protection* Act (1976), nor any Priority Flora species or locally significant species were identified within the site.

In summary there are no flora species or vegetation communities of significance on the site. There are no areas of vegetation or particular trees of environmental significance that are required to be retained in planning urban development for the site and no particular requirements have been identified as being necessary for future management of the site.

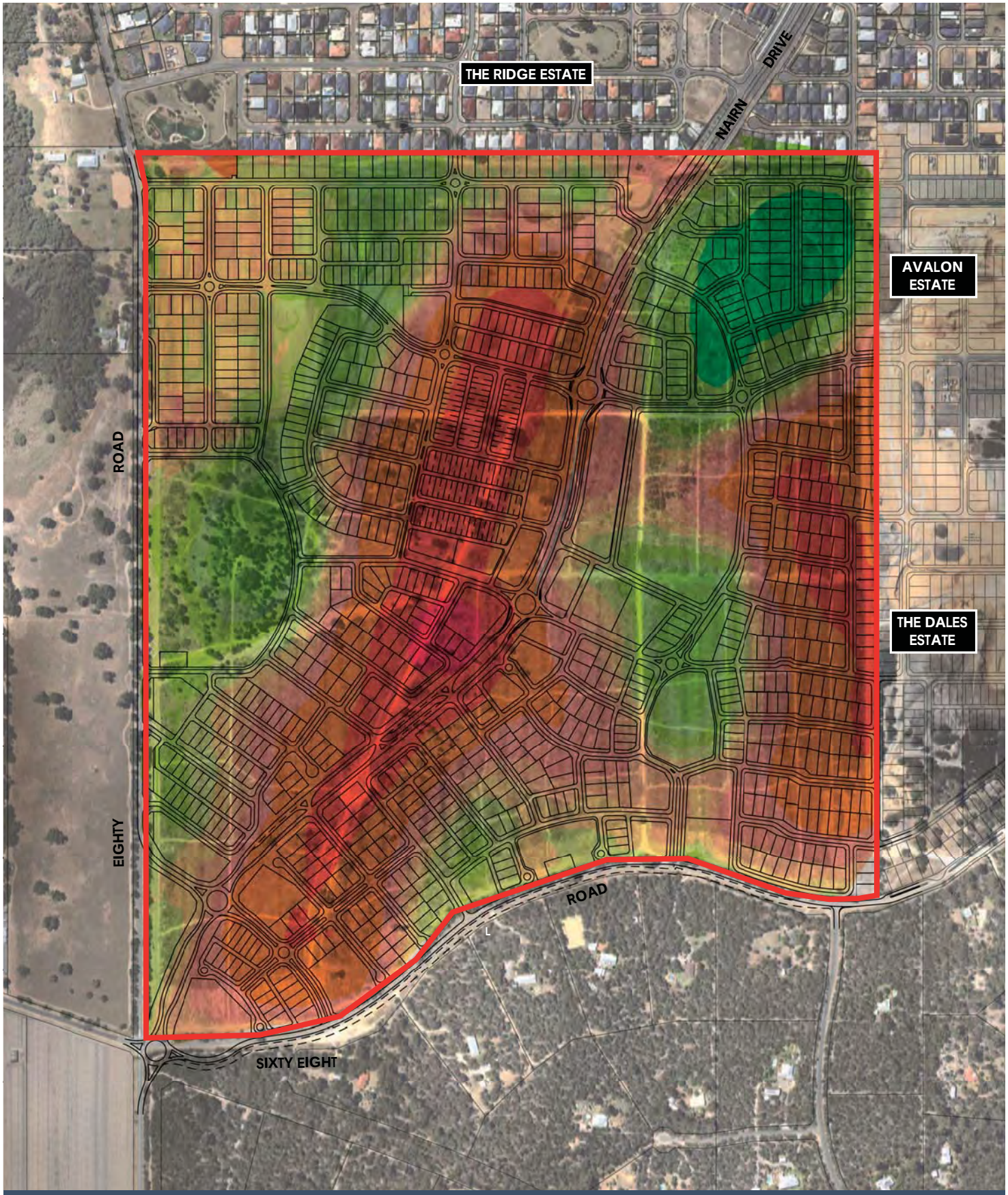
2.1.2 FAUNA

Reflective of the limited habitat that remains on-site, fauna surveys of the site are limited to a Black Cockatoo Site Assessment undertaken by ENV Australia in October 2010. Within the limited remnant vegetation that remains on-site the survey did identify foraging evidence of the Forest Red-tailed Black Cockatoo, however the extent of suitable habitat identified was extremely limited and highly degraded in condition.

In terms of breeding habitat no trees containing existing hollows were identified on-site, and only four trees were identified as being large enough to likely develop breeding hollows within the next 20 years, well below the DEC guidelines which recommend further investigation and the potential protection of areas containing three or more mature breeding trees per 0.5ha. Upon further investigation (refer **Appendix D**), it was noted that the four trees previously identified are located external to the site, within the adjoining Sixty Eight road reservation.

Based on ENV Australia's extensive experience with fauna surveys in the Perth Metropolitan Region, the lack of remnant vegetation and high level of site degradation, it is considered highly unlikely that any species of conservation significance will be affected by the proposed development.

Whilst small in size, the Health Department has identified Outridge Swamp (as per all other wetlands in the locality) as a potential breeding ground for mosquitoes known to carry viruses and other diseases. It is therefore anticipated that memorials will be required on all residential lots advising future purchasers of the hazard.



LEGEND

Site Boundary

Depth Key - CUT

- 0.00m to 1.00m
- 1.00m to 2.00m
- 2.00m to 4.00m
- 4.00m to 8.00m
- 8.00m to 12.00m
- 12.00m to 16.00m

Depth Key - FILL

- 12.00m to 9.00m
- 9.00m to 6.00m
- 6.00m to 3.00m
- 3.00m to 2.00m
- 2.00m to 1.00m
- 1.00m to 0.00m

VEGETATION OVERLAYED ON BULK EARTHWORKS

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

s: 1:7500@A4
d: July 12
j: 00/075

figure 10

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2.2 LANDFORM & SOILS

2.2.1 LANDSCAPE

From a topographical perspective, there are two main ridges running roughly north-south through the landholding. A small ridge with a high point of 19m AHD is located just inside the western boundary of the site. The second, with a high point of 33m AHD is located in the middle of the site and loosely forms the basis of the future alignment of Nairn Drive. A third ridge is located just east of the site within the adjoining Avalon and Dales Estates. Whilst these ridges require substantive modification in order to accommodate urbanisation of the land, they provide opportunities for views from housing and from streets, both to the Darling Scarp to the east and across rural and natural areas to the south and west.

A low point midway along the western boundary of the site could readily be modified for active open space purposes, inclusive of a curved amphitheatre that would provide a great viewing aspect and protection for spectators during sporting events.

Due to removal of the pine plantation and the significant earthworks required to service the estate (discussed further in **Section 3.9** of this report), opportunities for the retention of existing vegetation are limited to within and adjacent the existing Sixty-Eight and Eighty Road reservations. **Figure 10** clearly demonstrates the issue with all remaining vegetation on-site located in areas shown as requiring earthworks beyond the tolerance at which vegetation can practically be retained.

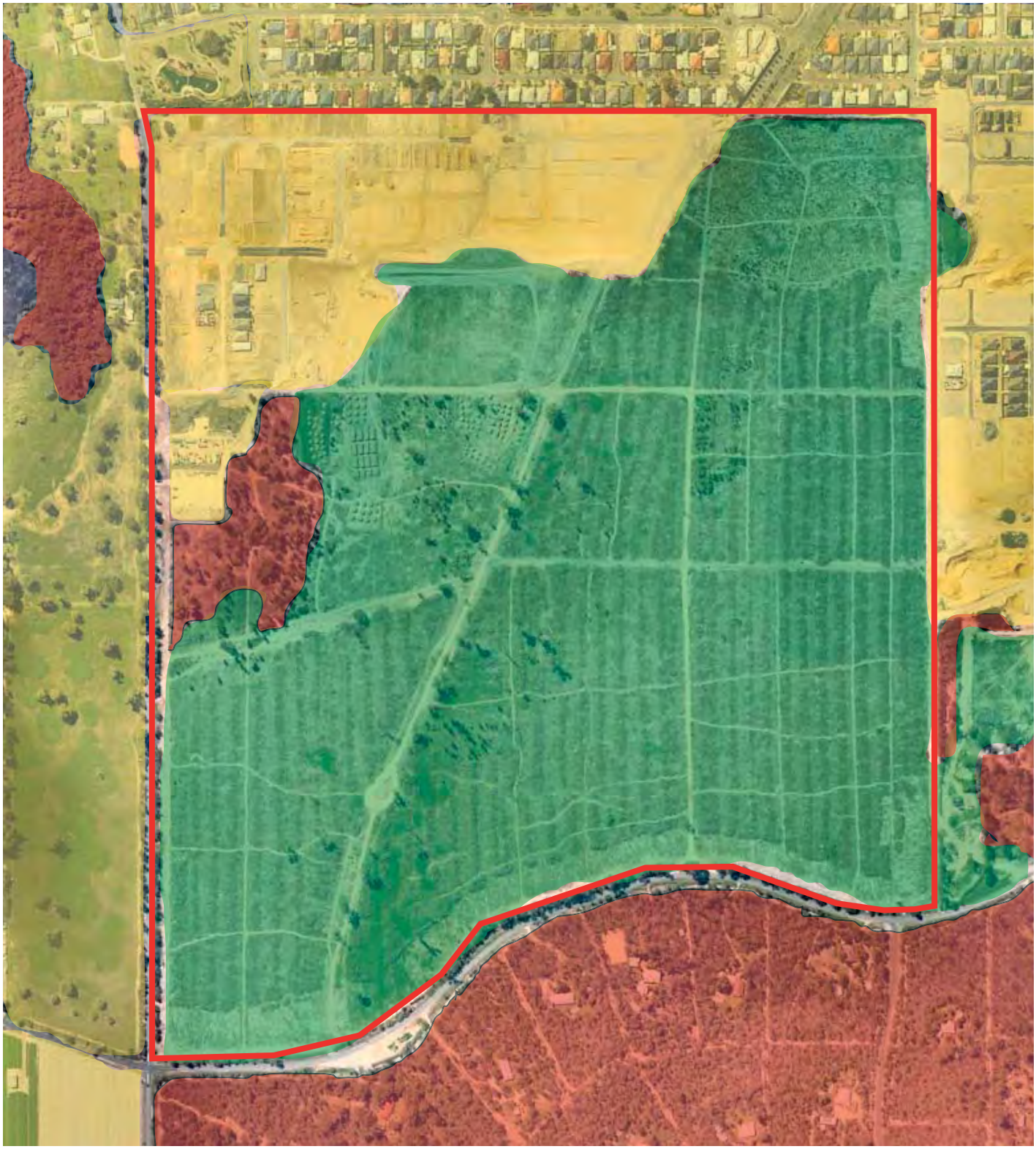
The land is unique however, in its relationship to adjacent land use. To the north and east are existing and/or rapidly developing suburban residential estates. To the south however are bush blocks associated with Rural Residential land use, whilst to the west of Eighty Road are wetlands combined with rural pursuits that provide a natural outlook and amenity. Given the limited landscape features within Lot 1507 it is important that the development embrace and takes advantage of this landscape reference, rather than turn its back on these areas.

2.2.2 SOILS

The geology of the site (S7 – Sand) is characterised by a low corrosion potential, low to medium slope stability, high ease of excavation and low to medium bearing capacity, characteristics that ENV Australia advise will not constrain development of the site.

2.2.2.1 ACID SULFATE SOILS

Department of Environment and Conservation mapping identifies the site as having *"No Known risk of ASS occurring within 3m of the natural soil surface (or deeper)"*. ENV Australia advise that there is limited potential for ASS disturbance along the low lying western boundary of the site, however this can be effectively characterised and managed, meaning that it poses no constraint to development of the site.



LEGEND

- Local Structure Plan Boundary
- Low
- Moderate
- Extreme

Source : **Bushfire Safety Fire Management Plan**

BUSHFIRE HAZARD ASSESSMENT

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Pty Ltd Project

0m 75 150m

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d: April 11
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figure **11**

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2.3 HYDROLOGY

2.3.1 SURFACE WATERS

There are no permanent or ephemeral water bodies or existing drainage lines on-site and a low potential for flooding due to relatively dry climatic conditions and highly permeable soils.

2.3.2 GROUNDWATER

Groundwater levels are greater than 1.2m below ground level across most of the site meaning fill will not be required to manage groundwater levels at the site except possibly in isolated areas around public open space and other low points. Subsoil drainage is not considered necessary to manage groundwater levels at the site.

2.4 BUSH FIRE MANAGEMENT

At the City's request, a Fire Management Plan (FMP) including a Bush Fire Hazard Assessment has been prepared by Bushfire Safety Consulting in accordance with the criteria set out in the WAPC's *Planning for Bush Fire Protection Guidelines (Edition 2)*. The FMP concludes that the LSP provides acceptable solutions and responses to the performance criteria that fulfil the intent of the bushfire hazard management issues outlined in WAPC policy. Key findings and recommendations of the plan appear on **Figure 11** and are detailed below. A full copy of the report appears as **Appendix E**.

Bushfire hazard levels across the site are rated as predominantly moderate to low due to the existing grass and pine tree slash. All bushfire hazards on-site will be removed during development and the public open space areas created populated with vegetation established and maintained to building protection zone standards as "low threat vegetation" as defined in the Australian Standard AS3959.

