LOCAL STRUCTURE PLAN

MUNDIJONG PRECINCT E1
TAYLOR ROAD / ADAMS STREET, MUNDIJONG

ROWEGROUP

OUR REF: 8381 21/11/2015

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

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

25 October 2013

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 MODIFICATIONS TO STRUCTURE PLAN

Modification No.	Description of Modification	Date Endorsed by Council	Date Endorsed by WAPC
0	Original Structure Plan	February 2014	30 Oct 2013
1	Removal of WWPS Investigation Area	9 November 2015	23 March 2016

EXECUTIVE SUMMARY

The subject site is located within the metropolitan south east corridor, within the municipality of the Shire of Serpentine-Jarrahdale. The site is situated approximately 38 kilometres south east of the Perth City Centre and approximately 1 kilometre north west of the Mundijong Town Centre.

The LSP area predominantly consists of residential development, providing a variety of low and medium density housing opportunities. The medium density single residential lots are predominantly located within proximity to areas of higher amenity, such as the public open space.

The LSP includes a linear public open space network. This network has been positioned within the site to respond to the existing drainage lines and to provide strong pedestrian corridors through the site and to the proposed primary schools in the north and south.

The provisions, standards and requirements specified under Part 1 of this LSP have the same force and effect as if it were a provision, standard or requirement of the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2 (TPS 2). Parts 2 and 3 of this LSP are for explanatory purposes and to provide a descriptive analysis of the LSP.

In the event of there being any inconsistencies or conflict between the provisions, standards or requirements of TPS 2, and the provisions, standards or requirements of this LSP, then the provisions, standards or requirements of TPS 2 will prevail to the extent of any inconsistency.

Structure Plan Summary Table

Item	Data	Section number referenced in report
Total area covered by the Structure Plan	94.8 hectares	-
Area of each land use proposed: Residential Industrial Commercial	 39.9 hectares nil nil	 - - -
Estimated lot yield	1261 lots	Section 3.1.4
Estimated number of dwellings	1261 dwellings	-
Estimated residential site density	31 dwellings per site hectare	Section 3.1.4
Estimated population	2786 people (based on the Outer Metropolitan Perth and Peel Sub-Regional Strategy estimates of 2.21 people per household for the south east sub-region)	-
Number of high schools	nil	-
Number of primary schools	nil	-
Estimated commercial floor space (for activity centres if appropriate)	n/a	-
Employment self sufficiency targets	n/a	-
Estimated area and % of public open space: Regional open space District open space	 nil nil	 - -
Estimated area and number neighbourhood parks local parks	 6.583 hectares, 3 parks 3.051 hectares, 5 parks	 Section 3.4
Estimated number and area of natural area and biodiversity assets	nil	-

CONTENTS

FIGURES

Part One: Statutory Section

Part Two: Explanatory Section

TECHNICAL APPENDICES

Appendix Number	Document Title	Nature of Document	Referral/Approval Agency	Summary of Document Modifications
1.	Certificates of Title	Supporting	n/a	
2.	Environment Assessment Report	Supporting	n/a	
3.	Local Structure Plan	Subject to approval	Shire of SJ / WAPC	
4.	Context Analysis Plan	Supporting	n/a	
6.	Traffic Assessment Report	Supporting	n/a	
7.	Local Water Management Strategy	Subject to approval	Department of Water	Approved
8.	Waste Water Re-Use Management Plan	Supporting	n/a	
9.	Servicing Report	Supporting	n/a	
10.	Noise Management Plan	Subject to approval	MRWA / Shire of SJ	Approved

Part One
STATUTORY SECTION

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1. Structure Plan Area

This Part applies to the Mundijong Precinct E1 Local Structure Plan (LSP) and shall apply to the northern portion of Precinct E of the Mundijong Whitby District Structure Plan (DSP), being all land contained within the inner edge of the broken red line shown on the LSP. Refer Figure 1.

2. Structure Plan Content

This Structure Plan comprises the following:

- Statutory Section (Part 1)
- Explanatory Section (Part 2)
- Technical Reports (Part 3 – Appendices)

Part 1 includes only the LSP map and provisions and requirements that need statutory effect.

Parts 2 and 3 of the LSP justifies and clarifies the provisions contained in Part 1, and is used as a reference guide to interpret and implement Part 1.

3. Interpretations and Use Class Permissibility

The words and expressions used in this LSP shall have the respective meanings given to them in the Shire of Serpentine Jarrahdale Town Planning Scheme No. 2 (TPS 2).

The use class permissibility for each zone within the LSP is outlined within TPS 2.

4. Operation Date

In accordance with sub-clause 5.18.6 of TPS 2, this LSP shall come into operation from the date of Council adoption pursuant to sub-clause 5.18.3.15 of TPS 2.

5. Relationship to Local Planning Scheme

The provisions, standards and requirements specified under Part 1 of this LSP shall have the same force and effect as if it were a provision, standard or requirement of TPS 2. Parts 2 and 3 of this LSP are for explanatory purposes and to provide a descriptive analysis of the LSP.

In the event of there being any inconsistencies or conflict between the provisions, standards or requirements of TPS 2, and the provisions, standards or requirements of this LSP, then the provisions, standards or requirements of TPS 2 will prevail to the extent of any inconsistency.

6. Public Open Space

The Public open space shall be distributed generally in accordance with the LSP, having regard for a variety of needs in Public Open Space, including active and passive recreation, and drainage, as outlined within Liveable Neighbourhoods.

7. Residential Density

Residential densities shall be in accordance with the residential design codes shown on the LSP map.

8. Zones, Reserves and Residential Density Codes

The LSP delineates and depicts the zones, reserves and residential density codes applicable to the LSP area according to the legend thereon.

The zones, reserves and residential density codes designated under this LSP apply to the land within it as if the zones, reserves and residential density codes were incorporated into TPS 2.

All provisions, standards and requirements applicable to the zones, reserves and residential density codes in TPS 2 shall apply, unless specific provision is made to the contrary in this LSP.

9. Development Requirements

Subdivision and development shall generally be in accordance with the LSP or any variations as approved by the Shire of Serpentine Jarrahdale and the Western Australian Planning Commission.

Development proposals that comply with the provisions of this LSP or an approved Local Development Plan are exempt from obtaining Planning Approval under Clause 5.1.2 of TPS 2. Separate Planning Approval obtained through the lodgement of a Development Application shall only be required if variations to the approved Local Development Plan are proposed.

The implementation of the LSP will be facilitated through the development and subdivision approvals which shall generally conform to the LSP. Applications shall generally comply with the following Character Statement and Development Objectives:

> *The Taylor Road estate will be a development encompassing the ambiance and rural theme that takes advantage of and reflects the locality's character, whilst delivering the diversity of lot choice and modern amenity expected today. It is an estate that will balance urban character with the natural environment.*
>
> *The street network reflects the grid-like pattern of a traditional country town, as well as the cadastral pattern of historical land uses, whilst importantly encompassing a high degree of solar access. Towns and buildings of the past relied on these passive techniques to heat and cool their homes.*
>
> *The overland drainage flows through the linear open space is reminiscent of the rural feel and will be treated as a living stream, bringing the traditional rural character into an urban environment, however recognising the area can experience long dry periods.*
>
> *Landscaping, streetscape and community artworks will be primarily aimed at bringing natural elements into a new urban environment. These will help to generate a strong sense of place and community identity for the new estate.*
>
> *The housing stock will be focussed on having a strong street presence and where appropriate, materials and design will be representative of the locality.*
>
> *Density and lots abutting the open space will help emphasise the strong connection between the urban and the natural environment. The range of densities and housing product will also support a diverse community with a high level of housing choice.*
>
> *The location of community facilities, such as the primary schools, local shops, and linear open space provides for strong community integration.*

Development Objectives:

1. Strong sense of place and community identity.
2. Integration of an urban village within a rural setting.
3. Cater for lot diversity whilst still maintaining the existing character of the locality.

4. Use of alternative and innovative materials where appropriate.
5. Collective environmental sustainability.
6. Adequately address traffic management, servicing and drainage requirements, facilitating an efficient and responsive design.

Council may require the preparation of Design Guidelines to guide subdivision and development within the LSP area. The Design Guidelines shall have regard to the following:

- The Character Statement and Development Objectives detailed above;
- The design principles of the District Structure Plan; and
- Relevant planning and design considerations.

10. Local Development Requirements

Local Development Plans (LDPs) shall be prepared for lots with an area less than 260m^2; areas where variations to average lot size, site coverage and setbacks are required to facilitate target densities; lots abutting public open space areas; grouped housing sites; and narrow lots that require special conditions to be set. Information detailed in LDPs may include, but is not limited to the following:

- Building envelopes;
- Setbacks;
- Building orientation;
- Vehicle and pedestrian access arrangements;
- Retention of vegetation;
- Fencing;
- Noise attenuation;
- Additional land uses; and
- Development provisions.

Council may waive the requirement to advertise a LDP pursuant to Clause 5.18.5 where the land the subject of the LDP is in single ownership and the adjoining land is in the same ownership.

11. Noise Attenuation

Noise attenuation treatments consistent with the recommendations outlined in the approved Noise Management Plan (Lloyd George Acoustics Noise Report dated February 2012) shall be implemented as conditions of subdivision approval for any lots affected by the presence of Tonkin Highway. Recommendations include, but are not limited to, the construction of a 1.8 metre high noise attenuation barrier along the western boundary of the LSP area, notifications on title, and quiet house design and building height limit provisions included on Local Development Plans.

12. Third Pipe Provision

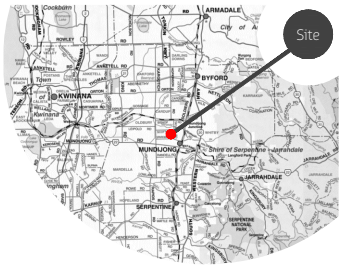
Subdivision and development plans are required to provide adequate road and verge widths to accommodate the service alignments of a possible future third pipe system.

13. Operation and Implementation

The following investigations and management plans are required prior to development:

Task	Local Structure Plan	Condition of Subdivision Approval	Approval Authority
Acid Sulphate Soils Management Plan		Acid Sulphate Soils Management Plan to be undertaken as a condition of subdivision approval.	Department of Environment and Conservation
Noise Management Plan	To be prepared and approved prior to the finalisation of the LSP	Implementation of requirements as a condition of subdivision approval.	Main Roads Western Australia
Landscape and Built Form Guidelines – Local Planning Policy		Implementation of Policy requirements through the preparation of Local Development Plans and approval of building licences and planning approvals.	Shire of Serpentine Jarrahdale
Construction Management Plan		Required to be prepared and implemented under the Health Act as part of subdivision works.	Shire of Serpentine Jarrahdale
Urban Water Management	Local Water Management Strategy to be prepared and approved by the Department of Water	Urban Water Management Plans to be prepared and implemented.	Department of Water
Flora and Fauna Management Plan		Preparation and implementation of recommendations as a condition of subdivision approval.	Shire of Serpentine Jarrahdale
Landscape and Vegetation Master Plan	Prepared as part of the LSP	Implemented as a condition of subdivision approval	Shire of Serpentine Jarrahdale
Fire and Emergency Management Plan		Preparation, approval and implementation as a condition of subdivision approval	Shire of Serpentine Jarrahdale

Planning Design Delivery



LEGEND

- Unrestricted POS
- Restricted POS
- (Indicative Drainage Swales and Basins)
- Residential - R25
- Residential - R30
- Residential - R40
- Neighbourhood Connector
- Water Corporation Service Corridor
- Tonkin Highway Reserve
- Waste Water Pump Station
- WWPS Odour Buffers
- Local Structure Plan Boundary
- Indicative 1.8m Noise Attenuation Barrier

0 187.5 Metres

REVISIONS

Rev	Date	Drawn
A	2015.09.02	W. Clements
B	2015.09.07	W. Clements

ROWEGROUP
PLANNING DESIGN DELIVERY

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Date Drawn:	2015.09.02
Job Ref:	8381
Scale:	1:7500 @ A4
Client:	Kerrboyle Pty Ltd
Designer:	R. Cumming
Drawn:	W. Clements
Projection:	N/A
Plan ID:	8381-LSP-01-B

Mundijong Precinct E1

Plan 1

Local Structure Plan - Statutory Plan

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William Clements 8 September 2015

SJS TRIM - IN15/24843

Part Two
EXPLANATORY SECTION

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01 Planning Background

1.1 Introduction and Purpose

The objectives of the Structure Plan and what it is trying to achieve.

