

# MUNDIJONG/WHITBY DISTRICT STRUCTURE PLAN

*AUGUST 2011*

Shire of Serpentine-Jarrahdale



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

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

**22 March 2011**

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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

## MUNDIJONG/WHITBY DISTRICT STRUCTURE PLAN

### CONSULTANT TEAM

#### Consultants

Masterplan WA	Town Planning
Hassell	Urban Design
Tactics 4	Retail and Employment
SKM	Engineering and Servicing
Essential Environmental Services	Sustainability
Laurie Piggott Consulting	Transport
G. Mason/Cardno	Traffic

#### Shire of Serpentine-Jarrahdale

Louise Howells	Project Director
Chris Portlock	Environmental

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## EXECUTIVE SUMMARY

The small rural village of Mundijong and adjoining area of Whitby was rezoned for urban purposes under the Metropolitan Region Scheme in 2006. Since then, the Shire of Serpentine-Jarrahdale has been completing various background studies including undertaking an Enquiry by Design exercise. This process has culminated in the preparation of the Mundijong/Whitby District Structure Plan. The District Structure Plan is bounded by principles and objectives outlined as part of the Enquiry by Design exercise with a focus upon creating a truly sustainable new town which retains its historic rural links.

The District Structure Plan plans for a minimum population of 30,000 and potentially up to 40,000 people dependent upon the final distribution of densities and household sizes. It incorporates provision for a new town centre with the opportunity to ultimately link into the Perth urban rail network and promotes the relocation of the existing freight rail line traversing the subject area to its perimeter in conjunction with the construction of the Tonkin Highway extension.

The District Structure Plan area has been split into seven precincts based on various criteria intended to enable efficient and coordinated development to be progressed. Specific planning, design and development requirements have been identified for each precinct as well as at a generic level across the whole of the District Structure Plan area. These are outlined in Part One – The Policy Framework with the standards within Part One required to be met in order for development to progress. The rationale, objectives and explanatory context is provided within Part Two – Explanatory Report. Dependent upon the specific precinct, one or several Local Structure Plan's could be prepared. There is a general presumption against subdivision until a appropriate local structure planning has been completed.

This local structure planning will be required to deliver the vision and objectives for Mundijong/Whitby outlined within the District Structure Plan.

## PART ONE: DISTRICT STRUCTURE PLAN FRAMEWORK

The District Structure Plan has been prepared to provide overall guidance to the structure, vision and objectives identified for the planning and development of Mundijong/Whitby. It is designed to establish the overall development theme and address major district-wide issues in order to facilitate efficient and coordinated development in a manner that delivers the objectives and vision identified.

The District Structure Plan by its nature is not intended to address detailed planning and design matters but to provide the context for which these matters can be appropriately dealt with as part of further more detailed planning and design.

### 1.0 DISTRICT STRUCTURE PLAN AREA

The District Structure Plan area is as per Plan 1: The District Structure Plan

### 2.0 DISTRICT STRUCTURE PLAN CONTENTS

The District Structure Plan comprises two parts;

1. Part One: District Structure Plan Framework, and;
2. Part Two: Explanatory Report

Part One defines the area, contents and requirements applicable under the District Structure Plan while Part Two outlines the context and vision inherent in the District Structure Plan.

### 3.0 INTERPRETATION

All interpretations shall be as per the Shire of Serpentine-Jarrahdale Town Planning Scheme No. 2.

### 4.0 DATE OF OPERATION

The date of operation shall be the date of adoption of the District Structure Plan by the Shire of Serpentine Jarrahdale pursuant to clause 5.18.3.15 of the Shire of Serpentine – Jarrahdale Town Planning Scheme No.2 (TPS2).

## 5.0 RELATIONSHIP WITH THE SCHEME

The Mundijong/Whitby District Structure Plan (DSP) has been prepared in accordance with clause 5.18 of the Shire of Serpentine-Jarrahdale Town Planning Scheme No.2 (TPS 2).

In accordance with clause 5.18.6.4 of TPS 2 the designations on Plan 1 are provided for guidance only and are not intended to have effect as if included in TPS 2.

## 6.0 GENERAL PROVISIONS

The following general provisions shall apply across the whole DSP area:

- 6.1 Local Structure Plans shall generally be prepared in accordance with the requirements of the DSP and other relevant policy.
- 6.2 There is a general presumption against subdivision in the DSP area until there is an adopted Local Structure Plan.
- 6.2 All Local Structure Plans shall take into consideration and demonstrate compliance with the planning principles, as follows, outlined in Chapter 5 of the DSP Part Two Explanatory Report:
  - 5.2.1 Natural Environment
  - 5.2.2 Built Environment
  - 5.2.3 Sustainable Economic Growth
  - 5.2.4 People and Community
  - 5.2.5 Serpentine-Jarrahdale Council at work
- 6.3 The provision of Public Open Space shall be calculated as per Element 4 of Liveable Neighbourhoods.

In addition to the above and Liveable Neighbourhoods, it is the position of the District Structure Plan that the following shall apply:

- 6.3.4 Locally significant natural areas identified under the Shire of Serpentine-Jarrahdale Local Biodiversity Strategy shall be protected from subdivision and development where possible and may be included within the 10% Public Open Space contribution.
- 6.4 Multiple Use Corridors shall be provided generally in the locations identified within the District Structure Plan. The location, size and dimension of MUC's shall be determined at Local Structure Plan stage based upon the requirements of District and Local Water Management Strategies and LSP design.

- 6.5 Provision of local and for Community Facilities, including the provision of playing fields, to be provided in accordance with the Community Facilities and Services Plan, or as otherwise determined by Council.
- 6.6 Provision of local centres to be generally consistent with the location shown within the DSP. Planning for these centres should be progressed through a 'centre plan' or similar, to be prepared by a suitably qualified consultant and shall define the location, extent and other matters of the centres as outlined in element 7 of Liveable Neighbourhoods. Where a centre is in fragmented ownership, landowners are required to work together to ensure that a coordinated outcome is achieved.
- 6.7 Local structure plans shall provide for a diversity of land uses, lot sizes and housing types to provide for a variety of resident needs and encourage a reliable local economy in accordance with this District Structure Plan.
- 6.8 LSP's shall retain and ensure protection of Bush Forever sites and identify local natural areas to be protected.
- 6.9 Planning and design to make allowance for adequate road and verge widths to accommodate the service alignments of a possible future dual water supply system and the property connections therefrom. The Street Tree and Utility Discussion Paper (WAPC May 2006) recommends the provision of 25% per hectare of road reserve to accommodate these items within the verge. Should investigations support the installation of a third pipe system, developments will be required to include a third pipe system.
- 6.10 Local Structure Plans are required to include a Landscaping Masterplan and Landscape Survey including a visual landscape assessment. The document entitled 'Visual Landscape Planning in Western Australia' – a manual for evaluation, assessment, siting and design (WAPC November 2007) should be used as a guideline for preparation of the landscape assessment. A Landscaping and Vegetation Management Plan will be required at subdivision stage.
- 6.11 Where development is proposed near wetlands, a Wetland Management Strategy is required at Local Structure Plan stage and a Wetland Management Plan in accordance with DEC Guidelines is required at subdivision stage.

6.12 A level 2 flora and fauna survey is required at Local Structure Plan stage. Where the clearing of native and remnant vegetation is proposed a flora and fauna management plan may be required at subdivision stage.

6.13 Such other information as may reasonably be required by the Council or the West Australian Planning Commission (WAPC).

## 7.0 DISTRICT STRUCTURE PLAN PRECINCTS

The District Structure Plan comprises seven (7) precincts. Refer Plan 2: Planning Precincts. These are described following including specific requirements applicable to individual precincts.

### 7.1 Precinct A

#### 7.1.1 Precinct Area

Precinct A is bounded by South Western Highway in the east, Parks and Recreation Reserve to the north, Soldiers Road to the west and Manjedal Brook to the south.

#### 7.1.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for all or a portion of the precinct with the extent of the Local Structure Plan to be confirmed in liaison with the Shire of Serpentine-Jarrahdale.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

#### 7.1.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

- 7.1.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Clause 5.18.2.4
- 7.1.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Schedule 15
- 7.1.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29 (LPP 29)

- 7.1.3.4 The identification of at least a 10 ha site, to the satisfaction of the Department of Education, for the purpose of a public high school in the location indicated within Precinct A within the District Structure Plan
- 7.1.3.5 The identification of two sites for the purposes of public primary schools generally in the location indicated in the District Structure Plan. The final location and size of the primary school sites within a Local Structure Plan shall be determined in accordance with Liveable Neighbourhoods Element 8 and in liaison with the Shire and Department of Education.
- 7.1.3.6 The identification of a site, generally consistent with the location shown within the DSP for the provision of a District Centre. Planning for this centre should be progressed through a 'centre plan' or similar, to be prepared by a suitably qualified consultant.
- 7.1.3.7 The identification of a site for the purposes of a possible future Technical and Further Education (TAFE) campus approximately 10ha in area within proximity of the future District Centre. The following criteria shall apply in determining the final location of a possible TAFE site within a Local Structure Plan:
  1. Adjacent to a Neighbourhood Connector Road
  2. Within 800m of a proposed transport node
  3. Within 800m of the proposed District CentreShould it be identified in the future that the site is not required to be provided for a TAFE, an amendment to any Local Structure Plan is to be considered to remove the requirement for a TAFE site. Any decision to remove the possible TAFE site should be undertaken in consultation with the Shire and the Department of Training and Workplace Development.
- 7.1.3.8 The identification of a future Transit Precinct incorporating the opportunity for Park and Ride facilities as part of the future District Centre.
- 7.1.3.9 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.
- 7.1.3.10 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.
- 7.1.3.11 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and



private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.

7.1.3.12 A foreshore management plan is required for the Manjedal Brook reserve between Paterson Road and South Western Highway (both sides) including actions, roles and responsibilities for implementation. Subdividers within the Precinct may be required to undertake works, in accordance with the established foreshore management plan.

7.1.3.13 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.

7.1.3.14 Such other information as may reasonably be required by the Council or the WAPC.

## 7.2 Precinct B

### 7.2.1 Precinct Area

Precinct B is bounded by South Western Highway to the east, Soldiers Road to the west, Evelyn and Galvin Roads to the south and Manjedal Brook to the north.

### 7.2.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for the entire precinct.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

### 7.2.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

7.2.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Clause 5.18.2.4.

7.2.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Schedule 15.

7.2.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29 (LPP No. 29).

7.2.3.4 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.

7.2.3.5 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or

Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.

- 7.2.3.6 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.
- 7.2.3.7 Subdividers within the Precinct may be required to undertake works, in accordance with the established foreshore management plan.
- 7.2.3.8 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.
- 7.2.3.9 Such other information as may reasonably be required by the Council or the WAPC.

### 7.3 Precinct C

#### 7.3.1 Precinct Area

Precinct C is bounded by South Western Highway to the east, Evelyn and Galvin Roads to the north, Paterson Road to the west and Mundijong Road to the south.

#### 7.3.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for all or portion of the precinct with the extent of the Local Structure Plan to be confirmed in liaison with the Shire of Serpentine-Jarrahdale.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

#### 7.3.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

- 7.3.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Clause 5.18.2.4.
- 7.3.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Schedule 15.

- 7.3.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29 (LPP No. 29).
- 7.3.3.4 The identification of two sites for the purposes of public primary schools generally in the location indicated in the District Structure Plan. The final location of the primary school sites within a Local Structure Plan shall be determined in accordance with Liveable Neighbourhoods Element 8 and in liaison with the Shire and Department of Education.
- 7.3.3.5 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.
- 7.3.3.6 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.
- 7.3.3.7 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.
- 7.3.3.8 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.
- 7.3.3.9 Such other information as may reasonably be required by the Council or the WAPC.

## 7.4 Precinct D

### 7.4.1 Precinct Area

Precinct D is formed by the boundary of the DSP area in the south and east, Mundijong Road to the north and Wright Road to the west.

### 7.4.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for the entire precinct.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

### 7.4.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

- 7.4.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Clause 5.18.2.4.
- 7.4.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Schedule 15.
- 7.4.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29 (LPP 29).
- 7.4.3.4 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.
- 7.4.3.5 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.
- 7.4.3.6 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in explanatory Part 2, Chapter 6, clause 6.2.2(5) of this DSP.
- 7.4.3.7 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.
- 7.4.3.8 Such other information as may reasonably be required by the Council or the WAPC.

## 7.5 Precinct E

### 7.5.1 Precinct Area

Precinct E is bounded by Taylor Road, Adonis Street and Wright Road to the east, the southern boundary of the DSP area to the south, the western boundary of the DSP area to the west and Scott Road to the north.

### 7.5.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for all or portion of the precinct with the extent of the Local Structure Plan to be confirmed in liaison with the Shire of Serpentine-Jarrahdale.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

### 7.5.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

- 7.5.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale Town Planning Scheme Number 2, Clause 5.18.2.4.
- 7.5.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale Town Planning Scheme Number 2, Schedule 15.
- 7.5.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29 (LPP 29).
- 7.5.3.4 The identification of two sites for the purposes of public primary schools generally in the location indicated in the District Structure Plan. The final location of the primary school sites within a Local Structure Plan shall be determined in accordance with Liveable Neighbourhoods Element 8.
- 7.5.3.5 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.
- 7.5.3.6 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in Explanatory Part 2, chapter 6, clause 6.2.2(5) of this DSP.
- 7.5.3.7 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in Explanatory Part 2, chapter 6, clause 6.2.2(5) of this DSP.
- 7.5.3.8 LSP's should confirm the extent of the proposed service corridor to the east of Tonkin Highway and pump station site. The pump station site will need to be set aside for future acquisition by WaterCorp.
- 7.5.3.9 Noise mitigation measures as required under appropriate policy requirements including SPP 5.4 are to be addressed at LSP stage.
- 7.5.3.10 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.

7.5.3.11 Such other information as may reasonably be required by the Council or the WAPC.

## 7.6 Precinct F

### 7.6.1 Precinct Area

Precinct F is bounded by Paterson Street in the east, Keirnan Street to the north, Adonis Street and Taylor Road to the west and Mundijong Road to the south.

### 7.6.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for the entire precinct.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

### 7.6.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

- 7.6.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Clause 5.18.2.4.
- 7.6.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale TPS2, Schedule 15.
- 7.6.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29 (LPP 29)
- 7.6.3.4 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.
- 7.6.3.5 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in Explanatory Part 2, chapter 6, clause 6.2.2(5) of this DSP.
- 7.6.3.6 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in Explanatory Part 2, chapter 6, clause 6.2.2(5) of this DSP.

- 7.6.3.7 Retention of the existing character of the town centre and compliance with the strategies detailed within section 6.10 of the DSP Part Two Explanatory Report.
- 7.6.3.8 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.
- 7.6.3.9 Such other information as may reasonably be required by the Council or the WAPC.

## 7.7 Precinct G

### 7.7.1 Precinct Area

Precinct G is bounded by Soldiers Road to the east, Bishop Road to the north, the western boundary of the DSP area to the west and Kiernan Street and Scott Road to the south.

### 7.7.2 Local Structure Plan Required

A Local Structure Plan shall be prepared for all or portion of the precinct with the extent of the Local Structure Plan to be confirmed in liaison with the Shire of Serpentine-Jarrahdale.

There is a general presumption that no further subdivision shall proceed within the precinct unless subject to an adopted Local Structure Plan.

### 7.7.3 Matters to be addressed

The following matters shall be addressed within a Local Structure Plan:

- 7.7.3.1 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Clause 5.18.2.4
- 7.7.3.2 Matters outlined in the Shire of Serpentine-Jarrahdale TPS 2, Schedule 15
- 7.7.3.3 Matters outlined in the Shire of Serpentine-Jarrahdale Local Planning Policy No. 29
- 7.7.3.4 The identification of one site for the purpose of a public primary school generally in the location indicated in the District Structure Plan. The final location of the primary school sites within a Local Structure Plan shall be determined in accordance with Liveable Neighbourhoods Element 8 and in liaison with the Shire and Department of Education.

- 7.7.3.5 Public Open Space shall be provided in accordance with clause 6.3 above and relevant policy.
- 7.7.3.6 LSP's should establish objectives for built form and any design guidelines that are required to be established, typically as Local Planning Policies or Centre Plans that are required prior to applications for developments and/or subdivision. These should be cognisant of sections 8.8 and 8.9 of the Enquiry by Design Report and should reflect the structure described in Explanatory Part 2, chapter 6, clause 6.2.2(5) of this DSP.
- 7.7.3.7 Landscape design guidelines shall be provided as part of any LSP. These shall address measures to be adopted to implement both public and private landscaping that reflects the historic landscape character of Mundijong/Whitby and should reflect the structure described in Explanatory Part 2, chapter 6, clause 6.2.2(5) of this DSP.
- 7.7.3.8 The LSP's are to acknowledge and allow for appropriate interface to Bush Forever sites.
- 7.7.3.9 Such other information as may reasonably be required by the Council or the WAPC.

## 8.0 IMPLEMENTATION

The District Structure Plan shall be implemented in accordance with the requirements of this District Structure Plan, Town Planning Scheme No. 2 and all other relevant policy requirements.

Relevant cost sharing and infrastructure contribution requirements shall be in accordance with a Mundijong/Whitby District Development Contribution Plan.

Contribution Arrangements may be required to be established and thereafter implemented for both 'traditional' and 'community' infrastructure, to ensure timely and equitable delivery of such infrastructure.

Contribution arrangements may be prepared at both a district level and precinct level. The District Structure Plan does not place a statutory obligation on Council to establish contribution arrangements, nor does Council in its decision-making on any contribution arrangements. Contribution arrangements are required to be progressed in accordance with the Shire's Town Planning Scheme No. 2, State Planning Policy 3.6 and any such other requirements of Council and the Western Australian Planning Commission.







## PART TWO: EXPLANATORY REPORT

### 1.0 INTRODUCTION

The Mundijong/Whitby District Structure Plan has been prepared by the Shire of Serpentine-Jarrahdale to provide guidance for the future planning and development of Mundijong/Whitby. The District Structure Plan applies primarily to the urban and urban deferred zoned area of Mundijong/Whitby and comprises an area of 1,420 hectares. It has been prepared in accordance with relevant protocols and appropriate policy and is the result of an exhaustive process of assessment and consultation.

Mundijong/Whitby will develop into a vibrant and unique town of thirty thousand plus people over the course of the next three decades. It will have its own town centre offering a mix of commercial, retail and residential components and a range of lifestyle experiences. There will be a diverse offering of residential products capable of satisfying the dwelling needs of all phases of the lifecycle, supported by a full range of community and social services.

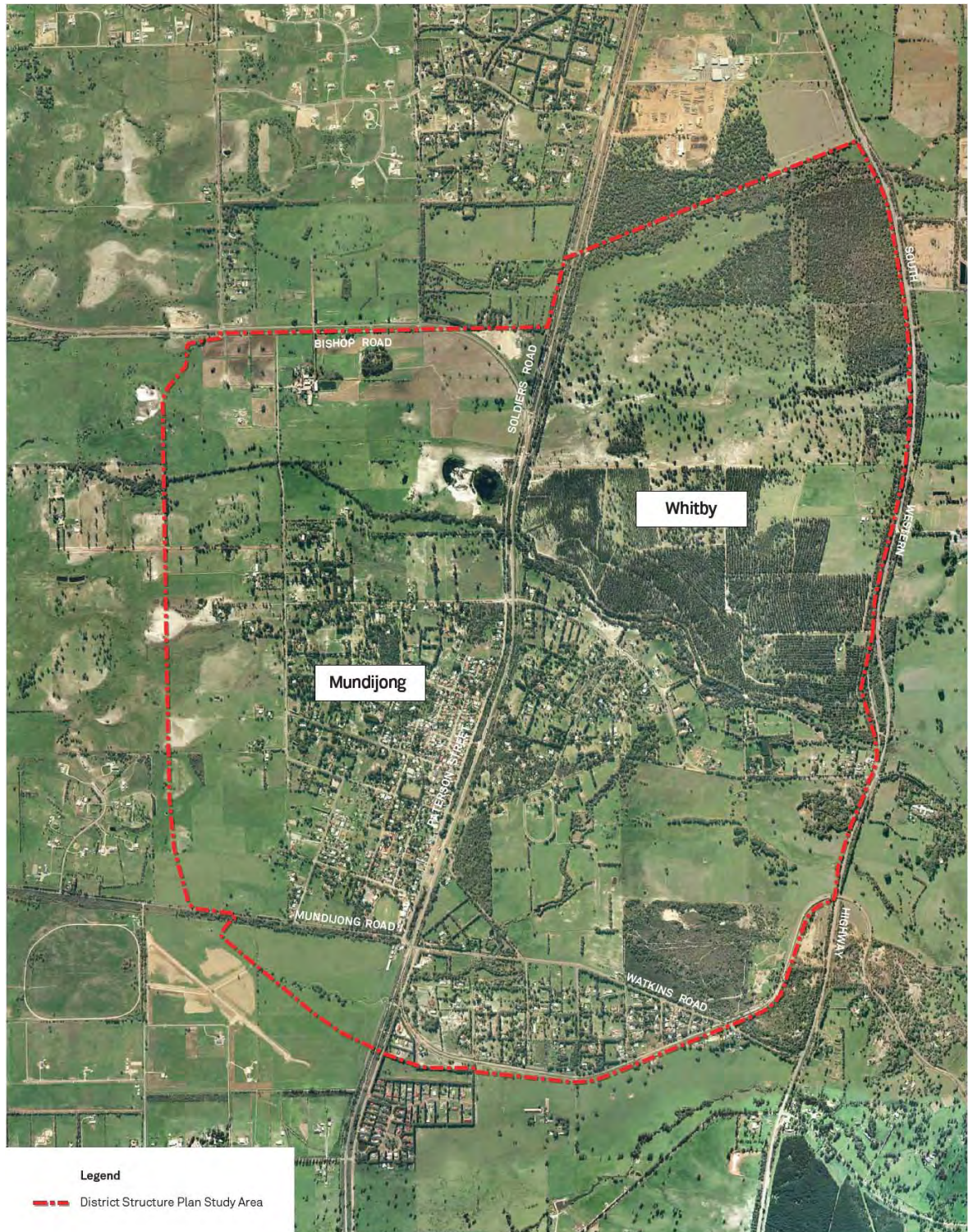
The town will be as economically self-sufficient as possible with structure planning for the town proceeding concurrently with planning for major new employment nodes nearby. Particular attention will also be paid to environmental integrity and a major objective will be achieving the retention of the historic rural character of Mundijong/Whitby where possible as part of the development of a significant new urban centre.

A major objective of the Shire will be to see Mundijong/Whitby become a benchmark for the development of truly sustainable new urban areas, and to be sustainable environmentally, socially and economically. The District Structure Plan will provide the foundation to see this objective become reality.









## 2.0 CONTEXTUAL ANALYSIS

### 2.1 Subject Area

#### 2.1.1 Regional Context

The Mundijong/Whitby District Structure Plan (DSP) Area forms the southern most urban area in the South Eastern corridor of the Perth Metropolitan Region, 40 km south-east of the Perth CBD.

While at the southern end of the South East metropolitan corridor, Mundijong/Whitby is geographically centrally located within the Shire of Serpentine-Jarrahdale. The subject area is well connected to Perth (via Armadale) and Bunbury via the South Western Highway and again to Perth via Mundijong Road and the Kwinana Freeway. The DSP area is also well connected to the Rockingham, Cockburn and Kwinana industrial areas to the west, via Mundijong Road.

The subject area is dissected by a major freight line. This freight line services the Alcoa and Boddington mining areas and connects to the Kwinana Strategic Industrial area and ultimately port facilities on the coast. Significant freight movements occur on a daily basis.

Current land uses to the north, west and south are generally dominated by rural and/or associated agricultural pursuits. The Darling Scarp and State Forest to the east provide an alternative landscape background to the subject area and offer potential for tourism and alternative lifestyle experiences.

A number of major strategic initiatives are already planned or being contemplated which further influences the regional context within which the Mundijong/Whitby DSP must be considered.

The reservation of land immediately adjoining the subject area to the west for the purpose of extending the Tonkin Highway to the South-West Highway will place Mundijong/Whitby at the junction of major regional highways. This will significantly improve regional transport links and more efficiently connect Mundijong/Whitby to the rest of the metropolitan area.

The future construction of this regionally significant road link also provides the opportunity to relocate the existing freight line as part of a combined transport corridor.

Rezoning of land north of Mundijong/Whitby at Cardup has also been proposed from Rural to Industrial under the Metropolitan Region Scheme. This process will provide the opportunity for development of employment and service uses which will support the future population of the Mundijong/Whitby and Byford urban areas.

In addition, strategic regional planning for major industrial sites has identified the area immediately west of Mundijong/Whitby as a potential future major industrial area. This has clear synergies when considered with the future extension of Tonkin Highway and potential relocation of the freight rail line.



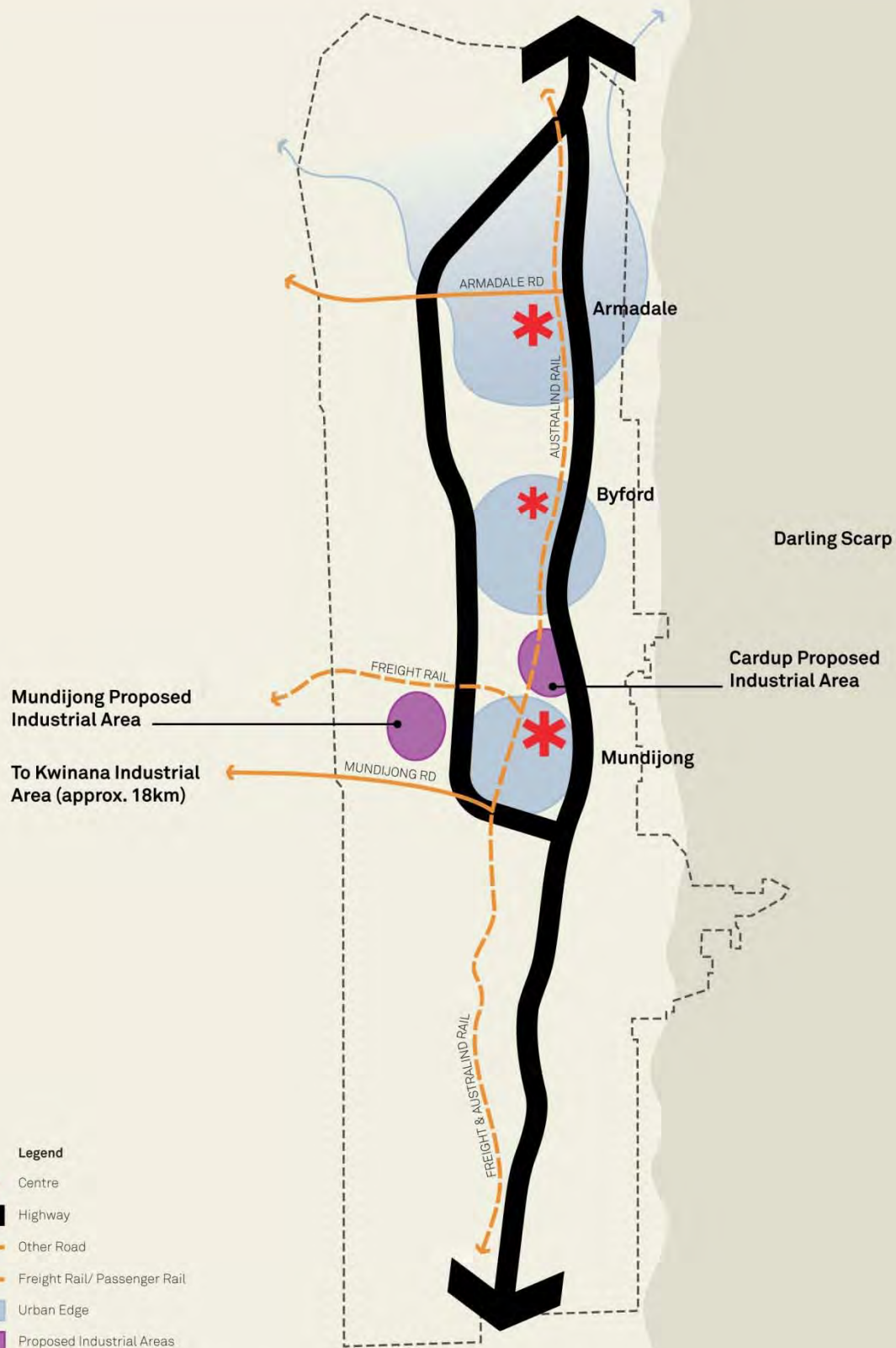


FIGURE 3 REGIONAL CONTEXT PLAN





### 2.1.2 Local Context

The DSP area is formed by the Tonkin Highway extension to the west, a disused Alcoa freight line to the south, Norman and Bishop Roads to the north and South Western Highway to the east. The DSP area is 1,420 ha and encompasses the existing town site of Mundijong as well as areas of existing rural and semi-rural landholdings.

The town site of Mundijong is located in the south western portion of the DSP area. It contains the Shire of Serpentine-Jarrahdale Administration offices, a sporting reserve, a private high school, a primary school, police station, Landcare centre, TAFE training centre, tavern, grocery market, small shopping outlets and takeaway premises.

Residential land is generally centred around the Mundijong town site and decreases in density moving away from the town centre. Beyond the town centre medium sized rural residential properties slowly give way to larger rural properties on the periphery.

The DSP area has an existing road network which generally feeds off the main north south distributor of Paterson Street/Soldiers Road and branches east and west towards the South Western Highway and Tonkin Highway respectively.

While there are substantial remnant pockets of vegetation and bush forever designated areas, the majority of the DSP area has historically been cleared for agricultural purposes. Several significant drainage/creek lines traverse the DSP area.



### 2.1.3 Key Issues and Challenges

Key issues and challenges for preparation of the District Structure Plan were outlined as part of the preliminary Enquiry by Design exercise. These included:

#### 2.1.3.1 Social Issues

1. Maintaining a sense of the existing rural character.
2. Maintaining a sense of community during the transition from a country village to an urban town.
3. Satisfying the objectives of the broader metropolitan planning framework.
4. Maximising human interaction whilst minimising the travel, and particularly car travel, necessary to do it.
5. Retaining a sense of identity to the existing Mundijong settlement.

#### 2.1.3.2 Environmental Issues

1. Retention of good quality bushland.
2. Delivering an urban form that is more energy, water and resource efficient.
3. Achieving a best fit between the natural ecological system and the human ecological system.
4. Retaining sufficient trees to keep some of the existing sense of place.
5. Enhancing and incorporating the creek lines.
6. Managing stormwater run-off from the hills.

#### 2.1.3.3 Economic Issues

1. Creating an environment that encourages businesses to move to Mundijong.
2. Delivering sufficient jobs to reduce the export of labour.
3. Locating commercial activity where it has the most potential to survive and thrive.
4. Achieving high quality development outcomes from a base of relatively low land values.
5. Establishing sufficient residents and workers to justify the extension of the passenger rail service from Armadale.

## 2.1.4 Opportunities and Constraints

A range of both opportunities and constraints to progressing urban development of the Mundijong/Whitby DSP area have been identified. These are listed following:

### 2.1.4.1 Opportunities

1. Majority of DSP area under limited ownership with large scale landholdings enabling co-ordination and development efficiencies to be achieved.
2. Majority of DSP area historically cleared.
3. Future extension of Tonkin Highway will significantly improve intra-regional connectivity.
4. Potential to extend urban rail network to Mundijong/Whitby along existing line from Armadale.
5. Identification of adjoining areas as potential strategic industrial nodes.
6. Potential to relocate existing freight railway as part of construction of Tonkin Highway extension.
7. Attractive setting with a strong landscape background in the form of the Darling Scarp connected to the DSP area via a number of significant vegetation areas (Bush Forever sites) and strong drainage linkages (various creeks).

### 2.1.4.2 Constraints

1. Portions of DSP area historically subdivided into smaller landholdings under multiple ownership.
2. Existing freight rail line severs DSP area.
3. Level terrain of much of DSP area requires innovative urban water management responses.
4. A range of environmental items will need to be addressed, including the presence of wetlands, remnant vegetation, the presence of TEC's and a number of possibly contaminant sites in the vicinity.

The various opportunities and constraints are illustrated graphically in Figure 5.





## 3.0 SITE ANALYSIS

### 3.1 Climate

The south-west of Australia enjoys a Mediterranean climate. It is a mild climate with hot, dry summers and cool, wet winters although in recent years rainfall has been on occasion erratic. Nonetheless, the Perth region is noted for having the most reliable rainfall of any region in Australia, and for having a greater rainfall and longer rain season than any region with a similar geographic position (on the west coast of a southern hemisphere continent). The reliable rainfall usually provides for generous surface and groundwater supplies, and the unique ecosystems and human uses have evolved based on this mild, reliable climate.

