


FINAL REPORT

Prepared for: Glenelg Shire Council

09 January 2009

GLENELG STRATEGIC FUTURES PLAN

INFRASTRUCTURE STRATEGY

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CONTENTS

Executive Summary		i
1. INTRODUCTION		1
1.1. Project Description		1
1.2. Project Background		1
1.3. Objectives		1
1.4. Scope of works		1
2. SHIRE DESCRIPTION		3
2.1. General		3
2.2. Groundwater and surface hydrology		4
2.2.1. Wetlands network		4
2.2.2. Coastal conditions		4
2.2.3. Groundwater Geothermal Resources		4
2.3. Identified Growth Areas		5
3. INFRASTRUCTURE SERVICES OVERVIEW		6
3.1. Drainage		6
3.1.1. Floodway Management		6
3.1.2. Stormwater Management Strategies		8
3.2. Water Supply		8
3.3. Sewerage		10
3.4. Natural Gas		11
3.5. Power		12
3.5.1. Renewable Energy Options		13
3.6. Telecommunications		14
4. TOWNSHIPS INFRASTRUCTURE ASSESSMENT		15
4.1. General Assessment		15
4.2. Portland and Surrounds		16
4.2.1. General Description		16
4.2.2. Physical Development Constraints		17
4.2.3. Infrastructure Services Assessment		18
4.3. Heywood		22
4.3.1. General Description		22
4.3.2. Infrastructure Services Assessment		22
4.4. Casterton		23
4.4.1. General Description		23
4.4.2. Infrastructure Services Assessment		23
5. SUMMARY AND RECOMMENDATIONS		24
5.1. Reticulation Infrastructure services		24
5.2. Development opportunities and constraints		24
5.3. Recommendations		25
5.3.1. General		25
5.3.2. Portland and Surrounds		25

List of Tables

Table 3.1 Glenelg Shire Telecommunications Services Summary.....	14
Table 4.1 Portland Drainage Infrastructure Assessment.....	19
Table 4.2 Portland Water Services Assessment.....	20
Table 4.3 Portland Sewer Services Assessment.....	21
Table 5.1 Reticulated Services Summary.....	24
Table 5.2 Identified Major Development Constraints.....	24

List of Figures

Figure 1 Map of Glenelg Shire and Locality Plan	3
Figure 2 Planning Scheme Overlays, Glenelg Shire	6
Figure 3 1 in 100 year flood zones, Glenelg Shire	7
Figure 4 Defined Flood ways, Glenelg Shire	7
Figure 5 Water reticulation extents, Glenelg Shire	9
Figure 6 Sewer reticulation extents, Glenelg Shire	10
Figure 7 High Pressure Gas Transmission Lines, Glenelg Shire	11
Figure 8 Trunk Power Infrastructure, Glenelg Shire	12
Figure 9 Portland and Surrounds	16
Figure 10 Physical development constraints, Portland	17
Figure 11 Drainage Issues, Portland	19
Figure 12 Water Supply Issues, Portland	21
Figure 13 Sewering Issues, Portland	21
Figure 14 Beavis Street drain, Heywood	22

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Macro Plan Australia Pty Ltd has been commissioned by the Glenelg Shire Council to prepare the *Glenelg Strategic Futures Plan*, which will present a 20-year strategy accommodating for future growth within the shire. Macro Plan engaged Meinhardt Infrastructure & Environment Pty Ltd to investigate and assess the engineering infrastructure services of the Glenelg Shire to support the strategic plan. An independent traffic assessment for the region has been conducted by Glenelg Shire Council. This report presents the outcomes of the infrastructure services assessment.


It has been assumed for the purposes of this report that the Shire could experience growth of an additional 5,000 people by the year 2020. The potential areas for growth include Portland, Heywood, Bridgewater and Nelson. Most of this growth would need to be generated by additional economic growth. Most of this growth is anticipated to come from potential developments in forestry related industry, renewable energy developments, forestry related wood processing and transport, tourism and the provision of community services, especially educational, research and health services.

In addition to population growth it is anticipated that the number of dwellings will rise, in percentage terms, faster than population growth, due to declining household sizes. Certain area around Portland have been identified as having a potential to accommodate some of the projected Portland urban growth.

Existing urban areas within the Shire have sufficient capacity in existing drainage, water and sewer infrastructure to allow for further infill growth within defined town boundaries, in accordance to current land use zoning. All towns have adequate power reticulation and telephone services, with Portland being the only town with gas reticulation services. There are no apparent limitations to gas, power or telecommunications services infrastructure upgrades. However, the provision of reticulation services to currently non-serviced towns is restricted by the lack of commercial viability.

Portland is the only urban centre currently capable of supporting any future industrial developments in terms of sufficient services capacity and is one of few with industrial land use zoning. Heywood and Casterton are also towns within the shire with industrial land use zoning, however existing resources in these towns may not be able to support heavy usage industries.

The provision of adequate drainage infrastructure is a major development constraint within Portland and nearby Dutton Way. Existing issues include the majority of existing drainage infrastructure being at or near capacity, fragmented and sparse development around the town presenting difficulty in implementation of drainage services and numerous sinkholes currently receiving untreated stormwater runoff, which may contaminate the groundwater. Independent flooding investigations for the Portland, Heywood and Casterton townships have been carried out by Cardno Lawson Treloar to identify the extent of land subject to inundation that may constrain developable areas.



Numerous limitations exist on servicing areas north of Portland and Dutton Way. The main issues are the high existing groundwater table making a conventional gravity sewer system difficult to implement, the erosion of the existing sea wall and unknown impacts of inundation due to storm surges and rising sea levels and the site being located beyond the existing northern ridgeline in Portland, which presents water supply pressure and gravity sewer feed issues.

Further investigations are required to gain a more comprehensive understanding of the site conditions within Glenelg Shire, particularly concerning the impacts of coastal erosion and viable renewable energy options.

It should be noted that to this end, the Glenelg Shire Council has committed to preparing a major study known as the Portland to Narrawong Coastal Engineering and Planning Study to further address the difficult issues applying to this coastal area. This study will be done in conjunction with major data gathering exercises being undertaken by the State Government under its 'Future Coasts' program.

Site specific and detailed infrastructure assessments should also be conducted if industrial developments (or other high demand developments) are proposed. Review of other relevant studies, coordination with the relevant authorities and service providers and consideration of environmentally significant site features should also be considered to ensure optimal and feasible strategic planning is achieved.

1. INTRODUCTION

1.1. PROJECT DESCRIPTION

Macro Plan Australia Pty Ltd (Macro Plan) has engaged Meinhardt Infrastructure & Environment Pty Ltd (Meinhardt) to investigate and assess the engineering infrastructure services of the Glenelg Shire. An independent traffic assessment for the region has been conducted by Glenelg Shire Council..

This report presents the outcomes of the infrastructure services assessment.

1.2. PROJECT BACKGROUND

Macro Plan have been commissioned by the Glenelg Shire Council (Council) to prepare the *Glenelg Strategic Futures Plan*, which will present a 20-year strategy accommodating for future growth within the shire. The infrastructure services assessments conducted will be used to support the strategic plan.

Previously conducted infrastructure assessments were presented in August 2006, which identified the major service providers within the Shire and some issues associated with the servicing of the urban centres. Additional investigations have been carried out by Cardno Lawson Treloar to refine the extent of flooding within the Portland, Heywood and Casterton townships.

This report expands upon this background reporting and will consider the capacity of infrastructure services and the extent of flooding to accommodate projected growth in the identified urban areas.

1.3. OBJECTIVES

The identified project objectives are to:

- Determine the location and capacity of existing trunk services and infrastructure in existing urban centres;
- Determine the capability of the existing infrastructure to support future development in identified growth areas;
- Summarise independent flooding report findings;
- Investigate the required works, upgrades and/ or strategies required to allow for future growth and development.

1.4. SCOPE OF WORKS

The project scope of works have included the following:

(a) Data Collection Phase

- Literature review;
- Desktop study;
- Discussions with relevant authorities and stakeholders;
- Site visit.



(b) Data Analysis

- Review of collected data;
- Identification of existing site development issues;
- Analysis of infrastructure services capacities and capabilities;
- Identifying future growth strategies in the context of the project objectives.

(c) Reporting

- Preparation of written summary;
- Preparation of associated figures and sketches.

2. SHIRE DESCRIPTION

2.1. GENERAL

The Glenelg Shire is located in south west Victoria, bound by South Australia to the west, West Wimmera Shire to the north and the South Grampians Shire and Moyne Shire to the east. The Shire covers an area of 6,212km² with a population of approximately 20,000. The main urban and employment centre for the Shire is Portland, with a population of approximately 10,000. Portland, Heywood and Casterton are the towns within the shire with existing industrial zoning.

Figure 1 **Map of Glenelg Shire and Locality Plan**



LEGEND



- URBAN CENTRE
- MAJOR ROAD
- MAJOR WATERCOURSE

MAP OF GLENELG SHIRE AND LOCALITY PLAN

FIGURE 1

3083-00
FEBRUARY 2007

SOURCE: DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT, VICTORIA

2.2. GROUNDWATER AND SURFACE HYDROLOGY

2.2.1. Wetlands network

While not part of the infrastructure review, the Glenelg Shire contains some of Victoria's most environmentally significant wetlands. There are four major wetlands in the Glenelg Region. These are:

- Glenelg Estuary (1km south of Nelson)
- Long Swamp (6km south-east of Nelson)
- Lindsay-Werrikoo Wetlands (14 km north north-west of Dartmoor)
- Mundi-Selkerk Wetlands (10 km south-west of Casterton)

These wetlands contain a variety of threatened flora and fauna species, such as The Great Egret, Australasian Bittern, Brolga and Blue-billed ducks.

Consideration of these wetlands is recommended to be factored into the strategic plan.

