

Preface – DJPR Cover Note

Latrobe Valley Regional Rehabilitation Strategy: Identification of Recognised Regional Receptors

February 2021

The *Latrobe Valley Regional Rehabilitation Strategy: Identification of Recognised Regional Receptors*, authored by Jacobs and commissioned by the Department of Jobs, Precincts and Regions (DJPR), was largely developed over the period of August to December 2017. It was undertaken at an early stage in the process of preparing the *Latrobe Valley Regional Rehabilitation Strategy* (LVRRS), and its primary purpose was to inform the scope of the three regional studies that would inform the LVRRS: the [regional geotechnical study](#), the [regional water study](#) and the [regional land use study](#). Parts of this report have therefore been superseded by these regional studies and the LVRRS itself. The LVRRS was released by the Minister for Resources in June 2020 and is currently being implemented.

The regional receptors in this report were identified based on a *scenario* in which the three coal mine voids of the Latrobe Valley would be filled with water from local water sources (i.e. the Latrobe River system and Latrobe Valley aquifers) to create waterbodies as final rehabilitated landforms. This particular scenario was used in this study because, in response to the findings of the Hazelwood Fire Mine Inquiry (HMF1), the Victorian Government committed to further investigating the feasibility of water-based rehabilitation options.

This report represents an initial high-level identification of regional receptors of interest, for the purpose of scoping the three technical studies that would inform the LVRRS. It is unlikely that all receptors that may be relevant to the scenario at hand have been identified. The receptor inventory may also need to be re-visited in the future if different options are explored or put forward by mine licensees. This will especially be the case where rehabilitation proposals include the use of resources from outside the study area featured in this report.



Latrobe Valley Regional Rehabilitation Strategy

Department of Jobs, Precincts and Regions

Identification of Recognised Regional Receptors

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Latrobe Valley Regional Rehabilitation Strategy

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Contents

1.	Introduction	1
1.1	Background	1
1.2	LVRRS Development Context for Study	1
1.3	Objectives.....	2
1.4	Mine Rehabilitation Studies and Information.....	2
1.5	Scope.....	2
1.6	Report Structure	3
1.7	Stakeholder Engagement and Consultation.....	3
2.	Approach to Identifying Regional Receptors	4
2.1	Approach Summary.....	4
2.2	Screen of Receptors for Qualitative and Quantitative Assessment	4
2.3	Receptor Inventory Categories and Sub-Categories	5
2.4	Identifying Recognised Regional Receptors	7
2.5	Materiality Assessment.....	9
2.6	Receptor Gaps and Uncertainties	12
3.	Overview of Latrobe Valley Regional Receptors (Inventory)	13
3.1	Profile.....	13
3.2	Aboriginal and non-Aboriginal Cultural Heritage	14
3.3	Environment	14
3.4	Infrastructure	15
3.5	Land.....	16
3.6	Water	16
4.	Recognised Regional Receptors	18
4.1	Aboriginal and non-Aboriginal Cultural Heritage	18
4.2	Environment	19
4.3	Infrastructure	20
4.4	Land.....	21
4.5	Water	22
5.	Recognised Regional Receptors – Quantitative Assessment	23
5.1	Aboriginal and non-Aboriginal Cultural Heritage	23
5.2	Environment	23
5.3	Infrastructure	24
5.4	Land.....	26
5.5	Water	26
5.6	Ownership	29
6.	Recognised Regional Receptors – Qualitative Assessment	30
6.1	Aboriginal and non-Aboriginal Cultural Heritage	30
6.2	Environment	31
6.3	Infrastructure	33
6.4	Land.....	34
6.5	Water	36

6.6 Ownership 36

Appendix A. Stakeholders Consulted

Appendix B. Glossary and Receptor Inventory Sub-Category Definitions

- B.1 Glossary
- B.2 Aboriginal and non-Aboriginal Cultural Heritage
- B.3 Environment
- B.4 Infrastructure
- B.5 Land
- B.6 Water

Appendix C. Publicly Available Documents

- C.1 Aboriginal and Historical Cultural Heritage
- C.2 Environment
- C.3 Infrastructure
- C.4 Land
- C.5 Water

Appendix D. Approach to Determining Materiality

- D.1 Determining Materiality for Recognised Regional Receptors
 - D.1.1 Stage One: Specifying Pathways, Duration, Extent and Magnitude
 - D.1.2 Stage Two: High-level Assessment of Materiality
 - D.1.3 Stage Three: Categorisation of Recognised Regional Receptors According to Materiality

Appendix E. Overview of Recognised Regional Receptors to be Quantitatively Assessed

- E.1 Aboriginal and non-Aboriginal Cultural Heritage
 - E.1.1 Aboriginal Cultural Heritage
 - E.1.2 non-Aboriginal Cultural Heritage
- E.2 Environment
 - E.2.1 Rivers, Waterways and Natural Lakes
 - E.2.2 Wetlands
 - E.2.3 Water Dependent Habitats - Fish
 - E.2.4 Water Dependent Habitats – Frogs
 - E.2.5 Water-Dependent Habitats – Birds
- E.3 Infrastructure
 - E.3.1 Electricity Transmission Networks
 - E.3.2 Roads – Freeway (State-Maintained) and Bridges
 - E.3.3 Roads – Local Council Maintained Roads and Bridges
 - E.3.4 Gas and Liquid Pipelines
 - E.3.5 Operating Coal Mines
 - E.3.6 Gas Fired Power Station
 - E.3.7 Rail
 - E.3.8 Telecommunications
- E.4 Land

E.4.1 Towns

E.5 Water

E.5.1 Drains

E.5.2 Aquifers and Groundwater Use

E.5.3 Water Rights and Entitlement Holders

Appendix F. Receptor Inventory

F.1 Aboriginal and non-Aboriginal Cultural Heritage

F.2 Environment

F.3 Infrastructure

F.4 Land

F.5 Water

Executive Summary

This report forms part of foundation studies undertaken to inform the development of the Latrobe Valley Regional Rehabilitation Strategy (LVRRS), prepared by the Department of Jobs, Precincts and Regions (DJPR) in partnership with the Department of Environment, Land, Water and Planning (DELWP).