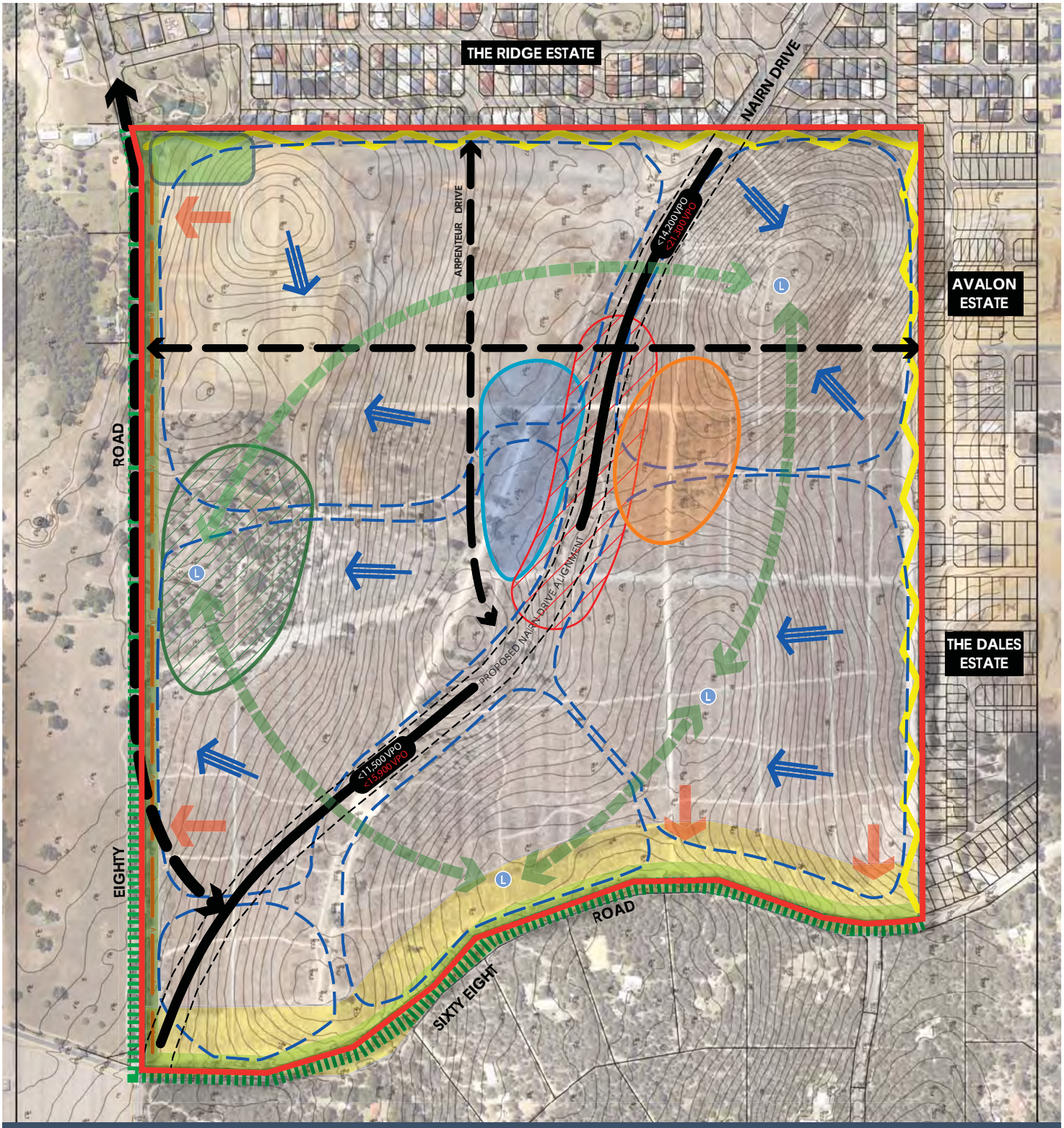
The only undeveloped area of potential concern is that located along the southern boundary within 100m of banksia woodland vegetation south of Sixty Eight Road, with dwellings in this area of the site the most vulnerable to attack. Sixty Eight Road provides good access and separation distance between the bushfire hazard and development. This combined with internal roads, setback distances on lots facing the hazard and management of vegetation on the development side of Sixty Eight Road establish an adequate building protection zone. Nevertheless the FMP recommends that if fuel loads remain at current Bushfire Attack Levels (BAL) a Section 70A Memorial be applied to the Title of all lots within the 100m hazard setback, alerting purchasers and successors in Title of the FMP and the requirement to construct dwellings in accordance with *AS3959 – Construction of Homes in Bushfire Prone Areas*.

As the affected area is contained within what is expected to be the final stages of development, and the land to the south of Sixty Eight Road is identified as an urban investigation area in the Outer Metropolitan Sub-Regional Strategy (refer **Figure 4**), there is a strong possibility that fuel loads in this area will be reduced by the time that development occurs in this portion of the estate. Allowance should be made therefore for BAL's to be re-evaluated prior to the creation of Titles for this portion of the estate.

In the interim, the FMP recommends that a 100m low fuel buffer be created and maintained around development throughout progressive staged development of the estate.

2.5 HERITAGE

There are no known or listed Aboriginal Heritage or European Heritage sites within the site.



LEGEND

- Site Boundary

ISSUES

- Nairn Drive Traffic Volumes
  - VPD Retention of existing land use south of Sixty Eight Road
  - VPD Including urbananisation of land south of Sixty Eight Road
- Key linkages (including)
  - *Future alignment of Karnup & Sixty Eight Roads*
  - *Requirement to realign Eighty Road*
  - *Arpenteur Drive & East-West connector provide primary access into adjoining estates*
- Existing 132kv Powerlines
- Low Points
- Existing Drainage Catchments
- Gradient of Landform requires streets to be aligned perpendicular to contours
- Interface with existing and proposed residential lots
- AS3959 Bushfire Protection Zone
- Department of Education and Training preferred Primary School location

OPPORTUNITIES

- Opportunity to intergrate in central location
- Preferred location for Retail / Commercial land use
- Interface with and views towards existing rural and special residential land use
- Long Distance Scenic Amenity
- Extended low ground with clumps of native trees forming a natural amphitheatre
- Intergrate public open space with adjacent parkland
- Public Open Space connection between low points
- Enhance veg eta ion and streetscape along Sixty Eight and Eighty Roads

ISSUES AND OPPORTUNITIES

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

s: 1:7500@A4
d: July 12
j: 00/075

TAYLOR BURRELL BARNETT

figure 12

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2.6 SUMMARY OF ISSUES & OPPORTUNITIES

Site analysis issues and opportunities are provided diagrammatically in **Figure 12**. The key elements of the site that need to be taken into account when planning for Lot 1507 include:

- Integration with existing and approved residential estates, immediately north and east of Lot 1507;
- Creation of an appropriate interface with land to the west and south, that is likely to be retained for rural, conservation or rural residential purposes;
- Existing vegetation provides excellent streetscape opportunities along both Eighty and Sixty-Eight Roads;
- Proximity to the Outridge Swamp creates the need for notifications advising of a potential mosquito nuisance on resultant residential Titles.
- Bushfire risk across the site is manageable, with the only impact on development being the need for a review of fuel loads prior to the creation of Titles within 100m of banksia woodland south of Sixty Eight Road. If loads remain as they are Memorials should be applied to Titles specifying the need to build in accordance with *AS3959 – Construction of Homes in Bushfire Prone Zones*.
- A 132kv power line lies 9m within and runs parallel to the Eighty Road reserve boundary. An 18m easement (9m either side of the centre point of the distribution line) will be required to retain its overhead alignment;
- The north-south ridges running through the site provide for expansive views, particularly to the west;
- Low points scattered throughout the site provide appropriate opportunities for the location of drainage facilities. Suitably connected, these areas could form the spine of an integrated public open space network;
- The gradient of the landform requires streets in various areas to be aligned perpendicular to the contour in order to minimise the size of necessary retaining walls;
- There are only two areas that can practicably be flattened out for expansive land use activities such as playing fields, a primary school and/or commercial development. The first is in the low point adjacent to Eighty Road with the second being located near the crest of the central ridge in the middle of the site, either side of the future alignment of Nairn Drive;
- Nairn Drive has the potential to act as a significant barrier to cohesive integrated development of the site;
- Arpenteur Road, an important neighbourhood connector containing the likely bus route, extends into the LSP from the adjoining Ridge Estate and needs to continue through to intersect with Nairn Drive;
- An east-west neighbourhood connector also needs to be accommodated within the northern portion of the site linking the approved design for Avalon Estate through to Eighty Road.
- The east-west neighbourhood connector's intersection with Nairn Drive will create a highly energised location ideal for civic and/or commercial land use; and
- Eighty Road requires realigning at its southern end to allow Nairn Drive to intersect with future construction of the Karnup Road freeway interchange.

LEGEND

- Site Boundary
- Community Hub at the heart of the Estate
- Diversity of active and passive recreation opportunities
- Medium and high density adjacent to activity nodes and open space
- Nairn Drive inclusive of opportunities to maximise integration
- Key Neighbourhood connector network
- Future Upgrade
- Fitness / Walk Trail intergrating Network of open spaces
- 400m / 5min walkable catchment
- Character Precincts incorporating diversity of housing types, urban form and public realm qualities

DESIGN PRINCIPLES

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

s: 1:7500@A4
d: July 12
j: 00/075

figure 13

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3 STRUCTURE PLAN

3.1 DESIGN PRINCIPLES

This LSP has been prepared adopting a cooperative and collaborative approach with stakeholders in the planning process including the City of Rockingham and the State Government Departments of Planning and Education & Training. At its core are a number of fundamental design principles, as summarised below:

- Respect for the inherent features/attributes of the land and its location;
- A sound rationale for the unfolding of development including its integration with the wider Baldivis locality;
- To achieve a distinct identity and sense of place for future residents of the area;
- To facilitate innovation in built form in terms of housing typologies, affordability and sustainability;
- To ensure that the Estate is fully integrated across Nairn Drive;
- To ensure that the Estate completes and builds upon the arterial road network set out on the Baldivis DSP;
- Creation of attractive network of engaging and well-utilised gathering places;
- To establish an environment that provides a variety of active and passive recreational facilities that specifically seek to promote the mental and physical health and wellbeing of future residents; and
- Establish character precincts as true neighbourhoods in a manner that is consistent with contemporary planning principles.

Their influence spatially on the LSP design is depicted diagrammatically in **Figure 13**.

3.2 LAND USE

The following sections, detail the nature and location of the various land uses proposed by the LSP. A breakdown of the proposed land use as they appear on **Figure 14** is contained in the following table:

STRUCTURE PLAN SUMMARY TABLE			
Total LSP Area (ha):	120.82	Dwelling Yield Range:	1,300 – 1,600
Commercial:	Nil (excluded from LSP)	Estimated Population @ 2.7 per dwelling:	3,510 – 4,320
Education:	4.00	Number of Primary Schools:	1
POS / Drainage:	12.96	Retail Floorspace:	N/A
Residential:	63.73	Estimated Employment:	40
Estimated No. of Lots:	1049 x Single Residential 27 x Grouped Housing 4 x Mixed Use / Commercial	Number and Approximate Size of Key Open Space Areas:	20 Reserves encompassing 12.83 ha

3.3 EDUCATION & COMMUNITY FACILITIES

Education facilities within the LSP are limited to the provision of one government operated Primary School. The Department of Education and Training (DET) was consulted early on in the LSP's preparation and indicated acceptance of the location shown which is central to its intended catchment. At the City's request this advice has been confirmed in writing at **Appendix F**. The site will be earth worked to meet the requirements of DET's internal site criteria planning policy.

The City has advised that it has no plans to develop or operate any community facility within the boundaries of the LSP, other than sporting facilities and clubrooms on the District Playing Field site (refer to **Section 3.5.1**).

LEGEND

ZONES / RESERVES

- RESIDENTIAL R60
- RESIDENTIAL R40
- RESIDENTIAL R30
- RESIDENTIAL R25
- RESIDENTIAL R20
- RESIDENTIAL R15
- EDUCATION
- PUBLIC OPEN SPACE

OTHER

- LOCAL STRUCTURE PLAN BOUNDARY
- 400M NEIGHBOURHOOD WALKABLE CATCHMENT
- POWERLINE EASEMENT
- ROAD WIDENING (SIXTY EIGHT ROAD)
- PLANNED BUS ROUTE
- VEGETATION TO BE PROTECTED (WHERE POSSIBLE)
- SEWER PUMP STATION (900m²)

NOTES

1. The boundary of this Local Structure Plan (LSP) is in accordance with the approved Comprehensive Development Plan (CDP) 2002 and original Lot 1507 boundary.
2. The access street and associated lot layout shown on the Plan is indicative only and subject to refinement as part of the detailed subdivision process.
3. The Village Centre shall form the subject of a separate planning exercise and is excluded from this proposal.
4. POS areas are indicative only and subject to further detailed design and drainage considerations.
5. All road carriageway detail depicted on this Plan including pavements, road treatments, medians and parking are for illustrative purposes only and are subject to final engineering design and any relevant approvals. The detail reflects the intent of the road network standards preferred for this subdivision. All dimensions and areas depicted on this Plan are subject to pre-cal and final survey and may vary from the figures shown.
6. Bushfire attack level to be reviewed prior to the creation of titles. Development may require construction in accordance with AS3959 - Construction in Bushfire Prone Areas.
7. Sixty-Eight Road widening to accommodate future upgrade to boulevard standard. Construction requirements to be negotiated at subdivision stage of development.