2.2.2. Coastal conditions


The coastal environment of the Glenelg Shire is characterised by a high energy wind environment, which constantly alters the coastal conditions. The coastal environment varies from low coastal plains, mobile coastal dunes and brackish wetlands to cliffs, escarpments and rock platforms. Strong winds and salt spray has created a harsh environment in some sections of the coastline where vegetation is sparse. Coastal vegetation varies from cleared agricultural land to remnant coastal heath and low Stringy bark woodlands.

Coastal erosion is evident on the beaches and foreshores in the Glenelg Shire. Sections of limestone cliffs near Nelson Bay have collapsed due to marine undercutting.

2.2.3. Groundwater Geothermal Resources

Glenelg Shire is located within the Otway Basin. It is one of four basins that are located within Victoria. The Otway Basin extends in a west-north westerly direction across Victoria into South Australia. The basin is broadly wedge shaped, thickening to the south-south west where upper cretaceous to recent age sediments and volcanics have been deposited throughout the basin.

The Otway Basin groundwater resources are contained in sand and gravel aquifer sequences. The groundwater extracted from within the lower tertiary groups generally has a temperature range between 30°C and 70°C. The higher temperatures can be located at increased depths or where there are major fault zones. The aquifer depth in the basin along the coastal regions ranges from 500 metres to 1,000 metres. The existing bores in the region are capable of producing groundwater in excess of 50°C at 50L/sec.



The groundwater quality in the region is high and currently found to be suitable for urban supply and irrigation purposes. Groundwater is currently heavily used in the Glenelg Shire for irrigation, stock watering, dairy-washing, industrial and potable town supplies.

2.3. IDENTIFIED GROWTH AREAS

Little natural population growth has been forecast within the Shire for the next 20 years. However, some expansion has been projected in Portland due to general business and employment growth, associated with the development of the forestry industry, renewable energy, tourism and community services and facilities. Heywood, Bridgewater and Nelson have also been identified as towns with potential growth.

It has been assumed that there is potential increase of 5000 people by the year 2020, most of which has been forecast to occur in Portland.

Demand for urban growth has also been identified in Narrawong, however, decisions in relation to the future of Narrawong will be subject to the Portland to Narrawong Coastal Engineering and Planning Study.

3. INFRASTRUCTURE SERVICES OVERVIEW

3.1. DRAINAGE

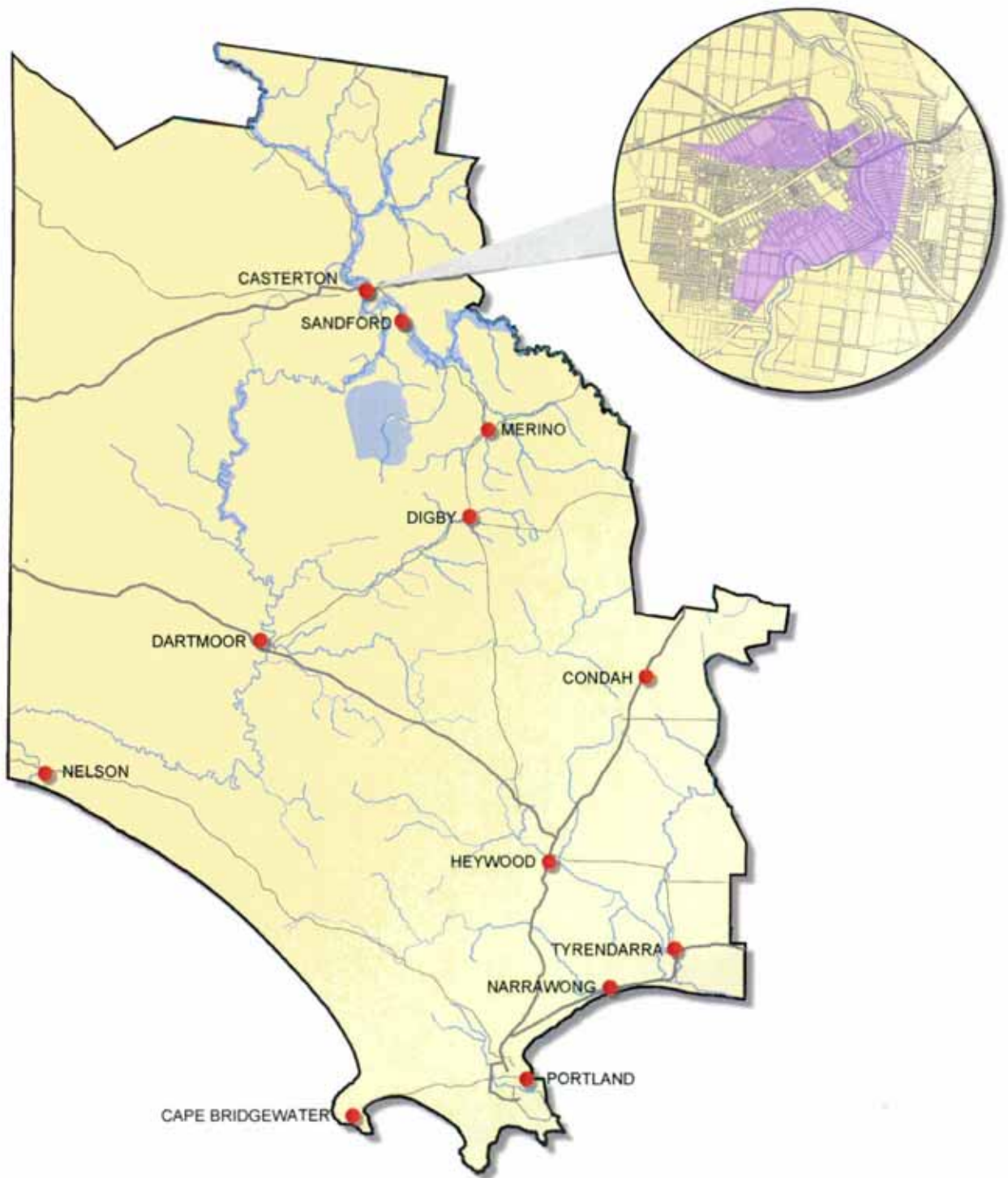
The relevant catchment authority is the Glenelg Hopkins Catchment Management Authority (GHCMA). The Glenelg Shire Council is the responsible authority regarding road and drainage infrastructure.

The Shire is located in the Glenelg Catchment, which can be further defined by the Glenelg River Basin and the Portland Coast Basin.

3.1.1. Floodway Management

The Glenelg Planning Scheme identifies an Urban Floodway Zone (UFZ) within Portland, Land Subject to Inundation overlay (LSIO) and Rural Floodway Overlay (RFO) within Casterton. The Department of Sustainability and Environment (DSE), Victoria has identified an RFO to affect northern Glenelg catchment. However, the currently identified LSIO and RFO are based on historical data and aerial photography only and do not fully represent the extents of flooding.

Figure 2 **Planning Scheme Overlays, Glenelg Shire**
(Source: Department of Sustainability and Environment, Victoria)