1.1.1 Purpose of the Local Structure Plan

This Local Structure Plan (LSP) has been prepared by Investa Residential Group Pty Ltd and QUBE Property Group Pty Ltd, as a precursor to subdivision for land zoned 'Urban Development' under the provisions of the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2.

The purpose of the LSP is to refine the provisions under the district framework and ensure a comprehensive approach to planning and development is undertaken, with input from landowners, government agencies and other key stakeholders.

The LSP is a statutory planning document that will guide future land use and development within the Mundijong-Whitby Precinct E area, and provide a framework for more detailed planning at subdivision.

1.1.2 Extent of the LSP Area

For the purpose of this report, the LSP area is defined as the general area bounded by Scott Road to the north, Taylor Road to the east, and Sparkman Road to the south. Land to the west is reserved for the future extension of the Tonkin Highway.

The LSP comprises the northern half of Precinct E, as defined under the Mundijong/Whitby District Structure Plan.

1.1.3 The Study Team

Investa Residential Group Pty Ltd and QUBE Property Group Pty Ltd have established a consultant team comprising experts across a variety of disciplines. Members of the Study Team are listed below.

Discipline	Consultant
Civil Engineering	The Civil Group
Environmental and Landscaping	Emerge Associates
Hydrological	JDA Consultant Hydrologists
Traffic	Donald Veal Consultants (DVC)
Town Planning	Rowe Group

Rowe Group is the principal point of contact for all enquiries relating to this Application.

1.2 Land Description

1.2.1 Location

The subject site is located within the metropolitan south east corridor, within the municipality of the Shire of Serpentine-Jarrahdale (the Shire). The site is situated approximately 38 kilometres south east

of the Perth City Centre, and is accessible by the South Western Highway, Mundijong Road, and the Kwinana Freeway.

Refer Figure 1 – Regional Location.

1.2.2 Local Location

The subject site is bounded by Taylor Road to the east, Scott Road to the north and Sparkman Road to the south. The western boundary of the subject site is reserved for the future extension of Tonkin Highway and the Water Corporation service corridor.

The site is situated approximately 1 kilometre north west of the Mundijong Town Centre.

Refer Figure 2 – Local Location.

1.2.3 Area and Land Use

The subject site covers an area of approximately 94.83 hectares.

The subject site is currently used for grazing and/or similar agricultural activities. The site is generally vacant, with existing sheds and houses on some lots. The land is largely cleared, with some existing stands of trees around homesteads.

Given the close proximity of the site to the Mundijong Town Centre and within the Mundijong/Whitby Urban area, the site is strategically placed to accommodate high quality urban development.

Refer to Figure 3 for an aerial view of the subject site.

1.2.4 Legal Description and Ownership

The subject land comprises ten (10) separate allotments. The following table provides the Title particulars of the lots contained within the LSP.

Refer Appendix 1 – Certificates of Title.

Lot Address	Land Owner	Volume	Folio	Diagram/ Plan	Area (ha)
Lot 9001 Adams Street	Investa Residential Group Pty Ltd	2742	764	DP65404	17.509
Lot 9000 (No. 83) Adams Street	John Cecil Munday	2564	960	DP36929	8.8915
Lot 9003 Adams Street	Investa Residential Group Pty Ltd	2742	762	DP65403	8.7197
Lot 9005 Adams Street	Investa Residential Group Pty Ltd	2742	766	DP65402	17.5798
Lot 7 (No. 21) Adams Street	QUBE Adams Street Mundijong Development Ltd	1800	844	D72358	20.2629
Lot 6 (No. 5) Adams Street	KC and MS Gilbert	1800	843	D72358	4.0517
Lot 9002 *(Tonkin Highway Reserve)*	WA Planning Commission	2742	765	DP65404	2.6697
Lot 179 (UCL) *(Tonkin Highway Reserve)*	State of WA	LR3131	384	DP36929	1.353
Lot 9004 *(Tonkin Highway Reserve)*	WA Planning Commission	2742	763	DP65403	1.3228
Lot 9006 *(Tonkin Highway Reserve)*	WA Planning Commission	2742	767	DP65402	2.6756

We confirm Investa Residential Group Pty Ltd represents Lots 9001, 9003 and 9005 Adams Street, and QUBE Property Group Pty Ltd, represents Lot 7 (No. 21) Adams Street.

1.3 Planning Framework

1.3.1 Zoning and Reservations

The subject site is zoned 'Urban' under the provisions of the Metropolitan Region Scheme (MRS). Land to the north, east and south of the site is also zoned Urban.

There is also a 'Primary Regional Roads' reservation running along the western boundary of the subject site, reserved for the future Tonkin Highway extension further south to connect into Mundijong Road.

Refer Figure 4 – Metropolitan Region Scheme zoning.

The subject site is zoned 'Urban Development (DA 1)' under the provisions of the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2 (TPS 2).

Refer Figure 5: TPS 2 zoning.

The purpose of the 'Urban Development' zone is:

> *"to provide for the orderly planning of large areas of land in a locally integrate manner and within a regional context, whilst retaining flexibility to review planning with changing circumstances."*

The zone allows for the following:

- Development of functional communities consistent with orderly and proper planning and the establishment and maintenance of an appropriate level of amenity;
- Variety in the range of lot sizes and dwelling types within communities, consistent with a cohesive and attractive built environment;
- Provision of retail, commercial, industrial and mixed use facilities to service the needs of residents within the communities, and integration of these facilities with social and recreational services, so as to maximise convenience;
- Provision of retail, commercial, business park and industrial facilities to provide local employment opportunities;
- Provision of open space and recreation networks, appropriate community services, school sites and other recreational facilities;
- Establishment of multiple use corridors for drainage, nutrient control and recreational purposes, in association with the development of communities based on the principles of water sensitive urban design;
- Optimisation of convenience in respect of rail, road, cycleway and other transportation means, to and within the communities.

The proposed LSP is consistent with the above objectives and allocates land uses, provides a flexible mechanism of planning, and identifies the provision of service infrastructure within the subject site. These will be dealt with in greater detail throughout this report.

1.3.2 Regional and Sub-Regional Planning

1.3.2.1 Directions 2031 – A Spatial Framework for Perth and Peel

Directions 2031 is a long term strategic document for the Perth Metropolitan and Peel Regions that provides a broad framework for urban growth. The document primarily seeks to control urban growth by maximising infill of existing urban zoned land. As such, Directions 2031 has set a density target of 15 dwellings per gross hectare and encourages more intensive development closer to Activity Centres.

The subject site is situated within the south-east sub-region, as identified under Directions 2031.

Directions 2031 notes the south-east sub-region will require an additional 35,000 dwellings to accommodate an anticipated population of 228,000 by 2031. Growth will be accommodated by a combination of infill and greenfields development. The subject site is identified as urban under Directions 2031, and as such the development of the site will contribute to meeting these growth targets for the wider region.

Directions 2031 also identifies an employment self-sufficiency of 55% for the sub-region, which will require 31,000 new jobs by 2031. This is accommodated through the growth of existing activity centres and other employment opportunities within the sub-region. Mundijong is identified as an emerging District Centre under Directions 2031.

1.3.2.2 Outer Metropolitan Perth and Peel Sub Regional Strategy

The draft Outer Metropolitan Perth and Peel Sub-Regional Strategy (OMPPSRS) has been prepared to guide state and local government, and development industry actions and decisions to achieve Directions 2031 outcomes. The subject site is identified as 'Urban Zoned Undeveloped' under the OMPPSRS.

The OMPPSRS states potential dwelling yields have been calculated using a range between the 'business as usual' scenario of 10 dwellings per gross urban zoned hectare to the 'connected city' scenario of 15 dwellings per gross urban zoned hectare in greenfields development. Based on these density targets, within the Shire region, the OMPPSRS estimates there will be a need for 30,000 medium density dwellings over the next 25 years within greenfields sites.

For the south-east sub-region, the OMPPSRS identifies planned urban growth areas in Byford, Southern River/Forrestdale, Mundijong, and the Armadale Redevelopment Authority Area. The OMPPSRS states the following for Mundijong:

The town of Mundijong is experiencing significant development pressure. Structure planning for the area is underway and has identified capacity to accommodate 30,000 residents over the longer term. It is expected that development in Mundijong will follow Byford and is therefore, considered a medium to long term growth opportunity for beyond 2031.

Notwithstanding the growth timeframes projected under the OMPPSRS, development of the Mundijong Urban Village is underway, facilitated through the District Structure Plan and subsequent local structure planning.

1.3.2.3 Mundijong/Whitby District Structure Plan

The Mundijong/Whitby District Structure Plan (DSP) was finally adopted by the Shire in August 2011, to provide overall guidance to the structure, vision and objectives identified for the planning and development of Mundijong/Whitby. The DSP comprises a number of 'Precincts', and defines a framework by which urban subdivision and development is able to occur in an orderly and coordinated

manner. The LSP is situated within 'Precinct E' of the DSP. The DSP is intended to be used as a guide in the preparation of more detailed Local Structure Plans.

The DSP predominantly deals with district level issues, such as:

- Biodiversity;
- Landscape protection;
- Appropriate management of water quality and maintenance of hydrology;
- Efficient use and re-use of water;
- Responsive built form outcomes, sense of place, and community identity and character;
- Providing for alternative modes of transport;
- Climate responsive design and energy efficiency;
- Economic prosperity; and
- Community well-being.

As noted above, the proposed LSP is situated within Precinct E of the DSP. As stipulated in the Shire's Local Planning Policy No. 29 – Mundijong/Whitby Planning Framework (LPP 29), Council will not support a local structure plan for any area geographically smaller than those sub-precincts identified under the DSP, unless specifically resolved otherwise by Council.

In this regard, Council at its 10 April, 2012 meeting resolved to modify LPP 29 to depict the sub-precincts proposed in the Council Agenda dated 10 April, 2012. Sub-precinct E North comprises the area the subject of this LSP. The Council resolution also requires that LSP's demonstrate integration with the surrounding area. Additionally, design guidelines are required to address the relevant full DSP precinct.