PUBLIC OPEN SPACE TABLE

NOTES	CREDITABLE AREA (ha)	NOTES	CREDITABLE AREA (ha)
A	0.4009	I	0.2388
B	0.1730	J	0.1618
C	0.8576	K	0.3439
D	0.2305	L	0.2328
E	0.5242	M	0.8281
F	5.3703	N	0.4755
G	0.4331	O	0.7076
H	0.3574		
TOTAL AREA OF POS & DRAINAGE			11.3355
% OF GROSS LANDHOLDING			10.57%

LOCAL STRUCTURE PLAN

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 50 100m

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figure 14

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BACK
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LEGEND

RESIDENTIAL DENSITIES	AREA (ha)	SINGLE LOTS	GH LOTS	GH DWELLINGS	TOTAL DWELLINGS
Residential R60	3.7253	0	8	203	203
Residential R40	5.4665	0	16	243	243
Residential R30	12.0900	299			299
Residential R25	1.1489	27			27
Residential R20	36.2858	659			659
Residential R15	1.2328	16			16
RESIDENTIAL TOTALS	**59.9493**	**1001**	**24**	**446**	**1447**

OTHER

- Local Structure Plan Boundary
- 400m Neighbourhood Walkable Catchment
- Planned Bus Route
- Local Amenity
- General Building Orientation

RESIDENTIAL DENSITIES PLAN

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

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figure 15

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3.4 RESIDENTIAL

3.4.1 DENSITY TARGETS

Directions 2031 and Beyond sets a target of *'15 dwellings per gross urban zoned hectare'* of land in new development areas within the Perth and Peel Metropolitan Regions. Element 1 of Liveable Neighbourhoods embraces this target, equating the measurement to *'22 dwellings per site hectare'* (encompassing land purely zoned for residential purposes) and asks that this be measured as a means of determining whether the residential densities proposed in a LSP will deliver the dwelling aspirations outlined in Directions 2031 and Beyond, the Outer Metropolitan Sub-Regional Strategy and Liveable Neighbourhoods.

In terms of 'Gross Hectare' some 107.43ha of the subject land is zoned 'Urban' in the MRS (which reduces to 100.78ha once the central area excluded from the LSP is deducted). Based on the lot and dwelling predictions outlined in Section 3.2 and an estimated 1,447 dwellings, this equates to '*14.4 dwellings per urban hectare*'. Once you then reduce the site area to land solely identified for residential land use, the 'Site Hectare' comes down to 59.95ha, with the same maximum number of houses equating this time to *'24.1 dwellings per site hectare'*. This number is very close to the target set in Liveable Neighbourhoods, but is expected to be whittled down as grouped housing development responds to the market and delivers yields below the maximums identified in this document. The creation of local services will also have a significant impact on the ultimate density of development realised.

3.4.2 LOT SIZE, VARIETY & ORIENTATION

Figure 15 depicts the proposed residential density codings for all residential development within the LSP area. Specifically in relation to the subject site, the LSP proposes:

- 'Medium Density (R30-R60) Grouped Housing' sites shaped to accommodate Rockingham Park's Building Company (Summit's) own building product within immediate proximity to high amenity locations such as the network of public open space outlined in **Section 3.6**. Twenty-seven (27) sites ranging between 3,000m^2 and 1.1ha in area are proposed, capable of accommodating up to a maximum of 532 additional dwellings on sites ranging between 160m^2 and 240m^2 in area.
- 'Medium Density (R30) Rear-loaded Cottage Lots' with frontages of 7.5m-15m, and depths of 28-32m that create sites between 240m^2 and 480m^2 in area.
- 'Low Density (R20-R25) Single Housing' over the balance of residential zoned land with 15-22m frontages and lot depths of 28-32m, that create sites between 440m^2 and 700m^2 in area.
- A small strip of larger ('R15') lots located along Eighty Road that are slightly wider or longer to include portions of the land encumbered by the existing power line easement.

In accordance with the requirements of the City's Local Planning Policy on the matter, in the limited instances where lots are proposed directly adjacent POS, lot levels will be raised above, a footpath will be constructed to clearly demarcate the boundary between public and private land, and DAP's will be imposed as conditions of subdivision approval in order to ensure that the fencing and building orientation of subsequent dwellings adequately surveil the adjoining reserve

The residential densities proposed provide for a diverse variety in residential lot and dwelling product befitting an estate of this size, having regard for local site characteristics, market research, and the dwelling targets of the District Structure Plan, Liveable Neighbourhoods and the Outer Metropolitan Sub-Regional Strategy.

POS A
Neighbourhood Active POS
- Retention of Existing trees
- 'Blend' into existing northern POS
- Recreational facilities such as a small playground and street furniture
- Open active informal grassed area
- Fully irrigated
- All native trees and shrubs
- Drainage basin requirements
- Limited off street parking

POS C
Neighbourhood Active POS
- No existing vegetation
- Residential direct access into POS
- Recreational facilities such as a medium playground, street furniture, BBQ and shelter
- Open active informal grassed area
- 'Parkland Circuit'
- Fully irrigated
- All native trees and shrubs
- Drainage basin requirements
- Limited off street parkingh
- Limited lighting

POS D
Local Passive POS
- No existing vegetation
- Residential direct access into POS
- Recreational facilities such as street furniture
- 'Parkland Circuit'
- High proportion of tree planting
- Fully irrigated
- All native trees and shrubs
- Limited lighting

POS E
Local Passive POS
- No existing vegetation
- Residential direct access into POS
- Recreational facilities such as street furniture
- 'Parkland Circuit'
- High proportion of tree planting
- Fully irrigated
- All native trees and shrubs
- Limited off street parking
- Limited lighting

POS K
Neighbourhood Passive POS
- No existing vegetation
- Recreational facilities such as a small playground, street furniture
- 'Parkland Circuit'
- Open active informal grassed area
- Fully irrigated
- All native trees and shrubs
- Large drainage basin requirements
- Limited off street parking
- Limited lighting

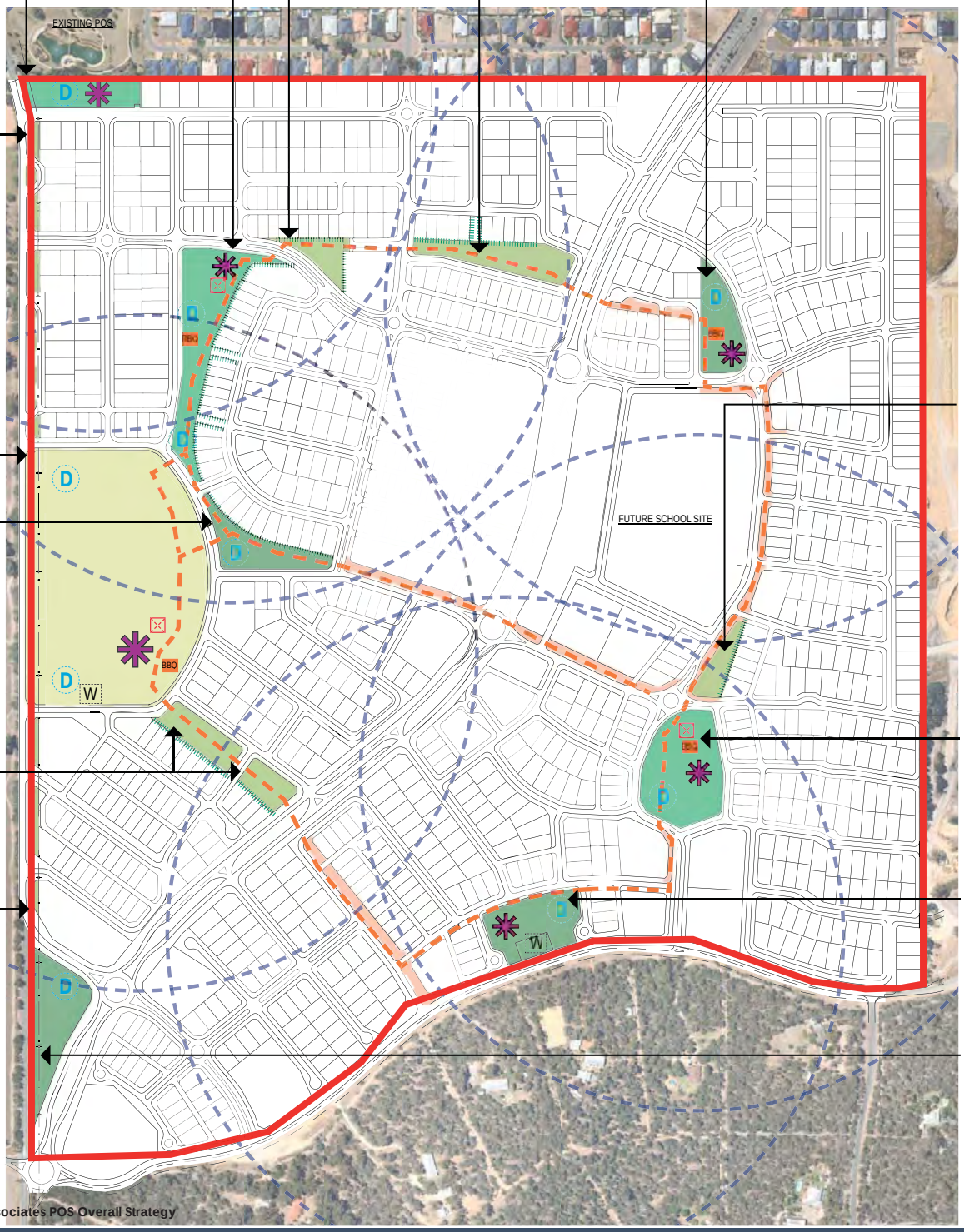
POS B
Local Passive POS
- Retention of Existing trees
- No recreational facilities
- All native trees and shrubs
- Sub-surface drainage infrastructu e

POS F
District Active POS
- Retention of existing vegetation
- Community facility (by others)
- Informal Amphitheatre
- Recreational facilities such as a medium playground, street furniture, BBQ and shelter
- POS lighting
- Open active formal grassed oval
- 'Parkland Circuit'
- Fully irrigated
- All native trees and shrubs
- Drainage basin requirements
- Waste Water Treatment Plant location
- Car parking

POS G
Neighbourhood Passive POS
- No existing vegetation
- Residential direct access into POS
- Recreational facilities such as a street furniture
- High proportion of tree planting
- 'Parkland Circuit'
- Fully irrigated
- All native trees and shrubs
- Drainage basin requirements
- Limited off street parking
- Limited lighting

POS H + I
Local Passive POS
- No existing vegetation
- Residential direct access into POS
- Recreational facilities such as a street furniture
- Small informal grassed area
- 'Parkland Circuit'
- Fully irrigated
- All native trees and shrubs
- Limited lighting

POS J
Local Passive POS
- Retention of Existing trees
- No recreational facilities
- Fully irrigated
- All native trees and shrubs



POS L
Local Passive POS
- No existing vegetation
- Residential direct access into POS
- Recreational facilities such as street furniture
- 'Parkland Circuit'
- Small informal grassed area
- Fully irrigated
- All native trees and shrubs
- Limited off street parking
- Limited lighting

POS M
Neighbourhood Active POS
- No existing vegetation
- Recreational facilities such as a small playground, street furniture and shelter
- 'Parkland Circuit'
- Open active informal grassed area
- Fully irrigated
- All native trees and shrubs
- Drainage basin requirements
- Limited off street parking
- Limited lighting

POS N
Neighbourhood Passive POS
- No existing vegetation
- Recreational facilities such as a street furniture
- Open informal grassed area
- Fully irrigated
- All native trees and shrubs
- 'Parkland Circuit'
- Drainage basin requirements
- Waste Water Treatment Plant (to be confirmed)
- Limited off street parking

POS O
Neighbourhood Passive POS
- No existing vegetation
- Recreational facilities such as a street furniture
- High proportion of tree planting
- Open informal grassed area
- Fully irrigated
- All native trees and shrubs
- Drainage basin requirements

Source : **Emerge Associates POS Overall Strategy**

LEGEND

- District POS
- Neighbourhood Active POS
- Neighbourhood Passive POS
- Local Passive
- Green Link (Widened Verge)
- 'Parkland Circuit' Path Network
- Existing Tree to be retained (Where Possible)
- Waste water treatment plant location
- Playground location
- Residential facing POS
- Drainage Requirements
- Small Open Shelter Location
- BBQ Facilites Location
- 400m Walkable Catchment (from playground)

PUBLIC OPEN SPACE STRATEGY
Lot 1507 Eighty Road, Baldivis
A Rockingham Park Project

0m 75 150
s: 1:7500@A4
d: Dec 12
j: 00/075

emerge ASSOCIATES
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figure 16

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3.5 PUBLIC OPEN SPACE

Figure 16 shows the proposed distribution and arrangement of Public Open Space across the LSP area. The table below demonstrates that the LSP is compliant in its 10% POS requirement, having regard for both the requirements of *Liveable Neighbourhoods* and the City's Planning Policy 3.4.1, with some additional allowance for ultimate development of the central area that has been excluded from the current proposal.