LEGEND

- URBAN CENTRE
- MAJOR ROAD
- MAJOR WATERCOURSE
- RURAL FLOODING OVERLAY
- LAND SUBJECT TO INUNDATION OVERLAY


**PLANNING SCHEME OVERLAYS,
GLENELG SHIRE**

FIGURE 2

3083-00
FEBRUARY 2007

SOURCE: DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT, VICTORIA



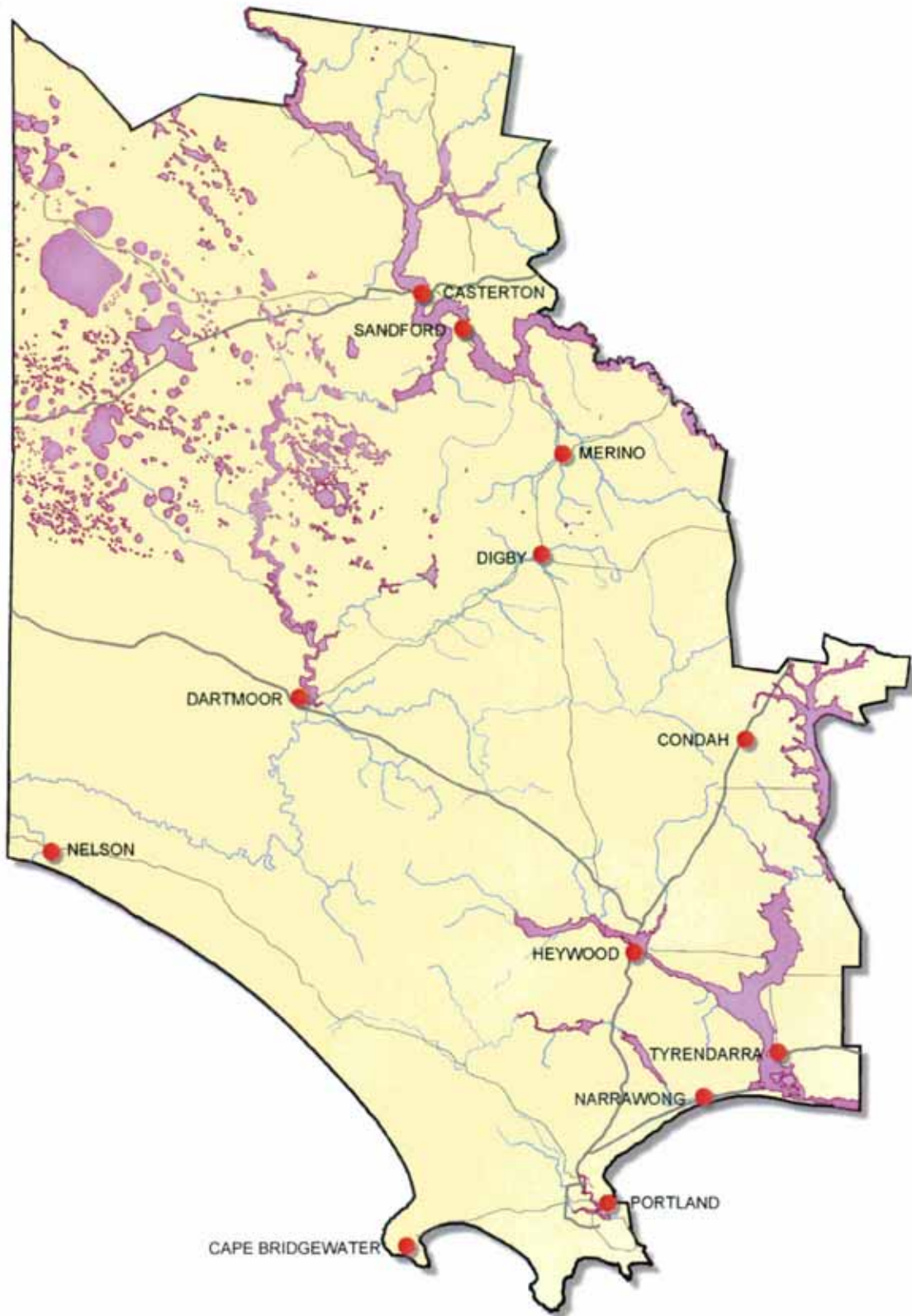


The 1 in 100 year average recurrence interval (ARI) flood zones overlay as declared by the DSE identifies that many of the urban centres within the Glenelg Shire are affected. In addition, four defined flood ways have been declared in and within the vicinities of Casterton, Heywood and Portland.

Glenelg Chire Council has engaged Cardno Lawson Treloar to carry out hydrologic modelling for the Glenelg River and Fitzroy River to identify the extent of land subject to inundation for the 10 and 100 year ARI events.

Figure 3 **1 in 100 year flood zones, Glenelg Shire**
(Source: Department of Sustainability and Environment, Victoria)

Figure 4 **Defined Flood ways, Glenelg Shire**
(Source: Department of Sustainability and Environment, Victoria)



LEGEND

- URBAN CENTRE
- MAJOR ROAD
- MAJOR WATERCOURSE
- 1 in 100 YEAR FLOOD ZONE

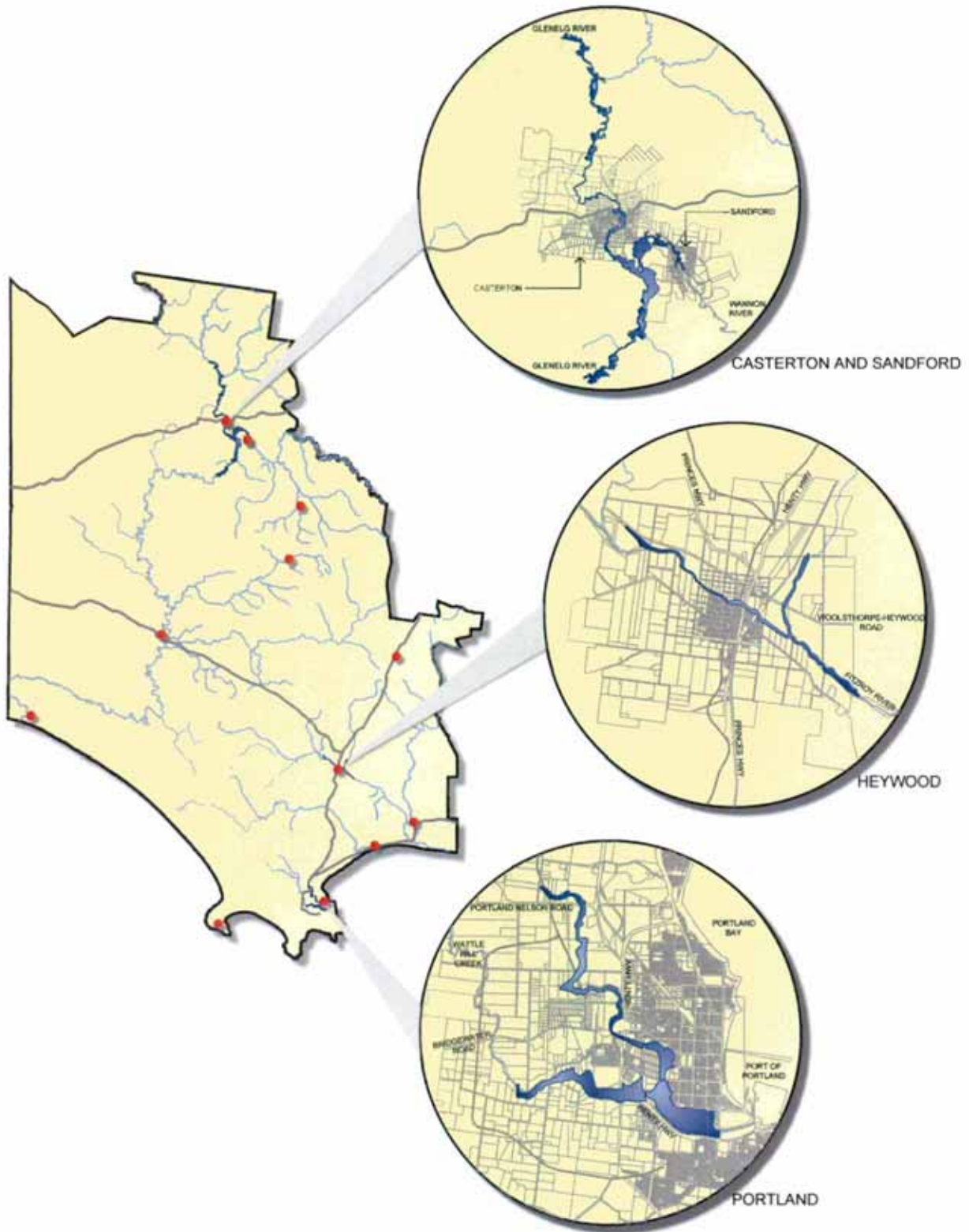
**1 in 100 YEAR FLOOD ZONES,
GLENELG SHIRE**

FIGURE 3

3083-00
JANUARY 2007



SOURCE: DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT, VICTORIA



LEGEND

- URBAN CENTRE
- MAJOR ROAD
- MAJOR WATERCOURSE
- DEFINED FLOODWAY


**DEFINED FLOODWAYS,
GLENELG SHIRE**

FIGURE 4

3083-00
FEBRUARY 2007



SOURCE: DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT, VICTORIA



Results of the flooding study identify a similar extent of inundation for the 1 in 100 ARI within the Portland Township to the existing UFZ. The extent of flooding within Portland has been influenced by the throttled Fawthrop Lagoon discharge to the Wattle Hill Creek canal.

Casterton and Heywood are subject to inundation that will impact the extent and types of development within the townships.

Further works are required by Glenelg Shire Council and the GHCMA to refine the UFZ, RFO and LSIO overlays within the Glenelg Planning Scheme to reflect the updated modelling by Cardno Lawson Treloar during 2008.

Constraints on developing the areas subject to inundation include, but are not limited to, ensuring existing floodplain storage capacities are not compromised and that existing flow paths are not interrupted in a 1 in 100 year storm event. Planning permit applications concerning flooding regions are to be referred to the GHCMA.

Remediation works to existing drainage infrastructure to mitigate the extent of inundation within the townships may be considered by Glenelg Shire Council and the GHCMA to open new areas for development.


3.1.2. Stormwater Management Strategies

Major constraints on suitable land for urban development are linked to the provision of adequate drainage. Recent legislation by the Victorian Government also requires Water Sensitive Urban Design (WSUD) initiatives to be implemented in all new urban developments to improve or maintain levels of stormwater discharge quality and to minimise or eliminate detrimental impacts on downstream water bodies.

The Glenelg Shire Council is currently reviewing the stormwater management strategies for future urban developments. This includes investigating and implementing WSUD guidelines. The implementation of WSUD practise will be critical for ongoing development and rectification of existing problem areas. The WSUD guidelines are anticipated to be released in late 2007.

3.2. WATER SUPPLY

Wannon Water is the relevant authority regarding reticulated water supply services in the urban areas of the Glenelg Shire. Smaller council owned schemes are operated in other settlements. Ground water bores are the main source of water supply. Southern Rural Water is the relevant authority regarding licensing of groundwater bores.



Urban centres with reticulated water services are listed as follows:

- Casterton
- Sandford
- Merino
- Dartmoor
- Heywood
- Portland

Extracted groundwater is currently cooled prior to distribution, as the existing reticulation infrastructure has not been designed to accommodate heated water. Wannon Water must also ensure that the water quality complies with the standards of the Victorian Safe Drinking Water Act.

The security of the existing groundwater supply to the Shire has been determined to be secure for the next 20 years, in accordance with predicted rainfall trends.

Wannon Water has prepared a strategic servicing plan for the Glenelg Shire for 2008-2013. Wannon Water is to be informed of any committed projects that have high projected water usage demands to incorporate into their strategic servicing plan.

Wannon Water has indicated that they have no plans to service the smaller communities within the Shire that currently do not have reticulated water supply services due to the lack of commercial viability.