The average annual rainfall varies from 800 to 1000 mm on the coastal plain area, increasing to 1200 mm on parts of the Darling Plateau. Bureau of Meteorology records for the Shire are limited to rainfall data at Jarrahdale. The closest indicative weather stations for the coastal plain are Perth Airport in the north and Pinjarra in the south.

Most of the rain falls during the winter when the band of high pressure cells, which is centred over the state in summer, moves north. This allows the low pressure systems to move up from the south. Cold fronts then move across the southwest region bringing precipitation, which is often associated with strong north-westerly winds. This generally produces consistent rain. In the wake of the cold fronts, south-westerly winds often bring showery rain. The heavy consistent rain mostly falls from May to July, while the second type of rainfall seems to be more evenly distributed from May to October. As a result, rain in the second half of the rainy season is more likely to be associated with south-westerly winds following the passage of the cold fronts. This second type of rainfall also increases with proximity to the Scarp, causing the increase in annual rainfall totals from west to east across the Shire.

Table 1: Average Rainfall

Station	Ave Annual Rainfall mm
Jarrahdale	1175
Perth Airport	786
Pinjarra	942

The rainfall patterns over the southwest of the State are strongly influenced by the Leeuwin Current. This warm water current flows south along the western coastline, increasing the moisture in the atmosphere and significantly increasing the amount of rainfall in the southwest. It is also thought to play a role in the relatively reliable rainfall of the southwest region. The stability of this current in the face of global climate change is uncertain, but could be an important factor in determining future rainfall trends.

In summer, the high pressure cells move south, bringing hot, dry conditions. Hot easterly winds are frequent, as are cooling sea breezes from the southwest. The influence of the sea breeze is important in reducing the high summer temperatures, and consequently the amount of evaporation and moisture stress. Decaying tropical thunderstorms will occasionally bring heavy rainfall to the region during summer or autumn.

The climate is currently much drier than it has been since the beginning of the last century. Historically, rainfall patterns in the region vary greatly from year to year and decade to decade. The innate variability of the climate makes it difficult to make long-term predictions, and climatic models also vary. The first half of the 20<sup>th</sup> century had relatively high rainfall but since the 1950s there has been a substantial decline in rainfall coupled with a slight increase in temperature. The decrease in rainfall has centred on the early winter falls, while rainfall between August and October has increased very slightly. Scientists are uncertain how much of this decrease in rainfall is due to natural variability and how much is caused by the greenhouse effect. Nevertheless, current studies strongly suggest that winter rainfall will continue to decline.

Planning for the future urban community of Mundijong/Whitby must acknowledge this situation.

### 3.2 Topography/Soils/Landscape/Views

Ground elevations at the site slope from the western boundary to the north-west point of the site from approximately 25 m AHD to 75 m AHD, reaching a high point of 96 m AHD along the eastern boundary (South Western Highway).

The Swan Coastal Plain is a part of a deep linear trough of sedimentary rocks called the Perth Basin, which extends north-south, parallel to the coastline, for about 1000 km (Wade, 2006). The Mundijong/Whitby Cell consists of three soil types: Forrestfield, Pinjarra and Bassendean. The Forrestfield soils are situated along the undulating foothills of the Darling Scarp. The formation of these soils results from a mixture of colluvium and ancient shoreline

deposits (Wade, 2006). They are predominantly duplex sandy gravels, pale deep sands and deep sandy duplexes, susceptible to water erosion and phosphorus export, particularly in drainage channels and on the steeper slopes (Wade, 2006). The formation of the Pinjarra soils is attributed to alluvial materials deposited across the plain, extending from north to south adjacent to the Forrestfield group, and through the centre of the Shire to its western boundary (Wade, 2006).

In isolated pockets, the alluvial soils are overlain by windblown sand typical of the Bassendean System. These areas are prone to wind erosion, but only minor areas of the remainder of the flats are susceptible to either wind or water erosion (Wade, 2006). Most of the low lying heavy soils are susceptible to water logging and substantial areas have some risk of developing secondary salinity (Wade, 2006).

There are three dominant landforms surrounding the Mundijong/Whitby DSP area; the Darling Plateau, the Darling Scarp and the Swan Coastal Plain. The Darling Plateau lies to the east of the subject area and provides no real influence. The Darling Scarp is the most prominent physiographic feature within the South West of Western Australia. The Scarp's main influence within the Mundijong/Whitby is the effect of developments on views of the Scarp. The Swan Coastal Plain lies to the west of the Darling Scarp and is the dominant landform within the subject area. The Plain is predominantly low-lying with a gently undulating to flat surface.

Three vegetation complexes are found within the DSP area: Forrestfield, Guildford and Beermullah. The Forrestfield Vegetation Complex ranges from open forest of *Corymbia calophylla*, *Eucalyptus wandoo*, *Eucalyptus marginata* to open forest of *E. marginata*, *C. calophylla*, *Allocasuarina fraseriana* and *Banksia* species. Fringing woodlands of *Eucalyptus rudis* occur in the gullies that dissect this complex (Bush Forever, 2000b).

The Guildford Vegetation Complex is a mixture of open forest to tall open forest of *C. calophylla*, *E. wandoo*, *E. marginata* and woodland of *E. wandoo* (with rare occurrences of *Eucalyptus lanepoolei*). Some minor components of this complex also include *E. rudis* and *Melaleuca raphiophylla* (Bush Forever, 2000b). The Beermullah Vegetation Complex is a mixture of low open forest of *Casuarina obesa* and open woodland of *C. calophylla*, *E. wandoo* and *E. marginata*. Some minor components of the complex include closed scrub of *Melaleuca* species and occurrences of *Actinostrobus pyramidalis* (Bush Forever, 2000b). While a majority of the site has been cleared, there are some larger areas of remnant vegetation including five TEC's. The main vegetation features are:



1. Bush Forever Sites 350, 354 360 362 and 365;
2. Manjedal Brook;
3. Gingagup Brook;
4. Cardup Brook;
5. Norman Road; and
6. Manjedal wetland.

There are six community values that have been identified:

1. Aboriginal Heritage Sites;
2. Rural area/lifestyle;
3. Bush Forever;
4. Darling Scarp Views;
5. Flora Roads; and
6. Reserves and wetlands.

Local Planning Policy 8 - Landscape Protection (Serpentine-Jarrahdale Scheme, 2004a) targets areas of high landscape value and aims to maintain the integrity of significant landscape areas and features. In particular, such areas occur all along the escarpment between the railway line and the top of the escarpment in a line of sight ("viewshed") from the South-Western Highway and along some major watercourses.

The following key public viewing areas have been identified within the DSP Area (refer Figure 6: Landscape Protection/Public viewing area):

1. South Western Highway;
2. Norman Road;
3. Taylor Road;
4. North-South Railway line;
5. Manjedal Brook;
6. Cardup Brook; and
7. Gingagup Brook.

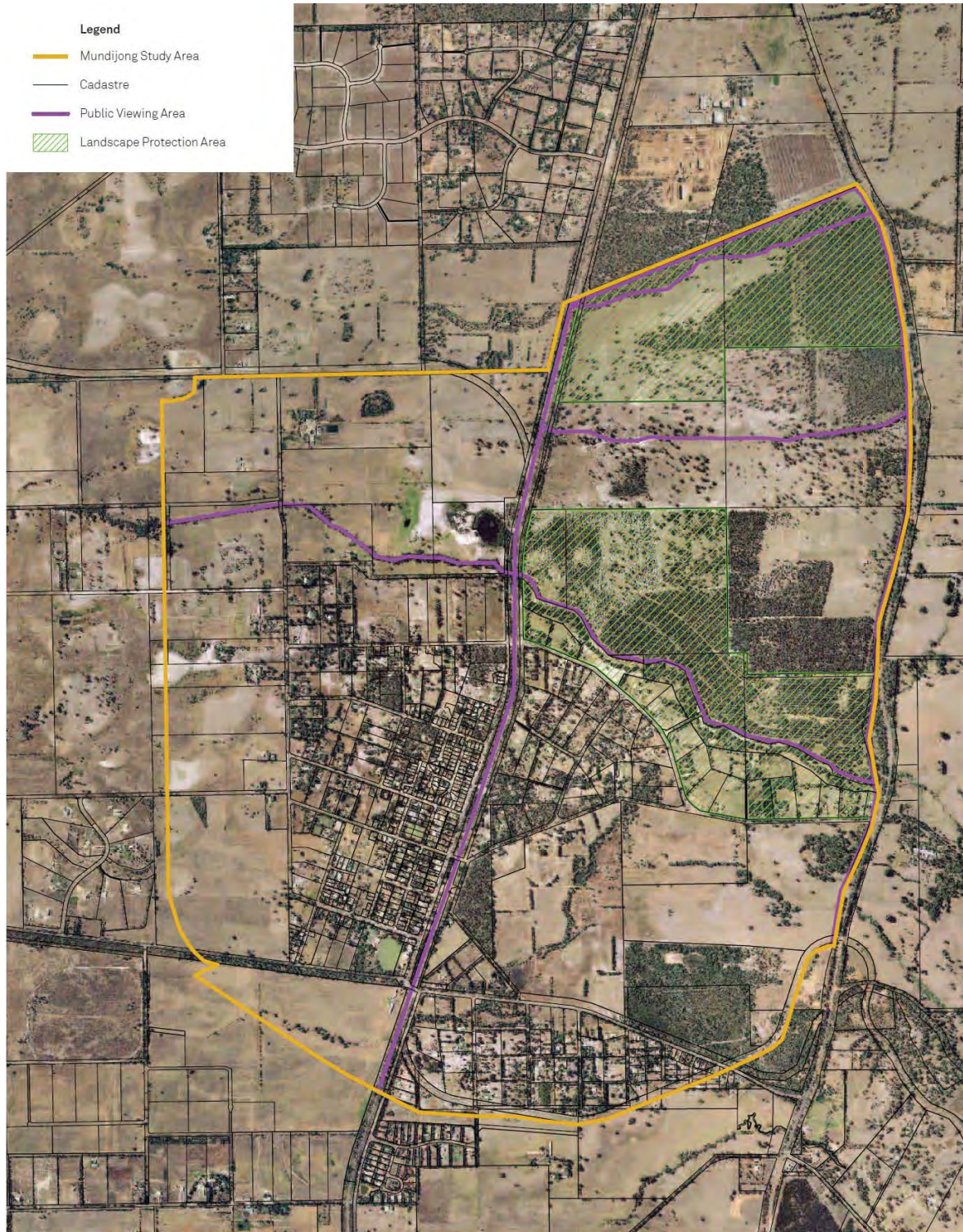


FIGURE 6 LANDSCAPE PROTECTION AND PUBLIC VIEWING AREAS

0 100 400 800m  
Scale 1:30000@A4

A Landscape and Vegetation Management Plan should be prepared that details:

1. protected areas within the DSP area or individual precincts therein;
2. management practices for each area of remnant vegetation;
3. ecological linkages within the DSP area;
4. an approved planting list for gardens and public open space;
5. offset requirements should significant native vegetation require clearing;
6. weed management requirements for the DSP precincts; and
7. hygiene requirements for soil imported into the DSP area.

Lists of plant species for natural areas and gardens within the Mundijong/Whitby area are developed on an area by area basis from a master list “Keeping It Local” maintained by the Shire. As a preference, plants used in gardens, POS and particularly median strips should be local native species with other species subject to approvals based on being non-invasive non-local species.

It is important that fill imported into the cell be free of *Phytophthora cinnamomi* (Dieback) and that it be free of acid sulphate. Local Planning Policy 8 – Landscape Protection Area triggers a Development Application requirement where conditions can be imposed addressing minimising clearing, building heights, use of reflective building materials, lot sizes, planting of fringing vegetation, building envelopes, adequate building setbacks and provision of public open space. Where possible fringing vegetation should be planted to shield new houses from existing railroads, roads and highways and is always required to maintain views such as those scenic views of the Darling Scarp.

Both visual amenity and biodiversity values requiring tree or remnant vegetation retention and management can be addressed during the local structure planning stage. There is also a Landcare/Shire free verge plant program rolled out with a weed control program along road verges and rail tracks which addresses visual amenity enhancement.

### 3.3 Biodiversity Assets and Areas of High Conservation Priority

Threats of species extinction are recognised at two levels:

1. Commonwealth – Flora is protected under the *Environmental Protection and Biodiversity Conservation (EPBC) Act, 1999*; and
2. State – Flora is protected under the *Wildlife Protection Act, 1950*.



The *EPBC Act* and the *Wildlife Protection Act* both identify a series of categories of threatened flora. An EPBC Act Protected Matters Report (DEWHA, 2007a; Appendix 4) and a DEC Declared Rare and Priority Flora Search (DEC, 2007b; Appendix 5) identified a total of 13 species of threatened flora with the potential to occur within the DSP area. A total of three Declared Rare Flora and one Priority Flora species have been so far identified.

Threatened Ecological Communities (TECs) and their associated threat category are assessed by the Department of Environment and Conservation. TECs are identified by the floristic community type (FCT) classification which has been identified and classified based on species composition across the Swan Coastal Plain. TECs are included with a number of other Biodiversity Features and their buffers in areas designated as “environmentally sensitive areas” and protected under the *Environmental Protection Act, 1986* (WA). Scheduled TECs are also further protected at the Commonwealth level under the EPBC Act. There are five State listed TECs within the DSP area, two of which are also protected under the EPBC Act. Where the TEC is a wetland, the buffer distance incorporates the minimum area to protect the wetland from developments with potential to impact hydrology.

The majority of TECs in the DSP area are located in Bush Forever sites. Bush Forever sites are protected at the State level under *State Planning Policy 2.8*. Any clearing proposals for any remnant vegetation, and particularly “environmentally sensitive areas”, require assessment and a licence received through the Environmental Protection Authority’s Clearing regulations assessment process, which can include offset requirements.

The remnant vegetation remaining in the DSP area is generally restricted to the Bush Forever sites, namely sites 354, 350, 362 and 360. The vegetation condition for these sites is mostly good to excellent condition. All local government reserves with natural areas have been assessed using the Natural Area Initial Assessment (NAIA) templates.

Bush Forever Sites are identified as bushland of a vegetation complex with only 400 hectares or less than 10 percent (whichever is the greater) remaining in the Bush Forever Study Area by the WA Planning Commission (WAPC, 2000). It should be noted that other natural areas of regional significance have not been formally identified by the State Government within the Bush Forever Study Area. The principal objective of Bush Forever is to provide a guide for landowners, developers and the community to implement protection to lots that have been clearly distinguished as a Bush Forever site. The statutory policy framework that oversees Bush Forever is *State Planning Policy 2.8* (SPP) under the *Planning and Development Act 2005*.

Bush Forever Site 350 is considered one of the most significant areas of remnant vegetation, recognised by the Shire of Serpentine Jarrahdale as the Soldiers Road Flora Road (Shire of Serpentine-Jarrahdale 1992, Keighery 1996c cited from WAPC, 2000). With Bella Cumming Reserve this Flora Road forms Bush Forever Site 350. The Flora Road is a significant vegetation asset as it contains a north-south transect of plant communities, which is representative of the eastern side of the Swan Coastal Plain (WAPC, 2000). Bush Forever Site 350 also contains three TECs. The vegetation condition along Soldiers Road is considered to be 50% excellent to very good and 50% good to completely degraded, with areas of localised disturbance. The vegetation for the Bella Cumming Reserve is considered to be excellent to very good.

Bush Forever Site 354 contains two TECs. The condition of the vegetation was found to be 90% excellent to very good and 10% good. The boundary of Bush Forever Site 354 has been successfully renegotiated with the WAPC by Urban Pacific. The potential exists to combine this site with Bush Forever Site 361 by closing and rehabilitating Norman Road. This would result in the creation of a very significant conservation area within the North of the Cell.

Bush Forever Site 360 contains plant communities representative of the eastern side of the Swan Coastal Plain that are considered to be regionally significant (WAPC, 2000), and four TECs. The vegetation condition of the site is considered to be 50% excellent to very good and 50% good to completely degraded, with areas of severe localized disturbance. The Department of Environment and Conservation also has the Watkins Road Nature Reserve which is located within the Bush Forever Site and currently undergoing an intensive weed treatment.

Bush Forever Site 362 contains plant communities representative of the eastern side of the Swan Coastal Plain (WAPC, 2000), and three TEC's. The condition of the vegetation has been found to be 90% very good to good and 10% degraded.

Natural areas are any physical area that contains native species or ecological communities in a relative natural state and hence contains biodiversity values (Perth Biodiversity Program – PBP, 2004). Local Natural Areas (LNAs) are natural areas that are outside DEC Managed Estates, Regional Parks and Bush Forever sites. Locally Significant Natural Areas (LSNAs) are verified Local Natural Areas that are in good to better condition and include one or more biodiversity features.

Regional ecological linkages or corridors are natural areas with varying degrees of fragmentation that assist in the movement of fauna and flora. Ecological linkages are achieved when small natural areas are used to connect larger natural areas by forming “stepping stones” to assist the movement of organisms between the larger areas over time. Regional ecological linkages, identified at the State level, and local ecological corridors, described by the Shire, are important to improve the viability of vegetation communities that would normally be too small to be viable if they remained isolated (WALGA & PBP Guidelines, 2004).

Ecological linkages are important as they allow for the movement of wildlife between isolated patches of bushland, particularly movement across the Swan Coastal Plain in an east-west or north-south direction. This provides greater access to potential breeding partners, new habitats and food sources. The movement of animals from one area of remnant bushland to another also helps maintain genetic diversity in plant communities through distribution of pollen and seed.

Greenways link bushland remnants, usually associated with wildlife corridors (actual or potential). Greenways are defined as “networks of land containing linear elements that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use”. Wetlands and waterways networks also play a significant, often overlooked role in the linkage of bushland areas.

The Shire has designated local ecological linkages as multiple use corridors as well as multi-use trails in *Local Planning Policy No. 9 – Multiple-Use Trails within the Shire of Serpentine-Jarrahdale* and the *Local Planning Policy 8 - Landscape Protection*.

The Green Town plan recommends planning of several local linkages based mostly on waterways or multiple use corridors where rehabilitation of these waterways for use as “living streams” will permit the corridor movement of fauna throughout the DSP area.

Should there be any proposals involving the disturbance of any remnant vegetation, particularly Environmentally Sensitive Areas (ESAs, which include DRF, TECs, Conservation Category Wetlands and other Biodiversity Features and their buffers) or Potentially Significant Local Natural Areas (PSLNAs), the involvement of the Department of Environment and Conservation and in some cases the Federal Government Department will

be required, including clearing permit applications. These will likely attract some Offset proposals should they be supported. Where necessary, fences should be upgraded.

Regional Ecological Linkages within Mundijong/Whitby have been identified and these will also need to be considered and incorporated into the District and Local Structure Plans, with recommendations for specific relevant management such as vegetation retention or revegetation. Where possible, significant hollow-bearing trees located in cleared pasture land adjacent to remnant vegetation areas should be preserved to facilitate the movement of fauna across the landscape and provide breeding and shelter resources for significant fauna such as the federally protected species of Black Cockatoos.

Prior to commencing work in areas of remnant vegetation, field investigations for Specially Protected (Threatened) Fauna should be undertaken. If identified these species should be protected in accordance with the Wildlife Protection Act 1950. In particular, protection and enhancement strategies will need to be developed for Regional Ecological Linkages and local ecological corridors which often occur along railroads, roads and scenic highways.

### 3.4 Contaminated Sites, Acid Sulphate Soils, Odour, Fill and Excavation

A search conducted on 4 December 2007 of the DEC records of known or suspected contaminated sites, the Public Database of Confirmed Contaminated Sites (under development) and the Perth Ground Water Atlas identified one area (2 Jarrahdale Road) as “contaminated remediation required”. This site is situated outside of the DSP area to the south-east and therefore is not a significant concern for the DSP.

A Preliminary Site Investigation (PSI) of potentially contaminated sites within the DSP area was undertaken as part of the Environmental Study for the District Structure Plan. Potentially contaminated sites were identified based on consultation with the Shire of Serpentine Jarrahdale and a review of previous environmental studies. The sites investigated for this PSI included:

1. Dairies (Lots 2/11 Taylor Road)
2. Poultry (Lot 2 Adamson Street)
3. Garden Hire Business (Lot 410 Watkins Road)
4. Lots 100/101 (Keirnan Road - Stockfeeds)
5. Reserve 37149 (Adjacent to Lots 4396, 139 Watkins Road – old landfill)
6. Lots 48/50/221/222 (Butcher Street - Council Depot)
7. Lot 180 (Shanley Road – Telecom Tower)
8. Lots 200/201 (Shale Road – Cardup Landfill)

9. Lots 2/20/21/60 (Norman Road - Timber mill)
10. Reserve 7125 (South Western Highway – Motorcross track)
11. Lots 4396/139 (Bush Forever site 360 - Mundijong Rubbish Tip Road – Old Landfill)
12. Decommissioned mine Lot 5
13. Reserve 37149 (Watkins Road - Council pound).

All of the sites are located within or in close proximity to the DSP area.

The investigation was completed in accordance with the DEC Contaminated Sites Guidelines, which is part of the *Contaminated Sites Management Series: Reporting on Site Assessments 2001*. The *Contaminated Sites Act 2003* (Act) defines contamination as a substance present on land, water or site at levels above background concentrations and at high enough concentrations, such that it presents, or has the potential to present, a risk to human health, the environment or any environmental value. Under the Act it is a requirement for people to report sites they know, or suspect, are contaminated to the DEC.

The objectives of the Preliminary Site Investigations were to:

1. Assess identified potentially contaminated sites, within or adjacent to the Cell, probable contaminants and their possible locations;
2. Identify potential sources of impact, transport mediums, preferential pathways and sensitive receptors;
3. Assess if potential contamination poses an actual or potential risk to human health and/or the environment; and
4. Provide recommendations in accordance with DEC guidelines.

Risk Assessment is an integral part of all contaminated site investigations. All sites assessed in this PSI have been considered with respect to their risk potential. The DEC states that for a site to be considered “contaminated” there needs to be a risk (i.e. a source, pathway and receptor) that has either materialised or has the potential to materialise (DEC, 2006a). The conclusions provided for each site have been developed based on the risk potential.

The land use planning process also plays a crucial role for the identification and subsequent management of unknown contaminated sites. In essence, this process operates in parallel to the *Contaminated Sites Act 2003*. The level of consideration and detail paid to contamination issues varies depending on the level of planning at which the proposal is being assessed (e.g. strategic plans, structure plans, scheme amendments to subdivision



and development) (DEC, 2006b). The DEC recommends that, before making a determination on a proposal, planning authorities take into account that contamination in most cases is manageable and, in terms of subdivision and development applications, issues can commonly be mitigated by the application of appropriate conditions. Potential soil and/or groundwater contamination must, however, be identified and managed or remediated, if necessary, prior to any development activities.

A significant portion of the subject area is agricultural land. The DEC has documented a number of potential causes of contamination that are commonly associated with rural activities (DEC, 2004c), including:

1. Current or historical arsenic-based sheep or cattle dips - especially if they were unlined or sludge/residue was disposed of on-site;
2. Uncontrolled landfills and rubbish dumps - particularly sites where unused chemicals were disposed of on-site and leachate from landfills may enter surface water or groundwater;
3. Areas of land where fertilisers, pesticides or herbicides were not applied in accordance with manufacturer recommendations and therefore elevated concentrations may be present in the soil;
4. Large spillages of hazardous chemicals or fuels which have impacted soil and may impact groundwater and surface water; and
5. Storage of disused chemicals, particularly where these have the potential to leak into the soil, surface water or groundwater.

The *Mundijong/Whitby District Structure Plan Environmental Scoping Paper* (Land Insights, 2006) identified a number of sites within the subject area considered to contain potentially contaminating activities and requiring further investigation. An inspection of these sites and others identified through consultation with the Shire of Serpentine Jarrahdale was conducted on 17 October 2007 to produce a list of the sites identified for inclusion in this assessment.

As part of the *Environmental Scoping Paper* (Land Insights, 2006) preliminary investigations were undertaken to identify potential contaminated sites within the Cell. The list of potentially contaminated sites identified in this study was incorporated as the baseline data for this Preliminary Site Investigation. The parcel of land considered in this PSI included ten adjoining lots between South Western Highway, Norman Road, Soldiers Road and Manjedal Brook (north of Kiernan Road).

The PSI included Lots 22 to 27, 29 and 45 South Western Highway and Lots 302 and 399 Reilly Road. Various zoning classifications applied to the land parcels. The PSI determined there were no environmental concerns with the majority of the site. However, nine areas of potential site contamination were identified.

The study concluded that given past and present use, it is unlikely that the potential sources of contamination detected will have resulted in significant soil or groundwater impacts. However, it is recommended that further investigations (including sampling) be undertaken to confirm this.

Storage of chemicals and use of chemicals on-site in rural properties, decommissioned landfill or mine sites and in other areas such as depots will need to be identified further in some areas. Should any change of land use be proposed, further investigations would be required in some areas where constraints on development due to contamination potential may be conditioned.

The Cardup Landfill Site receives various wastes, including non-hazardous inert (type 1 and 2), putrescible, commercial/industrial, low hazardous wastes special waste (type 1 and 2), asbestos, clinical and related wastes, clean fill uncontaminated soil, contaminated soil (special purpose fill), and low-level contaminated soil. This site is not considered a significant issue for the redevelopment of the DSP area, assuming the present land uses for the site remain. The site is situated outside of the DSP area, east of South Western Highway, and the landfill has a clay underlining, primary lining membrane and covering protective fabric (Koltasz-Smith, 2006). The lining alleviates the risk of leachate entering the soil and groundwater below the landfill, which suggests the risk of possible contamination down gradient into the Cell. An odour buffer exists for this Landfill Site which will need to be taken into consideration with proposed residential development.

Any decommissioned land fill or mine sites may require remediation. The EPA has outlined guidelines to achieve appropriate remediation of contaminated land. The guidelines are based on two principles:

1. "Contaminated materials shall preferably be either treated on-site and the contaminants reduced to acceptable levels, or be treated off-site and returned for reuse after the contaminants have been reduced to acceptable levels; and
2. Disposal of contaminated material to an approved waste disposal facility or landfill or 'cap and contain' management options will only be considered if:

- Treatment of the contaminated material is shown or demonstrated not to be practicable;
- The options to dispose to landfill or 'cap and contain' are undertaken in an environmentally acceptable manner; and
- The risk of disturbance of the contaminant exceeds the risk of leaving it undisturbed and contained on-site."(EPA, 2000).

The EPA specifies that while the Guidance Statement only relates to remediation of contaminated land, water resources cannot be discounted with respect to identifying a suitable remediation option (DEC, 2004a). This is of particular relevance where there are extensive groundwater resources that are at high risk of contamination from surface land uses.

The Guidance Statement states that maintaining the environmental integrity of groundwater resources after remediation has stopped is very important and, as such, the levels of contaminants in any soil that has been treated and/or replaced must be sufficiently low to ensure groundwater will not continue to be contaminated (DEC, 2004b).

#### 3.4.1 Acid Sulphate Soils

Should excavations deeper than three metres be proposed in High or Medium ASS risk areas, ASS investigations should be conducted. Any groundwater abstraction from the cell should not exceed levels that would result in ASS exposure.

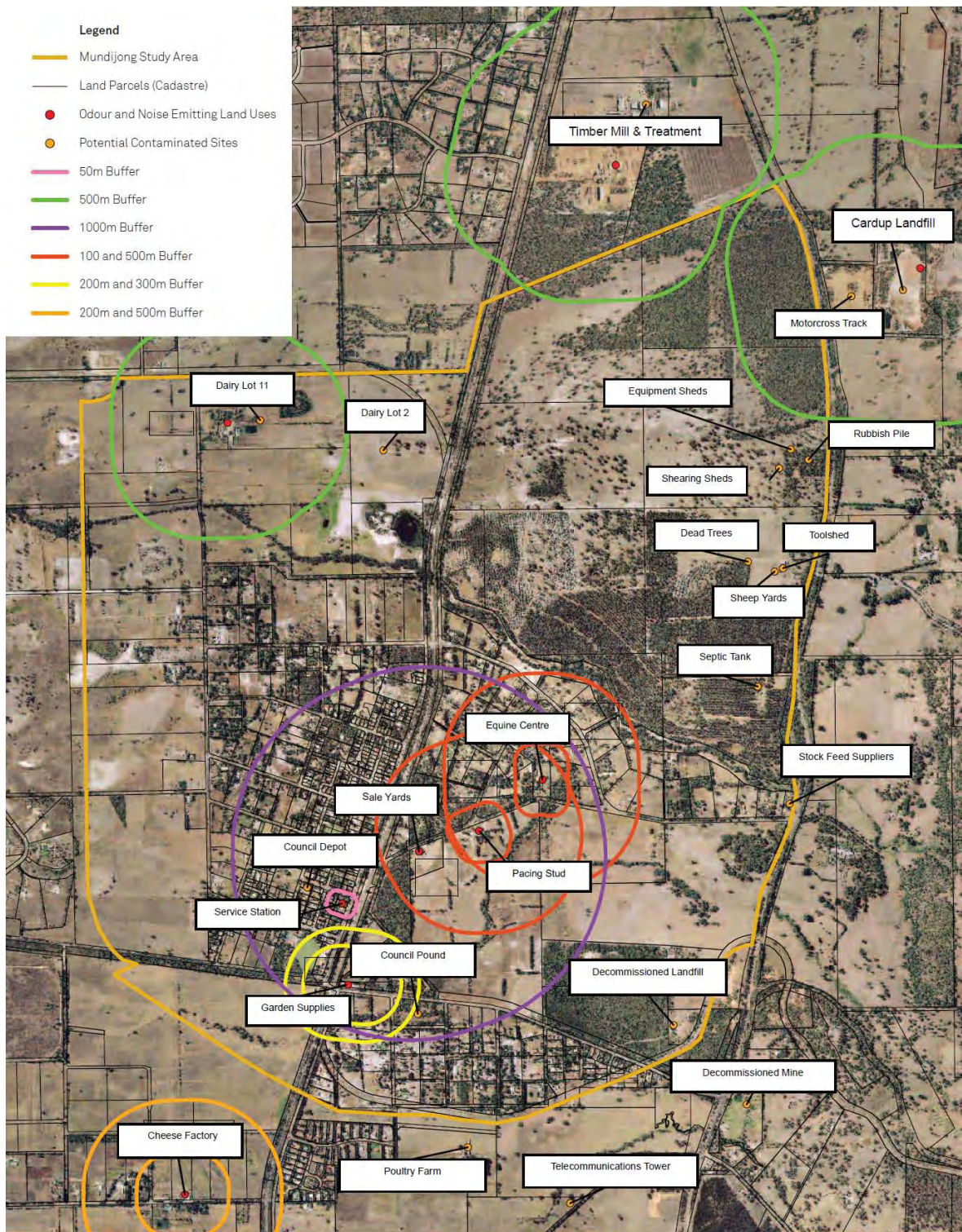
#### 3.4.2 Odour

No odour-sensitive development should occur within the buffer zones of existing odour-emitting premises. No new odour-emitting premises should be constructed such that existing odour-sensitive premises are within the buffer zone.

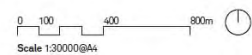
#### 3.4.3 Fill and Excavation

Any properties requesting fill, excavations such as dams, removal of Town Planning Scheme protected trees or the development of stables will require Shire Development Application and Approval.





**FIGURE 7 NOISE, ODOUR AND POTENTIAL CONTAMINATION**



### 3.5 Vegetation/Flora/Fauna

The Mundijong/Whitby District Structure Plan area is part of the Southwest Botanical Province which is considered a global biodiversity hotspot (DEC, 2006d). It is located within the Swan Coastal Plain Bioregion and is dominated by vegetation of the Pinjarra Plain and Bassendean System. Vegetation of the Pinjarra Plain in the study site is represented by *Corymbia calophylla* (marri) open forest and the Bassendean System by banksia low woodland, generally *Banksia attenuata* (slender banksia), *Banksia menziesii* (firewood banksia), *Banksia ilicifolia* (holly-leaf banksia), *Eucalyptus tottiana* (coastal blackbutt) and *Nuytsia floribunda* (Christmas tree).

Flora survey information so far compiled has identified 393 taxa, comprising 55 families and 183 genera. A total of 59 introduced (weed) species have been identified to date.

The Shire is in the process of implementing its Local Biodiversity Strategy. Potentially Significant Local Natural Areas have been assessed and are being assessed progressively to Verified Natural Areas. Significant where condition is good or better and where the targeted vegetation complex has one or more biodiversity feature (i.e. Declared Rare Flora, Threatened Ecological Community or has an area within a Regional Ecological Linkage). All local government reserves with natural areas in the Shire have been assessed using the Natural Area Initial Assessment (NAIA) templates. The percentage remnants of each complex within the study area are now known and the review of the protection priority for all remnant vegetation within the DSP area can now be undertaken through assessment of vegetation condition and the presence of one or more biodiversity feature.