PUBLIC OPEN SPACE SCHEDULE (18 December 2012)

Lot 1507 Eighty Road			120.8250
less Nairn Drive Regional Road Reservation		6.1563	
less Sixty-Eight Road Reservation Widening		0.1982	
Nett Site Area			114.4705
Deductions			
Primary School		4.0000	
Central Exclusion Area		6.6513	
2 x Sewer Pump Stations		0.1800	
Dedicated Drainage (up to 1:1 year event)			
B1	0.1878	1.4977	
B2	0.2654		
B3	0.1508		
B4	0.1043		
B5	0.1414		
B6	0.1732		
B7	0.0798		
B8	0.0750		
B9	0.1924		
B10	0.0814		
S5	0.0462		
Surplus Restricted Open Space		0.0000	
Gross Subdivisible Area			102.1415
Public Open Space @ 10%			10.2142

Drainage Calculations (13/12/11)	1:1	1:5	1:10	1:100
B1	0.1878	0.2085	0.2159	0.2495
B2	0.2654	0.2893	0.2977	0.3365
B3	0.1508	0.1755	0.1839	0.2227
B4	0.1043	0.1206	0.1265	0.1546
B5	0.1414	0.1673	0.1759	0.2095
B6	0.1732	0.1795	0.1840	0.2119
B7	0.0798	0.0878	0.0902	0.0935
B8	0.0750	0.0810	0.0836	0.0942
B9	0.1924	0.2112	0.2180	0.2501
B10	0.0814	0.0961	0.1012	0.1245
S5	0.0462	0.0573	0.0607	0.0711

Unrestricted Public Open Space

Public Open Space (as shown on Plan)

ID	Total	Drainage ID	*less* 1:1 event (deduction)	*less* 1:5 event (restricted)	*less* Pump Stations (deduction)	Easement (restricted)		1:10 event	%	NOTES
A	0.4823	B10	0.0814	0.0147		0.0652	0.3210	0.1012	21%	
B	0.1730					0.1730	0.0000			
C	1.1250	B8 & B9	0.2674	0.0248			0.8328	0.3016	27%	22% when divided by combined area of D & E (which form one linear park)
D	0.2305						0.2305			
E	0.5704	S5	0.0462	0.0111			0.5131	0.0607	11%	
F	5.7749	B5 & B6	0.3146	0.0322	0.0900	0.5561	4.7820	0.3599	6%	
G	0.5129	B7	0.0798	0.0080			0.4251	0.0902	18%	
H	0.3574						0.3574			
I	0.2388						0.2388			Variation requested on the basis of having to accommodate late change to Primary School location, whilst maintaining secondary N/S connection activating eastern side of school
J	0.1618					0.1618	0.0000			
K	0.5317	B1	0.1878	0.0207			0.3232	0.2159	41%	
L	0.2328						0.2328			20% when divided by combined area of L & M (which form one linear park)
M	1.0935	B2	0.2654	0.0239			0.8042	0.2977	27%	
N	0.7163	B3	0.1508	0.0247	0.0900		0.4508	0.1839	26%	24% if Sixty-Eight Road Widening not imposed
O	0.8119	B4	0.1043	0.0163		0.3603	0.3310	0.1265	16%	
TOTAL Unrestricted							9.8427			

Restricted Open Space

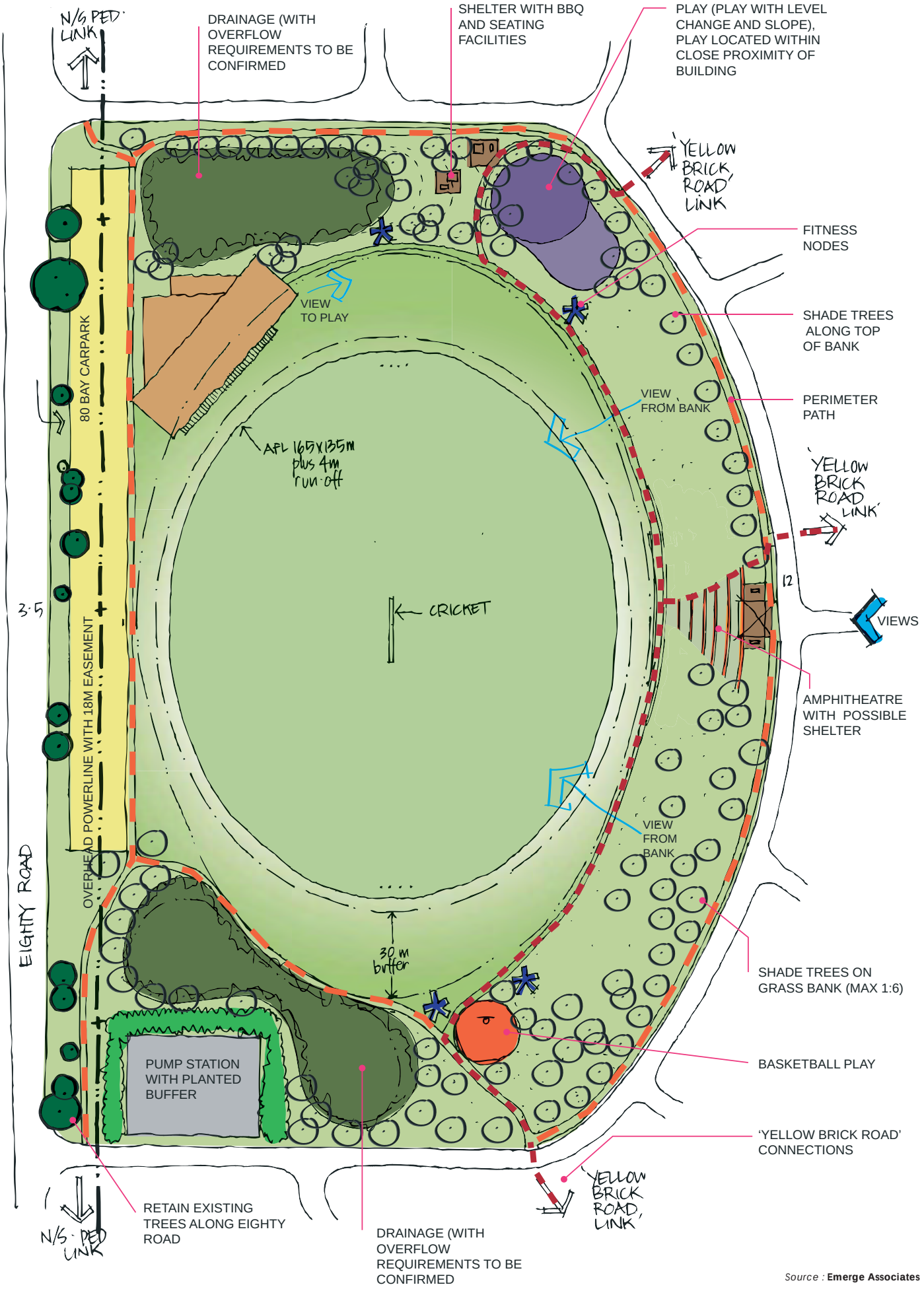
Powerline Easement		
A		0.0652
B		0.1730
F		0.5561
J		0.1618
O		0.3603
Drainage Surface Area (between 1:1 year event and 1:5 year event)		
A	(B10)	0.0147
C	(B8 & B9)	0.0248
E	(S5)	0.0111
F	(B5 & B6)	0.0322
G	(B7)	0.0080
K	(B1)	0.0207
M	(B2)	0.0239
N	(B3)	0.0247
O	(B4)	0.0163
TOTAL Restricted		1.4928
Maximum Permitted		2.0428
TOTAL Restricted Credited		1.4928

CREDITABLE POS	Un	Restricted	TOTAL
A	0.3210	0.0799	0.4009
B	0.0000	0.1730	0.1730
C	0.8328	0.0248	0.8576
D	0.2305		0.2305
E	0.5131	0.0111	0.5242
F	4.7820	0.5883	5.3703
G	0.4251	0.0080	0.4331
H	0.3574		0.3574
I	0.2388		0.2388
J	0.0000	0.1618	0.1618
K	0.3232	0.0207	0.3439
L	0.2328		0.2328
M	0.8042	0.0239	0.8281
N	0.4508	0.0247	0.4755
Excess	0.3310	0.3766	0.7076
N/A	9.8427	1.4928	11.3355

TOTAL Public Open Space Provision		11.3355
Unrestricted POS	9.8427	
Restricted POS	1.4928	
Difference		1.1214

11.10% of Gross Subdivisible Area

In addition to meeting the land area requirements and drainage limitations as they relate to the relevant policies, the LSP also creates a variety of reserves which cater for a diverse range of both active and passive recreational activities. A summary of the different types of reserves is detailed in the following section:



Source : **Emerge Associates**

DISTRICT PLAYING FIELDS CONCEPT

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

s: nts@A4
d:Dec 12
j: 00/075

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figure 17

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3.5.1 DISTRICT PLAYING FIELD

One of two fundamental design elements of the LSP is the creation of a District Playing Field within an expansion of the natural amphitheatre identified midway along Eighty Road.

Early on in discussions over a potential review of the LSP design, the City advised of a desire to provide a senior sized AFL oval within the site. The LSP embraces this opportunity, viewing the provision of such a facility as an asset to the development.

In order to create a level playing surface of a size capable of meeting the requirements of the City, extensive earthworks are required including the creation of a relatively steep bank along the eastern side of the reserve. This creates the opportunity for terraced seating that compliments the main spectator and clubroom facilities accessed directly off Eighty Road.

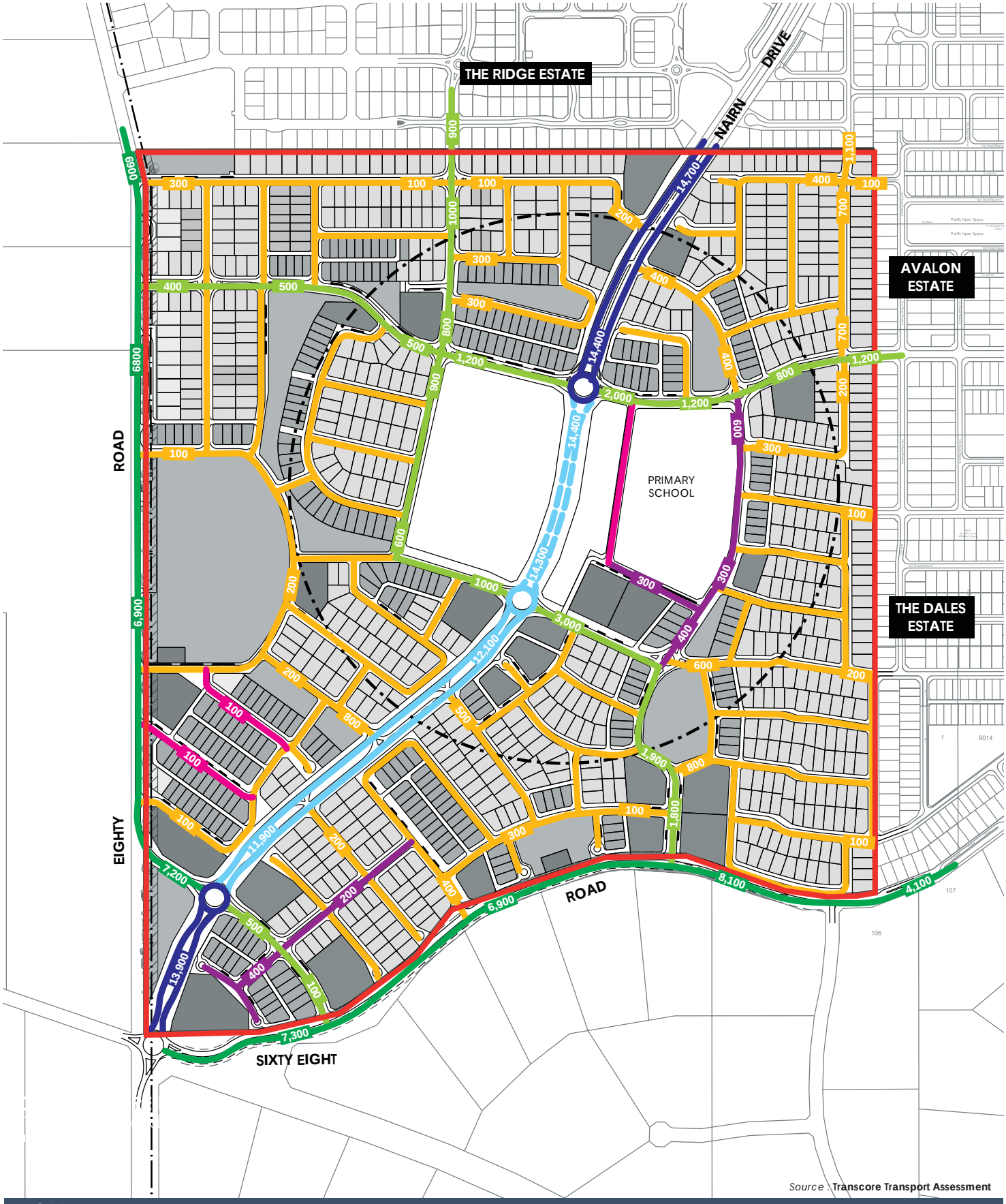
Other key elements of the District Playing Fields concept shown at **Figure 17** include:

- A community facility inclusive of opportunities for a grandstand, ablutions, change rooms and storage;
- An associated car park that makes use of land constrained by the existing power line easement, and by virtue of being accessed directly from Eighty Road separates recreation from local residential traffic;
- A shade or similar structure located atop the terraced seating that announces the location of the playing fields and acts as a magnet to residents and visitors uphill of the facility;
- A children's playground inclusive of shelter and barbecue facilities;
- A hardstand area for informal basketball play;
- A series of paths that utilising the adjacent road network radiate out from the reserve, inclusive of key connections that form part of the Parkland Circuit network (detailed in **Section 3.6.6**);
- Fitness equipment similar to that located along the length of the Parkland Circuit, that contribute to the overall network established within the LSP;
- Drainage facilities and a Waste Water Pumping Station required to service this portion of the LSP catchment; and
- Opportunities for supplementary embayed car parking areas (where practical) along the northern, southern and eastern perimeter of the site.

3.5.2 COMMUNITY PARKS

Strategically located throughout the balance of the LSP area is a series of community parks. Located central to the various residential precincts identified within the LSP the parks ensure that all lots are within a walkable catchment of a POS facility, including more than 90% of future residents being located within 400m of a proposed playground location.

The Community parks provide for a high degree of aspect and amenity for surrounding residences, thereby representing an opportunity for housing innovation and diversity. This has been reflected in the LSP, which provides for 'traditional', laneway, direct frontage and grouped housing adjacent to Community Parkland areas. Broad Concept Plans prepared by Emerge for each of the reserves proposed in the LSP are included at **Appendix G**.



Source : **Transcore Transport Assessment**

LEGEND

ROAD HIERARCHY

- Integrator A
- Integrator B
- Neighbourhood Connector A
- Neighbourhood Connector B
- Access Street B
- Access Street C & D
- Special Access Street
- 100 Forecast Traffic Flows

OTHER

- Local Structure Plan Boundary
- 400m Neighbourhood Walkaable Catchment

MOVEMENT NETWORK

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

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figure **18**

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3.6 MOVEMENT NETWORK

Transcore was engaged by Rockingham Park to undertake a Transport Assessment of the Local Structure Plan design. A full copy of the report can be found at **Appendix H**. Key points are summarised below.