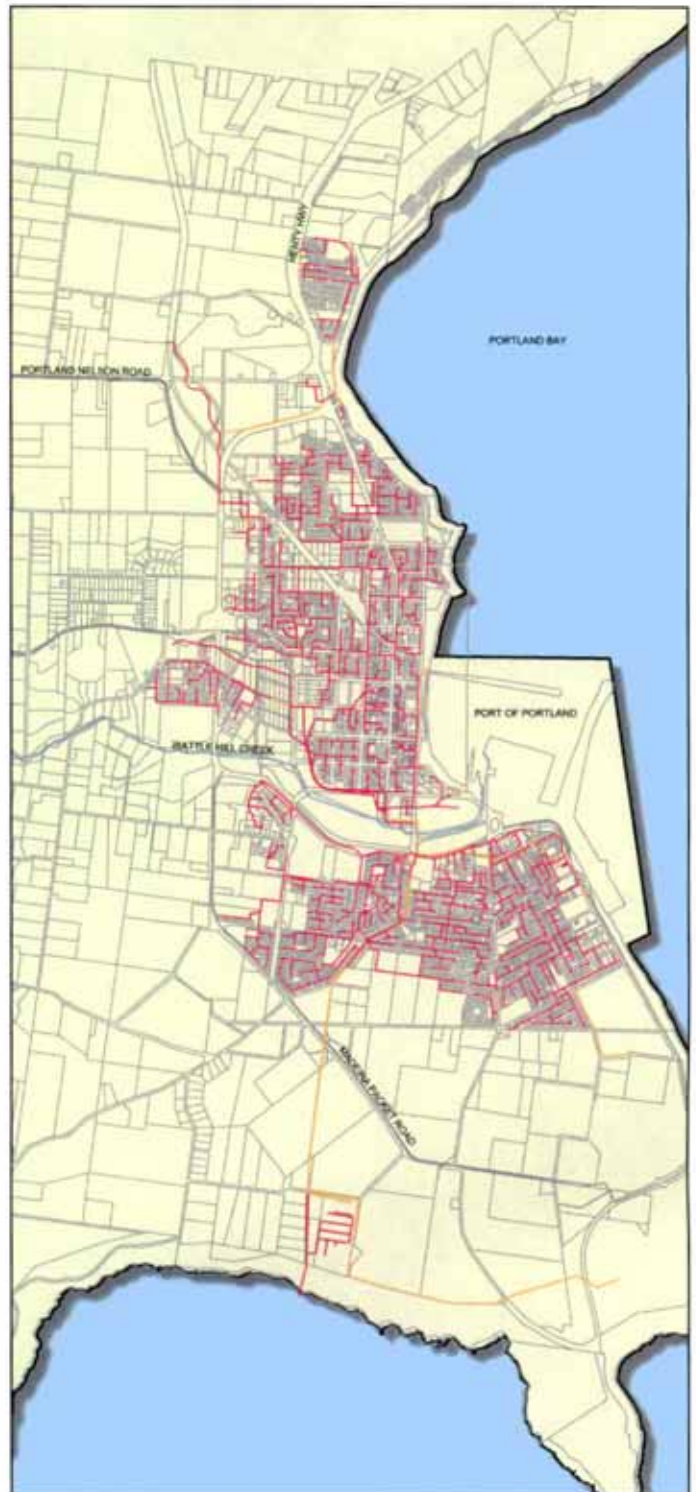
Figure 5 **Water reticulation extents, Glenelg Shire**
(Source: Wannon Water)



▲ CASTERTON



▲ HEYWOOD



▲ PORTLAND

LEGEND

- MAJOR WATERCOURSE
- GRAVITY SEWER MAIN
- RISING SEWER MAIN

**SEWER RETICULATION LAYOUT EXTENTS,
GLENELG SHIRE**

FIGURE 5

3083-00
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SOURCE: WANNON WATER



3.3. SEWERAGE

Wannon Water is the relevant authority regarding sewerage services in the Glenelg Shire.

Urban centres with reticulated sewer services are listed as follows:

- Casterton
- Heywood
- Portland

Discussions have not identified any other developments within the shire to have reticulated sewer services. Septic tank systems are utilised in other developments within the shire. The Council is responsible for the approval of proposed septic systems.

As a requirement of the Council, further development of existing urban centres is not to occur unless sewer reticulation infrastructure and adequate sewerage treatment services are implemented.

Figure 6 **Sewer reticulation extents, Glenelg Shire**
(Source: Wannon Water)



▲ SANDFORD



▲ MERINO



▲ HEYWOOD



▲ CASTERTON



▲ PORTLAND

LEGEND

- MAJOR WATERCOURSE
- WATER MAIN

WATER RETICULATION LAYOUT EXTENTS, GLENELG SHIRE

FIGURE 6

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SOURCE: WARWON WATER





3.4. NATURAL GAS

Providers regarding the supply of natural gas to the Glenelg Shire are:

- GasNet Australia Pty Ltd (GasNet)
- SEAGas
- SP AusNet Group (SP AusNet)

GasNet and SEAGas own and operate high pressure transmission lines in the Glenelg Shire, including a SEAGas line in the north west and a high pressure GasNet line to the south. SP AusNet distributes gas through low pressure mains in the Portland area. Portland is the only urban centre with reticulated natural gas.

Figure 7 **High Pressure Gas Transmission Lines, Glenelg Shire**
(Sources: GasNet Australia Pty Ltd, SEAGas)



LEGEND

- URBAN CENTRE
- MAJOR ROAD
- MAJOR WATERCOURSE
- HIGH PRESSURE GAS TRANSMISSION LINE


**TRUNK GAS INFRASTRUCTURE,
GLENELG SHIRE**

FIGURE 7

3083-00
FEBRUARY 2007

SOURCE: GASNET AUSTRALIA PTY LTD. 3083/03





SeaGAS currently do not have any plans for upgrade or augmentation works to existing infrastructure. GasNet submits infrastructure augmentation/ upgrade plans every 5 years to the Australian Competition and Consumer Commission (ACCC), in accordance with VENCORP gas market forecasts.

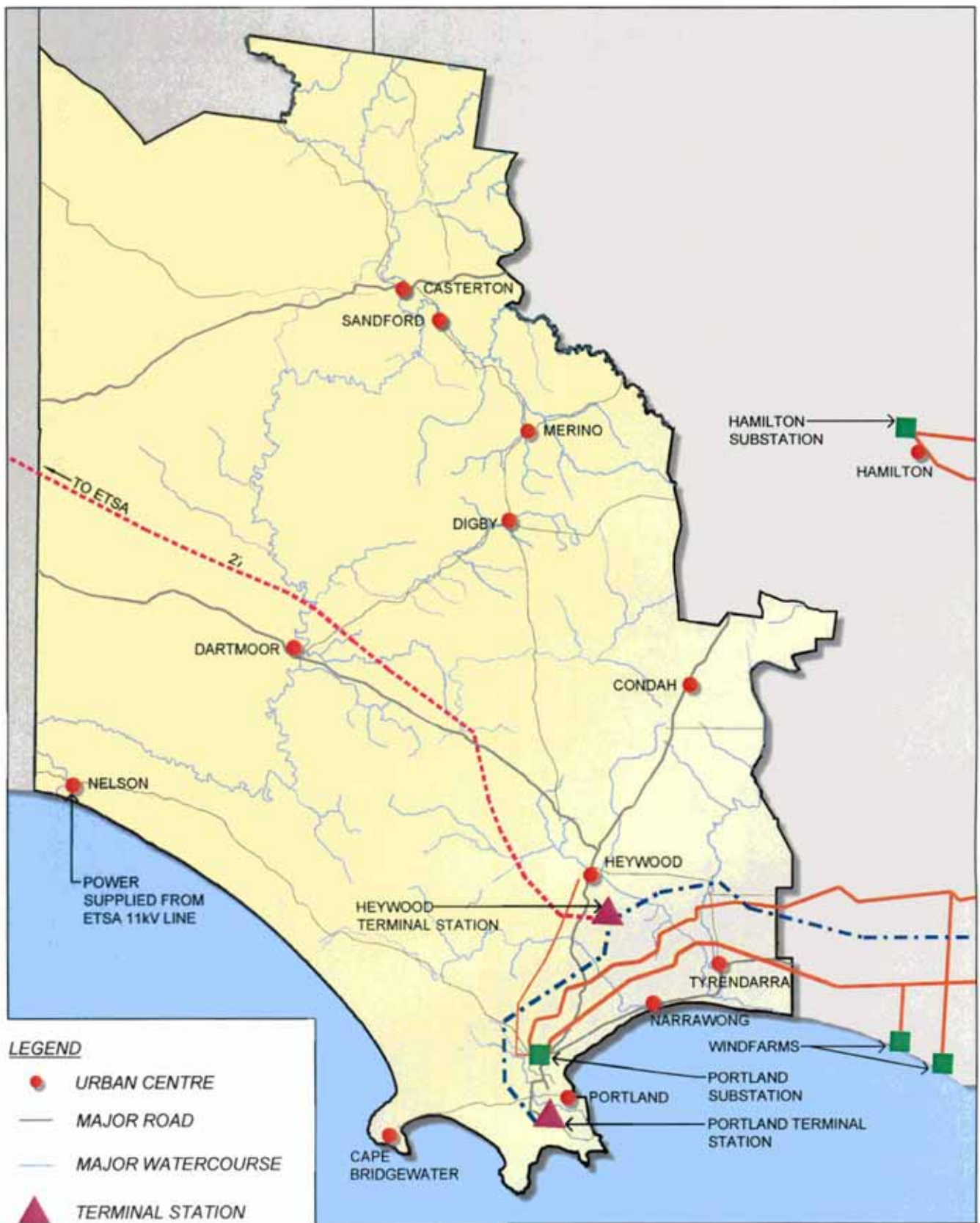
To provide gas reticulation services to other areas, connection to existing high pressure transmission lines would require pressure reducing stations and reticulation supply pipes, which involve high capital costs. Pressure reducing stations costs have been advised to be in the order of \$10M per station. Low pressure mains can be extended up to 20km with associated costs in the order of \$0.5-1M per km. High pressure steel pipes incur higher costs as well as corrosion protection and maintenance costs.

3.5. POWER

Powercor is the distribution business regarding electrical supply to the Glenelg Shire.

