The Glades, Byford
Revised Local Structure Plan

January 2019

Prepared for
LWP Property

Taylor Burrell Barnett
Town Planning & Design

This structure plan is prepared under the provisions of the Shire of Serpentine Jarrahdale Town Planning Scheme No.2.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE STATUTORY PLANNING COMMITTEE ON:

22 February 2011

In accordance with Schedule 2, Part 4, Clause 28 (2) and refer to Part 1, 2. (b) of the *Planning and Development (Local Planning Schemes) Regulations 2015.*

Date of Expiry: 19 October 2025

TABLE OF AMENDMENTS

Amendment No.	Summary of the Amendment	Amendment Type	Date Approved by WAPC
Structure Plan Amendments approved by WAPC under Planning and Development (Local Planning Schemes) Regulations 2015			
8	Various - Icaria Precinct	Minor	22.11.17
9	Various - Woodland Grove Precinct	Minor	06.07.17
10	Various - Icaria Precinct	Minor	05.03.19

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DOCUMENT HISTORY AND STATUS

Job No.	06/014			
Author	Kris Nolan			
Revision	**Date Issued**	**Reviewed by**	**Approved by**	**Date Approved**
0	06.07.09	Kris Nolan	Samantha Thompson	06.07.09
1	21.09.09	Kris Nolan	Samantha Thompson	
2	10.03.11	Jason Carr	Samantha Thompson	10.03.11
3	31.01.19	Katherine Shirley	Samantha Thompson	31.01.19

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Appendix 3 Black Cockatoo Assessment (Coffey Environmental)
Appendix 4 Aboriginal Heritage -Section 18 Advice for the Glades and Brook Developments
Appendix 5 The Glades Village Centre Retail and Commercial Analysis (Taktics 4)
Appendix 6 Traffic & Transportation Report (with various updates) (Riley Consulting and Transcore)
Appendix 7 Local Urban Stormwater Management Report (JDA Consulting)

PART ONE – STATUTORY SECTION

1 STATUTORY PLANNING

1.1 THE STRUCTURE PLAN AREA

This Local Structure Plan (LSP) applies to the land contained within the areas defined as the subject land on the LSP.

1.2 STRUCTURE PLAN CONTENT

The Structure Plan comprises:

- Statutory Section (Part 1)
- Explanatory Report and Elements of the Structure Plan (Part 2)
- Appendices – Detailed Technical Reports

1.3 INTERPRETATION

The words and expressions used in this Structure Plan shall have the respective meanings given to them in the Scheme, or where not defined in the Scheme, as set out hereunder:

'The Scheme' shall mean the Shire of Serpentine Jarrahdale Town Planning Scheme No. 2 (as amended) or such amendments or modifications thereto that may be current. 'The Structure Plan' shall mean the Local Structure Plan (LSP).

The adopted Structure Plan includes the Structure Plan Map (**Figure 1**) and the Part 1 – Statutory Section. All other documentation contained within the Structure Plan Report is for background or explanatory purposes only and does not form part of the adopted Structure Plan.

1.4 OPERATION DATE

This Structure Plan shall come into operation on the date it is adopted by Local Government pursuant with sub-clause 5.18.6.1 of the Scheme.

1.5 RELATIONSHIP WITH THE SCHEME

Pursuant with sub-clause 5.18.6.2 of the Scheme the provisions, standards and requirements specified within Part 1 of the Structure Plan shall have the same force and effect as if it were a provision, standard or requirement of the Scheme. Part 2 of this Structure Plan is for explanatory purposes only, in order to provide a descriptive analysis of the Structure Plan.

In the event of there being any inconsistencies or conflicts between the provisions, standards or requirements of the Scheme and the provisions, standards or requirements of this Structure Plan, then the provisions, standards or requirements of the Scheme will prevail.

2 OBJECTIVES

The objectives of this Local Structure Plan are to:

i) Progress planning, design and development of the Structure Plan area in the context of the principles and design parameters established by the Byford Structure Plan 2005 (as amended), Byford Town Site Drainage and Water Management Plan, The Glades Local Water Management Strategy and other relevant Shire of Serpentine-Jarrahdale strategies or policies;

ii) Retain and celebrate where possible, significant remnant vegetation in road reserves, Public Open Space or Foreshore Reserve;

iii) Establish key east-west multiple-use corridors in accordance with the requirements of the Byford Structure Plan 2005 (as amended);

iv) Provide a vibrant and active Village Centre, in accordance with the Byford Structure Plan 2005 (as amended), that compliments and not undermines the Byford Town Centre;

v) Create a balanced distribution of and access to active, passive and conservation open space;

vi) Provide a diversity of housing typologies including medium and low residential development and mixed-use development, catering to a diverse population and ensuring the full range of housing alternatives;

vii) Create a highly connected road network with shared use pathways that relates strongly to the Byford Town Centre and adjacent recreation facilities; and

viii) Create a street block layout that will facilitate passive solar lot orientation.

3 OPERATION OF THE STRUCTURE PLAN

The subdivision and development of land within the Structure Plan area is to generally be in accordance with the Structure Plan. Matters of detailed design (i.e. provision of rear lanes, public open space rationalisation, local road realignments and detailed intersection design) can be considered and refined at the subdivision stage. Significant variations in design or land use will require amendments to the Structure Plan, in accordance with the provisions clause 5.18 of the Scheme.

Where required, Detailed Area Plans (DAPs) will be prepared and submitted consistent with the provisions of Clause 5.18.5 of Council's Scheme.

4 STRUCTURE PLAN MAP

The Structure Plan Map (refer **Figure 1**) outlines the planned pattern of development for the Structure Plan area.

5 ZONES AND RESIDENTIAL DENSITIES

The Structure Plan Map delineates and depicts the zones and residential density codes applicable to the Structure Plan according to the legend thereon.

The zones and residential density codes designated under this Structure Plan apply to the land within it as if they were incorporated in the Scheme.

All provisions, standards and requirements applicable to the zones and residential density codes in the Scheme shall apply, except where stipulated within **Section 5.0** of Part 1 of this report.

5.1 RESIDENTIAL ZONE

The provisions, standards and requirements of this Zone are in accordance with those applicable to the same zone in the Scheme, except where varied by a Detailed Area Plan. As a minimum requirement, Detailed Area Plans shall be required for the following:

- Rear loaded or Laneway lots;
- Lots with dual frontages;
- Lots immediately abutting public open space or foreshore areas;
- Lots with frontage to or abutting Regional Roads, Other Regional Roads or Railway Reservations; and
- Lots with frontage to Abernethy and Orton Roads.

For land zoned Residential on the Structure Plan Map, subdivision and development shall generally be in accordance with the adopted Structure Plan.

5.2 VILLAGE CENTRE ZONE

The provisions, standards and requirements of this Zone are to be in accordance with those of an adopted Glades Village Centre Local Planning Policy, except where varied by a Detailed Area Plan approved by the Shire in accordance with Town Planning Scheme No.2.

The maximum amount of retail floorspace permissible within the Village Centre is 4,500 m^2 Net Lettable Area (NLA). The maximum amount of non-retail (commercial) floor space is 2,500 m^2 NLA.

5.3 NEIGHBOURHOOD NODE

The provisions, standards and requirements of this Zone are to be in accordance with those of the 'Neighbourhood Node', in the Local Planning Policy No. 19 – Byford Structure Plan Development Area Requirements, except where varied as follows:

- Neighbourhood Nodes shall not exceed 200 m^2 retail floor space; and
- All Neighbourhood Nodes shall be the subject of a Detailed Area Plan to be approved by the Shire of Serpentine-Jarrahdale.

5.4 MIXED USE ZONE

The provisions standards and requirements of this Zone are to be in accordance with those applicable to the Commercial zone in the Scheme, except where varied by the following provisions:

a) In addition to the permitted and discretionary (identified as AA within the Scheme) uses, the following uses are also discretionary uses within the Mixed Use Zone:

   - Residential – Single House
   - Residential – Grouped Dwelling
   - Residential – Multiple Dwelling

b) In addition to the discretionary uses subject to advertising in accordance with Clause 6.3 of the Scheme (identified SA within the Scheme), the following uses are also discretionary subject to the advertising requirements of Clause 6.3:

- Corner Store;
- Home Business;
- Home Occupation;
- Educational Establishment; and
- Residential Building

c) All development within the Mixed Use Zone will be in accordance with the requirements of an approved Detailed Area Plan (DAP)

d) The residential density application to the Mixed Use zone is R80.

6 STRATEGIES AND PLANS

Prior to the commencement of development, the Shire will require the preparation and approval of the following strategies and plans, listed below:

6.1 LOCAL WATER MANAGEMENT STRATEGY

A Local Water Management Strategy shall be prepared and approved as part of the Local Structure Plan in accordance with the principles and objectives of the Byford Townsite Drainage and Water Management Plan.

6.2 URBAN WATER MANAGEMENT PLAN

An Urban Water Management Plan is to be prepared as a condition of subdivision for any subdivision application and prepared in accordance with the adopted Local Water Management Strategy.

6.3 FORESHORE MANAGEMENT PLAN

A Foreshore Management Plan is to be prepared as a condition of subdivision or development that is south of Orton Road, north of the Cardup Brook and within the LSP area. The plan will identify opportunities to preserve existing vegetation, rehabilitation of the foreshore and planting of native species local to the area.

6.4 LAKE MANAGEMENT PLAN

A Lake Management Plan is to be prepared as a condition of subdivision or development approval for any land immediately abutting or including the proposed lake (as shown on **Figure 1**). The plan will detail the whole of life costings, maintenance responsibilities and monitoring requirements of the lake.

6.5 LANDSCAPE MANAGEMENT PLAN

A Landscape Management Plan is to be prepared as a requirement of a condition of subdivision or development approval for any land abutting the Multiple Use Corridor or Village Centre (as shown on **Figure 1**). The extent of the Landscape Management Plan will be at the discretion of the Director of Planning. The Landscape Management Plan (if necessary), shall consider matters of fire management.

6.6 FIRE MANAGEMENT PLAN

A Fire Management Plan is to be prepared to identify potentially affected areas and outline the necessary fire management requirements to be implemented (via Detailed Area Plans).

6.7 NOISE MANAGEMENT PLAN

A Noise Management Plan is to be prepared as a requirement of a condition of subdivision or development approval for land within proximity to the Tonkin Highway reservation (as shown on **Figure 1**). The plan will identify lots affected by traffic noise from Tonkin Highway and outline the relevant noise mitigation measures to be implemented.

6.8 DETAILED AREA PLANS

Detailed Area Plans are to be prepared as a requirement of a condition of subdivision for proposed lots or lots that abut road reserves which accommodate existing significant vegetation worthy of retention, not affected by necessary subdivision works.

7 MISCELLANEOUS

7.1 BYFORD TROTTING COMPLEX

All landowners within 200m of the Byford Trotting Complex shall be notified by way of notification on title, of the possible impacts associated with the Trotting Complex.

PART TWO – EXPLANATORY REPORT

1 INTRODUCTION

1.1 BACKGROUND

This Local Structure Plan has been prepared for LWP Property Group Pty Ltd on behalf of LWP Byford Syndicate over the land known as 'The Glades,' Byford (refer Part 1 and **Figure 1**). Hereafter referred to as "the Structure Plan," this report has been prepared to guide the development of The Glades at Byford. "The Glades" is the estate name of the planning precinct formerly known as Byford Main Precinct.

LWP Property Group are also the developers of "The Brook" estate to the immediate south of the Structure Plan area, on the southern side of the Cardup Brook.

The Local Structure Plan was originally prepared and lodged in December 2005, however given the Shire's review of the Byford Structure Plan (2005 as amended) and the progression and finalisation of the Byford Townsite Drainage and Water Management Plan 2008 (superseding the previous Byford Urban Stormwater Management Strategy), the Structure Plan could not be progressed with any certainty. Given now the finalisation of the Byford Townsite Drainage and Water Management Plan (BTDWMP) and the review of the Byford Structure Plan, the Glades consultant team has been able to revise the Structure Plan in accordance with the requirements of both of these documents.

Accordingly it is important to note that this document represents a revision to the December 2005 version of the Local Structure Plan, to reflect the requirements of these documents, however the general intent and principles remain the same.

1.2 PURPOSE OF REPORT

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

This Structure Plan has been prepared under Section 5.18.3 of Council's Scheme to facilitate the urbanisation of The Glades, being the sites transition from a rural to urban land 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 Structure Plan will become the reference document for all future subdivision and development within The Glades.

The Glades - Local Structure Plan - Figure 1

LWP BYFORD SYNDICATE PTY LTD

LEGEND

GLADES STRUCTURE PLAN AREA

RESIDENTIAL

- RESIDENTIAL R10
- RESIDENTIAL R12.5
- RESIDENTIAL R15
- RESIDENTIAL R20
- RESIDENTIAL R25
- RESIDENTIAL R30
- RESIDENTIAL R40
- RESIDENTIAL R50
- RESIDENTIAL R60

CENTRES

- VILLAGE CENTRE (RESIDENTIAL R80)
- NEIGHBOURHOOD NODE (RESIDENTIAL R80)
- MIXED-USE (RESIDENTIAL R80)

OPEN SPACE

- PUBLIC OPEN SPACE AND DRAINAGE
- FORESHORE RESERVE
- DRAINAGE CHANNELS SUBJECT TO DETAILED DESIGN
- 30m FORESHORE BUFFER

OTHER

- COMMUNITY
- SCHOOLS
- 400m (5 MINUTE WALK) AND 800m (10 MINUTE WALK) WALKABLE CATCHMENTS
- AREA SUBJECT TO VILLAGE CENTRE LOCAL PLANNING POLICY

1. ABERNETHY ROAD TO BE WIDENED TO A 30m RESERVATION AS REQUIRED BY THE SHIRE OF SERPENTINE JARRAHDALE
2. ACCESS ARRANGEMENTS TO ABERNETHY ROAD TO BE DETERMINED AT THE TIME OF SUBDIVISION
3. INTEGRATOR B ROADS (30m + ROAD RESERVATION)
4. NEIGHBOURHOOD CONNECTOR ROADS (18m-30m ROAD RESERVATION)
5. PROPOSED LAKE
6. SEWER PUMP STATION
7. WATER CORPORATION SERVICE CORRIDOR (60m WIDE) - INDICATIVE
8. LOTS TO BE THE SUBJECT OF A LOCAL DEVELOPMENT PLAN ADDRESSING, AMONGST OTHER ITEMS, FIRE MANAGEMENT
9. A LOCAL DEVELOPMENT PLAN TO BE PREPARED PRIOR TO DEVELOPMENT THAT ADDRESSES THE FOLLOWING:
   - DWELLING AND GARAGE SETBACKS
   - GARAGE LOCATION (TO ENSURE DRIVEWAYS AVOID UNNECESSARY CLEARING OF VEGETATION)

NOTE:

1. THE SUBDIVISION AND DEVELOPMENT OF LAND WITHIN THE STRUCTURE PLAN AREA IS TO GENERALLY BE IN ACCORDANCE WITH THE STRUCTURE PLAN. MATTERS OF DETAILED DESIGN (i.e. PROVISION OF REAR LANES, PUBLIC OPEN SPACE RATIONALISATION, LOCAL ROAD REALIGNMENTS AND DETAILED INTERSECTION DESIGN) CAN BE CONSIDERED AND REFINED AT THE SUBDIVISION STAGE. SIGNIFICANT VARIATIONS IN DESIGN OR LAND USE WILL REQUIRE AMENDMENTS TO THE STRUCTURE PLAN, IN ACCORDANCE WITH THE PROVISIONS OF CLAUSE 5.18 OF THE SCHEME.
2. THE PROVISION OF REAR LANEWAYS HAS NOT BEEN IDENTIFIED ON THE STRUCTURE PLAN. REAR LANEWAYS WILL BE INCORPORATED WHERE APPROPRIATE AS PART OF DETAILED SUBDIVISION DESIGN.

EXISTING TREES TO BE RETAINED WITHIN ROAD RESERVATIONS WHERE POSSIBLE, FOLLOWING DETAILED DESIGN PROCESS.

AMENDMENT NO.	OCM DATE	DESCRIPTION
1	24.10.11	DENSITY INCREASE (EAST OF VILLAGE CENTRE)
2	26.02.12	DENSITY INCREASE (WEST OF WARRINGTON ROAD)
3	11.06.12	DENSITY AND ROAD LAYOUT CHANGES (WEST OF DOLEY ROAD)
4	26.11.12	REMOVAL OF ROAD ACROSS MUC (WEST OF DOLEY ROAD)
5	10.12.12	DENSITY INCREASE (SOUTH OF RENAUD WAY)
6	25.02.13	DENSITY INCREASE (WEST OF DOLEY ROAD)
7	09.12.13	ICARIA PRECINCT MODIFIED
8	.....	VARIOUS
9	06.07.17	WOODLAND GROVE PRECINCT MODIFIED
10	.....	VARIOUS

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date 03/01/2019 | checked: BDM
projection: PCG 94 | drawn: NM
scale: 1:60000@A1 | 1:40000@A0
0 80 160m

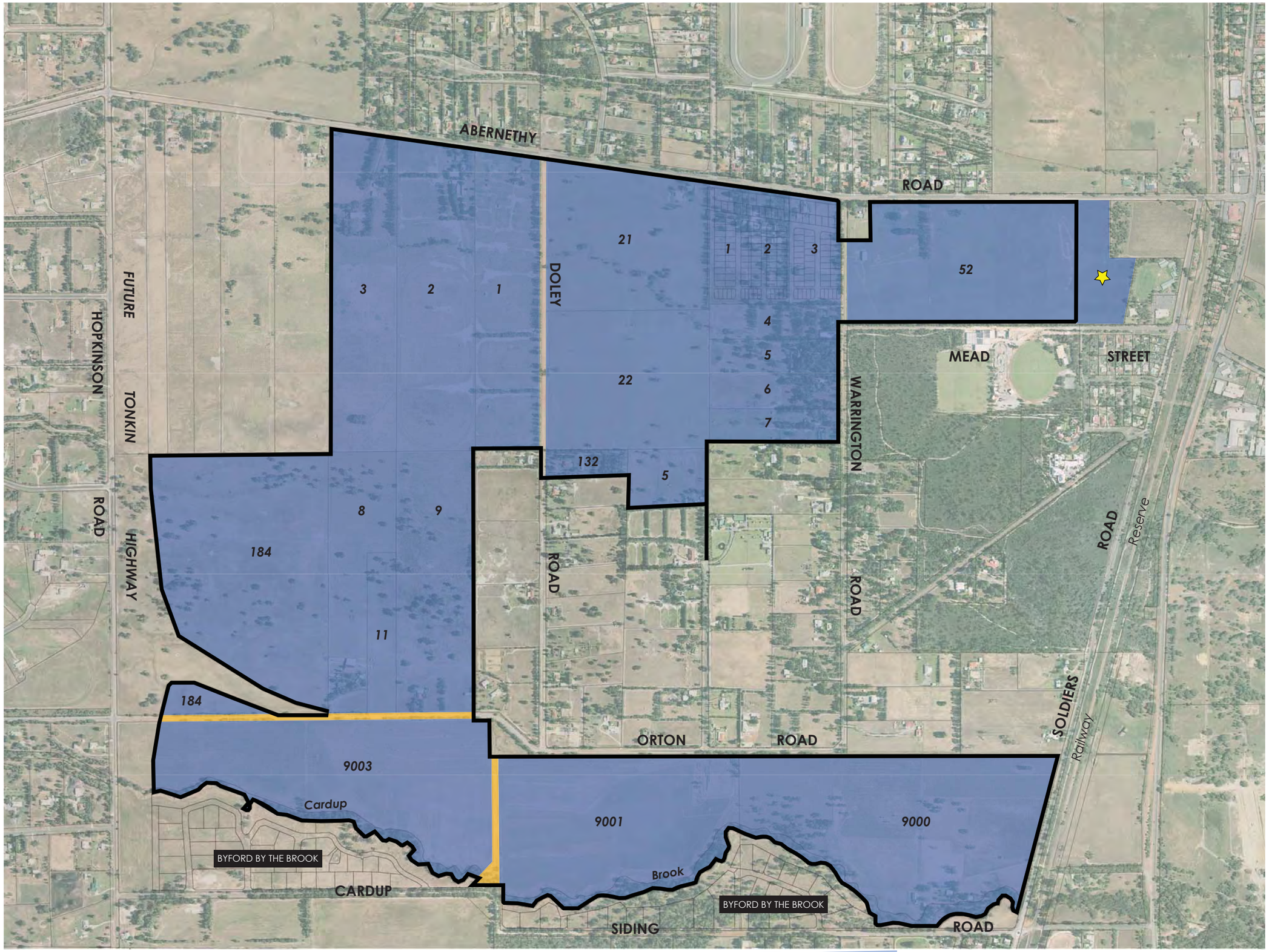
1.3 STRUCTURE PLAN AREA

The Structure Plan area (refer **Figure 2**) includes the following landholdings:

TABLE 1: LAND SCHEDULE

	Description	Vol/Folio	Area
Lot 9000	Orton Road	1414/690	36.8954 ha
Lot 9001	Orton Road	1007/489	28.9802 ha
Lot 9003	Orton Road	1038/46	32.1230 ha
Pt Lot 184	Orton Road	2135/962	35.1859 ha
Pt Lot 8	Orton Road	1578/358	11.4194 ha
Lot 9	Orton Road	1289/288	18.2285 ha
Lot 11	Orton Road	1566/487	4.0472 ha
Lot 1	Abernethy Road	2130/36	16.9664 ha
Lot 2	Abernethy Road	1694/347	21.1549 ha
Lot 3	Abernethy Road	1291/125	19.0050 ha
Lot 1	Abernethy Road	1416/14	4.0870 ha
Lot 2	Abernethy Road	1416/15	4.0726 ha
Lot 3	Abernethy Road	1416/16	4.9296 ha
Portion of Lot 52	Abernethy Road	2057/313	24.3741 ha
Lot 21	Doley Road	576/24A	20.1154 ha
Lot 22	Doley Road	576/22A	19.8802 ha
Lot 4	Warrington Road	2607/948	4.0495 ha
Lot 5	Warrington Road	1416/18	4.0410 ha
Lot 6	Warrington Road	1416/19	4.0381 ha
Lot 7	Warrington Road	1416/20	4.0528 ha
Lot 5	Lawrence Way	2094/682	4.4328 ha
Lot 132	Doley Road	1812/66	2.0653 ha
Road Reserve*			4.8598 ha
Total			329.4532 ha

** Does not include existing Doley and Warrington Road reserves (which will be utilised as part of future development)*



LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- LAND OWNED BY LWP PROPERTY GROUP PTY LTD
- LAND EXCLUDED FROM STRUCTURE PLAN AREA - subject to the Byford Townsite Structure Plan
- ROAD RESERVE - to be closed / realigned

STRUCTURE PLAN AREA

The Glades - Local Structure Plan

0m 100 200m

s: scale bar
d: june 09
j: 06/014

figure 2

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1.4 LOCATION

The Structure Plan area is generally bound by Abernethy Road to the north, Tonkin Highway to the west, Cardup Brook to the south and Doley/Warrington Roads to the east. The Structure Plan area is approximately 35 km from the Perth CBD to the north-west and 10 km from the Armadale Regional Centre to the north-east. Tonkin Highway and Thomas Road provide the key regional access points to the site.

Section 3 of this report considers the surrounding context of the Structure Plan area in greater detail.

1.5 STUDY TEAM

The Structure Plan has been prepared by Taylor Burrell Barnett in collaboration with the following team of specialist consultants:

- Coffey Environmental;
- Ethnosciences (Aboriginal Heritage);
- JDA Consulting (Hydrology);
- Overman & Zuideveld (Architecture);
- Plan E (Landscape Architecture);
- Riley Consulting and Transcore (Traffic and Transport);
- Wood & Grieve Engineers (Civil Engineering); and
- McMullen Nolan (Surveyors).

1.6 REPORT FORMAT

This report comprises two distinct parts. **Part 1** provides the statutory basis for which the Structure Plan will be implemented and creates a statutory link between the Structure Plan and the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2. **Part 2** explains and describes the proposed Structure Plan and how it will be implemented.

Separation of the content in this manner allows the requirements of the Structure Plan to be read in isolation. This in turn aids in the implementation of the Plan.

Owing to the breadth of data that has been prepared in support of the Structure Plan, only summaries of the various technical reports are contained in this document. Full copies of the following reports are attached as appendices:

Appendix 1	Shire of Serpentine-Jarrahdale Local Planning Policy No. 19 – Byford Structure Plan Area Development Requirements
Appendix 2	Environmental Appraisal Report (Coffey Environmental)
Appendix 3	Black Cockatoo Assessment (Coffey Environmental)
Appendix 4	Aboriginal Heritage -Section 18 Advice for the Glades and Brook Developments
Appendix 5	The Glades Village Centre Retail and Commercial Analysis (Taktics 4)
Appendix 6	Traffic & Transportation Report (with various updates) (Riley Consulting and Transcore)
Appendix 7	Local Urban Stormwater Management Report (JDA Consulting)

1.7 PROJECT PHILOSOPHY

LWP Property Group, as Project Managers of The Glades development, set two critical objectives for the project team in preparing this Structure Plan. First was the fundamental imperative of setting, and subsequently realising, sustainability benchmarks. The second was the need to sensitively integrate this new development into an almost 100 year old, semi-rural town of proud and distinct character.

In order to facilitate achievement of these two objectives an overarching philosophy will apply to the development from inception through to delivery of the final stage. The project philosophy is to *'tread lightly'.*

This is a borrowed expression that can be applied to the individual, an organisation, corporation or government body. It may be interpreted in a number of ways but in the context of this Structure Plan *'treading lightly'* relates to finding a delicate balance between optimising environmental outcomes and continued progress/development. The public and private sectors alike must operate with awareness that subdivision and development is a legacy that future generations and the environment will either suffer or celebrate.

LWP considers significant benefit will be enjoyed in the following key areas of the proposed Structure Plan.

1.7.1 TRADITIONAL NEIGHBOURHOOD DESIGN/SUSTAINABLE COMMUNITY

As part of the project brief, and in keeping with contemporary design practice in Western Australia, the Structure Plan is designed in accordance with the principle recommendations of Liveable Neighbourhoods (LN).

Liveable Neighbourhoods is the benchmark for community design in Western Australia and now enforced as a State Planning Policy. Whilst reference to the principles therein is the responsible path for any developer, it is particularly relevant in the Byford context where the existing townsite possesses characteristics also inherent to LN.

Integration between 'The Glades' project and the existing townsite will be aided where commonality of urban form exists.

The Glades at Byford design exhibits:

- A highly interconnected network of neighbourhoods with a traditional Village Centre at its core;
- A main street Village Centre that will offer a variety of uses including retail floorspace, commercial floorspace, medium density residential, mixed-use development, community facilities and civic spaces;
- Neighbourhood nodes that are interspersed throughout the Structure Plan area at important intersections;
- An interconnected street network that will link residential uses with the town and village centre, neighbourhood nodes, key civic spaces and a generous network of public open space and urban bush land; and
- A range of residential densities that are promoted across the Structure Plan area to;
  - optimise public equity (by maximising the available interface with community assets such as public open space, urban bushland, school sites, neighbourhood nodes and the neighbourhood centre);
  - provide a diversity of housing product for increased choice and to accommodate an evolving household/family structure; and

- promote higher densities in strategic locations thus facilitating a more efficient and sustainable use of land.

Combined, these elements promote variety and interest in the urban fabric, facilitate walkability, reduce car dependency, and ultimately encourage human interaction.

View south-east through the Village Centre

1.7.2 VIBRANT VILLAGE CENTRE

Central to the Glades project is the Village Centre. The Centre is anchored at the junction of two spine roads (Doley Road and Mead Street) that traverse the site.

The function of a Village Centre is to provide a convenience retail offer and a range of services that meet the daily needs of the surrounding populous.

In addition to this function, this Village Centre will act as a community focal point through the provision of landscaped public open space, massing of the built form, variety of interactive land uses (such retail, entertainment, and community facilities); highly pedestrianised public realm, and linkages with important civic infrastructure (such as the local High School, Byford Train Station, and the new Recreation Centre).

The Village Centre will bind the new community, yet, given its east west axis, will also forge visual and associative linkages with the existing Byford town centre.

View looking south towards the Village Centre across the lake

1.7.3 SUSTAINABLE ENVIRONMENT

All care has been taken in preparing this Structure Plan to reflect the principles of Liveable Neighbourhoods which facilitates sustainable urban outcomes and to identify a drainage strategy, earthworks regime and servicing plan that responds not only to the needs of the site, but meets sustainability targets.

1.7.4 SUSTAINABLE HOUSING

There are a number of architectural elements that can be incorporated in the design of new buildings that will help to reduce the energy load of the building and the resources spent during and after construction. Initiatives include:

- Orientating buildings for solar access;
- Adopting energy saving devices and systems;
- Using natural ventilation and daylight;
- Using light coloured materials to reflect heat externally and reflect daylight internally;
- Planning for a range of outdoor spaces to take advantage of daily and seasonal weather changes;
- Using low embodied energy, reused or recycled materials;
- Using materials and products with low toxic emissions;
- Utilizing building thermal mass and insulation to delay and reduce peak loads;
- Selecting products and systems that minimise water use; and
- Minimising waste during construction.

This list is by no means exhaustive but offers an insight into the simple design considerations that can significantly reduce ongoing energy expenditure. Taking care to design buildings for maximum efficiency helps to ease the burden on the environment.

It is often difficult for Governments to mandate stricter design requirements and so it can fall to the private sector to promote new benchmarks. To round out the suite of sustainability initiatives adopted for this project, it is vital that LWP, in conjunction with the Shire of Serpentine Jarrahdale formulate design guidelines, which focus not only on integrating the development with the existing Byford townsite, but also promoting sustainable development solutions.

1.7.5 CELEBRATION OF NATURAL FEATURES

The Glades is located at the eastern extent of the Swan Coastal Plain near the foot of the Darling Range. The site is characterised by a series of creek/drainage systems and vast expanses of vacant pastureland. As it exists, The Glades is a picture of tranquillity only 40 minutes from the Perth city centre.

It is this low-density development and the dominance of the sites environmental attributes that define the existing character. The charge for the consultant team has been to weave the environmental assets through the development whilst achieving the appropriate level of urbanism demanded by a growing population.

The Structure Plan, and subsequent phases of subdivision, will therefore recognise and celebrate the available views back to the Darling Scarp, existing vegetation, the presence of the Cardup Brook and the drainage channels that feed into the Brook.

This desire to retain and consolidate upon the natural features is perhaps best articulated in LWP's landscape brief, which states:

The landscape vision for The Glades project is to create a development with a strong sense of place and identity that is compatible with the surrounding environment. The incorporation of sustainable design principles is an over-riding objective, with tree retention in public open spaces and road reserves a key priority.

The creation of useful open spaces that fulfil a variety of functions is vital; such functions include:

- The establishment of significant multiple-use corridors along existing drainage lines;
- To re-create a diversity of indigenous plant communities and fauna habitats;
- To provide a showcase for a variety of environmental features and practices to assist in community education and foster a sense of community pride and ownership; and
- To provide a diversity of visual and recreational opportunities and experiences.

An overall approach in the open space design will be to minimise areas of irrigated grass and to re-establish extensive areas of bushland using endemic plant species.