3.6.1 ROAD HIERARCHY & TRAFFIC VOLUMES

The proposed road hierarchy for the subject land, and projected traffic volumes attributed to each road are depicted on **Figure 18**, and can be summarised as follows:

ARTERIAL INTEGRATOR

Nairn Drive is an 'Arterial Integrator Road', with its alignment and reservation width set by its 40m wide 'Other Regional Road' reservation in the MRS. Nairn Drive serves the function of an 'Integrator A' at its northern and southern ends within Lot 1507, however projected traffic volumes in the middle of the LSP area allow it to be classified as an 'Integrator B' through this section for the foreseeable future. A 70km/h speed limit on the 'Integrator A' sections shown on **Figure 18** is proposed, however a lower speed is recommended for the Integrator B section. A 60km/h speed limit would assist pedestrian crossing and general integration of the estate across Nairn Drive.

NEIGHBOURHOOD CONNECTORS

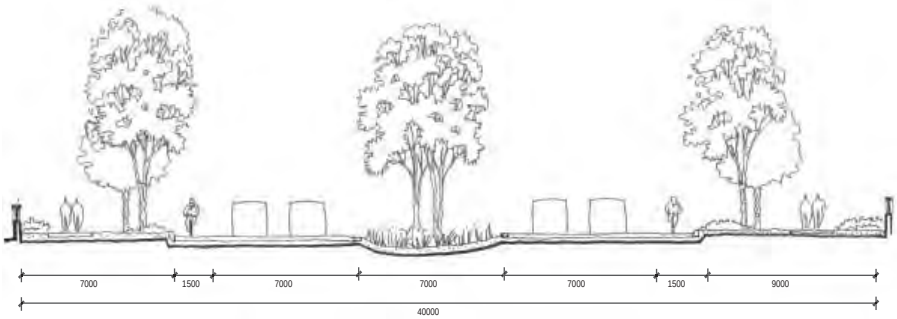
Eighty Road is classified as a 'Neighbourhood Connector A' Road. Similar to what has occurred to the north, the road is proposed to be upgraded to a fully kerbed and drained, 7.4m wide single carriageway, with a reduced traffic speed of 60km/h adjacent and through the LSP area. Development on the eastern side of Eighty Road will need to be setback by virtue of retention of the existing high voltage power line. Access to lots fronting Eighty Road shall be limited to Controlled Access Place (CAP or Service) Roads in a similar manner to that which has been approved and is being constructed in the initial stages of development in the northwest corner of the estate.

Sixty-Eight Road is also classified as a 'Neighbourhood Connector A' Road. Widening of the reserve to accommodate a boulevard road treatment is accommodated in the LSP, based on a 25m wide reservation that due to the unique road geometry of the location is based upon the centreline of the existing carriageway. Similar to Eighty Road, until urbanisation proceeds south of Sixty Eight Road it is proposed that the road be upgraded to a fully kerbed and drained, 7.4m wide single carriageway, with a reduced traffic speed of 60km/h adjacent the LSP area. Access (where proposed), will be restricted to the use of CAP Roads as has been used in 'The Dales Estate' immediately to the east.

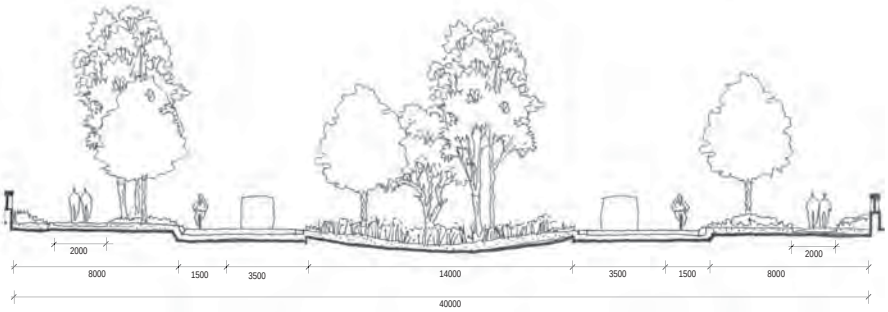
Arpenteur Drive and the continuation of that route through to Sixty-Eight Road are classified as 'Neighbourhood Connector B' Roads. Similar to Eighty and Sixty-Eight Roads, it is proposed that the 7.4m carriageway established within The Ridge Estate be continued on through the LSP, with road reserves to accommodate the service varying from between 16m (adjacent to POS) to 25m where the carriageway has been divided with a median as the southern entrance to the estate. A speed limit of 50km/h is expected to apply to this route.

Furnivall Parade / Regency Avenue located in the northern part of the LSP area is the final Neighbourhood Connector within or adjoining the LSP area. Also classified as a 'Neighbourhood Connector B' Road it is proposed to be constructed as a boulevard-style road within a varying reservation width of 20-25m. At its western end the road acts as the initial estate entrance, with the additional reserve width allowing for a landscaped entry treatment.

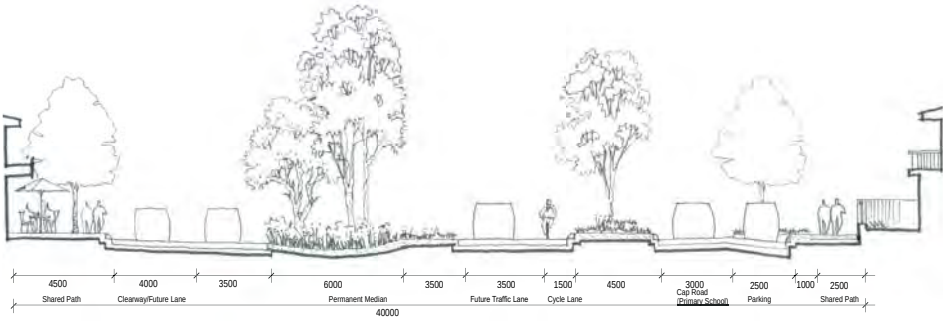
At the request of the City, two additional high order Access Street connections, being a direct **north-south link** between Nairn Drive and Sixty-Eight Road (running along the eastern boundary of the school site), and extension of the east-west aligned **Baroness Road** within 'Avalon Estate' in order to provide a direct connection between Smirk Road and the District Playing Field.



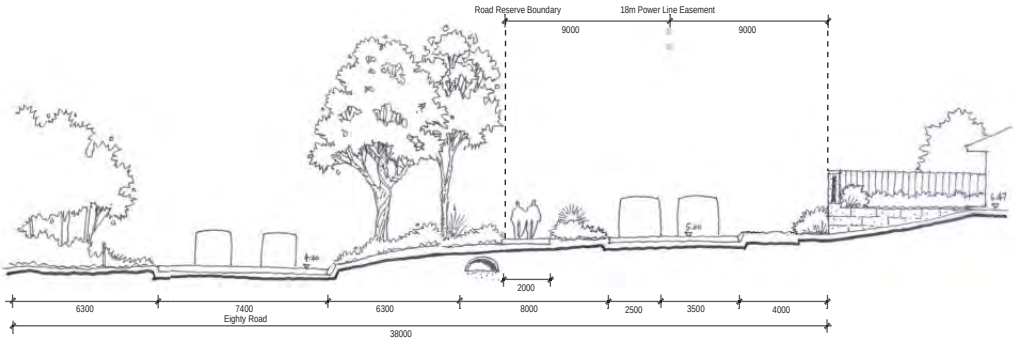
Intergrator A



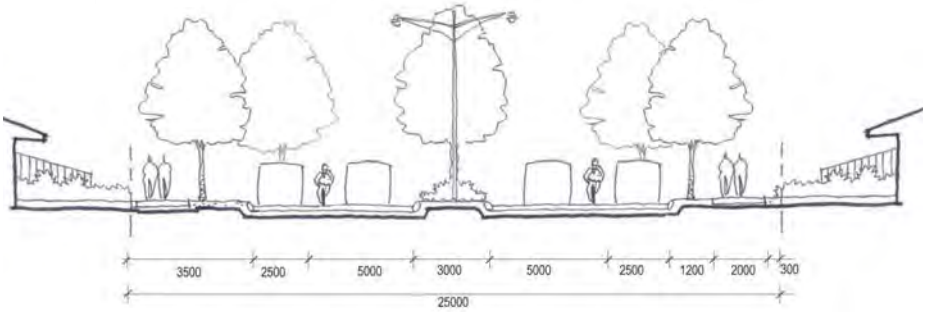
Intergrator B - 40m Reserve - 14m Median



Intergrator B - 40m Reserve - 6m Median



Neighbourhood Connector A - Eighty Road



Neighbourhood Connector B - Boulevard 25m

Source : **Emerge Associates Street Sections**

TYPICAL ROAD CROSS SECTIONS

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

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figure **19A**

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ACCESS STREETS

With the exception of laneways and the special streets discussed below, all other roads within the LSP area are designated as 'Access Streets'. Each of the roads will encompass a 6m wide carriageway within a typical reserve width of 16m. Whilst none of the roads are expected to experience volumes in excess of 1,000 VPD, four of the roads have been designated as 'Access Street B' (as opposed to Access Street 'C' or 'D') which involves a slightly wider 18m reserve width purely to assist with the location of street furniture in areas of higher activity.

Adjacent to public open space *Liveable Neighbourhoods* allows verge widths to be reduced down to 1m as a result of there being no need to accommodate service alignments for the development of adjacent land. The LSP proposes 13.5m reserve widths where access streets abut POS, including a more conservative 2.5m verge on the reserve side on the basis that this width can accommodate street trees and visitor parking embayments without the infrastructure extending outside of the road reservation.

HILLSIDE RELIEF

In the eastern portion of the site where roads rapidly descend from 'The Dales' down towards POS Areas 'L' and 'M', a number of specially landscaped pockets are strategically located so as to provide visual relief, particularly to pedestrians and POS patrons as they traverse and/or look back up the slope in that direction.

SPECIAL ACCESS STREETS

In the southwest corner of the LSP area is a special precinct that has been designed differently. Similar to sections of the Parkland Circuit (discussed in **Section 3.6.7**), two streets have a widened verge on one side where the absence of crossovers allows for additional landscaped connections to be created linking cottages to the nearby District Playing Field. A meandering carriageway embedded with visitor parking and urban water initiatives such as rain gardens will be considered at the subdivision and detailed design stages of implementation.

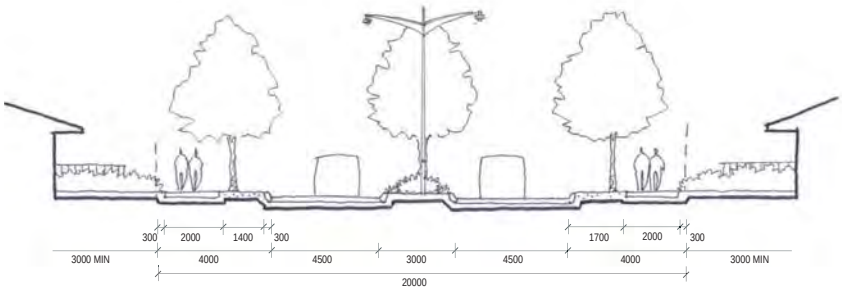
LANEWAYS

At the City's direction reduced carriageway widths and the introduction of a landscaping strip as per the Subi Centro laneway example is no longer proposed. Instead laneways will constitute the typical 6m wide carriageway with 1m building setbacks on both sides to accommodate the requirements of the City's refuse collection vehicle. Along Arpenteur Drive medians have been used to manage intersection spacing in accordance with Liveable Neighbourhoods requirements.

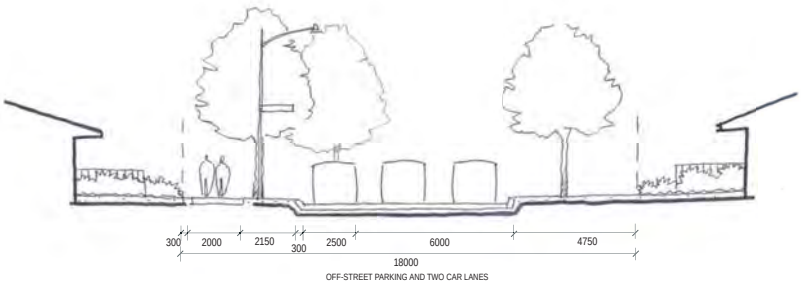
PEDESTRIAN ACCESS WAYS

A limited number of Pedestrian Access Ways (PAW)'s are also proposed in key locations where they open up local residential cells, allow direct access and draws the amenity of local POS reserves further back within each cell. In all instances the PAW's adhere to the guidelines expressed in the WAPC's Planning guidelines for *'Reducing Crime and Anti-Social Behaviour in Pedestrian Access Ways (October 2009)'*, inclusive of an 8m minimum width with clear sight lines along their entire length. The two located within the dress circle near the District Playing Field also involve a significant level change further minimising impacts on neighbours and opportunities for anti-social behaviour.

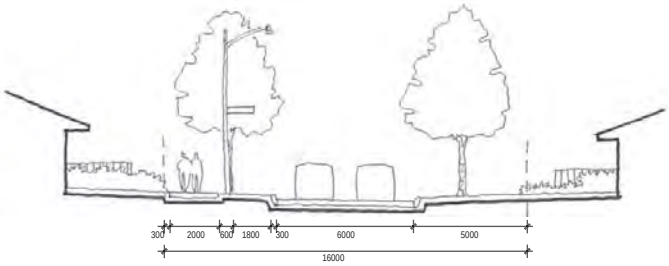
Indicative cross sections for each road in the above hierarchy are depicted on **Figures 19a & 19b**.