The Shire is supplied with electricity from the Terang Terminal Station (TGTS), located approximately 100km east of Glenelg Shire. Supply infrastructure within the shire includes zone substations in Hamilton and Portland (refer Figure 8). Alcoa, who manages the aluminium smelter in Portland, has a separate power supply via the national transmission network grid. Electrical supply to the Nelson area is by ETSA Utilities from South Australia.

Figure 8 *Trunk Power Infrastructure, Glenelg Shire*
(Source: Powercor)



LEGEND

- URBAN CENTRE
- MAJOR ROAD
- MAJOR WATERCOURSE
- ▲ TERMINAL STATION
- ZONE SUBSTATION
- - - - TRANSMISSION LINE 500kV
- - - - TRANSMISSION LINE
- SUB-TRANSMISSION LINE 66kV
- SUB-TRANSMISSION LINE

TRUNK POWER INFRASTRUCTURE, GLENELG SHIRE

FIGURE 8

3083-00
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SOURCE: POWERCOR



The development of the Powercor network is based on demand forecasts and future customer loadings. Powercor has advised that there are no plans for augmentation works based on currently forecasted general growth.

3.5.1. Renewable Energy Options

Renewable energy refers to sources of energy that can be used without depleting the natural resources utilised in the generation process. Renewable energy options are advantageous as they produce minimal or no by-products that are detrimental to the environment. The existing environment of the Glenelg Shire is rich in available sources of renewable energy. Available forms of renewable energy found in the Shire are listed as follows:

(a) Wind Energy

The coastal conditions of the Shire make it an ideal region for wind energy harvesting. The current Portland Wind Energy Project by Pacific Hydro will see 120 wind turbines constructed in 4 locations around the Shire. These locations are Cape Bridgewater, Cape Nelson and Cape Sir William Grant. With a combined capacity of 195MW, and a "capacity factor" of 48%, the wind farms will be able to supply power to an estimated 125,000 homes per annum and provide greenhouse gas savings of approximately 920,000 tonnes per annum¹. This project is due for completion -2009.

(b) Wave Energy

The coastal region of the Glenelg Shire has been reported to be the best wave energy resource location in Victoria. Oceanlinx is developing and installing an initial 2mW wave-energy generation system, to be moored to the seabed several kilometres off the coast near Portland. The wave energy converter will generate renewable electricity for transmission via submerged cables to the power grid.

Oceanlinx is also currently investigating the development of a \$40 million generating plant in Portland, which would have the capacity to generate sufficient electricity for 30,000 homes.²

(c) Geothermal

The deep high yielding aquifers found within the Shire are ideal for use as a geothermal resource. There is the potential to utilise this resource for industrial or recreational purposes, depending on the quantity of water required for the proposed use. Of the existing groundwater bore supplies in Portland, none is being utilised, due to the closure of the former geothermal facility due to corrosion in 2006.

An even deeper aquifer is being investigated by Hot Rock Limited for power generation within the region using recently developed proven binary cycle power plants.

¹ <http://www.pacifichydro.com.au>, sourced 17/11/2006

² Orchison, K., *Converters test the ocean's might*, <http://theaustralian.new.com.au>, sourced 4/12/2006

3.6. TELECOMMUNICATIONS

Telstra is a commercial organisation that provides telecommunications services to the Glenelg Shire. The services coverage to the major urban centres have been summarised as follows:

Table 3.1 *Glenelg Shire Telecommunications Services Summary*

Township	Telstra Services				
	Telephone Service	Broadband (<8mbit/s)	2 Way Satellite Internet Connection	Next G Network	GSM Network
Portland	Yes	Yes	Yes	Yes	Yes
Casterton	Yes	Yes	Yes	Yes	Yes
Heywood	Yes	Yes	Yes	Yes	Yes
Nelson	Yes	No*	Yes	No*	Yes
Cape Bridgewater	Yes	No*	Yes	No	No
Dartmoor	Yes	No*	Yes	Yes	Yes
Merino	Yes	No*	Yes	Yes	Yes
Narrawong	Yes	No*	Yes	Yes	Yes
Tyrendarra	Yes	Yes	Yes	Yes	Yes

* Service coverage expected in the future.

4. TOWNSHIPS INFRASTRUCTURE ASSESSMENT

4.1. GENERAL ASSESSMENT

Stormwater Drainage

Discussions with Council representatives have revealed that there are no major concerns with the drainage infrastructure in the smaller urban centres. This is mostly due to little growth forecast in these areas. Infrastructure works required will be part of the general upgrade and/ or replacement works program prepared by the Glenelg Shire Council.

Water

The infrastructure in currently reticulated towns has been confirmed by Wannon Water to have sufficient capacity to cater for further infill growth within the existing town boundaries. Portland is the only centre to have the capacity to cater for major industrial demands.

Sewerage

The infrastructure in currently reticulated towns has been confirmed by Wannon Water to have sufficient capacity to cater for further infill growth within the existing town boundaries.

Gas

Discussions with the relevant providers has identified that it is not economically viable for the gas providers to invest in the capital works required to reticulate the towns currently without gas services. A cost benefit analysis is required to determine whether such ventures are feasible if the demand for reticulated services arises.

Concerns have been raised regarding the risk of potential disruption to underground assets due to construction of informal roads, agricultural activity, etc. Such events could lead to catastrophic outcomes. Measures need to be put in place to ensure that such events are avoided.

Power

Discussions with Powercor have indicated that there are no apparent limitations to the upgrade of power supply infrastructure. However, customers are responsible for the cost of supply extension/ upgrade works in part or in full. Conditions for supply extensions rest with the power retailer(s).



Telecommunications

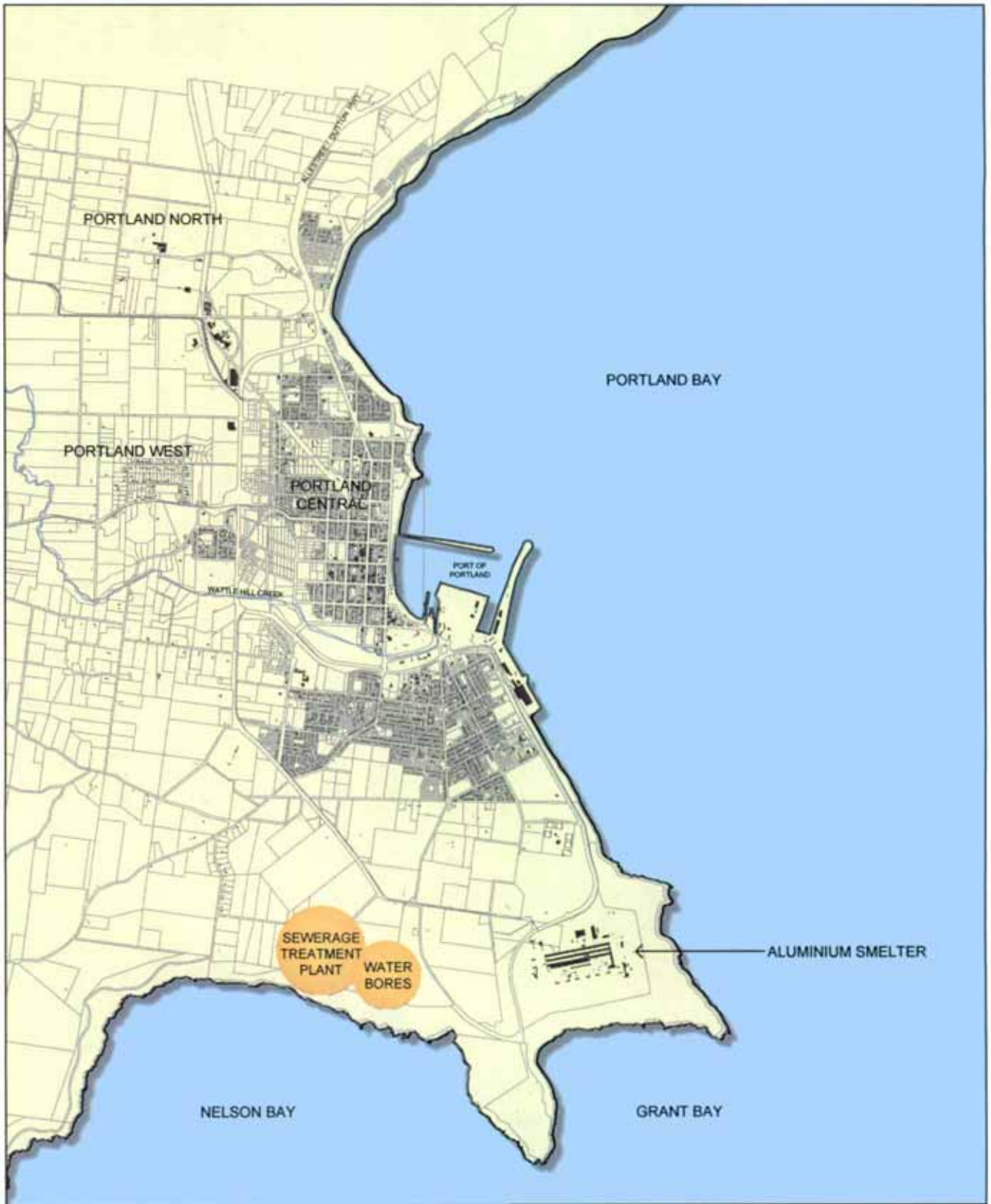
Discussions with Telstra have indicated that the existing network has extensive capacity to cater for future developments within the Shire. There are no apparent limiting constraints that will affect future developments.

4.2. PORTLAND AND SURROUNDS

4.2.1. General Description

Portland is located on the coast in the south east of the Shire. It is further divided into Portland, Portland West and Portland North. Allestree/ Dutton Way is located north of Portland. Much of the industrial land in Portland North is currently undeveloped.