Refer Figure 6 – District Structure Plan

1.3.2.4 Serpentine-Jarrahdale Shire Community Facilities and Services Plan

The Serpentine-Jarrahdale Shire Community Facilities and Services Plan 2020 (CFSP) was prepared by CCS Strategic Management in association with Geografia in July 2008, with a goal to provide more in-depth discussion in regard to the needs, outcomes and strategies relevant to the Shire. The document includes an outline of various growth scenarios, services demands and needs, implementation strategies, and cost recovery mechanisms.

Notably, it provides a comprehensive overview of the Mundijong area and details the current supply shortages of services, as well as solutions for providing those services in high demand.

The CFSP was considered in the preparation of the Mundijong/Whitby District Structure Plan, with those considerations translating through to the LSP.

1.3.2.5 Local Planning Policies

The Shire of SJ have prepared a suite of Local Planning Polices (LPP's), some adopted and some still in draft form, which are to be considered in the preparation and implementation of any LSP's within the Shire.

The following LPP's were considered in the preparation of this LSP, and will continue to be considered and implemented through further detailed design at subdivision and Local Development Planning, as

well as through the preparation of the Landscape and Built Form Design Guidelines. It is intended the Design Guidelines will be adopted and implemented as a LPP.

- LPP 4 Revegetation Policy
- LPP 6 Water Sensitive Design
- LPP 8 Landscape Protection
- LPP 24 Designing Out Crime (Draft)
- LPP 26 Biodiversity Planning
- LPP 27 Stakeholder Engagement in Land Use Planning (Draft)
- LPP 29 Mundijong-Whitby Planning Framework
- LPP 43 Hazards and Natural Disasters (Draft)
- LPP 57 Housing Diversity (Draft)
- LPP 60 Public Open Space
- LPP 61 Local Structure Plan
- LPP 62 Urban Water Management (Draft)
- LPP 63 Integrated Transport and Land Use Planning (Draft)
- LPP 67 Landscape and Vegetation (Draft)
- LPP 68 Sustainability Assessment

02 Site Conditions and Environment

2.1 Environmental Assessment

Emerge Associates has prepared an Environmental Assessment and Justification Report (EAJR), which details the site characteristics and investigations undertaken to support the LSP. The following section provides a brief overview. Please refer to Appendix 2 for further detail.

2.1.1 Soil and Topography

The subject site is situated on the Swan Coastal Plain, predominantly within the Pinjarra Plain geomorphic entity. The Pinjarra Plain is described as generally unconsolidated fluvatile sediments, and when compared to the remainder of the Swan Coastal Plain is relatively fertile.

Landform and soil mapping indicates the site is found within the Guildford soil association and is described as a flat plain with medium textured deposits and yellow duplex soils. These soils range from grey siliceous sands, to deep bleached pale grey sands, to moderately deep bleached sands with clay subsoil (dark grey of sandy loam).

The site generally slopes from 31 metres AHD in the north east to 27 metres AHD in the west.

2.1.2 Acid Sulphate Soils

As prescribed by the WAPC Planning Bulletin No. 64: Acid Sulphate Soils (ASS), the site has predominantly been classified as having a moderate to low risk of ASS occurring within 3 metres of the natural soil surface (or deeper).

Dewatering, soil disturbance, compaction or lateral displacement in the ASS risk area will require preliminary site assessment and investigation to determine whether or not ASS are present. Depending on the results of the investigation, an ASS Management Plan may also be required in accordance with DEC (2003) guidelines and to obtain a groundwater abstraction licence from DoW.

2.1.3 Vegetation / Flora

A flora and vegetation survey has not been conducted for the site, as the site is largely cleared and contains no intact remnant vegetation. However, the values of the site have been evaluated through available regional and local information, including a site inspection.

Across the site there are scattered paddock trees, consisting of the following species:

- Corymbia calophylla;
- Casuarina obesa;
- Eucalyptus rudis;
- Melaleuca preissiana; and
- Melaleuca rhaphiophylla.

Majority of the site is covered with annual pasture grasses and weed species. There are also a number of planted Eucalyptus species and other non-native species around the existing dwellings and along fence-lines.

It is considered highly unlikely that any species of conservation significance (Threatened Ecological Communities, Priority Flora or Declared Rare Flora) would occur within the site, given the site is largely cleared with limited remnant vegetation remaining and is used for grazing.

2.1.4 Fauna

A fauna survey has not been completed for the site, however given that no intact vegetation is found within the site it is considered unlikely that any significant fauna would rely on the site for habitat purposes, or that the site would form part of a species significant habitat.

The seasonally inundated paddocks may provide potential habitat for a number of conservation significant migratory species, however they are considered to be occasional visitors to the area and the site is unlikely to form significant habitat.

2.1.5 Wetlands

A review of DEC wetland mapping indicates that one wetland is mapped as occurring over approximately one third of the site, and is classified as a Multiple Use Wetland (UFI 15785). The wetland has limited value given it is largely comprised of cleared paddocks, with limited to no vegetation present.

Multiple Use wetlands are described as having few natural attributes remaining. Development and management is to be considered in the context of ecologically sustainable development and best management practice catchment planning, focussing on the retention of hydrological functions. Multiple Use wetlands are afforded no statutory and minimal policy protection by the EPA and DEC.

2.1.6 Surface Water Hydrology

The site is located within the Serpentine River Catchment and Lower Serpentine Water allocation sub area. There are three natural channels, one major and two minor, running through the site. The minor drainage channels occur in the northern portion of the site and the catchment of these channels does not extend beyond the study area. A major channel flowing from the east of the site runs to the south west, and has catchments extending east of Taylor Road, as outlined in the District Water Management Strategy ('DWMS'). All channels are overland flow paths connecting to artificial drains and remain dry for majority of the year.

District surface catchments are presented in the DWMS. The subject site is located on the western boundary of the DWMS. The DWMS catchment areas have been refined in the LWMS using detailed topographic maps and ground-truthing.

Surface water flow was monitored by JDA for a period of three years between 2007 and 2010. During this time a maximum peak flow rate of 0.196 m^3/s occurred during the month of August 2007, and a maximum daily mean flow rate of 0.021 m^3/s occurred during the month of September 2009.

2.1.7 Groundwater

There are three main aquifers existing under the subject site. In descending order of depth from natural surface they are:

- Superficial Aquifer (unconfined)
- Leederville Aquifer (confined)
- Cattamarra Coal Measures (confined)

The Superficial Aquifer in Mundijong is part of the Byford area with flow in a western direction. The saturated thickness of the aquifer is approximately 15m and consists of clayey sediments of the Guildford Clay with an average transmissivity of 100m²/d. Due to the low yields and salinity levels the Superficial Aquifer is not a major groundwater supply source in the Mundijong area.

The Leederville Aquifer in the area is approximately 115m thick. The Wanneroo member is found between 15mAHD where it meets the Superficial Formations and -30mAHD where it overlies the Mariginiup member. From -30mAHD to -100mAHD the Mariginiup member occurs which overlies the Cattamarra Coal Measures.

The Cattamarra Coal Measures consist of sandstones, siltstones and shales with minor coal seams, and can be up to 1500m thick. In the southern areas of Perth around Mundijong, it is overlain by the Leederville Formation (Mariginiup member) at -100mAHD.

Given the low yields available in the Superficial Formations, the Cattamarra Coal Measures provide an alternative for groundwater supply for the development area.

Three years of pre-development monthly sampling of the M-Series bores was conducted by JDA. The seasonal variation in the water table between summer and winter is 0.83 to 1.91m.

To determine the groundwater design levels over the study area local groundwater investigations were conducted by JDA in 2007-2010 for the Investa landholdings and Emerson Stewart for Qube landholdings. For the Investa landholdings, JDA installed 5 single bores and 11 nests of (shallow and deep) groundwater level monitoring bores across the study area. Water levels were measured in these bores over the three year period with August 2009 recording peak levels.

Emerson Stewart recorded water levels for the Qube landholdings over a period of 7 months to capture maximum winter levels in 2009 in 4 groundwater monitoring bores.

Based on predevelopment monitoring results, any potential discharge of groundwater from the site should not pose any significant risk to receiving waterways.

2.1.8 Potential Contamination

A search of the DEC's Contaminated Sites Database indicates the site has not been registered as a contaminated site, or as a site suspected of being contaminated.

Given the historical uses on the site for grazing/agriculture there may be potential for some localised and minor contamination on site. This potential contamination risk is likely to be predominantly associated with existing residences and the related working sheds, and may relate to the use and storage of various chemicals (associated with livestock and agriculture).

No spatial consideration has been provided within the LSP area for contamination, as any potential contamination is expected to be minor and localised, and can be managed through the subdivision process.

A Preliminary Site Investigation (PSI) is proposed to be undertaken as part of the subdivision process, which will determine if any residual soil and/or groundwater contamination exists. The PSI will also, if required, identify any remedial measures that may be required across the site. All investigations and remedial works will be undertaken in accordance with the Contaminated Sites Act 2003 and verified by an independent auditor prior to approval by the DEC.

2.1.9 Hazards and Natural Disasters

The risk of hazards and natural disasters impacting human health and the built and the natural environment is considered to be low. The site is located within a largely cleared agricultural area, with similar areas also situated to the north, south and west of the site, and residential areas to the east. There is also limited vegetation present and therefore the site has a minimal, if any, risk of bush fire. Whilst the site is relatively low lying, there is limited risk of flooding from nearby streamlines.

Notwithstanding, a Fire and Emergency Management Plan will be prepared and implemented as a condition of subdivision approval.

2.2 Heritage Assessment

A search of the Department of Indigenous Affairs Aboriginal Heritage Inquiry System identified two 'other heritage sites' located within the subject site. These are described as stored data and are not considered to be sites subject to the Aboriginal Heritage Act 1972. These sites are located partially within the western portion of the site adjacent to the area identified as the future Tonkin Highway reserve extension. The sites are described as:

- DIA 17923 is registered as stored data and as an artefact/scatter.
- DIA 18189 is registered as stored data and as an artefact/scatter.

In addition, there are two registered sites located within the Tonkin Highway Reserve, adjacent to the western boundary of the site. These sites are described as:

- DIA 18187 is a registered site described as an artefact/scatter.
- DIA 18188 is a registered site described as an artefact/scatter.

A search of the following available databases was also undertaken to determine whether the subject site contained any sites of non-indigenous heritage significance:

- World heritage sites;
- National heritage sites;
- Commonwealth heritage sites;
- Sites on the register of the National Estate; and
- Sites listed on the Shire's Municipal Heritage Inventory.

No sites of non-indigenous heritage significance were identified within the subject site.

2.3 Accessibility Assessment

2.3.1 Taylor Road

Taylor Road abuts the subject site on its eastern boundary. Taylor Road is classified as a Local Distributor and is constructed as a two-lane divided carriageway to a rural standard. According to traffic volume projections sourced from the *Mundijong-Whitby District Transport Study (Draft)* (Cardno BSD, 2007), this road is anticipated to carry up to approximately 1,100 vehicles per day under the short term modelling scenario (year 2012), 10,000 vehicles per day under the medium term modelling scenario (year 2017), and 13,000 vehicles per day under the long term modelling scenario (year 2027).

As at 2007, when modelling was carried out, the traffic volumes were assumed to be in the order of 470 vehicles per day.