2 PLANNING CONTEXT

2.1 EXISTING ZONING

2.1.1 METROPOLITAN REGION SCHEME

The Structure Plan area is predominantly zoned Urban under the Metropolitan Region Scheme (MRS). There is a portion of land in the north of the Structure Plan area abutting Abernethy Road and adjacent the Byford Trotting Complex that is zoned Urban Deferred (refer **Figure 3**)

To the west of the Structure Plan area is the Tonkin Highway and to the east is the South West Highway, which are both Primary Regional Road reservations under the MRS (refer **Figure 3**). To the east of the Structure Plan area there is also a substantial Parks and Recreation reservation (Bush Forever Site 321).

2.1.2 SHIRE OF SERPENTINE-JARRAHDALE TOWN PLANNING SCHEME NO. 2

The site is zoned Urban Development under the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2 (refer **Figure 4**). The 'Urban Development' zone is applied to land as a precursor to extensive development or redevelopment. Town Planning Scheme No. 2 (TPS2) requires the preparation of a Local Structure Plan within the Urban Development zone, prior to subdivision and development

2.2 STRATEGIC PLANNING CONTEXT

2.2.1 BYFORD STRUCTURE PLAN

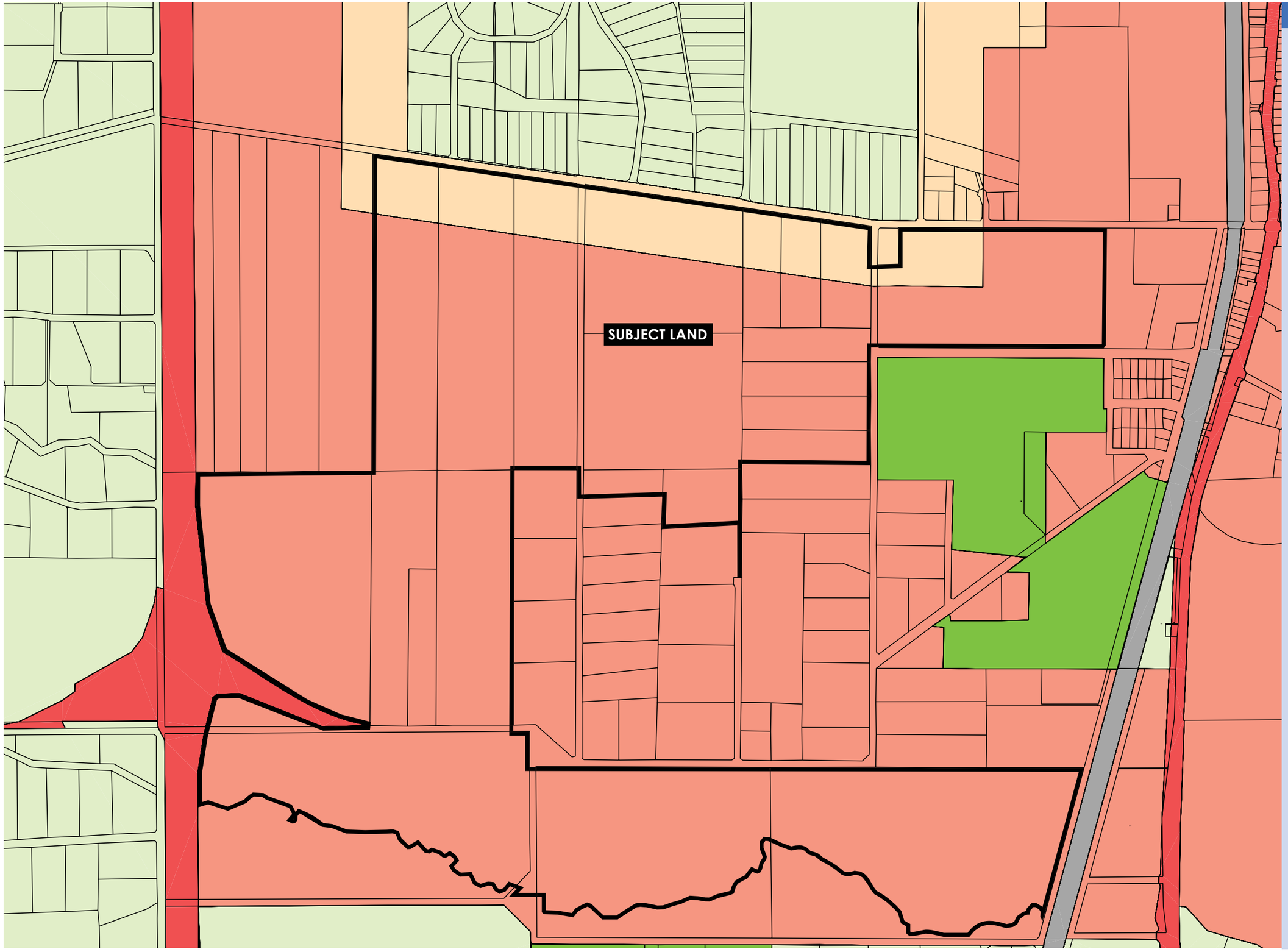
In accordance with the requirements of TPS No. 2, the Shire commissioned Taylor Burrell Barnett and Kinhill Engineers to prepare a district structure for the land fringing the Byford townsite in late 1999. The Byford District Structure Plan or Byford Structure Plan as it is now known (refer **Figure 5**), was prepared over a number of years and finally approved in 22 August 2005. Council undertook a review of the Structure Plan in 2006, however this review and new design was never endorsed or adopted by Council. In 2007, Council decided to review the existing 2005 Byford Structure Plan and in February 2007, they formally adopted modifications to this plan. The Western Australian Planning Commission approved some of these modifications in April 2008.

It is understood that the Shire are currently undertaking a further review of the Byford Structure Plan and that this review will be considered by Council in mid 2009.

Key elements of the WAPC approved Byford Structure Plan (2005 as amended) which inform the Glades Local Structure Plan include:

- A Village Centre, centrally located off Doley Road;
- Two major east-west Multiple Use Corridors;
- One High School and one Primary School site; and
- Some Mixed Business along Orton Road.

The Byford Structure plan also identifies the land south of Orton Road as "Land subject to further study – planning to be finalised subject to resolution of alignment of Orton Road". This document will address the alignment of Orton Road to enable development within this precinct to be facilitated through this structure plan. Further details are provided within **Table 2** below.



LEGEND

LOCAL STRUCTURE PLAN BOUNDARY

RESERVED LANDS

- PARKS AND RECREATION
- RAILWAYS
- PORT INSTALLATION
- STATE FORESTS
- WATER CATCHMENT
- CIVIC AND CULTURAL
- WATERWAYS

ROADS

- PRIMARY REGIONAL ROADS
- OTHER REGIONAL ROADS

PUBLIC PURPOSES - DENOTED AS FOLLOWS:

H	HOSPITAL
HS	HIGH SCHOOL
TS	TECHNICAL SCHOOL
CP	CAR PARK
U	UNIVERSITY
CG	COMMONWEALTH GOVERNMENT
SEC	STATE ENEGY COMMISSION
SU	SPECIAL USES
WSD	WATER AUTHORITY OF WA
P	PRISON

ZONES

- URBAN
- URBAN DEFERRED
- CENTRAL CITY AREA
- INDUSTRIAL
- SPECIAL INDUSTRIAL
- RURAL
- PRIVATE RECREATION
- RURAL - WATER PROTECTION

EXTRACT FROM METROPOLITAN REGION SCHEME

The Glades - Local Structure Plan

0m 100 200m

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TAYLOR BURRELL BARNETT

figure 3

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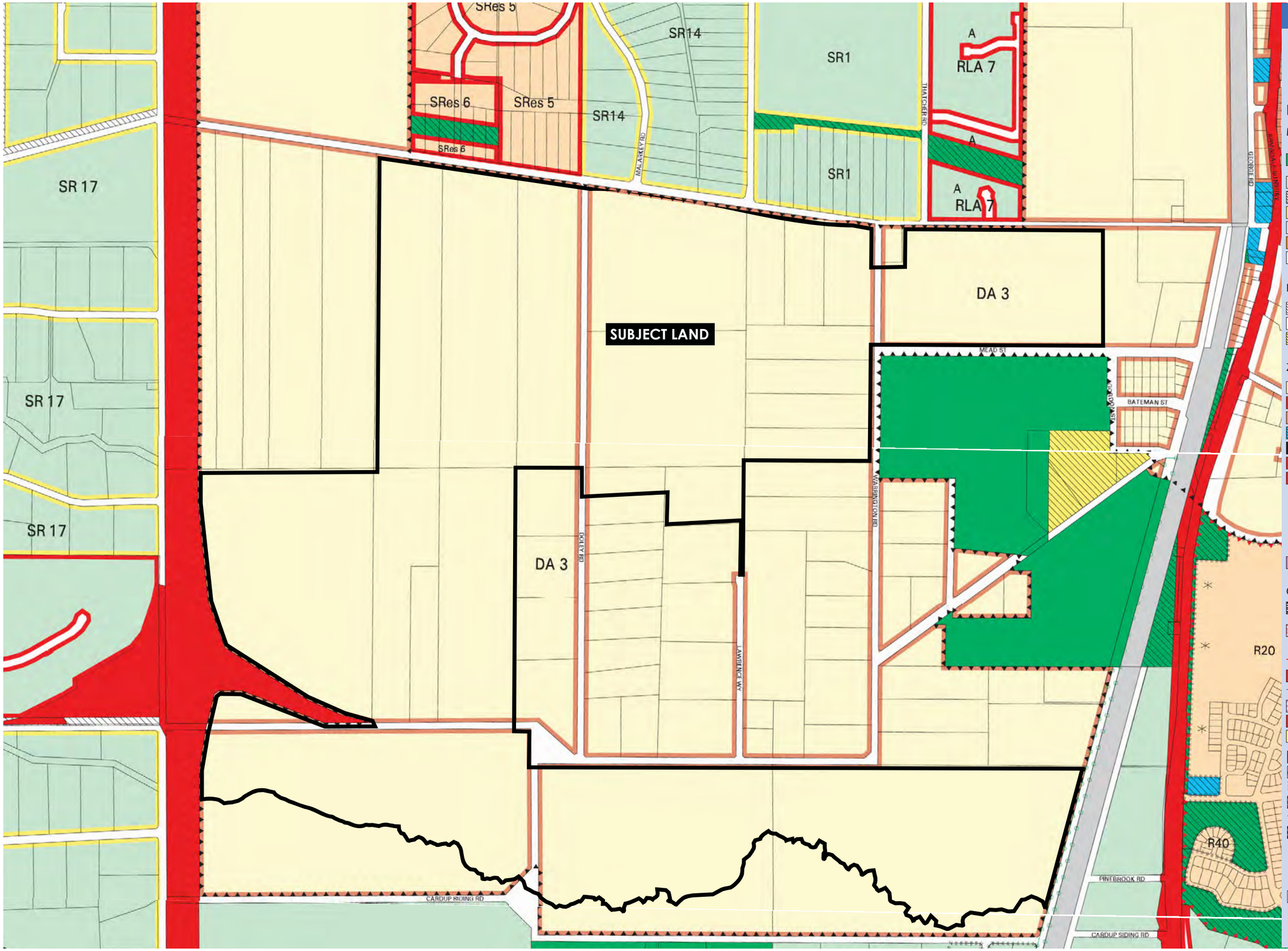

LEGEND

LOCAL STRUCTURE PLAN BOUNDARY

LEGEND

METROPOLITAN REGION SCHEME RESERVES

- PARKS AND RECREATION
- R — RESTRICTED PUBLIC ACCESS
- RAILWAYS
- PORT INSTALLATIONS
- STATE FORESTS
- WATER CATCHMENTS
- CIVIC AND CULTURAL
- WATERWAYS
- PRIMARY REGIONAL ROADS
- OTHER REGIONAL ROADS
- PUBLIC PURPOSES - DENOTED AS FOLLOWS:
  - H — HOSPITAL
  - HS — HIGH SCHOOL
  - TS — TECHNICAL SCHOOL
  - CP — CAR PARK
  - U — UNIVERSITY
  - CG — COMMONWEALTH GOVERNMENT
  - SEC — STATE ENERGY COMMISSION
  - SU — SPECIAL USES
  - WSD — WATER AUTHORITY OF WA
  - P — PRISON

LOCAL SCHEME RESERVES

- DRAINAGE PURPOSES
- LOCAL ROADS
- PUBLIC AND COMMUNITY PURPOSES
- PUBLIC OPEN SPACE

ZONES

- RESIDENTIAL
- SPECIAL RESIDENTIAL
- URBAN DEVELOPMENT
- COMMERCIAL
- SHOWROOM/WAREHOUSE
- SPECIAL USE
- SPECIAL USE — DENOTED AS FOLLOWS:
  - CL — CONSERVATION LIVING
  - EHR — EXTRACTION OF HARD ROCK
  - EHR/LF — EXTRACTION OF HARD ROCK/LANDFILL
  - ESC — EXTRACTION/STORAGE SHALE & CLAY
  - ESC/LF — EXTRACTION/STORAGE SHALE & CLAY/LANDFILL
  - FF/TA — FAST FOOD/TAKE AWAY
  - HP — HISTORIC PRECINCT
  - LP — LANDSCAPE PROTECTION
  - MDT — MANUFACTURE/DISTRIBUTION TIMBER
  - TM — TIMBER MILL
- GENERAL INDUSTRY
- LIGHT INDUSTRY
- CONSERVATION
- AP — AGRICULTURAL PROTECTION
- F — FARMLET
- RURAL
- RURAL GROUNDWATER PROTECTION
- A — RURAL LIVING A
- B — RURAL LIVING B
- SPECIAL RURAL

OTHER

- R CODES
- A1 — ADDITIONAL USES
- SCHEME BOUNDARY
- LOCAL GOVERNMENT BOUNDARY
- SRes 5 — SPECIAL RESIDENTIAL AREAS (SEE SCHEME TEXT)
- JARRAHDALE TOWNSCAPE PRECINCT
- PF — POULTRY FARM SPECIAL CONTROL AREA (SEE SCHEME TEXT)
- RLA 12 — RURAL LIVING A AREA (SEE SCHEME TEXT)
- SR19 — SPECIAL RURAL AREA (SEE SCHEME TEXT)
- RLA 18 — RURAL LIVING A AREA (SEE SCHEME TEXT)
- N3 2 — AREA OF NATURAL BEAUTY (SEE SCHEME TEXT)
- H7 — AREA OF HISTORICAL INTEREST (SEE SCHEME TEXT)
- EC1 — ENVIRONMENTAL CONDITIONS (SEE SCHEME TEXT)
- JARRAHDALE HERITAGE PRECINCT
- DA 3 — DEVELOPMENT AREA (SEE SCHEME TEXT)
- HISTORIC/SCIENTIFIC BUILDING OR OBJECT (SEE SCHEME TEXT)
- * — REFER TO CLAUSE 5.4 (RESIDENTIAL PLANNING CODES)
- NO ZONE

EXTRACT FROM SERPENTINE-JARRAHDALE TPS No.2

The Glades - Local Structure Plan

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figure 4

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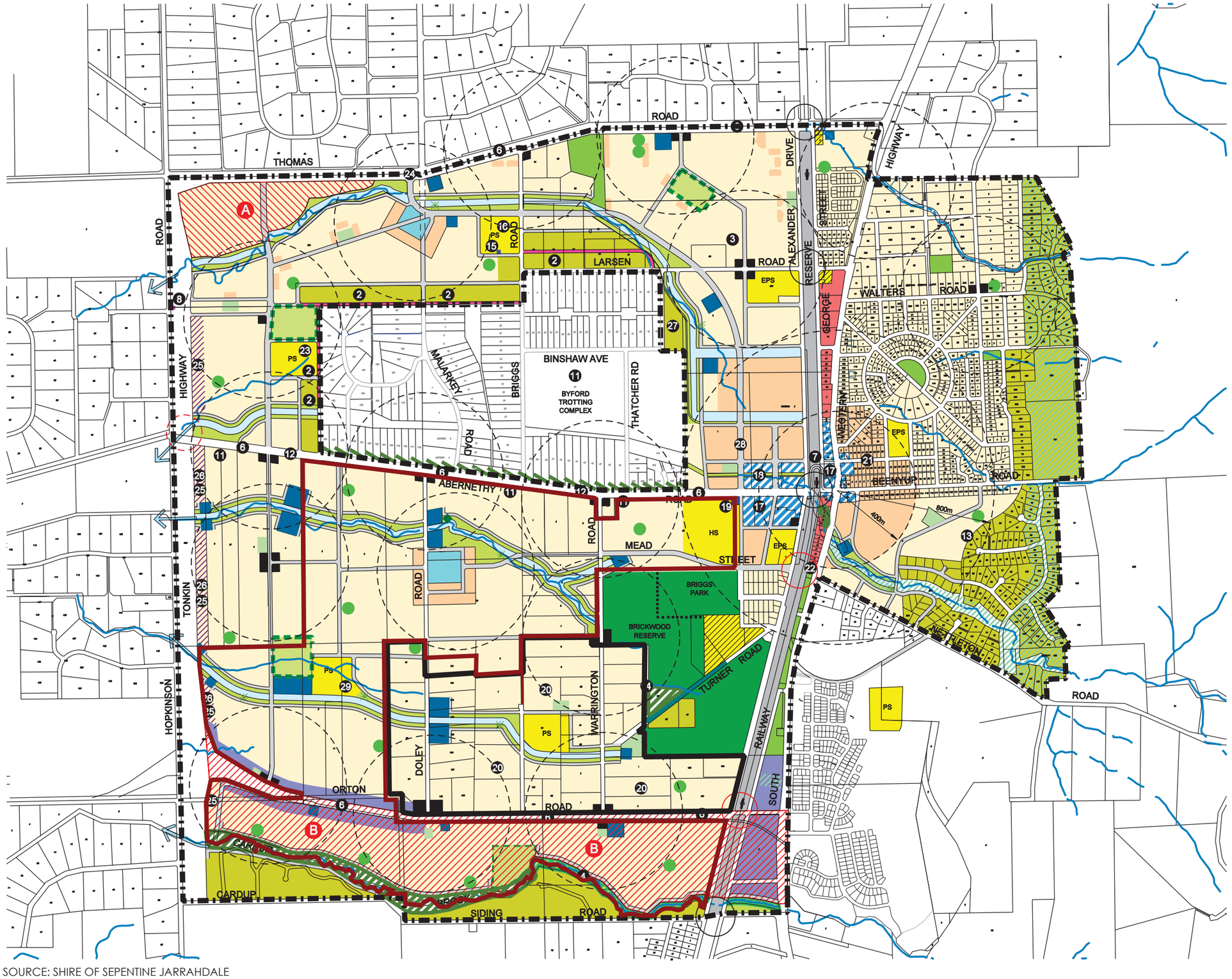

SOURCE: SHIRE OF SEPENTINE JARRAHDALE

NOTES

1. AT SUCH TIME AS ANY LAND, CURRENTLY DESIGNATED FOR NON-RESIDENTIAL USES (INCLUDING RURAL -RESIDENTIAL OR RURAL-LIVING PURPOSES) IS SUBDIVIDED FOR RESIDENTIAL PURPOSES, THERE WILL BE AN EXPECTATION OF A STANDARD CONTRIBUTION TOWARDS PUBLIC OPEN SPACE AND OTHER INFRASTRUCTURE.
2. EQUESTRIAN USE WITHIN RURAL RESIDENTIAL BUFFERLIMITED TO ONE HORSE PER LOT STABLED AT THE REAR OF THE LOT ADJACENT TO THE BRIDLE PATH. NO CONNECTION BETWEEN BRIDLE PATH AND PUBLIC ROAD.
3. INTERSECTION TREATMENT OF NEW TOWN CENTRE DISTRICT DISTRIBUTOR INTEGRATOR 'B' ROAD AND LARSEN ROAD TO BE REVIEWED AS PART OF FURTHER DETAILED STRUCTURE PLANNING
4. CARDUP BROOK FORESHORE RESERVE: NOMINAL WIDTH 30 METRES.FINAL WIDTH SUBJECT TO DETAILED INVESTIGATION. LAND TO BE CEDED FREE OF COST UPON SUBDIVISION, IN ACCORDANCE WITH WESTERN AUSTRALIAN PLANNING COMMISSION SUBDIVISION POLICY.
5. RURAL RESIDENTIAL NO HORSES PERMITTED DUE TO PROXIMITY TO WATERWAY.
6. THOMAS ROAD, ABERNETHY ROAD AND ORTON ROAD TO BE WIDENED TO ACCOMMODATE STORMWATER, REFER BYFORD URBAN STORMWATER MANAGEMENT STRATEGY. PLAN TO REQUIRE THE FINAL WIDTH OF ABERNETHY ROAD TO BE 40 METRES UNLESS OTHERWISE DETERMINED AT THE LOCAL STRUCTURE PLAN STAGE.
7. POSSIBLE ALTERNATE LOCATION FOR FUTURE RAILWAY STATION BASED ON RECOMMENDATIONS OF THE TOWNSCAPE STUDY.
8. APPROX. LOCATION OF SEWER PUMP STATION AND 150m BUFFER.
9. THE BYFORD STRUCTURE PLAN PROVIDES 8.6% PUBLIC OPEN SPACE. THE BALANCE 1.4% PUBLIC OPEN SPACE WILL BE REQUIRED TO BE IDENTIFIED IN FURTHER DETAILED STRUCTURE PLANNING AND TO BE GIVEN UP AT THE TIME OF SUBDIVISION.
10. PROSPECTIVE PURCHASERS OF ALL NEW RESIDENTIAL LOTS CREATED WITHIN 200 METRES OF ANY LOT CONTAINED WITHIN THE BYFORD TROTTING COMPLEX WILL BE REQUIRED TO BE NOTIFIED THAT THEY ARE WITHIN PROXIMITY OF THE TROTTING COMPLEX AND ASSOCIATED LAND USES.
11. ANY DETAILED STRUCTURE PLANS FOR THE LAND ABUTTING THE SOUTH SIDE OF ABERNETHY ROAD SHOULD INCLUDE MEASURES TO PROVIDE FOR AN ADDITIONAL BUFFER BETWEEN ABERNETHY ROAD AND THE RURAL LAND ON THE NORTH SIDE OF ABERNETHY ROAD. SUCH MEASURES COULD INCLUDE, BUT ARE NOT LIMITED TO, THE ORIENTATION OF LOTS, LOCATION OF LOCAL PUBLIC OPEN SPACE AND ATTENTION TO THE LOCAL ROAD SYSTEM.
12. THE FUTURE CONSTRUCTION OF ABERNETHY ROAD SHOULD INCLUDE MEASURES TO PROVIDE AN AMENITY BUFFER TO THE RESIDENTIAL LAND USES ON THE SOUTH SIDE OF ABERNETHY ROAD. SUCH MEASURES COULD INCLUDE DENSE LANDSCAPING, APPROPRIATE FENCING OR BUNDING. ABERNETHY ROAD / TONKIN HIGHWAY MAY INTERACT BY MEANS OF A GRADE SEPARATION.
13. NOTWITHSTANDING LAND HAVING A CLASSIFICATION OF RESIDENTIAL (R20) WHERE SUCH LAND ABUTS LAND CLASSIFIED RURAL RESIDENTIAL, AN APPROPRIATE (LOWER) INTERFACE DENSITY OF DEVELOPMENT MAY BE REQUIRED TO BE IMPLEMENTED.
14. THE BYFORD STRUCTURE PLAN IS NOT RESPONSIBLE FOR THE ACQUISITION OF LOT 48 TURNER ROAD (BUSH FOREVER SITE) AND THAT THIS MATTER IS TO BE ADDRESSED SEPARATELY BY THE WESTERN AUSTRALIAN PLANNING COMMISSION.
15. FURTHER CONSIDERATION FOR THE RETENTION OF THE HOMESTEAD BUILDING WILL BE REQUIRED DURING DETAILED STRUCTURE PLANNING INCLUDING CONSULTATION WITH DET (IF REQUIRED) AND FURTHER DETAIL AS TO THE PROPOSED FUNCTION AND SUITABILITY OF THE BUILDING FOR COMMUNITY PURPOSES.
16. EXACT LOCATION OF THE PRIMARY SCHOOL WITHIN LOT 7 BRIGGS ROAD IS TO BE DETERMINED AT THE LOCAL STRUCTURE PLAN STAGE
17. TOWN CENTRE REQUIRES THE PREPARATION AND COMPLETION OF A LOCAL STRUCTURE PLAN, COMPLETE WITH DETAILED AREA PLANS AND DESIGN GUIDELINES. LOCAL STRUCTURE PLAN IS TO INCLUDE AN INVESTIGATION INTO INCREASED RESIDENTIAL DENSITIES WITHIN THE 800 METRE WALKABLE CATCHMENT AND ITS RELATIONSHIP WITH TRANSIT ORIENTED URBAN DESIGN. THE LOCATION, NATURE, ROLE, RELATIONSHIP AND DISTRIBUTION OF DIFFERENT ACTIVITIES WITHIN THE TOWN CENTRE INCLUDING 800 METRE WALKABLE CATCHMENT AREA. ANY CHANGE TO RESIDENTIAL DENSITIES OR USES WITHIN THE 800 METRE WALKABLE CATCHMENT OF THE TOWN CENTRE WILL BE SUBJECT TO A SEPARATE MODIFICATION TO THE BSP 2008 AND COMMUNITY CONSULTATION.
18. THE EXISTING WATERWAY WILL BE SUBJECT TOWATER SENSATIVE URBAN DESIGN PRINCIPLES AT THE DETAILED ENGINEERING DESIGN STAGE. THE SPECIFIC WIDTH OF THE WATER WAY WILL BE DETERMINED AT THE LOCAL STRUCTURE PLAN STAGE.
19. THE HIGH SCHOOL SITE WILL BE A PROMINENT LANDMARK SITE. FURTHER INVESTIGATIONS ARE REQUIRED TO DETERMINE THE POSSIBILITY OF CO-LOCATING THE SCHOOL SITE WITH OTHER COMMUNITY FACILITIES. THE FACILITIES SHOULD BE LOCATED IN THE NORTH-EAST CORNER OF THE SCHOOL SITE ALONG ABERNETHY ROAD. DESIGN GUIDELINES ARE TO BE PREPARED FOR THE COMMUNITY PURPOSES SITE AS PART OF THE LOCAL STRUCTURE PLAN FOR THE TOWN CENTRE.
20. LOCAL STRUCTURE PLANS FOR PORTIONS OF THE DOLEY ROAD/WARRINGTON ROAD PRECINCT, ARE TO BE PREPARED AS DETERMINED BY THE SHIRE. THE LOCAL STRUCTURE PLAN SUBMITTED FOR THE AREA ADJACENT TO THE WESTERN EDGE OF THE BRICKWOOD RESERVE IS TO SHOW A ROAD RESERVE ADJACENT TO BRICKWOOD RESERVE SEPARATING IT FROM THE RESIDENTIAL AREA. THE LOCAL STRUCTURE PLAN SHALL ALSO INCLUDE A PUBLIC OPEN SPACE LINK BETWEEN BRICKWOOD RESERVE AND THE MULTIPLE USE CORRIDOR ON TURNER ROAD. THE LOCATION OF DRAINAGE WITHIN DOLEY ROAD/WARRINGTON ROAD PRECINCT IS INDICATIVE ONLY AND WILL BE REFINED AT THE LOCAL STRUCTURE PLAN STAGE. THE FINAL LOCATION OF THE PRIMARY SCHOOL MAY BE SUBJECT TO CHANGE AND ITS LOCATION IS TO BE DETERMINED IN CONSULTATION WITH THE DET DURING DETAILED STRUCTURE PLANNING.
21. RESIDENTIAL DENSITY LIMITED TO R30 IN ACCORDANCE WITH THE BYFORD TOWNSITE DETAILED AREA PLAN.
22. THERE IS A POTENTIAL FOR A RAIL CROSSING LINKING MEAD STREET AND SOUTH WESTERN HIGHWAY. HOWEVER, THIS IS A LONG TERM OPTION AND SUBJECT TO CONSOLTATION WITH THE PUBLIC TRANSPORT AUTHORITY.
23. DETAILED STRUCTURE PLANNING WILL BE REQUIRED TO DETERMINE THE FINAL LOCATION OF THE PRIMARY SCHOOL (IN CONSULTATION WITH DET) AND THE CORRESPONDING LOCATION OF THE RURAL RESIDENTIAL ZONE.
24. THE FINAL LOCATION AND DETAILED DESIGN OF THE INTERSECTION IS TO BE DETERMINED THROUGH FUTHER DETAILED PLANNING.
25. FURTHER REVIEW OF NOISE ATTENUATION REQUIREMENTS AND OPTIONS FOR LAND ADJACENT TO TONKIN HIGHWAY IS REQUIRED DURING STRUCTURE PLANNING.
26. LAND ADJACENT TO TONKIN HIGHWAY, SOUTH OF ABERNETHY ROAD TO ORTON ROAD MAY BE REQUIRED FOR A POSSIBLE FUTURE WATER CORPORATION SERVICE CORRIDOR.
27. ADDITIONAL DRAINAGE MAY BE REQUIRED, TO BE DETERMINED THROUGH DETAILED STUCTURE PLANNING (INCLUDING PREPARATION AND FINALISATION OF A DRAINAGE AND NUTRIENT MANAGEMENT PLAN).
28. THE FINAL ALIGNMENT OF THE TOWN CENTRE DISTRIBUTOR ROAD THROUGH LOT 1 ABERNETHY ROAD WILL BE DETERMINED DURING DETAILED STRUCTURE PLANNING.
29. FINAL LOCATION OF THE PRIMARY SCHOOL NORTH OF ORTON ROAD AND WEST OF DOLEY ROAD IS TO BE DETERMINED IN CONSULTATION WITH THE DEPARTMENT OF EDUCATION AND TRAINING DURING DETAILED STRUCTURE PLANNING FOR THE AREA.

GENERAL NOTES:

THE PREPARATION AND IMPLEMENTATION OF A BICYCLE AND PEDESTRIAN PLAN FOR EACH LOCAL STRUCTURE PLAN IN ACCORDANCE WITH THE SHIRES'S BICYCLE AND PEDESTRIAN MASTER PLAN IS REQUIRED.

LOCAL STRUCTURE PLANS TO BE PREPARED, APPROVED AND ADOPTED ACROSS THE ENTIRE DEVELOPMENT AREA.

DETAILED AREA PLANS WILL BE REQUIRED FOR LAND ABUTTING MAJOR DISTRIBUTOR ROADS, PUBLIC OPEN SPACE, RESERVES, MULTIPLE USE CORRIDORS AND ARTERIAL ROADS TO ENSURE THE BUILT FORM REFLECTS THE RURAL CHARACTER OF THE AREA.