For the LVRRS, a regional receptor is defined as any physical entity, process or value, which may potentially be directly or indirectly impacted by a water-based mine rehabilitation option. A receptor may be part of the natural or built environment. Aspects such as Aboriginal heritage, land, water resources, the environment and infrastructure all have multiple, significant receptors which require definition as the first step in considering potential impacts from regional rehabilitation scenarios.

Many receptors exist across the LVRRS study area. To adequately assess potential regional rehabilitation scenario impacts, receptors need to be identified and their important characteristics (e.g. location and condition) determined, specifically with respect to water and/or geotechnical-related impacts. This report is the initial step in what is likely to be a multi-step process to determine and characterise receptors.

The purpose of this report is to:

- Define and describe the receptors within the LVRRS study area (Receptor Inventory or the ‘very long list’);
- Identify recognised receptors in which a material link or pathway for potential impact from a regional rehabilitation scenario is unclear, and which may require those potential impacts to be qualitatively assessed to inform the development of the LVRRS (‘shorter list’); and
- Identify recognised receptors likely to be materially linked to a regional rehabilitation scenario, and which may require those potential impacts to be quantitatively assessed to inform the development of the LVRRS (‘short list’).

The screening of receptors that may require a qualitative and quantitative assessment is summarised graphically as Figure E1.

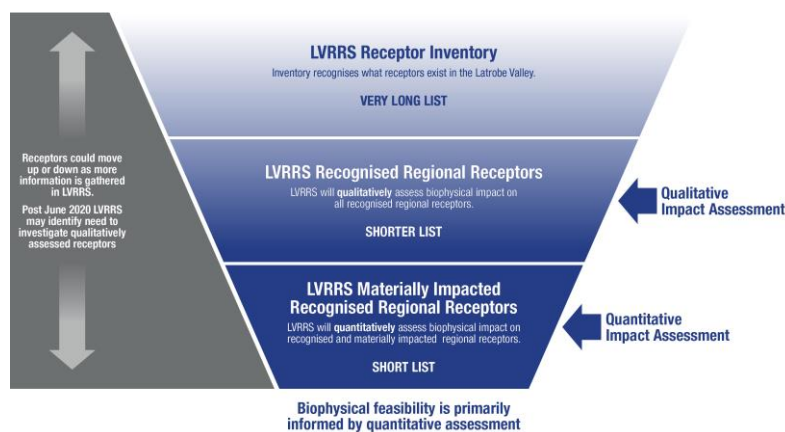


Figure E1 – LVRRS receptor inventory

Extensive consultation was conducted with receptor custodians and stakeholders as part of this study over the period of August to October 2017. These included regional authorities (e.g. Southern Rural Water, Gippsland Water, West Gippsland CMA, and Latrobe City Council), State Government departments and agencies (e.g. DJPR Resources, DELWP Water Resources, DELWP Implementation Planning, DELWP Policy Infrastructure and Coordination, VicRoads, and V/Line) and community representatives (e.g. Latrobe Valley Rehabilitation Advisory Committee) and Traditional Owners (e.g. Gunaikurnai Land and Waters Aboriginal Corporation [GLaWAC]).

Using contextual information and consultation with receptor technical specialists/custodians, the following was completed.

- The receptor inventory (very long list), a spreadsheet containing 190 receptors. The findings from subsequent consultation (e.g. direct community consultation) can be easily added to the spreadsheet.
- Most of the receptors are ‘recognised’, i.e. has an existing level of recognition at State or Federal level, such as by inclusion in a management plan, recognised in a formal protection or management framework or protected under legislation (shorter list).
- 50 receptors covering 17 receptor sub-categories were identified as receptors that may need to be quantitatively assessed (short list – see Table E-1). These recognised regional receptors have a material link to a regional rehabilitation scenario due to either their proximity, causal pathway, severity of consequence and/or their expected level of exposure to one or more mine void waterbodies.
- Notably, receptors may move between the need for undertaking a qualitative or quantitative impact assessment as more information is collected during the LVRRS investigations. After the completion of the LVRRS project in 2020, the need to investigate qualitatively assessed receptors may be identified and undertaken accordingly.

Table E-1 – Recognised Regional Receptors – Potentially Impacted by mine rehabilitation scenario as considered by this study

Receptor Category	Receptor Sub Category	Receptors
Aboriginal and non-Aboriginal Cultural Heritage	Aboriginal cultural heritage	<ul style="list-style-type: none"> • Tangible cultural heritage • Intangible cultural heritage (subject to further stakeholder engagement)
Environment	Rivers, waterways and natural lakes	<ul style="list-style-type: none"> • Rivers (Morwell River, Latrobe River, (see also note below) • Creeks (Traralgon, Flynn’s, Sheepwash, Bennet’s, Merriman’s, Billy’s) • Lakes (Lake Wellington, Lake Victoria)
	Listed Species	<ul style="list-style-type: none"> • Fish (e.g. Australian Grayling, Eastern Dwarf Galaxias habitats) • Frogs (e.g. Bell Frog, Growling Grass Frog, Burrowing Frog, Spotted Tree Frog habitats) • Birds (e.g. Musk Duck, Eastern Great Egret habitats)
	Wetlands	<ul style="list-style-type: none"> • Lower Latrobe Wetlands (Sale Common, Dowd Morass, Heart Morass) • Gippsland Lakes Ramsar site(s) inclusive of Lake Wellington and Victoria Wetlands • Morwell River Wetlands bordering Yallourn
Infrastructure	Bridges	<ul style="list-style-type: none"> • All bridges on roads in the inter-mine area. This excludes culverts.
	Electricity Transmission Network	<ul style="list-style-type: none"> • High Voltage Transmission Line – South of Hazelwood and Morwell to Traralgon
	Extractive Industry	<ul style="list-style-type: none"> • Operating coal mines Yallourn • Operating coal mines Loy Yang • Yallourn North mine void
	Gas Fired Power Station	<ul style="list-style-type: none"> • Jeeralang Power Station
	Pipelines – Gas and Liquid	<ul style="list-style-type: none"> • APA VTS Australia Pipeline • Australian Gas Networks Pipeline • Energy Australia (Yallourn) Pipeline • Esso Australia Resources Pipeline • Proposed CarbonNet CO₂ Pipeline
	Rail	<ul style="list-style-type: none"> • Melbourne to Traralgon (adjacent to Yallourn and past Morwell)
	Road – Freeway/State Maintained	<ul style="list-style-type: none"> • Princes Highway (southern urban boundary of Morwell and northern boundary of Hazelwood to Yallourn mine) • Strzelecki Highway (adjacent to Hazelwood)