The DSP proposes Taylor Road to function as higher order road within the Mundijong-Whitby area. Taylor Road provides connections to existing higher order roads such as Mundijong Road to the south and Bishop Road to the north, thereby providing direct regional access to the Kwinana Freeway and the South Western Highway.

2.3.2 Scott Road

Scott Road abuts the site's northern boundary. Scott Road is classified as an Access Road and provides local access to abutting rural properties. The road is constructed as an unsealed single carriageway. The existing traffic volumes along this road are expected to be minimal, with the forecasted volumes at 600 vehicles per day in the medium term, and 3,260 vehicles per day in the long term.

2.3.3 Sparkman Road

Sparkman Road abuts the site's southern boundary. Sparkman Road is classified as an Access Road and provides access to an abutting rural property. Only a portion of the road has been constructed, being the portion of road closest to the Taylor Road intersection. This portion of road is constructed as an unsealed single carriageway. The existing traffic volumes along this road are expected to be very minimal, with the forecasted volumes at 400 vehicles per day in the medium term and 1,600 vehicles per day in the long term.

2.3.4 Tonkin Highway Reserve Extension

The Tonkin Highway road reservation runs parallel to the Water Corporation service corridor, situated adjacent to the site's western boundary. The reserve is situated approximately 60 metres from the site's boundary. The reserve is anticipated to accommodate the future extension of the Tonkin Highway. Timing for the construction of the Tonkin Highway extension is not known at this stage.

2.3.5 Public Transport

There are no existing public transport services within the subject site. The nearest services are Transperth bus rotes 252 (Armadale to Mundijong) and 253 (Armadale to Jarrahdale), which connect between Mundijong/Jarrahdale and the Armadale train station. Both these routes run along Paterson Street and Soldiers Road, approximately 400 metres from the subject site. As urban development increases in the locality it is anticipated bus services will be extended to cater for the new residential areas.

The DSP proposes a number of new bus routes, including a route along Taylor Road, which will connect between Mundijong Road and Soldiers Road, and provide connections to the Mundijong town centre.

The Draft Public Transport for Perth in 2031 document identifies a future passenger railway connection to Byford and Mundijong, as an extension of the Armadale line. There is currently a rail reservation identified on the Metropolitan Region Scheme running through the Mundijong town centre.

2.4 Servicing Assessment

2.4.1 Water

The Mundijong Townsite is currently supplied from a mains extension off the Serpentine Trunk Main. This supply is currently operating at capacity, and as such the Water Corporation has proposed upsizing of this infrastructure to increase capacity. This involves the installation of a 400 diameter main alongside existing 150 diameter mains. Servicing of the LSP area is likely to require an extension of a larger diameter reticulation main to the site from the 400 diameter main at Mundijong Road.

The Water Corporation's long term planning for the area proposes an extension of a distribution main southwards from Byford. Currently, the Water Corporation does not have sufficient water supply infrastructure in Byford to facilitate this outcome.

The Shire also requires, through the preparation of a Wastewater Re-Use Management Plan as part of local structure planning, the establishment of recycled water infrastructure within the DSP area, to enable residents to have access to alternate water sources. The DSP includes a requirement for subdividers to provide 'third pipe' infrastructure within any new development (for the conveyance of recycled water). Third pipe schemes will typically be located along the alignment reserved for water mains – with the potable water main positioned on one side of the road and the recycled water main on the other.

The source of the recycled water requires high level investigations to be carried out by the relevant authorities across the entire DSP area before third pipe scheme will be implemented by developers. Whilst the Shire has initiated investigations through the engagement of 'Essential Environments', this is not expected to be finalised as part of local structure planning.

2.4.2 Sewer

The Water Corporation has developed conceptual planning for its eventual sewering of the corridor between Byford and Mundijong. This involves a series of pumping stations intended to convey the wastewater southwards to a significant facility proposed to be constructed on the edge of the Mundijong Urban Village. From this location the wastewater is intended to be conveyed westwards across to Baldivis and then onto the East Rockingham Wastewater Treatment Plant.

The LSP makes provision for an interim Type 90 pump station, with sufficient area to enable expansion to a Type 350 pump station in the future, in the north-western corner of the site. The pump stations will serve the expanding Mundijong town site, as well as the local area, pumping waste water to the East Rockingham Waste Water Treatment Plant. The size, location and configuration of these pump stations have been agreed by the Water Corporation.

The Water Corporation has advised they are also planning for a potential future Type 500 pump station, however this will be located west of the Tonkin Highway reserve, not affecting the LSP area.

2.4.3 Water Corporation Service Corridor

The Water Corporation proposes to acquire a 60 metre wide service corridor alongside the Tonkin Highway reservation as part of its Southern Sources Integration Assets (SSIA) project. This is being created to accommodate major water distribution mains that will convey potable water supplies into the metropolitan area. The Water Corporation anticipates that it may locate two large diameter water

mains in this corridor. The timing for the construction of these services is not currently known, and may be up to 20 years away.

The corridor will also be used to accommodate future pressure mains and/or main sewers that will link this infrastructure. The timing for this infrastructure will be dictated by development in the corridor.

The Water Corporation has also indicated they are willing to accommodate stormwater runoff for more significant rainfall events within the corridor. Appropriate landscape treatments within the corridor will need to be negotiated between the Water Corporation and the Shire.

2.4.4 Electricity and Gas

Western Power has indicated it has sufficient capacity in its existing infrastructure to service the initial stages of development within the DSP area. As the extent of development increases, Western Power will need to carry out various system reinforcement measures to maintain adequate supply. Ultimately, a new substation will need to be constructed and located northwest of the DSP area.

Existing gas distribution infrastructure currently terminates at Nettleton Road in Byford. The gas supplier (Atco Gas) has typically required developers to fund any extensions required to bring its supply mains to the boundary of new developments. Atco Gas has typically funded the costs of reticulation within a development. It is therefore required that the developer fund an extension of several kilometres to the subject site should a gas supply be a required/desired service.

2.5 Employment Assessment

Given the sites accessibility to the Perth City Centre, Kwinana and Armadale, and other key activity centres, afforded by access to the Kwinana Freeway and the South Western Highway via Mundijong and Bishop Roads, there are a number of regional employment opportunities available to the community. Key employment areas for the subject site will likely be situated within Kwinana and Armadale. Armadale is recognised as a Strategic Metropolitan Centre and Kwinana as a Secondary Centre under the State Planning Policy 4.2 Activity Centres for Perth and Peel.

The site is located within proximity to the following regional centres:

- Perth City Centre 38 km
- Armadale 16 km
- Kwinana 17 km
- Rockingham 21 km
- Cockburn Central 22 km
- Mandurah 33 km

In addition to the employment generators immediately within the aforementioned strategic centres, the Kwinana Industrial Area provides approximately 26,000 employment positions and is located approximately 18.5 km from the LSP area. The LSP area is also located approximately 18 km from the Latitude 32 Industrial Areas (Hope Valley Wattleup Redevelopment Area), which are expected to ultimately provide for 10,000 additional jobs.

Locally, there are a number of employment opportunities within the existing Mundijong and Byford town centres. The Mundijong town centre is situated approximately 1 kilometre east of the site and the

Byford town centre approximately 7 kilometres to the north east. The DSP identifies that Mundijong/Whitby is capable of providing opportunities for up to 54% of its resident labour force. Employment opportunities are relatively diverse with opportunities for 12% of the resident labour force to be employed within the commercial sector, 10% in home based businesses, and 29% in the industrial and mixed business areas provided adjacent (west and north) to the DSP area.

It is also noted the subject site is situated within close proximity to the proposed West Mundijong Strategic Industrial Area, to be situated on the western side of the Tonkin Highway reserve. Upon completion this site will provide local industrial employment opportunities for the site.

Local employment opportunities will be further generated and encouraged through the growth of the Mundijong town centre and the urban development of the DSP area generally. Similarly, the growth of the Byford town centre will also provide for local employment opportunities.

2.6 School Sites Assessment

There are currently no school sites within the LSP area, with the closest existing primary school located in the Mundijong town centre. Serpentine-Jarrahdale Grammar School is situated at the intersection of Bishop Road and Soldiers Road.

Under the DSP, two primary schools are proposed adjacent to the LSP area, one being on the northern side of Scott Road and the other south of Sparkman Road. The DSP also identifies a possible future TAFE site, notionally shown in the north-east of the DSP area.

As noted in the DSP, the Department of Education (DoE) has identified the provision of two public high school and eight public primary school sites in the DSP area. The DoE has already purchased a 10 ha high school site along Keirnan Street to service the western half of the DSP area, including the subject site.

03 Local Structure Plan

The Local Structure Plan sets out land use, residential densities, public open space, public and private transport provision, environmental considerations and servicing requirements.

The following section has been prepared in support of the Local Structure Plan and addresses the relevant elements of *Liveable Neighbourhoods*.

The Local Structure Plan is depicted at Figure 7, with a copy to scale provided at Appendix 3.

3.1 Community Design

3.1.1 Built Form and Landscape Design Guidelines

As required under the district framework, Built Form and Landscape Design Guidelines (the Guidelines) are required to be prepared and implemented to guide development within the LSP area. The Guidelines are to be prepared in consultation with the Shire, and are to be adopted as a Local Planning Policy. The Guidelines Policy will be prepared and adopted as a separate process to the LSP but will be guided by the principles and objectives outlined in the LSP. Subdivision and development within the LSP area is to be in accordance with the Guidelines and any subsequent Local Development Plans.

Whilst further investigations and consultation with the Shire is required, the following character statement is provided for the LSP area. This statement will form the basis of the preparation of the Guidelines:

> *The Taylor Road estate will be a development encompassing the ambiance and rural theme that takes advantage of and reflects the locality's character, whilst delivering the diversity of lot choice and modern amenity expected today. It is an estate that will balance urban character with the natural environment.*
>
> *The street network reflects the grid-like pattern of a traditional country town, as well as the cadastral pattern of historical land uses, whilst importantly encompassing a high degree of solar access. Towns and buildings of the past relied on these passive techniques to heat and cool their homes.*
>
> *The overland drainage flows through the linear open space is reminiscent of the rural feel and will be treated as a living stream, bringing the traditional rural character into an urban environment, however recognising the area can experience long dry periods.*
>
> *Landscaping, streetscape and community artworks will be primarily aimed at bringing natural elements into a new urban environment. These will help to generate a strong sense of place and community identity for the new estate.*
>
> *The housing stock will be focussed on having a strong street presence and where appropriate, materials and design will be representative of the locality.*
>
> *Density and lots abutting the open space will help emphasise the strong connection between the urban and the natural. The range of densities and housing product will also support a diverse community with a high level of housing choice.*
>
> *The location of community facilities, such as the primary schools, local shops, and linear open space provides for strong community integration.*

From the above character statement, the following key objectives have been identified. These objectives will be further refined through the preparation of the Guidelines and consultation with the Shire.

1. Strong sense of place and community identity.
2. Integration of an urban village within a rural setting.
3. Cater for lot diversity whilst still maintaining the existing character of the locality.
4. Use of alternative and innovative materials where appropriate.
5. Collective environmental sustainability.