LEGEND

- STRUCTURE PLAN AREA
- THE GLADES LOCAL STRUCTURE PLAN AREA
- DOLEY/WARRINGTON ROAD PRECINCT BOUNDARY
- RURAL RESIDENTIAL
- RESIDENTIAL (R20)
- RESIDENTIAL (R30-60)
- LAND SUBJECT TO FURTHER STUDY. SEE NOTES 25 & 26 WHERE APPLICABLE
- TOWN CENTRE (TOWN CENTRE SUBJECT TO LOCAL STRUCTURE PLAN AND DETAILED AREA PLAN AND DESIGN GUIDELINES)
- NEIGHBOURHOOD CENTRE
- HIGHWAY COMMERCIAL
- COMMUNITY PURPOSE
- NEIGHBOURHOOD NODE
- SCHOOLS
  EPS - Existing Primary School
  PS - Primary School
  HS - High School
- MIXED BUSINESS
- MULTIPLE USE CORRIDOR (MUC)
- WATERWAY
- DRAINAGE BASIN INDICATIVE LOCATION
- FUTURE ROADS
- EXISTING MRS REGIONAL PARKS AND RECREATION RESERVE
- EXISTING LOCAL PUBLIC OPEN SPACE
- PROPOSED LOCAL PARK (Approx.3000m²)
- PROPOSED LOCAL PARK WITHIN MUC
- PROPOSED NEIGHBOURHOOD PARK (Approx. 4000m²)
- PROPOSED NEIGHBOURHOOD PARK WITHIN MUC
- DISTRICT RECREATION (Approx. 4ha)
- CONSERVATION
- FORESHORE RESERVE
- PUBLIC PURPOSES
- BUFFER BETWEEN TROTTING COMPLEX EQUESTRIAN RELATED ACTIVITIES AND RESIDENTIAL AREA INCLUDED WITHIN EXISTING LOTS
- AREA OF LANDSCAPE SENSITIVITY
- DRAINAGE DIRECTION FLOW
- UNCONSTRUCTED ROAD / BRIDLE PATH
- TURNER ROAD - POSSIBLE CLOSURE SUBJECT TO FURTHER INVESTIGATIONS BY COUNCIL
- RAILWAY CROSSINGS
- POTENTIAL RAIL CROSSING SUBJECT TO FURTHER INVESTIGATIONS
- POSSIBLE FUTURE GRADE SEPERATED CROSSING
- POSSIBLE FUTURE RAILWAY STATION
- A — LAND SUBJECT TO FURTHER STUDY TO ADDRESS THE REQUIREMENTS FOR DRAINAGE AND DETAILED STRUCTURE PLANNING. CONSIDERATION TO BE GIVEN TO THE PREFERRED ALIGNMENT OF THE TONKIN HIGHWAY PRIMARY REGIONAL ROAD RESERVATION.
- B — LAND SUBJECT TO FURTHER STUDY - PLANNING TO BE FINALISED SUBJECT TO RESOLUTION OF ALIGNMENT OF ORTON ROAD

BYFORD DISTRICT STRUCTURE PLAN

The Glades - Local Structure Plan

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figure 5

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TABLE 2: BYFORD STRUCTURE PLAN LAND USE BREAKDOWN

Property	Designated Uses
Pt Lot 9001 Cardup Siding Road	Predominantly R20 with a conservation area along Cardup Brook, a neighbourhood node, a proposed local park, neighbourhood park & drainage basin.
Pt Lot 9000 Cardup Siding Road	Predominantly R20 with a conservation area along Cardup Brook, a portion of Mixed Business, a 4,000 sqm district recreation area, a proposed local park, neighbourhood park & drainage basin.
Pt Lot 9003 Cardup Siding	Predominantly R20 with a conservation area along Cardup Brook, two proposed local park, a portion of Mixed Business and drainage basin.
Pt Lot 184 Orton Road	Predominantly R20, with a multiple use corridor, a neighbourhood node, 3 drainage basins (or part thereof), portion of district recreation reserve, a portion of Mixed Business and a proposed neighbourhood park.
Pt Lot 8 Orton Road	Predominantly R20 with a multiple use corridor, portion of a drainage basin, portion of district recreation reserve, a porion of Mixed Business and a portion of a primary school site.
Lot 9 Orton Road	Predominantly R20 with a multiple use corridor, proposed local park within MUC, a proposed local park and portion of a primary school site.
Lot 11 Orton Road	R20 and a small portion of multiple use corridor.
Lot 1 Abernethy Road	Predominantly R20 with a multiple use corridor, a neighbourhood node, a fringing area of residential R30-60.
Lot 2 Abernethy Road	Predominantly R20 with a multiple use corridor and two local parks.
Lot 3 Abernethy Road	Predominantly R20 with a multiple use corridor, a portion of a drainage basin and portion of proposed district recreation reserve.
Lot 1 Abernethy Road (now Stage 1)	R20 with a neighbourhood node.
Lot 2 Abernethy Road (now Stage 1)	R20
Lot 3 Abernethy Road (now Stage 1)	R20
Lot 52 Abernethy Road	Predominantly R20 with a multiple use corridor, a neighbourhood node, drainage basin, proposed local park, high school site with a community purpose and area of residential R30-60.
Lot 21 Doley Road	Predominantly R20 with a multiple use corridor, 2 drainage basins, a portion of neighbourhood centre and fringing area of residential R30-60.
Lot 22 Doley Road	Predominantly R20 with a multiple use corridor, portion of proposed neighbourhood centre and fringing area of residential R30-60.
Lot 4 Warrington Road (formerly – now Stage 1)	Predominantly multiple use corridor with a small portion of R20.
Lot 5 Warrington Road	Predominantly multiple use corridor with a small portion of R20
Lot 6 Warrington Road	Predominantly R20 with multiple use corridor
Lot 7 Warrington Road	Predominantly R20 with multiple use corridor

Whilst the Byford Structure Plan resolves the district level planning issues, local structure planning is required before further subdivision and development may be contemplated within The Glades Estate.

2.3 EXISTING STUDIES AND RELEVANT POLICY CONSIDERATIONS

2.3.1 BYFORD TOWNSITE DRAINAGE AND WATER MANAGEMENT PLAN

As previously mentioned, in 2005 the Byford Structure Plan was endorsed by the Shire of Serpentine-Jarrahdale. In support of the BSP was the Byford Urban Stormwater Management Strategy (2003) was prepared and later simplified as the Byford Urban Stormwater Management Plan Developer Guidelines in 2005.

In 2007, the Department of Water nominated to prepare the Byford Townsite Drainage and Water Management Plan (DWMP) to address the Byford Structure Plan. The DWMP was completed in 2008, and according to the document, now supersedes the Byford Urban Stormwater Management Strategy previously adopted by the Shire.

The DWMP provides a district scale assessment of the hydrology relevant to the implementation of the BSP. The LWMS included in this LSP addresses the water management criteria presented in the DWMP and provides a refinement of the hydrology to a local scale, appropriate for the implementation of The Glades LSP.

2.3.2 BETTER URBAN WATER MANAGEMENT (WAPC 2008)

The guideline document Better Urban Water Management (WAPC, 2008), focuses on the process of integration between land use and water planning by specifying the level of investigations and documentations required at various decision points in the planning process.

The LWMS included in this LSP complies with the BUWM process.

2.3.3 SHIRE OF SERPENTINE-JARRAHDALE LOCAL PLANNING POLICY 19 – BYFORD STRUCTURE PLAN AREA DEVELOPMENT REQUIREMENTS

The Shire of Serpentine-Jarrahdale's Local Planning Policy 19 (refer **Appendix 1**) provides guidance and requirements for land use and development within the Byford Structure Plan area. Importantly, this policy considers land use permissibility and development requirements for centres (including the Village Centre within the Structure Plan area) within the BSP area and specifically allows for Mixed Use development, which is currently not permissible based on the provisions of Town Planning Scheme No. 2.

To provide further statutory rigour to the provisions of this policy, Part 1 of this Structure Plan re-iterates the provisions of this policy for many of the land uses identified on the Structure Plan.

2.3.4 DRAFT ACTIVITY CENTRES STRATEGY

It is understood the Shire is currently preparing a Draft Activity Centre Strategy across the entire municipality, however this is yet to be released to the public.

3 CONTEXTUAL ANALYSIS AND EXISTING LAND USE PATTERN

3.1 SITE CONTEXT

As outlined in **Figure 6**, the Structure Plan area is approximately 35 km from the Perth CBD to the north-west and 10 km from the Armadale Regional Centre to the north-east. Tonkin Highway (future extension) to the immediate west and Thomas Road (1.5 km to the north) provide the key regional access points to the site.

In a more local context, as outlined in **Figure 7**, the Structure Plan area is to the immediate east of the existing Byford Town Centre and this needs to be acknowledged and considered carefully as part of the planning of The Glades. To the east there are also existing recreation facilities and a private primary school and to the south is the existing Byford by the Brook development.

The Byford Trotting complex to the immediate north of the Structure Plan area will also require careful consideration from an interface perspective. The Structure Plan areas wraps around an area of fragmented semi rural landholdings (generally north of Orton Road and west of Warrington Road) which will also require careful consideration from an access and interface perspective.

3.2 EXISTING LAND USE PATTERN

For the purposes of describing the existing environment, the Structure Plan area has been broken up into 3 separate sub-precincts, as outlined in **Figure 8**.

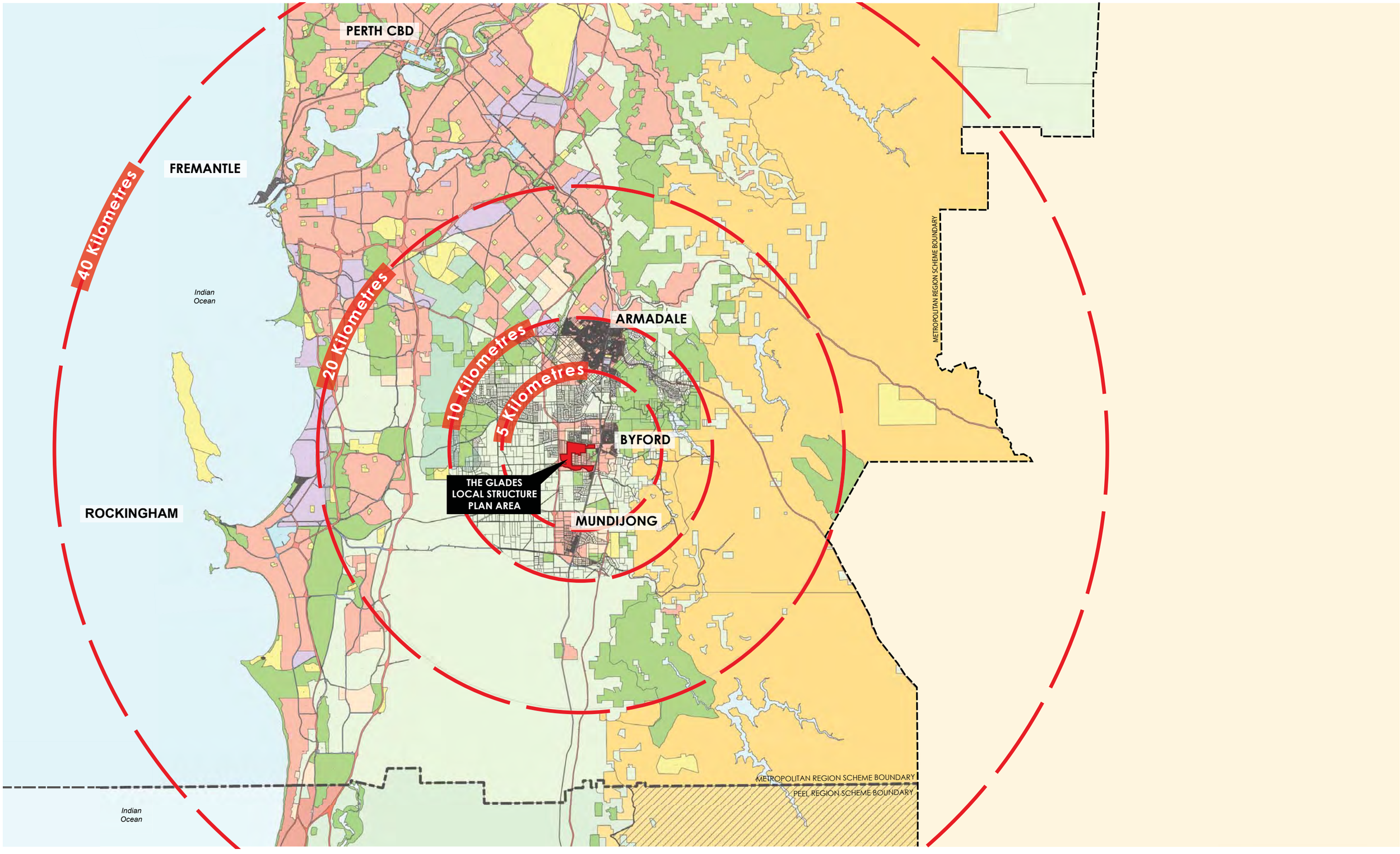
Sub-precincts 1 and 2 comprise the bulk of land bound by Abernethy Road, Soldiers Road, Orton Road and Hopkinson Road. The Tonkin Highway Reserve is located along the south-western and western boundaries of sub-precinct 2.

Of the small number of improvements located within sub-precincts 1 & 2, most are single residential dwellings (and associated outbuildings) located forward on their respective lots. This pattern of development renders much of the sub-precincts vacant and concentrates development towards the various road frontages. The balance of lots are utilised for pastureland.

A local structure plan has been prepared for land located immediately west of sub-precinct 1 (Byford West). The structure plan proposes residential development of densities between R20 and R30. It is also understood that subdivision approval has been granted (through a decision of the State Administrative Tribunal) over these landholdings, however there are some concerns in relation to the width of the approved Multiple Use Corridors and their ability to accommodate the drainage volumes anticipated by the Byford Townsite Drainage and Water Management Plan. Further negotiations with this landowner may be required at the detailed subdivision design stage to ensure an appropriate and realistic design outcome can be achieved.

Sub-precinct 3 comprises all land south of Orton Road and north of the Cardup Brook watercourse. The Tonkin Highway Reserve forms the western and north western boundaries of the sub-precinct.

The vast majority of sub-precinct 3 is pastureland with only one small cluster of buildings located towards Soldiers Road. It is understood that this cluster comprises a residential building and associated outbuildings.



REGIONAL CONTEXT PLAN

The Glades - Local Structure Plan

0 3km 6km

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figure 6

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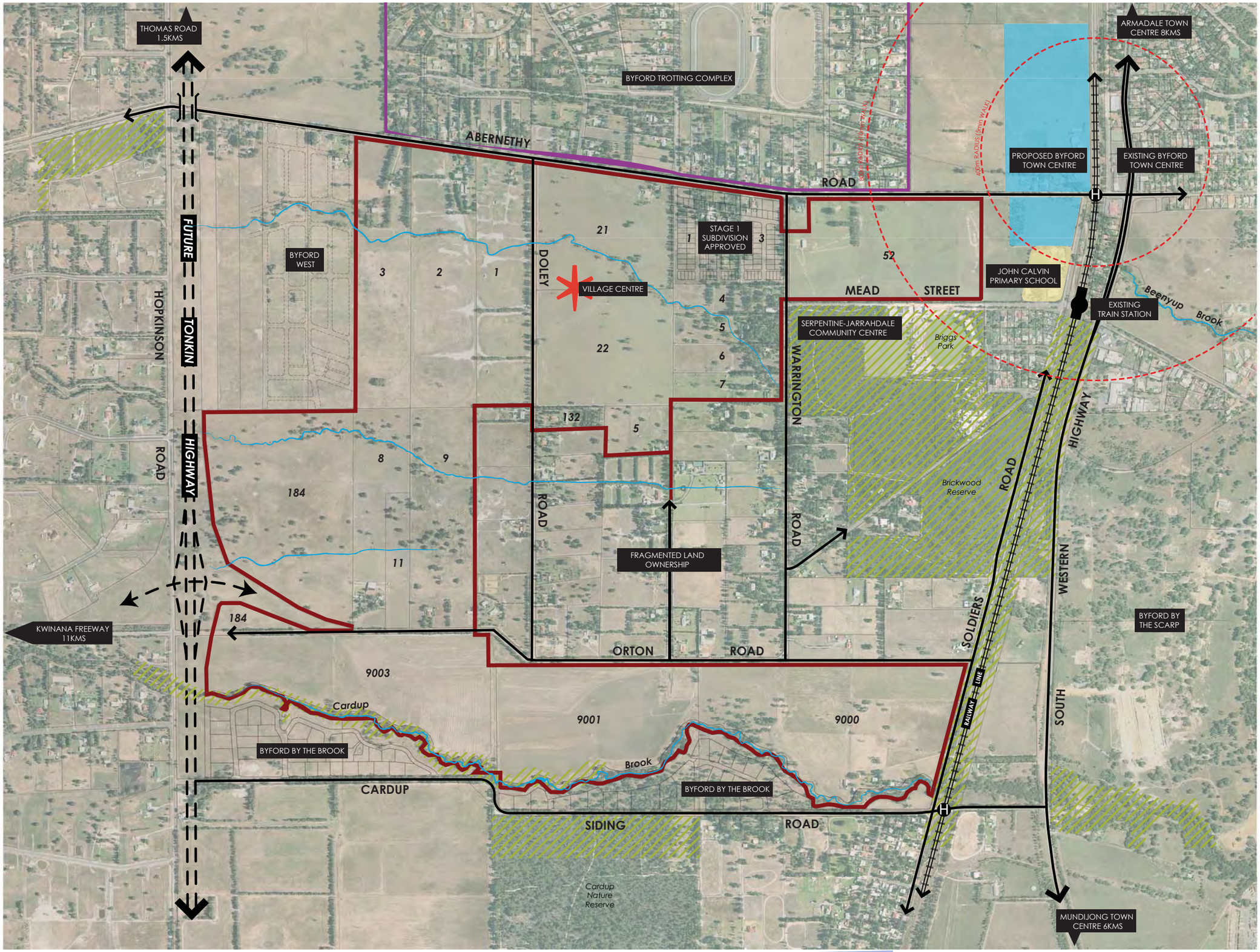

LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- BYFORD TOWN CENTRE (SUBJECT TO SEPERATE STRUCTURE PLAN)
- VILLAGE CENTRE LOCATION AS IDENTIFIED ON BYFORD STRUCTURE PLAN (2005)
- BYFORD TROTTING COMPLEX
- RAIL CROSSING
- BUSH FOREVER
- EXISTING WATERCOURSE

LOCAL CONTEXT ANALYSIS

The Glades - Local Structure Plan

0m 100 200m

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figure 7

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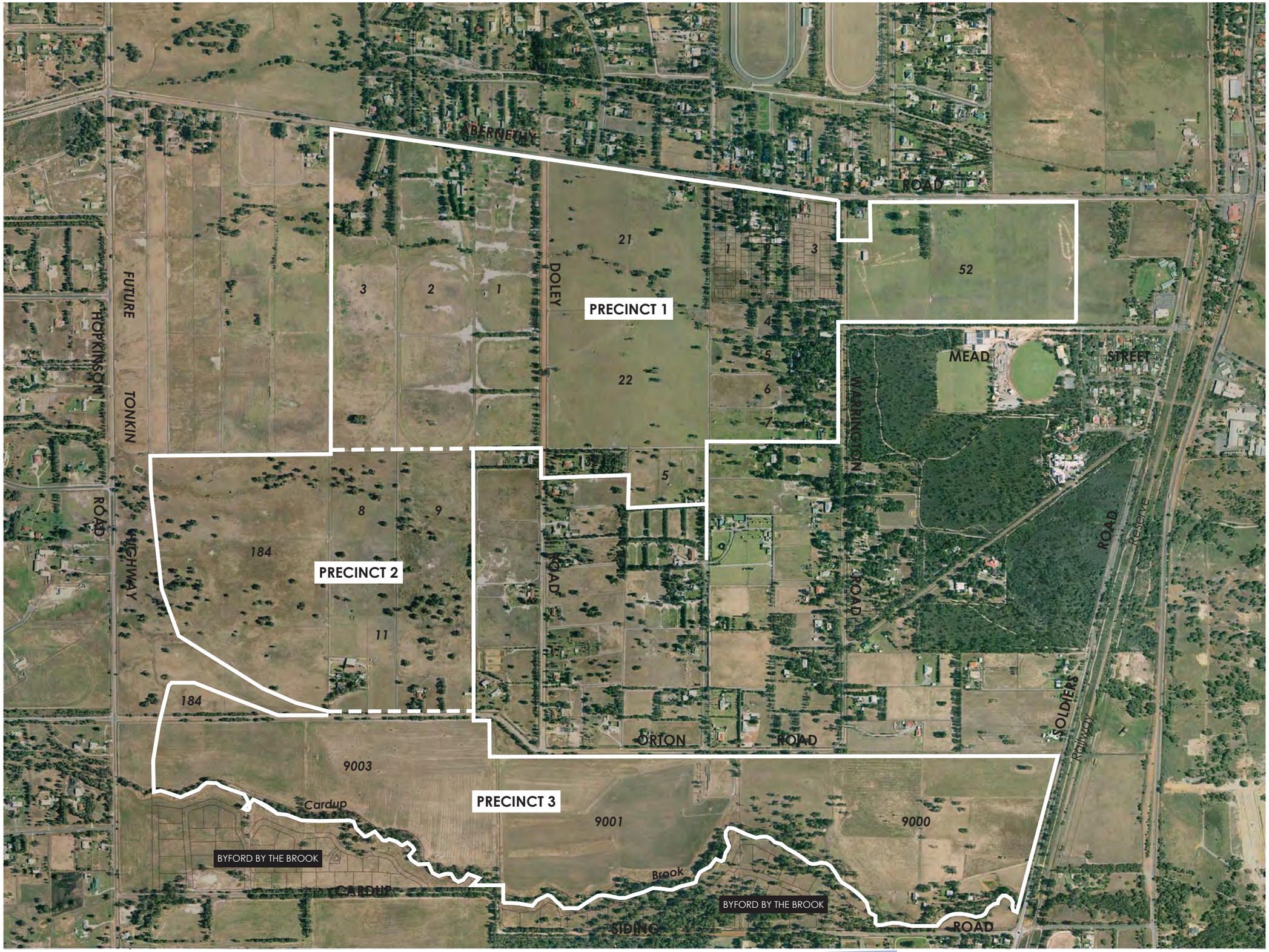

LEGEND

LOCAL STRUCTURE PLAN BOUNDARY

AERIAL PHOTOGRAPH & SUB PRECINCTS

The Glades - Local Structure Plan

N

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TAYLOR BURRELL BARNETT

figure 8

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4 EXISTING ENVIRONMENT

4.1 INDIGENOUS HERITAGE SIGNIFICANCE

An Aboriginal Heritage assessment of The Glades was completed in 2006, which included a desktop study and archaeological field survey. The ethnographic field survey and community consultation was undertaken in January 2006.

A number of Aboriginal sites were listed on the Register of Aboriginal Sites within the Structure Plan area. These included:

- Cardup Brook (Site ID 16108), listed on the Interim Register of Aboriginal Sites as a mythological site and encompasses the entire brook and a buffer zone of 30 m on either side.
- Cardup (Site ID 3310), listed on the Interim Register of Aboriginal Sites as an artefact scatter is reportedly located approximately 50 m from the north bank of Cardup Brook and roughly 400 m southwest of the intersection of the Orton and Doley roads. The subsequent field survey could not locate the previously recorded Cardup site (Site ID 3310) and it is possible that either the spatial information recorded by DIA is incorrect or that the site has been destroyed by previous land use.

As a result of the archaeological field survey, three potential archaeological sites, stone artefact scatters (BAS-001, BAS-002 and BAS-005) and four isolated artefacts (BAS/ISO-003-BAS/ISO-006) were recorded within the Glades.

Following this assessment, conditional consent under Section 18 (3) of the Aboriginal Heritage Act 1972 has been granted over both the Glades and Brook developments. This advice has requested that in addition to the Cardup Brook, two sites (one within and one within close proximity to the Cardup Brook Foreshore) be retained and protected in open space. This advice however will be discussed in further detail in Sections 5 and 6.

4.2 ACCESS

To the north of the site, access is provided by Abernethy Road, a Neighbourhood Connector and due to the existing low traffic volumes all intersections operate with priority control. To the south of the site access can be taken from Orton Road, which is an Integrator B Road in accordance with Liveable Neighbourhoods road hierarchy. It is understood that Orton Road is unlikely to connect through to South-West Highway given the likely extension of the Tonkin Hwy to Mundijong Road.

Two north-south roads pass through the site, Doley Road and Warrington Road, which will operate as neighbourhood connectors. To the east lies the South West Highway, a Primary Regional Road under the control of Main Roads WA. It provides a regional link between Armadale, where it joins Albany Highway to Perth. In a southerly direction it extends to Walpole where it joins the South Coast Highway to Albany. The South Western Highway is a primary freight route and caters for large trucks throughout the year.

To the west of the site a primary regional road reservation is provided for the future extension of the Tonkin Highway. The Highway will be constructed to Freeway standard and will link South West Highway at Mundijong Road through to the Reid/Roe Highways at Midland.

4.3 LANDFORM

Generally site topography is relatively flat with terrain typically falling from east to west at a gradient of approximately 1 in 100, from RL 56 m AHD at Soldiers Road to RL 28 m AHD at Hopkinson Road.

The Western Australian Department of Agriculture and Food (DAFWA) mapping in the northern section of the Peel-Harvey catchment utilises existing land resource survey data such as soil type, landforms, and slope (WADA 1990). These characteristics and the distribution of these units within the site is shown in Figure 5 of **Appendix 2** (Environmental Appraisal Report, Coffey Environmental).

4.4 GEOTECHNICAL CONDITION

A preliminary geotechnical investigation has been completed for The Glades Structure Plan area. The general findings include:

- The subsurface profile for areas not adjacent to Cardup Brook consist of a 0.1 m thick topsoil layer overlying 0.4 – 1.3 m thick sand to clayey sand to sandy gravel overlying a clayey sand all of Guildford Formation.
- In accordance with AS2570-1996 the majority of the development is classified Class 'M'. The upgrade to a Class 'S' site will typically require 0.8 m of controlled fill over the insitu clay.
- The subsurface profile for areas adjacent to Cardup Brook consists of a 0.1 m thick topsoil layer overlying a 0.9 – 1.5 m thick clay to sandy clay layer overlying a 0.4– 1 m thick to gravely clayey sand to sandy clayey gravel overlying a clayey sand to clayey gravel all of Guildford Formation.
- The insitu soil is not suitable for soakage and as such lot connection pits will be required.
- Subsoil drains are required on both sides of the roads.
- Preliminary testing indicates that insitu material at the site does not have the potential for acid sulphate generation and is unlikely to require an acid sulphate soil management plan.

4.5 SURFACE HYDROLOGY

The Glades development is located at the eastern extent of the Swan Coastal Plain, near the foot of the Darling Range, and is characterized by a series of creek systems flowing east to west onto the Swan Coastal Plain from the Scarp. A series of five creeks run through the area with the major tributary, Cardup Brook, forming the southern boundary of the development area.

Historically these creeks were discontinuous over the Swan Coastal Plain, with the creeks flooding out into flat wetland areas further west of Byford. Flow within the creeks is a combination of surface rainfall runoff, including areas of the Darling Scarp where catchments extend further east of South Western Hwy, and groundwater discharge where the channel intercepts the watertable.

Several studies have been completed on the constraints and opportunities of these creeks (Evangelisti & Associates 1994, 95; JDA 1995), with the most recent being the Byford Townsite Drainage and Water Management Plan (DoW, 2008).

4.5.1 EXISTING DRAINAGE

With land-use changes over time open drainage has been constructed within the Byford area to reduce surface water logging and inundation and provide arable land for agricultural activities. Currently existing water courses flow through The Glades development area, west to Hopkinson Road, where they connect with the Oakland Drain. The Oakland drain flows to the Birrega Main Drain, which in turn flows south west discharging to Serpentine River and ultimately the Peel-Harvey Estuary.

Details of the catchment areas for each of the tributaries is summarised in the Byford Townsite DWMP (DoW, 2008).

With the exception of Cardup Brook, the creeks running through The Glades development area are unprotected from grazing activities and as such are generally suffering from eroded banks.

4.6 GROUNDWATER

Groundwater over the site is generally shallow (i.e. 0 to 5 m below natural surface) with 'perched' water tables forming locally where clay layers within the soil profile limit the rate at which rainfall recharge can infiltrate into the regional water table.

The watertable is the upper surface of the unconfined aquifer within the Superficial Formations. Groundwater abstraction for low rate users targets groundwater in sand lenses at the base of the Guildford Clay, with high rate water users drawing from the confined Cattamarra Coal Measures Aquifer below. A summary of the hydrogeology for Byford from Davidson (1995) is provided below. Department of Water have indicated there are currently water resources available for allocation within both aquifer systems.

4.6.1 REGIONAL HYDROGEOLOGY

4.6.1.1 SUPERFICIAL AQUIFER

The Superficial Aquifer in this region is referred to as the Byford Area, and covers approximately 166 km^2. The aquifer has a maximum thickness of 20 m and consists of clayey sediments of the Guildford Clay with an average transmissivity of about 100 m^2/day.

Due to the poor hydraulic conductivity of the clayey soils the area is characterised by extensive surface flow.

The Superficial Aquifer is directly underlain by the Cattamarra Coal Measures in the Study Area.

4.6.1.2 CATTAMARRA COAL MEASURES AQUIFER

The Cattamarra Coal Measures formation extends beneath all of the coastal plain between Gingin Brook and South Dandalup River, but it is presently at a relatively shallow depth only in the southern area where the Yarragadee Formation is absent (Davidson, 1995). The formation is made up of fluvial sandstones, siltstones and shales with minor coal seams. In the Perth region the sandstone are pale in colour, often clayey, mostly medium to course grained and in beds up to 50 m thick. The shales are dark grey, sometimes carbonaceous, often laminated and occur in beds up to 30 m thick. The upper section of the formation is often weathered to a yellow, reddish brown colour.

Drilling in the Structure Plan area has encountered the top of the formation at approximately 60 m below natural surface level. The Cattamarra Coal Measures represents the most feasible source of non-potable water supply in this area.

4.7 WETLANDS

Several wetlands occur on and adjacent to the study area. A large portion of the study area is mapped in the DEC's *Geomorphic Wetlands Swan Coastal Plain* dataset as palusplain (a seasonally waterlogged flat) (UFI 13500; 13912). Throughout the Swan Coastal Plain, areas of palusplain have historically been extensively cleared for rural pursuits (grazing and horse agistment) as is the case in the study area. The management category of the majority of these wetlands has been evaluated as Multiple Use (MU) wetlands. Wetlands that support native vegetation are identified as Conservation (CCW) or Resource Enhancement (RE) wetlands. Wetland Management categories and their objectives are shown in **Table 3** below**.**

TABLE 3: WETLAND MANAGEMENT CATEGORIES & OBJECTIVES

Management Category	General Description
Conservation Category Wetland (CCW)	Wetlands support a high level of ecological attributes and functions.
Resource Enhancement Wetland (REW)	Wetlands which may have been partially modified but still support substantial ecological attributes and functions.
Multiple Use Wetland (MU)	Wetlands with few important ecological attributes and functions remaining.

A large portion of the site is mapped in the DEC's *Geomorphic Wetlands Swan Coastal Plain* dataset as palusplain (a seasonally waterlogged flat). Throughout the Swan Coastal Plain, areas of palusplain have historically been extensively cleared for rural pursuits (grazing and horse agistment) as is the case in the site. The management category of the majority these wetlands has been evaluated as Multiple Use (MU) wetlands. Wetlands that support native vegetation are identified as Conservation (CCW) or Resource Enhancement (RE) wetlands.

Sections of Cardup Brook that support native riparian vegetation and parts of the Bush Forever Site 321 (within Cardup Brook) associated with wetlands have been identified in the *Geomorphic Wetlands Swan Coastal Plain* dataset as RE wetlands. These conservation areas will be protected within the Cardup Brook Foreshore Reserve.