Receptor Category	Receptor Sub Category	Receptors
		<ul style="list-style-type: none"> Proposed Traralgon Bypass (between Loy Yang and Traralgon) Hyland Highway (adjacent to Loy Yang)
	Road – Local Council maintained	<ul style="list-style-type: none"> Latrobe Road (adjacent Yallourn)
	Telecommunications	<ul style="list-style-type: none"> Base stations and network cables in the Hazelwood and Yallourn zone
Land	Townships/Settlements	<ul style="list-style-type: none"> Southern urban boundary of Morwell Urban buffer between Yallourn coal mine and Morwell Current and likely future Urban land south of Traralgon, near Loy Yang
	Agriculture	<ul style="list-style-type: none"> Irrigated agriculture and horticulture Dairying
Water	Aquifers and Groundwater Use	<ul style="list-style-type: none"> Near-surface shallow aquifer system The Morwell Formation aquifer system The Traralgon Formation aquifer system Moe Groundwater Management Area
	Dams, artificial lakes and Reservoirs	<ul style="list-style-type: none"> Buckley's Hill Reservoir Rehabilitated mine void waterbodies
	Drains	<ul style="list-style-type: none"> Morwell Main Drain
	Water Rights and Entitlement Holders	<ul style="list-style-type: none"> Water Entitlement Holders as listed in the Victorian Water Register Riparian rights holders Water supply catchment (surface water) Above cap flows

Note: During stakeholder meetings, the Macalister and Thomson Rivers were identified as potential receptors for mine rehabilitation if additional water would need to be released from dams on these rivers to offset the impacts on the Gippsland Lakes caused by increased diversions from the Latrobe River for mine rehabilitation. As these options are not proposed for mine rehabilitation, they were not considered further

1. Introduction

The Latrobe Valley Regional Rehabilitation Strategy (LVRRS) is part of the Victorian Government's response to the Hazelwood Mine Fire Inquiry (HMF), which found that there were significant uncertainties and gaps in knowledge surrounding the closure and rehabilitation of the Latrobe Valley's three brown coal mines. The LVRRS will address some of these knowledge gaps through a series of technical studies leading to a final LVRRS report to be completed by June 2020.

The Department of Jobs, Precincts and Regions (DJPR) and the Department of Environment, Land, Water and Planning (DELWP) are jointly responsible for preparing and delivering the LVRRS. Development of the Strategy will involve technical studies covering hydrology, hydrogeology, geomechanics, water quality, geochemistry, statutory/regulatory issues, and environmental, socioeconomic and cultural issues.

1.1 Background

The Latrobe Valley, 150 km east of Melbourne, Victoria, hosts one of the world's largest brown coal deposits and is the site of three coal mines – known as Yallourn, Hazelwood and Loy Yang – with associated power stations. The three mine voids are very large, each up to 12 km² in area and up to 200 m deep and are located in close proximity to each other (within a ~20 km zone) and to local towns. The mines have been in operation for 40-90 years, and at closure are expected to have a combined void volume of more than 3,000 GL (Mm³).

The Hazelwood mine and power station ceased operations in March 2017. Yallourn has plans to continue operating until 2032, and Loy Yang until 2048.

A major fire at the Hazelwood mine in 2014 triggered by local bushfires resulted in significant impacts to the local community. In response, the Victorian Government established an inquiry into the Hazelwood mine fire. Among other issues, the inquiry considered the options for rehabilitation of all three mines in a regional context and identified that there are significant knowledge gaps around the feasibility of the mine operator's proposed rehabilitation plans and the cumulative effects of those plans. The LVRRS aims to address these knowledge gaps.

To fill the regional knowledge gaps the Victorian Government committed to investigating the feasibility of water-based rehabilitation options identified by the HMF for the Latrobe Valley mines, and to prepare the LVRRS to guide regional, and influence site-scale, rehabilitation planning, taking into account the interactions between the mine voids. Specifically, the LVRRS committed to undertake regional studies to investigate geotechnical and water considerations:

- Latrobe Valley Regional Geotechnical Study - to investigate the regional stability and fire risks associated with the coal mine voids, and whether those risks can be mitigated if water was used to fill or partly fill the voids.
- Latrobe Valley Regional Water Study - to investigate whether, and to what extent, the proposed filling or partial filling of the mine voids with water taken from the Latrobe River system and Latrobe Valley aquifers would result in adverse ecological, social, cultural and economic impacts to the region.

1.2 LVRRS Development Context for Study

An important task of the LVRRS is to assess the biophysical feasibility of water-based mine void rehabilitated landforms as regional rehabilitation 'scenarios' based on the findings of technical studies and an assessment of cumulative impacts.