In order to achieve the above objectives, the Guidelines will address, but are not limited to, the following key elements:

- Defining a sense of place and identity;
- Crime prevention;
- Design for better health;
- Housing diversity;

- Townscape character and streetscape;
- Energy efficiency;
- Emergency management;
- Colours and materials;
- Fencing;
- Housing design and orientation;
- Relationships with open space; and
- Setbacks.

3.1.2 Design Objectives

Given the natural and man-made site characteristics of the locality, the following objectives were identified through the design process:

- To create an environmentally sound and efficient urban development;
- To maintain the amenity of the existing community;
- To develop a sense of place informed by the local characteristics; and
- To adequately address traffic management, servicing and drainage requirements, facilitating an efficient and responsive design.

3.1.3 Design Response to Site and Context Analysis

In preparing the LSP, due consideration has been given to ensure integration of land uses and facilities with the surrounding locality. A Context Analysis Plan is provided at Appendix 4.

3.1.3.1 Water Corporation Service Corridor

The Water Corporation proposes to acquire a 60 metre wide service corridor running along the western boundary of the LSP area. This is being created to accommodate major water distribution mains that will convey water supplies into the metropolitan area. The timing for the construction of these services is not currently known, and may be up to 20 years away.

The corridor will also be used to accommodate future pressure mains and/or Main Sewers that will link this infrastructure. The timing for this infrastructure will be dictated by development in the corridor.

The Water Corporation has also indicated they are willing to accommodate stormwater runoff for more significant rainfall events within the corridor.

Given the timing of construction and details on the Water Corporation's access requirements within the corridor is unknown at this stage, it is difficult to ascertain what interface treatments are appropriate. Through preliminary dialogue with the Water Corporation, it is likely the Corporation would like to see public access limited given the public safety and liability issues that may arise.

In this regard, the LSP proposes a mixture of interface treatments. The LSP has generally been designed so that future development backs on to the corridor. This will limit public access, as well as provide some noise attenuation for the future Tonkin Highway extension. The LSP also proposes some drainage within the corridor, and therefore provides two areas of public open space directly abutting

the corridor. Some road frontages are also provided along the corridor interface to provide for service access by the Water Corporation and other relevant authorities.

Specific measures for the treatment of and interface with the service corridor will be addressed through the preparation and implementation of the Built Form and Landscape Design Guidelines, required to be prepared as part of local structure planning. Treatment of the corridor through the Guidelines will be required to address designing out crime principles, public access and safety, community amenity, and appropriate landscaping treatments.

3.1.3.2 Drainage

Multiple Use Corridors have been provided throughout the LSP area to take advantage of existing drainage movements across the site. These areas will be constructed as natural swales and living streams in keeping with the existing rural character of the locality. The multiple use corridors will provide for both the active and passive recreation requirements of the community.

3.1.3.3 Adjacent Development

The local structure planning of the land immediately to the north and south of the site is currently being progressed by Peet Limited. Whilst planning over the Peet Limited land is only in preliminary stages, consultation and dialogue with Peet Limited has taken place to ensure road hierarchy and offsets, and servicing is well integrated.

3.1.3.4 Potential Noise Impacts

Whilst there is uncertainty at this stage regarding the planning and delivery of potential noise sources relevant to the subject site, the following potential sources will be investigated and discussed in relation to potential noise management for the site. Under State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP 5.4) the following uses generate the requirement for an acoustic assessment and the provision of suitable noise mitigation measures through the preparation of a Noise Management Plan (NMP). Therefore, in accordance with SPP 5.4, the Shire requires an approved Noise Management Plan (NMP) to be implemented as a condition of subdivision approval.

- **Tonkin Highway extension** – SPP 5.4 requires consideration and planning for noise for up to a 20-year horizon. Whilst the timing for the construction of the Tonkin Highway extension is unknown at this stage, it is likely this will need to be included within acoustic modelling for the site and in the NMP. Prior to undertaking an acoustic assessment or preparing the NMP, certain assumptions will need to be determined and agreed between the relevant stakeholders. These assumptions will include the likely traffic volumes, the height of the road, and the timing of construction.
- **Potential Freight Rail realignment** – Whilst identified in the Shire's strategic planning, the realignment of the freight rail is subject to further detailed investigations and discussions between the relevant stakeholders. SPP 5.4 stipulates the proponent of the construction or substantial realignment of rail is responsible for the preparation of a Noise Management Plan for the redevelopment works. Given the Shire is the proponent of the potential rail realignment it is suggested any studies and mitigation would be the responsibility of the Shire. This is, however, the subject of further investigations and discussions between the relevant stakeholders.
- **Potential West Mundijong Strategic Industrial Area** – The proposed 'West Mundijong Strategic Industrial Area' / Intermodal facility is only planned at this stage and is subject to

further investigations. The Economic and Employment Lands Strategy: Non-heavy Industrial (EELS) identifies the West Mundijong site as a 'potential industrial area – medium term'. EELS defines medium term as 4-10 years. EELS also describes the West Mundijong site as having capacity to be developed in the medium term, however, investigative work for this site has not occurred. In this regard, whilst identified as a potential site proposed by the Shire, it is subject to detailed investigations taking place before any certainty can be provided as to whether it will go ahead. It is suggested that given both the timing and the potential of the site has yet to be confirmed it is difficult to appropriately consider any noise implications for the area. Similar to rail realignments, SPP 5.4 stipulates the proponent is responsible for the noise assessment, which in this instance would be the Shire. This is, however, the subject of further investigations and discussions between the relevant stakeholders.

SPP 5.4 requires NMP's to stipulate the roles and responsibilities of relevant stakeholders in undertaking acoustic assessments and the relevant mitigation measures. At this stage, given the uncertainty regarding the planning and delivery of the potential noise sources – Tonkin Highway extension, potential freight rail realignment, and the potential West Mundijong Strategic Industrial Area – the roles and responsibilities of each stakeholder have not yet been determined. In this regard, prior to undertaking any acoustic assessment or NMP for the site detailed discussions between the Shire, Main Roads WA and the Landowner needs to occur to determine the relevant roles and responsibilities of each of these key stakeholders.

3.1.4 Density

Residential densities for the site have been determined generally in accordance with the requirements of Liveable Neighbourhoods, which states:

- 12 to 20 dwellings per site hectare for standard lot layouts, distributed to achieve any required urban density of dwelling yield;
- 20 to 30 dwelling per site hectare within 400m of neighbourhood centres; and
- 30 to 40 dwellings per site hectare for areas within 400m of town centres.

Liveable Neighbourhoods further stipulates an average residential density of 22 dwellings per site hectare to be achieved in new urban areas.

The LSP achieves an average residential density of 31 dwellings per site hectare. Whilst the residential density exceeds the average density stipulated for residential development in new urban areas under Liveable Neighbourhoods, the proposed densities are in accordance with the DSP. The DSP identifies the subject site as predominantly being low/medium densities of R20 to R40, with higher densities around the proposed local centre and along the proposed public transport routes. It is also considered appropriate for higher densities to be situated in proximity to areas of higher amenity and accessibility such as primary schools and public open space.

Furthermore, Directions 2031 sets a density target of at least 15 dwellings per gross hectare. The subject site is in accordance with this target, with 16.58 dwellings per gross hectare.

An R25 density is applicable to the majority of the site, with areas of R30 and R40 allocated to those areas with higher amenity, such as adjacent to public open space, primary schools and the commercial centre. On the basis of the aforementioned densities, the LSP has the potential to yield in the order of 1261 lots. However, this yield is subject to detailed design at subdivision.

It is anticipated Local Development Plans will be required for some lots prior to development approval to ensure a high amenity in built form outcomes.

Refer to Figure 8 for the Zoning Plan, identifying proposed densities across the site.

3.2 Movement Network

The following section provides an overview of traffic management matters for the LSP. For further detail, please refer to Appendix 5 for the full DVC Traffic Management report. Please refer Figure 9 for a Road Hierarchy Plan.

3.2.1 Traffic Volumes and Street Hierarchy

3.2.1.1 Description of Road Network

The proposed road network consists of predominantly access roads, arranged in a permeable grid network to allow for efficiency and legibility. The network comprises two Neighbourhood Connector B road reserves and one Neighbourhood Connector A, providing a connection to the existing Keirnan Street and through to the Mundijong town centre. All of the proposed roads have north-south and east-west orientation, in accordance with Liveable Neighbourhoods.

A full movement four-way intersection is proposed at the intersection of Taylor Road and Keirnan Street, and at the intersection of Taylor Road and Tonkin Street. A full movement intersection is also proposed at the intersection of Sparkman Road and the main north-south connector through the site. The LSP proposes local intersections with Scott Road and Sparkman Road along the northern and southern boundaries of the site, respectively.

3.2.1.2 Integrator Arterial B

Taylor Road is identified under the DSP to serve a district function and is likely to be classified as an Integrator arterial B road. This road classification generally runs through centres and will typically have at least one clear travel lane in each direction, as well as a parking and/or manoeuvring lane.

The LSP proposes a cross-section of 24.5 metres for Taylor Road. This proposed cross-section will require a widening of the existing 20 metre reserve, to be distributed equally on either side of the existing reserve. Taylor Road is also identified as a bus route, and the proposed cross-section allows for this.

Traffic volumes for Taylor Road within the the vicinity of the subject site are anticipated to be up to 9,100 vehicle movements per day. Traffic volumes along this road are anticipated to be higher in the northern half of LSP area than in the south.

3.2.1.3 Neighbourhood Connector A and B

The LSP proposes two Neighbourhood Connector B roads, one providing a direct north-south route through the site, and the other providing a connection through to Tonkin Street. A Neighbourhood connector A is proposed to connect the internal north-south connector to Keirnan Street, providing a direct link from the site to the Mundijong town centre, as well as to Taylor Road, which is proposed to serve a district function under the DSP.

Liveable Neighbourhoods states the following for Neighbourhood Connector roads:

> *Streets with mostly residential frontage that typically provide the lower order sub-arterial network. These streets service and link neighbourhoods and towns.*

The Neighbourhood Connector A is a two-lane divided street used for higher neighbourhood connector volumes, or for character, stormwater infiltration swales or safety.

The Neighbourhood Connector B is a two-lane undivided street for lower volume neighbourhood connectors.

Typically, these streets can accommodate buses, will have at least one shared path, and when above 3,000 vehicles per day may have separate on-street bike lanes.

The Neighbourhood Connector A is proposed to have a cross-section of 25 metres, and is anticipated to carry volumes of up to 3,250 vehicle movements per day within the LSP area. After the Taylor Road intersection, this road is anticipated to carry volumes of up to 5,500 vehicle movements per day.

The central north-south Neighbourhood Connector B is proposed to have a cross-section of 20 metres, and is anticipated to carry volumes of up to 1,900 vehicle movements per day.

The east-west Neighbourhood Connector B is proposed to have a cross-section of 22 metres, and is anticipated to carry volumes of up to 2,100 vehicle movements per day. This road is anticipated to be constructed as an entrance statement into the LSP area, and includes a central vegetated swale.

3.2.1.4 Access Street

Majority of the roads within the LSP area are proposed to be constructed as Access Street C in accordance with the Liveable Neighbourhoods cross-section of 15.4 metres. Access Street D roads are proposed adjacent to areas of public open space, and are proposed to be constructed with a 13.2 metre cross-section.

Liveable Neighbourhoods states the following for Access Streets:

Access Streets are to accommodate shared pedestrian, bike and vehicular movements. The requirements of adjacent land uses should be supported through street design.