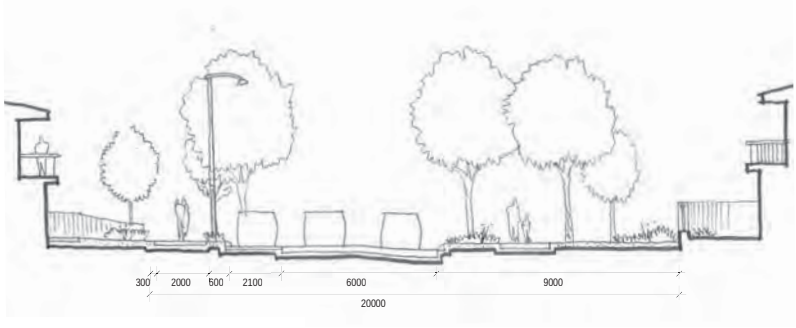
Neighbourhood Connector B - Boulevard 20m



Residential Road - 18m Reserve - Access Street B

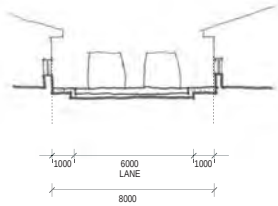


Residential Road - 16m Reserve - Access Street C/D

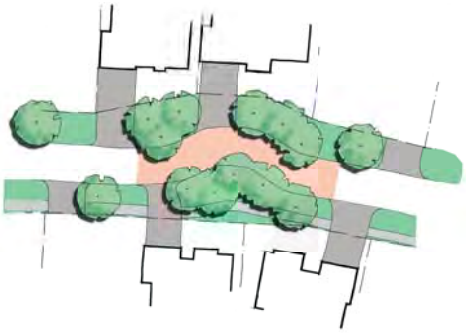


Special Access Street - 20m Reserve

Landscaped Midpoint Concept



Laneway - 6m Reserve



Source : **Emerge Associates Street Sections**

TYPICAL ROAD CROSS SECTIONS

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

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emerge ASSOCIATES
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figure
19B

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3.6.2 PERMEABILITY & ACCESSIBILITY

Overall the road layout accommodates a high level of interconnectivity with the surrounding area, with regular connections to Nairn Drive (the primary transport route through the area) and relatively short and straight street blocks being arranged in a manner that achieves a high degree of legibility, permeability and walkability in accordance with the principles of *Liveable Neighbourhoods*.

3.6.3 TRAFFIC MANAGEMENT ISSUES

The Local Structure Plan incorporates each of the management devices recommended by Transcore, including:

- Nairn Drive being initially designed and constructed as a single carriageway through the middle of the LSP;
- A roundabout intersection treatment at the southern end of Nairn Drive as an interim solution pending construction of the Karnup Road extension and future freeway connection;
- Three other roundabouts along Nairn Drive where four-way intersections are proposed at the intersections of Arpenteur Drive, the east-west aligned 'Neighbourhood Connector' and the realignment of Eighty Road;
- The staggering of intersections elsewhere along Nairn Drive such that they meet the intersection spacing requirements of *Liveable Neighbourhoods* (or specific techniques are proposed as set out below, to manage traffic where compliance is impractical);
- Right turn pockets but no left turn deceleration lanes along Nairn Drive, to assist in managing speed;
- The northern pair of access street intersections with Nairn Drive being configured as left-in, left-out only, so as to eliminate the need for overlapping turning pockets;
- Use of a wider (14m) median where right turn pockets in the southern portion of the LSP design would otherwise overlap;
- The creation of a right turning pocket along Sixty-Eight Road at its intersection with the boulevard configured 'Neighbourhood Connector B' Road that in time will become the southern entrance to the estate;
- Restriction of access along Eighty Road to the use of Controlled Access Plan (CAP) Roads for residential development and limited car parking access for the District Playing Field; and
- The use of three priority controlled four-way intersection treatments at the convergence of short, low traffic volume access streets within the LSP. Appropriate entry treatments will be provided on side roads to help alert drivers to the presence of the intersection and that traffic on the major road has priority.

A plan showing key intersection treatments within the LSP area appears as **Figure 9** of **Appendix H**.

3.6.4 INTERFACE WITH ADJOINING DEVELOPMENT

Careful consideration has been given to the interface of adjoining landholdings. Specifically, the LSP considers:

- Existing connections to The Ridge Estate to the north;
- Approved connections to the east through 'The Dales' and 'Avalon Estate';
- The use of loop or controlled access roads so that where possible, development provides a frontage towards both Sixty-Eight and Eighty Roads, whilst minimising direct access;
- Use of a variety of lot interface treatments along Nairn Drive that maintain an adequate level of surveillance along its route whilst minimising anticipated impacts on resident amenity; and
- Potential for closure of some or all of the Eighty Road reservation west of POS Area 'O', such that the park will form a landscaped extension of the adjoining private school facility.

LEGEND

PATH NETWORK

- 'Parkland Circuit' - 2.5m min path
- On-road cycle lanes + 2m footpath
- High use areas (2.5m wide path proposed)
- Major Pedestrian Routes (2m path proposed)

OTHER

- Local Structure Plan Boundary
- 400m Neighbourhood Walkaable Catchment
- Planned Bus Route
- P Indicative Parking Locations (to be reviewed @ subdivision)

BUS ROUTE, PATH NETWORK & PARKING EMBAYMENTS

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

s: 1:7500@A4
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figure 20

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3.6.5 PUBLIC TRANSPORT

A Transperth operated **Bus Route 564** currently provides a limited service to the South Baldivis locality, linking Settlers Hill Estate with Warnbro Station on the SW Metropolitan Railway Line.

The *Baldivis Road Needs Study Traffic and Infrastructure Report (2005)* identifies three bus routes ultimately servicing the locality, inclusive of two routes in or around Lot 1507. The South Baldivis Western Bus Route enters Lot 1507 via Arpenteur Road and continues through the middle of the landholding via Nairn Drive, before terminating at Sixty Eight Road. The South Baldivis Central Bus Route follows a similar north-south aligned route through the adjoining The Dales and Avalon Estates (some 300m east of Lot 1507), this time linking back to the Baldivis District Centre in addition to Warnbro Station.

The LSP accommodates the Western Bus Route alignment both in terms of reservation width and carriageway design. In addition the LSP embraces the opportunities that the bus route presents, by proposing medium density housing adjacent its entire route. Consistent with advice from the Public Transport Authority on similar proposals, bus embayments are not proposed. Wider carriageways and reserves are also provided surrounding the Primary School and District Playing Fields where regular bus use is anticipated.

3.6.6 PEDESTRIAN & CYCLIST NETWORK

A highly permeable road network within the LSP area creates excellent opportunities for the provision of good pedestrian and cyclist facilities that maximise the use of non-motorised transport modes. **Figure 20** outlines the key pedestrian and cyclist routes through the LSP area.

In accordance with the requirements of *Liveable Neighbourhoods,* paths shall be provided on one side of all roads and on both sides of roads classified as an 'Integrator' or 'Neighbourhood Connector' (refer **Figure 18**). In accordance with the current practice of the City of Rockingham all paths will be constructed 2m in width so that they can be designated as shared paths for pedestrians and cyclists. Slightly wider 2.5m widths will be applied in high pedestrian-traffic locations such as adjacent to the Primary School.

On-street cycle lanes will be included along Nairn Drive and along both sides of all internalised 'Neighbourhood Connectors'.

3.6.7 PARKLAND CIRCUIT

The 'Parkland Circuit' path network is the second fundamental design element of the LSP. Identified on **Figure 20**, the circuit is essentially a shared path located within wider landscaped road verges that link the estate's expansive network of public open space reservations, inclusive of on-route facilities that encourage both passive and active recreational use.

Initial thoughts beyond seating and shade structures involve the provision of fitness equipment strategically located at various positions along its route. At the City's suggestion the developer is also investigating the potential to include Calico infrastructure that through the use of totem poles and personal mobile phones, allow users of the route to track their individual performance. Cross-sections detailing the different environment along various sections of the route are shown on **Figure 21a** and **21b**.

3.6.8 VISITOR PARKING

At the City's request visitor parking embayments have been identified in key areas of the LSP, such as adjacent laneway development (which lack driveway depths that accommodate visitor parking); around Grouped Housing sites (to assist in catering for overflow parking having regard for likely future access and egress opportunities); and in and around public open space reservations. These locations are purely notional and will be reviewed at the subdivision and detailed engineering stages of design.

THE 'PARKLAND CIRCUIT' IS A PEDESTRIAN PATH NETWORK CONNECTING PUBLIC OPEN SPACES WITHIN PARKLAND HEIGHTS.

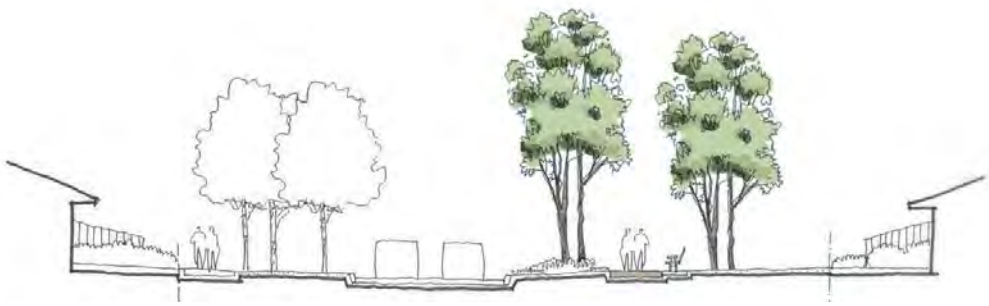
CHARACTERISTICS OF THE 'PARKLAND CIRCUIT' INCLUDE;

- *WIDENED PEDESTRIAN PATH (2.5 - 3.0m)*
- *TREES ALONG THE 'PARKLAND CIRCUIT' PATH NETWORK TO BE THE SAME SPECIES - PROVIDING SHADE AND CHARACTER*
- EXERCISE NODES PROVIDED ALONG THE ROUTE TO ENCOURAGE THE COMMINITY TO CREATE THEIR OWN FITNESS CIRCUIT
- PATH TO BE A DIFFERENT MATERIAL THAN ANY OTHER USED IN THE DEVELOPMENT
- SEATS/PASSIVE NODES TO ALLOW FOR REST ALONG THE CIRCUIT.

THE BELOW SECTIONS PROVIDE AN INDICATIVE GUIDE TO THE VARYING CONCEPTS ALONG THE 'PARKLAND CIRCUIT' (CONCEPT SUBJECT TO DETAILED DESIGN)

1. 'PARKLAND CIRCUIT' TYPOLOGY ONE

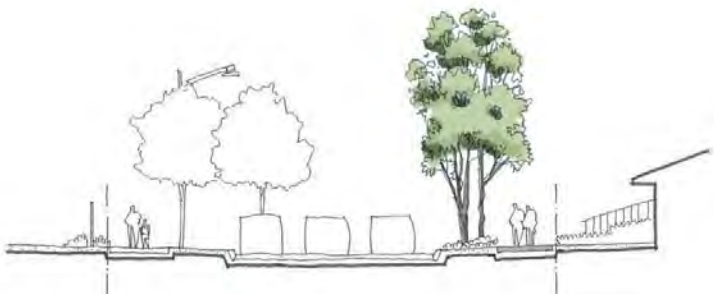
SECTION THROUGH RESIDENTIAL CUL-DE-SAC ROAD (WIDTH VARIES)



- *WIDE PATH THROUGH GROVE OF TREES*
- *PASSIVE NODE*

2. 'PARKLAND CIRCUIT' TYPOLOGY TWO

SECTION ADJACENT TO PRIMARY SCHOOL

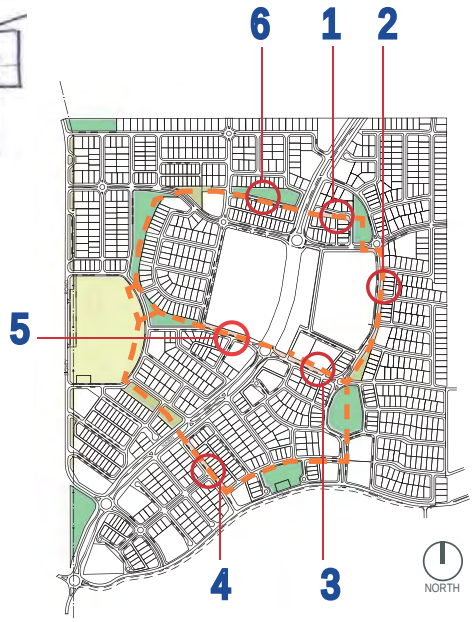


- *WIDE PATH ALONG BOUNDARY*
- *CO-ORDINATION WITH SERVICES AND BOUNDARY FENCING REQUIRED*

3. 'PARKLAND CIRCUIT' TYPOLOGY THREE

SECTION THROUGH WIDENED VERGE WITH DRAINAGE (25 M GREEN LINK)

- *WIDE PATH THROUGH GROVE OF TREES*
- *ROAD SIDE SWALE TO PROVIDE A SOFT BUFFER TO ROAD*



Source : **Emerge Associates POS Overall Strategy June 2011**

PARKLAND CIRCUIT
Lot 1507 Eighty Road, Baldivis
A Rockingham Park Project

s: nts@A4
d: Dec 12
j: 00/075

emerge ASSOCIATES Integrated Science & Design

figure **21A**

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4. 'PARKLAND CIRCUIT' TYPOLOGY FOUR

SECTION THROUGH WIDENED VERGE WITH PASSIVE NODE/SHELTER (25 M GREEN LINK)

- *WIDE PATH THROUGH GROVE OF TREES*
- *PASSIVE NODE*

5. 'PARKLAND CIRCUIT' TYPOLOGY SIX

SECTION THROUGH WIDENED VERGE WITH DRAINAGE (25 M GREEN LINK)

- *WIDE PATH THROUGH GROVE OF TREES*
- *ROAD SIDE SWALE TO PROVIDE A SOFT BUFFER TO ROAD*
- *TURFED AREA TO PROVIDE OPPORTUNITIES FOR REST*
- *LIGHTING PROVISIONS*

6. 'PARKLAND CIRCUIT' TYPOLOGY SEVEN

SECTION THROUGH PUBLIC OPEN SPACE

- *WIDE PATH THROUGH GROVE OF TREES*
- *MEANDERS THROUGH PUBLIC OPEN SPACE*
- *EXERCISE NODES LOCATED THROUGHOUT PUBLIC OPEN SPACES*

Source : **Emerge Associates POS Overall Strategy June 2011**

PARKLAND CIRCUIT
Lot 1507 Eighty Road, Baldivis
A Rockingham Park Project

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figure **21B**

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LEGEND

DESIGN ASSUMPTIONS

1) Where Subdivision layout not available impervious area equals 25% of total catchment area.