The LVRRS considers the mines individually and collectively (cumulatively) in the context of potential impacts on the environment, Aboriginal and non-Aboriginal cultural heritage values, infrastructure and land uses in the Latrobe Valley, with a particular focus on water and land stability issues, noting that the primary objective of rehabilitation is to achieve a safe, stable and sustainable landform for the closed mine voids.

The biophysical feasibility assessment incorporates an assessment of cumulative impacts, defined as the collective effects of activities and pressures on regional receptors, being the environment (e.g. rivers, lakes, flora, fauna), major infrastructure (e.g. roads, residential property) and other land uses (e.g. agricultural), both direct and indirect, including present and reasonably foreseeable future pressures.

For the LVRRS, a receptor is defined as any physical entity, process or value, which may potentially be directly or indirectly impacted by regional rehabilitation scenarios. A receptor may be part of the natural or built environment. Aspects such as Aboriginal heritage, land, water resources, the environment and infrastructure all have multiple, significant receptors which require definition as the first step in considering potential impacts from regional rehabilitation scenarios.

Many receptors exist across the LVRRS study area. To adequately assess regional rehabilitation scenario impacts, receptors need to be identified and their important characteristics (e.g. location and condition) determined, particularly with respect to water and/or geotechnical-related impacts.

The results of the biophysical feasibility assessment can then be used to inform an assessment of the potential environmental, social and economic impacts and opportunities of land uses resulting from or supported by the rehabilitation scenarios.

1.3 Objectives

The objective of this report is to define and describe the receptors within the LVRRS study area and to make value-based judgements regarding the status of receptors being considered to be 'recognised' and technical judgments regarding the material linkages between those receptors and the cumulative impacts of regional rehabilitation scenarios.

This involved:

- Developing criteria for categorising regional receptors as 'recognised';
- Establishing an inventory with baseline information on receptor type, location, ownership and current level of recognition (e.g. protection under State or Federal environmental legislation);
- Developing a spatially enabled database, with associated metadata, of recognised regional receptors; and
- Identifying those recognised receptors that are likely to have a material link to the cumulative impacts of regional rehabilitation scenarios, and which may require to have those potential impacts quantitatively assessed to inform the development of the LVRRS.

1.4 Mine Rehabilitation Studies and Information

Relevant information to appreciate proposed mine (waterbody) rehabilitation options supporting this work included:

- The current approved mine plans for each mine;
- The 'Hazelwood Mine Fire Inquiry Report 2015/2016 – Volume IV – Mine Rehabilitation';
- Supporting reports for approved work plans and proposed work plan variations;
- Alternate pit waterbody concepts that have been investigated by coal mine operators and which may form part of a future work plan variation (and the supporting work plans); and
- Other LVRRS tasks, including reports completed in response to the HMF1.

1.5 Scope

The following receptors are within the scope of the LVRRS:

- Aboriginal and non-Aboriginal cultural heritage
- Environment
- Infrastructure
- Land

- Water

Coal reserves and operating coal mines

Within this report, existing Latrobe Valley coal reserves have been treated as a receptor in relation to potential restrictions on future coal access as a consequence of mine rehabilitation. Some impacts, such as groundwater pressure responses, for example, may affect other operating coal mines.

Foreseeable future receptors

Foreseeable future receptors have been identified through a combination of stakeholder workshops and a review of literature. These future receptors are potential land uses in areas which may occur in the short to medium term based on regional growth plans and strategies (e.g. expansion of urban growth in Morwell and Traralgon, and proposed sites for major new infrastructure such as the Traralgon Bypass).

1.5.1 Out of Scope

This report is focused on biophysical receptors only. Social and economic receptors that are valued by stakeholders and communities in the Latrobe Valley and that are potentially affected by mine rehabilitation will require consideration as part of the mine operators' development and government approval of Declared Mine Rehabilitation Plans.

1.6 Report Structure

The report structure is:

- Executive Summary
- Section 1 – Introduction (background, objective, scope, project activities, stakeholder consultation etc.)
- Section 2 – Approach to identifying regional receptors
- Section 3 – Overview of Latrobe Valley Regional Receptors (receptor inventory)
- Section 4 – Recognised Regional Receptors
- Section 5 – Recognised Regional Receptors – Quantitative Assessment
- Section 6 – Recognised Regional Receptors – Qualitative Assessment
- Appendix A – Stakeholders Consulted
- Appendix B – Glossary and Receptor Inventory Sub-Category Definitions
- Appendix C – Publicly Available Documents used to source receptor recognition
- Appendix D – Approach to determining materiality
- Appendix E – Overview of Regional Receptors to be quantitatively assessed
- Appendix F – Receptor Inventory

1.7 Stakeholder Engagement and Consultation

Identification of recognised regional receptors involved consultation August to October 2017 with relevant regional authorities (e.g. Southern Rural Water, Gippsland Water, West Gippsland CMA, and Latrobe City Council), State Government departments and agencies (e.g. DJPR Low Emission Resource Division, DELWP Water Resources, DELWP Implementation Planning Division, DELWP Policy Infrastructure and Coordination, VicRoads, and V/Line), Traditional Owners (GLaWAC) and community representatives (e.g. Latrobe Valley Rehabilitation Advisory Committee). Owners of infrastructure assets were also consulted (e.g. SPAusnet, pipeline etc.).

Refer to Appendix A for a stakeholder list.

2. Approach to Identifying Regional Receptors

2.1 Approach Summary

2.1.1 Identification of Recognised Regional Receptors

The following activities were undertaken to identify recognised regional receptors.