Access Street C is the most typical and most common residential street. Access Street D is for short, low volume and low parking demand streets.

3.2.1.5 Traffic Volumes

Based on traffic modelling undertaken for the site, it is expected that in the order of 10,200 vehicle trips per day would be generated, with the majority of trips being generated to and from the north. The distribution of trips across the LSP area will result in the internal access roads typically carrying up to approximately 2,000 vehicles per day. The Neighbourhood Connector roads, as noted above, will typically carry larger volumes, up to a maximum of 3,250 vehicle movements per day.

Based on the relatively low traffic volumes anticipated for the site, majority of internal intersections will be basic priority-controlled T-intersections. The four-way intersections proposed along Taylor Road may be controlled by roundabout treatments, however this will be subject to detailed design at subdivision.

Whilst traffic volumes throughout the site are relatively low, in order to minimise any conflicts and maximise safety within the locality, Local Area Traffic Management measures will be implemented. These measures are intended to address long, straight sections of road that, whilst provide for an efficient and permeable movement network, have the potential to develop issues with excessive vehicle speeds. Specific traffic management measures, such as line marking, intersection control and traffic calming devices will be addressed at detailed subdivision design.

3.2.1.6 Connectivity

The local road network has been designed with a high level of connectivity to facilitate walking and cycling, and enable relatively direct local vehicle trips. The LSP proposes a number of connections to Taylor Road, Kiernan Street and Tonkin Street, providing connectivity to the Mundijong town centre and regional road network.

The public open space links through the site and the proposed shared paths will also provide strong connectivity within the LSP area to recreation and other services.

3.2.1.7 Pedestrian and Cycling Network

An on-road cycle lane is proposed along the main east-west connector road through to Kiernan Street and Taylor Road.

Principal shared paths are proposed on both sides of the main connector roads, providing for safe travel by pedestrians and cyclists north-south and east-west through the site and into the surrounding network. Shared paths are also proposed along the key-east-west roads that link through to Taylor Road (and the proposed local centre and bus route), on north-south roads in the vicinity of the proposed primary schools, and as a link to the proposed principal shared path running along the future Tonkin Highway extension. Connections from the shared path network within the site to Scott Road in the north and Sparkman Road in the south will also be facilitated through the detailed design of the path and road network.

Safe pedestrian and cycle crossings are also required across Scott and Sparkman Roads to the primary schools proposed to the immediate north and south of the site.

The balance of the LSP area is to have a footpath on at least one side of all roads. Footpath links are also proposed to cross the public open space to increase the convenience of the network for pedestrians. The location of these crossings will be subject to detailed landscaping design.

3.2.1.8 Public Transport

As previously noted, the existing local bus routes (routes 252 and 253) currently provide services to the established areas of Mundijong and Jarrahdale to the east of the LSP area. However, given the distance of these services from the LSP area, it is not expected they will be highly utilised by those travelling to and from the LSP area.

The DSP identifies a proposed new bus service along Taylor Road to service the western half of the DSP area. This service is proposed to run from Mundijong Road in the south to a new intersection approximately 500 metres north of the LSP boundary.

The placement of bus stops along Taylor Road will be dependent on planning by the Public Transport Authority. The proposed road network provides a number of east-west roads which connect between the main north-south link within the LSP to Taylor Road. These roads will form the key pedestrian links between the bus stops and the LSP area. In considering the placement of bus stops, consideration will need to be given to the layout of development surrounding the LSP area, the proposed local centre, and the proposed primary schools.

3.3 Lot Layout

3.3.1 Lot Size and Variety

The LSP proposes a range of densities across the site including R25, R30 and R40 sites.

Higher densities are situated adjacent to areas of high amenity such as the public open space areas throughout the site. The intention of the LSP is to provide a variety of lot product and housing choices for an increasingly diversified market place. Particular effort has been taken to ensure lots are orientated in a north-south / east-west configuration to assist in the solar passive design of homes.

The proposed densities will facilitate subdivision to create lots with a range of sizes, as stipulated below:

- Lots within the R25 zone to typically comprise areas of 350m^2 – 500m^2.
- Lots within the R30 zone to typically comprise areas of 300m^2 – 375m^2, and are generally in the vicinity of public open space or other areas of amenity.
- Lots within the R40 zone to typically comprise areas of 240m^2 – 300m^2, and are generally situated adjoining public open space.

On the basis of the above densities, an approximate average lot area of 388m^2 is anticipated across the site.

3.3.2 Land Use Description

The LSP area predominantly consists of residential development, providing a variety of low and medium density housing opportunities. Medium density single residential lots are predominantly located within proximity to areas of higher amenity, such as the public open space.

The LSP includes a linear public open space network. This network has been positioned within the site to respond to the existing drainage lines and to provide strong pedestrian corridors through the site and to the proposed primary schools in the north and south.

3.3.3 Retention of Existing Vegetation

As previously discussed, the LSP area has historically been used for agricultural purposes and has therefore been predominantly cleared, with the exception of some small stands of trees around existing homesteads.

Where appropriate, existing trees will be retained within POS areas, however this will be subject to detailed landscaping design at subdivision.

Given the subject site is predominantly cleared with paddock grasses, it is considered highly unlikely that any species of conservation significance are located within the LSP area.

3.3.4 Provision of School Sites

Whilst the LSP makes no provision for school sites, the DSP identifies two primary schools within close proximity of the site, situated immediately to the north and south of the LSP. Provision for these sites will be made as planning and development is further progressed by the landowners to the north and south of the LSP, or as the catchment requires. Liveable Neighbourhoods identifies a requirement for one primary school per 1500 lots.

In the interim, there is an existing primary school located in the Mundijong town centre. Serpentine-Jarrahdale Grammar School is situated at the intersection of Bishop Road and Soldiers Road.

As previously noted, the DoE has recently purchased a 10 ha high school site along Keirnan Street to to service the western half of the DSP area, including the subject site.

The DSP also identifies a possible future TAFE site, notionally shown in the north-east of the DSP area.

3.3.5 Climate Responsive Design

Under the provisions of Liveable Neighbourhoods lots should be oriented to facilitate the siting of dwellings and private open space to optimise solar access.

Liveable Neighbourhoods stipulates the following orientation requirements for lots:

- New streets have a north-south and/or an east-west orientation.
- Lots are square to rectangular in shape.
- Dwellings can be located on the southern portion of the lot, with useable open space and solar access on the northern portion.
- Lots on south facing slopes are wider to allow solar access on the northern face of the dwelling.
- Where dwellings are expected to have two storeys the lots are shaped to allow the standards to be met.

Figure 10 identifies the solar orientation of lots within the LSP. It is confirmed all lots are situated within the optimum 0-10 degrees solar access range.

3.3.6 Local Development Plans

As discussed, in order to achieve a range of lot sizes to facilitate a variety of housing choice and to address built form outcomes, Local Development Plans (LDP) are required to guide further development. LDP's can also assist in realising density targets by way of modifying standard R-Code provisions to deliver more efficient use of urban area by way of reduced setbacks and site coverage.

LDP's also present the opportunity to achieve better residential outcomes, particularly in relation to smaller lot sizes. Therefore, LDP's will be prepared for:

- Areas where variations to average lot size, site coverage and setbacks are required to facilitate target densities;
- Lots abutting public open space areas;
- Lots under 350m^2;
- Grouped Housing sites; and
- Narrow lots that require special conditions to be set.

LDP's will address, but are not limited to, design aspects such as access, dwelling orientation, fencing, landscaping, visitor parking, location of outdoor living areas, storage areas, and bin storage.

LDP's will be submitted, as required, to enable the clearance of conditions of subdivision approval.

3.4 Public Open Space

Under the provisions of Liveable Neighbourhoods, a range of site responsive urban parkland is required which appropriately addresses the district, neighbourhood and local needs of residents. Urban parkland is to comprise a mixture of unrestricted and restricted open space.

As previously discussed, public open space (POS) is predominantly provided in a linear form through the LSP area, resulting in a network of open space, linking the residential areas to the main transport routes and primary schools. The POS areas formalise the existing drainage occurring on site, performing both a stormwater retention and passive open space function. This design approach provides a greater ratio of POS interface with residential areas throughout the LSP area, and as such will result in an increased overall usage of these spaces.

The drainage channels through the site will be developed as natural swales, or 'living streams', through the use of plantings and grasses, and walled or contoured banks. Native sedges and rushes are proposed to assist with nutrient stripping and midge and mosquito control. Boulders or low walls will act as minor weirs to control the flow of storm water through the living stream. The proposed drainage swales will be unfenced and landscaped in accordance with Liveable Neighbourhoods to allow for informal active and passive recreational uses.

Whilst the majority of the public open space areas include some form of drainage function, there is sufficient area outside the allocated drainage sites for active and unrestricted local and neighbourhood park facilities. Each public open space precinct will provide a series of public facilities and spatial arrangements to allow for useability by future residents.

Outside of the LSP area, there is also a primary school site proposed immediately north of Scott Road, and another directly south of Sparkman Road. The primary schools also provide opportunities for the co-location of active recreational facilities within close proximity to the site.

The drainage requirements for the site have resulted in POS limitations, particularly in the ability to provide for a greater amount of consolidated local and neighbourhood POS areas. Notwithstanding, the POS design and distribution allows for green links through the LSP area, and provides all residents with access to public open space facilities within a 400 metre or five-minute walk circle.

The requirements under Liveable Neighbourhoods for restricted and unrestricted POS are summarised in the following schedule. As can be seen from the schedule, 11.9% POS is provided, in excess of the 10% Liveable Neighbourhoods required provision.

Public Open Space Schedule			
Site Area			94.834 ha
Less			
Water Corp Service Corridor/Tonkin Hwy Reserve	17.821 ha		
Waste Water Pump Station	0.600 ha		
Total		18.421 ha	
Net Site Area			76.413 ha
Deductions			
Designated Drainage (1 in 1 year ARI)	0.728		
Gross Subdivisible Area			75.685 ha
Public open space @10%			7.568 ha
Public Open Space Contribution			
May comprise:			
minimum 80% unrestricted POS		6.054 ha	
maximum 20% restricted POS		1.514 ha	7.568 ha
Public Open Space Provided - Plan Ref		**Unrestricted POS (ha)**	**Restricted POS (ha)**
1 – 0.344 ha		0.329	0.015
2 – 1.305 ha		1.263	0.042
3 – 2.628 ha		2.214	0.414
4 – 0.835 ha		0.678	0.157
5 – 2.262 ha		1.618	0.644
6 – 0.448 ha		0.278	0.169
7 – 0.911 ha		0.628	0.282
8 – 0.513 ha		0.485	0.028
Total		7.493 ha	1.753 ha
Public Open Space Provision (credited)			
Unrestricted POS		7.493 ha	
Restricted POS		1.521 ha	
			9.014 ha (11.9%)

The Landscape Strategy, provided at Appendix 6 identifies various facilities and treatments of the POS areas. This design is however provided as a guide and will be further refined and informed by detailed engineering design and discussions with the Shire at subdivision.

Figure 11 identifies the POS distribution across the site.

3.5 Fire Management

Given the site is predominantly cleared and is not situated within close proximity to any bushland, the bush fire hazard is considered as a 'low risk'.