The DSP area originally contained the Beermullah, Guildford and Forrestfield vegetation complexes, however due to clearing, there are only remnants of the Guildford and Forrestfield vegetation complexes remaining. Vegetation complexes are considered to be significant if there is currently less than ten percent ( $\text{current extent/original extent} \times 100$ ) remaining. Any developments that are likely to impact on significant vegetation complexes will trigger the formal EIA process under the *Environmental Protection Act, 1986* as outlined in *EPA Guidance Statement No. 10* (Environmental Protection Authority (EPA), 2003a).

The Forrestfield complex is significant as only nine percent remains on the Swan Coastal Plain and only three percent of the original extent remains within the Shire. The Guildford complex is significant as only six percent remains on the Swan Coastal Plain and only five percent of the original extent remains within the Shire. The DSP area contains



approximately 6.3% of the Shire's Guildford Complex. This represents a significant area of the Guildford vegetation complex within the Shire.

The DSP area contains approximately 189 ha of remnant native vegetation made up of the Forrestfield and Guildford vegetation complexes. Based on previous vegetation surveys 13 Floristic Communities Types (FCT) have been identified within the DSP area. With approximately 88.7% of the Study Area cleared, all remnant vegetation regardless of condition is significant.

The current extent of remnant vegetation in the Shire is less than ten percent of each of the original vegetation complexes. This is considerably lower than the recommended 30% mark, based on the first principle for local biodiversity planning and conservation (PBP, 2004), which proposes "retention of at least 30% of the pre-European extent of each ecological community". Thus the retention of existing vegetation and use of appropriate local native species for rehabilitation and revegetation is a high priority.

Despite the region's rich agricultural history, increasing urbanisation and the impacts of landclearing in reducing the extent of contiguous native vegetation units on this portion of the Swan Coastal Plain, large tracts of remnant vegetation still occur within the subject area. Several studies pertaining to the fauna of the eastern side of the Coastal Plain suggest a rich and diverse suite of faunal assemblages still exists.

The most significant bushland areas are situated in the north-eastern corner adjacent to Norman Road and South Western Highway, and the south-eastern corner on Watkins Road, and along the road and rail reserves of Mundijong Road and Paterson Road and are part of the previously described Bush Forever sites

As each of these remnants is large in size and in relatively good condition, each of these sites are considered potentially significant fauna habitats.

A total of four native mammal and two introduced mammal species, six amphibians, 12 reptiles and 24 birds have been recorded at sites within the subject area.

The *Wildlife Conservation Act 1950* is the primary legislative instrument concerned with the protection of native fauna in Western Australia. The Act confers on the Minister the authority to specially protect native fauna species at risk of extinction through provisions which enable threatened species to be listed under a series of schedules.

The *Environmental Protection & Biodiversity Conservation Act 2000* is a federal legislative instrument that aims to protect threatened native fauna on a national scale. Species listed under this section of the Act are considered to be matters of National Environmental Significance (NES).

Where native vegetation is proposed to be cleared, a flora survey may be required which identifies vegetation complex, condition and if any biodiversity features are present to determine Local Natural Area significance. Clearing of native vegetation should not be supported unless authorised by a DEC Clearing Permit or is exempt under Schedule 6 of the *Environmental Protection Act 1986* or Regulation 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Fauna Management Plans are often required when clearing is proposed of remnant vegetation. Retaining habitat trees and/or vegetation where possible and the relocation of fauna species may be conditioned if necessary.

An introduced animal management plan is in implementation phase by the Shire of Serpentine Jarrahdale in conjunction with Landcare, which includes baiting, fencing and community education. The focus of these types of management plans, in addition to education, includes restricting domestic cats and dogs from entering natural area reserves, establishing buffer zones (e.g. cat buffer exclusion zones) around key natural assets, limiting the number of cats per household and requiring cat owners to register their cats with the Shire.



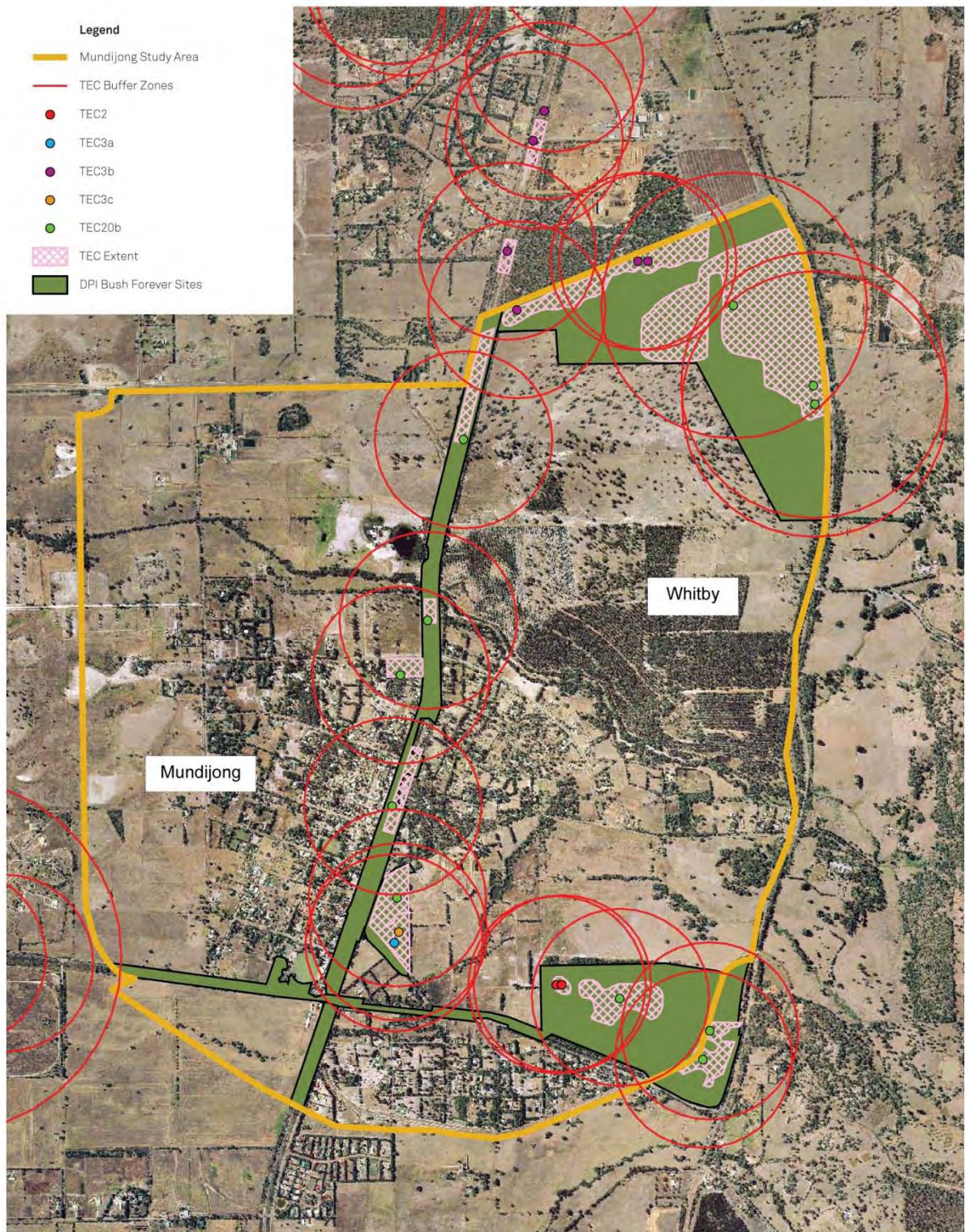
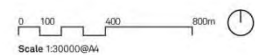


FIGURE 8 TEC'S AND PLANT COMMUNITIES





### 3.6 Surface and Ground Water

Surface water in the Shire of Serpentine Jarrahdale drains to the Serpentine River and ultimately the Peel Harvey Estuary. Surface hydrology in the DSP area has four surface flows:

1. Manjedal Brook traversing the DSP area from east-south-east to west-north-west;
2. Cardup Brook flowing east-north-east to west-south-west;
3. Gingagup Brook flowing east to west; and
4. A smaller unnamed ephemeral streamline (Stream A) flowing north-north-east to south-south-west.

Stream flows have not previously been gauged; however, previous investigations have estimated flow for Manjedal Brook as approximately 8.3ML/day in winter and 1.6ML/day in summer (Collins and Rosair as cited in Cardno BSD Pty Ltd, 2006).

There are five major sensitive environmental receptors within DSP area (Figure 20):

1. Shallow superficial groundwater tables occurring slightlying north-east of centre of the cell;
2. Wetlands and watercourse occurring within the project area;
3. TECs;
4. DRF; and
5. Bush Forever sites.

Urban development is also likely to result in changes in surface and groundwater hydrology. This has the potential to pose a significant threat to flora within the cell. Many flora and vegetation communities are strongly influenced by water availability caused by modified water regimes and hydrological imbalances. Wetlands are particularly vulnerable to water regime changes as well as upland vegetation such as banksias which are sensitive to lowering ground water tables.

Urban development can result in:

1. Increased volumes and velocity of stormwater runoff;
2. Decreased stormwater infiltration; and
3. A reduction in groundwater recharge.

Groundwater levels can be further reduced should garden bores be established. Draw-down of groundwater can cause serious detrimental effects, potentially resulting in the death of the groundwater-dependant vegetation. To ensure that the development of the DSP area has a

minimal impact on the groundwater-dependent ecosystems within and surrounding it, the following strategies should be implemented in collaboration with the Department of Water:

1. Determine the acceptable level of groundwater abstraction and hence the number of bores permitted and their specified abstraction rate;
2. Design all new developments within the DSP area to ensure maximum recharge of groundwater; and
3. Establish unit discharge that is representative of pre-development levels.

No development should ideally occur within important wetlands, significant natural areas or wetland or significant natural area buffers. New subdivisions should ensure that Lot boundaries do not intersect important wetlands, natural areas or their buffers and prospective purchasers of land containing an important wetland, natural areas or their buffers should be made aware of development restrictions through restrictive covenant, conservation covenant or reservation.

Where future subdivision has the potential to impact on streams such as Manjedal Brook, a foreshore management plan should be prepared by the subdivider for approval. All remnant vegetation, fringing vegetation and ecological linkages associated with the wetlands and water courses should be maintained. Access to wetlands should be controlled/restricted by using paths, fences and gates. The exact nature of these measures should be determined during Local Structure Plan stage.

Impacts from fill, excavation, fertiliser or chemical application, groundwater or wetland water abstraction, waste disposal or drainage into or out of important wetlands should all be considered with any development application.

Discharge of stormwater may be permitted into a wetland if consideration has been given in the context of a water management plan.

Water Management Strategies should be produced at the Local Structure Plan stage to ensure that any existing inappropriate stormwater disposal to wetlands or water courses are replaced and that water management at the site is in accordance with relevant policies. Where development is proposed near a wetland, a wetland management plan should be prepared and include the following:

1. the wetland's buffer distance;
2. the proposed management of water within and in and out of the wetlands;
3. the management of groundwater and its recharge;

4. any approved groundwater abstraction allowances;
5. any required rehabilitation of the wetland(s);
6. site monitoring; and
7. the management of Acid Sulphate Soils (where applicable).

Wetland Management Plans are also to be prepared in accordance with EPA Guidance Statement No.33 (Chapter B4), which outlines the requirements for wetland management.

Current watercourses are maintained or enhanced to living streams wherever possible. Fill brought in is designed for maximising phosphorous retention time. Drainage in most cases is designed to minimise risk of erosion and maximise infiltration while decreasing any water-logging or flooding impacts. Any development is designed so that suitable fill material and drainage can be provided.

Residents, both rural and urban, should be educated *and encouraged to use* slow release fertilisers. Wetlands or watercourses are rehabilitated to restore them to living streams, wherever possible consistent with local planning policies. State government agencies such as the Department of Water control acceptable levels of groundwater abstraction and hence the number of bores permitted and their abstraction rate. With new developments maximum recharge of groundwater is considered. District and Local Water Management Strategies and Plans are required which comply with relevant State and local policies, strategies and guidelines.

The following principals are identified in Shire local planning policies:

1. Maximising the infiltration of stormwater;
2. Ensuring unit discharge is representative of pre-development levels; and
3. Designing drainage to minimise the risk of water erosion, nutrient export, water-logging and flooding.



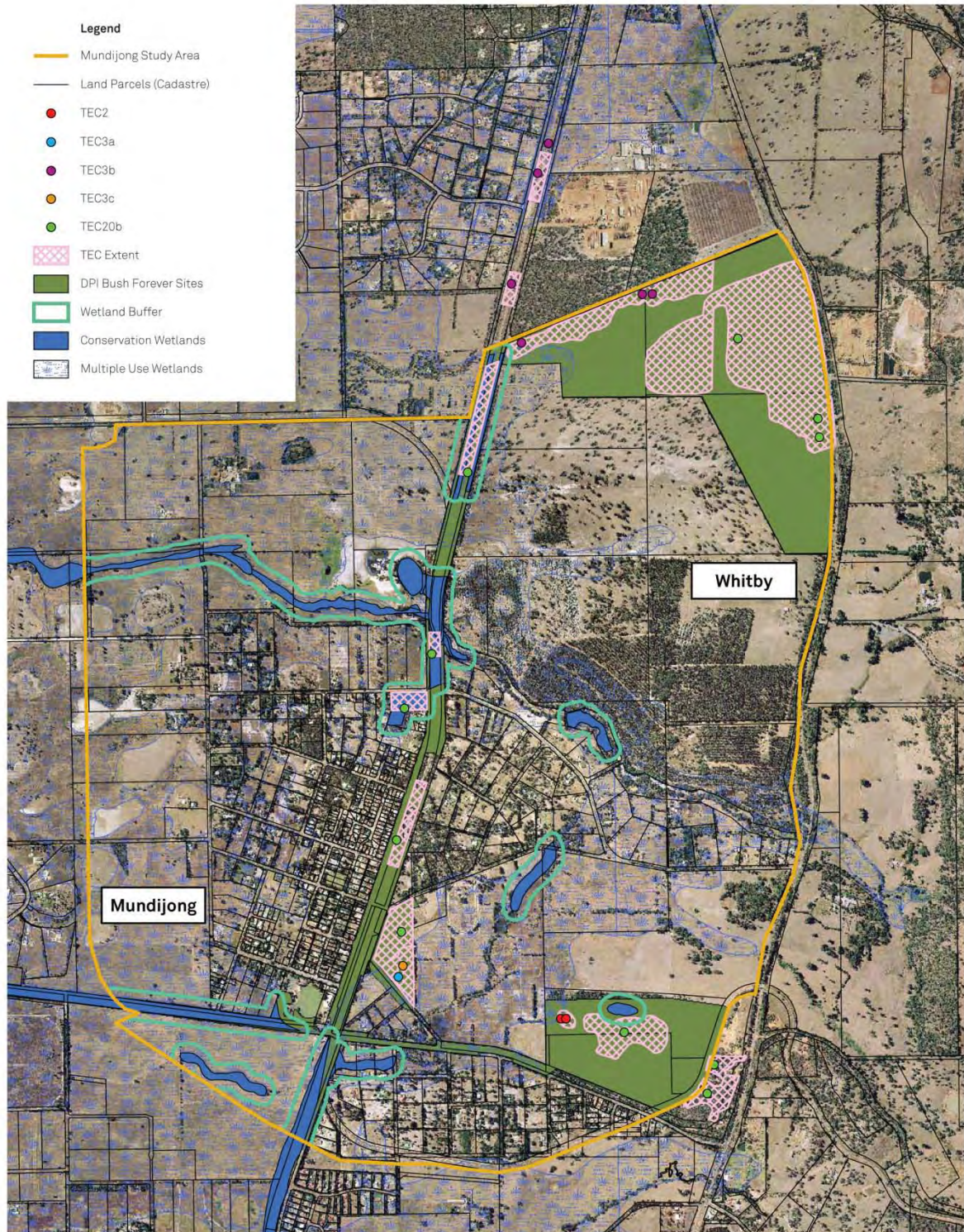


FIGURE 9 MAJOR SENSITIVE ENVIRONMENTAL RECEPTORS

### 3.7 Cultural Heritage Features

#### 3.7.1 Indigenous Heritage

The broad definition of environment in the Environmental Protection Act clearly encompasses the physical environment, including heritage matters. Given the overlap with the *Aboriginal Heritage Act 1972* (AH Act), the EPA has developed a guidance statement to reduce duplication of requirements for information and to make them as complementary as possible:

1. Where Aboriginal heritage is likely to be important it can be identified as an issue to be addressed by the proponent (this is a reminder to the proponent to provide information so that the EPA can consider whether or not Aboriginal heritage is a *relevant environmental factor*);
2. On the basis of information provided to it in the environmental review document and submissions, consider whether Aboriginal heritage is a *relevant environmental factor*;
3. Where Aboriginal heritage is a *relevant environmental factor*, a report can be required on the implementation of the proposal in relation to resulting changes to physical and biological attributes of the environment which may impact on the heritage significance of those attributes to Aboriginal people; and
4. Where it is possible that Aboriginal heritage is a *relevant environmental factor*, the proponent should demonstrate that the relevant Aboriginal heritage issues have or will be identified (to the satisfaction of the Department of Indigenous Affairs) and that the proponent has properly considered how to minimise any adverse impact by the proposal on heritage values.

The EPA *Guidance Statement 41: Assessment of Aboriginal Heritage* outlines actions which may be pertinent to the factor of Aboriginal heritage. They are:

- Consult with staff of the Department of Indigenous Affairs and review any site records (desk-top review) in accordance with the Aboriginal Heritage Act; and
- Undertake an Aboriginal heritage survey (if it is noted from a desk-top review that an adequate survey has not been undertaken for an area to be developed).



An adequate survey will need to include both consultation with appropriate Aboriginal people, and may include an anthropological survey and, if necessary, an archaeological survey. An adequate survey will need to:

- Inform the relevant Aboriginal people about details of the proposed development, including potential environmental impacts;
- Consult with relevant Aboriginal people to enable them to make known to the proponent their concerns in regard to environmental impacts as they affect heritage matters; and
- Demonstrate that any concerns raised by Aboriginal people have been adequately considered by the proponent in its management of environmental impacts, and any changes as a result of this process are made known to the relevant Aboriginal people.

The South West Land & Sea Council (SWLASC) is consulted in relation to all matters pertaining to Aboriginal heritage sites.

The Swan Catchment Council (SCC)'s 'one-stop shop' to help simplify the Aboriginal consultation process to ensure that all the requirements of a Section 18 Notice are met by the proponents such that consultation with the appropriate representatives of the relevant Aboriginal people can be facilitated.

Further ethnographical and archaeological surveys are proposed in the south-east of the subject area, should this area be subject to development under that Structure Plan, as previous surveys were unable to locate this site and assess its significance.

### 3.7.2 Non Indigenous Heritage

The identification of, and protection measures for, areas within the District Structure Plan with the greatest cultural heritage conservation value can be done by Local governments establishing and maintaining an inventory of buildings (Municipal Inventory) within its district which in its opinion are, or may become, of cultural heritage significance. Local government is required under Section 45 of the Heritage of Western Australia Act 1990 to prepare such a Municipal Inventory (Heritage Council of Western Australia, 2007b).

The State Register provides official recognition of a place's cultural heritage significance to Western Australia and assists the Heritage Council to identify,

provide for, and encourage the conservation of heritage places (Heritage Council of Western Australia, 2007a). The State Register legally protects a site's significant cultural heritage from any changes. Any development proposals regarding a registered place must be referred to the Heritage Council for advice.

The objective of the local government heritage inventories is to assist local governments to:

- Provide a cultural and historic record of the local district;
- Determine local government conservation policies; and
- Provide information about local heritage that may be required under a town planning scheme for that district.

Places entered in a Municipal Inventory do not have legal protection unless they are listed in a separate Heritage List linked to the local Town Planning Scheme, or are already entered in the State Register of Heritage Places.

There are thirteen sites within the DSP area that are listed on the Shire of Serpentine Jarrahdale's Municipal Heritage Inventory. Eight of these sites are all linked to the Serpentine Jarrahdale Town Planning Scheme No. 2, and as such are legally protected. Only those sites listed on the Town Planning Scheme have any legal protection under the Heritage Act.

These sites should be acknowledged as part of relevant local Structure Planning.



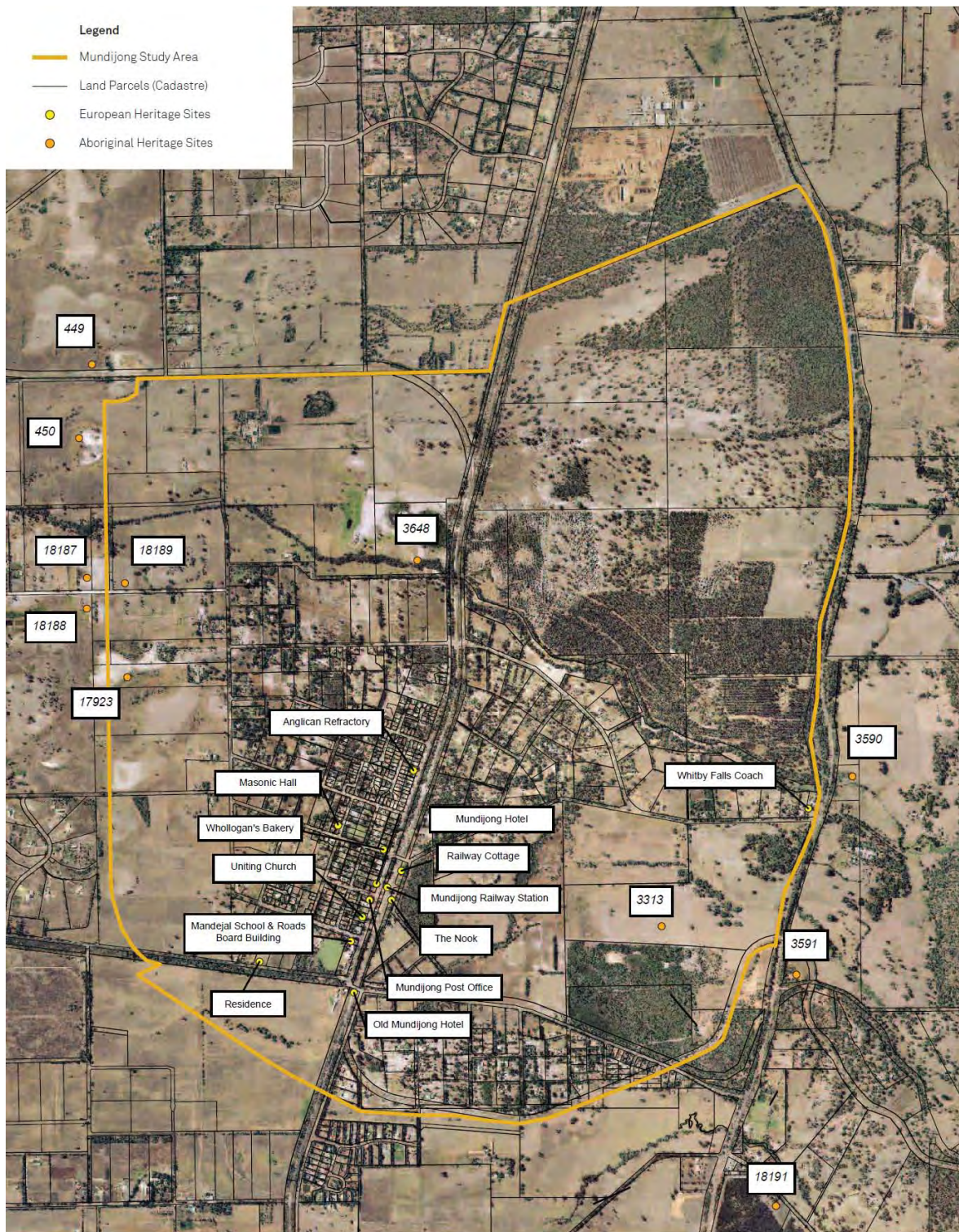


FIGURE 10 HERITAGE SITES

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## 4.0 PLANNING CONTEXT

### 4.1 Statutory Context

#### 4.1.1 Metropolitan Region Scheme

The DSP area is predominantly zoned “*Urban*” in the Metropolitan Region Scheme (MRS) with a portion in the north east “*Urban Deferred*”. Two small areas of “*Regional Open Space*” are located in the north east and south east of the subject area.

The DSP area is bound on its western extremity by the Tonkin Highway road reserve and on the east by South West Highway, both of which are classified as “Primary Regional Roads”. A regional Railway Reserve dissects the DSP area.



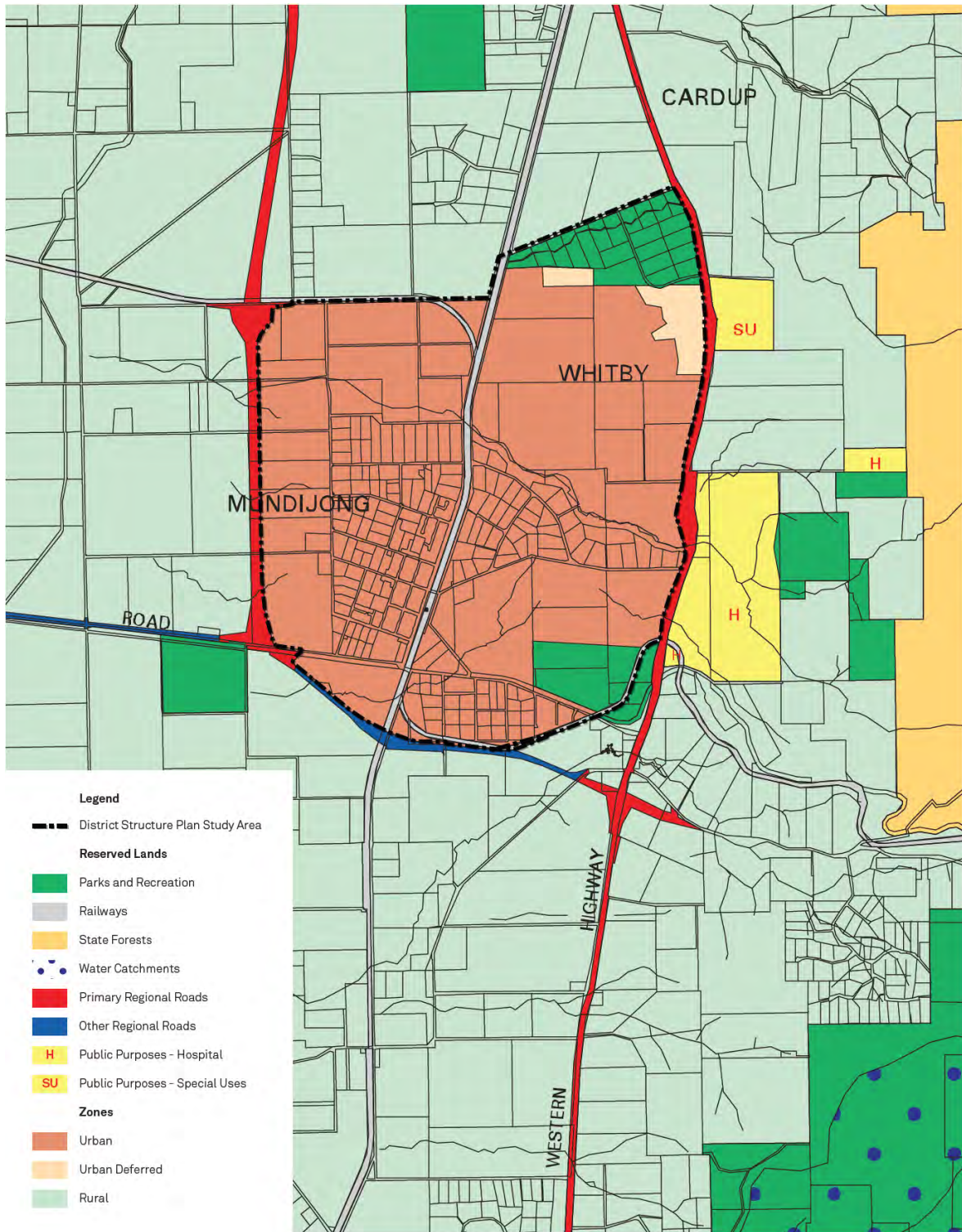


FIGURE 11 METROPOLITAN REGION SCHEME

0 100 400 800m  
Scale 1:60000@A4

#### 4.1.2 Shire of Serpentine-Jarrahdale TPS No. 2

The DSP area is zoned “*Urban Development*” within the Shire of Serpentine-Jarrahdale TPS No. 2, and is within designated Development Areas DA 1 – *Mundijong* and DA2 – *Whitby*.

Town Planning Scheme No. 2 provides the fundamental objectives, general provisions and controls for development within the existing zoning framework. Specifically, Appendix 15 describes development requirements and obligations for the nominated Development Areas. These requirements are required to be accommodated within the District Structure Plan.



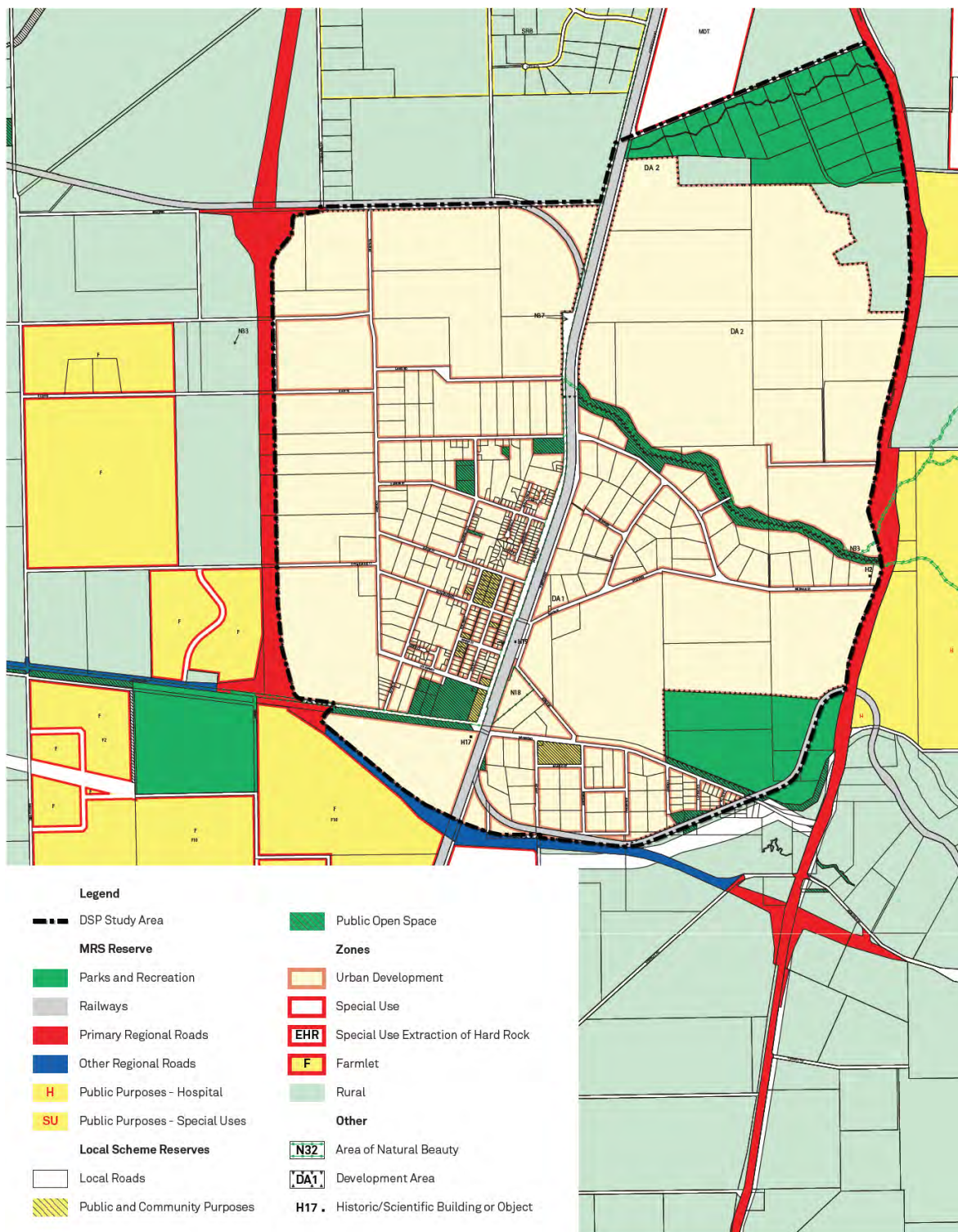


FIGURE 12 TOWN PLANNING SCHEME NO.2

0 100 400 800m  
Scale 1:25000@A4

#### 4.1.3 State Planning Policies

State Planning Policies are prepared and adopted by the Western Australian Planning Commission in accordance with the statutory procedures set out in Part 3 of the Planning and Development Act 2005. Due regard is required to be given to State Planning Policies and their contents including in the preparation of Structure Plans and in the determination of planning decisions by local and state agencies. All proposals within the DSP areas should demonstrate compliance with State Planning Policies.