2) Infiltration area is estimated at 25% of all
   - POS
   - Road / median area within catchment
   - Below ground infiltration network area

LEGEND

- Generalised drainage flow direction
- Extent of site catchment boundary
- Drainage sub catchment boundary
- Existing surface contour
- Proposed public open space
- Proposed below ground infiltration storage
- Denotes drainage infiltration basin. Shape to be determined at detail design
  - Denotes 1 in 1 storm twl
  - Denotes 1 in 5 storm twl
  - Denotes 1 in 10 storm twl
  - Denotes 1 in 100 storm twl

TABLES

AREAS AND STORAGE 1 IN 5 STORM

SWALE	CATCHMENT	IMPERVIOUS AREA	INFILTRATION RATE	SWALE AREA	STORM VOLUME
1	1.33 ha	1.20 ha	3.0m/DAY	691m²	120m³
2	1.89 ha	1.70 ha	3.0m/DAY	1232m²	190m³
3	2.17 ha	1.95 ha	3.0m/DAY	1000m²	250m³
4	1.73 ha	1.56 ha	3.0m/DAY	755m²	180m³
5	0.99 ha	0.89 ha	3.0m/DAY	573m²	80m³

BASIN	CATCHMENT AREA	IMPERVIOUS AREA	INFILTRATION RATE	BASIN AREA	STORM VOLUME
B1	3.77 ha	3.39 ha	3.0m/DAY	2085m²	740m³
B2	6.32 ha	5.69 ha	3.0m/DAY	2893m²	1070m³
B3	5.09 ha	4.58 ha	3.0m/DAY	1755m²	1050m³
B4	2.06 ha	1.85 ha	3.0m/DAY	1206m²	430m³
B5	2.75 ha	2.48 ha	3.0m/DAY	1673m²	440m³
B6	1.27 ha	1.14 ha	3.0m/DAY	1795m²	140m³
B7	1.89 ha	1.70 ha	3.0m/DAY	878m²	270m³
B8	1.10 ha	0.99 ha	3.0m/DAY	810m²	130m³
B9	3.43 ha	3.09 ha	3.0m/DAY	2112m²	650m³
B10	2.12 ha	1.91 ha	3.0m/DAY	961m²	400m³

Source : Serling Service Infrastructure Report

BULK EARTHWORKS & DRAINAGE

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

s: 1:7500@A4
d: Dec 12
j: 00/075

TAYLOR BURRELL BARNETT

SERLING CONSULTING
INNOVATIVE ENGINEERING SOLUTIONS

figure 22

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3.7 URBAN WATER MANAGEMENT

ENV Australia was engaged by Rockingham Park to prepare a Local Water Management Strategy (LWMS) pursuant to the requirements of the WAPC's *Better Urban Water Management (2008)*. Key information is depicted on **Figure 22** whilst a general overview of the report appears below. A copy of the full report submitted to the Department of Water for its consideration can be found at **Appendix J**.

The objective of the LWMS is to ensure that sustainable management of the total water cycle within the estate occurs through water sensitive urban design. This includes water conservation, stormwater and groundwater management. Rockingham Park Pty Ltd aims to manage these issues at the site through the following initiatives:

WATER CONSERVATION

- Participating in the EnviroDevelopment program to achieve a maximum potable water usage of 80 kL/person/year and meet the EnviroDevelopment target of a 20% reduction in scheme water use from the State Water Plan target of 100kL/p/a. This will be achieved through implementation of the following:
  - Developer provided free waterwise landscaping for all residential front yards; and
  - Behaviour change of householders, encouraging water conservation through education packages and 'Living Smart' (The Behaviour Change Program).
- Providing waterwise landscaping for Public Open Space (POS) that includes waterwise plants, soil amendments to improve water and nutrient retention, minimising turf areas and water efficient irrigation;
- Investigating the possibility of using an alternative water source to irrigate the POS.

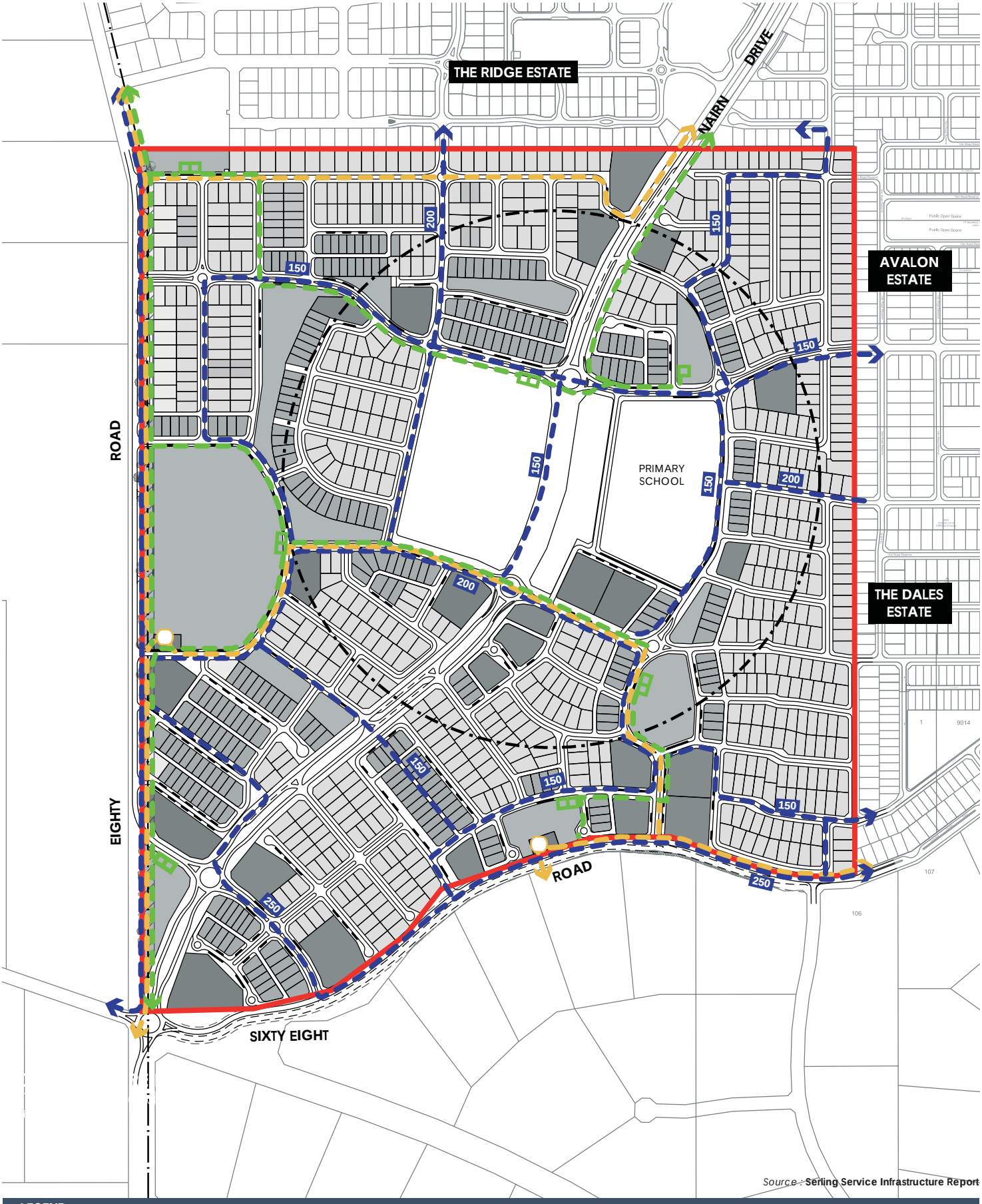
STORMWATER MANAGEMENT

- Implementing a drainage design that ensures pre-development discharge rates in the event of a 1:100 year ARI event will be maintained through storage and infiltration on-site; and
- Maximising infiltration by developing swales and rain gardens in road reserves where possible, planted with native vegetation to encourage nutrient and suspended solids uptake and removal prior to infiltration. Open based manholes will be used to maximise infiltration. Infiltration basins in Public Open Space will manage larger events.

GROUNDWATER MANAGEMENT

- Recognising the issue of restricted groundwater availability and planning low water use POS.

The LWMS demonstrates that Parkland Heights can be developed without significant constraints. Underlying Urban Water Management Plans (UWMP's) prepared on a subdivision stage by stage basis will include information relating to implementation and on-going management responsibilities, maintenance schedules, irrigation and nutrient management, groundwater and surface water monitoring programs and confirm proponent commitments relating to demand reduction within the development.



Source : **Serling Service Infrastructure Report**

LEGEND

- Local Structure Plan Boundary
- Potential WWPS Sites
- Potential Pressure Main Alignments
- Water Mains (>150mm)
- Major Electrical Distribution Lines
- Transformers and / or Switchgear

MAJOR SERVICE ALIGNMENTS

Lot 1507 Eighty Road, Baldivis

A Rockingham Park Project

0m 75 150

s: 1:7500@A4
d: Dec 12
j: 00/075

figure 23

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3.8 INFRASTRUCTURE CO-ORDINATION, STAGING & SERVICING

Serling Consulting were engaged by Rockingham Park to prepare a Service Infrastructure Report to support the Local Structure Plan design. The report confirms that the land can be connected to all services, either by extension from neighbouring developments or by extension from Eighty Road. Major service alignments are depicted on **Figure 23**. A copy of Serling's report can be found at **Appendix K,** key elements of the report are detailed below:

3.8.1 SEWER

Water Corporation waste water planning identifies the need to construct two Waste Water Pumping Stations (WWPS) and Pressure Mains (PM), (being Baldivis South WWPS's "K" and "N") in order to service the development of Lot 1507 and the surrounding locality.

Negotiations over the construction of the Baldivis South WWPS "K" is currently being sought from the Water Corporation to service the initial stages of development located in the northwest corner of the landholding fronting Eighty Road. The WWPS is a Type 40 permanent station that will be located on the eastern side of Eighty Road contiguous with the District Playing Field public open space. A site of approximately 40m x 22.5m is proposed to accommodate the facility inclusive of vehicle turnaround facility and 3 hours of emergency storage pipe network. Overflow is accommodated within the 1:1 year ARI event level of an adjoining drainage basin, an area that is already deducted from the gross subdivisible area, and therefore doesn't affect POS calculations.

Initially sewerage will be pumped from the proposed WWPS through a 1,360m pressure main to an existing DN225 gravity sewer main on Ridge Boulevard within The Ridge Estate.

Once capacity is reached at the discharge point (expected after 3-5 years of development), this pressure main is to be extended to a discharge point more than 2,150m from the pumping station into an existing DN300 gravity main. This discharge point will be in use for several years of further development, as the ultimate pressure main option will only be completed and used following further Water Corporation headworks.

The proposed ultimate discharge arrangement is located around 300m east of the intersection of Smirk and Sixty-Eight Roads where it is to discharge into DN450 gravity sewer reticulation. The WWPS required in this area and DN450 gravity main is not currently available nor a timeframe as to when it is expected to be available.

Due to the existence of significant vegetation and services within the Eighty Road reservation, open trenching along the majority of the gravity sewer alignment is not possible and boring (up to 6m deep) will be used to lay the sewer.

Land development to the east of Nairn Drive will trigger the need to construct WWPS "N" in the southern part of the development adjacent to Sixty Eight Road. Whilst allowance has been made for a similar sized site collocated with an area of POS located along Sixty-Eight Road, no detailed work has been completed for this pumping station so its location is yet to be confirmed. It is possible that the final location will be outside the LSP area.

3.8.2 WATER

The landholding is located within the Tamworth tank water reticulation area within which the Water Corporation has advised it is unable to service land without localised boosting above the RL 30m AHD contour.

Initial stages of subdivision in the northwest corner of the site are being serviced by an existing DN200 water main located in Arpenteur Drive. Extension of an existing DN375 water main located on the eastern side of Eighty Road will be required to service future development within the southwest corner of the site.

Water supply to the eastern part of the landholding is limited until the DN500 water distribution main in Nairn Drive is extended south to the DN250 reticulation main at The Ridge Boulevard. This work is currently underway with further extensions proposed to occur as the development front continues southward along Nairn Drive.

3.8.3 STORMWATER DESIGN

The undulating topography and sandy geology of the site provides an ideal environment for the adoption of water sensitive design principles focussing on infiltration. Building on the commitments outlined in the LWMS the drainage strategy proposed for the development incorporates progressive infiltration along the entire length of the stormwater system through the use of trapped "leaky" bases, swales and below ground StormTech infiltration systems as appropriate. This holds back the timing of the peak flow, dissipates the nutrients and first flush in a water sensitive design approach, reduces the pipe sizes and reduces the quantity of storm water discharging into the infiltration basins.

Open drainage infiltration basins have been strategically located in the POS areas that cater for the total of ten (10) sub catchments within the development. In accordance with Council Policy, preliminary modelling indicates that in all bar one instance (POS Area 'K') where a variation has been accepted by the City at LSP adoption, all the infiltration basins within the landholding require no more than 25% of the area of the POS for the 10 year storm event, and the overall system is capable of handling the 100 year storm event without flooding the developed lots. Drainage Catchment Plans included within **Appendix K** detail the proposed drainage system showing the sub-catchment boundaries, the location of swales, below ground infiltration systems and the location and size of infiltration basins required for the 1 in 1yr, 1 in 5yr, 1 in 10yr and 1 in 100yr storm events.