A CCW was previously located on Lot 3 Abernethy Road (UFI 7829, 7866 and 7829). As part of the site investigations undertaken for this report, ATA Environmental conducted a site visit in September 2005 to 'ground truth' the appropriateness of the CCW management category of the wetland. It was concluded that due to the degraded nature of the wetland, along with other environmental characteristics of the site (discussed in further detail in Section 3 of **Appendix 2**), the DEC's CCW classification should be revised to a MU management category. The Wetlands Branch of the Department of Environment agreed to revaluate the wetland category of Conservation Category to Multiple Use in February 2006.

One CCW (UFI 15452) is located on land directly abutting the study area and is within the Bush Forever Site 321 to the east of the study area.

4.8 VEGETATION & FLORA

A flora and vegetation survey of the site was conducted by ATA Environmental on 7 September 2005. The survey was undertaken to determine if any of the significant species or Threatened Ecological Communities (TECs) identified by DEC occur, within the study area. This was based on sampling within quadrats of 10 m x 10 m dimension as well as a thorough a site walkover to record all plant species present at the time of the survey. This method complies with the Environmental Protection Authority's (EPA) guidelines for flora surveys as outlined in the EPA Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004a).

The major vegetation types and associated flora were surveyed and delineated using a 1:4,000 colour aerial photograph (Figure 8 of **Appendix 2**). The vegetation was described and mapped according to the structure and species composition of the dominant stratum using the system adopted in *Bush Forever* (Government of Western Australia, 2000a).

The conservation status of all recorded flora was checked against the current lists published in the Governmental Gazette and available from the DEC's (October 2005) and Department of the Environment, Water, Heritage and the Arts (DEWHA). The results of these findings are considered in the following sections and **Appendix 2.**

4.8.1 VEGETATION COMPLEXES

The site contains vegetation characteristic of the Forrestfield Vegetation Complex (Heddle *et. al.,* 1980).

The Forrestfield Complex vegetation generally consists of Open Forest of *Corymbia calophylla, Eucalyptus wandoo* and *Eucalyptus marginata* to Open Forest of *Eucalyptus marginata – Corymbia calophylla – Allocasuarina fraseriana – Banksia* spp. A fringing Woodland of *Eucalyptus rudis* is often found in the gullies that dissect this landform (Heddle *et al*., 1980).

Approximately 9% of the Forrestfield Complex remains on the Swan Coastal Plain (Government of Western Australia, 2000b). The EPA's objective is to protect at least 30% of the original extent of the vegetation complexes in unconstrained areas and 10% in constrained areas (i.e. Urban zoned regions). While most of the vegetation complexes on the Swan Coastal Plain meet the 30% target, the Forrestfield Complex compares poorly with 9% of the original extent remaining on the Swan Coastal Plain. The Glades area is considered a constrained area due to its MRS "Urban" zoning and the 10% target therefore applies to the site.

The Glades however, has historically been used for pastoral and agricultural land uses and as such its original state has been highly modified. Although it contains characteristics of the Forrestfield Complex, it is not considered to be a good representation of this vegetation complex due to the extent of historical clearing. Figure 8 of **Appendix 2,** shows the vegetation types and condition found across the site and except for a couple of lots fronting Warrington Road and Bush Forever site 321 (Brickwood Reserve and adjacent bushland Byford), the best examples of the Forrestfield Complex are to be found within the adjacent road reserves.

4.8.2 VEGETATION TYPES

Vegetation types are vegetation units that can be described and mapped at a finer level than the vegetation complexes. Nineteen vegetation types associated with the site were identified and described during the flora and vegetation survey undertaken on 7 September 2005. These vegetation types are described in **Appendix 2** and in some instances a typical photograph and 10 m x 10 m quadrat data indicating species present, their percentage cover and height has also been included.

4.8.3 VEGETATION CONDITION

The condition of the vegetation was assessed according to the system devised by Keighery and described in *Bush Forever* (2000a). Keighery's condition rating scale ranges from Pristine (which the vegetation exhibits no visible signs of disturbance) to Completely Degraded (where the vegetation structure in no longer intact and without native plant species). Vegetation condition for the Byford Main Precinct is mapped in Figure 8 of **Appendix 2** and ranges from Excellent to Completely Degraded. The majority of the study area has been historically used for farming which has adversely affected areas of native vegetation through grazing, trampling, introducing and spreading weeds, and nutrient enrichment. Across the study area, intact areas of remnant vegetation are generally confined to sections of road reserves and Bush Forever sites.

4.8.4 THREATENED ECOLOGICAL COMMUNITIES

Based on Floristic data collected during this survey, a vegetation type in The Glades was inferred to have once been representative of one FCT (Gibson *et al.,* 1994):

- Floristic Community Type 3b – *Corymbia calophylla – Eucalyptus marginata* woodlands on sandy clay soils.

This Floristic Community Type is listed as a Threatened Ecological Community by English and Blythe (1997) and by DEC's list of TECs and is also listed as Vulnerable on the Endangered Community List under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Due to the Degraded to Highly Degraded nature of the vegetation type CcEmLOW, it is Coffey Environments assessment that there are not any remaining vegetation types representative of TEC 3b in The Glades Local Structure Plan area.

The CcEmLOW vegetation type adjacent to the study area in the Warrington Road roadside reserve that abuts with the Bush Forever Site 321 is similar to TEC 3b and was considered to range in condition from Excellent to Very Good. This vegetation type may have once been present in the Glades LSP area adjacent to the Bush Forever Site 321 prior to vegetation clearing and grazing activities.

4.8.5 FLORA

A total of 100 plant species were recorded from the site during the September 2005 survey. The total includes three Gymnosperms, 30 Monocotyledons and 67 Dicotyledons. The flora assessment was undertaken on 7 September 2005, a time when the majority of ephemeral species such as lilies and orchids would have been recorded. As such the flora list is considered to represent at least 90% of the species likely to occur on the site. A full list of flora species recorded from the site is provided in **Appendix 2.**

Of the 100 plant species recorded, 60 (60%) were native and 40 (40%) were introduced or non-endemic planted species. Families with the highest representation of taxa were the Poaceae (Grass family – 11 taxa; 1 native, 10 introduced), the Myrtaceae (Eucalyptus family - 14 taxa; 12 native and 2 introduced), the Papilionaceae (Pea family – 10 taxa; 6 native and 4 introduced) and the Proteaceae (Banksia family – 11 taxa; 11 natives). This family composition is typical of the flora of the Swan Coastal Plain of Western Australia.

4.8.6 SIGNIFICANT FLORA

Prior to conducting site investigations, a search of DEC's Declared Rare and Priority Flora database (CALM, 2005b) was undertaken by Coffey Environmental. The database search found that eight Priority taxa and three Declared Rare Flora (DRF) species had been previously recorded within the vicinity of the site (refer **Table 4**).

TABLE 4: SPECIES LISTED ON CALM'S DATABASE RECORDED IN VICINITY OF THE GLADES

Species	Priority Code	Habitat	Flower Period
Aotus cordifolia	P3	Peaty soils and swamps	Aug-Jan
Baeckea sp. Perth Region (R.J Cranfield 444)	P3	Sandy white clay soils	
Drosera occidentalis subsp. Occidentalis	P4	Grey sandy clay	Oct-Jan
Johnsonia pubescens subsp, cygnorum	P2	White, grey, yellow black or lateritic sand, granite limestone. Flats, wet sites, coastal areas and road sides.	Aug-Nov
Schoenus pennisetis	P1	Grey or peaty sand, sandy clay. Swamps and winter flats.	Aug-Sep
Synaphea odocoileops	P1	Brown, orange loam and sandy clay granite. Swamps and winter wet areas.	Aug-Oct
Verticordia lindleyi subsp. Lindleyi	P4	Sand, sandy clay. Winter wet depressions.	May/Nov – Jan
Verticordia plumosa var. pleiobotrya	R	Clay, sandy loam. Seasonally inundated swamps and road verges.	Oct-Dec
Tetraria australiensis	R		Nov-Dec
Trichocline sp. Treeton (B. J Keighery & N. Gibson 564)	P2	Sand over limestone, sandy clay over ironstone. Seasonally wet flats	
Centrolepis caespitose	R	White sand, clay. Salt flats wet areas.	Oct-Dec

Source: CALM, 2005

Following actual site investigations, it was determined that no Declared Rare Flora, Priority Flora or Commonwealth Listed species were recorded on the site (refer **Appendix 2** for further details)

4.9 FAUNA

A desktop fauna assessment of the site was conducted based on the CALM Threatened and Priority Species database search conducted for the area, the Western Australian Museum *FaunaBase* (2005) and the Department of Environment and Conservation (DEC) database to identify Threatened and Priority species potentially occurring within the site. In February 2005, a site assessment of potential nesting hollows for Black Cockatoos (i.e. Carnaby's, Baudins's and Forest Red-tailed) was also conducted.

4.9.1 SIGNIFICANT FAUNA RECORDED OR PREDICTED

The fauna species listed in **Table 5** have protected status under either State or Commonwealth government legislation and were present in database searches. Four Schedule 1 species, two Schedule 4 species and two Priority species were identified as potentially being present within the Structure Plan area.

TABLE 5: THREATENED & PRIORITY FAUNA IN VICINITY OF BYFORD MAIN PRECINCT IDENTIFIED FROM CALM DATABASE SEARCH

Species	Status under Wildlife Conservation Act Schedule/Priority	Status under Commonwealth EPBC Act	Comment
Chuditch *Dasyurus geoffroii*	Schedule 1	Vulnerable	Species is *unlikely* to occur within area
Carnaby's Black-Cockatoo *Calyptorhynchus latirostris*	Schedule 1	Endangered	Species *likely* to occur within area
Baudin's Black-Cockatoo *Calyptorhynchus baudinii*	Schedule 1	Vulnerable	Species *likely* to occur within area
Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso*	Schedule 1		Species *likely* to occur within area
Peregrine Falcon *Falco peregrinus*	Schedule 4		Species *may* occur within area but *unlikely* to rely on project area
Quenda or Southern Brown Bandicoot *Isoodon obesulus fusciventer*	Priority 5		Species *may* occur within area
Rainbow Bee-eater *Merops ornatus*		Migratory	Species *likely* to occur within area but *unlikely* to rely on area for breeding

Each of these species and their potential relationship with the Structure Plan area are considered in further detailed as part of **Appendices 2** and **3** and **Section 4.9.2** below.

4.9.2 PREVIOUS ON-SITE BLACK COCKATOO INVESTIGATIONS

Coffey Environmental have conducted a Black Cockatoo assessment (refer **Appendix 3**) of numerous properties including Lots 494, 104 and 16 ('Byford by the Brook'); Lots 184, 8, 11, and 9 ('Byford by the Stables'); Lots 3, 2, 1, 21, 22, 5, 52, and 2 ('Byford by the Glade'); and Lots 523 and 521 ('Byford by the Scarp', refer **Appendix 3**). These areas include the Structure Plan area, as well as areas surrounding it. In addition to these properties, numerous bushland sites within a 10 km radius were also searched to provide a regional perspective of Black Cockatoo nesting and feeding opportunities (ATA Environmental, 2005).

The Glades has largely cleared undergrowth however there are remnant Marri and Jarrah pockets. All trees and remnant vegetation were assessed to identify areas that have potential as nesting hollows for breeding Black Cockatoos. A thorough search was made of the canopy of each of the trees within the site and the location of any significant trees recorded on 1 February 2005.

Twenty-two trees that contained hollows large enough for Black Cockatoo were identified in this assessment. Only nine of these trees are within the Glades. Although there are suitable sized hollows, some of these trees are in cleared paddocks and are therefore unlikely to be used as nesting sites.

There are many trees that would potentially provide feeding sites (i.e. Marri nuts), however none of the Marri trees examined showed any evidence of Black Cockatoo feeding. Black Cockatoos have a distinctive feeding method and their presence in an area can be determined by discarded Marri nuts or Banksia cones.

Although four Forest Red-tailed Black Cockatoos were observed flying over Lot 21 and 22 (1 Feb 2005), they were not observed to be utilising vegetation occurring on site.

Even though there are many trees that may provide feeding sites for Black Cockatoos, there was no evidence of Black Cockatoo's feeding in the area. A search of bushland within a 10 km radius of the site indicated that there were extensive areas of suitable feeding and nesting habitat that will not be impacted by the proposed development. Some of these alternative feeding and nesting habitats are also protected under Bush Forever.

5 OPPORTUNITIES AND CONSTRAINTS

As is outlined in this section, the subject site is characterised by a number of factors which are relevant in the formulation of the Local Structure Plan and which will influence design outcomes. The result of the opportunities and constraints analysis is described in further detail below.

5.1 OPPORTUNITIES

The key opportunities associated with the site are as follows (refer **Figure 9**).

5.1.1 EXISTING VEGETATION

As has been previously mentioned, whilst the site is predominantly cleared, there are a number of substantial stands of existing vegetation. Wherever possible (and where identified as worthy of retention), this vegetation will be retained in public open space, road reserves or transplanted to more appropriate locations.

5.1.2 EXISTING WATERCOURSES

The subject site contains a number of existing rural drainage lines, running east-west across the site. These existing drainage lines will provide the basis for the alignment of the Multiple Use Corridors (MUC) required by the Byford Structure Plan. The MUCs, whilst likely to provide a significant drainage function, will also provide a high level of amenity and both a passive and active recreation function. Furthermore, these green corridors will provide important environmental linkages through to the conservation areas to the east of the structure plan area.

5.1.3 CARDUP BROOK

The Cardup Brook provides the southern boundary to the site and is the most significant environmental asset within the structure plan area. As a high amenity, natural asset, view corridors should be created down to the foreshore to ensure maximum public enjoyment of this environment. As part of the Brook development to the south, the preparation of a foreshore management plan for the entire brook was required and accordingly, the northern foreshore of the brook will need to be developed in accordance with this plan.

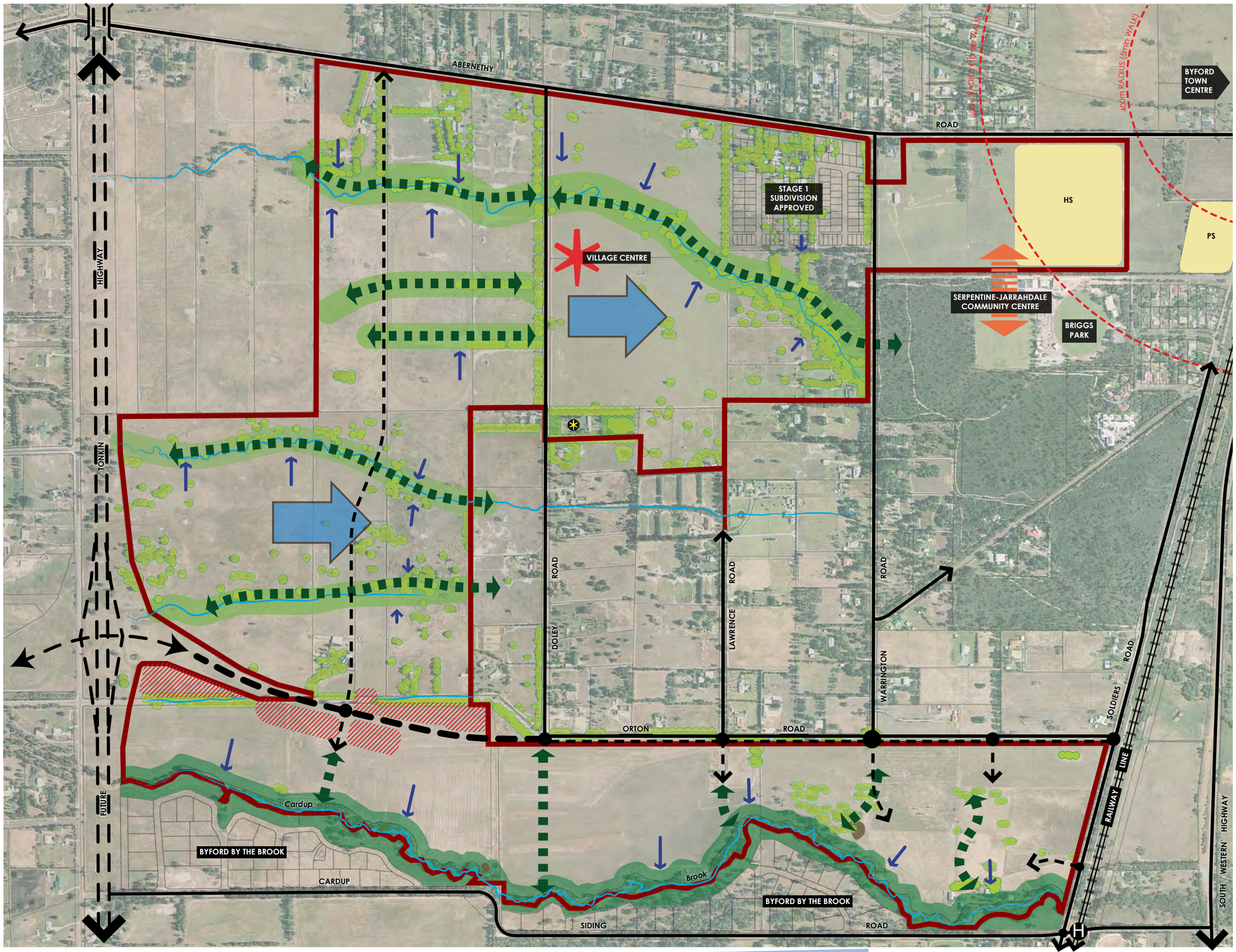
5.1.4 VILLAGE CENTRE

The location of the future Village or Neighbourhood Centre has been identified by the Byford Structure Plan as being to the immediate east of Doley Road and to the immediate south of the most northern MUC. Apart from potentially providing a key focal point for the project, the Village Centre will lend itself to the intensification of land uses in and around the Village Centre. Specifically there is the potential for the Village Centre to anchor increased residential densities (including aged persons) and mixed-use development.

5.1.5 COMMERCIAL OPPORTUNITIES – ORTON ROAD

The Byford Structure Plan 2005 (as amended) provides for a portion of commercial/mixed business land along Orton Road, within close proximity to the future Tonkin/Orton interchange. Whilst the ultimate function of Orton Road may be somewhat unclear, the ability to achieve commercial development needs to be considered.

Such development will also provide needed local employment.



LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- EXISTING ROADS
- SCHOOL SITES
  - HS — HIGH SCHOOL LOCATION IN ACCORDANCE WITH BYFORD STRUCTURE PLAN (2005)
  - PS — JOHN CALVIN PRIMARY SCHOOL
- RAIL CROSSING

OPPORTUNITIES

- POTENTIAL VIEW CORRIDORS TO OPEN SPACE AND CONSERVATION AREAS
- POTENTIAL LINEAR POS LINKS WITH DRAINAGE FUNCTIONS
- POTENTIAL CO-LOCATION OF FACILITIES WITH RECREATION CENTRE
- OPPORTUNITY TO RETAIN TREES WITHIN POS / DRAINAGE AND ROAD RESERVE WHERE POSSIBLE
- EXISTING WATERCOURSE
- REGISTERED ABORIGINAL HERITAGE SITES LIKELY TO BE RETAINED
- POSSIBLE REALIGNMENT OF ORTON ROAD TO IMPROVE CONNECTIVITY AND LEGIBILITY THROUGHOUT THE STRUCTURE PLAN AREA
- POTENTIAL OPPORTUNITY FOR COMMERCIAL/MIXED-USE ALONG ORTON ROAD AS IDENTIFIED ON BYFORD STRUCTURE PLAN (2005)
- VIEWS TO DARLING SCARP

CONSIDERATIONS

- EXISTING DWELLING TO BE RETAINED
- VILLAGE CENTRE LOCATION AS IDENTIFIED ON BYFORD STRUCTURE PLAN (2005)
- ROAD CONNECTIONS THROUGH SITE TO INCREASE LEGIBILITY, MOVEMENT AND CONNECTIVITY

OPPORTUNITIES PLAN

The Glades - Local Structure Plan

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figure 9

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5.1.6 ABORIGINAL HERITAGE

As previously mentioned, Section 18 advice regarding aboriginal heritage issues (refer **Appendix 4**) has been provided for the entire Local Structure Plan area and whilst not required, this advice requested that the following two Aboriginal Heritage sites be retained within open space:

- DIA 23914 (Byford Archaeological Survey 001); and
- DIA 23915 (Byford Archaeological Survey 002).

DIA 23914 is located within the Cardup Brook Foreshore reserve and will be protected accordingly. DIA 23915 is currently located in a cleared portion of the site and if protected, will need to be set aside within open space.

5.1.7 LAND USE AND RELATIONSHIP TO BYFORD TOWN CENTRE

The Byford Town Centre is located to the immediate north-east of the Structure Plan area. Whilst subject to a separate structure planning process, it is understood the Town Centre will essentially function as a District Centre, with the potential for a future train station and transit-oriented development. Not unlike the Village Centre, there is the ability within the north-east portion of the Glades Local Structure Plan for land use intensification or the introduction of uses with synergies such a large centre (i.e. education, medium residential densities, commercial etc).

5.1.8 SYNERGIES WITH EXISTING RECREATIONAL FACILITIES

To the immediate east of the Structure Plan area, there are the existing community and recreational areas. Given the such close proximity to the Structure Plan areas, there is great potential to create synergies between the land uses within the Structure Plan and these facilities.

5.1.9 VIEW CORRIDORS

The subject site currently has sweeping views to the east up to the Darling Scarp. Through the provision of the Multiple Use Corridors and a predominantly east-west road orientation, these views can be retained. Also, through appropriate design responses, view corridors to open space and conservation areas should be achieved.

5.2 CONSTRAINTS

The key constraints associated with the site are as follows (refer **Figure 10**).

5.2.1 INTERFACE WITH MAJOR ACCESS STREETS

The subject site has frontage to three major roads in Tonkin Highway, Orton Road and Abernethy Road. Tonkin Highway is a high volume 'Regional Road' where issues such as access, intersection treatments, turning movement and noise all require detailed consideration. Abernethy and Orton Roads will function as Neighbourhood Connectors, however given the requirements of the Byford Townsite Drainage and Water Management Plan, both roads will have significant drainage functions that will have implications for access, intersection treatments and frontages to each of these roads.

Careful consideration will need to be given to the interface with each of these roads.

BYFORD TROTTING COMPLEX

ABERNETHY ROAD

STAGE 1 SUBDIVISION APPROVED

VILLAGE CENTRE

HIGHWAY

TONKIN

DOLEY ROAD

LAWRENCE ROAD

WARRINGTON ROAD

SOLDIERS ROAD

ORTON ROAD

FUTURE

Cardup Brook

BYFORD BY THE BROOK

CARDUP

SIDING ROAD

RAILWAY LINE

SOUTH WESTERN HIGHWAY

LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- EXISTING ROADS
- RAIL CROSSING
- EXISTING WATERCOURSE

CONSTRAINTS

- VEHICLE MOVEMENT ACROSS RAILWAY LINE LIMITED BY NUMBER OF CROSSOVERS
- NO DEVELOPMENT WITHIN CARDUP BROOK FORESHORE
- BUFFER TO RESOURCE ENHANCEMENT WETLAND WITHIN CARDUP BROOK FORESHORE
- BUSH FOREVER SITES
- REGISTERED ABORIGINAL HERITAGE SITES LIKELY TO BE RETAINED
- POTENTIAL IMPACTS FROM BYFORD TROTTING COMPLEX
- EXISTING DWELLING TO BE RETAINED

CONSIDERATIONS

- ROAD CONNECTIONS THROUGH SITE TO INCREASE LEGIBILITY, MOVEMENT AND CONNECTIVITY
- MAJOR ROAD INTERFACE AND ACCESS, NOISE ATTENUATION REQUIRES CONSIDERATION
- 1 CLOSE PROXIMITY TO BYFORD TOWN CENTRE
- 2 ABERNETHY ROAD TO BE WIDENED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BYFORD TOWNSITE DRAINAGE AND MANAGEMENT PLAN
- 3 FRAGMENTED LAND OWNERSHIP
- 4 POSSIBLE REALIGNMENT OF ORTON ROAD REQUIRED FOR LEGIBILITY
- VILLAGE CENTRE LOCATION AS DEFINED BY BYFORD STRUCTURE PLAN (2005)
- MULTIPLE USE CORRIDOR AS DEFINED BY THE BYFORD STRUCTURE PLAN (2005)

CONSTRAINTS PLAN

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figure 10

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5.2.2 INTERFACE WITH BYFORD TROTTING COMPLEX

The Local Structure Plan area is located to the immediate south of the existing Byford Trotting Complex. Given the rural character of this area, as well as the potential noise/odour issues associated with such properties, the interface to Abernethy Road and the trotting complex will need to be carefully considered.

5.2.3 TOPOGRAPHY

The subject site is essentially flat and low-lying with very little variation in topography, somewhat limiting the ability to create new view corridors. Given the low lying nature of the site, substantial fill will also be required for groundwater separation purposes.

5.2.4 CARDUP BROOK

Cardup Brook is a mapped Resource Enhancement wetland and Bush Forever site (partially). Resource Enhancement wetlands typically (though depending on condition) require retention and are to be protected by a land use buffer. There are also generally limitations on the ability for directing stormwater flows into such wetlands.

5.2.5 ABORIGINAL HERITAGE

The Structure Plan design will need to give due consideration to the likely protection of the two previously mentioned Aboriginal Heritage Sites.

5.2.6 ADJACENT LANDHOLDINGS

To the east of the Structure Plan area is a large number of individual semi-rural landholdings. Whilst identified for future residential development, no detailed structure planning has occurred for this portion of land. Accordingly, careful consideration will need to be given to interface and movement network connectivity between the Structure Plan area and these landholdings.

Immediately adjacent to the north-west corner of the Local Structure Plan area is Byford West Estate. It is understood that subdivision approval has been granted over this portion of land and again consideration will need to be given to both interface and movement network connectivity with the Structure Plan area.

6 PROPOSED LOCAL STRUCTURE PLAN

The Glades Local Structure Plan (LSP), refer **Figure 11,** has been prepared utilising the diverse skills and experience of the project team and within the parameters established by the requirements of Council's Scheme with respect to LSP requirements and Liveable Neighbourhoods. The Local Structure Plan (formerly Byford Main Precinct) was originally prepared and lodged in December 2005, however given the progression and finalisation of the Byford Townsite Drainage and Water Management Plan 2008 (superseding the previous Byford Urban Stormwater Management Strategy), together with the Shire's review of the Byford Structure Plan (2005 as amended), the LSP could not be progressed with any certainty. Given the finalisation of the Byford Townsite Drainage and Water Management Plan (BTDWMP) and the review of the Byford Structure Plan, it is considered that the Glades LSP can now proceed in accordance with the outcomes of these two documents.

The proposed LSP being submitted now reflects the land use requirements of these elements and incorporates further design refinements that have been incorporated as a result of further detailed site investigations and knowledge.

6.1 COMMUNITY DESIGN

The Glades Structure Plan (refer **Figure 11**) has been formulated following detailed site investigations, consultation with key stakeholders and numerous design iterations. The Plan and design philosophy is based on the following founding principles:

- The Glades Estate will be under-pinned by traditional neighbourhood design principles, with a 'village style' centre at the heart of the Precinct;
- The Village Centre that is hinged off the intersection of the east-west (Mead Street deviation) and north-south (Doley Road) spine roads;
- A village core at the heart of the centre to encourage a strong sense of community;
- A modified grid road network radiates from the intersection of the spine roads;
- A mix of land uses in the Village Centre encourage social interaction, supported by a permeable road and pedestrian access system between neighbourhoods;
- A pedestrian friendly street environment with good accessibility to the neighbourhood centre, open space network and back into the Byford townsite will assist in reducing car dependency and encouraging social interaction;
- A pedestrian movement system, which provides linkages between key land uses such as the neighbourhood centre, educational facilities, open space network and conservation trail;
- Street networks and public open space designed to maximise passive surveillance;
- In a bid to optimise public equity, densities are applied strategically across the Structure Plan area in order to maximise access to open space, the neighbourhood centre and the Byford townsite; and
- A robust Village Precinct that will allow for change in land use activity over time.

BYFORD WEST APPROVED STRUCTURE PLAN

PRIMARY SCHOOL

PRIVATE SCHOOL (K-12)

HIGH SCHOOL

BYFORD TOWN CENTRE

5 min WALK

400m

800m

BYFORD BY THE BROOK

CARDUP

Cardup

LEGEND

LOCAL STRUCTURE PLAN BOUNDARY

ZONES

Residential

- RESIDENTIAL R10
- RESIDENTIAL R12.5
- RESIDENTIAL R15
- RESIDENTIAL R20
- RESIDENTIAL R25
- RESIDENTIAL R30
- RESIDENTIAL R40
- RESIDENTIAL R50
- RESIDENTIAL R60

Centres

- VILLAGE CENTRE (R80)
- NEIGHBOURHOOD NODE (R60)
- MIXED-USE (R60/R80)

RESERVES

Open Space

- PUBLIC OPEN SPACE AND DRAINAGE
- FORESHORE RESERVE (INCLUDES RESOURCE ENHANCEMENT WETLAND & BUFFER)

Other

- COMMUNITY PURPOSE

OTHER

- SCHOOLS
- 30m FORESHORE BUFFER
- EXISTING WATERCOURSE SUBJECT TO DETAILED DESIGN
- 400m (5 MINUTE WALK) AND 800m (10 MINUTE WALK) WALKABLE CATCHMENTS

1. ABERNETHY ROAD TO BE WIDENED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BYFORD TOWNSITE DRAINAGE AND WATER MANAGEMENT PLAN
2. ACCESS ARRANGEMENTS TO ABERNETHY ROAD TO BE DETERMINED AT THE TIME OF SUBDIVISION
3. PROPOSED LAKE
4. POTENTIAL RETIREMENT LIVING SITE (R30)
5. SEWER PUMP STATION

STRUCTURE PLAN AREA

The Glades - Local Structure Plan

N

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figure 11

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6.2 COMMUNITY BENEFIT

The Glades project will provide significant investment in the locality and community benefit for both existing and future residents, as outlined below:

- Enable development of a quality 'Main Street' and village centre precinct for the new urban area being created;
- Provide a broader choice of residential locations and lifestyle opportunities;
- Opportunities to expand the employment opportunities within the area by development of the Village Centre;
- Retention of existing vegetation and existing drainage lines where possible within road reserves and public open spaces; and
- A strong pedestrian connection through to the Brickwood Reserve through to link into the multiple use corridor extension.

6.3 DESIGN RESPONSE TO SITE

The desire to retain and consolidate upon the Structure Plan area's (the subject site) natural features is paramount to the LSP design. The key physical features of the site are the Cardup Brook in the south, the various drainage channels that traverse the site, sweeping views to the Darling Scarp and whilst the site is predominantly cleared, there are some significant stands of remnant vegetation worthy of retention.

The Cardup Brook will be a key design feature and focus for the southern portion of LSP, with a proposed strong orientation towards the brook itself and the co-location of open space areas with the associated foreshore region. The LSP also re-aligns the multiple use corridors as depicted on the Byford Structure Plan onto the current alignment of the existing drainage corridors that traverse the site, where these existing tributaries can still be utilised for drainage purposes.

The subject site is predominantly devoid of large stands of existing vegetation, however there are some areas where both endemic and exotic species can potentially be retained. Whilst the site will be earthworked substantially, it is intended that these existing trees will be retained wherever possible within public open space areas and road reserves. This is evident within the proposed LSP where in specific locations oversized or deflected verge treatments have been provided (in all cases for tree retention).