A number of State Planning Policies are of specific relevance to the District Structure Plan.

##### 4.1.3.1 State Planning Policy 3.0 - Urban Growth and Settlement

SPP3 sets out the principles and considerations which apply to planning for urban growth and settlements in Western Australia. The key objectives of the policy are to promote sustainable well planned patterns of settlement, build on existing communities, manage growth, and coordinate new development with the efficient, economic and timely provision of infrastructure and services.

##### 4.1.3.2 State Planning Policy 3.1 — Residential Design Codes (Variation 1) 2008

SPP3.1 provides local governments, the community and the development industry with a comprehensive tool for the control of the built form and density of residential development throughout Western Australia.

The Residential Design Codes are intended to cover all requirements for planning control purposes and to minimise the need for councils to introduce separate planning policies or variations to these matters. SPP3.1 has been in place since the 1980's with a number of revisions having been undertaken, the most recent being in 2009.

The DSP will identify residential density ranges in order to meet policy requirements and deliver the DSP vision.

#### 4.1.3.3 *State Planning Policy 2.9 - Better Urban Water Management Framework (2008)*

This Better Urban Water Management Framework provides guidance on the implementation of State Planning Policy 2.9 — Water Resources (which is a requirement of the State Water Strategy for Western Australia). The Framework is designed to facilitate better management and use of urban water resources by ensuring an appropriate level of consideration is given to the total water cycle at each stage of the planning system. The document intends to assist regional, district and local land use planning, as well as subdivision and development phases of the planning process.

#### 4.1.3.4 *State Planning Policy 2.1 - Peel-Harvey Coastal Plain Catchment.*

*“The Peel-Harvey coastal plain catchment policy ensures that land use changes within the Peel-Harvey estuarine system likely to cause environmental damage to the estuary are brought under planning control and prevented”.*

The DSP area is partially located within the State Planning Policy area and a nominated Bush Forever site is under the jurisdiction of the Policy. As such, the DSP will need to be cognisant of the Policy objectives, as follows:

1. *Improve the social, economic, ecological, aesthetic, and recreational potential of the Peel-Harvey coastal plain catchment.*
2. *Ensure that changes to land use within the catchment to the Peel-Harvey estuarine system are controlled so as to avoid and minimise environmental damage.*
3. *Balance environmental protection with the economic viability of the primary sector.*
4. *Increase high water-using vegetation cover within the Peel-Harvey coastal plain catchment.*
5. *Reflect the environmental objectives in the draft Environmental Protection Policy (Peel-Harvey Estuarine System) 1992.*
6. *Prevent land uses likely to result in excessive nutrient export into the drainage system.*



#### 4.1.3.5 *State Planning Policy 4.2 Activity Centres for Perth and Peel*

The Activity Centres Policy provides a regional planning framework to co-ordinate the location and development of retail, commercial and centre activities in the Perth and Peel region. It identifies Mundijong as a *District Centre*.

The policy promotes development that is flexible enough to enable a range of development to occur which will promote genuine activity centres and includes requirements pertaining to residential densities within Activity Centres.

#### 4.1.3.6 *State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning*

SPP 5.4 is aimed at minimising the adverse impact of transport noise on residential development. It will apply to the rezoning of land for residential purposes and subdivision or development applications in the vicinity of primary distributor roads and rail lines.

The policy outlines noise exposure levels and criteria that should be met by affected residential development for both outdoor and indoor areas. It recognizes that the separation of residential development from transport corridors is not compatible with the encouragement of transit oriented development, and that noise amelioration should therefore be achieved through building design and other reasonable and practical measures where appropriate.

Proponents need to be aware of the potential impact of transport noise on residential development, although the policy statement acknowledges that safety, functionality and energy efficiency should not be compromised in the pursuit of noise reductions.

#### 4.1.3.7 *State Planning Policy 2.8*

The aim of this policy is to provide a policy and implementation framework that will ensure bushland protection and management issues in the Perth Metropolitan Region are appropriately addressed and integrated with broader land use planning and decision-making. This will secure long-term protection of biodiversity and associated environmental values.

The policy recognises the protection and management of significant bushland areas as a fundamental consideration in the planning process, while also seeking to integrate and balance wider environmental, social and economic considerations. In general terms, the policy does not prevent development where it is consistent with the policy measures in this policy and other planning and environmental considerations.

Proponents need to be aware that the Mundijong-Whitby area in the Shire of Serpentine – Jarrahdale contains several Bush Forever sites which must be protected from inappropriate development.

#### 4.1.4 Liveable Neighbourhoods

Liveable Neighbourhoods 2007 is an operational policy for the design and assessment of structure plans and subdivision for new urban areas in the Perth Metropolitan Region and Country Centres. The DSP must meet Liveable Neighbourhoods expectations.

#### 4.1.5 Relevant Shire of Serpentine-Jarrahdale Local Planning Policies

##### 4.1.5.1 Local Planning Policy No.6 – Water Sensitive Design

Local Planning Policy No.6 is intended to assist in enhancing the beneficial uses of all watercourses and wetlands in the Shire. The Policy's key objectives are to assist Council's consideration of structure plans and guide Council's advice to the Western Australian Planning Commission regarding fulfilment of subdivision conditions.

##### 4.1.5.2 Local Planning Policy No.8 – Landscape Protection

Local Planning Policy No.8 targets areas of high landscape value and aims to maintain the integrity of significant landscape areas and features. A small portion of the north eastern corner of the DSP Area is designated as Landscape Protection.

*"LPP No. 8 provides for the continued use and development of land but introduces requirements and controls on development to ensure a high standard of visual appearance sympathetic to the qualities of the landscape."*

#### 4.1.5.3 *Local Planning Policy No.9 – Multiple Use Trails*

Local Planning Policy No.9 highlights the need to conserve and expand upon the numerous multiple use trails through the Shire area, including those located within the Mundijong/Whitby DSP area. Multiple use trails need to be considered and catered for within new development areas.

#### 4.1.5.4 *Local Planning Policy No.16 – Paterson Street Design Guidelines*

Local Planning Policy No.16 applies to the Paterson Street Design Guidelines from the Mundijong Road intersection with Paterson Street to Richardson Street. The Design Guidelines have been prepared to assist Council in dealing with development within the Paterson Street precinct and maintaining the heritage value and retaining character. Specific built form requirements applicable to proposed alterations and new development in the area are detailed.

#### 4.1.5.5 *Local Planning Policy No.22 – Water Sensitive Urban Design*

Local Planning Policy No.22 is intended to aid in achieving total water cycle management outcomes consistent with State Planning Policy 2.9: Water Resources (2006). The Policy applies to the planning and development approvals process to achieve better land and water planning consistent with the intended outcomes for the Peel-Harvey catchment and to ensure that land use planning decisions are compatible with the objectives and maintenance of the Environmental Quality Criteria in the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992, the Ministerial Conditions imposed in Bulletin 994 “Peel Region Scheme” and the Peel-Harvey Coastal Catchment Water Quality Improvement Plan (EPA, in preparation).

#### 4.1.5.6 *Local Planning Policy No.26 – Biodiversity Planning*

Local Planning Policy No.26 seeks to recognise biodiversity conservation as a relevant planning consideration in statutory decision making while also identifying and protecting natural areas and valuable ecosystems in the Shire.

The Policy goes further by establishing local biodiversity targets for Structure Plans pursuant to the requirements of Town Planning Scheme No.2.

#### 4.1.5.7 *Local Planning Policy No.29 – Mundijong/Whitby Planning Framework*

Local Planning Policy No.29 seeks to guide the orderly and proper planning of the Mundijong/Whitby Urban Development Area. The Policy outlines the requirements for preparing District and Local Structure Plans for the Development Area and what specific information is to be addressed.

#### 4.1.5.8 *Local Planning Policy No.30 – Mineral Sands Extraction*

“Local Planning Policy No. 30 seeks to establish a framework for the consideration of proposals to extract mineral sands and resources within the Shire. Mineral sands and resources are located within the Mundijong-Whitby District Structure Plan. In accordance with the requirements set out in LPP 29, there should be a general presumption against the extraction of mineral sands and resources unless a proposal can demonstrate that there would be net social, environmental and economic benefits.”

Policies are to be reviewed on a regular basis and as necessary, new policies are to be developed to provide a framework for emerging issues.

## 4.2 Strategic Context

### 4.2.1 State Planning Strategy

The State Planning Strategy 1997 provides the basis for long-term State and regional land use planning. The strategy identifies five key principles, as follows:

1. Environment: To protect and enhance the key natural and cultural assets of the State and deliver to all West Australians a high quality of life which is based on sound environmentally sustainable principles.
2. Community: To respond to social changes and facilitate the creation of vibrant, safe and self-reliant communities.
3. Economy: To actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.

4. Infrastructure: To facilitate strategic development by making provision for efficient and equitable transport and public utilities.
5. Regional Development: To assist the development of regional Western Australia by taking account of the special assets and accommodating the individual requirements of each region.

#### 4.2.2 State Sustainability Strategy

The State Sustainability Strategy 2003 was developed by the Department of the Premier and Cabinet as a coordinated Government approach to the implementation of a sustainability framework in which environmental, social and economic actions can be delivered. Sustainability is meeting the needs of current and future generations through integration of environmental protection, and social and economic prosperity.

#### 4.2.3 Directions 2031 and Beyond: Spatial Framework for Perth and Peel (2010)

Directions 2031 and Beyond: Spatial Framework for Perth and Peel is a high-level spatial framework plan to guide the detailed planning and delivery of housing, necessary infrastructure and services to accommodate the future growth of Perth and the Peel Region. The Framework was formally adopted in August 2010.

#### 4.2.4 South East Corridor Structure Plan 1996

The South East Corridor Structure Plan was prepared by the Western Australian Planning Commission as a guiding tool to ensure a comprehensive approach to planning and development in the southern part of the South East Corridor and to guide more detailed local planning for the area.

While now dated, the Structure Plan has not yet been replaced. The urban designation for Mundijong/Whitby is consistent with the Plan.

#### 4.2.5 Bush Forever

Bush Forever was developed by the Western Australian Planning Commission to identify areas of urban bushland that have regional conservation value in the Swan Coastal Plain portion of the Perth Metropolitan Region.

#### 4.2.6 Shire of Serpentine-Jarrahdale Activity Centres Strategy - Draft Employment Framework

The Draft Employment Framework is one of five key documents that when combined will provide the basis for the final Shire's Activity Centre Strategy. The Employment Framework study objectives were to develop a new employment framework that will guide and encourage employment generation within the Activity Centre, set employment targets and develop a framework for the Shire in evaluating Structure Plans and Subdivision Applications.

The Employment framework concluded that employment trends are generally regional in nature, though specific planning approaches may encourage employment generation to proceed at a greater rate.

#### 4.2.7 Serpentine-Jarrahdale Shire Community Facilities & Services Plan

The Serpentine-Jarrahdale Shire Community Facilities & Services Plan 2020 was prepared by CCS Strategic Management in association with Geografia in July 2008 with a goal to provide more in-depth discussion of the needs, outcomes and strategies that face 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/Whitby/Mardella area and details the current supply shortages of services, as well as solutions for providing those services in high demand.

A condensed version of the Community Facilities and Services Plan (CFSP) is provided as Appendix 3.

### 4.3 Planning process to date

There has been extensive statutory and strategic planning relevant to the Mundijong/Whitby area progressed during the preceding eight years. This is summarised following:

April 2002      The Western Australian Planning Commission, in response to a subdivision application, instructed the Shire of Serpentine-Jarrahdale to prepare a Structure Plan for the Mundijong Urban Cell as a matter of priority due to increased pressure for subdivision.



May 2002	The Council acknowledged the Structure Plan request but advised that it had no sufficient resources allocated in its 2002-2007 Principal Activities Plan to undertake the preparation of the Structure Plan.
March 2006	The Shire resolved to support a request to transfer land in the Mundijong/Whitby area from Urban Deferred to Urban in the Metropolitan Region Scheme.
April 2006	The Council endorsed a proposed process to prepare a District Structure Plan for Mundijong/Whitby.
May 2006	An initial Council workshop was held.
September 2006	The Council resolved to amend its Town Planning Scheme to rezone the Mundijong/Whitby Development area to "Urban".
November 2006	The lifting of the Urban Deferred zoned land and rezoning to Urban was published in the Government Gazette.
2007-2008	Scoping papers/tender briefs were prepared and sub-consultants appointed to undertake required preliminary investigation for the District Structure Plan.
March 2009	An Enquiry by Design workshop was undertaken by the Shire.
August 2009	The final version of the Enquiry by Design workshop report for Mundijong/Whitby was received by the Shire.
December 2009	The Council resolved to initiate the District Structure Plan Process.
February 2010	A Collaborative workshop and Community workshop were held involving landowners, their consultants, various government agencies and the community.

## 5.0 VISION, GUIDING PRINCIPLES AND OBJECTIVES

Sustainability in an urban development context comprises the journey undertaken as part of the planning, design, construction and development of sustainable communities. It facilitates the integrated consideration of a broad range of environmental, economic and social planning matters and encourages innovation in design, technologies and approaches to achieve vibrant, diverse and safe communities which are connected, prosperous and efficient, as well as enhance and value natural environments.

### 5.1 Vision and Objectives

The vision for Mundijong/Whitby is the creation of a sustainable community. This vision is further explored and expressed in a series of objectives, which have been identified for particular elements of importance to the Shire, landowners and community and evolved as part of the Enquiry by Design process undertaken as a preamble to preparation of the DSP.

From consultation undertaken with the community and their councillors prior to the workshop, the workshop team distilled the following vision for the Mundijong/Whitby development area:

“A contemporary, connected place reflecting the community’s rural character, green values and vibrant village feel.”

The objectives for the Mundijong/Whitby District Structure Plan are to:

1. Protect and enhance significant natural areas and their buffers, including those with ecological linkage values along railroads, roads and scenic highways (Biodiversity);
2. Preserve the existing rural, “leafy green” character of the structure plan area including its scenic values, views and landscapes (Landscape protection);
3. Protect and enhance wetlands, waterways and catchments through appropriate management of water quality and maintenance of hydrology as part of land use change and development (water resources);
4. Maximise the efficient use and reuse of water by conserving water through efficiency and facilitating water reuse and fit-for-purpose use (water resources);
5. Create a distinctive and responsive built form that enhances the sense of place, community identity and character of Mundijong/Whitby (urban form);
6. Reduce reliance on vehicles by creating a pedestrian-oriented community and providing for alternative modes of transport (movement networks);

7. Reduce consumption of non-renewable resources via climate responsive design, efficient use of energy and water and increased use of renewable energy (climate responsive design and energy);
8. Create a strong local employment base which provides for locally available infrastructure and services (economic prosperity); and
9. Create a vibrant and attractive place that offers a range of lifestyle choices and a liveable environment, supporting a safe, healthy and active community (community wellbeing).

These objectives are proposed to be met through the implementation of a range of strategies, in order to achieve defined sustainability criteria.

## 5.2 Planning Principles

Additional guidance for the planning decision-making is provided by a series of Planning Principles. These Planning Principles were developed as part of the Enquiry by Design process to provide direction on how to achieve the shared vision for the District Structure Plan area. The planning principles are:

### 5.2.1 Natural Environment

1. The natural environment will be protected, repaired, enhanced and respected within the urban context.
2. Urban development will promote of green power initiatives.
3. The total water cycle will be sustainably repaired, maintained and enhanced.
4. Feasible water cycle management approaches will be promoted.
5. Existing landform must be respected and maintained and be utilised to enhance the built environment.

### 5.2.2 Built Environment

1. Local Structure Plans are to establish objectives for built form and any design guidelines that are required to reflect the rural character of the community.
2. The Green Towns character of the community will be maintained.
3. Activity centres will facilitate mixed-use built form which is robust and adaptable and allows for social exchange.
4. The movement network will provide accessibility and connectivity to a full range of housing, employment, retail, recreational and community service opportunities.
5. Local and regional infrastructure will provide a full range of urban services.

6. A full range of housing options will be provided.
7. An integrated system of multi-use areas/corridors to be provided.

#### 5.2.3 Sustainable Economic Growth

1. Diverse and self-contained local employment opportunities will be promoted.
2. The provision of community and infrastructure services will be economically viable.
3. State-of-the-art communications technology will facilitate and enhance local business and learning opportunities.

#### 5.2.4 People & Community

1. Community activism, empowerment and integration will be promoted.
2. Activation of a vibrant sense of place and “village feel” is to be promoted.
3. A safe living and working environment will be promoted.
4. Education opportunities aligned with equine, agricultural and environmental activities will be promoted.

#### 5.2.5 Serpentine-Jarrahdale Council at Work

1. Strategic alliances will be established and promoted through an integrated implementation plan.
2. A collaborative and interactive approach will be formulated to deliver the successful implementation of the District Structure Plan.

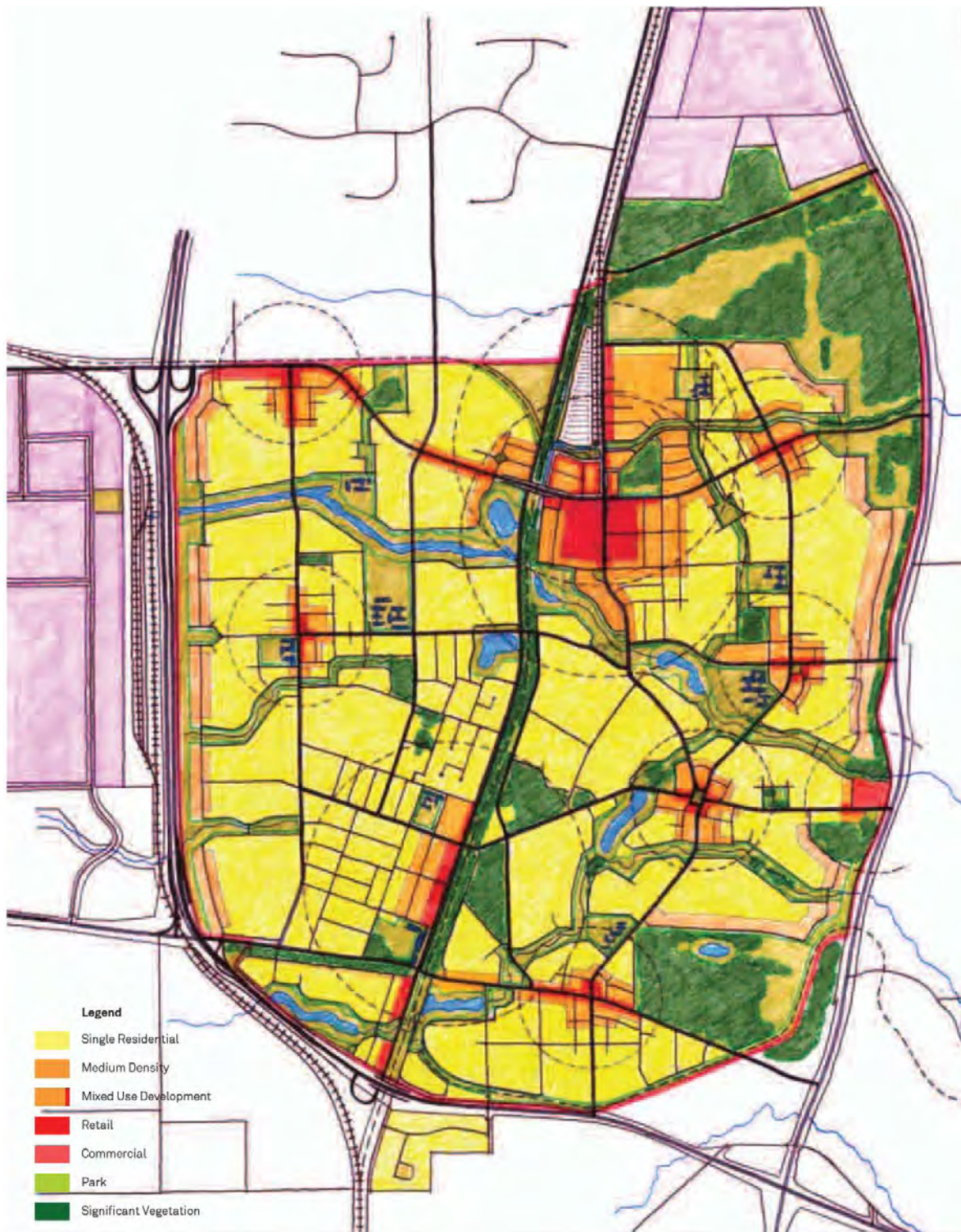


FIGURE 13 ENQUIRY BY DESIGN CONCEPT



### 5.3 Sustainability Strategy

Additional information on the recommended sustainability strategies and criteria is contained in the *Mundijong/Whitby District Structure Plan Sustainability Strategy*, which accompanies this District Structure Plan, including an implementation framework for the recommended strategies. The criteria contained within the Sustainability Strategy are proposed to be met as part of the future planning and development of the District Structure Plan area.

Within the Mundijong/Whitby District Structure Plan area, the priority areas of focus for sustainability initiatives are:

1. Biodiversity
2. Landscape protection
3. Water resources
4. Urban form
5. Movement networks
6. Climate-responsive design
7. Economic prosperity
8. Community wellbeing

#### 5.3.1 Biodiversity

*5.3.1.1 Objective: protect and enhance significant natural areas and their buffer including those with ecological linkage values along railroads, roads and scenic highways.*

The District Structure Plan Area is extensively cleared (89% cleared), and therefore any remaining remnant vegetation is considered to have some ecological significance. Thus the retention of existing vegetation is a high priority, and revegetation of original vegetation complexes is recommended wherever possible.

The Shire has recently completed the *Serpentine-Jarrahdale Shire Local Biodiversity Strategy* (Del Marco & Penna, 2007), which identifies local natural areas which should be protected. The Mundijong/Whitby District Structure Plan area contains a number of these identified local natural areas. These areas should be retained and incorporated into public open space or the public realm where possible, as part of local structure planning.

Threats to the remaining biodiversity within the District Structure Plan area include loss of and fragmentation of remaining habitat through clearing for development; changes to hydrological conditions; uncontrolled access and rubbish dumping in vegetated areas; weeds, pests and feral animals; and inappropriate fire regimes. Biodiversity should be enhanced and threats need to be managed as part of future planning and development through the establishment and implementation of management plans and management strategies.

#### 5.3.1.2 *Recommended strategies*

The following strategies should be implemented:

1. Retain and protect Bush Forever sites and rehabilitate nearby areas to establish fauna linkages wherever possible
2. Verify, retain and protect local natural areas and achieve the goals and targets of the *Serpentine-Jarrahdale draft Local Biodiversity Strategy* (Del Marco & Penna, 2007), as they relate to the District Structure Plan area
3. Where possible, no vegetation should be cleared in TEC's or near known populations of DRF. If development is planned near a TEC, ground truthing is required to confirm the TEC boundary. A flora survey should be undertaken prior to clearing any vegetation near known DRF populations. Should clearing be required approval should be obtained from relevant State and/or Federal Government Departments prior to clearing
4. Where clearing of any remnant vegetation is proposed, detailed floristic surveys and surveys for Specially Protected (threatened) Fauna should be undertaken prior to subdivision in accordance with the EPA Guidance Statements No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia and 54, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Where clearing is required, other areas should be rehabilitated and protected to increase the extent of native vegetation in the district structure plan area
5. Fauna and vegetation management plans should be prepared for environmentally sensitive areas which address the identified threats

to biodiversity conservation and contain mechanisms for implementation of management requirements

6. Landscaping of private and public spaces to consist primarily of locally native plants

### 5.3.2 Landscape Protection

*5.3.2.1 Objective: Preserve the existing rural, "leafy green" character of the structure plan area including its scenic values, views and landscapes.*

Particular views and landscapes requiring preservation within the district structure plan area have been identified in *Local Planning Policy 8 – Landscape Protection* (Shire of Serpentine-Jarrahdale, 2004). These include South-Western highway, Norman Road, Taylor Road, North-South Railway line, Manjedal Brook, Cardup Brook and Gingagup Brook.

The planning process to date has identified the strong community desire to retain the rural landscape character of the area and develop a community which reflects a "leafy, green" environment.

#### *5.3.2.2 Recommended strategies*

The following strategies should be implemented as part of future planning and development:

1. Ensure that all developments within the Landscape Protection Area comply with Local Planning Policy 8 – Landscape Protection (Shire of Serpentine-Jarrahdale, 2004) through the preparation of a Landscape management Plan prior to development and subsequent implementation of the plan
2. Use larger lot sizes within the Landscape protection areas (in precincts A and B) and identify adequate setbacks and building envelopes during the local structure planning stage
3. Preserve all fringing vegetation along railroads, roads, highways and within the Landscape Protection Area
4. Where possible plant fringing vegetation to shield new houses and housing developments from existing railroads, roads and highways and maintain the view of the Darling Scarp
5. Retain and protect existing wetlands and waterways and rehabilitate riparian areas wherever possible

### 5.3.3 Water Resources

*5.3.3.1 Objective: Protect and enhance wetlands, waterways and catchments through appropriate management of water quality and maintenance of hydrology as part of land use change and development*

The Mundijong/Whitby District Structure Plan area contains a number of environmentally significant water resources including conservation category wetlands, other wetlands, Manjedal Brook and associated watercourses. The *Shire of Serpentine-Jarrahdale Mundijong/Whitby District Structure Plan District Water Management Strategy* (GHD, 2009a) outlines strategies and design criteria which should be met as part of the future development of the district structure plan area.

*5.3.3.2 Objective: Maximise the efficient use and reuse of water by conserving water through efficiency and facilitation water reuse and fit-for-purpose use*

Opportunities for integrated water cycle management within the Mundijong/Whitby District Structure Plan area have been investigated as part of an Integrated Water Cycle Feasibility Study (GHD, 2009b)

*5.3.3.3 Recommended strategies*

The following strategies should be implemented as part of future planning and development

1. Each local structure plan to be supported by a local water management strategy consistent with the requirements of *Better Urban Water Management* (WAPC, 2008) and the *Mundijong/Whitby District Water Management Strategy* (GHD, 2010) including all design criteria
2. Urban water management plans should be prepared to support any application for subdivision consistent with the requirements of *Better Urban Water Management* (WAPC, 2008) and the *Mundijong/Whitby District Water Management Strategy* (GHD, 2010) and any approved local water management strategy
3. Implementation of the management recommendations contained within the *Environmental Study for Mundijong/Whitby District Structure Plan* (SMEC, 2009)
4. Implementation of the *Mundijong/Whitby District Water Management Strategy* (GHD, 2010)

5. Further work undertaken to identify a preferred option for the supply of water and provision of wastewater services for the Mundijong/Whitby community and provision made for the implementation of the preferred option incorporated into the scheme and local planning requirements
6. Where fill is to be used for a future Public Open Space area as proposed as part of LSP's and subdivision, a Phosphorus Retention Index of 70% is to be required.

#### 5.3.4 Urban Form

*5.3.4.1 Objective: Create a distinctive and responsive built form that enhances the sense of place, community identity and character of Mundijong/Whitby*

The urban form of development within the district structure plan area will embrace the character of Mundijong/Whitby – celebrating the existing cultural and built heritage of the area while minimising the impact on the landscape and natural resources. This will be achieved via development of building and landscaping design guidelines for individual precincts which deliver the vision for the local area, consistent with the district structure plan.

Residential design standards will be developed and contained within the building and landscaping design guidelines which are responsive to site and lot attributes and that promote energy efficient, affordable and flexible dwelling design.

#### *5.3.4.2 Recommended strategies*

The following strategies should be implemented as part of future planning and development

1. Promote landscape themes which are reflective of the natural, leafy, green nature of the area and current architectural character
2. Develop building and landscaping design guidelines for local structure plan areas which are responsive to site and lot attributes and that promote energy efficient, affordable and flexible dwelling design



3. Local structure plans should provide for a diversity of land uses, lot sizes and housing types to provide for a variety of resident needs and encourage a reliable local economy
4. Buildings and dwellings should be designed with a high level of adaptability to suit different lifecycle stages/changing demographic needs of their occupants

### 5.3.5 Movement networks

#### 5.3.5.1 *Objective: Reduce reliance on vehicles by creating a pedestrian-oriented community and providing for alternative modes of transport*

Sustainable development requires the creation of communities with a central focus on increasing walkability and reduced car dependence. This can be achieved by maximising the efficiency of the transport network, incorporating all modes of transport including rail and public transport into urban form and creating a pedestrian-oriented community with public spaces which encourage community interaction and help foster community spirit.

#### 5.3.5.2 *Recommended strategies*

The following strategies should be implemented as part of future planning and development

1. Maximise connectivity for vehicular, pedestrian and cycling transport networks both internally and to the surrounding street network
2. Develop a public transport network that incorporates a local bus service with regional connections to Armadale, Serpentine, Kwinana and Rockingham and which provides for an interim transit hub in the main town centre until the proposed train station is constructed
3. Develop clear and legible bicycle network and identify key areas for storage facilities
4. Prepare a business case for relocation of the freight rail line to the western boundary which has the support of Government and key stakeholders and contains accurate costings
5. Work with Government and the community to obtain political support for the extension of the passenger rail network to Whitby

6. Ensure local structure planning for Precinct A incorporates flexibility to provide for the proposed rail station in the longer term

### 5.3.6 Climate-responsive design and energy

*5.3.6.1 Objective: Reduce consumption of non-renewable resources via climate responsive design, efficient use of energy and water and increased use of renewable energy*

Future development within the district structure plan areas should be oriented to embrace the natural environment, land forms and take advantage of the sunlight, prevailing breezes and natural shading by maximising orientation of lots. Appropriate design and orientation of developments should be achieved through the development and application of building and landscaping design guidelines which aim to minimise community energy and water use via appropriate orientation and design of housing. Housing should be encouraged to achieve 6 Star Energy rating, including 4 to 5 star heating and cooling systems, energy and water-efficient appliances and solar hot water.

#### *5.3.6.2 Recommended strategies*

The following strategies should be implemented as part of future planning and development:

1. Development of building and landscaping design guidelines for each precinct which aim to minimise community energy and water use as elaborated within the Sustainability Strategy.
2. Commercial, industrial and public buildings to meet 5 Star Green Star design or above, as rated by the Green Building Council of Australia Green Star rating program
3. Developments should be encouraged to sign up for “green energy” from Synergy
4. Use of solar panels within public open space, e.g. on an amenities block or pergola roof in a park, to collect solar energy that will assist in running BBQ facilities or street lighting
5. Street lights to be energy efficient and solar powered where possible
6. Promote the investigation of renewable energy sources at local structure plan stages and for commercial development, including

promotion of buildings that generate their own energy demand from a renewable energy source

### 5.3.7 Economic prosperity

*5.3.7.1 Objective: Create a strong local employment base which provides for locally available infrastructure and services*

Diversity in land use and housing product supports the development of a variety of business opportunities which are necessary to provide the services and infrastructure required by sustainable communities. Local employment also reduces commuter trips and consequent transport emissions.

*5.3.7.2 Recommended strategies*

The following strategies should be implemented as part of future planning and development:

1. Provide a range of commercial and mixed use spaces for a variety of businesses
2. Provide flexibility in housing design to facilitate work from home opportunities
3. Provide advanced communications technology and infrastructure throughout the district structure plan area

### 5.3.8 Community wellbeing

*5.3.8.1 Objective: Create a vibrant and attractive place that offers a range of lifestyle choices and a liveable environment, supporting a safe, healthy and active community*

The developments should foster a sense of community and wellbeing by providing opportunities for residents to meet others in a safe environment and fulfil daily needs within the Mundijong/Whitby community

*5.3.8.2 Recommended strategies*

The following strategies should be implemented as part of future planning and development

1. Continue to work with the local community to foster support and ensure engagement in the development of the area and resultant community
2. Provide public spaces, community facilities and meeting points to create an active, vibrant and engaging place to live and work

- 
3. Ensure that site layout maximises access opportunities as well as safety and security for residents.

## 6.0 COMMUNITY DESIGN

### 6.1 Sense of place and identity

The DSP supports the creation of a distinct sense of place and identity for Mundijong/Whitby. A foundation for this sense of place and identity is provided by the history and rural village context of the existing Mundijong settlement, however, the ultimate identity of Mundijong/Whitby will evolve with development of the town. The DSP provides the initial platform for this unique identity to develop, and recognises the consultation which has occurred and the vision and objectives which have followed from this process.