- Prepared a receptor inventory including:
 - Definition of receptor type categories and subcategories;
 - Location; and
 - Ownership, level of management and/or protection (and the authority that enables that management or protection).
- Compiled a list of recognised regional receptors for the receptor inventory, by extracting those receptors that are 'recognised' (e.g. recognised in statutory and other public documents).
- Assessed whether recognised receptors may be materially (casually) linked to a mine rehabilitation scenario through a land or water connection (pathway).
- Reviewed with stakeholders the completeness of receptor inventory, proposed approach for recognising regional receptors and whether a recognised regional receptor is likely to be materially linked to a rehabilitation scenario.
- Developed a list of recognised and materially linked regional receptors, which may be required to have potential impacts due to the materially linkage determination assessed to inform developing the LVRRS.

2.2 Screen of Receptors for Qualitative and Quantitative Assessment

The approach to identifying a recognised and materially linked regional receptor started by listing all potential receptors in the nominated categories of Environment, Infrastructure, Aboriginal and non-Aboriginal Cultural Heritage, Land, and Water Resources and Infrastructure (receptor inventory or very long list).

The list was then shortened by extracting those receptors that are 'recognised' (e.g. recognised in statutory and other public documents), which are part of the shorter list.

Finally, those receptors are further refined by identifying those that may be reasonably materially linked to a regional rehabilitation scenario (i.e. the potential cumulative impacts from the creation of more than one mine void water bodies). Figure 2.1 shows schematically the LVRRS biophysical feasibility assessment process for regionally recognised receptors.

Notably, receptors are expected to move between the requirement for a qualitative or quantitative impact assessment as more information is collected during the LVRRS investigations. After the completion of the LVRRS project in 2020, the need to investigate qualitatively assessed receptors may be identified and undertaken accordingly.

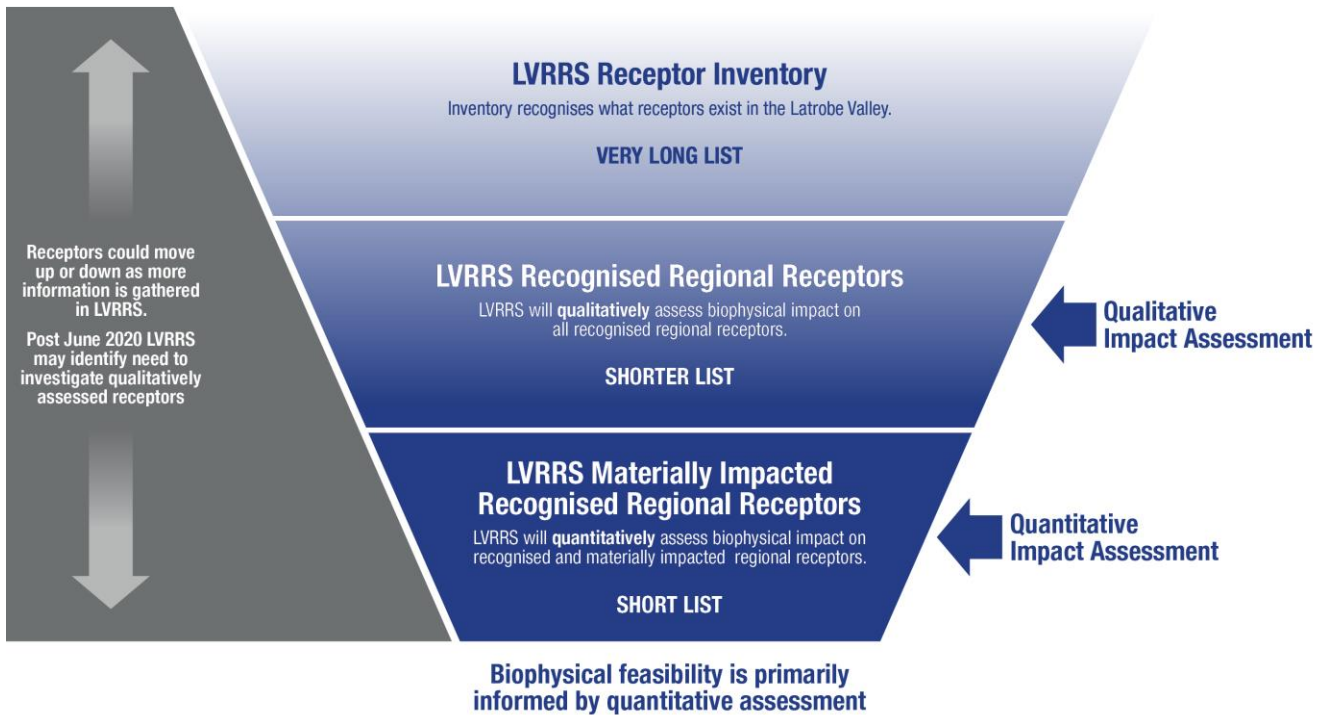


Figure 2.1 – Screening process for specifying receptors for the qualitative and quantitative assessment

2.3 Receptor Inventory Categories and Sub-Categories

The receptor inventory contains a record of the instances and existence of the receptors for five categories:

- 1) Aboriginal and non-Aboriginal Cultural Heritage
- 2) Environment
- 3) Infrastructure
- 4) Land
- 5) Water

2.3.1 Receptor Inventory Sub-Categories

Each category comprises sub-categories and these are listed in Table 2-1 . The sub-categories are defined in Appendix B.