The sweeping views across to the Darling Scarp are obviously a key feature of the site. The strong east-west orientation of a number of key spine roads, as well as the multiple use corridors, will facilitate expansive view corridors up to the hills.

The retention and celebration of these natural site features will be essential in creating a sense of place and providing a suitably landscape setting.

6.4 LAND USE DISTRIBUTION AND RATIONALE

The following section describes the land uses proposed by the Local Structure Plan (refer **Figure 11** and listed below) and provides a rationale for their location within the structure plan area:

- Residential;
- Village Centre;
- Neighbourhood Nodes;
- Mixed Use;
- Community Facilities;
- Education Facilities; and
- Public Open Space.

6.4.1 RESIDENTIAL

Residential densities have been provided based on the principles outlined within Element 3 – Lot Layout of Liveable Neighbourhood. In particular, R2-R4, which specify the need for a variety of lots sizes and R12-14, which specify housing density near centres. **Figure 12** specifically highlights the residential densities proposed throughout the structure plan and are described in further detail later in this section of the report.

As is outlined in **Figure 11,** the Structure Plan provides for the following density ranges, which are all considered in further detail in the following sections:

- Low Residential Density Development;
- Medium Residential Density Development; and
- Potential Retirement Living Development.

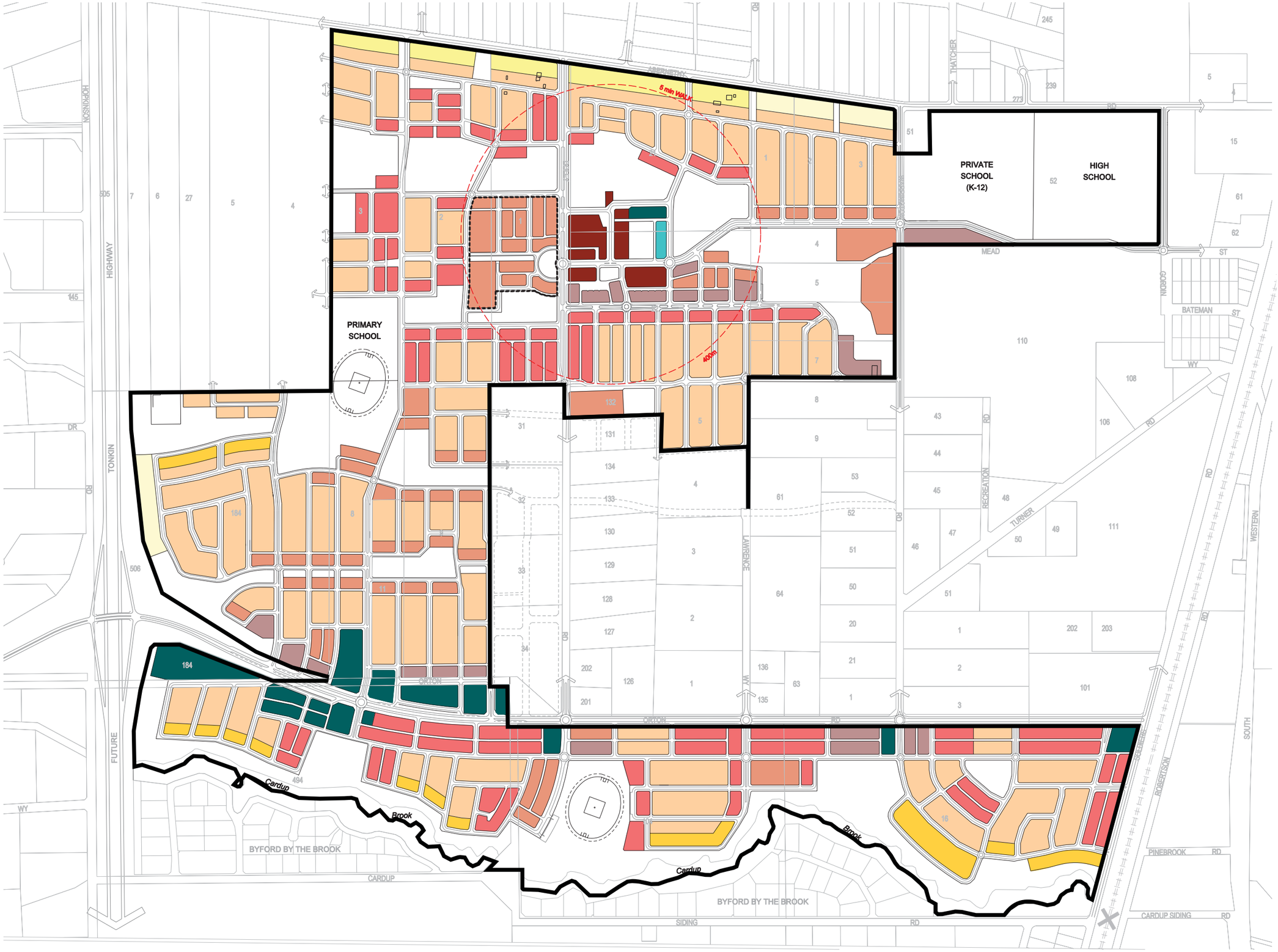
In relation to the last residential development type mentioned above, the Structure Plan sets aside an R30 development site to the immediate west of the Village Centre, as a potential Retirement Living site.

Whilst the Retirement Living site is likely to be developed by another party, LWP Property intend on preparing a Detailed Area Plan to ensure strong public connections through the site and an active interface between the development and surrounding residential catchment. It is not the intention of LWP Property Group for the proposed Retirement Living Precinct to be a "gated community."

Liveable Neighbourhoods Edition 4 (R12-14) require the achievement of 20-30 dwellings per site hectare within 400m of a neighbourhood or village centre. Accordingly the provision of higher residential densities within the Village Centre is not only desirable but a statutory requirement. As previously mentioned, two development sites (R60 and R50) have been identified overlooking the MUC (refer **Figure 12**). It is anticipated that these development sites will require guidelines and/or detailed area plans to facilitate development as either apartments or terraces as a minimum.

All mixed use sites on Main and Mead Streets (within the Village Centre) have a residential density coding of up to R80. Whilst all mixed use development may not achieve this density, it is considered adequate in seeking to encourage and achieve upper floor residential development. Other identified residential sites within the Village Centre (South of Mead Street) will have a residential density coding of either R30 or R40. It is anticipated that these sites will be developed as terrace style or small lot single house product.

Based on the densities proposed by the Local Structure Plan, approximately 31 dwellings per site hectare will be achieved within 400m of the Village Centre.



LEGEND

LOCAL STRUCTURE PLAN BOUNDARY

RESIDENTIAL DENSITIES

LOW
- R10
- R12.5
- R15
- R20

MEDIUM
- R25
- R30
- R40
- R50
- R60

HIGH
- R80

POTENTIAL RETIREMENT LIVING

400m CATCHMENT

RESIDENTIAL DENSITIES PLAN

The Glades - Local Structure Plan

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figure 12

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Table 6 provides an indicative dwelling yield breakdown for the Structure Plan area:

TABLE 6: DWELLING UNIT YIELDS

R-Code	Dwelling Yield
R10-15	93
R20	1381
R25	664
R30	459
R40 (incorporates Mixed Use)	259
R50	63
R60	48
R80 (Mixed Use)	241
Total	**3208**

Note: The dwelling unit yields provided are based on Figures 1 and 11. These yields have been calculated at LSP stage and will be subject to detailed design refinement and are therefore subject to change. The dwelling yields have been determined based on a mix of RD Code averages and market input. The yields may vary at the landowners discretion as the development unfolds.

6.4.1.1 LOW RESIDENTIAL DENSITIES

Areas of Residential R10, R12.5 and R15 have been allocated in areas where the land may be influenced by external factors or where larger lots are considered a more appropriate transition between the surrounding land use. These areas include the southern side of Abernethy Road, (opposite the trotting complex and stable lots) and as an interface to the Tonkin Highway Reserve where noise impact may be experienced and in those areas adjacent Cardup Brook.

In addition to maximising amenity for residents, larger lots will soften the transition between the rural uses (located to the north and east) and the level of urbanism promoted within The Glades.

The R10-15 density permits a minimum lot size of 875 m^2 and an average lot area of 1,000 m^2 and R15 permits minimum 580 m^2 and an average of 666 m^2.

A base density coding of R20 has been applied across the Structure Plan area. The R20 coding allows for a minimum lot size of 440 m^2 and an average lot area of 500 m^2. Much of the Structure Plan area is designated R20.

6.4.1.2 MEDIUM RESIDENTIAL DENSITIES

Densities of R30 are strategically located around open space, multiple use corridors, the Cardup Brook, Neighbourhood Activity Nodes and the Village Centre.

As discussed earlier in this report, it is considered that maximising densities around community and areas of high amenity promotes a more equitable urban structure and offers high accessibility to open space for smaller lots. Increased densities also ensure that sufficient critical mass exists to support the provision of infrastructure, and the neighbourhood centre. The strategic allocation of densities also provides for increased accessibility and the promotion a lively community nucleus.

Specifically the two large R30 sites located off Warrington Road (within the most northern Multiple Use Corridor) will be developed as grouped housing as issues of surveillance and interface can be addressed as part of the Development Application process. The detailed design of all other single residential R30 lots is likely to be guided by Detailed Area Plans.

The R30 density permits a minimum lot size of 270 m^2 and an average lot area of 300 m^2.

The R40 density coding permits a minimum lot size of 200 m^2 and an average lot area of 220 m^2. This is moderately dense in the context of Byford and will generally comprise grouped dwellings, (i.e. terrace or 4-pack configuration) with some single residential lots are also permissible.

The distribution of R40 sites within the Structure Plan area is generally in accordance with the same philosophy used for the allocation of R30 sites. However, the R40 sites are also concentrated around the Village Centre and Neighbourhood Nodes. Again detailed design of R40 designated areas will be guided by either Detailed Area Plans or the Development Application process.

6.4.1.3 POSSIBLE RETIREMENT LIVING (R30)

As previously mentioned, the Structure Plan makes provision for a potential Retirement/Independent Living Village (or an 'Aged Persons Facility') at the intersection of Doley Road and the extension of Mead Street. This intersection is a key 'energy' location at the gateway to the Village Centre

It is anticipated that synergies can be nurtured between the Retirement Living units and surrounding Village Centre uses, such as potential future civic buildings, retail uses and medical facilities.

The site comprises approximately 6.54 hectares of developable area (including private open space). This gives potential for approximately 178 living units (without utilising the potential density bonus afforded by the Residential Design Codes). These yields however could potentially increase should a prospective developer wish to utilise the density bonus and it is considered that the layout proposed by the Structure Plan can and will accommodate such an increase in density.

Should the Retirement Living Site not come to fruition, the density coding and structure plan design is considered to be robust enough to accommodate standard residential development (at R30).

6.4.2 VILLAGE CENTRE

The Structure Plan provides for a Village Centre, generally located at the intersection of Mead Street and Doley Road, south of the most northern Multiple Use Corridor. This location is generally consistent with the Byford Structure Plan (2005 as amended). It is intended that the centre will be a mixed-use, main street based centre that could contain up to 4500 m^2 retail floor space.

Section 7 of this report however, will consider the Village Centre in detail.

6.4.3 NEIGHBOURHOOD NODES

Consistent with the Byford Structure Plan, the Local Structure Plan provides for a number of localised walkable catchment nodes, which allow the potential for 'corner stores' or other localised convenience uses (refer Local Planning Policy No. 19). The nodes are likely to be between 100-200 m^2 NLA. These have been strategically located, predominantly in the south of the Structure Plan area, to maximise residential catchment potential (refer **Figure 11**).

The primary objective of the Neighbourhood Node is to establish local focal centres to created localised communities. Whilst a small retail component may be permitted, other uses such as a medical centre, post office, residential, day care and or other community facilities will be encouraged in these locations.

6.4.4 MIXED USE

A significant proportion of Mixed Use development is set aside at the western end of Orton Road, within close proximity to Tonkin Highway. The Byford Structure Plan 2005 (as amended) identified much of this location as being appropriate for Mixed Business development, however given the lesser traffic volumes now anticipated on Orton Road (refer Section 8), it is considered that a 'Mixed Use' designation that permits residential as well as commercial/showroom development, is more appropriate. The land use permissibility for the Mixed Use zone is outlined in Part 1 of this Structure Plan.

As will be outlined within Section 7, the Village Centre is also intended to operate as a mixed use centre.

6.4.5 COMMUNITY

Design creates social, economic and environmental opportunities.

It is widely acknowledged that the world we live in has changed at the local, regional, national and global level. These shifts are reflected in employment patterns, social attitudes, product development, market needs, built form, regulatory regimes and the state of the environment.

At the community level these changes have major repercussions, the most profound of which is that now more than ever before efforts need to be made to create communities. Mass production and consumption has led to a situation whereby the world has become more and more the same. Standard built form and planning practices over the last 20 years has led to a situation whereby the distinctiveness of many localities is lost in a sea of sub-urbanism.

What these trends and influences indicate is that traditional community structures are less likely to evolve naturally. What is often required, particularly in new localities, is a series of enablers to stimulate people to interact, build relationships, establish networks and create a local sense of community identity.

As part of the Glades project, a Community Development Plan (CDP) is being developed that will provide the framework in which these enablers are collated and documented. The intent and process of developing the CDP will serve to draw together key stakeholders and explore areas of mutual self-interest between the various partners.

6.4.5.1 COMMUNITY FACILITIES

Community facilities provide focal points for social interaction and assist in building a strong and cohesive local community. Within the structure plan a number of areas have been set aside for these facilities.

Whilst the final design and layout of this proposed infrastructure will need to be determined by discussions with the wider community and the Shire of Serpentine-Jarrahdale, the current framework provides a number of opportunities for existing and future populations. This includes:

EDUCATION

- A 9.5 ha private K-12 school site;
- A 4.0 ha primary school site;
- A 11.2 ha high school site;

OPEN SPACE

- 37 parcels of public open space with active, passive and conservation uses, plus variations in the foreshore reserves;

OTHER

- Shared paths throughout the subdivision; and
- Village Centre, comprising a range of retail, community, commercial and entertainment uses.

Initially it is proposed that a sales office will be established that could double as a community house. A more permanent integrated facility will be developed at the southern end of Main Street within the Village Centre to service local organisations.

A diverse set of leisure based facilities will also be provided within the development. The co-location of active sports ovals is proposed for the primary school site and ovals can also be provided as part of the High School site.

To encourage non-vehicle transport modes (i.e. walking, cycling), dual use pathways will also be developed throughout the subdivision. This will assist reduce the level of vehicle emissions and stimulate a healthy local population by encouraging walking/cycling activities.

6.4.6 EDUCATION FACILITIES

6.4.6.1 PRIMARY SCHOOL

The proposed Local Structure Plan provides for one 4.0 ha primary school government primary school (co-located with public open space) in the western portion of the Structure Plan area. Liveable Neighbourhoods requires the provision of one primary school site per 1500 residential dwellings. As is outlined **Section 6**, it is estimated that the Local Structure Plan area will generate approximately 3270 residential dwellings. In accordance with Liveable Neighbourhoods, this number of residential dwellings would typically necessitate the need for two primary school sites, however the Glades Local Structure Plan has only provided one site, consistent with the requirements of the Byford Structure Plan (refer **Figure 5**).

The Department of Entertainment and Training (DET) have recently advised that there is a shortfall of approximately 0.8 of a primary school within the Byford Structure Plan area west of the South-West Highway and that this additional school site should be located within the Glades Structure Plan area.

Numerous discussions have taken place with the DET to determine their catchment requirements and consider how these may be accommodated within the framework provided by the Byford DSP. There are a number of major constraints to including a second school site within the Glades LSP as outlined below:

- Whilst the cell defined as Tonkin Highway, Cardup Brook, Soldiers Road and Abernethy Road is a regular cell, LWP's landholding is in fact irregular which makes consideration to the placement of a second school site within LWP's landholding very difficult. In essence a large central portion of the cell exists in small lot holdings. Placement of a second school within LWP landholding north of Orton Road is impacted by this anomaly and would result in the second school site being too close (i.e within a 5 minute walk) to the currently planned school on the western boundary of their landholding.

- Orton Road is anticipated to carry in excess of 10,500 vpd. Any school site, planned to serve a catchment wider than the one contained south of Orton Road is likely to be constrained by the physical constraints of Orton Road

- The precinct south of Orton Road, by its elongated nature is constrained. It is approximately 2.6 kilometres in length and only 150m wide at its widest point. This shape could render parts of the catchment to be a considerable distance from any primary school located within it.

Specifically, this may result in students having to travel much greater than typical distances (potentially across major physical barriers such as Orton Road) to get to school. Such an approach is considered to be a particularly inefficient and inequitable approach to schools planning. Such an approach is considered to be a particularly inefficient and inequitable approach to schools planning.

This rationale seeks to outline the difficulties in trying to identify a location for a second school site, that has to be constrained to LWP's landholding. Whilst LWP acknowledge their lot contribution does warrant the provision of two school sites, the physical constraints outlined above, would result in the compromised positioning of a second primary school site. As previously discussed, LWP are not looking to negate their responsibilities with respect to the provision of primary school facilities, and in response have agreed to make the relevant contributions necessary to make up for any resulting shortfalls.

In addition it has been suggested that as opposed to providing one whole additional school that is unlikely to ever operate at full capacity, the 4 proposed school sites west of the South-West Highway be provided as larger (minimum 4.5 ha) school sites. This approach has been utilised elsewhere in other District Structure Plan areas such as Wungong, in Armadale Redevelopment Authority.

In addition, DET has previously discussed the opportunity for the oversized HS site that LWP has generously provided to be utilized for some primary school facilities i.e. child care, kindergarten and pre-primary school. This would assist in reducing the requirements on any of the primary school sites.

Accordingly the Glades Structure Plan has provided one 4.0 ha primary school site, co-located with a large portion of public open space to accommodate the provision of a senior planning field. The provision of smaller primary school sites where they are co-located with open space is consistent with the requirements of Liveable Neighbourhoods (specifically Element 8, Requirement 11). The public open space in which the playing field is provided does form part of a Multiple Use Corridor but does not serve a drainage function.

6.4.6.2 HIGH SCHOOL SITE

One public high school site (11.22 ha) is proposed within the Structure Plan area on the southern side of Abernethy Road, southwest of the Byford Town Centre (which is consistent with the location identified on the Byford Structure Plan 2005). A larger than typically required high school site has been provided at the request of the Department of Education and Training. The high school site was chosen given its proximity to the Byford Town Centre and the potential synergies between the school site, Town Centre and possible future rail station. In accordance with Liveable Neighbourhoods requirements, this school site is also located on future public transport routes and has major road frontage to two major roads in Abernethy Road and Mead Street.

A subdivision application has been lodged to set aside this site and approval to this application is expected in the coming weeks.

6.4.6.3 PRIVATE K-12 SCHOOL CAMPUS

A private K-12 school site (9.59 ha) has been designated immediately to the west of the abovementioned High School site. It is likely that this school site will be operated by the Catholic Education Department. It is intended that in locating the Private K-12 school site in this location, the sharing of ovals and facilities (i.e. libraries) may be possible with the public High School site, immediately adjacent. This sharing of facilities supports the provision of the two school sites being immediately adjacent, with no dividing roads (which would typically be provided).

Co-locating the two school sites also essentially creates a small education precinct that again relates strongly to the Town Centre and would be well served by the possible railway station. The Private K-12 site enjoys the same public transport access and major road frontage as the public high school site.

Again a subdivision application has been lodged to set aside this site and approval to this application is expected in the coming weeks.

6.4.7 PUBLIC OPEN SPACE

The Local Structure Plan proposes a generous network of open spaces that range in size and function (refer **Figure 13**). It is considered that the proposed distribution of open space will provide adequate levels of both passive and active open space. As previously mentioned, where possible, open space has been oriented to retain remnant stands of trees to add character and enhance these open space areas.

The public open space provision is summarised below:

- Two multiple use corridors traverse east-west across the site (refer POS areas 8 and 17 on **Figure 13**). These corridors provide an important drainage function but have been widened in areas to ensure they provide both an active and passive recreation function.
- Multi-purpose playing fields at POS area 16 (co-located oval with a primary school site), area 31 (Senior Playing field) and area 34 (large open recreation area) provided predominantly for active open space purposes (refer **Figure 13)**.
- Linear open space corridor provides key green linkage between larger open space areas or key destinations (refer POS Area 22)
- Small pocket parks predominantly provided for passive recreation purposes that wherever possible attempt to retain existing vegetation (i.e. refer POS area 20 on **Figure 13**).

LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- PUBLIC OPEN SPACE - ACTIVE AND PASSIVE
- FORESHORE RESERVE (INCLUDES RESOURCE ENHANCEMENT WETLAND)
- 30m RESOURCE ENHANCEMENT WETLAND BUFFER
- 13 PUBLIC OPEN SPACE NUMBER
- COMMUNITY PURPOSE SITE
- EXISTING WATERCOURSE POTENTIALLY SUBJECT TO REALIGNMENT AS PART OF DETAILED MULTIPLE USE CORRIDOR DESIGN
- 400m WALKABLE CATCHMENT

PUBLIC OPEN SPACE PROVISION

The Glades - Local Structure Plan

0m 80 160m

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j: 06/014

figure 13

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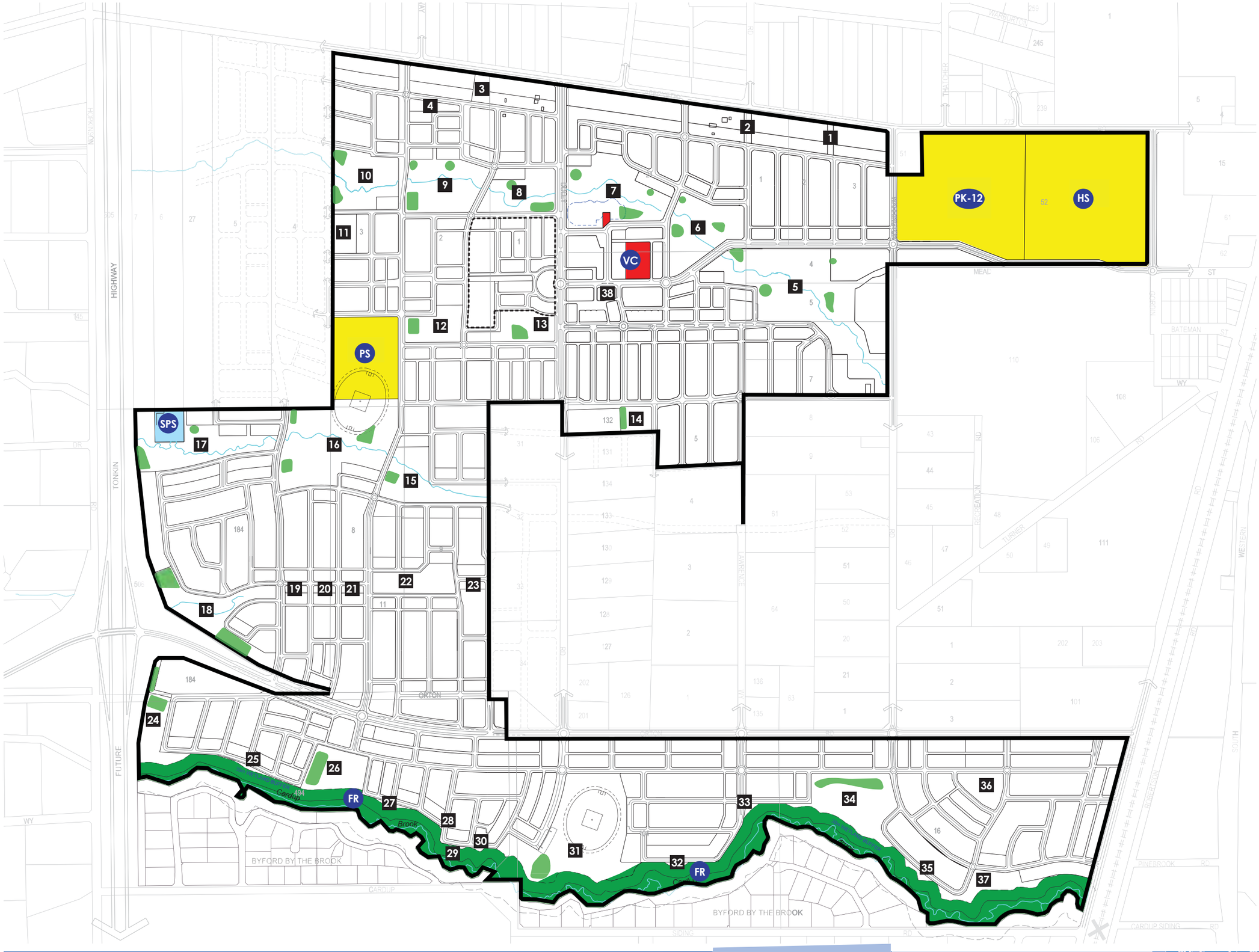
Table 7 below provides a detailed breakdown of the Public Open Space (POS) provision within the Structure Plan area. POS has been calculated in accordance with the requirements of Element 4 of Liveable Neighbourhoods. **Figure 14** identifies all POS areas and deductions considered when calculating the overall provision.

As is outlined below, the Structure Plan provides 17.3736% POS overall; significantly exceeding the 10% minimum required by the Western Australian Planning Commission. This over-provision of open space is largely due to the need to provide the Multiple Use Corridors required by the Byford Structure Plan (2005) and specifically, the need for these corridors to have a significant drainage function (catering up to the 1 in 100 yr event) as required by the Byford Town Site Drainage and Water Management Plan.

TABLE 7: PUBLIC OPEN SPACE SCHEDULE

Gross Subdivision Area		**(ha)**	**318.6586**
Deductions			
	Water Corporation Services Corridor	5.6711	
	Private K-12 School Site	9.8908	
	Primary School Site	3.4975	
	Drainage (up to 1:1 yr event including tributary)	3.3749	
	Village Centre Core (Shopping Centre only)	1.0500	
	Sewer Pump Station	0.6841	
	Foreshore to Cardup Brook	18.9388	
	Surplus Restricted Open Space	0.1161	
	Total Area of Deductions		**43.2233**
Nett Subdivisible Area			275.4353
Public Open Space Required (10%)			27.5435
Unrestricted Public Open Space being Provided			
1		0.1244	
2		0.1567	
3		0.1486	
4		0.2722	
5		5.2002	
6		2.4046	
7		3.2353	
8		3.6024	
9		2.3355	
10		0.2245	
11		0.3043	
12		0.4981	
13		0.7177	
14		0.0712	
15		1.9451	
16		4.7806	
17		1.6439	
18		0.2731	
19		0.3915	
20		0.6546	
21		0.5636	
22		1.0630	
23		0.1906	
24		0.7591	
25		0.0920	



LEGEND

- STRUCTURE PLAN BOUNDARY
- 13 PUBLIC OPEN SPACE NUMBER

DEDUCTIONS

- VC VILLAGE CENTRE
- FR FORESHORE RESERVE (INCLUDES RESOURCE ENHANCEMENT WETLAND AND ASSOCIATED BUFFER)
- HS HIGH SCHOOL
- PK-12 PRIVATE KINDERGARTEN TO YEAR 12 SCHOOL
- PS PRIMARY SCHOOL
- SPS SEWER PUMP STATION SITE
- DRAINAGE STORAGE - 1YR EVENT
- EXISTING WATERCOURSE (1YR EVENT)

NOTE: SURPLUS RESTRICTED OPEN SPACE NOT DEPICTED ON THIS PLAN

PUBLIC OPEN SPACE DEDUCTIONS PLAN

The Glades - Local Structure Plan

N

0m 80 160m

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figure 14

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Gross Subdivision Area			(ha)	318.6586
26			0.7256	
27			0.0794	
28			0.0032	
29			0.0029	
30			0.0350	
31			5.4733	
32			0.0389	
33			0.0614	
34			2.0983	
35			0.1110	
36			0.8628	
37			1.0261	
38	Community Purpose Site		0.1714	
SUB TOTAL				**42.3421**
RESTRICTED OPEN SPACE		Maximum 2% of 10% POS provided or 5.5001 ha		
5	Surface Area between 1:1 yr event and 1:5 yr event		0.4690	
6	"		0.1095	
7	Surface Area between 1:1 yr event and 1:5 yr event + Lake		0.7590	
8	Surface Area between 1:1 yr event and 1:5 yr event		0.9840	
9	"		0.6240	
10	"		0	
11	"		0	
12	"		0.1430	
13	"		0.2840	
14	"		0	
15	"		0	
16	"		0.0610	
17	"		0.2385	
18	"		0	
19	"		0.3485	
20	"		0	
21	"		0.1166	
22	"		0	
23	"		0	
24	"		0.4610	
26	"		0.3610	
31	"		0.3280	
34	"		0.3400	
SUB TOTAL				**5.6271**
TOTAL (Restricted)		(Surplus Restricted Open Space – 0.1161ha)		**5.5110**
Total POS Provided (Restricted + Unrestricted)			**42.3421+5.5110= 47.8531 ha**	**17.3736%**

Assumptions:

1. *Drainage inputs provided by JDA as follows:*
    a. *1m wide tributary through MUC 1:1 yr event.*
    b. *2m either side of tributary = up to 1:5 year event.*
    c. *All other basis as defined by JDA*

Note: The areas identified within this table are based on the level of design applied at the LSP stage. As detailed design progresses and design refinement occurs, these areas are subject to change and the calculations will therefore need to be adjusted as development progresses.

6.4.7.1 DESIGN AND TREATMENT OF LANDSCAPE AND OPEN SPACE

The vision for The Glades is to create a development with a strong sense of place and identity that is compatible and seamless with the surrounding environment. The incorporation of sustainable design principles is an over-arching objective, with tree retention in public open spaces and streets a key priority. The creation of useful open space that fulfils several functions is a key objective. These functions include the following:

- establishes significant multiple-use corridors along existing drainage lines;
- recreates a diversity of indigenous plant communities and fauna habitats;
- provides a showcase for a variety of environmental features and practices to assist in community education and foster a sense of community pride and ownership; and
- provides a diversity of visual and recreational opportunities and experiences.

An overall approach in the open space design will be to minimise areas of irrigated grass and to re-establish extensive areas of bushland using endemic plant species. Grassed spaces will be incorporated into key nodes to enable passive and active recreational activity to occur.

6.4.7.2 SITE ANALYSIS

Prior to developing landscape ideas for the project it was important to gain an appreciation of the site and its context. Some of the key elements or features of the site include:

- The site is located within a rural/semi-rural setting:
- The site has an attractive easterly outlook to the hills, which provides both a sense of place and a sense of orientation;
- The site contains good stands of remnant vegetation in the eastern sector; and
- The site contains some good avenues of trees (planted natives and exotics), primarily along existing roads, driveways and fence lines.

6.4.7.3 LANDSCAPE THEME

The inspiration for landscape theming will derive from the existing site character and environs, the key elements being:

- rural/semi-rural/town character;
- native vegetation; and
- red/brown gravely clay soils.

Plant species endemic to the site will inspire both the planting palette for the development and may also provide the inspiration for artworks and other motifs.

The proposed landscape character will reflect the semi-rural/country town location, with the use of materials and colours complementary to the Byford area:

- Reds and browns in paving colours;
- Rammed earth walls;
- Stone paving in key feature areas; and
- Steel and timber.

These elements will be combined in a contemporary style to reflect a modern look.

6.4.7.4 KEY LANDSCAPE FEATURES

The key landscape elements of the Local Structure Plan are a series of significant east-west green spines and several north-south boulevards or primary streets that will provide a strong green-link effect.