The key recommendations for fire management are as follows:

- The separation of open space areas by the road network. This is not applicable for landscaped POS that consists of reticulated lawns and shade trees;
- Public open space management to detail fire and bush loads within open space areas; and
- Fire Hydrants are to be installed every 200 metres in residential areas as per FESA, Water Corporation, WAPC and Planning for Bushfire Protection standards.

A Fire and Emergency Management Plan will be required to be prepared and implemented as a condition of subdivision approval.

3.6 Activity Centres and Employment

Whilst there are no activity centres planned for within the site, the Mundijong Town Centre, identified as an emerging District Centre under SPP 4.2, is situated approximately 1 kilometre east of the site.

The DSP Activity Centres planning undertaken by Taktics4 identifies a small local centre immediately adjacent to the LSP on the eastern side of Taylor Road. This centre is referred to as the 'West Village' under the DSP and is planned to have approximately 2,500m^2 of retail activity. It is anticipated the West Village will have a small supermarket of up to 1,500m^2 and approximately 1,000m^2 (10 to 15 shops) of specialty retail. Whilst this local centre will provide for day-to-day convenience shopping, the Mundijong Town Centre will primarily provide for the weekly shopping needs of future residents.

Notwithstanding the abovementioned planning, the final location and configuration of local centre is subject to further investigations and discussions with the Shire.

3.6.1 Employment

Local employment opportunities will be created through the planned growth of the Mundijong town centre and the urban development of the DSP area generally. Similarly, the growth of the Byford town centre, north of the LSP area, will also provide for local employment opportunities. The Mundijong town centre is situated approximately 1 kilometre east of the site and the Byford town centre approximately 7 kilometres to the north east.

As previously noted, the site has relatively good accessibility to the Perth City Centre, Kwinana and Armadale, and other key activity centres, afforded by access to the Kwinana Freeway and the South Western Highway via Mundijong and Bishop Roads.

Key employment areas for the locality will likely be situated within the Kwinana and Armadale. Armadale is recognised as a Strategic Metropolitan Centre and Kwinana as a Secondary Centre under the State Planning Policy 4.2 Activity Centres for Perth and Peel.

The site is located within proximity to the following regional centres:

- Perth City Centre 38 km
- Armadale 16 km
- Kwinana 17 km

- Rockingham 21 km
- Cockburn Central 22 km
- Mandurah 33 km

In addition to the employment generators immediately within the aforementioned strategic centres, the Kwinana Industrial Area provides approximately 26,000 employment positions and is located approximately 18.5 km from the LSP area. The LSP area is also located approximately 18 km from the Latitude 32 Industrial Areas (Hope Valley Wattleup Redevelopment Area), which are expected to ultimately provide for 10,000 additional jobs.

It is also noted the subject site is situated within close proximity to the proposed West Mundijong Strategic Industrial Area, to be situated on the western side of the Tonkin Highway reserve. Upon completion this site will provide local industrial employment opportunities for the site.

3.7 Urban Water Management

This section addresses the proposed urban water management network, maintenance of this network, groundwater recharge, runoff water quality, environmental values and physical characteristics of receiving domains/watercourses, protection from stormwater and flooding, cost contribution arrangements, and ongoing management arrangements.

Please refer to Appendix 7 for a copy of the Local Water Management Strategy (LWMS) prepared by JDA.

3.7.1 Water Management Strategies and Planning

The LWMS uses the following key documents to define its content, key principles and objectives.

3.7.1.1 Stormwater Management Manual for Western Australia (2007)

The Waters and Rivers Commission (now Department of Water, 'DoW') released *A Manual for Managing Urban Stormwater Quality in Western Australia* in 1998 to define and practically describe Best Management Practices (BMP's) to reduce pollutant and nutrient inputs to stormwater drainage systems. The Manual also aimed to provide guidelines for the incorporation of water sensitive design principles into urban planning and design, which would enable the achievement of improved water quality from urban development.

The DoW has recently completed a major review of the Manual, with the revised manual officially released in August 2007.

3.7.1.2 Better Urban Water Management (2008)

The guideline document *Better Urban Water Management* (WAPC, 2008) focuses on the process of integration between land use and water planning, and specifying the level of investigations and documentations required at various decision points in the planning process, rather than the provision of any specific design objectives and criteria for urban water management.

The LWMS complies with the BUWM process.

3.7.1.3 Mundijong-Whitby District Water Management Strategy (2010)

The Mundijong-Whitby District Water Management Strategy (DWMS) was prepared in accordance with the responsibilities for drainage planning assigned to the Department of Water (DoW) and the Shire by

the State Government. The LWMS aims to combine DoW's Drainage and Water Management Plan with the DWMS.

3.7.2 Groundwater Management

The LWMS, prepared by JDA, has been prepared in accordance with the design criteria outlined in the Mundijong-Whitby DWMS (2010) and the Stormwater Management Manual for Western Australia (2007).

3.7.2.1 District Design Criteria

- Where a groundwater design level is at or within 1.5 metres of natural ground level, the importation of clean fill and/or the provision of sub-surface drainage will be required to ensure that adequate separation of building floor slabs from groundwater is achieved. In such instances, the sub-surface drainage will need to be placed at or above the approved controlled groundwater level.
- Sub-surface drainage (subsoils) and drainage infrastructure set at or above groundwater design levels, although existing inverts below level may remain.
- Installed subsoil drainage outlets to be free draining.
- Managing and minimising changes in groundwater levels following development.

3.7.2.2 Managing Groundwater Levels to Protect Infrastructure

To protect infrastructure from high seasonal groundwater levels, the groundwater design level has been calculated by measurement of the water table by JDA. With reference to these contours the criteria for the installation of subsoil pipes over the site will be as follows:

- In areas where finished level depth to groundwater is <1.5m subsoil pipes will be laid at or above the groundwater design level.
- Subsoil pipe systems must be designed with free draining outlets.

Based on these criteria, areas where subsoil pipes will be required are shown on Figure 9 of the LWMS. Subsoil locations will be specified in the UWMP.

3.7.3 Sparkman Road Drain

As part of the DWMS, Sparkman Road is noted as a key outlet point from the study area. Dialogue with the Shire is currently underway with regard to the upgrade of the drain to ensure adequate drainage for the area. It is recommended the drain has the capacity to hold a maximum flow of 2.0m^3/s. A trapezoidal channel running either side of Sparkman road is recommended with an approximate base of 0.6 metres and a depth of 0.6 metres using 1 in 2 slopes. Two box culverts running under the road 0.45 metres high by 0.75 metres wide will be needed to convey the water to the drain on the southern side of Sparkman Road.

With the future construction of Tonkin Highway, Sparkman Road will become a cul-de-sac and culverts will need to be provided under Tonkin Highway to convey 2.0m^3/s.

3.7.4 Local Stormwater Management

The stormwater drainage system will be designed using a major/minor approach, adhering to district flow design criteria. The major drainage system is defined as the arrangement of roads, drainage

reserves, detention basins and open space planned to provide for the safe passage of stormwater runoff from extreme events which exceed the capacity of the minor system.

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 than 5 year ARI. The minor drainage incorporates a treatment train of best management practice (BMP) water quality structural controls such as vegetated swale and storage systems that provide water quality treatment from the proposed development.

3.7.4.1 Minor Drainage System (up to 5 year ARI)

To meet the design criteria for the minor drainage system, the following strategies are proposed:

- Soakwells with a minimum capacity of 10 millimetres of rainfall for residential lots where separation to the watertable of 1.5 metres is achieved or where site geotechnical classification permits.
- The roadside pipe network will be sized to convey the 5 year ARI flow.
- Drainage treatment train systems will have the minimum capacity to treat the 3 month ARI event.

3.7.4.2 Major Drainage System (greater than 5 year ARI and up to 100 year ARI)

The design strategy is consistent with the objectives provided in the district DWMS. The key points of the major drainage system strategy are as follows:

- Maintaining the water alignment of current natural channels on site.
- Discharge rates from detention basins controlled to retain existing outflow discharge rates outlined in the DWMS.
- Detention storages provided 'online' to drainage channels for efficient use of multiple use corridors.
- Catchments have been designed so each developer has individual drainage.
- Water Corporation service corridor utilised to detain the 100 year critical ARI where possible.
- Detention basin A, C and F designed with control pipe at basin invert level and spillway at the top of the basin to allow maximum detention in the 5 year ARI event then overflow into 100 year ARI detention basin in the Water Corporation easement.
- Basin D uses bifurcation to maximise the efficiency of storage in the Water Corporation easement and reduce outflow to Sparkman Road during major events.
- Roads graded to direct flow to the lowest point in the catchment. Swales and spillways utilised in key locations to convey flow from detention basins to connect drains and channels of the site.
- Restoration of the existing channels to open swales to convey flows. Works may include regarding the drain to prevent water pooling.
- At least a 0.5 metre clearance above the estimated 100 year ARI flood level of the detention storages for all building finish levels.

3.7.5 Monitoring

The monitoring program has been designed to allow a quantitative assessment of hydrological impacts of the proposed development within the LSP area.

The post-development monitoring program is designed to operate over a three year period to allow for time lag impacts of development on the receiving environment to occur. The program will be periodically reviewed to ensure suitability and practicality. The program may need to be modified as data is collected to increase or decrease the monitoring effort in a particular area or alter the scope of the program itself.

Groundwater levels are to be monitored quarterly, groundwater quality quarterly; surface water site levels by a continuous logger, and surface water quality sampled three times per year when flowing.

The post-development proposed monitoring locations should be designed to:

- Monitor groundwater levels and quality for three paired pre-development groundwater sites for comparison to pre-development.
- Measure and compare peak outflows at main surface water discharge point.

All sampling is to be conducted according to Australian Standards, and all water quality sample testing will be conducted by a NATA approved laboratory.

The preparation of annual monitoring reports is to be coordinated by the developer and be submitted to the Department of Water and the Shire for review. The report will compare the monitoring results with the design criteria and performance objectives, and determine what, if any, further actions may be necessary consistent with the contingency planning measures detailed in Table 14 of the LWMS.

3.7.6 Ongoing Management and Responsibilities

The operation and maintenance of the drainage system will initially be the responsibility of the developer, ultimately reverting to the local authority, the Shire.

The ongoing water management and responsibilities are summarised in the table below:

Management Issue	**Responsibility and Funding**
Preparation of UWMP for subdivisions application areas	Developer
Construction of drainage structures (street drainage infiltration storage, bio-retention areas and detention storages) and Irrigation systems.	Developer
Maintenance of drainage structures (street drainage, infiltration storage, bio-retention and detention storage). 12 months defects period following construction: Ongoing:	 Developer Shire of Serpentine-Jarrahdale
Irrigation system management. 2 years following development: Ongoing:	 Developer Shire of Serpentine-Jarrahdale

Post-development monitoring. 3 years following development: Ongoing (if required):	 Developer Shire of Serpentine-Jarrahdale
Prepare and submit a water quality monitoring report for post-development monitoring.	Developer

3.7.7 Waste Water Re-Use Management Plan

As stipulated in the DSP, the Shire is committed to investigating alternative sources of water and not simply applying the business as usual approach to water planning. From initial investigations on integrated water cycle management undertaken by GHD, the Shire is seeking a third pipe scheme to be implemented in all new development within the DSP. This is to ensure that any outcome as a result of further investigations into the integrated water cycle management options can be retrospectively applied.