3.8.4 GAS

WestNet gas infrastructure is located within Eighty Road and has sufficient capacity to supply the subdivision and development of Lot 1507.

3.8.5 ELECTRICITY

A 132kV high voltage aerial feeder line is located within the landholding along its frontage to Eighty Road. Retention and protection of this line is proposed via the creation of an 18m wide easement that precludes the construction of buildings underneath. Power will be distributed throughout the estate using high and low voltage underground power lines that connect back to this aerial service.

3.8.6 TELECOMMUNICATIONS

Existing Telstra infrastructure is located within the landholding immediately east of the aerial electricity feeder line. With the impending rollout of the national broadband service however there will no longer be a copper to node service installed. Instead the developer will arrange for an NBNCo approved pit and pipe system design. The external NBNCo connection will most likely use the existing Telstra infrastructure in the Eighty Road reservation.

3.8.7 EARTHWORKS

In order to bring the land below the 30m contour line (above which a reticulated water supply cannot be provided – refer ***Section 3.9.2***), and to shape the landholding to facilitate appropriate residential development (including full access road grades where practical and essential, such as major routes to key facilities such as the Primary School, some 2M m^3 of excess cut will be removed from the site.

Agreement has been reached with the owners of land located along the eastern boundary of the site to lower existing levels in the order of up to 6m to better suit the development proposed on these landholdings and to achieve a workable interface between the developments. This reduction assists in reducing grades in the eastern portion of the estate, meaning that retaining wall heights throughout the majority of the estate can be kept below 2m in height.

3.8.8 TIMEFRAMES AND STAGING

The development of Parkland Heights estate has already commenced. Construction of Stage 1, located in the north-west corner of the landholding was completed and released for sale in September 2011, whilst Stage 2 (an eastward extension of Stage 1), is scheduled to commence construction in July 2012. Upon approval of this new LSP, Rockingham Park intends to proceed with between 2-4 further stages west of Nairn Drive prior to transitioning across to the eastern side. A plan detailing Rockingham Park's current staging strategy is included as **Figure 24**.

It is worth noting that the earthworks staging is slightly different due to the cut-to-fill strategy adopted for the site. The change relates to the centre of the site which will be earthworked early on (potentially as part of Stage 3 or 4), but not being serviced or developed until later in the development program.

Given the central location and relatively level nature of this and the District Playing Field sites, Rockingham Park intend to approach the City regarding interim use of these areas for various community building and environmental sustainability initiatives it intends to pursue as the estate progresses through its anticipated 20 year lifetime.

An example is the Materials Recovery Centre, a temporary facility that will move along with staging of the estate. Initially located adjacent to the civil works compound on portion of the District Playing Fields site, it is essentially a central storage yard for waste generated by other legitimate activities on-site (civil works and housing construction), the aim being to recycle between 60-80% of unused building products, a significant increase to the 25% average currently achieved across the Metropolitan Region.

Other initiatives may involve the erection of a large multi-purpose building at the centre of the site that can be used for a variety of community activities pending resolution of the detailed planning of this area.

3.9 DEVELOPER CONTRIBUTION ARRANGEMENTS

Lot 1507 is capable of developing independently and is not the subject of any existing or proposed Developer Contribution arrangement as they relate to roads or service infrastructure (utilities, road upgrades etc).

The City is however, in the process of finalising a Community Infrastructure cost sharing initiative across the balance of its urban expansion areas via Amendment No.114 to TPS2. Advertised for public review and adopted for final approval by the City in late 2011, the Amendment is a seriously entertained proposal, meaning that any subsequent stages of development will be conditional upon a proportional contribution towards the final schedule of infrastructure, as subsequently determined by the Minister for Planning.

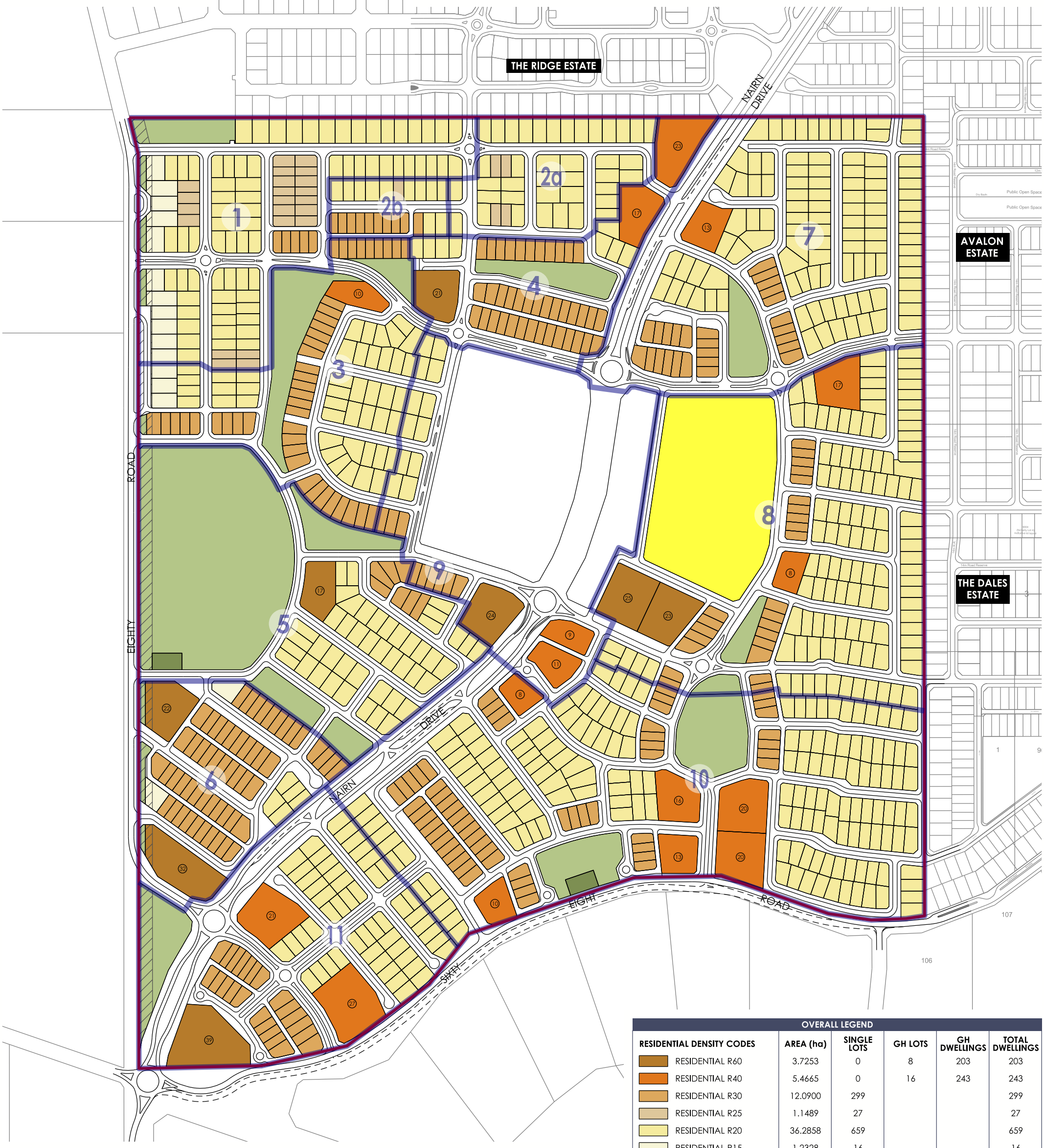
STAGE 1				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R30	1786m²	5		357m²
RESIDENTIAL R25	9365m²	22		425m²
RESIDENTIAL R20	40086m²	70		572m²
RESIDENTIAL R15	8438m²	11		767m²
TOTAL	59675m²	109		
PUBLIC OPEN SPACE	6284m²	4		

STAGE 2				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R30	3421m²	10		342m²
RESIDENTIAL R25	2114m²	5		422m²
RESIDENTIAL R20	29993m²	50		599m²
TOTAL	35528m²	65		

STAGE 3				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R40	2331m²	1	10	2331m²
RESIDENTIAL R30	18116m²	43		421m²
RESIDENTIAL R20	24974m²	44		567m²
RESIDENTIAL R15	2117m²	3		705m²
TOTAL	47538m²	91	10	
PUBLIC OPEN SPACE	13821m²	3		

STAGE 4				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R60	3838m²	1	21	3838m²
RESIDENTIAL R40	8980m²	2	40	4490m²
RESIDENTIAL R30	15144m²	39		388m²
RESIDENTIAL R20	4466m²	8		558m²
TOTAL	32428m²	50	61	
PUBLIC OPEN SPACE	5704m²	1		

STAGE 5				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R60	3137m²	1	17	3137m²
RESIDENTIAL R30	3421m²	7		488m²
RESIDENTIAL R20	25734m²	45		571m²
TOTAL	32292m²	53	17	
PUBLIC OPEN SPACE	67940m²	4		
PUMP STATION	900m²	1		



STAGE 6				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R60	9916m²	2	54	4958m²
RESIDENTIAL R30	22646m²	55		411m²
RESIDENTIAL R20	2627m²	5		525m²
RESIDENTIAL R15	1764m²	2		882m²
TOTAL	36953m²	64	54	

STAGE 7				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R40	2908m²	1	13	2908m²
RESIDENTIAL R30	10646m²	26		409m²
RESIDENTIAL R20	58969m²	106		556m²
TOTAL	72523m²	133	13	
PUBLIC OPEN SPACE	5316m²	1		

STAGE 8				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R60	8903m²	2	48	4451m²
RESIDENTIAL R40	5775m²	2	25	2887m²
RESIDENTIAL R30	9934m²	25		397m²
RESIDENTIAL R20	60122m²	114		527m²
TOTAL	125046m²	143	73	
EDUCATION	40312m²	1		
PUBLIC OPEN SPACE	3772m²	2		

STAGE 9				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R60	4428m²	1	24	4428m²
RESIDENTIAL R40	4644m²	2	20	2322m²
RESIDENTIAL R30	3891m²	9		432m²
RESIDENTIAL R20	7307m²	12		608m²
TOTAL	20270m²	24	44	
BALANCE LAND	66512m²			

STAGE 10				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R40	19279m²	6	87	3213m²
RESIDENTIAL R30	22001m²	57		385m²
RESIDENTIAL R20	82739m²	155		533m²
TOTAL	124019m²	218	87	
PUBLIC OPEN SPACE	15753m²	2		
PUMP STATION	900m²	1		

STAGE 11				
Lot Type	Area	Single Lots	GH Dwellings	Average Size
RESIDENTIAL R60	7026m²	1	39	7026m²
RESIDENTIAL R40	10745m²	2	48	5372m²
RESIDENTIAL R30	9793m²	23		425m²
RESIDENTIAL R20	25566m²	50		511m²
TOTAL	53130m²	76	87	
PUBLIC OPEN SPACE	9734m²	4		

OVERALL LEGEND					
RESIDENTIAL DENSITY CODES	**AREA (ha)**	**SINGLE LOTS**	**GH LOTS**	**GH DWELLINGS**	**TOTAL DWELLINGS**
RESIDENTIAL R60	3.7253	0	8	203	203
RESIDENTIAL R40	5.4665	0	16	243	243
RESIDENTIAL R30	12.0900	299			299
RESIDENTIAL R25	1.1489	27			27
RESIDENTIAL R20	36.2858	659			659
RESIDENTIAL R15	1.2328	16			16
RESIDENTIAL TOTALS	**59.9493**	**1001**	**24**	**446**	**1447**
LAND USE ZONES					
EDUCATION	4.0312	1			
PUBLIC OPEN SPACE	12.8330	21			
PUMP STATION	0.1800	2			
OTHER					
LSP BOUNDARY	120.7577				
POWERLINE EASEMENT	1.7074				

Note: Lot Layout Indicative Only.

INDICATIVE STAGING PLAN

Lot 1507 Eighty Road, Baldivis

a Rockingham Park Project

0m 25 50 75m

s: 1:5000@A3
d: December 2012
p: 00/075/0321

figure 24

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4 STATUTORY PLANNING IMPLEMENTATION

The Parkland Heights Local Structure Plan and report is submitted to the City of Rockingham for consideration in accordance with the requirements of Clause 4.2.3 of the City's Town Planning Scheme No.2. Upon its approval by the City and endorsement by the WAPC there are no further impediments to continued subdivision and development of Lot 1507.

As an interim measure approval has recently been granted to subdivide the parent land holding into two more manageable portions based on the eastern alignment of the Nairn Drive Other Regional Road Reservation. This should not be interpreted as an intent to sell portion of the site but is purely proposed for project budgeting purposes due to stricter regulations on money borrowing emanating from the Global Financial Crisis.

Upon the cessation of the LSP public advertisement period (at which stage any major issues with the proposal should have been identified), it is Rockingham Park's intention to lodge a subdivision application for the balance of the LSP landholding, encompassing all of the remaining landholding on both sides of Nairn Drive.

The need for notifications on title relating to mosquito nuisance is acknowledged. Also acknowledged is the potential for Section 70A Memorials to be applied along the southern boundary, a matter to be explored as and when clearance of the lot is requested but not prior to subdivision approval, as the physical siting of development is not in question, merely the standard of construction should the banksia woodland to the south of Sixty Eight Road remain.

Detailed Area Plans will be prepared in consultation with the City of Rockingham for the rear –loaded cottage lot product, lots adjacent PAW's and any other area identified in this document or as determined by the WAPC when approving subsequent subdivision proposals. Blanket variations to front setback and site coverage requirements of subsequent residential development, are currently being considered for future stages of the estate pending the outcomes of the ongoing Residential Design Codes Review.

APPENDICES

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APPENDIX B
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