### 6.2 Response to Site/Context Analysis

The DSP reinforces the following themes in response to analysis of the context of the DSP area.

#### 6.2.1 Maintaining the Natural Context

The Darling Scarp along with the water and vegetation corridors are key environmental and landscape elements that inform Mundijong/Whitby's character. Reinforcing these landscape elements within the District and Local Structure Plans is essential in ensuring the community remains connected to the landscape and its own history.

The DSP seeks to reinforce the existing 'natural/rural' identity by integrating the natural corridors, establishing broad development and design principles for Local Structure Plans and maximising remnant vegetation protection.

#### 6.2.2 Planning for 'a way of life'

Consultation has highlighted a desire for maintenance of a village-rural life, but with all the advantages of living in a contemporary urban settlement which are to an extent, conflicting aims. In response the DSP aims to reflect a village-rural character by:

1. Proposing a new 'contemporary' District Centre to develop over time in the north-east;
2. Retaining the existing Mundijong town site as a neighbourhood centre, with its rural character to be enhanced in any new development.
3. Creating neighbourhood centres and community hubs connected by natural links that embody a rural character.



4. Providing residential density higher closer to centres and lower in outer areas consistent with traditional village design and as a transition to surrounding rural areas
5. Ensuring the provision of area specific Urban and Landscape design guidelines for various precincts to ensure that the historical character of Mundijong/Whitby is maintained as part of the preparation of LSP's. In this regard the following Structure for preparation of Urban and Landscape design guidelines is recommended to be used at LSP preparation stage.

### Urban Design Guidelines

#### Development Character

1. Provide a statement describing the overall intended character of development.
2. Identify a suite of guiding principles.

#### Development Forms

1. Identify indicative character precincts and the range of development typologies that might be associated with each precinct.
2. Identify indicative setbacks, locations on lots, and relationships to the street for each development typology.
3. Identify the general approach to on-site parking for each development typology.

#### General Building Characteristics

1. Provide a statement on the degree of articulation of walls and the predominant materials (such as red brick and horizontal boarding).
2. Provide a statement on preferred roof forms and materials.
3. Provide a statement on the location and proportion of openings.
4. Provide a statement on the use of verandas, balconies and other external spaces to articulate buildings and manage solar ingress.
5. Provide a statement on the location of ancillary elements (such as mechanical plant, rainwater tanks, etc).
6. Identify a suite of design principles to encourage environmental and resource conservation.

### Precinct Specific Building Characteristics

1. Identify any exceptions to the above general characteristics for precincts where a specific character is desired.

### Landscape Design Guidelines

#### Landscape Character

1. Provide a statement describing the overall intended landscape character(s).
2. Identify a suite of guiding principles.

#### Landscape Themes

1. Identify an appropriate range of landscape themes for streets of different roles and scales.
2. Identify an appropriate range of landscape themes for different park types.
3. Identify an appropriate landscape theme(s) for riparian corridors
4. Identify an appropriate landscape theme(s) for small urban spaces (such as piazzas and courtyards).
5. Identify an appropriate landscape theme(s) for private gardens adjacent to streets and other public areas.

#### General Landscape Characteristics

1. Provide a statement on preferred fencing types by either street type or building type.
2. Provide a statement on enhancing safety and surveillance through the use of landscape design.
3. Provide a statement on encouraging environmental and resource conservation through landscape design.
4. Identify a list of preferred plant species.
5. Provide a statement on the intended quality and durability of landscape materials and elements.

### 6.3 Land use distribution and rationale

The land use distribution and rationale reflects the Liveable Neighbourhoods principle of interconnected neighbourhood centres surrounded by cells of residential development within a convenient 400m walking distance.

The District Structure Plan is generally based on the Community Design Principles set out in Element 1 of Liveable Neighbourhoods, and expects these principles to be reflected in Local Structure Planning.

### 6.4 Design philosophy

The overarching design philosophy is to create a contained urban settlement of a scale and density that optimises a balanced approach to transport options, particularly the extension of passenger rail infrastructure. Optimisation of landscape features will allow the existing rural character to be embodied in new development.

The regional freight rail alignment runs north and south through the settlement and contains significant flora and fauna. This central spine frames the district into two elongated east and west corridors.

The freight line is a significant design element particularly in relation to regional access to infrastructure and quality of life for nearby residents, and is likely to increase in use over time. Realigning the freight line along the Tonkin Highway corridor to the west is critical for Mundijong/Whitby and ultimate maturity of the area. Nevertheless, the DSP is sufficiently robust to facilitate the staged development of the area while the freight line remains on its current alignment.

Living streams will be strengthened to emphasise Mundijong/Whitby's rural character and close connection to the landscape. These corridors will help to protect flora and allow fauna movement. Ecological linkages also provide attractive routes for pedestrian, cyclists and horse riders. Commercial and community centres are strategically located to optimise walkable catchment and also promote use of living streams, which encourages community interaction, ownership and relationship to nature.

Three neighbourhood/local centres (including the Mundijong Townsite) are distributed evenly throughout the district to optimise access for day-to-day shopping needs. Improved

district access to the Mundijong Townsite will help to entrench its role as a neighbourhood centre in a manner which retains its historic character.

A district centre is proposed in the north/north-east area of the DSP as part of Precinct A. Its strategic location will provide a convenient and efficient option to capture the north south movement in a nod out of Mundijong/Whitby and presents the most logical location for a future rapid bus terminal and/or rail station.

District roads are designed to ensure functional and efficient movement throughout Mundijong/Whitby. Strong north to south access will improve the viability of public transport (bus) system and create a high degree of internal connectivity to commercial centres, community infrastructure, recreation facilities and employment.

The district road network is also intended to respond to improved regional connectivity over time. Key routes will change in desirability and function as infrastructure such as the Tonkin Highway is extended to Mundijong/Whitby. For example, the district road layout in Precinct A initially directs traffic into the District Centre and helps sustain the first retail services. This approach will help balance district traffic flows overtime, avoiding congestion in the District Centre.

The design seeks to avoid forcing urban levels of traffic onto adjacent rural roads, in order to minimise the impact on the rural amenity of the adjacent rural area.

## 6.5 Design principles

Chapter 5.0 above discussed the Vision, Guiding Principles and objectives for Mundijong/Whitby identified as part of the Enquiry by Design process. This process was undertaken with a set of clearly-defined best-practice urban design principles. These principles have been maintained in the refinement of the DSP and include:

**Sustainability:** Ensuring that places can be supported in terms of community, economic, and environmental outcomes.

**Permeability:** Making places accessible by providing people with choices on how to get where they want and need to go.

**Variety:** Increasing the choice of activities (living, working, shopping, learning, and playing) for people to do in any given place.

**Legibility:** Creating places that are easy to comprehend in a spatial sense.

**Robustness:** Ensuring that places can change their uses over time relatively easy.

**Appropriateness:** Creating buildings that look as if they do what they are expected to do, and are compatible with their surroundings.

**Richness:** Providing sufficient detail to make places more interesting.

**Personalisation:** Allowing people to feel as if they belong to their urban environment.

**Consultation:** Allowing the people who use and have responsibility for a place, to have a say in how that place is designed.

**Integration:** Ensuring that all the components of a place work together as a whole.

Following on from the E bD workshop, greater emphasis has been placed on embedding flexibility over time into the DSP. In particular, the DSP will be staged over time to respond to the likely freight rail realignment, passenger rail, and extension of Tonkin Highway.

## 6.6 Density Targets

A range of densities in appropriate locations allows community services and infrastructure to be provided in an efficient and equitable manner. Generally, higher densities are located close to centres and public transport routes, whilst lower densities are located away from centres.

Directions 2 031 e establishes a target for a t least 1 5 d wellings p er g ross h ectare. The Mundijong Whitby DSP reflects this target. A population threshold of approximately 30,000-40,000 people is proposed to support the extension of passenger rail to Mundijong-Whitby area in the longer term. This is based on a population density of 2.7 people per dwelling

Density targets across the precincts are established to encourage greater proportion of the community w ithin w alking d istance o f c entres and e mployment. F or ex ample, d ensity targets are higher within P recinct A ( Whitby) because o f the p roximity to t he e nvisaged Town Centre, employment opportunities and the future rapid (bus/rail) regional transit hub.

Local Structure Plans should seek to, as a minimum, achieve the target density. The DSP also seeks to foster greater self-sufficiency. In particular, in preparing Local Structure Plans proponents are encouraged to explore the introduction of innovative employment generating hub/activities, provided these uses do not compromise the integrity and functionality of the DSP framework.



## 6.7 Crime prevention

The district road layout presented by the DSP seeks to reinforce personal safety, as well as perceptions of safety and reduce opportunities for crime. This is to be achieved by providing streets and urban open spaces that are adjacent to housing and actively used facilities. Public spaces will be surveyed from adjacent buildings to promote community engagement in the activities of the street. In centres where afterhours activity is likely, higher density housing is encouraged to complement a need for greater surveillance of key pedestrian routes.

Local Structure Plans will be required to demonstrate the application of Crime Prevention Through Environmental Design (CPTED) principles, particularly in relation to surveillance and use of the ecological corridors and public open space areas. Sight lines, lighting, minimisation of entrapment points and designing in escape routes will be encouraged.

## 6.8 Designing for better health

The DSP promotes a spatial framework for better health and well-being for the community. However the finer grain detail of subdivision layout important to promoting walkable and attractive neighbourhoods will be addressed as part of Local Structure Planning.

Public Open Space identified in the DSP has been evenly distributed to provide all future residents access to a range of passive and active recreation opportunities. DSP open space is located on key pedestrian routes and accessible by car and public transport to maximise its use.

Key attractor locations such as neighbourhood hubs and the District Centre are linked by ecological and pedestrian, cycle and equestrian paths. This will promote the use of these pedestrian corridors, promoting personal health.

The Shire of Serpentine-Jarrahdale is also committed to exploring community gardens in association with schools to help educate students and residents about nutritional benefits of healthy, locally grown foods.

Social wellbeing initiatives organised by the Shire and community groups will help to activate public parks and pedestrian routes to demonstrate these spaces are accessible and comfortable for everyone.

## 6.9 Housing diversity

Mundijong/Whitby is envisaged as a contained, modern village settlement. Inherent in this vision is the expectation that there is considerably more variation in housing diversity compared to typical suburban areas of Perth. The housing stock and future subdivision is to embody the place specific characteristics of Mundijong/Whitby.

Social sustainability is promoted by offering a diverse range of housing options for different age groups and lifestyles. This is to be achieved by promoting a range of house sizes and types through a range of densities in the DSP.

The DSP housing diversity targets have been prepared, cognisant of viability of redevelopment opportunities in each precinct. Achievable density targets have therefore been set, particularly in early stages of development.

The DSP contains three general density areas:

1. Medium/high density to promote an urban setting close to centres,
2. Low/medium densities typical of suburban areas, and
3. Lower density transitional lots in areas of landscape importance and at the edges of the DSP area.

Medium/high density areas will comprise 35% of the DSP housing stock, whilst low density and rural-style lots will comprise 65%.

Higher densities should be concentrated within walking distance of areas offering good amenity, accessibility and adjacent to neighbourhood and community centres. Densities within the proposed District Centre will reflect the requirements of SPP 4.2 Activity Centres for Perth and Peel.

Due to the fragmented landownership in Precincts B, D and F, the rural-residential lots are likely to remain undeveloped for some time. It is reasonable to anticipate some landowners in these precincts, will seek to subdivide in the short term, while other landowners will retain the existing development intensity. Further subdivision in these already fragmented areas prior to finalisation of a LSP which would enable a co-ordinated approach to subdivision and development is a matter of concern. Servicing of these precincts will need to reflect a change to a more suburban density over time and will also require a co-ordinated approach.

The future extension of Tonkin Highway and the alignment of the existing and future freight rail line will generate high levels of noise that may be detrimental to residential amenity. Typically, solutions have often resulted in sterilising land by requiring large setback distances, noise mounds and high solid walls. It is likely that initial development stages will focus on areas further away from the existing freight railway providing opportunity for its relocation to be pursued and effected. Any development within vicinity of either the existing alignment or a future alignment will need to conform to relevant policy requirements including State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning.

## 6.10 Townscape character and streetscape

Several factors that influence Mundijong's character have been identified, including:

1. Landscape influences: create lines, wetlands and riparian vegetation, open fields, stands of bushland, avenues of trees to frame views and the Darling Scarp.
2. Street characteristics: use of materials and design standards consistent with Mundijong rural character, particularly in areas of rural-style development
3. Existing built form character: a significant part of Mundijong's character comes from its built form. The materials and scale of form along with common architectural features that are reminiscent of a rural character are evident in Mundijong, including use of weatherboard, corrugated iron, verandahs and vertical punctuation.

Several strategies are proposed to strengthen and secure the Mundijong townscape character and streetscape:

1. Introducing an east-west district road to allow movement through the town centre and encouraging its economic activation.
2. Encouraging the town centre to extend down Whitby Street allowing retail development to occur on both sides, promoting pedestrian movement, slow traffic and defining the town centre.
3. Consolidating the existing Mundijong town centre to approximately 200m in length to promote a strong, cohesive core of commercial buildings.
4. Encouraging development on the eastern side of Paterson Street in order to frame the town centre and create a double sided street. Buildings on two sides will help to promote pedestrian movement, slow traffic and define the town centre.

These strategies should be contemplated as part of Local Structure Planning for Precinct F.

## 6.11 Energy efficiency

The District Road framework provides east-west and north south connections with roads distributed evenly through the study area. This enables Local Structure Plans to connect local roads with a corresponding east-west and north-south street layout. This road layout optimises the number of lots with ideal orientation to facilitate the siting and design of dwellings that benefit from solar efficiency and minimise non-renewable energy use.

The DSP encourages higher residential densities in walking and cycling distance to attractors such as retail, services, and employment uses. Car dependence and more importantly, fossil fuel dependence, within the future community is minimised. Higher residential densities will entrench the centres as destinations for the community by framing the built form with a mix of more intense residential buildings, increase the population within a short distance and promote a safe and attractive local environment.

## 6.12 Population Estimates

The Structure Plan area is estimated will yield a minimum of 11,500 dwelling units and a population of 30,000 persons and up to 15,300 dwellings for a population of 40,000 people dependent upon the ultimate density mix and dwelling yield applied through Local Structure Plans.

Table 2: Population Estimates

PRECINCT	LOCATION	EXISTING SITUATION	GROSS Area (ha)	SINGLE RESIDENTIAL				MEDIUM DENSITY		PRECINCT POPULATION TARGETS	
				Development Conversion Rate	Effective Area Converted	Pro Rata Dwellings @ 40,000 pop	Pro Rata Dwellings @ 30,000 pop	Pro Rata Dwellings @ 40,000 pop	Pro Rata Dwellings @ 30,000 pop	40,000 pop	30,000 pop
A	north-east	larger rural lot(s)	367	100%	207	3563	2672	889	667	11397	8548
B	central-east	rural-residential lots	149	80%	70	1198	898	148	110	3530	2648
C	south-east	larger rural lot(s)	172	100%	101	1736	1301	222	167	5129	3846
D	lower south-east	rural-residential lots	98	80%	48	793	585	0	0	2141	1606
E	south-west & west	larger rural lot(s)	167	100%	98	1394	1270	149	111	4869	3652
F	townsite										
G	central	rural-residential and residential lots	195	60%	30	1553	1165	370	278	4934	3700
SUB-TOTAL	north-west	larger rural lot(s) and rural-residential lots	275	100%	163	2798	2899	222	167	8000	6000
TOTAL			1420		775	13033	10800	2000	1500	40000	30000

average gross area per dwelling @ 2.7 persons dwelling	1275		
average single residential lots size (m <sup>2</sup> )		581	775
residential density land take at 50% R100 & 50% R50		27	20

Table 2: Population Estimates

Assumptions: 2.7 persons per dwelling for single residential  
 2 persons per dwelling for medium density  
 Development conversion rate of 80% for precincts with fragmented landownership

20% allowance for roads; 15% for POS, watercourses and remnant vegetation linkages; and 5% for other public uses.

## 7.0 ACCESS/MOVEMENT NETWORK

### 7.1 Transport Philosophy

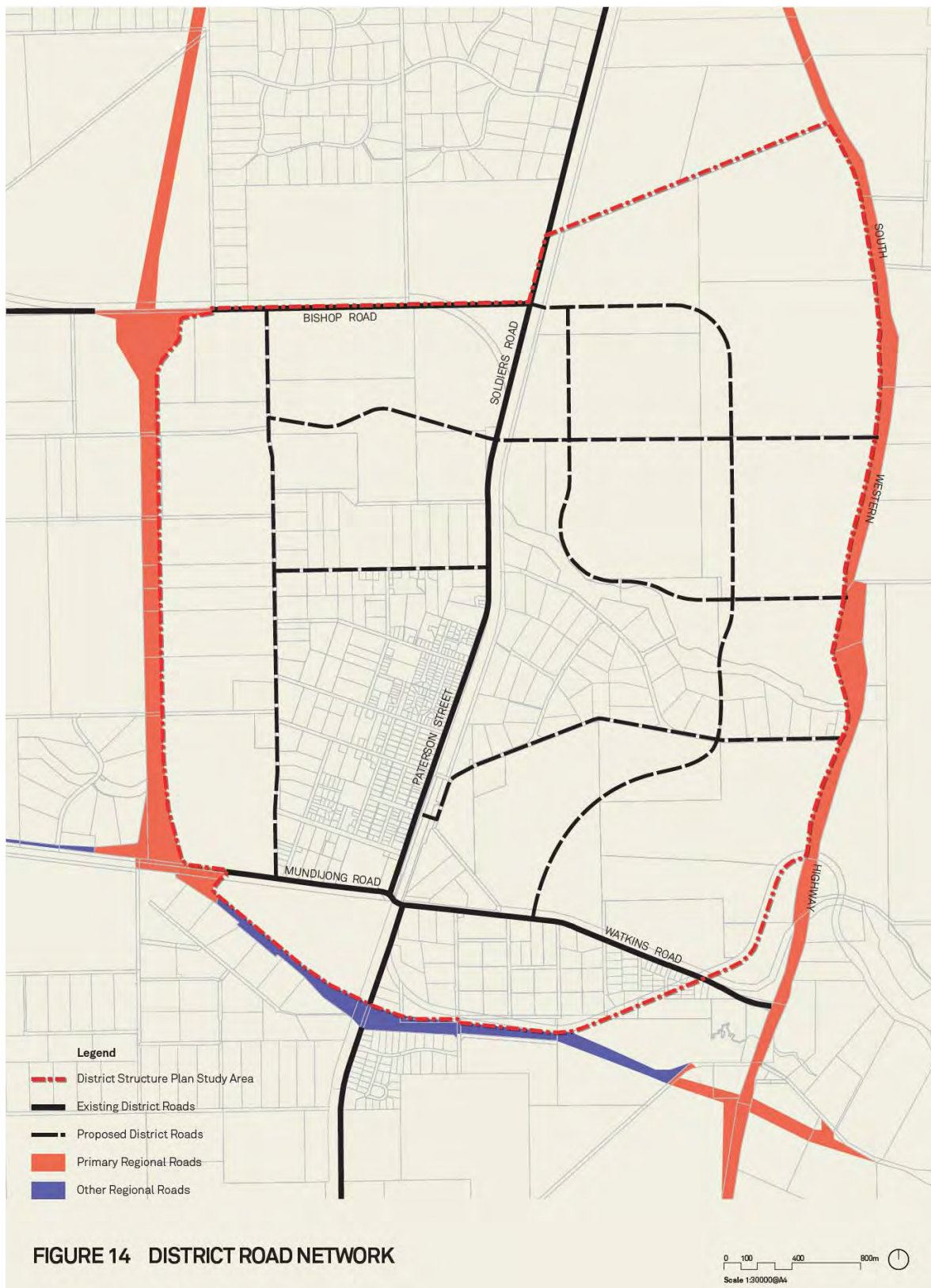
It is important to have a well-planned road hierarchy to allow for peak and off peak traffic flows to move through an area with ease and reduced congestion minimising major impacts. Appropriate design of intersections and major access points also reduces road trauma.

Well-planned road access and a safe road environment also allows for maximising the promotion of pedestrian and cycling facilities. These facilities reduce the number of vehicles on roadways, which in turn minimises the effects of traffic on adjacent residences.

Good pedestrian and cycling facilities also benefit the health aspects of a community and a well planned cycling and pedestrian system encourages residents to move within their community without using their motor vehicles.

Mundijong/Whitby has the opportunity to achieve all these benefits with a properly designed road hierarchy, pedestrian and cycling infrastructure.





Public transport networks are often designed and implemented as an afterthought following the completion of a development. It is not uncommon for the link between the road



hierarchy and local access to be lost during the design process. The design of a new urban community should avoid remote and unconnected pockets of development because they become difficult to provide efficient public transport services without having deviations from the main bus route streets.

Through the District Structure Planning process, the Shire is seeking to achieve the most efficient and effective public transport system, both from the point of potential users and service providers. Network planning will therefore need to be incorporated into the earliest stages of the urban design process as part of the Structure Plan. The public transport network should inform the process of deciding the road hierarchy, so that it can be designed to complement it, making the services direct, accessible and attractive.

A number of basic principles have been considered in developing a proposed local transport network for Mundijong/Whitby.

1. Direct and efficient access for bus routes through residential areas
2. A road hierarchy which is conducive to bus operations
3. Higher density housing around interchanges and public transport corridors

A key objective is to encourage the use of sustainable modes including walking, cycling and public transport. To achieve this, the following will need to be considered in the future planning of precincts within Mundijong/Whitby:

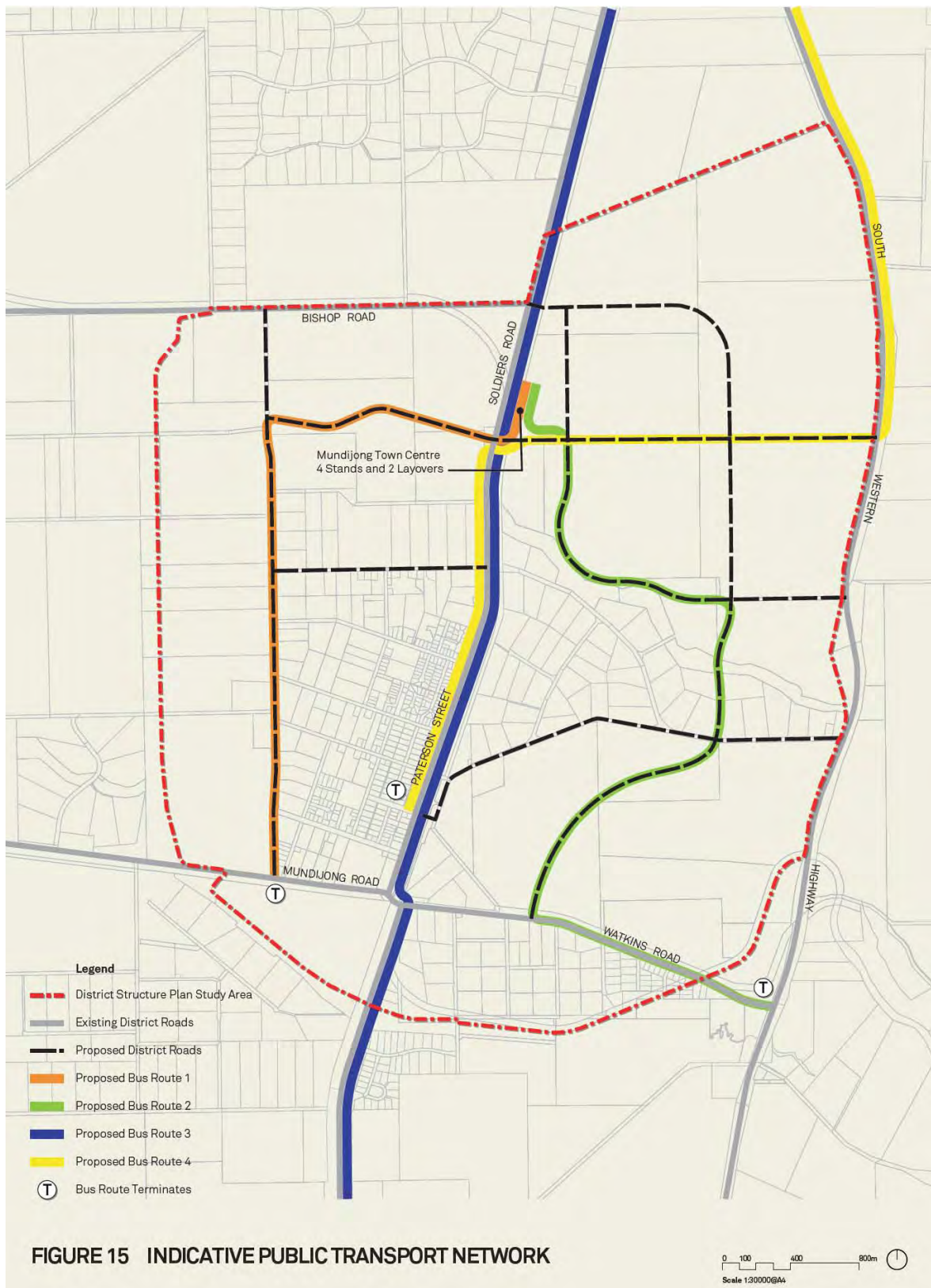
1. A high quality network of well lit and safe footpaths, walking and cycling routes
2. Connectivity between urban cells for pedestrians and cyclists
3. Well designed and safe crossing points around local centres and trip generators
4. Cycle storage facilities
5. Well designed and located public transport infrastructure, such as bus stops and shelters
6. Park and Ride facilities at bus and train interchanges

In planning a new bus network, Transperth has a target that 90 percent of the residents in the urbanised areas should be within a 500m walking distance of a bus stop. The 500m radius for catchment areas has been used to assist in reviewing potential bus routes within the study area, but should not be seen as an upper limit as various local conditions can impact on it, such as the local government, footways, street lighting, topography and climate.

A 5-minute walk to a bus stop or walking distance of 400m was used to plan the future bus network. From the "Liveable Neighbourhoods policy, Appendix 2", a target of 60 percent of

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the population of the urbanised area should be within a 400m or 5-minute walk to a bus stop. For the acceptable walking catchment to a railway station, a walking distance of 800m or a 10-minute walk is considered.



## 7.2 Hierarchy/traffic volumes

For the Mundijong/Whitby Township to achieve a sustainable transport network, the development of the road hierarchy will need to be informed by the design of the public transport network. Through this process, the District and Local Distributor roads will be cognisant of the most effective routing for the local bus network and transport interchange.

The Primary Distributor network that includes South Western Highway, and future Tonkin Highway extension, is operated and maintained under the jurisdiction of MRWA, the Shire manages the remaining Local roads. Therefore, any proposals to alter or create new accesses to or from the Primary Distributors will require consultation with MRWA.

Good access to and from the Primary Distributors will be a major consideration for many people moving to the area and new or improved connections to the South Western Highway and access to the Tonkin Highway extension will make Mundijong an attractive option.

The Tonkin Highway extension to Orton Road and ultimately to South Western Highway will have a major impact on the transport options for Mundijong/Whitby. If the highway extension is deferred, it could encourage more residents to use public transport. However, to service the growing urban cell more efficiently and to allow the regional and freight traffic to bypass the urban cell, the Tonkin Highway would be a major benefit to the development.

Cycling and walking are very important modes to provide good mobility within the local community. The local road network will need to be designed to cater for local trips to support and encourage the use of local businesses and community services. Walking and cycling should be the primary choice for most activities, whether to the local shops or as part of a more complex trip involving forms of public transport. The local road network will need to be easy to use and with direct, safe and well lit routes to local bus stops and centres.

The existing freight railway line and Manjedal Brook create issues with severance. This could be a major deterrent to residents to walk and cycle for local trips if the only alternative is a long circuitous diversion around the railway line or brook. A new north-south road for local traffic, buses, cyclists and pedestrians across the Manjedal Brook will improve the north-south connectivity and is of strategic importance to the development of an efficient public transport network.

Traffic modelling is provided as Appendix 4. Option A depicts the impact on traffic numbers should additional level crossings not be provided across the freight railway line.

### 7.3 Connectivity – street systems

In order for residents and visitors to the community to readily travel to and from the adjacent road system as well as within the Mundijong/Whitby area it is important to provide a clear and legible road network, whilst at the same time ensuring that the traffic use is consistent with the developed road hierarchy. A well connected street system allows people the opportunity take a variety of routes for their journey.

Isolated cells with limited connectivity can result in the concentration of traffic flows to a limited number of streets, make it more difficult to service the cell by public transport and can discourage walking and cycling by increasing the travel distance to adjacent areas and facilities.

A good level of permeability of the road, cycleway and path network assists a community to operate in a very flexible manner and as such is able to more readily accommodate both the varying community needs and also provides a framework which allows the operation of the network to change as the community needs alter in the future.

The South Western Highway, the Tonkin Highway extension and Mundijong Road will be the primary road connections into and out of the area. As such it is important to ensure there are an adequate number of connections provided, that they are designed to accommodate the expected traffic volumes and vehicle types, are appropriately signed and that they feed into the local street system in such a way that they do not encourage “rat-running” through local streets.

### 7.4 Connectivity – activity nodes

Activity nodes by their very nature result in higher numbers of trips to and from them, whether they are by motor vehicle, bicycle or walking. To this end the connections should be logical, intuitive and be adequately signed to clearly guide people to the nodes. The greater concentration of movement at these nodes requires additional treatments and facilities to safely and efficiently accommodate the various needs.

A specific issue here is the provision of safe and effective crossing points for pedestrians within the node and also to attain an appropriate level of priority for these people over other

forms of road users. This may include defined pedestrian crossings, raised plateaus, alternative pavement treatments, etc. In considering the pedestrian crossing points an assessment of the strong pedestrian desire lines must be made to ensure the facilities are provided where people want to cross, otherwise experience shows they will otherwise cross at less appropriate locations.

Consideration needs to be given for the provision of vehicular and non vehicular parking (bikes and mopeds for example) both on street and off street and well as loading zones for delivery vehicles.

## 7.5 Cross sections

The road hierarchy and function and use of a road dictate the cross sections of the various roads within the Mundijong/Whitby area. Liveable Neighbourhoods provides clear direction for road reservation widths and cross sections depending on the planned road hierarchy, proposed traffic volumes, proposed speed limits and adjacent land use. These guidelines should be followed to determine the appropriate road reservation widths required for the development of the District and various Local Structure Plans. The following table indicates the Liveable Neighbourhoods cross sectional figure required for major roads within the DSP area.

**TRAFFIC VOLUMES & ROAD DESIGNATIONS AND RELATED LIVEABLE NEIGHBOURHOODS ELEMENT 2 – INDICATIVE ROAD SECTION FIGURES**

Major Roads – with Rail Crossings	Volume	Designation	LN Figure Number
South Western Highway	12,000vpd	Primary Distributor	Width and section determined by Main Roads WA
Tonkin Highway	18,000vpd	Primary Distributor	Width and section determined by Main Roads WA
Soldiers Road	13,000vpd	Integrator Arterial A	Figures 12 & 13
North-South and East-West Connectors	1,000 to 7,000vpd	Neighbourhood Connectors (A and B)	Figures 17 & 18
Major Roads - without Rail Crossings			
South Western Highway	21,000vpd	Primary Distributor	Width and section determined by Main Roads WA
Tonkin Highway	16,000vpd	Primary Distributor	Width and section determined by Main Roads WA
Soldiers Road	10,000vpd	Integrator Arterial B	Figures 15 & 16
North-South and East-West Connectors	1,000 to 9,000vpd	Neighbourhood Connectors (A and B)	Figures 17 & 18

Reference Appendix 4.0 – Traffic Assessment  
Mundijong-Whitby District Structure Plan  
December 2010

Table 3 – Traffic Volumes

In considering the various options for road cross sections it is important to consider the uses the road system will be required to accommodate. For example in the commercial/shopping areas consideration should be given to the need for on street parking, the need for on street



cycling provision, the need to accommodate the largest delivery vehicles, provision of pedestrian crossing points and also the provision of central medians to assist pedestrians to cross and also manage traffic speed.

With distributor roads consideration should be given to the need for on road cycling via the provision of cycle lanes where appropriate.

## 7.6 Traffic Management/Network

In developing the road network it is important to ensure that appropriate traffic management facilities are provided to ensure the roads and intersections operate in a safe and appropriate manner.