EAST-WEST GREEN SPINES

There are several significant east-west green spines within the project; two major green spines that incorporate multiple use corridors located on existing stream lines, and two smaller green spines that have been located to capture significant stands or avenues of existing trees. A third major green spine is formed by Cardup Brook on the southern boundary of The Glades, and significant open spaces have been created adjacent to The Brook to capitalise on the visual and recreational amenity of this green spine.

NORTH-SOUTH ROADS

Wide road reserves incorporating existing avenues of trees will provide a distinctive rural character to the primary north-south roads, effectively providing north-south green spines that will intersect with the east-west green spine. These roads will incorporate shared use paths, providing an attractive and already shaded environment to encourage use by pedestrians and cyclists.

PARKLAND CORRIDOR TREE RETENTION

A large park (POS area 34 on **Figure 13**) will be established in the eastern sector of the site where there are significant stands of remnant vegetation. The key elements of this park will be:

- Re-establish native bushland habitat; and
- Provide an extensive path network through the park, with small recreation nodes/picnic areas developed to allow enjoyment and appreciation of the bush experience.

As the park is located adjacent to the bush forever site, it is even more important that bushland should be re-established here. Environmental education initiatives will be implemented to encourage community awareness and appreciation of the natural bushland. These initiatives may include the development of interpretive and/or community gardens and possibly a local environmental centre. Community involvement and participation will be encouraged to foster a sense of pride and ownership of the local environment, and this involvement would ideally extend into the long-term management of existing and recreated bushland and wetland areas.

6.4.7.5 PUBLIC ART

Public art will be an important and integral component of the landscape design. Artworks will provide numerous benefits to the community, including:

- enrichment of the built environment;
- contribute to the local identity;
- development of community pride;
- interpret and express in a creative way the unique characteristics of this area (including natural, cultural and social characteristics);
- serve as landmarks and points of reference for orientation; and
- contribute to the safety of a place and reduce vandalism.

A public art strategy and program will be developed at the outset of the project to ensure the implementation of meaningful and relevant artworks throughout the development. Opportunities will be explored to involve local artists in specific projects. Public art opportunities involving local Aboriginal groups will also be explored to assist in the interpretation of indigenous heritage sites within the project.

6.4.8 ABORIGINAL HERITAGE

As previously mentioned, Section 18 advice for the Structure Plan area was obtained in 2007. As a consequence, no Aboriginal Heritage sites were required to be set aside and appropriately protected. This advice did however recommend that two sites be retained in open space. Accordingly, DIA 23915 has been set aside within POS area 34 (refer **Figure 13**) and DIA 23914 has been set aside within the foreshore of the Cardup Brook.

7 VILLAGE CENTRE

The Village Centre, in accordance with the Byford Structure Plan (2005 as amended) is provided at the intersection of Mead Street and Doley Road and to the immediate south of the most northern Multiple Use Corridor.

The design process for The Glades Village Centre has been an exhaustive one involving the entire project team, Shire of Serpentine–Jarrahdale Councillors and Council staff. As part of the evolution of the design, an Urban Design Framework was prepared to establish an agreed design framework for the future development of the Village Centre. The Urban Design Framework (UDF) was predominantly concerned with establishing an appropriate vision and urban structure. Whilst not fixing any elements, the UDF also considered built form scale, public realm and movement networks.

It is the intention that the outcomes of the UDF will be implemented through this Local Structure Plan and separate Detailed Area Plans. The following provides a summary of the key outcomes of the Urban Design Framework process.

7.1 VILLAGE CENTRE DESIGN

As is outlined above, the purpose of an UDF is to establish the core principles and framework for a specific project. **Figure 15** (Urban Design Framework Plan) represents the key principles to guide more detailed planning and design for The Glades Village Centre itself. The following provides a description of the key design elements:

- A comparatively short, north-south Main Street, linking the Village Centre to the amenity of the Multiple use Corridor extending to the civic space or community focal point.
- A Main Street based retail and shopping core comprising a small neighbourhood supermarket and numerous speciality retail outlets.
- A public plaza at the northern end of Main Street, providing an important community meeting place and creating a strong public link between the Village Centre and the Multiple Use Corridor.
- A leisure/commercial precinct overlooking the Multiple Use Corridor (Road A). Tavern, cafés restaurants and some commercial/office development would be encouraged in these locations.
- Larger parking areas sleeved off public streets and provided with built form or landscaped edges to minimise impact on important streetscapes.
- Extension of Mead Street being the predominant east-west connector to the Village Centre and Main Street. As the predominant neighbourhood connector, Mead Street will divert traffic out of the core of the Village Centre, allowing for Main Street and The Promenade (Roads A and B) to be predominantly pedestrian friendly environments.
- Ability to potentially close Road A and utilise as a civic space for community fair market on a semi regular basis without disrupting the vehicular flow of traffic through the Village Centre.
- Provision of mixed use opportunities along Main Street but predominantly along Mead Street where commercial development can capitalise on anticipated higher traffic volumes.

FUTURE PUBLIC OPEN SPACE

STREET B

STREET A

ROAD

MAIN STREET

FUTURE PUBLIC OPEN SPACE

STREET E

MEAD STREET EXTENSION

DOLEY

STREET D

STREET C

LEGEND

Land Use

- Medium-High Density Residential
  Facilitating a diversity of higher density residential dwelling choices.
- Mixed Use Potential
  Key area for growth of commercial land use, including a mix of residential.
- Leisure and Commercial
  Tavern/cafes and restaurants, and some offices, overlooking public spaces.
- Civic Building
  Hall/activity and meeting rooms/Post Office
- Landmark Parkside Building
  Cafe/Restaurant/Shelter
- Focal area for supermarket and specialty retail shops, including potential for upper-floor residential.
- Supermarket Site
- Key Service Area
  Screened, well-maintained

Public Domain

- Village Plaza
  Highly landscaped formal public space with planting, seating etc.
- Main Street
  Pedestrian-friendly environment with numerous safe crossings, continuous shade and shelter and no vehicle crossings.
- Mead Street Extension
  Slow-speed (40kph), well landscaped environment with numerous pedestrian crossings.
- Street A
  Opportunity to close street for weekly/occasional events. No parking on southern side to provide a wide north-facing al-fresco area.
- Key Frame Streets
  High quality built form and public realm treatments.
- Primary Gateway
  Feature landscaping and built form design.
- Secondary Gateway
  Attention to high quality built form and landscaping design.
- Central Junction
  Pedestrian-oriented area defined by landmark building architecture.
- Main Street buildings set at, or close to, the edge, with limited gaps between buildings.
- High quality landscaping along street edge of exposed parking area.
- Key approaches to be specially landscaped
- Well-landscaped parking areas, at rear of Main Street buildings.
- Landmark Sites
  Incorporating third storey architectural element
- Future Public Open Space
- Subject Site

URBAN DESIGN FRAMEWORK PLAN

The Glades - Local Structure Plan

N

0 15 30m

s: scale bar
d: june 09
j: 06/014

figure 15

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- Medium residential densities along Roads A and C (terrace style development), taking advantage of the amenity afforded by the Multiple Use Corridor.
- A dispersion of further medium density development to the south of Mead Street where further terrace or small lot detached single housing will be encouraged.
- A civic site at the southern end of Main Street providing a key point of destination and an integral community function.
- A legible and well connected movement network that disperses traffic, provides numerous entry points into the Village Centre and relates strongly to the surrounding residential catchment.

These are considered to be the fundamental core design elements formulated through detailed site and case study analysis. The following sections of this report seeks to 'flesh-out' these principles to provide a further level of fine-grained detail in relation to elements of land use, public realm, retail floor space allocation, built form and traffic and transportation.

7.2 LAND USE DISTRIBUTION

Figure 15 (UDF) illustrates the proposed land use distribution within the Village Centre core. In keeping with current urban design principles and the requirements of Liveable Neighbourhoods Edition 4, the Village Centre will be predominantly mixed-use based, with the provision of other essential retail, commercial and civic uses. Importantly, the proposed design also affords a number of medium density residential opportunities within the Village Centre core, in addition to the Mixed-Use development provided for throughout.

7.2.1 RETAIL

Retail development will largely be located along the Main Street and Streets A and B (fronting the Multiple Use Corridor). Retail development will bring vibrancy and activity to the centre and thus will play a particularly important role in the success of The Glades Village Centre.

A Centre Strategy has been undertaken to consider the appropriate amount and mix of retail, non-retail, commercial and civic uses within the Village Centre (refer **Appendix 5 -** The Glades Village Centre Retail and Commercial Analysis, Taktics 4). Specifically, the report suggests that The Glades Village Centre, in the context of its location in the future Byford residential catchment and the Byford Town Centre, could accommodate up to 4500 m^2 retail floor space. The suggested breakdown of these retail land use allocations is discussed below and outlined in **Table 8** overleaf.

The largest single component of the provision of retail floor space within the Village Centre is the supermarket. It is possible this centre could accommodate a larger full – line supermarket (i.e. Coles or Woolworths). However, in striving to achieve a more compact and localised Village Centre, the preference is to provide for a smaller supermarket format (i.e. IGA) of approximately 1,500 m^2. IGA formats generally have greater flexibility in their required design elements (and trading hours) and accordingly are better suited to Main Street development (as is intended in this location). As depicted in **Figure 15**, unlike many Main Street supermarkets that are intentionally sleeved behind the building mass to Main Street, it is proposed that the supermarket will have direct frontage and interact with the Street.

The UDF also provides for up to 1500 m^2 speciality retail outlets. This floorspace will be distributed between the eastern and western sides of Main Street. Based on a format of approximately 100 m^2 for each store, it is anticipated that up to 15 speciality stores could be accommodated along Main Street.

The Taktics 4 Centre Strategy designates up to 1000 m^2 of floor space for the purposes café/restaurants. It is anticipated that these uses will be located predominantly along Roads A and B to take advantage of the views across to the Multiple Use Corridor, fronting the Public Plaza and potentially along Main Street. A site has also been specifically designated at the northern end of Main Street, within the Multiple Use Corridor; again to take advantage of the high visual amenity with views across the MUC and to provide a point of destination at the northern end of the Village Centre. The provision cafés/restaurants provide integral day and night time activity needed for a centre of this scale.

The Village Centre design provides for a Tavern site along Road A. Whilst a tavern is for the most part a non-retail land use, it will have a retail component (i.e. bottle shop). Accordingly, 500 m^2 retail floor space has been provided for retail associated with the Tavern.

7.2.2 COMMERCIAL

It is intended that commercial development will occur along Main and Mead Streets in either stand alone commercial development sites or on the ground floor within designated mixed use development (refer **Figure 15**). Specifically, it is intended that much of this commercial development will be located along Mead Street, where development can capitalise on the higher volumes of traffic (4000-5000 vehicle per day).

Table 8 below outlines the proposed allocation of Commercial (non-retail) floor space within The Glades Village Centre. Specifically the Centre Strategy designates 1000 m^2 non-retail floor space to typical commercial (office) type development. Whilst there is not anticipated to be a considerably large demand for office type development (demand for office development is likely to be stronger within the Byford Town Centre), it is considered that a small amount of floor space to provide for essential services such as banks, post office, medical facilities is required to provide essential services for a centre of this size.

The tavern is the other major commercial type development within the Village Centre. Whilst there is a retail component to the Tavern, it is predominantly a non-retail land use. The tavern has been located along Road A (The Promenade) to take advantage of the outlook and relationship to the Multiple Use Corridor. It is anticipated that built form requirements for the tavern will ensure that the building appropriately addresses and interacts with the street.

The location of the tavern has also been strategically selected to minimise any potential adverse impact on the amenity of the surrounding residential development.

TABLE 8: PROPOSED RETAIL AND COMMERCIAL FLOORSPACE ALLOCATION, THE GLADES VILLAGE CENTRE

Supermarket	1,500 m^2
Speciality Retail (up to 15 outlets)	1500 m^2
Café/restaurants (4-5)	1000 m^2
Tavern (1) (25% utilised for retail purposes)	500 m^2
Total Retail	**4,500 m^2**
Tavern (1) (non retail allocation)	1500 m^2
Office/Non retail commercial space	1000 m^2
Total Non-Retail (Commercial)	**2,500 m^2**

7.2.3 MIXED-USE

Mixed use development is predominantly provided for along Main and Mead Streets within the Village Centre (refer **Figure 15**). The intent for Main Street mixed-use development will be to provide for retail/commercial opportunities along the ground floor and potential residential or commercial/office development within upper storeys. Mixed use development along Main Street will provide for a variety of uses needed to achieve an active, vibrant and sustainable village centre.

Much of Mead Street has also been designated for mixed use development. Given the comparatively high traffic volumes (3500 vehicles per day), it is considered that the mixed use in this location would be appropriate for commercial/office type ground floor development, again with the opportunity for residential or office/commercial development on the upper floors.

Mixed use development located on the periphery of The Glades Village Centre provides an appropriate transition between commercial and residential development. Mixed use lots will also be flexible and allow for residential development to occur with a transition to retail or commercial development when viable.

7.2.4 RESIDENTIAL

Providing a residential catchment is critical to the viability of any centre and resultant achievement of an active and vibrant mixed use Village Centre. Apart from the mixed use development opportunities provided for along Main and Mead Streets, the Village Centre design also provides for medium density residential development in two locations, overlooking the Multiple Use corridor (refer **Figure 15**). The north facing site has been designated Residential R60 and is intended to provide for apartment or terrace style housing. The east facing development site, also overlooking the MUC, is designated Residential R50 and is intended to facilitate terrace/town house type development.

Upper storey residential development is to be encouraged within the designated mixed use sites along Main Street and the Mead Street extension.

Residential development to the south of Mead Street is well connected through efficient road and pedestrian routes. The densities provided for these surrounding locations is predominantly Residential R40. It is intended that many of the residential lots will be flexible in that they allow for re-subdivision and either one or two dwellings could be constructed. This will offer alterative lifestyles for residents through the opportunity of choosing to own a large lot, or the option of subdividing the lot and retaining a smaller area. Those residents that may prefer to own a larger lot, particularly if they have young children and want to provide a play area, may at some time in the future subdivide and sell off a portion of the land or construct another dwelling for their family or extended family to reside in.

All residential development within the Village Centre will be the subject of separate Detailed Area Plans and requirements of Design Guidelines. This will ensure that this re-subdivision and further infill development is managed through the planning process and north on an ad hoc basis.

7.2.5 CIVIC USES

The Shire of Serpentine-Jarrahdale has indicated the need for a civic site within the Village Centre. Whilst not specific in its requirements, it is anticipated that such a site may be utilised for either a Community Hall or Library facility.

Accordingly, a 1700 m^2 site has been identified at the southern end of Main Street. This site is considered a key focal point of the Centre and will serve an important community function within the Centre and for the surrounding residential catchment.

7.3 PREFERRED LAND USES

Whilst land use permissibility is governed by the Shire of Serpentine-Jarrahdale Town Planning Scheme No (TPS2), it is intended that preference be given to some land uses over others in the context of achieving the desired vision for the Village Centre. Accordingly, Part 1 of this Structure Plan stipulates that land use discretion for the Village Centre shall be in accordance with the zoning table outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy 19. Reinforcing these provisions within Part 1 will provide further statutory weight to these requirements.

7.4 LANDMARK SITES

Four landmark sites have been identified within The Glades Village Centre to enable the built form to announce the centre in critical locations (refer **Figure 15**). Specifically, a landmark site has been provided on the corner of Doley Road and the Road A (The Promenade) to announce the entrance into the centre for vehicles travelling south on Doley Road. Built form on this site also has the opportunity to take advantage of extensive views to the north over the Multiple Use Corridor.

Two landmark sites are identified on the intersections of the Main Street and Mead Street intersection to announce the beginning of Main Street. It would be preferable for some symmetry to be provided in the development of any landmark elements on these sites.

A landmark site has also been identified on the western portion of the Residential R60 site (overlooking the MUC). It is considered that this provides a prime opportunity for residential development to be built to a greater height within the Village Centre and take advantage of northerly and easterly views over the public open space.

All landmark sites are to be a minimum of two storeys with a third storey architectural element.

A Village Centre Masterplan (refer **Figure 16**) has been prepared to demonstrate how it is anticipated the elements of urban design and landscape are will be brought together to deliver the Village Centre.

LEGEND

1. A 'CENTRAL PARK' ACTING AS AN EXTENSION TO THE VILLAGE CENTRE, CONTAINING KEY ELEMENTS SUCH AS: THE CREEK, DRAINAGE WATER BODY, WEIR, BOARDWALKS, CHILDREN'S PLAYGROUNDS, ACTIVE PLAY AREAS, SHADE STRUCTURES, FOOTPATH NETWORK, LANDSCAPED DRAINAGE DETENTION AREAS.
2. A NATURAL, LANDSCAPE BASED 'MULTIPLE USE CORRIDOR' FLANKING THE CENTRAL PARK, CONTAINING ELEMENTS SUCH AS: THE CREEK, DRAINAGE DETENTION AREAS AND ACTIVE PLAY AREAS.
3. FEATURE LAKE FOR PURPOSE OF IRRIGATION AND DRAINAGE CATCHMENT.
4. CAFE SITUATED ON THE WEIR AS A TERMINATION OF MAIN STREET, ADDING TO VILLAGE CENTRE ACTIVATION AND VIBRANCY.
5. PARKSIDE PROMENADE CREATED AS A PEDESTRIAN-FRIENDLY STREET EDGED BY TAVERN AND CAFES, AND WITH POTENTIAL FOR ROADWAY TO BE CLOSED FOR COMMUNITY EVENTS AND MARKETS.
6. A SMALL, BEAUTIFUL 'VILLAGE SQUARE' EDGED BY CAFES AND SHOPS BEING THE FOCUS FOR OUTDOOR SOCIALISING AND DINING IN THE VILLAGE CENTRE.
7. STREET-FRONT SUPERMARKET PROVIDING A KEY ACTIVATION POINT AND COMMUNITY FOCUS ON MAIN STREET.
8. WELL-LANDSCAPED CAR PARKING AND SERVICE AREAS LOCATED BEHIND SHOPS TO ENABLE PEDESTRIAN-ORIENTED STREETS.
9. PEOPLE-FRIENDLY MAIN STREET EDGED BY RETAIL OUTLETS, OFFICES, CAFES AND SHOP-TOP HOUSING.
10. DOLEY ROAD DESIGNED AS AN ATTRACTIVE BOULEVARD ACCOMMODATING EXISTING TREES IN THE MEDIAN ISLAND.
11. MIXED-USE BUILDINGS AT A KEY VILLAGE CENTRE 'GATEWAY', WITH THE ABILITY FOR COMMERCIAL TO BE INCORPORATED INTO RESIDENTIAL.
12. MEAD STREET, THROUGH THE VILLAGE CENTRE, CREATED AS A PEOPLE-FRIENDLY ENVIRONMENT WITH HIGH QUALITY LANDSCAPING AND SAFE CROSSING POINTS.
13. PERIPHERY OF VILLAGE CENTRE CONTAINING COTTAGES AND TOWNHOUSES FOR INCREASED HOUSING DIVERSITY AND AFFORDABILITY OPPORTUNITIES.
14. LANDMARK CIVIC BUILDING ANCHORS SOUTHERN END OF MAIN STREET AND PROVIDES A STRONG VISUAL COUNTERPOINT WITH THE PARKSIDE CAFÉ.
15. KEY HIGH-DENSITY RESIDENTIAL SITE WITH ADAPTABLE MIXED-USE FLOOR SPACE ALONG MEAD STREET.
16. MEAD STREET EXTENDED ALONG SOUTHERN SIDE OF THE VILLAGE CENTRE TO MOVE THROUGH-TRAFFIC AWAY FROM THE HIGH-AMENITY PARKSIDE PROMENADE, AND PROVIDE GOOD EXPOSURE TO THE SOUTHERN END OF MAIN STREET.

VILLAGE CENTRE MASTERPLAN

The Glades - Local Structure Plan

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TAYLOR BURRELL BARNETT

figure 16

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7.5 PUBLIC REALM

7.5.1 MULTIPLE USE CORRIDOR

The relationship and interface between the Multiple Use Corridor (MUC) is a critical elements of the Village Centre design. The MUC (incorporating the constructed lake) will provide a strong east-west link through the Village Centre (refer **Figure 17**). This corridor performs two key functions in that it provides a diverse range of recreational and educational opportunities and experiences for residents and the public alike, offering a variety of recreation spaces and a high level of accessibility in the form of dual use paths, boardwalks and walking trails. Secondly, the MUC forms an important component of the urban water management of the development, with the corridor aligning closely with the natural environment of existing drainage line, and the retention of existing trees a key consideration in the drainage design.

A central lawn area with a pavilion and play facilities to the north of the lake will provide an area for more community based events/active recreation, with a pedestrian/cycle bridge an important connector to the Village Centre. Smaller areas of lawn parkland with pathways and groves of native trees to the north of the lake will provide space for informal semi-active and passive recreation in close proximity to residents and dual use path and cycle way facilities.

The proposed lake will enhance the Village Centre by providing greater recreation and visual amenity, as well as providing an irrigation reservoir and contributing to drainage function and responsible stormwater management. The lake and promenade will enhance commercial development opportunities adjacent the lake in the Village Centre, such as cafés/restaurants overlooking the lake, and will encourage social interaction.

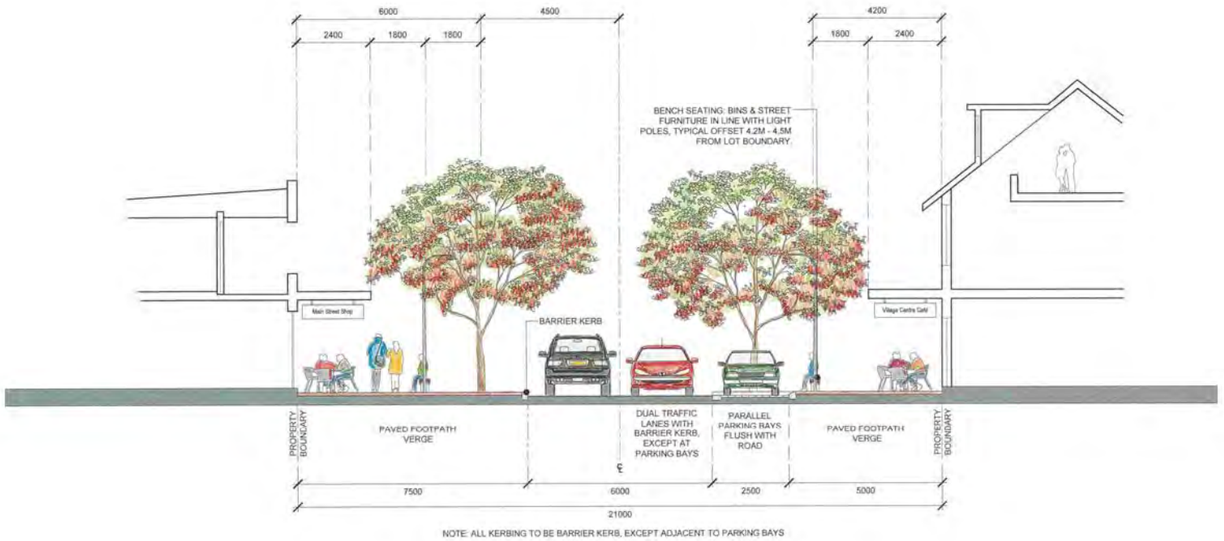
Endemic and native 'water-wise' species will be utilised to reduce the irrigation and maintenance requirements of the public open space landscape (refer **Figure 18**). Where possible, existing trees have been retained on site and development levels maintained as close as possible to existing ground levels.

7.5.2 STREETSCAPE

The design for the streetscape and public realm within the Village Centre will establish a high quality, intimate, and well detailed public environment that reflects the rural character of the site. The public realm within the Village Centre includes the roads, streets, paved verges and setbacks, lanes and the lake promenade edge, offering a diversity of spaces with a high level of amenity to cater for a variety of needs and uses.

An interesting and vibrant public realm will be established through the creative use of a simple palette of hard and soft landscape materials and colours, with a special sense of arrival created at major entry points into the Village Centre, and along the main roads connecting the Village Centre with the surrounding residential fabric.

The streetscape design will be dominated by hard landscape elements to create a series of flexible civic, urban and pedestrian spaces able to accommodate high levels of pedestrian use and promote walkability through the Village Centre. Staggered setbacks, fine detailing, covered lanes, public art and a robust street furniture palette combine to create an interesting streetscape character and provide a diversity of visual and recreational opportunities and experiences.



NOTE: ALL KERBING TO BE BARRIER KERB, EXCEPT ADJACENT TO PARKING BAYS

A SECTION A : MAIN STREET
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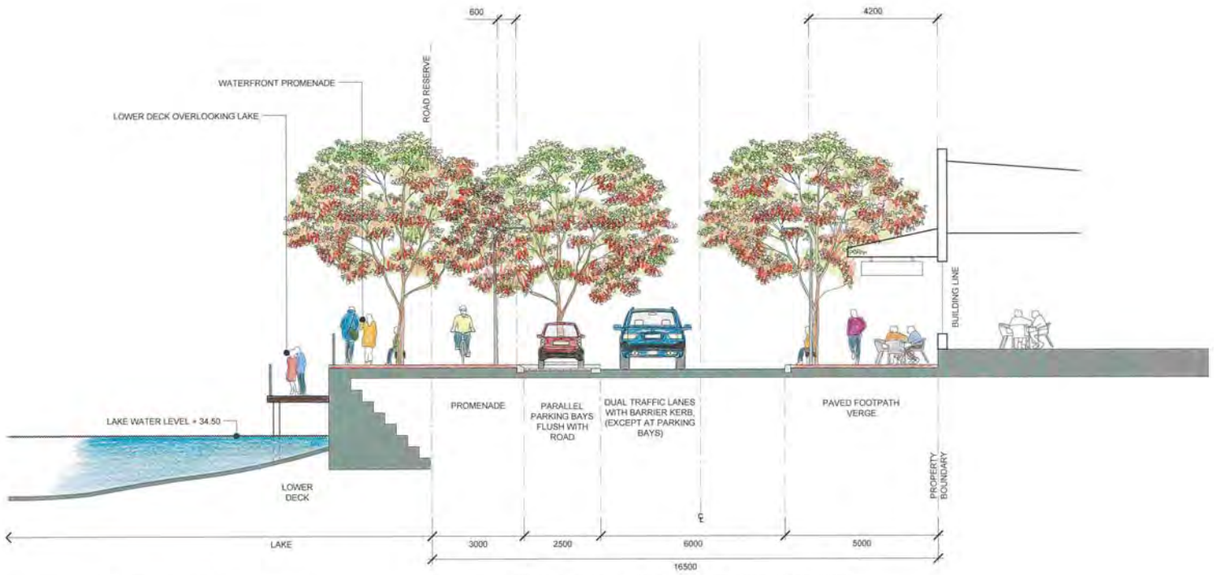

NOTE: ALL KERBING TO BE BARRIER KERB, EXCEPT ADJACENT TO PARKING BAYS

B SECTION B : PROMENADE
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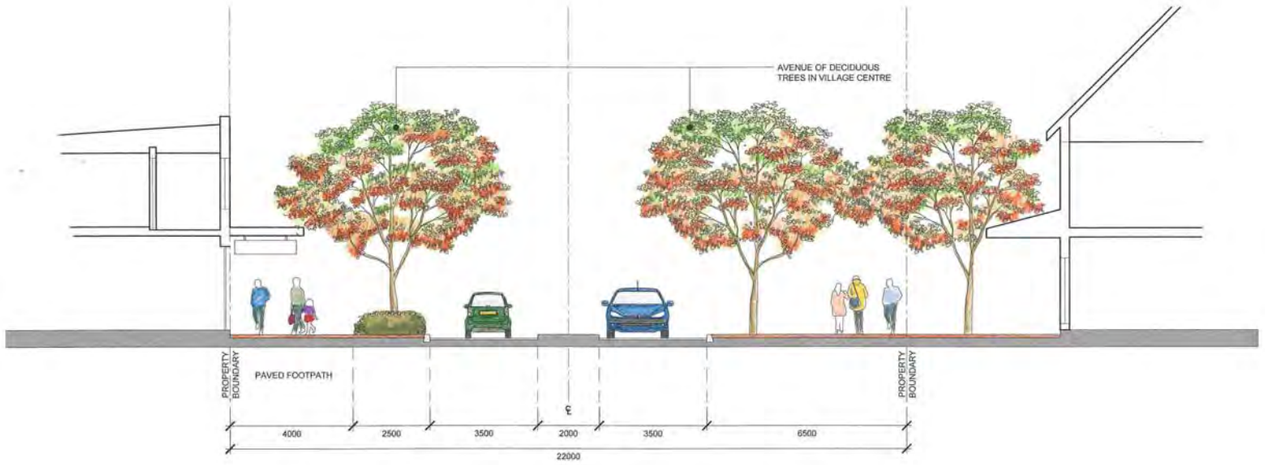

C SECTION C : MEAD STREET EXTENSION
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VILLAGE CENTRE STREET CROSS SECTIONS A,B & C

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figure 17

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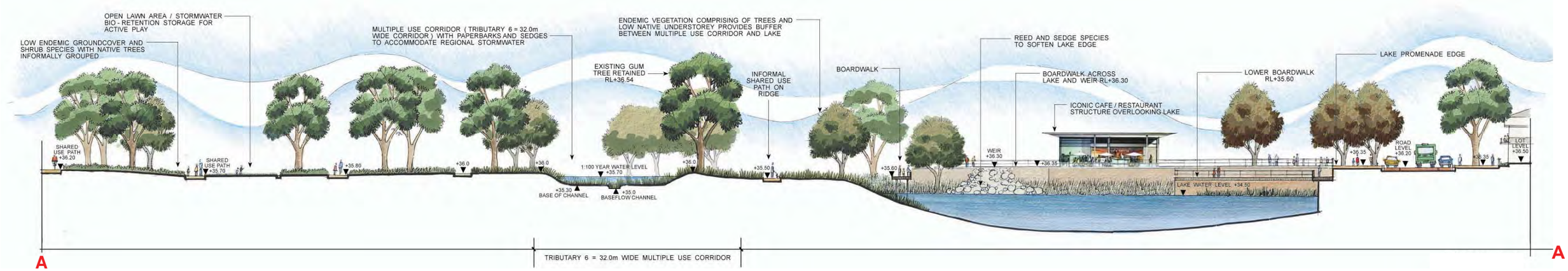

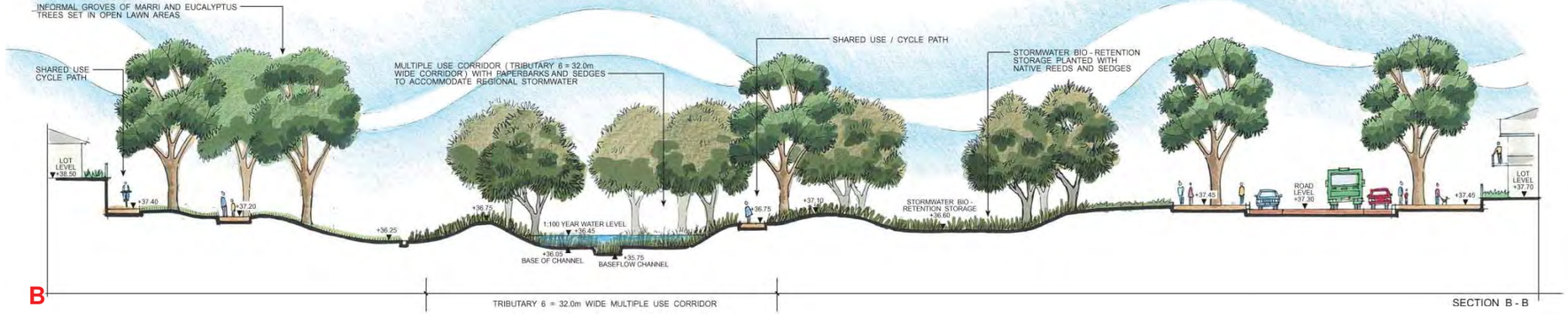

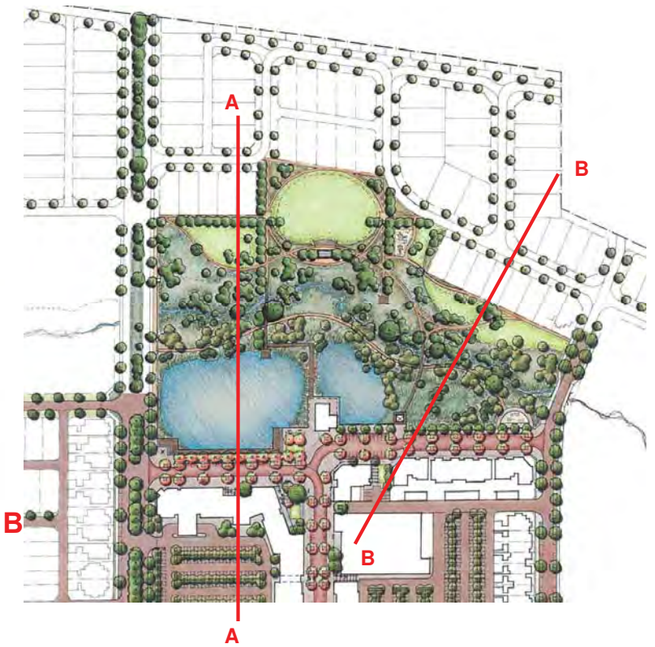

KEY POINTS :

→ Lake waterbody creates an important visual focus and visual amenity to the Village Centre, providing a distinctive point of destination:

→ The Lake creates social amenity (being a natural attractor for residents and visitors);

→ The Lake contributes to the recreational amenity value of the Multiple Use Corridor (MUC) providing an attractive focal element within the major recreation node of the MUC adjacent the Village Centre ;

→ Lake and permanent water-body accommodates key drainage and irrigation requirements for The Glades;

→ The Lake has hard edges adjacent the urban edge of the Village Centre, and soft edges with a wetland character within the MUC; and

→ The MUC recreation node incorporates a variety of passive, semi-active and active spaces catering for a variety of users.