Table 2-1 – Receptor inventory sub-categories

Category	Sub-Categories
Aboriginal and non-Aboriginal Cultural Heritage	<ul style="list-style-type: none"> • Aboriginal cultural heritage • non-Aboriginal cultural heritage
Environment	<ul style="list-style-type: none"> • Floodplains • Landscape • Rivers, waterways and natural lakes • Listed species • Terrestrial Habitats • Water-Dependant Habitats • Wetlands
Infrastructure	<ul style="list-style-type: none"> • Airports

Category	Sub-Categories
	<ul style="list-style-type: none"> • Alternate Energy Sources • Bridges • Coal Fired Power Generation • Gas Fired Power Station • Electricity Transmission Network • Extractive Industry • Gas and liquid pipelines • Industry and Manufacturing • Rail • Road – Freeway/State maintained • Road – Local Council maintained • Telecommunications
Land	<ul style="list-style-type: none"> • Coal Reserve • Cropping • Dairying • Protected public land • Flood Zones • Forestry plantations • Grazing • Irrigated agriculture & horticulture • Intensive agriculture • Multiple use public • Primary production support and infrastructure • Recreation • Specialist Facilities • Tourism • Townships/Settlement • Waste management
Water	<ul style="list-style-type: none"> • Aquifers and Groundwater Use • Dams, artificial lakes and reservoirs • Drains • Fisheries • Water Delivery Infrastructure • Wastewater Infrastructure • Water Rights and Entitlement Holders • Water supply catchment (Surface water) • Above cap flows

2.4 Identifying Recognised Regional Receptors

Table 2-2 outlines one or more of 12 criteria used to define recognised regional receptor, based on relevant legislation, policy, strategy and/or plans documenting the regional significance of listed receptors.

Table 2-2 – Criteria used to define Recognised Regional Receptors

#	Recognition Criteria	Examples of public documents containing evidence receptor is recognised
1	Listed in a state or national natural or cultural “heritage significance” register or list.	<ul style="list-style-type: none"> National Heritage List, under the Commonwealth <i>Environment Protection and Biodiversity Conservation (EPBC) Act 1999</i>. Places listed on the Victorian Heritage Register, under the <i>Heritage Act 2017</i>.
2	Receptor is the subject of an international treaty, convention or conservation agreement to which Australia is a party.	<ul style="list-style-type: none"> Wetlands listed under the Ramsar convention (e.g. Gippsland Lakes). Wetlands listed under the Japan-Australia, China-Australia or Republic of Korea migratory bird agreements (JAMBA, CAMBA, and ROKAMBA).
3	Receptor is listed and threatened and/or protected by Victorian and/or Commonwealth legislation. For example: <ul style="list-style-type: none"> Species or vegetation communities which are vulnerable, endangered or critically endangered. Land identified as having Indigenous cultural sensitivity. Aboriginal places listed on the Victorian Aboriginal Heritage Register. Blanket protection for all historical archaeological sites in Victoria whether listed or not, greater than 75 years. 	<ul style="list-style-type: none"> Species and vegetation communities listed and protected under Commonwealth <i>Environment Protection and Biodiversity Conservation (EPBC) Act 1999</i>. Species and vegetation communities listed and protected under Victorian <i>Flora and Fauna Guarantee Act 1988</i>. Heritage river listed and protected under the Victorian <i>Heritage Rivers Act 1992</i>. Archaeological sites protected under the Victorian <i>Heritage Act 2017</i>. Sites and places of significance protected under the Victorian <i>Aboriginal Heritage Act 2006</i>, <i>Aboriginal Heritage Regulations 2007</i> and/or Commonwealth <i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>.
4	Protected public land such as: <ul style="list-style-type: none"> National Parks Wilderness Parks Gazetted Reference Areas State Parks Regional Parks Flora, Fauna, Wildlife Caves Bushland Water frontage, Streamside, Coastal Nature conservation reserves 	<ul style="list-style-type: none"> Protection of Public lands through legislation such as <ul style="list-style-type: none"> <i>National Parks Act 1975</i> <i>Crown Land Reserves Act 1978</i> <i>Catchment and Land Protection Act 1994</i>
5	Receptor is of regional significance or priority in a plan or strategy developed by a state or regional authority. For example: <ul style="list-style-type: none"> Priority river reaches Priority wetlands Priority landscapes and views Key settlements Key freight and tourism transport routes 	<ul style="list-style-type: none"> Catchment Management Authority Regional Catchment Strategy or Regional Waterway Strategy Regional Growth Plan VicRoads’ Road Network Plan

#	Recognition Criteria	Examples of public documents containing evidence receptor is recognised
6	Receptor subject to land use controls because of its environmental or heritage value or environmental sensitivity.	Receptors protected through (as identified in planning scheme/ policies): <ul style="list-style-type: none"> • Environmental Significance Overlay • Heritage Overlay • Floodway Overlay, Land Subject to Inundation Overlay • Significant Landscape Overlay • Vegetation Protection Overlay
7	Population centre	<ul style="list-style-type: none"> • Regional Growth Plan • Planning scheme (land within a defined township boundary and included in non-rural zones) • Aerial photographs and satellite imagery
8	Natural features of recognised conservation significance or value. For example: <ul style="list-style-type: none"> • Bio-sites (e.g. Lake) • Remnant native vegetation whose ecological vegetation class is of bioregional conservation significance • Wetlands 	<ul style="list-style-type: none"> • Directory of Nationally Important Wetlands
9	Designated and protected water supply areas for groundwater and surface water resources including designated water supply catchment.	<ul style="list-style-type: none"> • Groundwater Management Areas and Plans developed by DELWP • <i>Water Act 1989</i> • Reservoir catchment declared under the <i>Catchment and Land Protection Act 1994</i>
10	Water supply features for town and irrigation water supply. For example: <ul style="list-style-type: none"> • Rural and town water supply dams • Groundwater bores for town water supplies • Rural water supply pipeline 	<ul style="list-style-type: none"> • Sustainable Water Strategy • Gippsland Water Urban Water Strategy
11	High social/economic value private or public land use. For example: <ul style="list-style-type: none"> • Agricultural land uses and plantations • Coal Reserves • Tourist sites 	<ul style="list-style-type: none"> • Victorian Government Coal Policy Statement
12	Critical Infrastructure. For example: <ul style="list-style-type: none"> • Coal Fired Power stations • Alternate Energy Generation • Open cut coal mines • Key electrical supply infrastructure • Gas transmission/distribution pipeline 	<ul style="list-style-type: none"> • <i>Mineral Resources (Sustainable Development) Act</i> • A Mining Licence • <i>Emergency Services Act</i> • Coal mining areas defined by special use zones within the Latrobe Planning Scheme

Recognition was typically described in a publicly available document (refer to Appendix C and Appendix F). A publicly available document was defined as:

- Created through official mandate (legislation or policy direction);
- Subject to public review and comment during their development;
- Transparent about methods for nomination of recognition; and
- Taken into consideration in decision making by the responsible agency.