In considering this, it is important to consider the form and function of intersections in conjunction with the road hierarchy and to ensure the safety of the various road uses is appropriately addressed. For instance, four way intersections require a minimum regulatory control at least on one road, however, depending on the road hierarchy, traffic volumes, speed, types of vehicles, sight distance, etc a higher level of control may be necessary. The higher the level of intersection control the greater the impact on the road user and as a consequence may raise the potential for them to travel on alternative routes that may not be the most appropriate or the intention of the road hierarchy.

T junctions have in general been found to have a higher level of safety compared to four way intersections.

The design of a road, its cross section, the adjacent land use, the prevalence of parking and topography, influences driver behaviour to varying degrees. By understanding these factors it is possible to achieve the desired outcome for both safety and amenity along that roadway. Alternatively the incorrect choice of measures can mean that an undesirable outcome occurs, such as higher vehicle speeds, greater traffic volumes, transfer of traffic movements to other streets and reduced level of road safety. Certainly the traffic management measures to be used will and should be governed by the adjacent land use. For example in commercial centre areas lower speeds should be encouraged by design rather than regulation via speed limits as this then becomes a self enforcing situation rather than requiring external enforcement.

Such treatments as road narrowing, kerbed medians, centrally planted trees, raised plateaus, roundabouts and formal pedestrian crossings all contribute to a lower speed

environment. In many cases it is a package of measures that are more effective than individual isolated treatments. Any regulatory control on the road network requires the approval of the Commissioner of Main Roads.

## 7.7 Railway Crossing Priorities

Until such time as the freight railway is relocated, crossing points will require careful consideration and planning. The DSP proposes retention of an existing crossing at Mundijong Road. The existing crossing at Keirnan Street may be retained in the short term, however, would ultimately be closed and relocated to establish a crossing approximately half way between Keirnan Street and Bishop Road to provide a district road connection across the railway line to the proposed district centre upon development of the District Centre. An additional crossing at Bishop Road is also proposed though will be subject to further detailed investigations which will need to take into consideration the potential impact on the possible future extension of passenger rail.

Figure 16 provides an indication crossing points and potential and proposed closures to be used as a basis for more detailed investigations.



## 7.8 Existing Public Transport Provision

The public transport system for the Mundijong Whitby area currently consists of the Australind train services operated by TransWA and local Transperth bus services to Armadale.

TransWA operates two return services daily between Perth and Bunbury using the Australind diesel train. A request train stop is at Mundijong railway station. Commuters to Perth would only travel on 7:42am inbound train and 6:43pm outbound train. The limited number of train services on the Australind encourages many commuters travelling to Perth to drive to the Armadale Park and Ride facility to catch the Transperth electric trains that operate every 15 minutes throughout the day and with an additional limited stop serviced during the peak periods. The Armadale Line operated seven days a week with a 30 minute frequency during the evenings and on Sundays.

## 7.9 Possible Future Public Transport Provision

### 7.9.1 STEM analysis

A STEM analysis was undertaken in March 2009, and calibrated in January 2010 by Laurie Piggott Consulting. The Stem Analysis will assist in the case to convince the state government to ultimately extend the railway from Armadale south to Byford and possibly Mundijong. The calibration provides realistic figures to support the Shire case and to have reliable input into infrastructure design. (Refer to Appendix 4.)

A further paper prepared by Laurie Piggott Consulting in January 2010 adds a further calibration which has more optimistic assumptions and combined with the result from the above paper provides two outcomes defining the outer limits of a range of possible patronage numbers. Also, in addition to investigating the demand for a station in Byford serving the whole Shire catchment, this paper investigates the demand for a station within the Byford catchment and the Mundijong catchment.

Table 3 shows total boarding's not broken into modes. The STEM result is based on current Lower WAPC population data, while the conservative and optimistic results indicate the range of patronage numbers that could be achieved at the ultimate population level.

Scenario	Station Boardings		
	Byford full catchment	Byford limited catchment	Mundijong catchment
STEM	4,200	3,000	2,300
Conservative	5,700	4,100	3,100
Optimistic	8,700	5,200	4,900

Table 4: Public Transport Boardings

### STEM Results and Railway Station Justification

As a rough guide, the STEM patronage threshold for justification of a railway station would be in the order of 4,000 boarding's. The above results therefore indicate that a station would ultimately be justified at Byford and possibly but with less certainty at Mundijong.

A decision to extend the railway will take account of a range of factors which include the STEM forecast, capital cost, operating cost, social issues and the environment. Because the STEM forecast is only one of the factors it cannot be used in isolation to determine the outcome. However the results at Byford are quite strong and at Mundijong are cause for hope.

This is complicated by the project being a line extension as well as a station building exercise. Due to capital and operating cost unknowns this makes it impractical to give better guidance than the above.

The STEM analysis generates a number of recommendations relevant to the DSP:

1. *That space is allocated within the Mundijong/Whitby District Structure Plan for a Transport Hub located along the existing Perth to Bunbury railway.*
2. *That interim regional bus transfer facilities operate until such time as the population and demand is sufficient to quantify a train station in Mundijong.*
3. *That the Shire enters into dialogue with the Public Transport Authority about the potential locations for the Transit Hub.*



### 7.9.2 Options for Passenger Rail in Mundijong and Interim Uses

The Mundijong/Whitby Enquiry by Design (EbD) Workshop investigated three scenarios for town Centre locations:

Scenario 1 – The existing Mundijong town site as the main town centre.

Scenario 2 – New town centre to the north of the study area.

Scenario 3 – Midpoint between the Mundijong town site and the north of the study area.

The EbD outcomes report identified Scenario 2 as the preferred location for reasons that include a shorter, less cost, extension of the rail network; but more importantly a station location suited to the travel direction of most of the population.

In line with the principal of keeping options open for the long term, with a Scenario 2 station at the northern end of the town, it would be prudent to retain the existing railway reserve through Mundijong even if there were no active function on it. This is a railway asset too valuable to be lost and conversion to another use would have that result. Interim uses, such as a park and ride facility at the existing Australind station (for transfer by buses) could be found but the focus should be on keeping railway options open for the future.

In any event, closure of the railway would require legislation in the form a “Rail Discontinuance Bill” that would be unlikely to gain political support.

### 7.10 Pedestrian, cycle and disabled access

Reducing the need to travel and promoting alternative modes are key design features in achieving more sustainable development. It is proposed that Mundijong/Whitby is designed as a town with good access to and high usage of public transport.

Since public transport trips typically start as walking or cycling trips, it is important that the infrastructure for this part of the trip be designed to be as safe and comfortable as possible to encourage access to and from the public transport system.

The design of the streetscape and local environment will be a key motivational factor for residents to make greater use of alternative modes. The Western Australian Planning Commission through the Liveable Neighbourhoods operational policy has provided advice and best practice on the development of sustainable communities, this includes:



1. Walkable neighbourhoods to reduce car dependence for access to employment, retail and community facilities
2. Interconnected network of streets which facilitate safe, efficient and pleasant walking, cycling and driving
3. Building frontages to streets to improve personal safety through increased activity and surveillance
4. Development which supports the efficiency of public transport and provides direct access to the system for residents

The freight rail line will remain a major obstacle and cause of severance until relocated. It has the potential to separate communities, create access difficulties that will lead to an increase in car trips. There will be a need to provide suitable crossing points at obvious desire points either side of the line, preferably at grade.

Relocation will address these difficulties and provide the opportunity for the reserve to be utilised as a central spine for the cycle and pedestrian network. This can then be linked via district and neighbourhood roads and the multiple use corridors to establish a truly interconnected cycle and pedestrian network.

The Multiple Use Corridors also provide an opportunity that can be integrated as part of the pedestrian and cycle network.



FIGURE 17 INDICATIVE BICYCLE AND PEDESTRIAN NETWORK

## 7.11 Freight Railway

The Mundijong/Whitby DSP area is bisected by the “South West Main” freight railway which in February 2010 carries “bulk haul” traffic as follows:

1. 8 coal trains,
2. 18 bauxite trains,
3. 4 caustic trains, and
4. 4 alumina trains

This makes 34 train movements through Mundijong per day made up of the loaded trains and the empty returns. For example, 8 coal train movements are made up of 4 loaded and 4 empty returns.

The “bulk haul” task will continue in the long term from existing and potential mines; in addition, a new container operation moving general freight will develop with increased population in Perth and the South West. Growth in this task will be bolstered by the impact of road congestion.

It is expected that the “South West Main” will continue to grow and be a strategic freight railway into the long term.

The following is a description of issues in comparing the existing rail alignment with a proposed western alignment:

### 7.11.1 Grade Separated Crossings

Tonkin Highway grade separated crossings are to be constructed by Main Roads WA at time of highway construction:

#### Existing Rail alignment

Two crossings required:

1. Under Tonkin Highway as part of the grade separation that will be required at Bishop Road.
2. Under Tonkin Highway as a stand alone structure to the south of Mundijong Road.

#### Western Rail alignment

Two crossings required:

1. Under Bishop Road to the west of Tonkin Highway.

2. Under Mundijong Road adjacent to its flyover crossing the Highway.

As such, no additional grade separated crossings are generated by relocating the freight railway adjacent to Tonkin Highway. In Mundijong/Whitby, however, grade separated crossings will be required to be constructed when traffic volumes arising from urban development bring the level of conflict to a higher protection level:

#### Existing Rail alignment

Six crossings required:

1. Bishop Road
2. Soldiers Road
3. Mundijong Road
4. Three proposed internal district Distributors.

#### Western Rail alignment

No crossings required.

To leave the freight railway in place will therefore ultimately require the construction of up to an additional six grade separated crossings.

#### 7.11.2 Urban Amenity

The freight railway through Mundijong/Whitby will have a major impact on potential development due to noise and vibration. The railway is a strategic state asset serving the south west with relatively high and growing traffic; planning and environmental authorities will require protection of the railway with appropriate buffers. Determination of the extent of buffers will require a noise impact study which will factor in projected freight traffic growth.

Under the existing alignment buffers will include the 40m rail reserve and adjacent roads such as Paterson/Soldiers Road. Where there is an adjacent road, noise investigations may show that the buffer is sufficient subject to special building conditions on development.

With the potential western re-alignment, Tonkin Highway and its noise amelioration measures may be a sufficient buffer against rail noise but special conditions on development may be required for vibration. This will, however, affect the western

periphery of the DSP area only rather than its central core as per the existing alignment.

#### 7.11.3 Urban Separation

This is an issue on the existing alignment which does not apply to the proposed western re-alignment. Relatively high rail traffic will restrict the number of road and pedestrian crossings and have an increased safety risk with increased population and freight traffic. This conflict will increase the probability of serious incidents resulting in tighter control of illegal access across the railway. This division will challenge the objectives of achieving a cohesive, well connected community at Mundijong/Whitby.

#### 7.11.4 Passenger Rail Design

The urban passenger railway station cannot be constructed on the freight railway reserve due to infrastructure space restrictions and the presence of protected vegetation.

Retention of the existing rail freight alignment will therefore require an urban passenger railway station to be located off the existing reserve to the west as shown in the Workshop Outcomes report.

Threatened Ecological Communities (TEC's) may stand in the way of the western location which, combined with the restriction of building a station on the freight railway will make it difficult to locate a railway station within the DSP area. Also, a station location off the existing rail reserve rules out the ability to extend the passenger rail to the southern end of the DSP and beyond.

If the western freight relocation is adopted a potential station location is the point at which the freight railway joins the existing passenger system. This area has already been cleared of vegetation.





7.11.5 Western Rail Alignment Issues While the relocation of the freight railway to the west abutting Tonkin Highway offers many positives, there are a number of issues that will need to be addressed.

1. The DSP will be best served by relocating the freight railway to the west at the same time or prior to the extension of Tonkin Highway. If not, there will



- be a duplication of bridge infrastructure and uncertainty about timing and responsibility for relocation.
2. A western re-alignment will best serve the proposed industrial area in Mundijong by making it possible to provide a rail/road intermodal terminal. This is not a marshalling yard but a facility to bring freight to the area by rail rather than road. Having this terminal linked to a metropolitan wide network will strengthen the industrial area and the employment base for the DSP.
  3. Splitting the town site into two separate cells with no increase in the limited number of crossing points due to 34 freight train movements per day. This division of urban cells threatens the ability to create a single significant town centre.
  4. Increased road traffic and informal pedestrian crossings of the railway will create a growing and ultimately significant safety and urban amenity problem. The crossings of Bishop Street and Soldiers Road already have a substandard alignment.
  5. There is now an urgent need to protect and fortify the new alignment particularly because of existing and potential rural living lots.

By progressing the relocation upfront and prior to or concurrent with the extension of the Tonkin Highway, there will be substantial benefits including:

1. Lesser cost of land to acquire – currently zoned Rural.
2. Possibility of incorporating the cost for the acquisition of land into developer contribution arrangements.
3. Certainty that the District Centre will be able to be developed and effectively service the catchment.
4. Avoidance of future conflicts between rail and road users and political pressures as a result of this conflict.
5. Avoidance of significant safety/emergency access issues due to limited crossings east west.
6. Removal of the need for a noise assessment report to be prepared for land adjacent to freight rail.
7. Assist in avoiding pressure from landowners whose land is constrained from developing in earlier stages due to the location of the freight line.

Benefits that can be used to justify the cost of relocating the freight railway include:

1. A much higher level urban amenity
2. Less cost for grade separated structures

3. Freight network benefits through integration with the proposed general industrial area and the metropolitan rail freight network
4. Improved rail and road safety
5. Flexibility with respect to future provision of passenger rail services.

The Shire is liaising with the Department of Planning, Public Transport Authority and Main Roads WA to further investigate the future relocation of the freight rail and the ultimate DSP is designed to accommodate this eventually.

## 8.0 ACTIVITY CENTRES

As part of the completion of the District Structure Plan, Taktics4 provided relevant retail, property economics and centres input. This included;

1. analysis of the future market demand for commercial activity in Mundijong/Whitby
2. assessment of the spatial distribution options for commercial activity
3. definition of commercial characteristics to promote the efficient commercial and effective planning outcomes for various activity centres
4. calculation of employment opportunities and self sufficiency in accordance with State Planning Policy requirements

Analysis was formulated on a range of fundamental assumptions including:

1. A review of the starting point based on the desired outcomes produced during the Enquiry by Design workshop
2. Recognition of the preferred/minimum target population base of 30,000 residents within the study area
3. That planning for commercial activity should be considered in the context of a range of staged relocation or alternate decisions relating to the future of the freight and passenger alignment through Mundijong/Whitby, including:
  - Retention of freight and passenger rail on existing alignment through middle of Mundijong/Whitby
  - Realignment of freight rail adjacent to Tonkin Highway reserve
  - Termination of passenger services to a station north of the study area within or adjacent to existing rail alignment

### 8.1 Market Demand

The size, function and sustainability of retail and commercial activity will be directly related to the size and needs of the ultimate Mundijong/Whitby community. In this regard, projected population has been outlined in section 6.12 preceding.

#### 8.1.1 Consumer Spending

According to the Australian Bureau of Statistics Household Expenditure Survey the Shire of Serpentine-Jarrahdale residents are estimated to spend on average of 2.6% above WA average spending on retail goods. Mundijong/Whitby residents are thought to spend less than WA average on Personal and Miscellaneous goods and services, similar amounts on grocery and leisure goods and services and above average spending on fashion and household goods.

Table 5: Household Expenditure

Spending Retail Categories	Average Weekly Spend		Difference	
	Serpentine Jarrahdale	WA average	\$	% from WA average
Misc	\$44.60	\$47.82	-\$3.22	-6.7%
Personal	\$87.14	\$88.09	-\$0.95	-1.1%
Leisure	\$123.80	\$121.97	\$1.83	1.5%
Grocery	\$148.85	\$144.91	\$3.94	2.7%
Fashion	\$42.93	\$41.29	\$1.64	4.0%
Household	\$144.32	\$132.82	\$11.50	8.7%
Total	\$591.64	\$576.90	\$14.74	2.6%

Household Expenditure Survey (ABS 2003-04)

CPI (ABS 2004-2009)

SpendInfo Small Area spending software (NIEIR 2008)

The ultimate Mundijong/Whitby population is estimated to generate in excess of \$316.95M p.a. on retail goods and services, including nearly \$190M p.a. on convenience based goods including food and grocery and personal services and \$100M on comparison goods such as household, fashion and leisure goods. The remaining expenditure is spent on large format goods such as furniture, appliances, and floor coverings.

Mundijong/Whitby is a relatively contained catchment. It is expected that Byford residents will also be relatively self contained and share a similar retail offer to Mundijong/Whitby. It is unlikely that Byford residents will need to or want to shop regularly at Mundijong. It is estimated that the Mundijong/Whitby catchment is capable of retaining up to 90% of convenience based spending and 55% of comparison goods spending.

Retailers in Mundijong/Whitby should therefore be able to trade to a potential resident spending pool of \$225M p.a. including \$169M p.a. in convenience and \$56M p.a. in comparison spending.

Table 6: Spending Capacity

	Aggregate Mundijong/Whitby Spending	Retention	Ultimate	Spending by Other Sources	Aggregate Available Retail Spending
Convenience Spending	\$190M p.a.	90%	\$170M p.a.	5%	\$179M p.a.
Comparison Spending	\$100M p.a.	55%	\$55M p.a.	5%	\$58M p.a.
Combined Retail Spending	\$290M p.a.	77.5%	\$225M p.a.	5%	\$237M p.a.

Household Expenditure Survey (ABS 2003-04)

CPI (ABS 2004-2009)

SpendInfo Small Area spending software (NIEIR 2008)

The hinterland catchment and visitors will be expected to generate at least 5% of the aggregate resident spending adding a further \$12M p.a. to the aggregate expenditure for Mundijong retailers.

### 8.1.2 Commercially Sustainable Floorspace

The aggregate retail expenditure is capable of sustaining up to 32,000sqm of retail floorspace including:

1. A single store for both full line supermarkets at 3,500sqm each (7,000sqm)
2. Up to 3 smaller supermarkets at 1,500sqm (4,500sqm)
3. A single Discount Department Store operator at 7,000sqm (7,000sqm)

Nearly 60% of the retail floor space (18,500sqm) is allocated to major tenants leaving 13,500sqm to be allocated to specialty shops. The majority of this space will be located in the full line supermarket and Discount Department Store (DDS) based centre(s).

## 8.2 Distribution Options

The distribution of commercial activity throughout the Mundijong/Whitby catchment will depend on:

1. Government policy
2. Preferred number and configuration of activity
3. Accessibility between catchments and activity
4. Commercial location and sitting requirements of major tenants

### 8.2.1 Philosophy

The spatial distribution of commercial activity is ideally developed to achieve a sustainable balance that delivers commercial efficiency, spatial equity and effective and achievable planning outcomes. The commercial sustainability of urban activity centres is generally reliant on the vitality of the retail activity. Typically, a vital retail activity is conducive to a healthy range of commercial and community activity.

It is also a commercial reality that the most successful retail centres are underpinned by at least one of the major retailers such as supermarkets and Discount Department Stores. A robust distribution of commercial activity should ideally consider the commercial trading needs and implications of these major tenants.

### 8.2.2 Market quadrants

The study area comprises four distinct and relatively equal sized quadrants delineated by a range of natural features and physical infrastructure.

It is imperative to the successful performance of commercial activity that residents from each quadrant are able to readily access commercial activity in each of the quadrants. In other words, residents from one quadrant can easily access the commercial activity in each of the other quadrants. This requirement is more important for higher order centres providing a district commercial role.

1. The east and west study area is delineated by the north south alignment of the freight railway and Paterson Street/Soldiers Road.
2. The north and south sections of the study area are delineated by the natural waterways flowing east west across the site.

A range of district distributor roads providing direct access across the natural and physical infrastructure barriers through the centre of each quadrant will contribute to the successful performance of all commercial activity nodes.

### 8.2.3 Existing Commercial Activity

There is limited retail and commercial activity in the subject area. The majority of retail activity in Mundijong/Whitby is located in the existing designated Mundijong Town Centre along the west side of Paterson Street between Whitby and



Richardson Streets. Commercial activity within the existing designated Mundijong Town Centre includes:

1. IGA delicatessen
2. Post Office
3. Service station
4. Cafes
5. The shire offices are also located further south on Paterson Street.

This offer represents an understandably small retail base that reflects the current small consumer catchment in Mundijong/Whitby.

#### 8.2.4 Future Distribution Options

The distribution of centres will need to accommodate both full line supermarkets (Coles and Woolworths) and a range of smaller supermarkets (typically associated with IGA distributors). There will also need to be a single centre capable of accommodating a single Discount Department Store.

1. A DDS based centre will require a catchment that incorporates the entire Mundijong/Whitby District Structure Plan area. A typical DDS operator trades successfully predominantly from a 3.5km catchment
2. Full line supermarket based centres typically require a catchment encompassing a 1.5km radius.
3. Smaller supermarket based centres typically require a catchment encompassing a 1 km radius.

It should be noted that if the preferred option includes two centres – each with a full line supermarket – i.e. one with a Coles and one with a Woolworths – they will both generate sales from within the entire Mundijong/Whitby District Structure Plan.

The following distribution options were assessed as part of preparation of the DSP.

##### 8.2.4.1 Single Central Centre

A single centre centrally located to entire catchment which:

1. would incorporate Coles and Woolworths supermarkets
2. may ultimately incorporate a DDS
3. could be located on or in close proximity to the main north-south road alignment

4. could also be located further south (toward Mundijong Town Centre) or further north as this centre would attract a significant proportion of all trips
5. would therefore require direct access from all quadrants of the subject area

This is the most commercially efficient option. However, the subject area is approximately 5 km square which means that residents on the outer fringe of the DSP area will have to travel further than most urban residents to access their retail goods and services. It also proved difficult to identify a suitable central site in the catchment given proximity of natural features and physical barriers and land uses which are not conducive to higher density urban development around the centre.

#### 8.2.4.2 *Two separate full line supermarket based centres*

Two centres at either end of the subject area where:

1. Each centre would incorporate a full line supermarket – Coles in one and Woolworths in the other
2. One may ultimately incorporate a DDS while the other would not
3. Both would be located in close proximity to the north south road alignment
4. The southern option may be incorporated within the Mundijong Town Centre

There is a risk associated with this option. A DDS may not develop in the catchment until very late in the development of the catchment, if at all. Under this scenario there will be two centres with the same role and function. This will effectively create duplication of commercial activity and may lead to confusion over the role and function of both centres by customers, tenants and developers.

The other concern about a full line supermarket based centre in the Mundijong Town Centre. The 4,500sqm size of this centre would require a land holding of 1.5Ha or dimensions of 100m by 150m. It is also doubtful whether the existing rural village theme and amenity desired by the community, is able to be retained with a centre of this size in the Mundijong Town centre.

#### 8.2.4.3 *Smaller Centre Network*

Involves the equitable distribution of smaller supermarket based centres serving smaller catchments, where:

1. There may be up to seven centres (as per EbD Workshop) evenly distributed throughout the study area
2. Each will contain a supermarket of 1,000sqm – 1,500sqm and 5-10 shops
3. They will serve a catchment of 800 metres
4. There will be no opportunities for a DDS based centre
5. There will be no opportunities for a Coles or Woolworths supermarket

The obvious risk associated with this option includes the continued pressure by the major tenants to access a site in the catchment. If the major tenants are successful in securing access into the catchment other surrounding centres may not develop creating an inequitable distribution of commercial activity in the catchment.

Alternatively, without opportunities for these tenants, customers will still be required to travel to Byford and beyond to access these retail goods and services.

#### 8.2.4.4 *Preferred Centre Distribution*

The preferred distribution option for Mundijong/Whitby involves a balanced combination of Option 1 and 3.

A single centre capable of comprising two full line supermarkets and a potential DDS located to the north of the catchment will create the opportunities necessary to accommodate the major tenants for Mundijong/Whitby residents and facilitate ultimately more efficient public transport links.

The location of the single centre to the north of the study area allows for a reduced number (three) of smaller supermarket based centres to be distributed evenly throughout the east, west and southern catchments – including in the Mundijong/Whitby Town Centre.

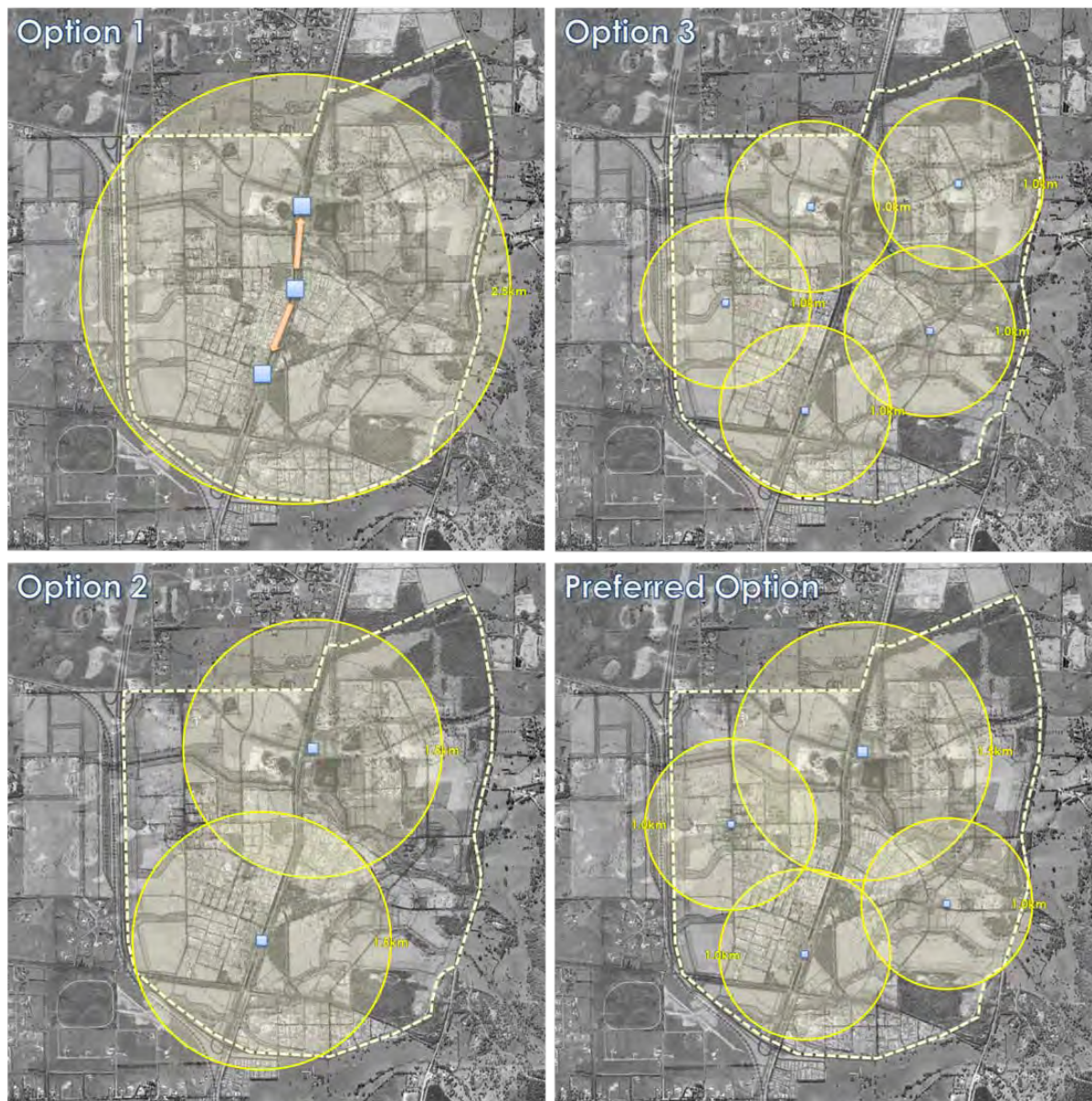


Figure 19: Centre Options

### 8.3 Centre Characteristics

The centres should be planned with consideration to the following characteristics.

#### 8.3.1 Northern Town Centre

Location	North Eastern Quadrant (western side)
Role/function	District Centre
Catchment	Serving the entire Mundijong/Whitby catchment
Anchor	Two full line supermarkets up to 3,500sqm each One DDS up to 8,000sqm 7,500sqm (75 shops) of specialty retail
Total size	22,500sqm of retail activity
Land Area	Uniform land area of 6Ha.
Configuration	District Activity Centre incorporating Main Street activation
Commercial	10,000 sqm office space
Community	Public Transport Interchange TAFE site Community facilities
Residential	Mix of residential and non residential uses, opportunity for high density (up to R100), to reflect requirements of SPP 4.2 Activity Centres for Perth and Peel, multiple level apartments, integrated multiple activity Town Centre
Access	Direct access to all areas of the Mundijong/Whitby catchment
Staging	Stage 1 - single supermarket with 15 shops Stage 2 – second supermarket with 25 shops Stage 3 – a DDS with additional 15 shops
Timing	As determined by development and tenant sector
Risks/threats	This centre requires direct at grade access to the western sector of the catchment. Failure to achieve at grade access across the rail alignment and Soldiers Road reduces the ability of this centre to trade successfully.
Alternatives	Without direct at grade access across the rail alignment and Soldiers Road the centre will develop as either a full line or small supermarket based centre. Under this scenario the larger district centre role will best be suited to the Mundijong Village – albeit with the associated risks listed under the distribution options.

### 8.3.2 Mundijong Village Centre

Location	South Western Quadrant (eastern side)
Role/function	Neighbourhood/Local Centre
Catchment	Predominantly serving a 1km catchment
Anchor	A small supermarket up to 1,500 sqm each 3,000sqm (15-20 shops) of specialty retail
Total size	4,500sqm of retail activity
Land Area	Uniform land area of 1.5Ha.
Configuration	Small main street
Commercial	Nil
Community	Shire Offices
Residential	Increased density in proximity of main street: medium density small lot/town house development as part of village centre
Access	Strong direct east west access to both southern quadrants
Staging	Stage 1 - single supermarket with 15 shops
Timing	as determined by developer and tenant sector
Risks/threats	This centre needs to remain small and focused on the local/neighbourhood role. The risk is that the commercial development will be allowed to continue to expand along Paterson street.



### 8.3.3 East Village and West Village

Location	West Village – southern section of North West quadrant East Village – northern section of South East quadrant
Role/function	Neighbourhood/Local Centre
Catchment	Predominantly serving a 1km catchment
Anchor	A small supermarket up to 1,500 sqm each 1,000sqm (10-15 shops) of specialty retail
Total size	2,500sqm of retail activity
Land Area	Uniform land area of 0.75Ha.
Configuration	Small single sided main street
Commercial	Nil
Residential	Increased density in proximity of main street; medium density small lot/town house development as part of village centre
Access	Strong and direct north south access to both north south quadrants
Staging	Stage 1 - single supermarket with 15 shops
Timing	as determined by developer and tenant sector
Risks/threats	Nil

## 9.0 EMPLOYMENT AND ECONOMIC DEVELOPMENT

Over 18,000 of the expected minimum 30,000 residents within the Mundijong/Whitby Structure Plan Area community will be expected to participate in the labour force.

Table 7: Labour Force Participation

Dwellings	11,538
Persons/dwelling	2.6
Population	30,000
Resident labour force (%)	60%
Resident labour force (persons)	18,000

### 9.1 Employment Opportunities

Employment opportunities in and around Mundijong/Whitby are calculated in the following table. It highlights 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, opportunities for 10% in home based businesses, and 29% in the industrial and Mixed business areas provided adjacent (West and North) to the District Structure Plan area. The level of self sufficiency falls below preferred levels of up to 60%. However, this figure should be considered in the context of significant agriculture based activity in the surrounding rural environment.