Figure 9 Portland and Surrounds



LEGEND

- MAJOR ROAD
- MAJOR WATERCOURSE

PORTLAND AND SURROUNDS

FIGURE 9

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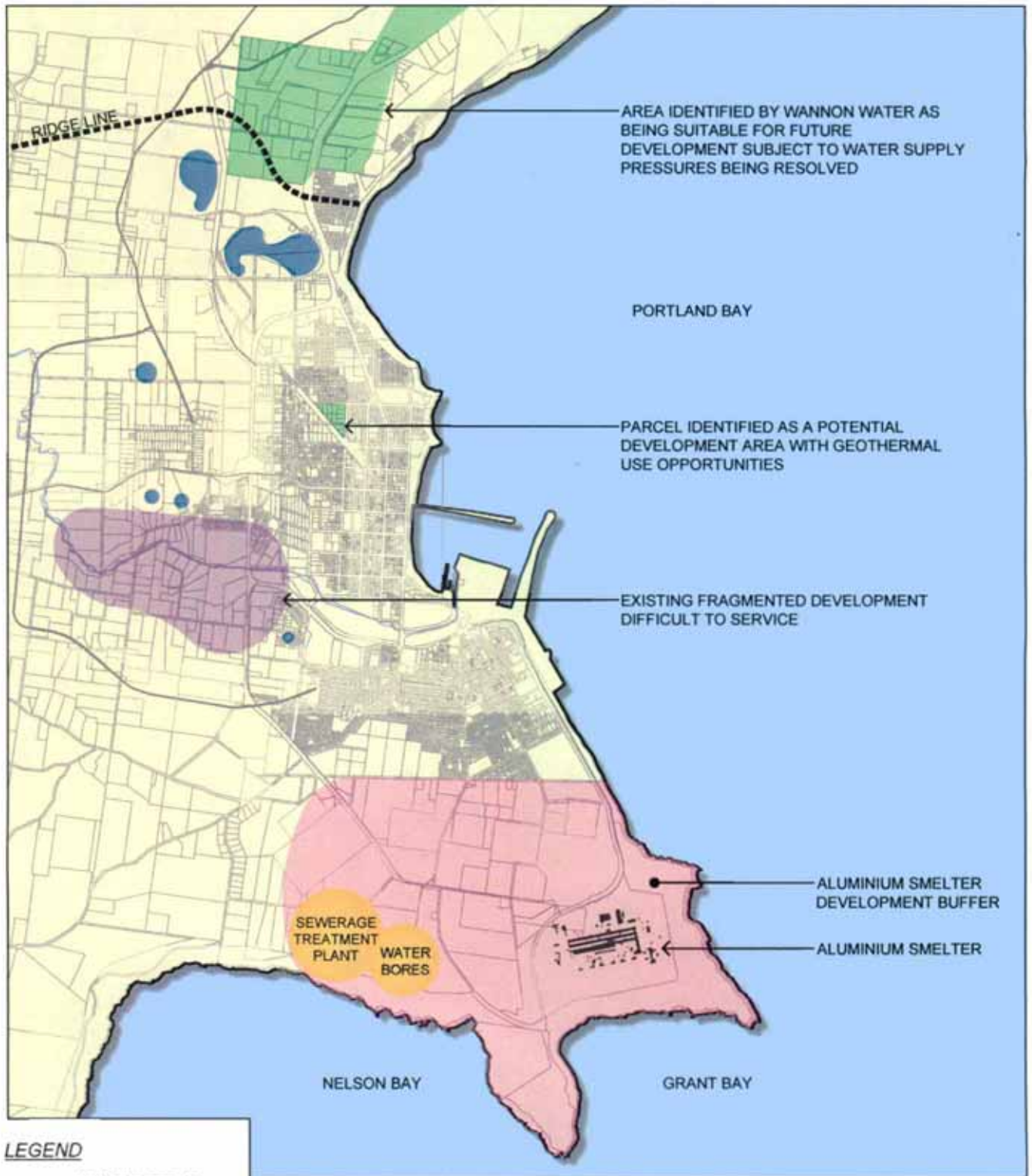


4.2.2. Physical Development Constraints

Without the implementation of extensive engineering solutions, numerous physical features affect the potential for development to occur in Portland and its surrounds (refer Figure 10). These include:

- Ridgeline located in the north of Portland
- Large elevation differences throughout the region
- Fragmented development in the south west
- Aluminium smelter development buffer zone
- Numerous sink holes/ basins
- Coastal erosion
- Extent of flooding

Figure 10 *Physical development constraints, Portland*



LEGEND


- MAJOR ROAD
- MAJOR WATERCOURSE
- RIDGELINE
- SINKHOLE / WETLAND
- NON-DEVELOPABLE AREA
- IDENTIFIED DEVELOPMENT OPPORTUNITY AREA
- IDENTIFIED PHYSICAL DEVELOPMENT CONSTRAINT

PHYSICAL DEVELOPMENT CONSTRAINTS, PORTLAND

FIGURE 10

3083-00
FEBRUARY 2007





Dutton Way itself presents a number of challenges in terms of providing infrastructure services. These include:

- Site is situated along the coast for an approximate length of 6km and is typically only 2 lots wide.
- Reticulated sewer does not service the site.
- The existing sea wall is subjected to coastal erosion (believed to be a result of modified current flows due to the construction of the breakwater in Portland harbour but also affected by sea level rise).
- Design storm used to design the seawall is unknown.
- Site is subject to inundation during storm surges.
- No detailed topographical survey of site exists.
- Climate change causing sea level increases, which could lead to inundation of the low lying areas within Dutton Way.

The Port of Portland Authority is required under its operating licence to pump sand from the harbour to the Dutton Way sea wall as part of remedial works. Discussions have identified that this action is currently not undertaken or enforced. This has exposed the sea wall to ongoing erosion issues.

Wannon Water has indicated that they are assessing sewer and water servicing strategies for Dutton Way, but are awaiting the results of the Portland to Narrawong Coastal Engineering and Planning Study before making any decisions on the matter.

4.2.3. Infrastructure Services Assessment

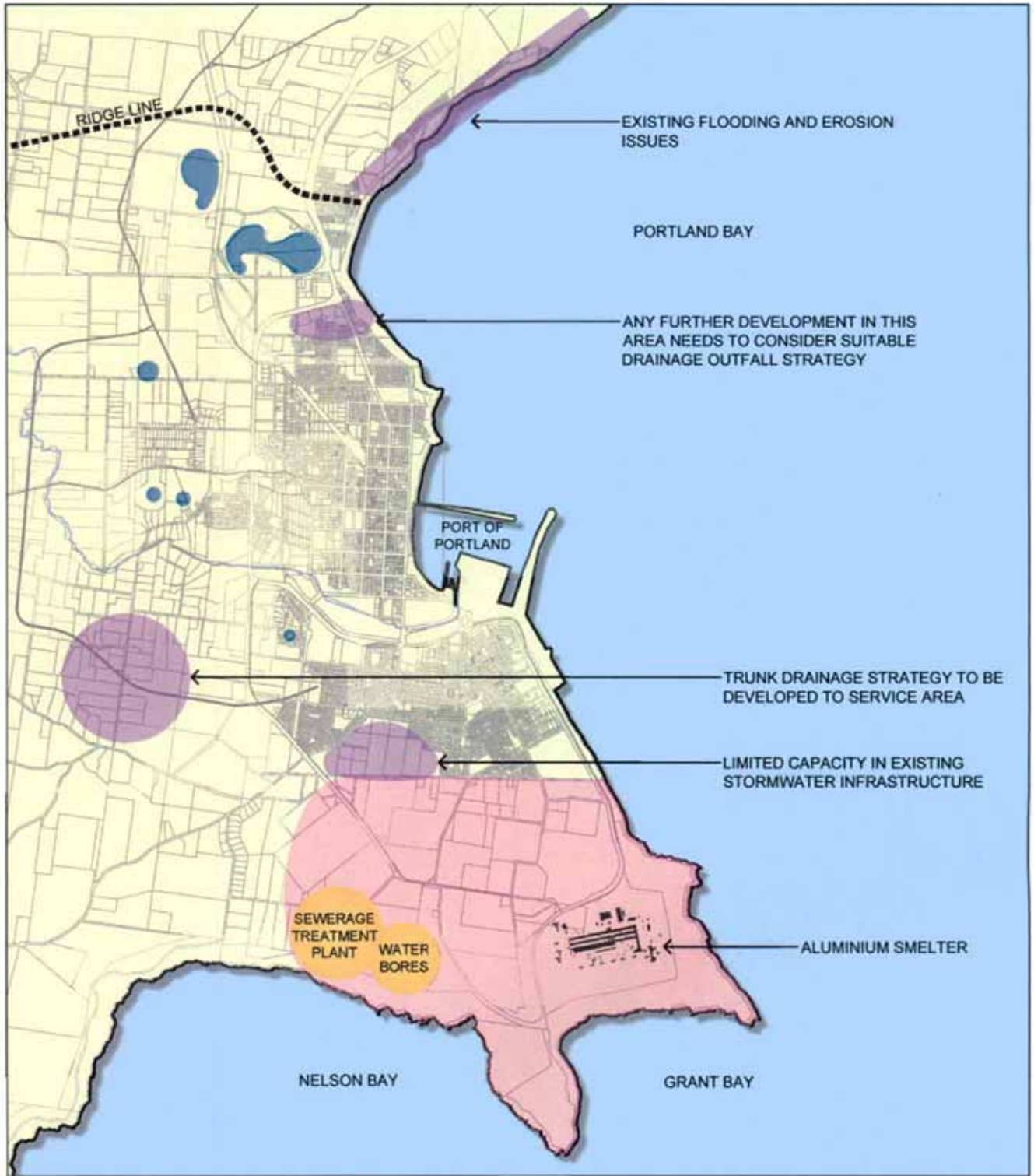
Drainage

Various issues associated with stormwater drainage have been identified and documented (refer Figure 11). Current and recommended actions to address these issues have been table below:

Table 4.1 *Portland Drainage Infrastructure Assessment*

Identified Issue	Current/ Recommended Remedial Action(s)
Untreated urban runoff entering sinkholes, potential of contaminating groundwater	<ul style="list-style-type: none"> Enforcing WSUD practises can ensure that all stormwater discharges meet the Stormwater Management Targets, as set out in the <i>Urban Stormwater – Best Practice Environmental Management Guidelines</i> (Victoria Stormwater Committee, 1999). This would eliminate potential groundwater contamination and the contamination of other sensitive water bodies.
Lack of trunk infrastructure in north west area (industrial zone)	<ul style="list-style-type: none"> Council currently investigating strategies to service the area.
Lack of trunk infrastructure in fragmented development area	<ul style="list-style-type: none"> Council currently investigating strategies to service the area.
Limited capacity in existing infrastructure and Wattle Hill Creek to the south	<ul style="list-style-type: none"> Enforce onsite attenuation for all new developments. Restrict developed discharges to pre-developed flows.
Poor existing coastal drainage along Hanlon Parade	<ul style="list-style-type: none"> Council in process of strategising remediation works for coastal drainage.
Flooding of Dutton Way during storm surges	<ul style="list-style-type: none"> Investigate condition of existing Dutton Way sea wall and erosion and identify and assess potential remedial actions to protect the site.