Most regionally recognised environmental (e.g. conservation reserves, priority waterways), historical and infrastructure (townships, roads, rail, tourism areas) receptors were defined in public documents. Evidence of regional recognition of some environmental and land related receptors was less well-defined. Regional growth strategies and planning schemes applicable to the Latrobe Valley were consulted to inform the recognition of different land uses. For the water-related receptors recognition were described by state policies and objectives (e.g. Sustainable Water Strategy and Catchment Management Strategy).

This project was informed by the *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978*. The Ministerial Guideline identifies significant effects on assets (receptors) of state or regional significance. The Ministerial Guidelines provides qualitative criteria for potential effects on the environment that might be of regional or state significance resulting in a combination of potential environmental effects (e.g. potential extensive or major effects on land stability, potential extensive or major effects on beneficial uses of waterbodies over the long term due to changes in water quality, stream flow or regional groundwater levels).

2.5 Materiality Assessment

The LVRRS project focuses on recognised regional receptors that are potentially affected by the cumulative impacts of mine rehabilitation. Materiality has been identified where impact pathways originate from having a proposed mine void water body. Impacts on receptors from one mine will also be managed under the *Mineral Resources (Sustainable Development) Act 1990* mine licencing provisions for each mine operator to work under an approved work plan.

Materiality, as defined during previous bioregional assessments in Victoria, is the “*threshold of likely or potential cumulative impact on receptors based on contextual information and is based on judgement following consideration of proximity, causal pathway and expected level of exposure*”.¹

A focus for the LVRRS biophysical feasibility assessment of recognised regional receptors is on those with a clear material linkage to water (e.g. changes in water quality and/or quantity) or geotechnical (e.g. ground movement) related impacts.

For example, if a water course was identified as a recognised environmental receptor but has no upstream or downstream linkages to surface water or groundwater systems that interact with mine void waterbodies and therefore could not feasibly be impacted by a void waterbody related ground movement, it is deemed not to be a materially affected recognised regional receptor for the LVRRS. It would therefore not be included in a quantitative assessment of biophysical feasibility but would be assessed qualitatively.

The approach used to determine whether recognised regional receptors were materially linked is described in Appendix D.

2.5.1 Regional Rehabilitation Scenarios

To be able to assess the cumulative impacts of mine rehabilitation, clear and detailed descriptions of regional rehabilitation scenarios are required. In conjunction with regional stakeholders, water-based mine rehabilitation scenarios were identified using the mine operators’ existing conceptual plans for rehabilitation, which involve the creation of waterbodies within the mine voids by partially or fully filling the voids via the use of local water resources.

The materiality assessment of the links between regional rehabilitation scenarios and recognised regional receptors was undertaken on the basis of End State Regional Rehabilitation Scenarios. This included the filling process, the landform that is in place once the mine void waterbody water level has reached an equilibrium state, the water quality the waterbody is approaching, connectivity of a waterbody with the other two voids or adjacent/receiving waterways and, its long-term status. The long-term status is not fully defined as once all operational elements of the mine have been removed and rehabilitated the extent of the waterbody and exact

¹ Bioregional Assessments (2012), Independent Expert Scientific Committee on Coal Seam Gas and Coal Development

shape of the landform is not clear. It should be noted that any post-mining landform will require some form of on-going management.

2.5.2 Spatial Scales

Recognised and materially linked receptors were located within one or more the LVRRS spatial scales. Figure 2.2 broadly illustrates the spatial scales described.

Mine/waterbody spatial scale

Receptors are located in the following two scales.

- Mine scale - Up to achieving the rehabilitated landform, the mine scale is defined as the area lying within the mining licence boundary.
- Waterbody scale - After achieving the rehabilitated landform, the spatial scale changes from the mine scale to the mine void waterbody scale. The mine void waterbody scale includes the final waterbody, final mine batters and other mine related features such as rehabilitated mine overburden dumps. While a mining licence is in place, the mine void waterbody scale will be up to the mining licence boundary, and after that, a more general boundary may need to apply.

Inter-mine scale

Receptors that are located in the area that encompasses all three coal mines and incorporates the physical surface and sub-surface interconnections between them. Within this scale, the actions by one mine may interact with and affect the operations and rehabilitation of the other mines. The inter-mine scale region reflects the zone of influence of one mine on another. While establishing the mine void waterbody (period from ceasing operations to achieving final waterbody level) the inter-mine scale starts at the mining licence boundary. Once the mine operators have achieved the rehabilitated landform agreed with the Victorian Government, the inter-mine scale starts at the crest of the waterbody.

Catchment scale

Receptors that are located in the hydrological catchment of the Latrobe River system. This includes the groundwater and surface water catchment inclusive of the Latrobe River and its tributaries. At a catchment scale, the LVRRS is primarily concerned with impacts caused by water availability, quality, security and reliability. The catchment is very large and much of the upstream area is outside of the material area of influence and will not be considered.