Table 8: Commercial Employment

Employment Category	Floorspace (sqm)	Floorspace/employee (sqm)	Total Employees	Employment Self Sufficiency
Retail Villages	32,000	25	1,280	7%
Commercial	12,500	15	833	5%
Community	5,000	75	67	0%
Commercial employment	49,500	23	2,180	12%

Table 9: Home Based Employment

Employment category	% of dwellings	Home based business	Employees/ business	Total Employees	Employment Self Sufficiency
Home Based Employment	10%	1,154	1.5	1,731	10%

Table 10: Educational Employment

Employment category		Average Employees	Number	Total Employees	Employment Self Sufficiency
Primary schools		40	8	320	2%
Secondary schools		80	3	240	1%
TAFE		200	1	200	1%
Education Employment			12	760	4%

Table 11: Industrial Employment

	land area (Ha)	floorspace (sqm)	Floorspace/ employee (sqm)	Total Employees	Employment Self Sufficiency
Industrial*	375	900,000	250	3,600	20%
Mixed Business (Cardup)	100	240,000	150	1,600	9%
Industry/Mixed Business	475	1,140,000	219	5,200	29%

\* based on 80% developable land and 30% plot ratio

Total Employment Opportunities	9871	55%
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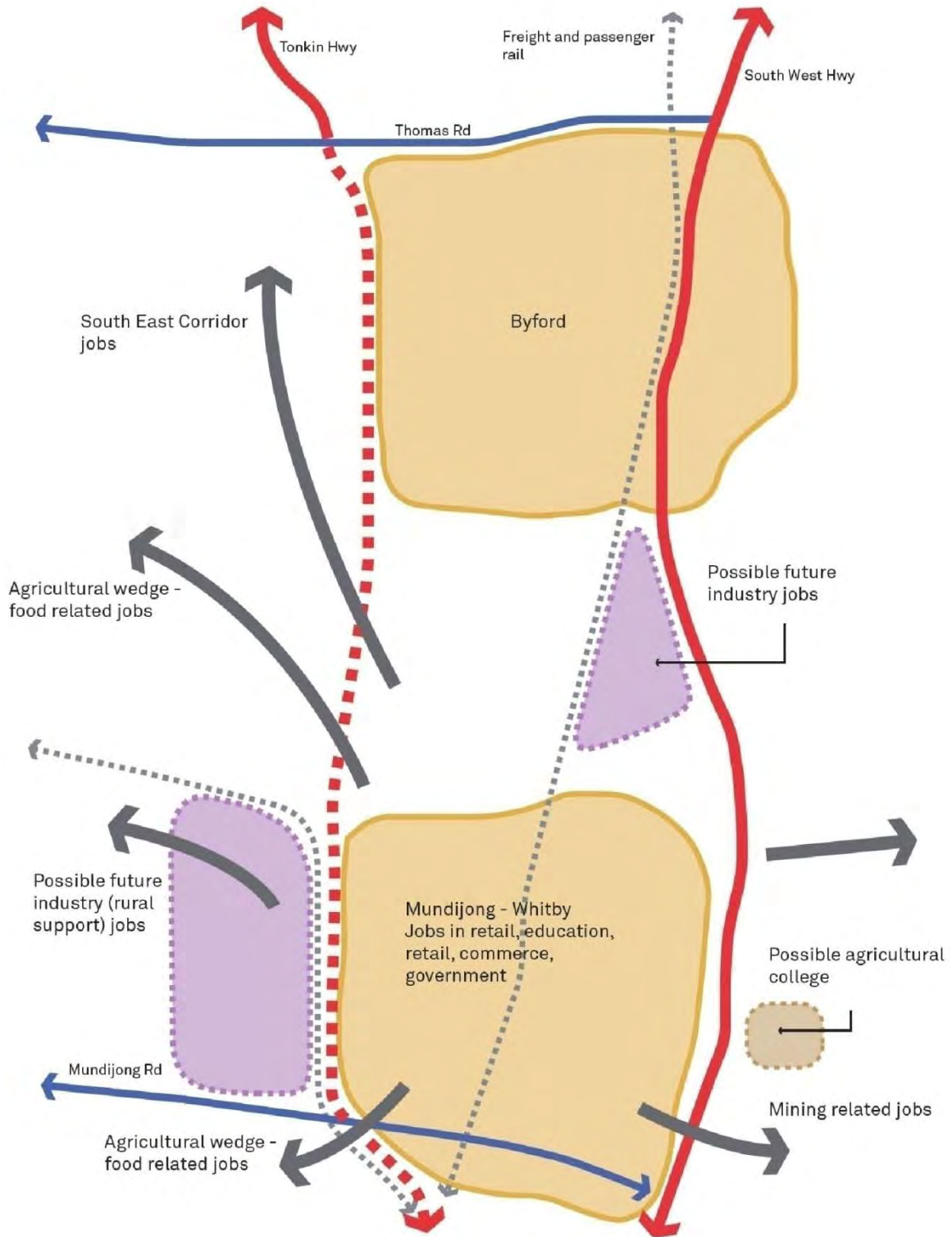


FIGURE 20 EMPLOYMENT OPPORTUNITIES

## 10.0 RESIDENTIAL DEVELOPMENT/LOT LAYOUT

The D SP provides for a wide range of residential product in order to deliver on the vision of a contemporary village lifestyle in Mundijong/Whitby and to provide flexibility in meeting projected population opportunities.

These can broadly be arranged into three groups:

1. Medium/High (urban) density
2. Low/Medium (suburban) density
3. Lower (transitional lots) density

As a guide, average urban densities of 15 dwellings per hectare across large urban areas, increasing to 20-25 dwellings per urban hectare at strategic sites (including within 400 m of town centres and metropolitan railway stations), are indicated.

### 10.1 Indicative R-Codings

#### 10.1.1 Medium/High (Urban) densities

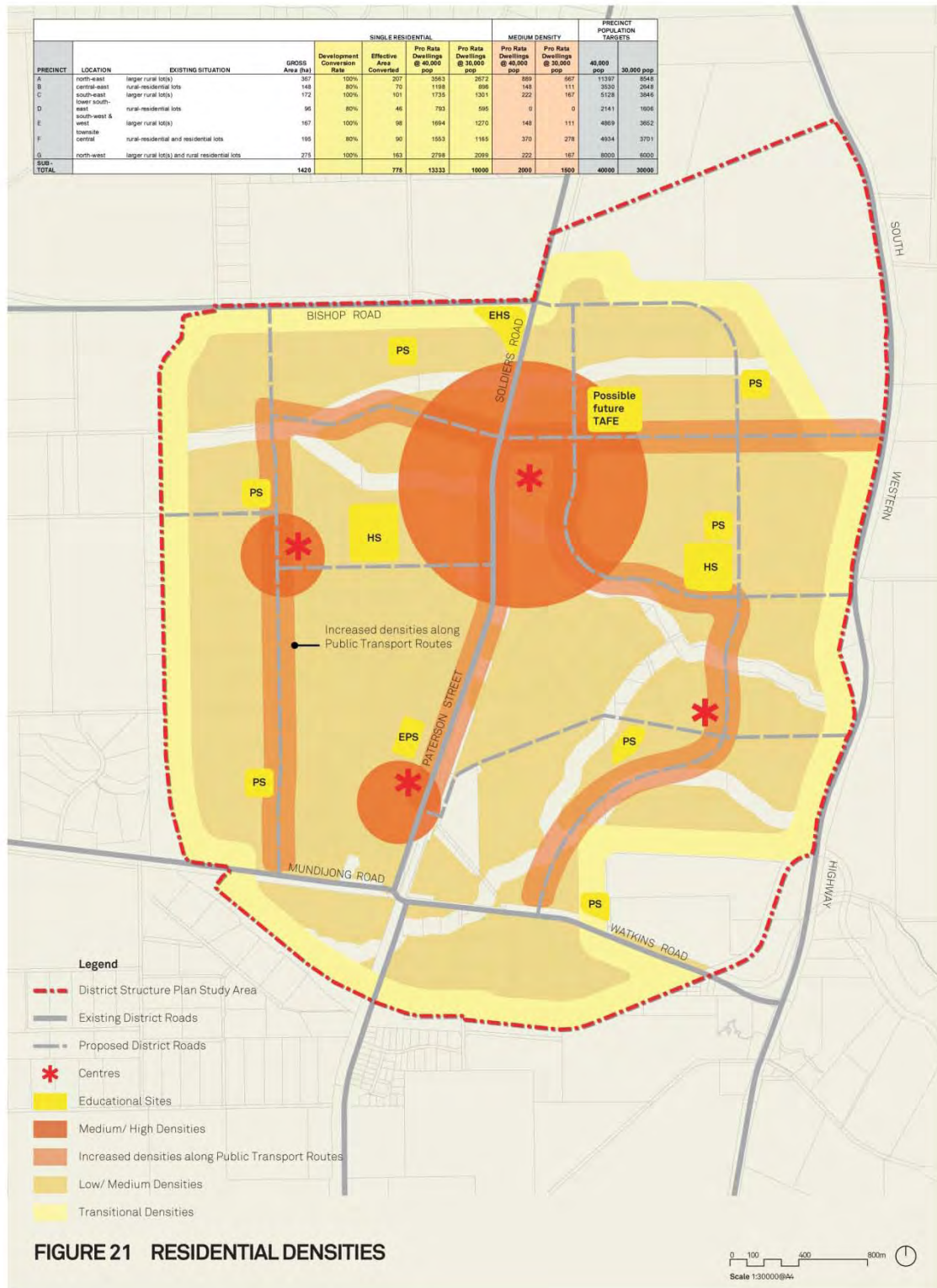
These densities will likely be based on a density code range in the order of R40-R100 and will be primarily located within the Town Centre as part of Precinct A. The final density range and distribution shall be determined as part of Local Structure Planning. Residential densities within the proposed District Centre should be guided by the requirements of SPP 4.2 Activity Centres for Perth and Peel.

#### 10.1.2 Low/Medium (Suburban) densities

These densities will likely be based on a density code range in the order of R20-R40 and will form the majority of residential development in the D SP area. Proximity to open space, linear parks, community facilities, local centres and public transport routes should be reflected in provision of residential development based upon the upper end of the density range. The final density range and distribution shall be determined as part of Local Structure Planning.

#### 10.1.3 Lower (Transitional Lots) densities

These densities will likely be based upon a density range in the order of R2-R20. These lots will be located as a transition to surrounding non urban uses or if appropriate as part of potential buffer areas adjacent to sensitive uses. The final density range and distribution shall be determined as part of Local Structure Planning.





## 10.2 Retention of existing vegetation

Retaining and enhancing vegetation in the Mundijong/Whitby location is critical to maintaining the desirability, amenity and sustainability of the district. This is evident in the EbD and vegetation retention is important for the DSP and future LSPs.

The DSP identifies locally significant natural areas that may be retained as part of local open space and dealt with through the LSP process.

Throughout the DSP area, there are several avenues of trees established along rural roads and driveways, where possible, the LSPs should retain this vegetation and take the opportunity to do this in open space or within new road reserve verges.

Further, conservation corridors and multiple use corridors will enable district significant areas to be retained and enhanced.

Where LSPs are affected by Bush forever, conservation corridors or multiple use corridors, management plans will need to be prepared and implemented in order to provide for ongoing health and viability.

The design of Local Structure Plans should demonstrate the preservation of as much vegetation within the urban fabric as possible.

## 10.3 School Sites

Primary and high schools provide important community infrastructure which, if designed correctly can open opportunities for shared facilities with the community, particularly ovals and playgrounds.

During preparation of LSP's proponents are encouraged to consider innovative approaches to integrate school sites and school activities with surrounding residential areas. Shared use of school facilities and/or provision of uses compatible with adjoining residential activities to encourage greater community use of school facilities either as part of educational facilities or an adjoining local node is encouraged. Facilities including the provision of local convenience shopping or a local café/coffee shop are encouraged to be investigated as part of local structure planning. Consideration of such activities may be considered as part of School Site Detailed Area Plans provided with LSP's.

## 11.0 PUBLIC PARKLANDS

### 11.1 Size and distribution of Public Open Space

The DSP area contains a number of important natural features including creeks and drainage lines which in accordance with the Shire's sustainability philosophies are to be preserved as part of the planning and development of Mundijong/Whitby. The main creek/drainage alignments are identified within the District Structure Plan as part of the linear park Multiple Use Corridors (MUC).

The exact size and dimension of the MUC's are to be determined at LSP stage based upon the requirements of District and Local Water Management Strategies prepared in accordance with appropriate policy. Where land is to be accommodated within MUC's for Urban Water Management or vegetation/wetland preservation purposes this shall be provided in addition to the standard 10% POS provision. Where land is included as part of a MUC for active or passive POS purposes, then that area can be considered as part of the 10% POS provision. A minimum of 10% of the residential developable area will be required to be provided and will be confirmed at LSP stage.

The POS contribution is to be calculated on the basis of 10% of purely residential designated land use only. Residential components of mixed use designated areas will not be included for the purposes of calculating the 10% requirement. An indicative schedule of deductions for the purposes of calculating POS is provided in Section 11.2 following.

Areas of remnant vegetation under the Shire's Local Diversity Strategy are to be protected from subdivision and development and therefore may be included within the 10% POS contribution.

The 10% POS requirement allows for the provision of 2% of restricted use public open space as outlined within Liveable Neighbourhoods. To ensure a consistent understanding and application of the Liveable Neighbourhoods requirements the following criteria should be applied in determining restricted and unrestricted use open space:

In some instances additional land, over and above the standard 10% public open space requirement, may be required to be provided at the time of subdivision and/or development to accommodate drainage, recreational, environmental or other similar functions. Such land may be required to be provided free of cost at the time of subdivision and/or development.



## 11.2 Indicative POS Schedule

For the purposes of calculating the 10% POS requirement at the LSP stage, the following indicative POS schedule is recommended;

Gross Subject Area:

1. Less:
  - Non residential land uses  
(including Commercial, Mixed Use, School Sites, Utility and infrastructure facilities)
  - Multiple Use Corridor  
(Urban Water Management and vegetation protection components as determined under District and Local Water Management Strategies)
2. Leaves: Net residential Development Area
3. Divided by 10% equals POS provision requirement

In accordance with WAPC requirements, residential components of mixed use developments will be included within the net residential development area for the purposes of calculating the POS requirement.

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## 12.0 EDUCATION

### 12.1 Catchment Requirements

Education requirements in the DSP area have been guided by relevant policy and the requirements of the Department for Education (DoE). The DoE has identified the provision of two public high school and eight public primary school sites as necessary. The DSP area has an existing primary school, which is to be included within the eight required, and one existing private high school which will be in addition to those proposed. The DoE has also purchased a 10 ha site on Keirnan Street, Mundijong which will be the location of one of the two public high schools identified as required.

The locations of the remaining seven primary school sites to service the DSP area will be confirmed as part of Local Structure Planning. The DSP identifies school provision by precinct and also stipulates locational criteria to be applied as part of the Local Structure Plan process in finalising the specific locations of each primary school.

Primary schools are conceptually shown on the DSP to provide an indication of the expected distribution of school sites to meet catchment requirements across the whole DSP area, however, final locations will be confirmed as part of Local Structure Plans in accordance with the nominated criteria.

As noted, a high school site has already been secured to service the western half of the DSP area by the DoE. A second high school site has been identified in the DSP to service the eastern catchment. This is centrally located abutting district level roads and the major multiple-use corridor traversing the DSP area and is confirmed in this location by the District Structure Plan.

### 12.2 Size of school sites

The size, shape and dimensions of school sites will be confirmed as part of the LSP's and should be determined in accordance with Liveable Neighbourhoods Element 8 and in liaison with the DoE.

### 12.3 School site DAP

Specific school site Detailed Area Plans may be required at LSP stage.

#### 12.4 Movement Network

School sites should be sited as close as possible to district or local neighbourhood roads and connected via the pedestrian and cycle network

#### 12.6 TAFE Site

Investigations in collaboration with the Department of Training and Workforce Development (DTWD) have also confirmed a possible future requirement for an approximately 10ha TAFE campus within the DSP area. The specific location of this campus will be determined as part of Local Structure Planning, however, it is envisaged that it will be located within close proximity of the future town centre and transit hub. Appropriate locational criteria will be included as part of the DSP requirements.

Should it be identified in the future that the site is not required for a TAFE, an amendment to any Local Structure Plan to remove the requirement for a TAFE site should be considered in consultation with the Shire and DTWD.



## 13.0 INTEGRATED WATER CYCLE MANAGEMENT

The Shire is committed to investigating alternative sources of water and not simply applying the business as usual approach to water planning. Initial investigations on Integrated Water Cycle Management have been undertaken by GHD which has led to a couple of Options to be further investigated in addition to Business as Usual. A third pipe scheme is required to be implemented to ensure that any outcome as a result of further investigations into the Integrated Water Cycle Management options can be retrospectively applied.

The approach to integrated water cycle management entailed the conceptualisation and assessment of four schemes supplying water of a appropriate quality for various Non-Drinking Water (NDW) purposes. A parallel scheme supplying the potable water requirements was also conceptualised. Various water sources were considered, likely treatment requirements determined and delivery systems configured based on the locations of the water sources and points of supply. The NDW uses included:

1. Fire fighting;
2. In-house residential use (toilet flushing and cold water supply to washing machines);
3. In-house residential use (domestic irrigation, external tap for car washing and hose down);  
and
4. Public Open Space (POS) irrigation

The assessment revealed the potentially feasible NDW supply concepts presented in Table 11.

Table 12: IWCM Options Summary

Option	Potable	In-house NDW	Ex-house NDW	POS irrigation
1 – Business as Usual	IWSS	IWSS	IWSS	LGW
2 – Groundwater	IWSS	LGW	LGW	LGW
3 – Sewer mining	IWSS	WWR	WWR	WWR

IWSS = Integrated Water Supply Scheme (Water Corporation)

LGW = Local groundwater dual supply system for non-drinking water (either superficial or confined aquifer)

WWR = Treated wastewater reuse dual supply system for non-drinking water

### Option 1 – Potable water supply only

The “Business as Usual” Option 1 comprises a conventional single potable water system supplying all uses (excepting POS irrigation) from the Water Corporation’s existing Integrated Water Supply Scheme (IWSS) and sources POS irrigation from local groundwater resources (Superficial Aquifer).

## Option 2 – Groundwater

Option 2 entails a dual supply system. The potable water requirements will be supplied by a downsized potable system. The in-house and ex-house NDW requirements will be supplied by a separate supply system sourcing groundwater from a well-field of bores abstracting from local groundwater resources (Superficial and Leederville Aquifers). POS irrigation will be supplied from local bores in the Superficial Aquifer. The groundwater for in-house and ex-house NDW use will need to be treated and a water treatment facility is included. The level of treatment will depend on the prevailing water quality. The construction of the treatment facility will be staged to meet the development requirements. No treatment for POS irrigation supply has been considered.

## Option 3 – Sewer Mining

Option 3 will also entail dual supplies for the potable and non-drinking water. A downsized potable system will supply the potable water requirements. The NDW requirements will be supplied in part with reclaimed water from a Wastewater Recycling Plant (WRP). The water balance reveals that this water source will not be adequate to meet the total of the NDW requirements and will require augmentation. The shortfall in Treated Sewage Effluent (TSE) will be made up with groundwater. The WRP will be constructed in stages as wastewater from the development becomes available. A groundwater supply will be required during the initial years of the development until wastewater flows reach a threshold to warrant construction of the WRP. Thereafter limited augmentation of TSE with groundwater will take place. Wastewater will be mined from the main outfall sewer on route to Byford Pump Station. POS irrigation will be supplied from local bores in the Superficial Aquifer.

## Regulatory framework

The delivery of an integrated water cycle management scheme will require a number of different licences and approvals depending on the source of the alternative water supply, the use thereof and the means of providing this service. Integrated water cycle management schemes are still in their infancy in Western Australia and there are significant gaps in both existing State Government policy and the regulatory framework in this regard.

The following agencies have been identified who may play a role in the guidance and approval of integrated water cycle management schemes and interventions:

1. Department of Water (DoW)
2. Water Corporation (WaterCorp)
3. Department of Health (DoH)
4. Department of Environment and Conservation (DEC)
5. Environmental Protection Authority (EPA)
6. Economic Regulation Authority (ERA)
7. Shire of Serpentine Jarradale

8. Western Australian Planning Commission (WAPC)
9. Plumbers Licensing Board (PLB)

The regulatory framework is summarised in Table 12 and Table 13 for groundwater and treated wastewater uses respectively.

Table 13: Regulatory framework for groundwater use

Institution	Approvals & Licences	Standards & Guidelines
DoW	S5c Licence to Take Groundwater S26D Licence to Construct or Alter a Well Only required in a proclaimed area or if abstraction greater than 5000 kL/year.	Draft policy on managing unlicensed groundwater use
WaterCorp	Possible Service Provider Compliance conditions apply	Unknown
DoH	Approve schemes on a case-by-case basis	Draft guidelines for Alternative Water Supply Guidelines - Stormwater & rainwater (for NDW). Health Risk Assessment according to National Guidelines.
DEC & EPA	Possible licence required to construct treatment plant	Unknown
ERA	Licence required for Service Provider if groundwater supply to multiple users for internal use. Deemed a scheme reticulated water supply. Further approvals may be required from DoH, ERA & LGA	Unknown
LGA	Approved required prior to installation. Regulation 11 Health Act (Underground Water Supply) 1959. Possible additional approvals required for dual reticulation system.	Unknown
WAPC	Approvals required from water sector regulators as part of the Land Planning Process.	Unknown

Institution	Approvals & Licences	Standards & Guidelines
PLB	Installation by licensed plumber	AS/NZS 3500 (2003) Plumbing Code of Australia 2004 Water Services Association of Australia - Dual Water Supply Systems 2005"

Table 14: Regulatory framework for treated wastewater use

Institution	Approvals & Licences	Standards & Guidelines
WaterCorp	Agreement required for sewer mining. May be a Service Provider.	Water Forever Horizon 2 Options
DoH	Approval required for construction of wastewater treatment plant. S98 & S129 Health Act (1911). S4 & S4a Health Regulations (1974).	Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) Managed Aquifer Recharge
DEC & EPA	Possible licence required to construct a wastewater treatment plant. Works approval or referral to the EPA required for 'prescribed premise'.	Unknown
ERA	ERA approval required for licence/exemption to be NDW service provider Water Services Licensing Act (1995)	Unknown
LGA	Possible additional approvals required for dual reticulation system or ASR scheme. Approval may also be required for privately operated recycled water schemes.	Unknown
WAPC	Approvals required from water sector regulators as part of the Land Planning Process.	Unknown
PLB	Installation by licensed plumber	AS/NZS 3500 (2003) Plumbing Code of Australia 2004 Water Services Association of Australia - Dual Water Supply Systems 2005"

## 14.0 UTILITIES

### 14.1 Servicing

Investigations into servicing and provision of infrastructure for the DSP area has been completed by Sinclair Knight Merz (SKM)

#### 14.1.1 Power

An Infrastructure and Services Study was carried out by Parsons and Brinckerhoff (PB) for the Shire in 2009. This study was aimed at assisting the Shire to prepare a District Structure Plan (DSP) for the area. A Preliminary Investigations Report was submitted by PB on the findings of the existing and future electrical services to the study area.

SKM reviewed the PB report for currency and adequacy as input to the DSP. As part of the review process, SKM liaised with Phillip Capper, Western Power via telephone conversations and emails to confirm the validity of the report submitted by PB. Western Power has confirmed that the findings of the report submitted by PB are still valid.

#### 14.1.2 Existing Infrastructure

The existing electrical infrastructure in the Whitby area is serviced by the Byford Substation (indicated by the letter from Western Power dated 20 December 2006 – attached as part of the PB report in Appendix B). The network structure is shown in Figure 23.

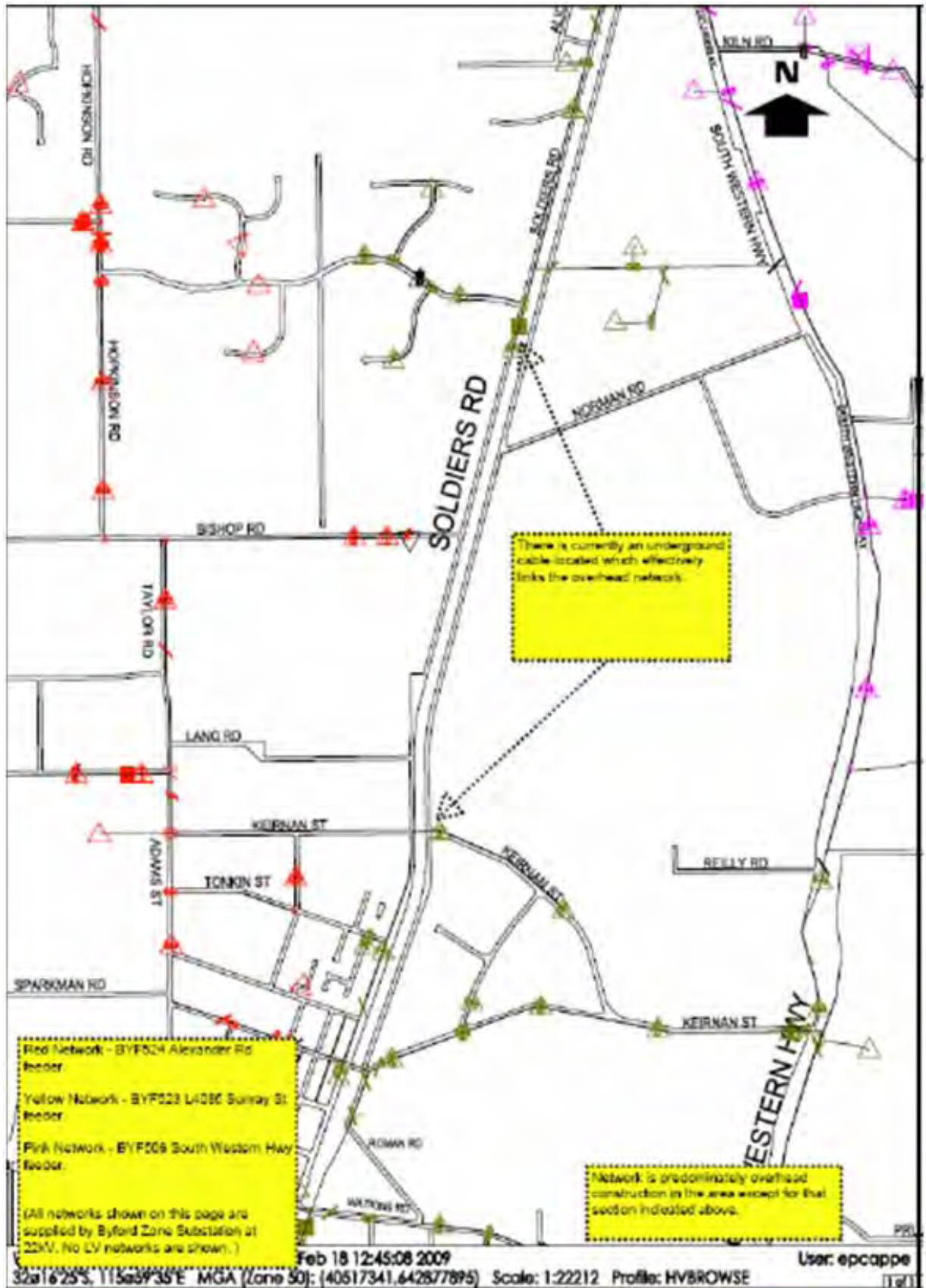


Figure 23: Existing Network Structure (DFIS Map)



The western side of the South Western Highway is electrically supplied by underground high voltage (HV) cable, extending to the eastern side of Robertson Road. The eastern side of South Western Highway is electrically supplied by HV overhead lines extending along the north side of Kiernan Street.

A tee-off is currently present along the 22kV HV aerial line along the eastern side of the South Western Highway that terminates with metered HV connection. This is depicted in Figure 24.

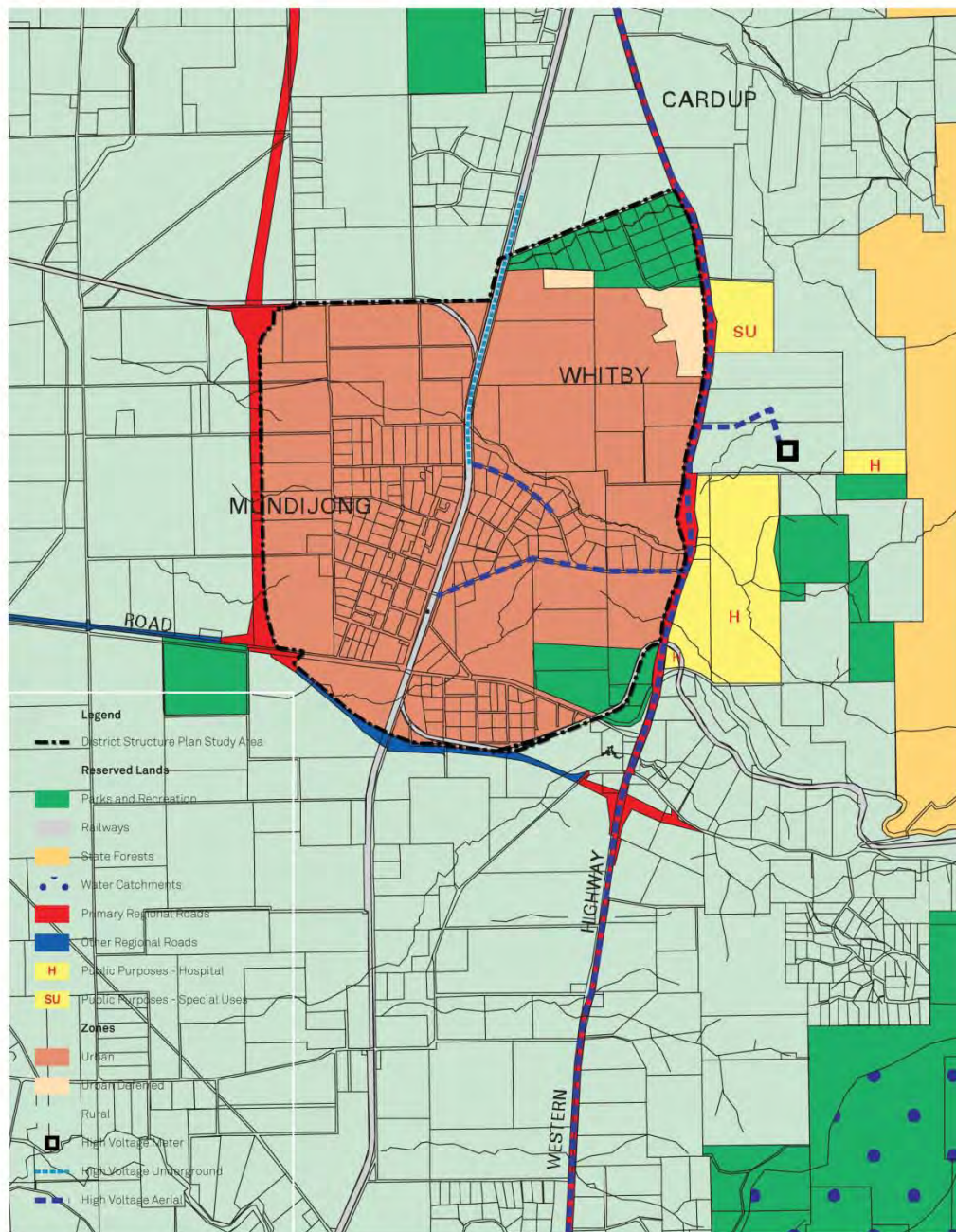


Figure 24: Tee-Off Along South Western Highway

There is currently some spare capacity available on two (2) feeders:

1. Reference BYF524 Alexander Road feeder – illustrated in red in Figure 23.
2. Reference BYF508 South Western Highway feeder – illustrated in pink in Figure 23.

The actual spare capacity available is not known. Confirmation from Western Power on this capacity will be required. This indicates that problems may exist with the capacity of the existing supply and discussions should be held with WPC to assess capacity and quality issues.

#### *Planned/Future Power Infrastructure*

As noted in the report submitted by PB, Western Power has plans to construct a major Zone Substation along Gossage Road in Oldbury. However, this is expected to occur only in 2025. If the supply capacity is required before this time, Western Power will charge the developer for the full capital costs.

The location of this proposed substation is shown in Figure 25:

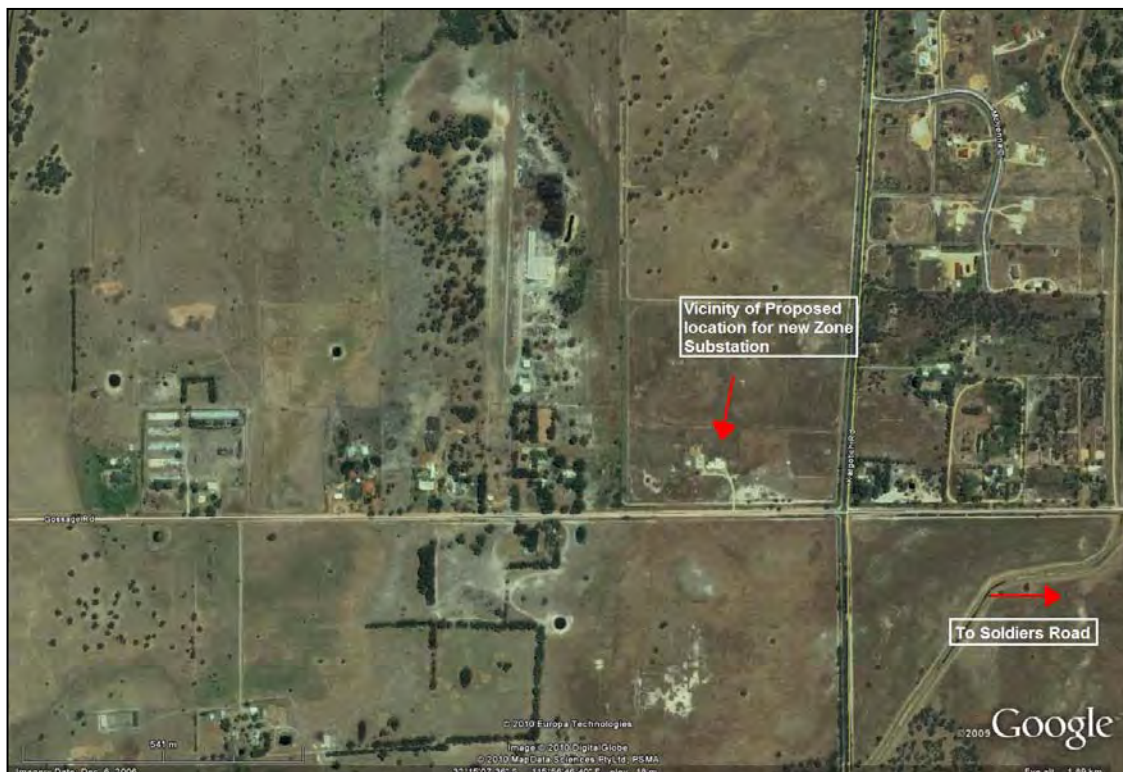


Figure 25: Intended Location of Proposed New Zone Substation (Western Power)

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Western Power has also noted that a voltage regulator is planned for installation along Roman Road in the future.