MULTIPLE USE CORRIDOR AND LAKE SECTIONS

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figure 18

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7.5.3 VILLAGE PLAZA

A public plaza, located at the heart of the Village Centre, will provide a strong recreational and visual focus. It is strategically located on the main east-west road overlooking the Multiple Use Corridor, adjacent possible future tavern/dining facilities, and across the road from the iconic café/restaurant, sales office and community buildings, so that its visual prominence is reinforced (refer **Figure 16**).

The design philosophy for the public plaza will focus on developing a multi-functional, vibrant and active social hub to the heart of the Village Centre, which relates strongly to the Public Open Space across the road and the promenade/boardwalk edge.

As the primary plaza space within the Village Centre, it will have a high level of treatment, including a lawn area for community events, shaded seating, informal performance space, public art and a mature feature tree (transplanted from site).

7.5.4 MAIN STREET

The Main Street of the Village Centre is to be memorable and use mature vegetation as the entry sequence (refer **Figure 17**). A continuous avenue of feature Coral Trees (transplanted from site) in paved tree wells is proposed to either side of the carriageway and will provide summer shade, winter sun and seasonal colour and will create a distinctive character to the Village Centre precinct whilst framing the central axis with views towards the public plaza, lake, and central public open space.

Additional evergreen tree planting is proposed where building setbacks occur, creating intimate spaces and shaded areas for alfresco dining, lunchtime socialising and rest, while providing some diversity and interest to the streetscape, often found in rural towns and villages. Roadside parking with paved tree wells between every second car bay, creates an abundance of crossing points with which to slow traffic and promote amenity within the Village Centre.

The paving treatment to the road and car bays of Main Street and Promenade Road are to be of a higher quality than the surrounding streets to enhance and define the character of the Village Centre precinct, slow traffic and create a pedestrian friendly street. A simple treatment of large concrete pavers in earthy tones and bench seating under Coral Trees defines the character of Main Street.

7.5.5 MEAD STREET

As the Mead Street extension is the primary route to the Village Centre from the east and west, it is be developed as a tree-lined boulevard, signifying its importance in the road hierarchy and also promoting its use as one of the primary pedestrian and cycle routes through to the Village Centre and development. Dual-use and cycle paths play an important part in linking the Village Centre with the broader community and public open space.

High quality landscaping to Mead Street comprising native understorey planting with avenues of endemic trees to provide shade will create a strong local character for Mead Street. The use of tall trees with low native groundcovers will permit glimpsed views down Mead Street to the Darling Ranges, enhancing the sense of place.

The landscape and paving treatment to the section of Mead Street directly flanking the Village Centre precinct is to be a continuation of the Village Centre treatment with feature paving to the verges and potentially Coral Tree transplants to highlight the sense of arrival into the Village Centre. The tree wells to Mead Street are to be planted to soften the verge, and provide 'green link' connections to the public open space areas that flank Mead Street in other areas of the development.

The Village Centre road treatment is to continue out into Mead Street in the area directly in front of the civic building to highlight the civic plaza forecourt and reinforce the sense of arrival into Main Street.

7.5.6 DOLEY ROAD

The wide road reserve of Doley Road incorporates an existing avenue of mature eucalyptus trees to provide a distinctive rural character to the north-south road leading into the heart of the Village Centre precinct. The existing trees have been retained within a central median and are to be enhanced by the planting of additional large eucalyptus trees on each side of the road. The verge is to be paved for foot and cycle traffic, with pockets of dense native planting alongside the road to enhance the existing native tree avenue and create a continuous canopy to the main entry roads leading into the Village Centre.

Roadside parking will be provided with car bays in groups of three (3) where possible with planted tree wells between the car bays, and sections of verge planted with native species to soften the streetscape and integrate with the adjacent public open space and 'green' corridors.

Additional planting between the footpath and lot boundary has been introduced to soften the appearance of the lot frontages and enhance the 'bush' character of Doley Road.

It should be noted that a partial road closure of the existing portion of Doley Road, will be required to facilitate the retention of the existing eucalypts within the central median (refer Section 8).

7.5.7 PROMENADE ROAD/ROAD A

The Promenade Road runs along the southern edge of the Central Public Open Space and Multiple Use Corridor, and features avenues of mature Coral Trees (transplanted from site) to create instant amenity and impact. The iconic and colourful Coral trees, which were traditionally planted in many rural properties, are to be set into paved tree wells to both sides of the road, and on the northern edge of the promenade the trees are set in paved tree wells between car parking bays. This avenue is supported by a more densely planted secondary avenue of Coral trees to create a shaded pedestrian promenade overlooking the lake defining the edge of the public open space.

The wide paved verge/promenade space has a predominantly hard treatment in keeping with the urban nature of this edge and will be flanked by Coral Trees providing a setting for community events, and a foreshore space promoting views out over the lake. The avenues of trees will provide shade and formality set within the paving to provide an easily traversable lake edge.

Feature public artwork strategically located at the corner of Promenade Road and Doley Road creates a focal point directing views to the lake and hills, and functions as the commencement point for the 'journey' through the Village Centre. Furniture, such as bench seating, lighting and cycle racks line the pedestrian promenade and broad seating steps leading down to lower boardwalk, creating opportunities for rest and respite overlooking the lake.

7.6 MOVEMENT NETWORK

As has been outlined previously, the proposed Village Centre is to be a Main Street based centre. The relatively short Main Street (approximately 125 m) reflects the compact scale of the proposed centre and the desire to create a relatively intimate setting, with a contemporary, yet rural feel. Main Street itself will accommodate relatively low levels of traffic (400-600 vpd), as it is not a neighbourhood connector or through connection road between neighbourhood connectors. This small amount of traffic will promote the pedestrian friendly environment being sought.

Doley Road will function as a key neighbourhood connector through the Local Structure Plan area and provide the key north-south connection to the Village Centre site. Doley Road will be provided as a 30 m median divided road, with the central median accommodating a significant row of eucalypts. Doley Road will accommodate up to 6000 vpd at the southern and north ends of the Local Structure Plan area but approximately 3500 vpd adjacent the Village Centre. Like Doley Road, Mead Street will function as a key neighbourhood connector and provided the key east-west connection through to the Village Centre and be provided as a 22.0 m median divided road. Mead Street will accommodate approximately 2500-3000 vpd.

The Promenade Road between the Village Centre and the Multiple Use Corridor will provide a key function in establishing the Village Centre, whilst creating a clear delineation between the public and private realms.

7.7 IMPLEMENTATION

Land Use within the Village Centre will be guided by the requirements of Part 1 of this Structure Plan and the TPS2.

Detailed Area Plans will be provided for all lots within the Village Centre to vary the built form requirements of the Residential Design Codes and achieve more site responsive design outcomes including optimum solar orientation, good interface with the street and appropriate framing of street corners. The detailed area plans will add an additional level of detail to the building height and setback plan requirements and will be provided prior to subdivision. It is intended that these Detail Area Plans will be considered and approved by both the Shire of Serpentine-Jarrahdale and LWP Property Group.

8 MOVEMENT NETWORK

8.1 ACCESS

Access to the subject land will primarily be taken to Abernethy Road to the north of the site and Orton Road to the south of the site. Most intersections would be expected to operate with priority control, but neighbourhood connectors may need a roundabout. Both Orton and Abernethy Roads will require a substantial median to accommodate substantial drainage requirements, which may result in careful consideration.

The following provides a summary of all traffic and transport matters to be considered. The numerous traffic reports undertaken to date are included in **Appendix 6** (Traffic & Transportation Reporting, Riley Consulting and Transcore).

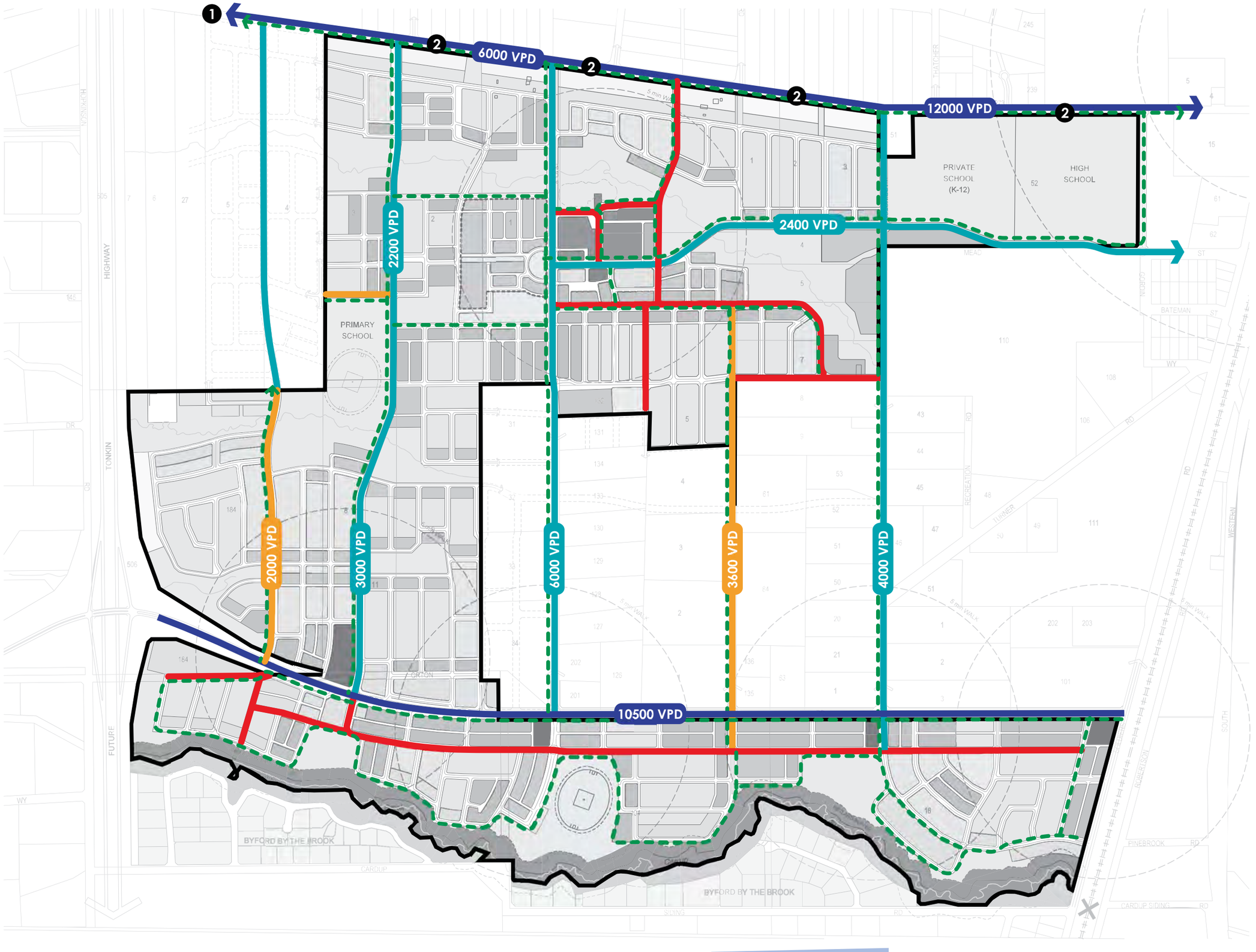
Figure 19 summarises the hierarchy of roads, depicts anticipated traffic volumes and proposed path locations.

8.2 STRATEGIC TRANSPORT ISSUES

Of significance to the subject site is the extension of Tonkin Highway. Initially the extension of the Tonkin Highway was planned to terminate at Orton Road. This extension would provide a by-pass so that regional freight traffic could be removed from traversing through the Byford Town Centre. This would require that Orton Road be upgraded to a rural Highway standard road. Whilst a Primary Regional Road reservation is included in the Metropolitan Region Scheme (MRS) for the Tonkin Highway and Orton Road intersection, no land is indicated in the MRS to provide for the Orton Road link to South West Highway.

Analysis, however of the current traffic volumes and regional growth indicates that South West Highway will require upgrading to a four-lane divided carriageway within the next 12 months. This growth rate also does not include for any traffic generated by current and proposed developments. It is likely therefore that the need to upgrade South-West Highway will be imminent and it is strongly suggested that as a more appropriate alternative, the Tonkin Highway should be extended to Mundijong Road providing local access to Orton Road and thereby reducing the traffic load on South-West Highway. This point has been raised on numerous occasions with Main Roads WA and Department for Planning and Infrastructure staff by both the Shire of Serpentine-Jarrahdale and LWP Property Group. Accordingly, the proposed Local Structure Plan provides for the Tonkin Hwy/Orton intersection but does not depict a direct connection through to the South West Highway. The Local Structure Plan does however provide a connection through to the existing Soldiers Road reservation, where vehicles do have the ability to make there way through to the South-West Highway if required.

Whilst not a traffic related issue, it should be noted that it is understood that there is the recorded presence of a Threatened Ecological Community within close proximity of the Orton/Railway Reserve intersection that also impacts on the ability to provide a connection o South-West Highway. The TEC (Floristic Community Type 3a) is listed as a TEC at the State and Commonwealth level and is protected under the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act*. Accordingly, again this Local Structure Plan (whilst not extending beyond Soldiers Road) does not anticipate or consider Orton Road connecting with the South-West Highway.



LEGEND

- LOCAL STRUCTURE PLAN BOUNDARY
- INTEGRATOR B (30m+ ROAD RESERVATION)
- NEIGHBOURHOOD CONNECTOR A (18m-30m ROAD RESERVATION)
- NEIGHBOURHOOD CONNECTOR B (18m-25m ROAD RESERVATION)
- HIGHER ORDER ACCESS STREET (15m-20m ROAD RESERVATION)
- SHARED PATH
- 8000 VPD — NUMBER OF VEHICLES PER DAY
- 1 — NO CONNECTION TO TONKIN HIGHWAY FROM ABERNETHY ROAD
- 2 — ABERNETHY ROAD TO BE WIDENED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BYFORD TOWNSITE DRAINAGE AND WATER MANAGEMENT PLAN

MOVEMENT & PATH NETWORK PLAN

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figure 19

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8.3 PUBLIC TRANSPORT

The subject land is currently serviced by one bus route running between Mundijong and Armadale train station. The service is infrequent and is timed to provide a connection to trains departing Armadale train station. Current journey times between Byford and Perth CBD are approximately 50 minutes.

Further negotiations with the PTA will be required in relation to future internal bus routes through The Glades project, however it is anticipated that at least one route will service the Village Centre, High School and Private K-12 school sites, whilst connecting through to the Byford Town Centre. It is also anticipated that another route connecting with Orton Road will service the southern portion of the Structure Plan, running east-west through the estate (but not along Orton Road).

The Australind passenger rail service passes through Byford and the station is within walking distance to the subject land. At present only two services per day are provided between Perth and Bunbury (and return) and bookings are required. At present the existing public transport provision would not be attractive to local residents. There is however, a significant opportunity to increase local public transport to provide a reliable and accessible connection to Perth CBD.

8.4 HIGHER ORDER ROADS

8.4.1 ABERNETHY ROAD

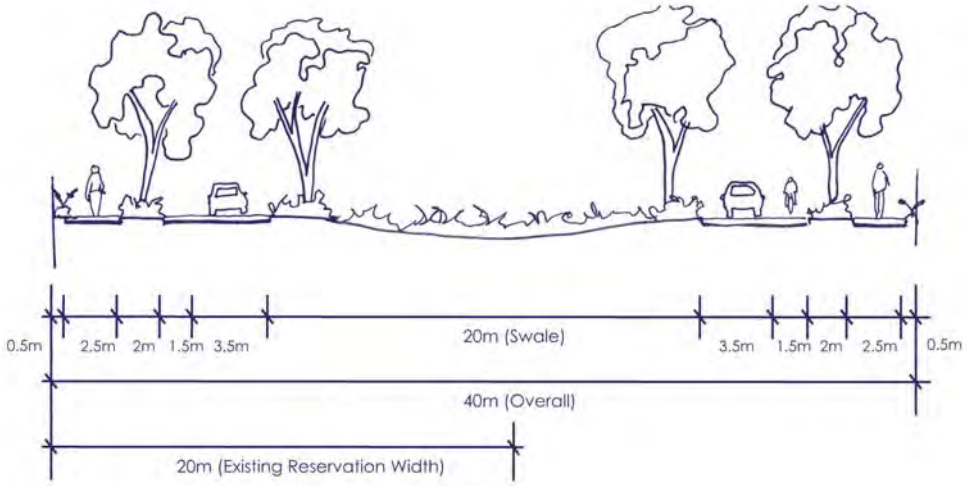
In accordance with the requirement of Liveable Neighbourhoods, Abernethy Road will function as a Neighbourhood Connector and accommodate between approximately 4000 and 8000 (8000 vpd only adjacent to the proposed High School site) vehicles per day. Abernethy Road will provide the northern entry into the estate and a key east-west distributor function. It is important to note that Abernethy Road will not connect through to the Tonkin Highway but is likely to retain its connection to Hopkinson Road which provides access through to Thomas Road.

Typically a neighbourhood connector accommodating these volumes of traffic would be provided as a median divided road reserve in the vicinity of 22-25 m. However, as required by the Byford Town Site Drainage and Water Management Plan, Abernethy Road will be required to provide an important drainage function and potentially up to an additional 20 m of road reserve to accommodate a major swale in either the central median or verge. The cross sections below identify a number of different design options (in three different locations) for accommodating these drainage requirements. We understand that the Shire of Serpentine-Jarrahdale is currently considering the ultimate design requirements for Abernethy Road. Once this has been determined, the detailed design of Abernethy Road will need to be finalised.

It is maintained that the proposed Local Structure Plan has the flexibility to accommodate the impacts of this widening.

OPTIONS FOR THE TREATMENT OF ABERNETHY ROAD

Option 1



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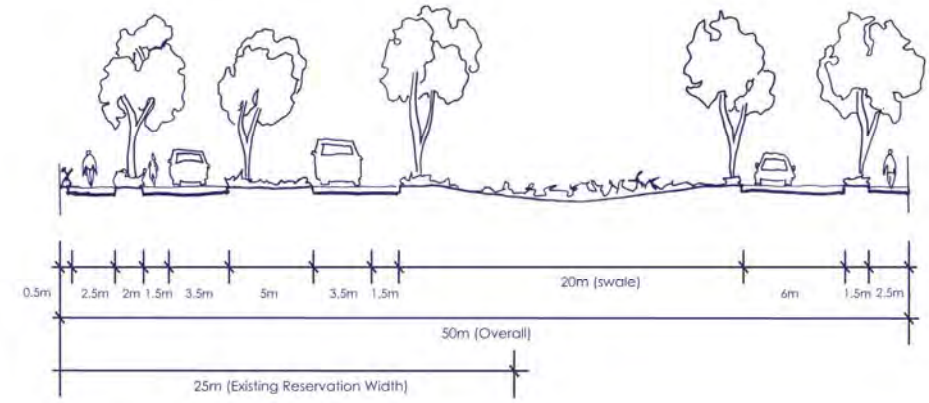

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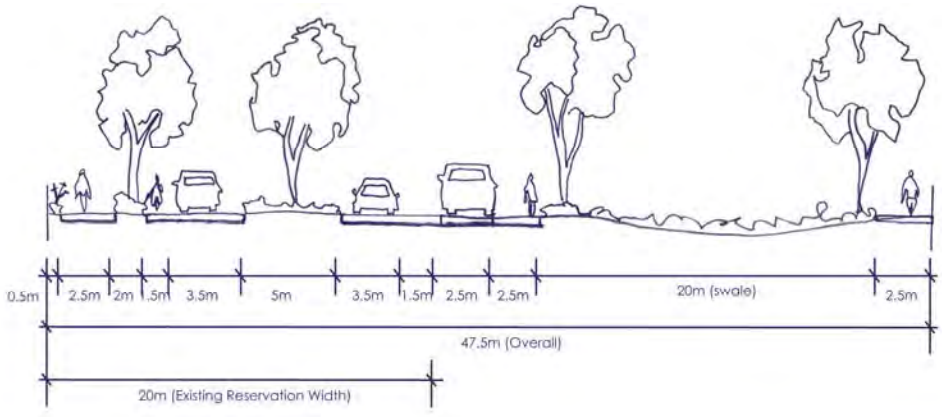


8.4.2 DOLEY ROAD

Doley Road will also function as a neighbourhood connector and provide the key north-south distributor function, providing the key connection to the Village Centre and connecting Abernethy and Orton Roads. Doley Road is anticipated to accommodate approximately 3,000-5,500 vpd, with the peak volumes being adjacent the Village Centre.

In accordance with Liveable Neighbourhoods, Doley Road would typically be provided as a 20-24 m reservation; however it is proposed that the existing Eucalypts within the existing road reserve be retained within a central median. As such a reservation of 30 m (refer **Figure 20**), incorporating a shared path, the oversized median and parking embayments on one side of the street, will be provided. In order to ensure the retention of these trees within a central median, the Doley Road reservation will need to be repositioned further west. As such, a portion of the existing Doley Road reserve will require closure for inclusion within future subdivision and development.

8.4.3 ORTON ROAD

As discussed in **Section 8.2**, it is intended that Orton Road will not connect through to the South-West Highway. Accordingly as opposed to providing a broader district level function, it is intended that Orton Road will now function as a lower Order Integrator B (with volumes approximately 14,000 vpd in the west of the site and decreasing down to 3500 vpd near Solider Road). The Local Structure Plan proposes to utilise the existing road reserve wherever possible and the final upgrade will require coordination with the adjacent landowners to the north (approximately 5m widening either side of the existing reservation).

It is anticipated that Orton Road will require an 8-10m drainage swale and this is proposed to be located within a central median (see **Figure 21**). Accordingly total road reservation of approximately 30.0 m will be required for Orton Road.

8.4.4 OTHER NEIGHBOURHOOD CONNECTORS

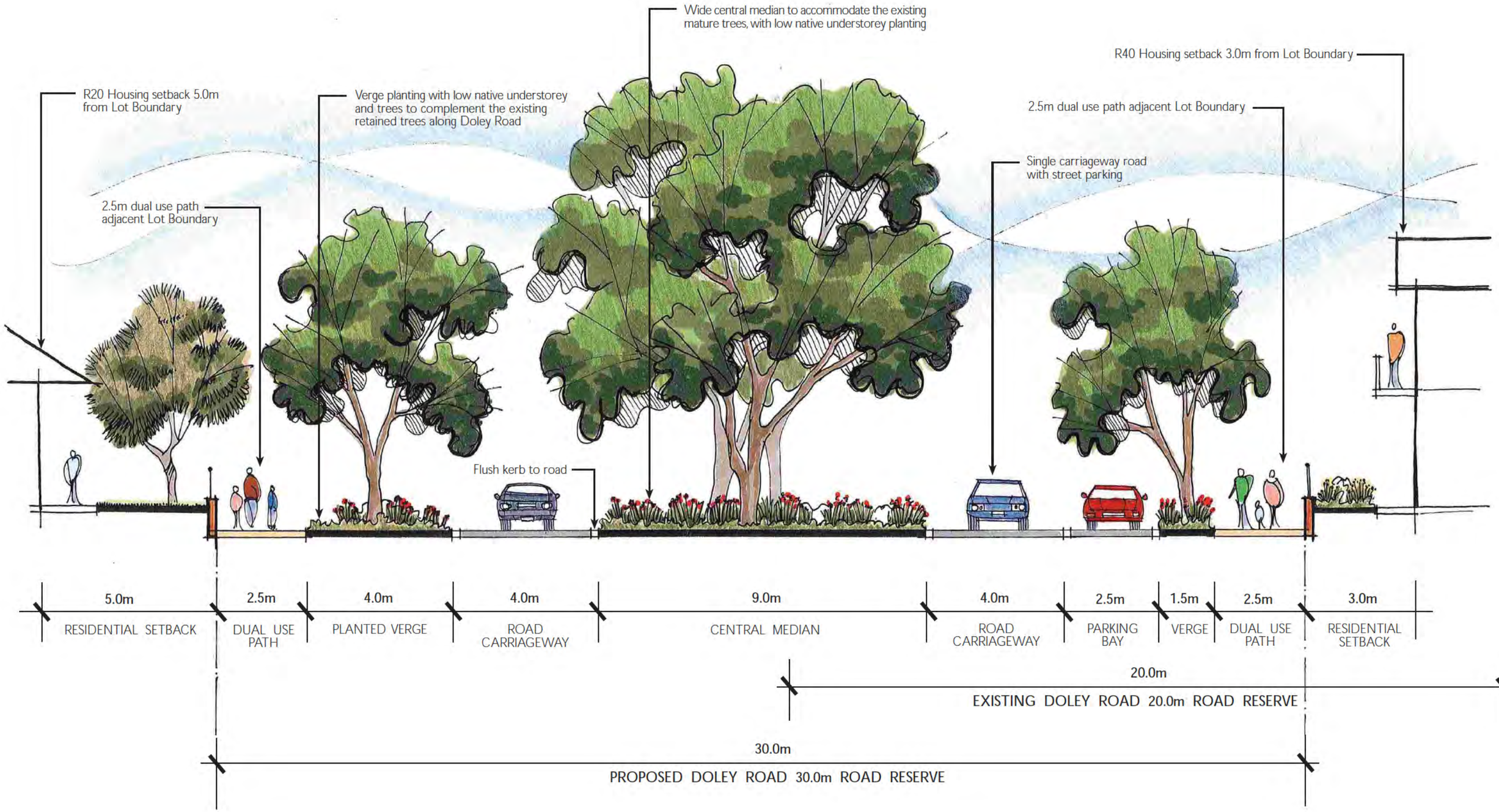
The Local Structure Plan identifies a number of other neighbourhood connectors (including Warrington Road and Mead Street) throughout the Structure Plan area. These roads will accommodate between 3000-5500 vpd and will be provided with a variety of treatments (median divided, direct frontage/no direct frontage etc) depending on surrounding land use and design.

8.5 LOCAL STREETS

Traffic volumes on local streets will be low and fall into the requirements set out in Liveable Neighbourhoods. The internal road hierarchy will be provided with access streets to service residential development; higher order access streets are provided with a wider reservation where traffic flows are greater than 1,000 vpd and Neighbourhood Connectors provide access to the existing external road network.

From a sustainability and design perspective, it is suggested that the minimum (15 m) road reservation be provided within the Local Structure Plan area so that internal residential streets are not attractive for high speed traffic movements. This will increase car travel time throughout the subject land whilst providing a safer environment for local residents and their children.

Localised widening of streets will be required to provide parking adjacent to shops, open space and schools and will be addressed at the time of subdivision. In some locations the Structure Plan has allowed for some localised widening for likely tree retention.