The 'third pipe' infrastructure to be provided within any new development (for the conveyance of recycled water) will typically be located along the alignment reserved for water mains – with the potable water main positioned on one side of the road and the recycled water main on the other. Upon commencement of development, should a suitable alternate non-potable water source be available, the developer will implement a third pipe scheme to allow future residents access to the source for toilet flushing and irrigation.

As part of the implementation of the above, the Shire requires the preparation and approval of a Wastewater Re-Use Management Plan (WWRUMP) as part of local structure planning. The WWRUMP is to consider the establishment of recycled water infrastructure within the DSP area, to enable residents to have access to alternate water sources. JDA has prepared a WWRUMP for the LSP area, which is contained in Appendix 8.

3.7.7.1 Water Balance

The WWRUMP details water balance and water demand requirements across the LSP area. A water balance has been established for the site assuming the availability of alternate water sources to meet all non-potable water demands. Assumptions for the water balance are as follows:

- Water supply for all POS irrigation will be met by local groundwater supplies.
- All other non-potable water is supplied by an alternate water source.
- Superficial aquifer recharge was calculated by assuming 5% of rainfall will reach groundwater.
- 20% of rainfall was assumed to exit the system as runoff through watercourses.
- Subsoil drainage accounts for the balance of rainfall in the system exiting the system through water courses.

3.7.7.2 Third Pipe Scheme

Third pipe schemes have the greatest chance of success if installation occurs during the construction of new residential developments. It provides and additional water service to the potable scheme that supplies water and the sewerage system that disposes of wastewater. Should a suitable alternate non-potable water source be available at the time of development, the Developer will implement a

third pipe scheme to provide residents with an alternate non-potable supply of water. It is anticipated that a third pipe scheme will allow an extra 40% of non-potable water to be utilised across the LSP area. It is assumed that all irrigation, toilet flushing and outdoor plumbing will be connected to alternate water supplies.

3.7.7.3 Potential Water Sources

3.7.7.3.1 ALCOA Pipeline

The development plans to take advantage of the pipeline proposed to take recycled wastewater from the Woodman Point wastewater treatment plant to Alcoa's Pinjarra refinery. This pipeline is proposed to be completed in 2015.

Whilst the pipe alignment is yet to be confirmed, preliminary discussions indicate it will be aligned with Kargotich Road, approximately two kilometres from the LSP area. The provision of a third pipe system for the LSP area assumes the Shire will construct a mainline from Kargotich Road to Taylor Road. The developer will then be responsible for installing a third pipe connection and meter to each lot.

The Shire building standards will need to ensure plumbing for houses is appropriate to allow a non-potable water connection for toilets, outdoor taps and irrigation systems.

3.7.7.3.2 Groundwater

The LSP area is located within the Serpentine groundwater area and the Byford groundwater sub-area. It is proposed the POS irrigation within the LSP will utilise groundwater from the Leederville Aquifer.

3.7.7.3.3 Other Sources

The source of the recycled water requires high level investigations to be carried out by the relevant authorities across the entire DSP area. Whilst the Shire has initiated these investigations through the engagement of 'Essential Environments', this is not expected to be completed as part of local structure planning. If, at the time of development, other alternate supplies of non-potable water are available a third pipe scheme will be implemented.

3.8 Public Health

3.8.1 Walkability

The LSP layout provides a comprehensive network of streets, footpaths and lineal public open space. These work to create a legible pedestrian network to encourage walking and cycling throughout the estate and to surrounding areas, therefore reducing reliance on motor vehicles. Improved walkability and a reduced reliance on motor vehicles will help to reduce obesity and associated illnesses, as well as reducing carbon emissions.

Furthermore, the permeable and legible nature of the street and public open space network will help to facilitate community integration through improved access to community nodes, such as parkland, primary schools, the proposed local centre etc. Easy access to community facilities will help to stimulate the social and subsequently the mental well being of residents.

3.8.2 Buffers

The LSP comprises a waste water pump station (WWPS), as noted and discussed throughout this report. There are potential odour impacts associated with the WWPS. To avoid any adverse impacts on the surrounding locality and the health of residents, the LSP makes provision for a includes a 30 metre buffer for the Type 90 pump station, and a 50 metre odour buffer for the Type 350 pump station, in

accordance with Water Corporation requirements. Sensitive land uses, such as residential development, are not permitted within the buffer area.

In preparing the LSP, potential impacts from pesticide spray drift from agricultural activities were also considered. It was resolved the site is not considered to be at risk of pesticide spray drift, and as such no buffers are applicable to the site.

As discussed throughout this report, the site is situated adjacent to the Tonkin Highway reserve, and as such will be subject to noise attenuation measures to minimise any adverse impact on residents. Noise attenuation requirements will be detailed in a Noise Management Plan to be approved for the site.

3.8.3 Disaster Preparedness

The risk of hazards and natural disasters impacting human health and the built and natural environment within the site is considered to be low. A Fire and Emergency Management Plan will be prepared and implemented as a condition of subdivision approval. Provision has also been made in the LWMS to minimise any potential impacts from flooding.

3.9 Servicing / Utilities

A Servicing Report has been prepared by Civil Group, and details requirements for sewerage, water supply, drainage, roads, electricity and gas supply, and telecommunications. The following presents a summary of the Servicing Report, which can be found in Appendix 9 of this report.

3.9.1 Sewer

As previously discussed, the Water Corporation has developed conceptual planning for its eventual sewering of the corridor between Byford and Mundijong. This involves a series of pumping stations intended to convey the wastewater southwards to a significant facility proposed to be constructed on the edge of the Mundijong Urban Village. From this location, the wastewater is intended to be conveyed westwards across to Baldivis and then onto the East Rockingham Wastewater Treatment Plant.

The LSP makes provision for an interim Type 90 pump station, with sufficient area to enable expansion to a Type 350 pump station in the future, in the north-western corner of the site. The pump stations will serve the expanding Mundijong town site, as well as the local area, pumping waste water to the East Rockingham Waste Water Treatment Plant.

The Water Corporation has advised they are also planning for a potential future Type 500 pump station, however this will be located west of the Tonkin Highway reserve, not affecting the LSP area.

3.9.1.1 Pumping Station Land Requirements

The Water Corporation has confirmed they require a site in the north western corner of the LSP area measuring approximately 6,000m^2, with dimensions 50 metres by 120 metres. In addition to the land area required for the WWPS, 30 and 50 metre odour buffers apply to each of the pump stations, respectively. Sensitive land uses, including residential, are not permitted within this buffer area. In this regard, the land surrounding the WWPS within the buffer area comprises public open space.

3.9.2 Water Supply

3.9.2.1 Potable Water Supply

As previously noted, the Mundijong Townsite is currently supplied from a mains extension off the Serpentine Trunk Main. This supply is currently operating at capacity, and as such the Water Corporation has proposed upsizing of this infrastructure to increase capacity. This involves the installation of a 400 diameter main alongside existing 150 diameter mains. Servicing of the LSP area is likely to require an extension of a larger diameter reticulation main to the site from the 400 diameter main at Mundijong Road.

The Water Corporation's long term planning for the area proposes an extension of a distribution main southwards from Byford. Currently, the Water Corporation does not have sufficient water supply infrastructure in Byford to facilitate this outcome.

3.9.2.2 Recycled Water Supply

As previously noted, the Shire requires, through the preparation of a Wastewater Re-Use Management Plan as part of local structure planning, the establishment of recycled water infrastructure within the DSP area, to enable residents to have access to alternate water sources. In this regard, should a suitable supply be available at the time of development, a third pipe system will be implemented across the LSP area to provide alternate non-potable water supply options. The third pipe will typically be located along the alignment reserved for water mains – with the potable water main positioned on one side of the road and the recycled water main on the other.

3.9.3 Electricity

Western Power has indicated it has sufficient capacity in its existing infrastructure to service the initial stages of development within the DSP area. As the extent of development increases, Western Power will need to carry out various system reinforcement measures to maintain adequate supply. Ultimately, a new substation will need to be constructed and located northwest of the DSP area.

3.9.4 Natural Gas

Existing gas distribution infrastructure currently terminates at Nettleton Road in Byford. The gas supplier (Atco Gas) has typically required the developer to fund any extensions required to bring its supply mains to the boundary of a new development. Atco Gas has typically funded the costs of reticulation within a development. It is therefore required that the developer fund an extension of several kilometres to the subject site should a gas supply be a required/desired service.

3.9.5 Communications

With the establishment of the National Broadband Network ('NBN'), the developer is required to fund the design and installation of 'pit and pipe' infrastructure suitable for handover to NBN Co. This would include the provision of an empty conduit which can then be used by NBN to haul through the proposed optic fibre network.

3.10 Developer Contributions

The Shire is currently preparing a Development Contribution Plan for the Mundijong Development Contribution Areas, inclusive of the LSP area. The timing for the completion of this Plan is not known at this stage. In the interim, it is understood a Developer Contribution Agreement, similar to that prepared for Byford, will be negotiated between the developer and the Shire.

Developer Contribution arrangements will include both 'traditional' infrastructure and 'community' infrastructure, through statutory processes and in accordance with State Planning Policy 3.6 Development Contributions for Infrastructure.

3.11 Operation of the Local Structure Plan

The Structure Plan is to operate in accordance with the provisions of 5.18 of the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2.

The LSP identifies reserves and zones, including residential densities. Use and development within the LSP area is to be in accordance with the provisions of the Town Planning Scheme No. 2 as if the reserves and zones as depicted on Figure 8 of this report were actual reserves and zones.

Local Development Plans will be required, prior to the clearance of subdivision, in accordance with the provisions of the LSP.

Otherwise, residential development is to be in accordance with the approved Local Development Plans (if applicable), the Residential Design Codes, Town Planning Scheme No.2, and any relevant Planning Policy.

Upon completion of development within the Structure Plan, the Shire will initiate an amendment to the Town Planning Scheme No. 2 to reflect the final zonings.

04 Conclusion

The LSP provides a planning framework to guide the urban development of the subject land. The proposed land uses and road layout are consistent with the planning context provided under the MRS, TPS 2, and the DSP. The structure plan design has been guided by the principles of Liveable Neighbourhoods.

The preparation of this structure plan has been guided by an analysis of the opportunities and constraints within the subject site.

The information provided within this report reflects that the subject site is capable of being suitably developed for urban purposes. Suitable provisions of POS have been made. The site is connected to the surrounding areas through an integrated road layout. Servicing requirements including roads, drainage and utilities have been adequately addressed.

FIGURES

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Part Three
TECHNICAL APPENDICES

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APPENDIX 1

CERTIFICATES OF TITLE

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APPENDIX 2

ENVIRONMENTAL ASSESSMENT REPORT

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APPENDIX 3

LOCAL STRUCTURE PLAN – PRESENTATION PLAN

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APPENDIX 4

CONTEXT ANALYSIS PLAN

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APPENDIX 5

TRAFFIC ASSESSMENT REPORT

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APPENDIX 6

LANDSCAPE STRATEGY

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LOCAL WATER MANAGEMENT STRATEGY

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APPENDIX 8

WASTE WATER RE-USE MANAGEMENT PLAN

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APPENDIX 9

SERVICING REPORT

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APPENDIX 10

NOISE MANAGEMENT PLAN

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