#### *Forecasted Load*

To assist in assessing future load requirements a preliminary estimate of likely load demand was completed.

Assessment of the likely electrical capacity for the District Structure Plan (DSP) uses typical load values, split into two (2) demand categories for purposes of this report:

1. Residential Lots – 4.5kVA per lot
2. Commercial (at 1 hectare or 10,000m<sup>2</sup>) – 200kVA

An “Enquiry by Design” workshop hosted by the Shire was conducted between the 25<sup>th</sup> and 27<sup>th</sup> March 2009. This workshop was aimed at providing some direction into the final district plans. As part of the outcomes report (v5 November 2009), three (3) development phases were identified:

1. Initial Development Phase
2. Medium Development Phase
3. Long Term Development Phase

The description of each phase included the expected population, and the likely commercial developments anticipated. Table 14 summarises the development phases and an indicative load (in kVA) required for each of these phases.

The residential lots were estimated utilising the expected population figures. The Australian Bureau of Statistics in a 2001 census revealed a mean household size of 2.6. For the purposes of this report, the residential lots were therefore estimated using a household size of 2.7.

Where land areas are not provided, an order of magnitude estimate was used to calculate the expected order of magnitude electrical capacity required.

Table 15: Indicative Expected Load Demand

		Description	Demand (kVA)	Total Demand
Initial Phase	Residential	5,000 persons ( $\approx 1,851$ lots)	$\approx 8,330$	8,530 kVA
	Commercial	Small Supermarket Limited retail ( $\approx 10,000$ m <sup>2</sup> )	$\approx 200$	
Medium Phase	Residential	15,000 persons ( $\approx 5,555$ lots)	$\approx 25,000$	25,500 kVA
	Commercial	2 supermarkets 35 shops and services ( $\approx 25,000$ m <sup>2</sup> )	$\approx 500$	
Long Term Phase	Residential	30,000 - 40,000 persons ( $\approx 11,111 - 14,814$ lots)	$\approx 50,000 - 66,700$	51,000 kVA (for 30,000 persons) 67,700 kVA (for 40,000 persons)
	Commercial	Small Discount Departmental Store 2 supermarkets and 60-70 shops ( $\approx 50,000$ m <sup>2</sup> )	$\approx 1,000$	



From Table 15, substantial increases in the load requirements are seen with the development of each phase. To meet the forecasted demand (particularly for the medium and long term phases), it is likely that the existing electrical infrastructure does not have the capacity. In the initial phase, confirmation with Western Power will be required to assess the availability of capacity to supply the demand as estimated above.

It should be noted that the above load demand estimates do not include other relevant loads like schools (150kVA – 200kVA for each school)<sup>1</sup>, and the proposed wastewater pump station (≈315kVA – 4,000kVA)<sup>2</sup>. This will need to be taken into consideration in planning for the electrical infrastructure to support the development phases.

#### *Summary of Outcomes*

The review of the electrical infrastructure in the Mundijong/Whitby district resulted in the following outcomes:

1. Western Power (WPC) confirms the data provided for the Preliminary Investigations Report submitted by Parsons and Brinckerhoff (PB) in 2009 is still valid).
2. For the estimated 30,000 – 40,000 people expected to populate the district in the next 25 years, significant upgrading of electrical infrastructure will be necessary. This includes a Zone Substation to provide for the ultimate population/demand.
3. Should the development proceed before 2025, the Zone Substation capital costs will need to be funded by the developer.

The initial development of the district could make use of two (2) feeders supplied from the existing Byford Substation (see Section 13.2.1.2). However, the available spare capacity for use is not known. Further discussions should be entered into with WPC to determine the available spare capacity from the existing feeders, which is currently not available.

<sup>1</sup> Based on industry practice and SKM's experience on past projects.

<sup>2</sup> Based on the demand of typical wastewater pump stations in WA with the range covering the regional areas (≈15kVA) and the metropolitan areas (up to ≈4,000kVA)



## 14.2 Gas Pipelines

There is no existing gas distribution / reticulation infrastructure in the Mundijong/Whitby District area and WA Gas network has no current infrastructure planning for this area.

SKM liaised with WestNet Energy to gather preliminary advice.

Figure 26 indicates the proposed route of the gas headworks main that will pass through the centre of the study area. Lateral gas mains would be required off this central backbone to complete the reticulation network that would service individual development pockets.

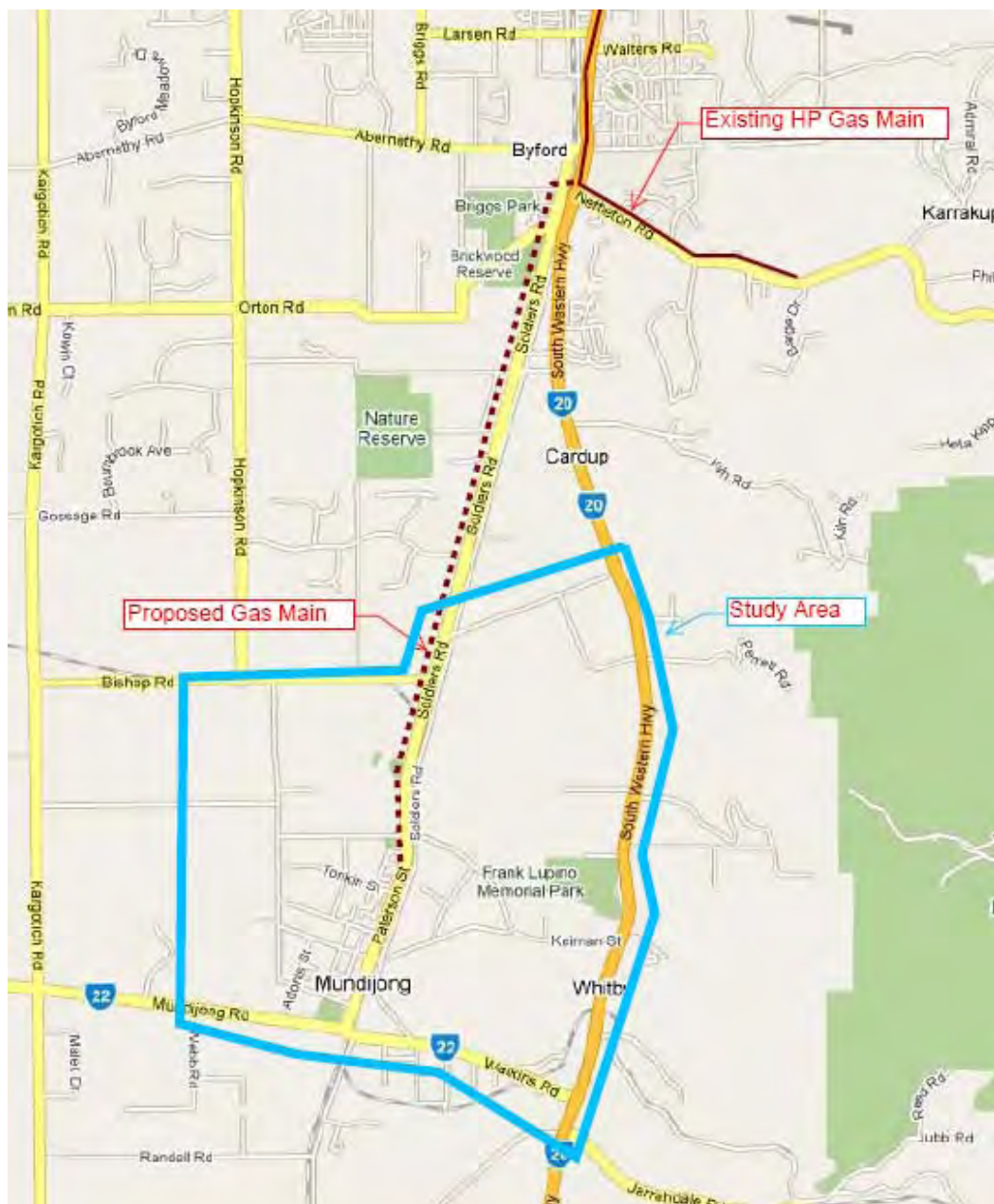


Figure 26: Indicates Proposed Route of "backbone" Gas Main

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### 14.3 Water

SKM liaised with Water Corporation to obtain preliminary advice on the proposed works at Mundijong/Whitby.

Water is currently supplied to Mundijong via an off-take from the Serpentine Trunk Main at Wright Road, a pproximately 5.5 km to the south of the town. Water is conveyed to Mundijong via a distribution main that varies in diameter from 050mm to 300mm along its length. The Corporation has scheduled replacement of the 150mm sections of the distribution main with 400mm pipes over the next 3-5 years in order to address water pressure problems in Mundijong. It is anticipated that these upgrades should meet growth demands in Mundijong until around 2023.

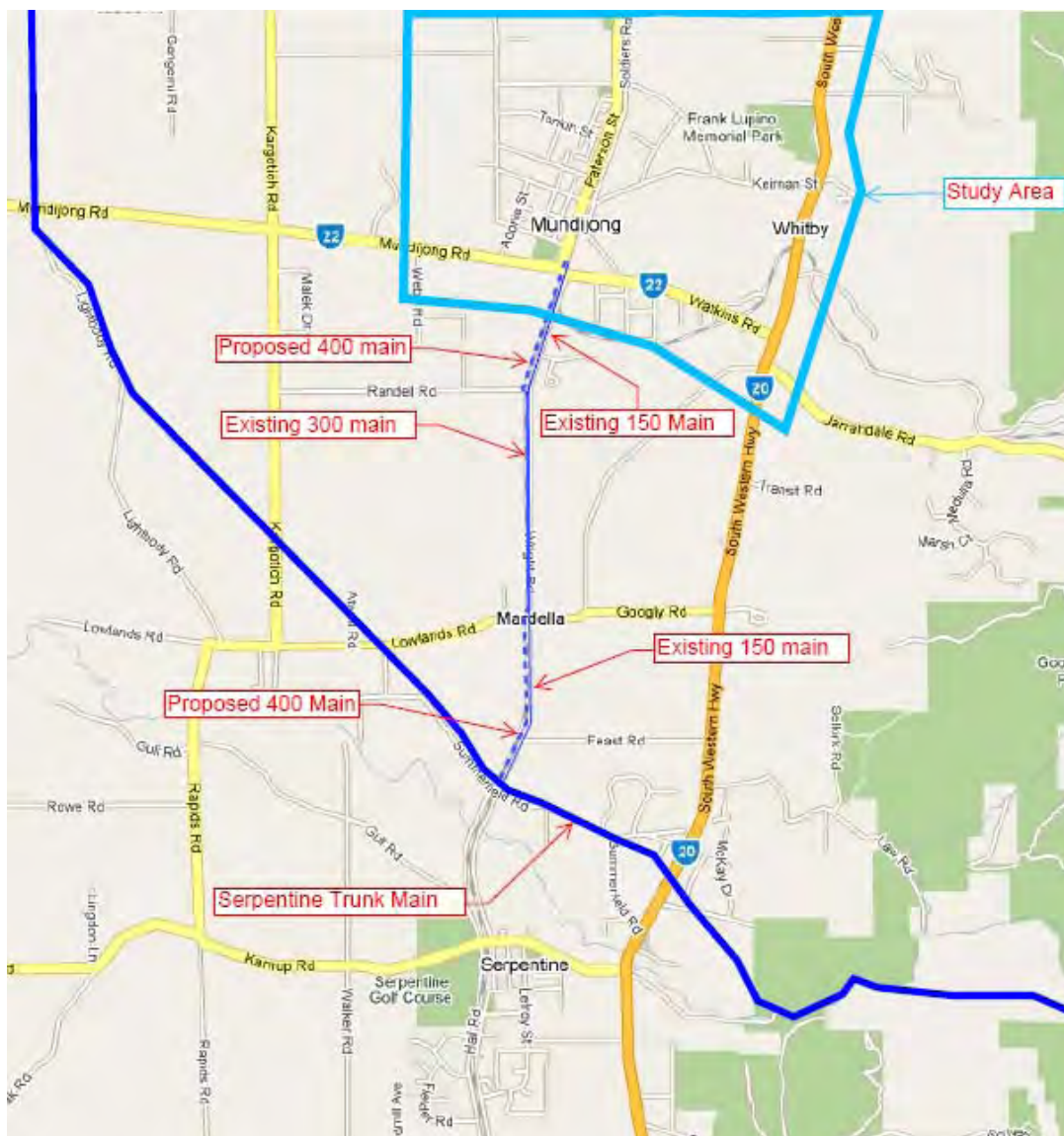


Figure 27: Proposed Interim Water System

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The long term water scheme planning is to supply water to Mundijong from a new high level tank to be located somewhere to the east of Byford (tank site location yet to be determined or acquired). This tank will supply southwards to Mundijong via large distribution mains to the proposed Mundijong Gravity zone. Some sections of the future distribution mains may need to be laid in stages as part of supply to Mundijong subdivisions as an interim solution while the area is still being supplied with water from the trunk main to the south. These mains would then later be used to supply water from the north through the ultimate scheme.



Figure 28: Mundijong Water Supply 2050 Proposed Scheme

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The Water Corporation is currently concluding route planning and environmental approvals for the identification of major service corridors through the southeast urban area, including Byford and Mundijong. The proposed service corridors are to accommodate the future construction of large (1,400mm diameter) bulk water transfer pipes to convey raw water from southern sources (including from the Binningup Seawater Desalination Plant) northwards to storages in the east and southeast parts of the Perth metropolitan area.

One of the pipeline routes identified in the planning traverses the western edge of the Mundijong DSP area. This pipe route is nominally identified as “Possible Service Corridor” on the draft DSP. The width of the corridor in this location varies and the corridor width will be known following the conclusion of the environmental approvals for the routes.

#### 14.4 Wastewater

Mundijong is situated within the Water Corp’s Byford Wastewater Scheme Catchment Area (Sewer District 86). The Corporation does not currently operate any wastewater infrastructure within the Mundijong Whithby DSP area. The Corporation’s wastewater scheme planning for the catchment requires a range of major headworks items to be constructed. The Corporation may be prepared to consider developers prefunding and staging the construction of some of these assets.

The wastewater planning for this area has been developed based on generalised land use, development and density/yield assumptions from previous draft iterations of the DSP. The current version of the DSP does not contain sufficient detail to warrant a review of wastewater planning. The detailed sewer mains and reticulation layout will need to be determined following the finalisation of the DSP and the preparation of draft LSPs.

The wastewater planning for this area indicates the need for major gravity mains running east to west (downhill) through the development area and a large collector sewer along the western edge of the urban development area. These sewers will need to be adequately accommodated with existing and future road reserves together with other domestic services. The width of road reserves and the size of these mains will need to be reviewed in more detail as the more detailed structure planning progresses for the various precincts.

The wastewater planning also provides for dual 600mm diameter wastewater pressure mains, which will ultimately pump wastewater southwards from Byford pump stations to a large regional pump station in Mundijong in the longer term. This wastewater pump station

will need to be constructed at the western edge of the Mundijong DSP urban area, adjacent to the future Tonkin Highway extension.

The Mundijong pump station has been planned to pump westwards through a large wastewater pressure main to the future East Rockingham Waste Water Treatment Plant (WWTP) in the longer term and will require an odour buffer of at least 150m radius.

The pump station site will need direct road access and services and should preferably be co-located with POS and drainage areas. Residences and similarly sensitive areas must not be located within the pump station buffer. The general location of the pump station and its 150m buffer is reflected on the DSP.

The interim wastewater strategy for this area is to convey wastewater from Mundijong and Byford northwards by pressure mains to the Waterworks Rd Main pump station (at the corner of Tonkin Hwy and Armadale Rd, Westfield) and then onwards to the Woodman Point WWTP. Initial sewer flows from developments in the Mundijong area will be pumped northwards through the Byford sub-catchment via the Byford pump station, subject to capacity limits. Based on the Water Corp's best estimates of growth rates from Byford and Mundijong, a limit of approximately 20 litres/sec has been allowed from Mundijong pumping northwards through the Byford pump station.

The Corporation intends to progressively upgrade the Byford pump station in stages according to demand in the area. In the longer term, this wastewater pumping system will reverse direction and will pump southwards to the regional Mundijong pump station. The Corporation will monitor development growth rates and flows in the Byford pump station catchment to determine when/if the Byford pump station and other assets need to be upgraded.

The 20 litres/second limit from the Mundijong urban area through the Byford pump station is available on a first-come-first-served basis. It is estimated that this will cater for approximately 1,500 lots in Mundijong.

The wastewater conveyance strategy beyond the planned limits of the Byford pump station and beyond the limits of downstream assets including the Waterworks Rd pump station and the pressure mains to Woodman Point WWTP is currently not known. The Corporation will need to review the planning in the future to determine the appropriate time to implement the ultimate conveyance strategy to the East Rockingham WWTP.



The Okaklands drains (Sub-section B, B1 and B2) drain the southern and south-western portions of the DSP area. The Water Corporation operates the Okaklands drains under licence conditions specified by the ERA. The Okaklands drains and other downstream contributing sub-drains are rural drains which were constructed in the 1930's by the former Public Works Department (PWD) in order to lower regional groundwater levels to prevent flooding of buildings and to allow land on the Swan Coastal Plain to be used for agricultural



purposes. These drains came under the responsibility of the then Water authority in 1985 when the PWD was abolished.

These rural drains only have a limited hydraulic capacity and were designed to flood adjacent rural land for up to three days, as specified in the Water Corp's Drainage Operating Licence. The responsibility for management of the relevant sections of the Oaklands drains adjacent to or within planned urban areas will need to be transferred to the Shire. The DWMP for Mundijong Whitby should identify the sections of drains to be transferred to the Local Government. Flows from surrounding land developments must be compensated to pre-development levels for a 100 ARI rainfall event.

In the event the Local Government is not prepared to take over responsibility for managing the drains, their rural drainage function must be protected by setting aside the minimum flood path and ensuring this area remains free of any additional development. No local urban drainage connections will be permitted into the rural drain.

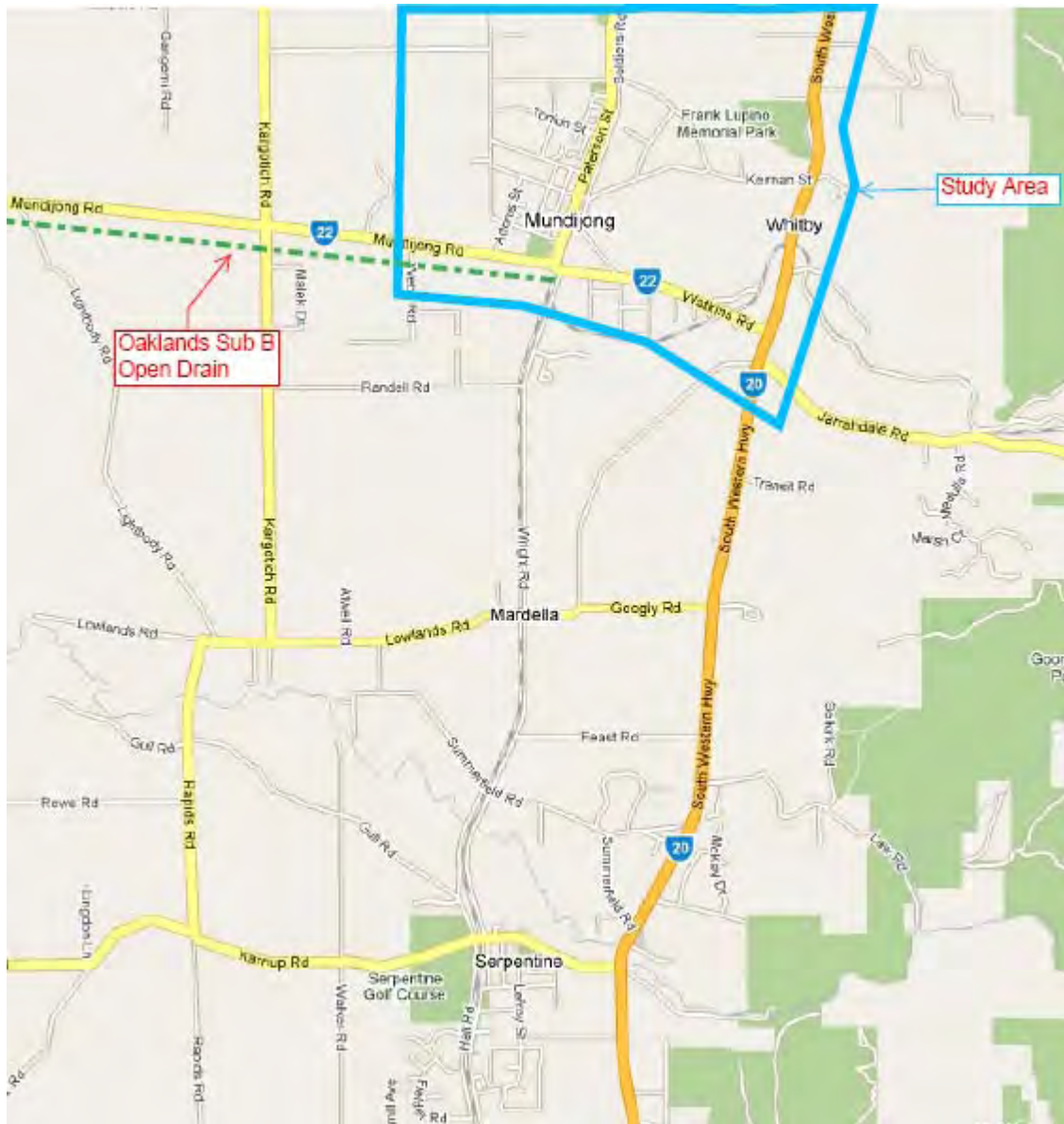


Figure30: Mundijong Existing Drainage

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## 15.0 THE DISTRICT STRUCTURE PLAN

Part 1 of the DSP provides the policy guidance for achieving the aims of the Structure Plan and implementing the vision. Part 2 provides explanation and background to the various components and aspects contained within this District Structure Plan and/or guidance when responding to the contents of Part 1. The DSP in Part 1 is addressed either as district wide matters, that is generic matters that apply a cross the whole District Structure Plan area, or more specific items relevant to individual precincts within the District Structure Plan.

### 15.1 Generic DSP Items

Items considered at a generic level across the whole DSP area include:

1. A requirement for Local Structure Plans to be prepared in accordance with the requirements of the DSP
2. A requirement for Local Structure Plans to take into account compliance with the planning principles identified within this report
3. Provisions relating to the calculation and provision of Public Open Space, and
4. Requirements confirming the provision of Multiple Use Corridors

### 15.2 Precincts

#### 15.2.1 Precinct Approach

The District Structure Plan area comprises seven individual precincts. The precinct approach has been adopted to simplify implementation of the planning objectives, vision, principles and policies inherent in this report and to enable coordination with other policy initiatives such as Local Planning Policy No. 29. The seven precincts have been identified to reflect both a comparable context and also enable the most efficient implementation of Local Structure Planning. Brief comments on each precinct follow.

#### 15.2.2 Precinct A

Precinct A is the largest precinct located at the north-east quadrant of the DSP area and is bounded by the South Western Highway to the east, Parks and Recreation Reserve to the north, Soldiers Road to the west and Manjedal Brook to the south. The Parks and Recreation Reserve portion of the precinct comprises a Bush Forever site while the central part of the precinct is mostly parkland cleared. The southern part of the precinct adjacent to Manjedal Brook comprises areas of denser vegetation although they are not identified as significant.

The precinct is all within one ownership and will play a pivotal role in the successful implementation in the vision for Mundijong/Whitby. The proposed new town centre and ultimately urban rail transit hub is to be located within this precinct. In addition, the second high school site and the possible future TAFE site will also be located within the precinct.

#### 15.2.3 Precinct B

Precinct B comprises a triangular portion of the subject site immediately south of Precinct A. It is bounded by South Western Highway in the east, Soldiers Road to the west, Evelyn and Galvin Roads to the south and Manjedal Brook to the north and has historically been developed for small lot special rural purposes.

The precinct is centrally located within the DSP area but due to the historic development and multiple ownership that has resulted, coordinated and efficient development in the short to medium term is likely to be problematical. Preparation of a Local Structure Plan focussing upon coordinating future development across the multiple land holdings will be necessary and likely ultimately be undertaken by public agencies rather than private landholders. Under the DSP the precinct is identified for future residential purposes.

#### 15.2.4 Precinct C

Precinct C is bounded by South Western Highway in the east, Evelyn and Galvin Roads to the north, Paterson Road to the west and Mundijong Road to the south. A Parks and Recreation reserve and a Bush Forever site are located south-east of the precinct. With the exception of a substantial area of locally significant bush at the western edge of Precinct C, the remainder of the land has essentially been historically cleared. Two significant creek lines traverse Precinct C while the majority of its eastern part remains crown land.

A significant portion of the western part of the precinct is under one ownership enabling reasonably efficient progression of local structure planning and ultimately development. The precinct will accommodate the major part of a local centre as well as providing for two primary school sites.

#### 15.2.5 Precinct D

Precinct D, like Precinct B, essentially comprises a cohesive area of historic special rural development. It is bounded by Mundijong Road to the north, Wright

Road to the west and the Tonkin Highway reservation forming the southern boundary of the DSP area on its south. A creek line traverses the north-west corner of the precinct which will need to be accommodated as part of the multiple use corridor network with the remainder of the precinct identified ultimately for residential purposes.

Again, efficient local structure planning and development will be complex due to the multiple ownership in place and will likely be longer term and at the instigation of government agencies.

#### 15.2.6 Precinct E

Precinct E is bounded by Taylor Road, Adonis Street and Wright Road in the east, the southern and western boundary of the DSP area to the south and west with Scott Road forming the northern boundary. Precinct E comprises historically cleared land in limited large landholding which should enable progression of local structure planning and ultimately development to be efficient.

Part of Precinct E south of Mundijong Road is traversed by a creek line which will be included as part of the MUC network. It will accommodate two primary school sites and part of a local neighbourhood centre.

#### 15.2.7 Precinct F

Precinct F comprises essentially the existing Mundijong townsite consisting of the existing town centre which will become the focus of one of the neighbourhood centres as part of the DSP plus surrounding suburban residential development and special rural style lots. This again results in multiple ownership and the challenges this brings to coordinated and efficient local structure planning and development.

#### 15.2.8 Precinct G

Bounded by Soldiers Road in the east, Bishop Road to the north, the western boundary of the DSP area to the west and Kiernan Street and Scott Road to the south, Precinct G is the remaining precinct. This comprises, in the main, historically cleared and farmed land although is traversed by Manjedal Brook which will form part of the MUC network. A primary school is to be provided within this precinct and peripheral activity associated with the town centre located in the adjacent Precinct A to the east.

Given the limited number of large landholdings, progression of local structure planning and development should be relatively efficient to achieve.

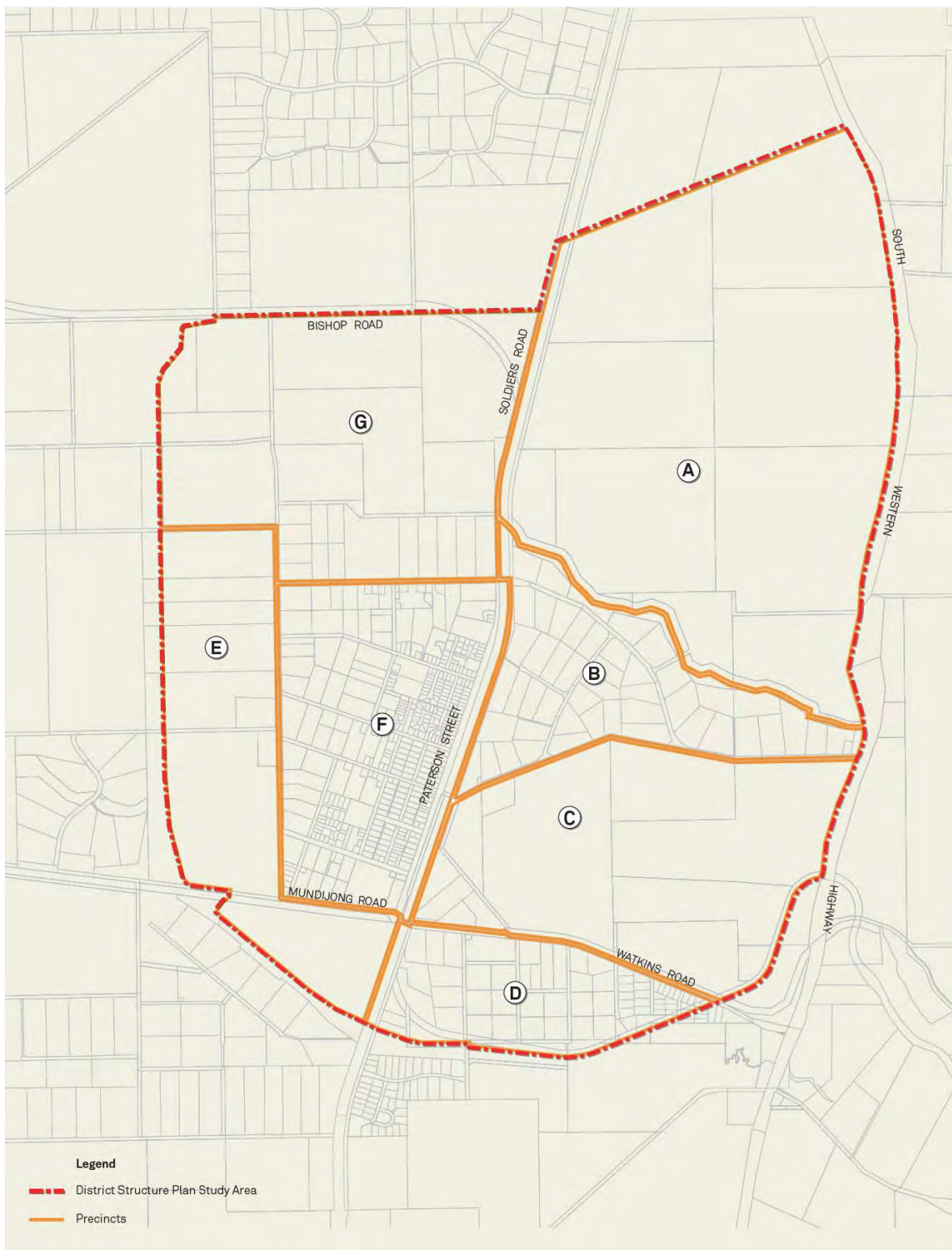


Figure 31: Precincts





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## 16.0 IMPLEMENTATION

### 16.1 Process

Development of the DSP will be progressed in accordance with the requirements of the District Structure Plan. There is a general presumption that Local Structure Plans will be required to be adopted, reflecting the objectives and requirements of the DSP prior to subdivision proceeding. Those LSP's will in turn confirm requirements for further detailed planning such as Detailed Area Plans, Environmental Management Plans, etc.

### 16.2 Staging

The DSP does not specify development staging although Local Structure Plans will be expected to address this matter. The DSP does, however, recognise that initial phases of development are likely to be influenced by the presence of the Freight Rail Line.



Figure 33: Staging

### 16.3 Development Contributions

A separate Development Contribution plan has been prepared by the Shire. This addresses development contribution requirements to implement the DSP.

Development Contribution Arrangements are to be established for 'traditional' and 'community infrastructure', through statutory processes and in accordance with SPP 3.6.

### 16.4 Implementation Strategy

Council may prepare an implementation strategy outlining tasks, responsibilities and timeframes for a range of stakeholders, to ensure effective implementation of the DSP.