DOLEY ROAD PROPOSED STREET CROSS SECTION

The Glades - Local Structure Plan

0m 1 2m
s: scale bar
d: june 09
j: 06/014

figure 20

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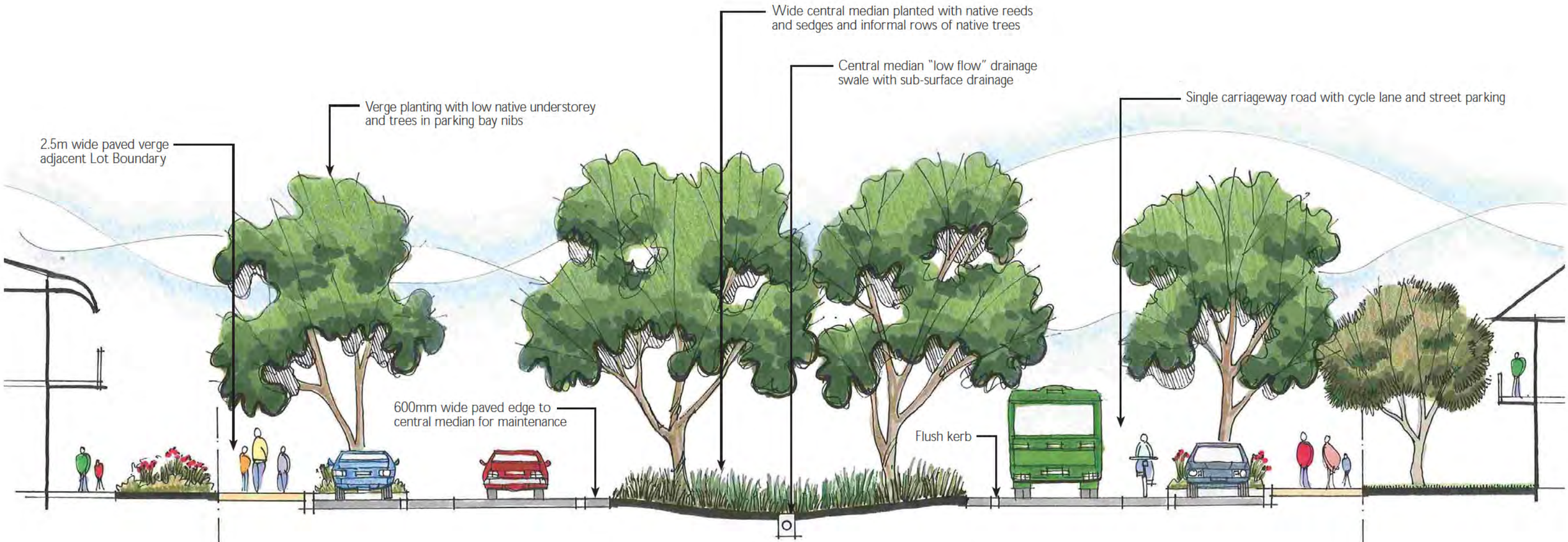

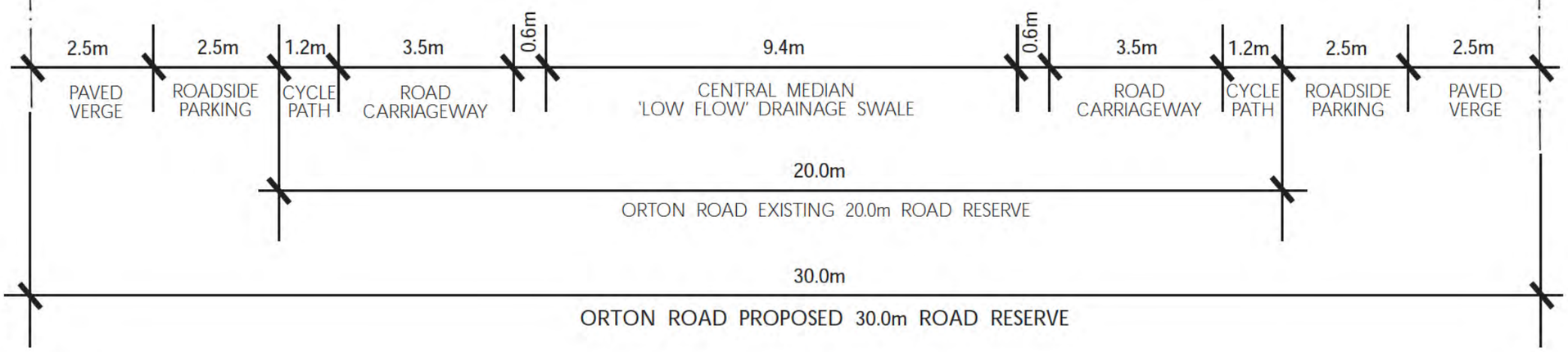

ORTON ROAD PROPOSED STREET CROSS SECTION

The Glades - Local Structure Plan

s: 1:100
d: April 09
j: 06/014

figure 21

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8.6 PEDESTRIAN MOVEMENT

A hierarchy of paths will be established throughout The Glades in accordance with the Path Network Plan (PNP) attached as **Figure 19.** The network will include:

- Shared Paths constructed to 2.1 m wide (minimum); The paths will be used by pedestrians and less experienced cyclists;
- Footpaths constructed to 1.5 m wide (this enables two pedestrians to pass with comfort and enables ease of use for people with prams); and
- Informal Paths located within areas of public open space. (These lower order paths will be identified in a Landscape Master Plan to be forwarded to the Shire for approval during the implementation phases).
- Paths will be provided in the verge of the more important streets in the local network.
- In the heart of the Village Centre, 'main street' design standards will apply and on-road cycle lanes will not be provided. In these low speed environments, cyclists will share the street with other users.
  - A series of footpaths are also proposed to supplement the Path Network. The footpaths enable users to connect with the shared paths from local streets. Given low traffic volumes, it is not considered necessary for all minor streets to offer footpaths. This is supported by Liveable Neighbourhoods.
- Streets in the Village Centre adjacent to higher density residential development or linking important activity sites will be provided with 1.5 m footpaths on both sides (or a shared path on one side and a footpath on the other side).
- In accordance with Liveable Neighbourhoods, residential streets with very low traffic volumes and low traffic speeds are provided with a footpath on one side only.

9 URBAN WATER MANAGEMENT

9.1 LOCAL WATER MANAGEMENT STRATEGY (LWMS)

A detailed LWMS (refer **Appendix 7** – Local Urban Stormwater Management Report, JDA Consulting) has been prepared and lodged with the Shire for The Glades development area. Provided below is a summary of the key elements taken from the LWMS.

9.1.1 WATER SUSTAINABILITY

To achieve water efficiency targets, households are to be built consistent with current BCA water efficiency standards and the State Government's 5 Star Plus scheme. To further improve the water efficiency of residential lots LWP will enter into a sustainability contract with each lot owner.

As part of the contract, LWP will provide the following waterwise initiatives:

- A waterwise front landscaping package to each home (eco-landscape), designed by a certified waterwise landscaper; and
- Provision of a 2,000 litre rainwater tank for each home plumbed to the toilet and laundry, with an overflow to the stormwater drainage system.

The water supply for the public open spaces is proposed to be from local groundwater resources. The superficial aquifer will provide a limited resource, but there are still significant groundwater allocation volumes available from the confined aquifer.

9.1.2 VILLAGE CENTRE LAKE

A constructed lake is proposed as part of the Village Centre precinct. The lake is intended as a community asset providing:

- Aesthetic functions which make the Village Centre an active hub for commercial and social activities;
- A focus for recreational activity, supported by the network of paths and boardwalks that provide access to the lake for residents;
- Structural benefits which include increased flexibility in the design of the POS irrigation system by providing storage;
- Additional stormwater detention storage in major flood events; and
- Water source for fire fighting.

9.1.3 PHYSICAL LAKE DESIGN CHARACTERISTICS

PROPOSED CONSTRUCTION

The proposed lake will be approximately 6000 m^2 in area. To account for the fall over the site of approximately 1:100 (v:h), the lake will be split into 2 levels, with the top level covering a slightly smaller in area than the bottom level.

The upper level will be located on the east side and overflow into the lower level on the west side adjacent to Doley Rd via a broad weir structure. The weir can be landscape for a more natural appearance and to improve access to the lake for residence a boardwalk could be constructed along the weir.

The lake will be a total depth of 2-3 m on both sides with the upper level approximately 1 m higher than the lower level.

LAKE WATER LEVELS

The lake will have a proposed top water level of 34.5 m AHD. This level is largely controlled by Doley Rd adjacent, which needs to be maintained at its existing level of approximately 35.3 m AHD to retain the roadside avenue of existing trees.

The watertable in the location of the proposed Village Centre Lake is greater than 2 m below natural surface at the seasonal maximum recorded level, but fluctuates in excess of 5 m. The lake will be designed so that the lake water level remains relatively constant (±0.30 m). In order to achieve this it will be necessary to line the lake, hydraulically separating the lake from the highly fluctuating watertable. The liner can be a natural clay based product or a PVC liner, so long as the base of the lake is sufficiently sealed to ensure minimal water losses from the lake via leakage.

BORE WATER TOP-UP

To maintain water levels in the lake it is proposed to top-up the lake using an artesian bore located on the west side of Doley Road. The bore was constructed in January 2008 and is currently licensed for abstraction of 50,000 kL/annum.

FLOOD RISK

In order to manage the water quality of the lake, the lake should be 'offline' of the minor drainage system (rainfall events up to the 5 yr ARI), as these rainfall events vary significantly in water quality and include catchment 'first flush' events. Regular stormwater flows should not enter the lake.

For events in excess of the 5 yr ARI, the drainage system may overflow into the lake and utilise the lake for additional flood detention storage. The lake is proposed to be designed with an additional 0.8 m of freeboard above the constant water level, with 0.5 m utilised for flood detention storage in the 100 yr ARI. This provides for 0.3 m freeboard to infrastructure outside of the lake in the 100 yr ARI flood event. For the lower lake this means a constant water level of approximately 34.5 m AHD, a 100 yr ARI peak water level of 35.0 m AHD, providing 0.30 m of freeboard to Doley Rd at 35.3 m AHD.

9.1.4 LAKE MANAGEMENT

To address lake management issues a Lake Management Plan should be prepared. The Lake Management Plan should address the flowing as a minimum:

- Control of nuisance algae;
- Control of nuisance insects and disease vectors;
- Control of feral fish and exotic plant invasions;
- Management of gross pollutants;
- Odour management;
- Management schedule; and
- Maintenance schedule.

This Lake Management Plan should be required as a condition of subdivision for the Village Centre precinct.

9.1.5 STORMWATER MANAGEMENT

The stormwater drainage system will be designed using a major/minor approach. The major drainage system is defined as the arrangement of roads, drainage reserves, detention or infiltration areas and open space planned to provide safe passage of stormwater runoff from extreme events which exceeds the capacity of the minor system. The locations of key features of the drainage system are shown in **Figure 14.**

The minor drainage system is defined as the series of pipes, kerbs, gutters etc designed to carry runoff generated by low frequency ARI storms, typically less then 5 year ARI. The minor drainage incorporates a treatment train of best management practice (BMP) water quality structural controls such as GPT's and bio-retention systems that provide water quality treatment from the proposed development.

9.1.5.1 MAJOR DRAINAGE SYSTEM

The major drainage system is designed to manage rainfall events greater than the 5 yr ARI, up the 100 yr ARI. The design strategy is consistent with the objectives provided in the District DWMP. Key points of the major drainage system strategy are as follows:

- Roads graded to direct flow to the lowest point in the catchment;
- Detention storage to be provided in the lowest point of the catchment to control outflows from the catchment;
- Flush kerbing or kerb breaks at the low point, graded to drain flows off the street into the detention storage; and
- Discharge from the detention storages consistent with pre-development outflows for the 5 yr and 100 yr ARIs.

Due to the low permeability of the soils over the site it is not possible to infiltrate large volumes of water. Therefore the major drainage system makes use of detention storages to control major runoff events to outflows consistent with pre-development flow rates.

The key design criteria for the major detention storages are as follows;

- Where storage is located near a tributary the detention storage will be designed with capacity to hold at least the 5 yr ARI;
- Where controls points along the main tributary exist (e.g. a road crossing) the detention storage can be designed to overflow into the tributary with the additional storage for the 100 yr ARI provide at the control point;
- Where no control point exists the 100 yr ARI storage volume must be provided outside of the tributary; and
- All storages are designed to dry out between storms with base levels at least 0.3 m above the design groundwater level. The minimum building floor levels will comply with DoW requirements for a 0.5 m clearance above the estimated 100 yr ARI flood level in the storages.

9.1.5.2 MINOR DRAINAGE SYSTEM

The minor drainage system is designed to manage rainfall events up to the 5 yr ARI. To meet the design criteria for the minor drainage system the following strategies are proposed:

- Residential lots will be connected to the road pipe drainage system with a connection capacity of 5 yr ARI;
- The road drainage system is via roadside pipe network with capacity for a 5 yr ARI;
- Bio-retention swales and bio-retention storages should be provided with a minimum treatment capacity of the 1 yr ARI 1 hour event; and
- For all outlets to minor stormwater detention storages, stormwater will be treated by Gross Pollutant Traps prior to discharge.

Specific details of 1 in 1 year treatment measures will be documented in the relevant UWMP.

9.1.6 GROUNDWATER MANAGEMENT

Over some low lying parts of the study area the seasonal fluctuation in the watertable results in the watertable being close to the natural surface level for a few months of the year. This generally occurs in August/September consistent with the seasonal rainfall pattern of Perth. It is appropriate to limit construction in these areas, but where construction is required a watertable design level needs to be specified in order to provide adequate separation of building footings from the winter maximum water level. As documented in the Byford Townsite DWMP, a separation of 1.2 m from the winter maximum level is considered appropriate, achieved by importing fill to the site.

The winter maximum varies from year to year consistent with the variation in the amount and intensity of rainfall and evapotranspiration; therefore the watertable design level needs to allow for this natural variation. The seasonal fluctuation in the watertable is particularly important in the proximity of the significant vegetation and wetlands over the site that have adapted to the variation.

To determine the watertable design levels over the study area, local groundwater investigations were conducted by JDA.

9.1.6.1 SEASONAL VARIATION IN THE WATER TABLE

The Superficial Aquifer in the Byford area is characterised by a high clay content in the sediments which ensures only a low percentage of rainfall migrates through the soil profile to recharge the water table. Davidson and Yu (2008) estimate the average recharge in this area to be 10% or equivalent of 87 mm per year. Depending on the specific yield of the local soils, fluctuations in the watertable may vary 2-5 m seasonally.

9.1.6.2 CHANGES IN GROUNDWATER LEVELS

The majority of the Glades development area is currently pasture. The change in land-use from pasture to urban is likely to result in only a small change in groundwater levels (<0.25 m rise). Pasture allows a large percentage of rainfall recharge to reach the water table, as grass allows little interception of rainfall, and has a lower transpiration loss compared to woodland. Urbanisation similarly has a high percentage of rainfall recharge, due to increases in impervious surfaces, onsite infiltration, importation of scheme water for garden irrigation, etc. In addition the provision of sub-soil drainage will prevent a water table rise into the placed fill, with sub-soil drainage laid at the elevation of the watertable design level or CGL.

It follows that the groundwater levels over The Glades development area are not expected to rise as a result of urbanisation.

9.1.6.3 MANAGING GROUNDWATER LEVELS TO PROTECT INFRASTRUCTURE

To protect infrastructure from high seasonal groundwater levels the average maximum annual watertable level has been calculated by measurement of the watertable. The estimated maximum groundwater levels are generally consistent with the CGL contours presented in the Byford Townsite DWMP with some local scale refinements. With reference to these contours (refer **Appendix 7**) the criteria for the installation of subsoil pipes will be as follows:

- Where a perched watertable exists or the predicated maximum groundwater level is at or within 1.2 m of natural surface, clean fill and/or the provision of subsoil drainage will be provided. In such instances subsoil pipes will be placed at or above the CGL level.
- Development should ensure finished lot levels are a minimum of 0.8 m above the level of any groundwater mounding between subsoil pipes.
- Subsoil pipe systems must be designed with free draining outlets.

Based on these criteria and the presence of clay soils over the site that will cause a perched watertable to form, subsoil pipes will be required for all building sites as part of this development.

9.1.7 WETLAND MANAGEMENT

9.1.7.1 MAINTAINING THE HYDROLOGICAL REGIME

The natural condition of the site results in limited recharge due to the clay sediments, with a high proportion for rainfall runoff. The hydrology of the wetlands located in the Study Area are therefore characterised by rainfall recharge directly onto the surface of the wetland, surface runoff into the wetland and only a small proportion of groundwater through-flow.

The hydrological regime of the wetlands will be maintained post-development by the following measures:

- The wetland areas will be preserved. The surface area for rainfall recharge directly onto the wetland will therefore remain unchanged:
- The watertable design level has been determined to allow the watertable to fluctuate up to the average annual maximum level in low lying areas where the seasonal maximum level is close to the existing natural surface level: and

- The estimated water balance of the site indicates the recharge to the Superficial Aquifer is relatively unchanged.

There are no water level criteria for significant wetlands in the region presented in the Byford Townsite DWMP.

9.1.7.2 PROTECTION OF WETLANDS FROM THE IMPACT OF URBAN RUNOFF

Consistent with the pre-development hydrological characteristics of the wetlands within the site (Cardup Brook) there will be no direct runoff from the stormwater drainage system into wetlands. For the five watercourses located within the Study Area, all runoff up to the 1 yr ARI 1 hour duration event will be treated prior to discharge into the waterways. Peak flows will be maintained to pre-development rates for 1 yr, 5 yr and 100 yr ARI with scour protection included as part of the restoration works of the waterways within the study area.

9.1.8 WATER QUALITY MANAGEMENT

The effective implementation of structural and non-structural controls as part of the urban development treatment train will improve stormwater quality runoff from this site as a result of the land use change.

9.1.8.1 NON STRUCTURAL SOURCE DETAILS

Non structural source controls to reduce nutrient export from the site need to focus on reducing the need for nutrient inputs into the landscape. The following strategies are proposed:

- Local native plants make up a minimum 50% of the landscape and streetscape treatments;
- Street sweeping and GPT education, co-ordinated with the Shire of Serpentine-Jarrahdale;
- Promotion of local native plants and drought tolerant gardens to lot purchasers via a landscape package; and
- Promotion of Fertilise Wise practices to new residents coordinated with the Shire of Serpentine-Jarrahdale.

9.1.8.2 STRUCTURAL SOURCE CONTROLS

Structural source controls are proposed to compliment the non-structural source controls and provide a complete treatment train for stormwater movement through the development. The following structural controls are considered appropriate for the development area:

- The use of bio-retention swales preferentially over pipe systems where design constraints permit. The swale should have capacity to treat the 1 yr ARI 1 hr flow and convey the 5 yr ARI critical flow:

- The use of bio-retention systems to treat road runoff. A minimum treatment capacity of approximately 2% of connected impervious area should be provided: and

- A GPT will be installed upstream of any outlets to detention/bio-retention storages sized to treat the 3 month ARI but with capacity to bypass the 5 yr ARI.

9.1.8.3 ASSESSMENT OF PROPOSED STRUCTURAL BEST MANAGEMENT PRACTICES TO DESIGN CRITERIA

Table 9 details a summary from DoW's Stormwater Management Manual for Western Australia (2007) of expected pollutant removal efficiencies for bio-retention and detention/retention systems in relation to the water quality design criteria specified in Better Water Management (DPI, 2008). Expected nutrient input reductions via non structural measures are outlined in **Appendix 7**.

While DoW (2007) does not provide expected pollutant removal efficiencies for all Best Management Practices (BMPs) application of a treatment train approach using a combination of non structural and structural measures will achieve the design objectives for water quality.

Specific details on the location, scale of application, and responsibilities for individual BMPs are to be assessed for individual development areas within the Precinct during development of Urban Water Management Plan.

TABLE 9: BMP WATER QUALITY PERFORMANCE IN RELATION TO DESIGN CRITERIA

Parameter	Non Structural Controls Nutrient Input Reduction	Structural Controls Nutrient Output Reduction 1	
		Bio-retention System	Detention/ Retention Measures
Total Suspended Solids	-	80%	65-99%
Total Phosphorus	70%	60%	40-80%
Total Nitrogen	60%	50%	50-70%
Gross Pollutants	-	-	>90%

1. Typical Performance Efficiencies via DoW (2007)

10 ENGINEERING INFRASTRUCTURE

Engineering infrastructure will be designed to be compatible with the overall planning intent of the Local Structure Plan.

Engineering input to the Local Structure Plan has been made to ensure that the provision of this infrastructure meets the sustainability goals of the project. Significant engineering aspects of the project are detailed below.

10.1 EARTHWORKS

The final earthworks levels for the site are a complex combination of geotechnical, hydrological, planning, environmental, engineering design and marketing factors.

The natural gradient of the development site falling at approximately 1 in 100 from East to West provides the proposed structure plan with the flexibility to orientate the majority of home sites to suit passive solar orientation.

The Structure Plan has paid particular attention to maintaining existing drainage routes and locating significant existing vegetation within Public Open Space. This will maximise the opportunity to preserve significant vegetation and existing ground form.

From a geotechnical perspective, the final lot classification in accordance with AS2570-1996 will depend on the clearance of sand fill over insitu clay materials. Presently market forces dictate that the preparation of S Class sites is highly preferable to M Class sites. The long duration of this project will however provide the opportunity for the building market to mature and accept M Class sites thus potentially significantly reducing imported fill requirements.

Market forces also presently dictate the provision of flat building sites with retaining walls to accommodate level differences. LWP Property Pty Ltd acknowledges the Shire of Serpentine-Jarrahdale's desire for retaining wall material to blend in with the surrounding natural environs and will reflect this in visible retaining structures.

In summary final earthworks levels and thus imported fill requirements will be a combination of the following factors:

- Providing adequate clearance to average annual maximum groundwater levels;
- Providing adequate clearance to 1 in 100 year ARI storm event flood levels:
- Roadway geometrical design incorporating flood routing constraints:
- Providing sufficient site levels for the operation of gravity sewer and stormwater lot connections:
- Provision of flat or gently sloping home sites:
- Lot classification achieved at Subdivision stage of works; and
- Maximising tree retention.

10.2 STORMWATER DRAINAGE

In accordance with the Byford Townsite Drainage & Water Management Plan (BTDWMP), the stormwater drainage design must ensure that the post development flows are maintained to the predevelopment levels specified. In summary it is proposed that a piped drainage network discharging to a combination of wet and dry offline and online detention basins would be utilised to achieve this. A project specific Local Water Management Strategy (LWMS) has been prepared by JDA Consultant Hydrologists for this project, which provides full details in this regard.

Due to the groundwater fluctuations, the developer may wish to have some lined basins in high amenity areas to achieve social and economic goals, together with providing irrigation reservoir, fire fighting storage and main storm event detention functions.

Separate first flush basins to minimise nutrient and sediment loads positioned offline to major storm events are proposed for the project.

The proposed structure plan has been designed to generally accommodate the stormwater detention requirements of the LWMS in accordance with the BTDWMP. POS locations have been selected to logically and sympathetically cater for proposed catchments.

In accordance with current Water Sensitive Urban Design principles, the BTDWMP and the LWMS, the following features will be incorporated into stormwater drainage works:

- Rubber ring jointed pipes with separate subsoil drainage pipes;
- First flush nutrient and sediment removal basins;
- Gross pollutant traps;
- Flush kerbs;
- Bioretention swales will be used as appropriate; and
- Vegetated swales.

Subsoil drains may be required on both sides of road pavements to ensure pavement integrity, subject to the specific geotechnical characteristics of each Stage of the site.

Lot connection points will be provided for each lot to allow for the collection of stormwater from each property. Soakwells will not be specified for the local disposal of stormwater due to the underlying clay ground conditions. The use of soakwells in this environment would have a detrimental impact on the AS2570-1996 lot classifications and would require substantially increased building setbacks.

10.3 ROAD WORKS

Roadways within the proposed Local Structure Plan will be constructed in accordance with the configurations established as part of the traffic engineering requirements of this proposal and the Shire's standard requirements.

A number of existing roads will be upgraded as part of development, including Abernethy Road, Orton Road, Hopkinson Road, Doley Road, Warrington Road and Mead Street. The funding for construction of the some of the major roads will be achieved by a developer contribution arrangement currently being prepared by the Shire.

An array of different pavement treatments would be envisaged to achieve the traffic calming and theme requirements of the various precincts of the project.

Road pavement configuration would be designed in accordance with specific geotechnical advice to accommodate the site's clay subgrade conditions. This will involve the provision of subsoil drains (or equivalent) on both sides of road pavements.

10.4 WASTEWATER

Disposal of wastewater will be achieved via a network of gravity reticulation sewers discharging into branch and collection sewers gravitating to a permanent wastewater pumping station located adjacent to the future Tonkin Highway reserve near the western boundary of the site.

The Local Structure Plan has been designed to provide very direct east west roadway links. This provides for efficient key sewer routes to be constructed at as shallow depth as possible.

The Water Corporation's current sewer planning indicates that a Type 180 wastewater pumping station would ultimately be required for the development. Due to the large flows required for this to operate, together with the design and construction timeframe required, a Type 180 wastewater pumping station is not feasible in the short term. Accordingly an interim Type 40 wastewater pumping station is currently being designed and will be shortly constructed to provide a sewer outfall for this project.

An outfall for the ultimate wastewater pumping station will achieved by construction of a sewer pressure main approximately 8 kilometres long to the Westfield Wastewater Treatment Plant. The interim wastewater solution requires a lesser extent of pressure main installation, discharging to the existing Byford Wastewater Pumping Station Number 1 located to the North of the site along Hopkinson Road. The timing for the ultimate sewer solution will depend on the development rates of both this and other subdivision projects in Byford.

The structure plan currently provides for a 50 m x 50 m site for the sewer pump station together with a minimum 50 m radius odour buffer to proposed residential development from the pump station wet well in accordance with current Water Corporation sewer planning.

10.5 WATER SUPPLY

Provision of a potable water supply to the project will be achieved by the extension of water distribution mains to the project site, with individual lots serviced by a network of water reticulation mains.

The Water Corporation is currently reviewing their overall water supply planning for the Byford Area based on the current Byford Structure Plan and expected development rates.

It is anticipated that ultimately a distribution main connection to the DN500 distribution main currently being constructed along George Street from near Larsen Road to Abernethy Road, together with smaller distribution mains along Abernethy Road and Doley Road will feed the site. The distribution main construction would be the subject of a prefunding agreement with the Water Corporation.

In the interim a DN200 water reticulation main is currently being constructed along Briggs Road to provide a suitable water supply to early stages of the project.

The grid like nature of the road network provides for an efficient project water main design layout.

10.6 UNDERGROUND POWER

Existing overhead high voltage infrastructure located in Abernethy Road and Orton Road will be utilised to provide a high voltage power supply to the development.

An underground network will be progressively constructed through the proposed subdivision with switchgear and transformers located about the site to feed the low voltage internal underground power cables connecting to each lot.

Existing overhead powerlines along existing roads within the proposed subdivision would be progressively undergrounded in accordance with current practise to satisfy subdivision approval conditions.

10.7 TELECOMMUNICATIONS

Telecommunications for the development area would be provided by connection to Telstra's Byford Exchange.

The size of the proposed subdivision and it's subsequent long development period will probably result in many changes in the way that telecommunication is delivered. The continual technological advances in this area over time will provide increased opportunity for home-based commerce activities and reduction in commuter based employment.

The developer is intent on pursuing best practice in this area, which currently involves the provision of Telstra 'Smart Community' infrastructure.

Infrastructure installation will be designed and constructed in a way to ensure for maximum flexibility for future technology advances.

Telecommunications conduits will be installed by Telstra, in a common trench with underground power, provided by the developer.

10.8 GAS

The site is currently serviced by an existing DN100 high-pressure gas main located in Soldiers Road and a DN150 medium pressure gas main located in Abernethy Road.

It is anticipated that Alinta Gas will service this development by the internal reticulation of natural gas about the subdivision, utilising a common trench with water reticulation being provided by the developer, connecting to the existing gas mains adjacent to the site.

A pressure-regulating valve is likely to be required on the existing high-pressure gas main to supply gas to the development at a pressure suitable for domestic use for later stages of the project.

11 IMPLEMENTATION

In order for the Structure Plan to fulfil its function as a formal component of the planning framework a number of actions are required to be undertaken, or finalised. The following items are the key actions required to complete the framework:

- Adoption of Local Structure Plan;
- Amendments to Local Planning Framework; and
- Commitments and Responsibilities.

11.1 ADOPTION OF THE LOCAL STRUCTURE PLAN

A fundamental objective of contemporary structure plans is to establish a planning framework that will enable an area to develop in the most orderly and integrated manner, meeting sound planning principles, and promoting high quality sustainable development solutions. In terms of The Local Glades Structure Plan, the statutory vehicle used to implement this objective is the Shire of Serpentine-Jarrahdale Town Planning Scheme No.2.

This Structure Plan should be formally adopted under Clause 5.18.3 of the Town Planning Scheme No. 2.

Once adopted, this Structure Plan will provide the basis for guiding subdivision and development within The Glades estate.

11.2 AMENDMENT TO LOCAL PLANNING FRAMEWORK

11.2.1 COST SHARING ARRANGEMENTS

It is understood that the Shire of Serpentine-Jarrahdale is currently preparing an amendment to Town Planning Scheme No. 2 to establish a cost-sharing framework for the Byford Structure Plan area. Furthermore, it is understood that certain items within this arrangement will be funded by development throughout the Structure Plan area and other will be shared between specific precincts.

Of key importance to the Glades project is the construction of Abernethy and Orton Roads. As has been previously identified, Abernethy Road will serve essentially a district drainage function and accordingly, the cost of upgrading the road should be shared by development within the entire Byford Structure Plan area. Orton Road, whilst not at the same magnitude, will also provide a key district drainage function (as well as a traffic function) and as such it is proposed that the cost of its construction (and land required for acquisition) should be shared between the Glades project and the landowners to the immediate north of the existing Orton Road reservation.

11.2.2 METROPOLITAN REGION SCHEME

Modifications will be required to the Metropolitan Region Scheme (MRS) to:

- Reflect the final location of the proposed High School site on Abernethy Road; and
- An area of Urban Deferred land immediately south of Abernethy Road.

Upon final resolution of the Local Structure Plan and detailed design, Council is requested to seek the WA Planning Commission's support to the modification to the MRS.

11.2.3 MODIFICATIONS TO THE BYFORD STRUCTURE PLAN

The Byford Structure Plan currently identifies the land south of Orton Road as "being subject to further study – Planning to be finalised subject to resolution of alignment of Orton Road". This Structure Plan identifies the proposed location and design treatment for Orton Road with much of it on its current reservation alignment. It is requested that Council concurrently endorses a variation to the Byford Structure Plan that seeks to remove the restriction "B" relating to the land being subject to further study, regarding resolution of the alignment of Orton Road.

11.3 ONGOING INITIATIVES

To ensure the successful implementation of the project, it is necessary that the commitment to undertake the works and ongoing responsibilities be clearly defined at the outset of the project.

The commitments and responsibilities that will be carried out by the stakeholders are defined below:

Item	Action	Responsibilities
Statutory Framework		
Adoption of Structure Plan	Shire of Serpentine-Jarrahdale to review, assess and adopt structure plan in consultation with Shire of Serpentine Jarrahdale.	Consultant team, LWP and Shire of Serpentine-Jarrahdale
Modify Town Planning Scheme to facilitate Structure Plan proposals	Prepare and implement all necessary modifications to the Town Planning Scheme to facilitate the Structure Plan proposals and initiate appropriate scheme amendments with the support of the Shire of Serpentine-Jarrahdale.	Consultant team, LWP and Shire of Serpentine-Jarrahdale
Management Plans		
Local Water Management Strategy	Prepare and implement Local Water Management Strategy and Urban Water Management Plans	Consultant team, LWP, Shire of Serpentine-Jarrahdale, DoW, Water Corp
Wetland Management Plan	Prepare and implement Wetland Management Plan	Consultant team, LWP and Shire of Serpentine-Jarrahdale, DOE
Environmental Management Plans	Prepare as required, necessary management plans to ensure the proper protection of significant areas of vegetation and to address other environmental issues as they arise.	Consultant team, LWP and Shire of Serpentine-Jarrahdale, DEC
Lake Management Plan	Prepare and implement a Lake Management Plan (required as a condition of subdivision) to ensure the appropriate ongoing management of the proposed water body.	LWP, Consultant Team, DoW and Shire of Serpentine-Jarrahdale
Provision of Services		
Internal Service Infrastructure	LWP to design and implement to the satisfaction of the Shire of Serpentine-Jarrahdale.	Consultant team, LWP and Shire of Serpentine-Jarrahdale

Item	Action	Responsibilities
External Services Infrastructure	The subdivider to upgrade external services as agreed with the Shire of Serpentine Jarrahdale and other service authorities to facilitate the Structure Plan proposals	Consultant team, LWP and Shire of Serpentine-Jarrahdale
Public Open Space		
Maintenance	Landscaping to be established by the subdivider and maintained for a period of two years following clearance of diagrams by Council or as agreed by LWP.	LWP
	Council to accept handover of landscaping and public open space after this maintenance period, and continue maintenance of POS, including drainage to a standard previously determined by LWP	Shire of Serpentine-Jarrahdale
Other		
	Consultation with existing adjoining residents during development.	LWP
	Investigate opportunities to create community facilities.	LWP, Shire of Serpentine-Jarrahdale