Figure 11 *Drainage Issues, Portland*





LEGEND

- MAJOR ROAD
- MAJOR WATERCOURSE
- RIDGELINE
- SINKHOLE / WETLAND
- NON-DEVELOPABLE AREA
- IDENTIFIED DRAINAGE ISSUES

STORMWATER DRAINAGE ASSESSMENT, PORTLAND

FIGURE 11

3083-00
FEBRUARY 2007

Water

Existing on-site infrastructure includes two major feed mains that extend from the pumped supply in the south up to Portland North. These mains have sufficient capacity to cater for further development. However, if high demand industries were to be implemented, further assessment of the capacity of existing resources would be required.

Wannon Water has identified a parcel of land directly north of Portland North as being suitable for development (refer Figure 12), subject to existing water supply pressure issues being resolved.

Other issues associated with water supply have been identified and documented (refer Figure 12). Current and recommended actions to address these issues have been table below:

Table 4.2 Portland Water Services Assessment

Identified Issue	Current/ Recommended Remedial Action(s)
Existing lots on situated on higher elevations to the south experience supply pressure problems during peak demand periods.	<ul style="list-style-type: none">• Further development would most likely require installation of pressure booster pumps.• Wannon Water currently exploring the need to implement works addressing current pressure supply problems in their next Capital Works Plan (2008 – 2013).
No reticulation infrastructure exists north of the northern ridgeline in Dutton Way.	<ul style="list-style-type: none">• Water servicing strategy to be determined.
Ridgeline presents water supply issues.	<ul style="list-style-type: none">• Booster pumps would be required to service any developments north of the ridgeline.

Sewer

The existing sewer infrastructure in Portland has capacity to cater for infill growth within existing residential zones and for growth up to the northern ridgeline. A sewerage treatment plant exists to the south of the site.

Portland West is currently serviced by septic tanks. A reticulated sewerage scheme has been scheduled for implementation in 2007-2008.

Wannon Water has raised concerns regarding the high ground water table of Dutton Way. This presents difficulties in providing sewerage services. Alternatives to conventional gravity sewers, such as low pressure sewers, may be suitable in servicing the region, pending on investigations beyond the scope of this study.

Other issues associated with sewerage services have been identified and documented (refer Figure 13). Current and recommended actions to address these issues have been table below:

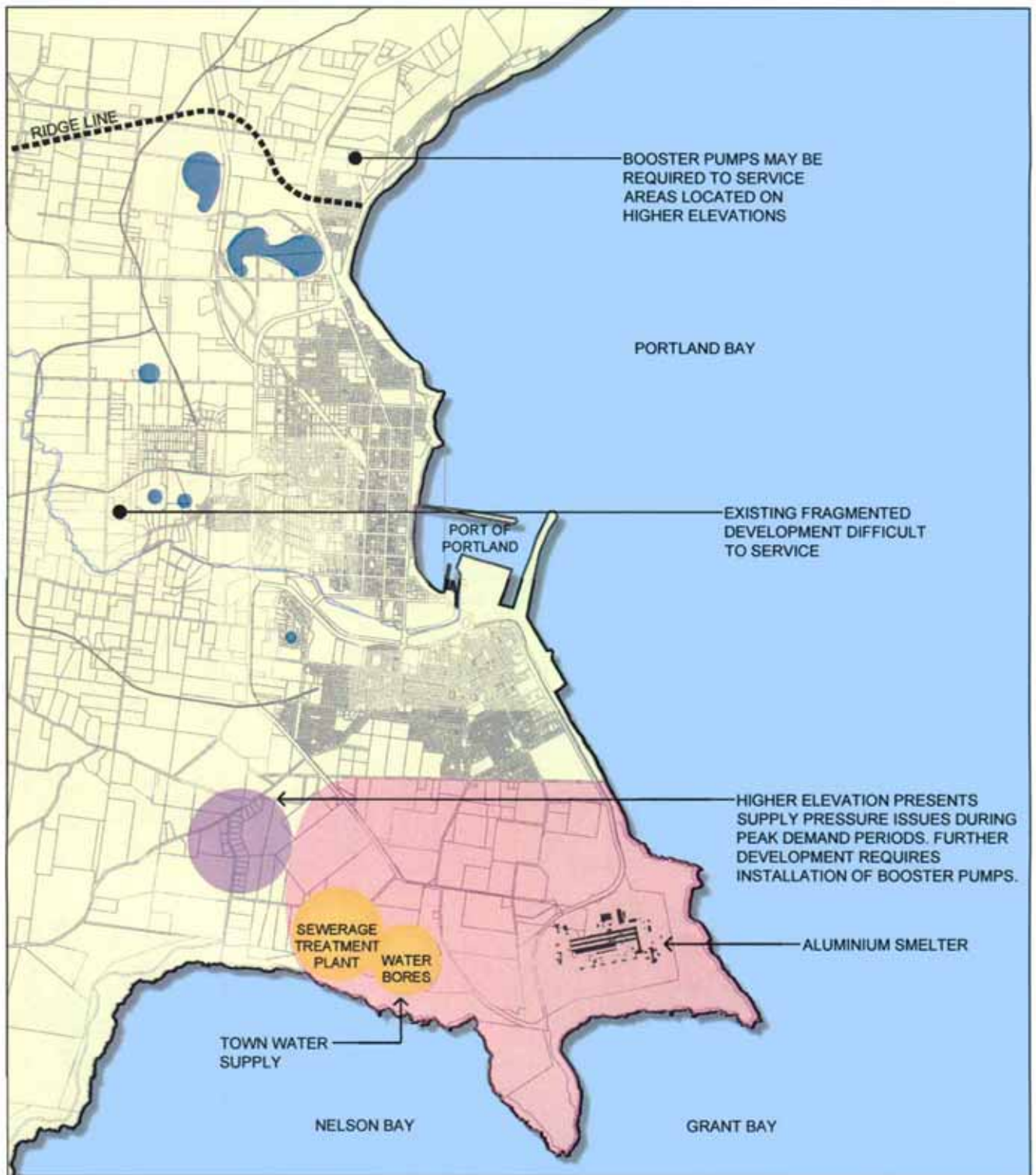


Table 4.3 *Portland Sewer Services Assessment*

Identified Issue	Current/ Recommended Remedial Action(s)
Ridgeline presents gravity feed issues	<ul style="list-style-type: none">• Pump station would be required to pump generated sewerage from Dutton Way to existing treatment plant.
Sewerage becoming stale during pumping from Dutton Way to existing treatment plant	<ul style="list-style-type: none">•
High groundwater table in Dutton Way	<ul style="list-style-type: none">• Investigate alternative servicing strategies suitable for the site (eg. low pressure sewer systems)

Figure 12 *Water Supply Issues, Portland*

Figure 13 *Sewering Issues, Portland*



LEGEND

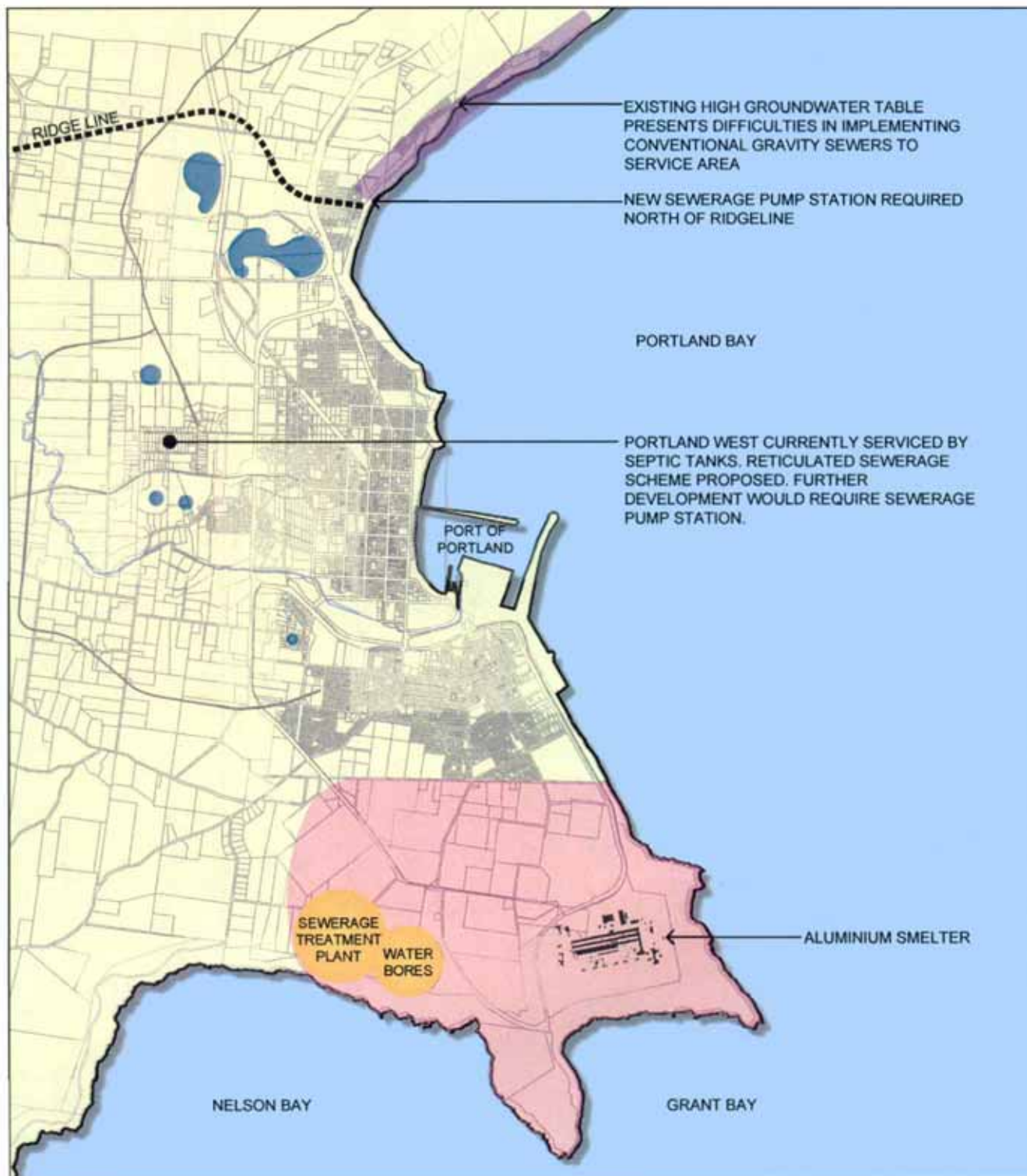
- MAJOR ROAD
- MAJOR WATERCOURSE
- RIDGELINE
- SINKHOLE / WETLAND
- NON-DEVELOPABLE AREA
- IDENTIFIED WATER ISSUES

WATER SERVICES ASSESSMENT, PORTLAND

FIGURE 12

3083-00
FEBRUARY 2007





LEGEND

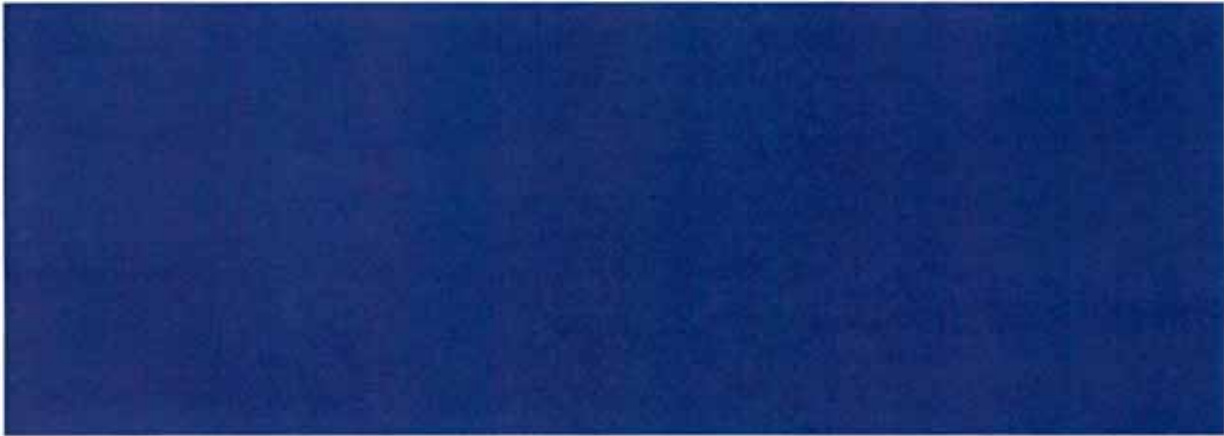
- MAJOR ROAD
- MAJOR WATERCOURSE
- RIDGELINE
- SINKHOLE / WETLAND
- NON-DEVELOPABLE AREA
- IDENTIFIED SEWERAGE ISSUES

SEWERAGE SERVICES ASSESSMENT, PORTLAND

FIGURE 13

3083-00
FEBRUARY 2007





Gas

No gas reticulation infrastructure currently exists in Dutton Way. SP AusNet have indicated that they have no current plans to service the area and no investigations regarding a servicing strategy have been performed to date. SP AusNet will only conduct an investigation into servicing the area in the event that development occurs.

4.3. HEYWOOD

4.3.1. General Description

Heywood is a relatively flat site located inland in the south east of the Shire. Heywood is strategically situated on the main transport routes by road and rail, to Portland. It therefore has considerable importance as a transport hub, in addition to servicing the local rural (both agriculture and forestry) community.

4.3.2. Infrastructure Services Assessment

Stormwater Drainage

A major open drain exists along Beavis Street (refer Figure 14). This presents potential clashes with other services that may need to be constructed across the road. Consideration should be given to the design of future services that will cross Beavis Street.

Figure 14 *Beavis Street drain, Heywood*



LEGEND

— MAJOR WATERCOURSE

**BEAVIS STREET DRAIN,
HEYWOOD**

FIGURE 14

3083-00
FEBRUARY 2007





Sewer

Heywood utilises a lagoon treatment system. There is capacity within the existing reticulation and treatment system to cater for further infill growth. However, given the flatness of the site, there is little capacity for development to occur beyond the existing town periphery.

Power

If developments with substantial projected demands were to be implemented around the Heywood area, a new zone substation would be required in the Heywood Terminal Station.

4.4. CASTERTON

4.4.1. General Description

Casterton is located inland in the northern region of the Shire.

4.4.2. Infrastructure Services Assessment

Water

Wannon Water has a 5 year Capital Works plan to upgrade existing water storages.

Sewer

There is capacity within the system to cater for further infill growth. For development to occur beyond the existing town periphery, an assessment of existing site contours would be required to determine the servicing feasibility.

5. SUMMARY AND RECOMMENDATIONS

5.1. RETICULATION INFRASTRUCTURE SERVICES

A summary of the existing reticulated infrastructure services of the towns within Glenelg Shire have been tabled below:

Table 5.1 Reticulated Services Summary

Urban Centre	Reticulated Services		
	Water	Sewer	Gas
Portland	✓	✓	✓
Casterton	✓	✓	
Heywood	✓	✓	
Dartmoor	✓		
Merino	✓		
Sandford	✓		

All towns identified in this report have adequate drainage infrastructure, power supply and telephone services. The level of telecommunications services vary across the Shire (refer Table 3.1).

5.2. DEVELOPMENT OPPORTUNITIES AND CONSTRAINTS

Aside from Portland, all identified towns have sufficient capacity in existing drainage, water and sewer infrastructure to allow for further infill growth within defined town boundaries, in accordance to current land use zoning.

There are no apparent limitations to gas, power or telecommunications services infrastructure upgrades. However, the provision of reticulation services to currently non-serviced towns is restricted by the lack of commercial viability.

Major constraints and servicing issues on developing the identified towns have been tabled below:

Table 5.2 Identified Major Development Constraints

Urban Centre	Service	Description
Portland	General	Dividing ridgeline between Portland and Dutton Way presents servicing issues in both water supply and sewerage collection to the north (Dutton Way).
	Drainage	Fragmented or lack of drainage infrastructure in various locations hinders development opportunities. Unknown impact(s) of potential site inundation during storm surges. Existing sea wall and coast subjected to erosion.
	Water	Areas of higher elevation present water supply pressure

		issues.
	Sewer	High ground water table in Dutton way, site difficult to service.
Heywood	Drainage	Major open drain along Beavis St creates potential services clashes should other services need to be extended across the street.
	Sewer	Flatness of site only allows for further development within existing town boundaries
Casterton	Sewer	Flatness of site only allows for further development within existing town boundaries

The Council also requires that further conventional density urban development can only occur subject to the provision of adequate sewer reticulation services in the named town.

5.3. RECOMMENDATIONS

5.3.1. General

- Ensure environmentally significant and sensitive features are considered when preparing the strategic plan, i.e. Wetlands, currently threatened and other flora and fauna species, Glenelg Shire coast, groundwater resources and quality.
- Consider and investigate renewable energy options to supplement existing services provisions.
- Update inundation overlays to identify areas prone to flooding to determine the extents and impacts of flood events. This will aid in determining areas where intensive development should not occur and in setting minimum floor levels for buildings.
- Should any industrial developments (or other heavy services demand developments) be proposed, conduct a service supply investigation to determine the infrastructure capacity.
- Coordinate with relevant authorities and service providers in the preparation of the strategic plan and in defining/ amending land use zoning to allow for provision of adequate services corridors when additional infrastructures is required for future developments.
- Review other consultants' assessments (GHD, Wannon Water, Council) currently being conducted when complete and to allow for reassessment of the findings presented in this report.

5.3.2. Portland and Surrounds

- Complete a geotechnical investigation prior to any site development to ensure that a sinkhole does not exist.
- Investigate area identified by Wannon Water as suitable for development; determine how water supply issues can be resolved.
- Investigate alternate sewer servicing strategies for servicing Dutton Way.
- Conduct a detailed assessment on the existing sea wall to determine the cause(s) of erosion, the extent of potential site inundation during storm surges and to determine viable remedial works.
- Undertake a cost benefit analysis concerning the further development of Dutton Way should it become a considered option.