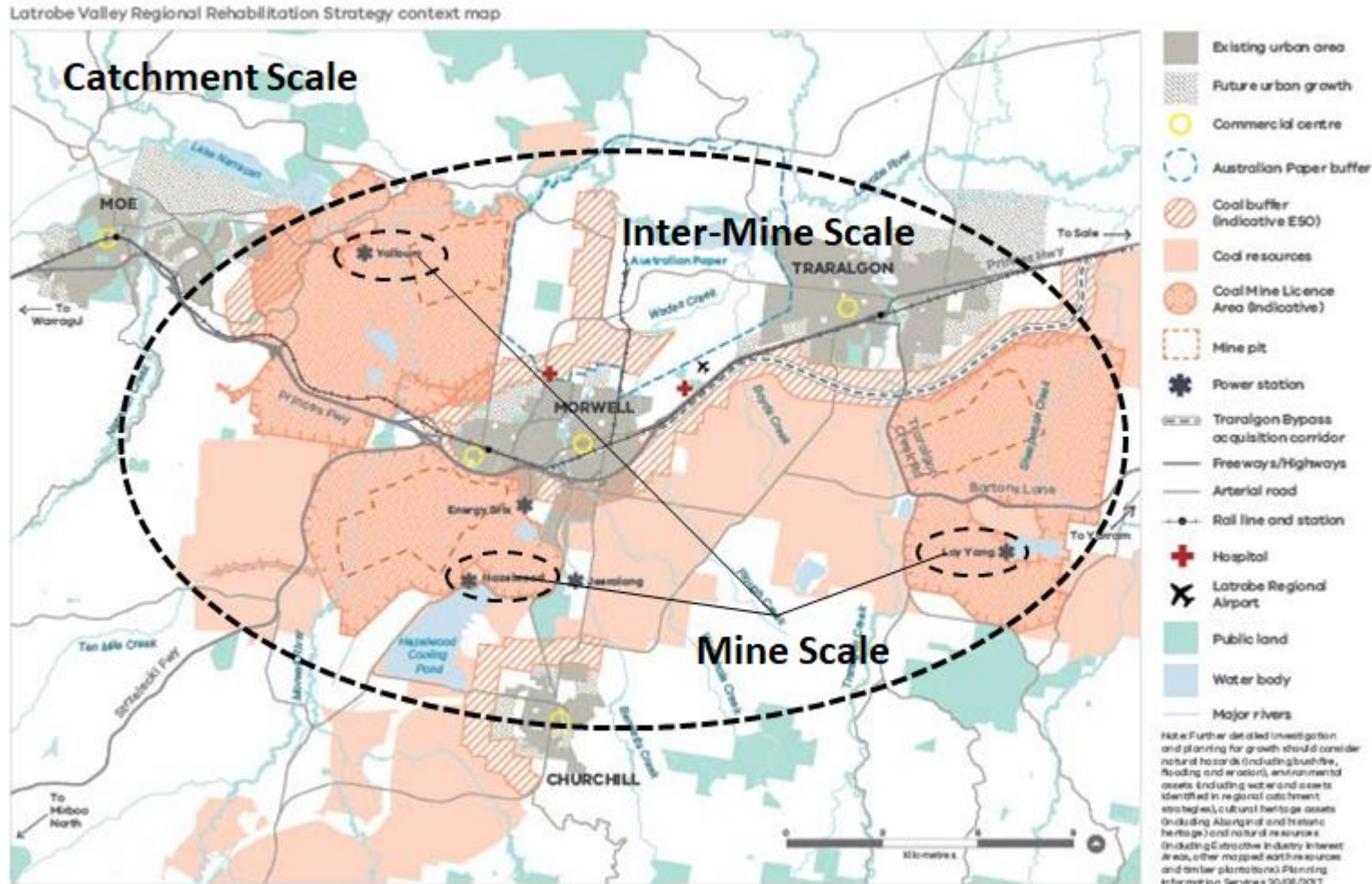


Figure 2.2 –The LVRRS Conceptual Spatial Scale Map. The mine scale is defined by the Coal Mine Licence Area (see legend), the inter-mine scale is the area between and around the mines and the catchment scale is beyond the inter-mine scale

2.6 Receptor Gaps and Uncertainties

The process of identifying and clarifying receptors has been undertaken based on a precautionary principle, to minimise the potential to miss significant impacts and to minimise doubt as to the suitability of receptors.

There are two aspects of uncertainty in this initial identification and classification of regional receptors within the LVRRS project:

- 1) the accuracy in assignment of recognition or value identification; and
- 2) the accuracy in determination of materiality.

Recognition

In the first instance, the assessment of all recognised receptors has followed documentary evidence. Where a receptor is recognised in public documents, then there is no uncertainty in that classification.

However, evidence of regional recognition of some environmental and land related receptors was less well-defined. Regional growth strategies and planning schemes applicable to the Latrobe Valley were consulted to inform the recognition of different land uses.

Materiality

There were uncertainties associated with decisions on materiality. Uncertainty in this context refers to the ambiguities and knowledge gaps that prevent a good understanding of the material linkage between regional recognised receptor and a regional rehabilitation scenario.²

As previously noted, receptors are expected to move between the requirement for a qualitative or quantitative impact assessment as more information is collected during the LVRRS investigations. Subsequent to the completion of the LVRRS project in 2020, the need to further investigate and potentially quantify receptor impacts may emerge.

Uncertainty in materiality assessment was addressed in one of two ways.

- 1) Where the causal pathways were not clear, likely material linkage to a recognised receptor was examined to a greater depth by adopting a systems-approach for pathways from multiple mine void water bodies and by identifying receptor sensitivities. Understanding likely temporal impacts was important in the systems analysis.
- 2) Where materiality remained uncertain, the recognised regional receptor was identified as requiring a quantitative assessment as part of the LVRRS. Further analysis may remove uncertainties and the recognised regional receptor may revert to needing a qualitative assessment only.

² Gregory, R et al 2012 Structured Decision Making Blackwell Wiley

3. Overview of Latrobe Valley Regional Receptors (Inventory)

3.1 Profile

3.1.1 Location

The Latrobe Valley is situated between the Great Dividing Range and the Strzelecki Ranges. The community of the Latrobe Valley is spread across several townships including Moe, Morwell and Traralgon, and surrounding farm holdings. The regional setting for the LVRRS is shown in Figure 3.1.

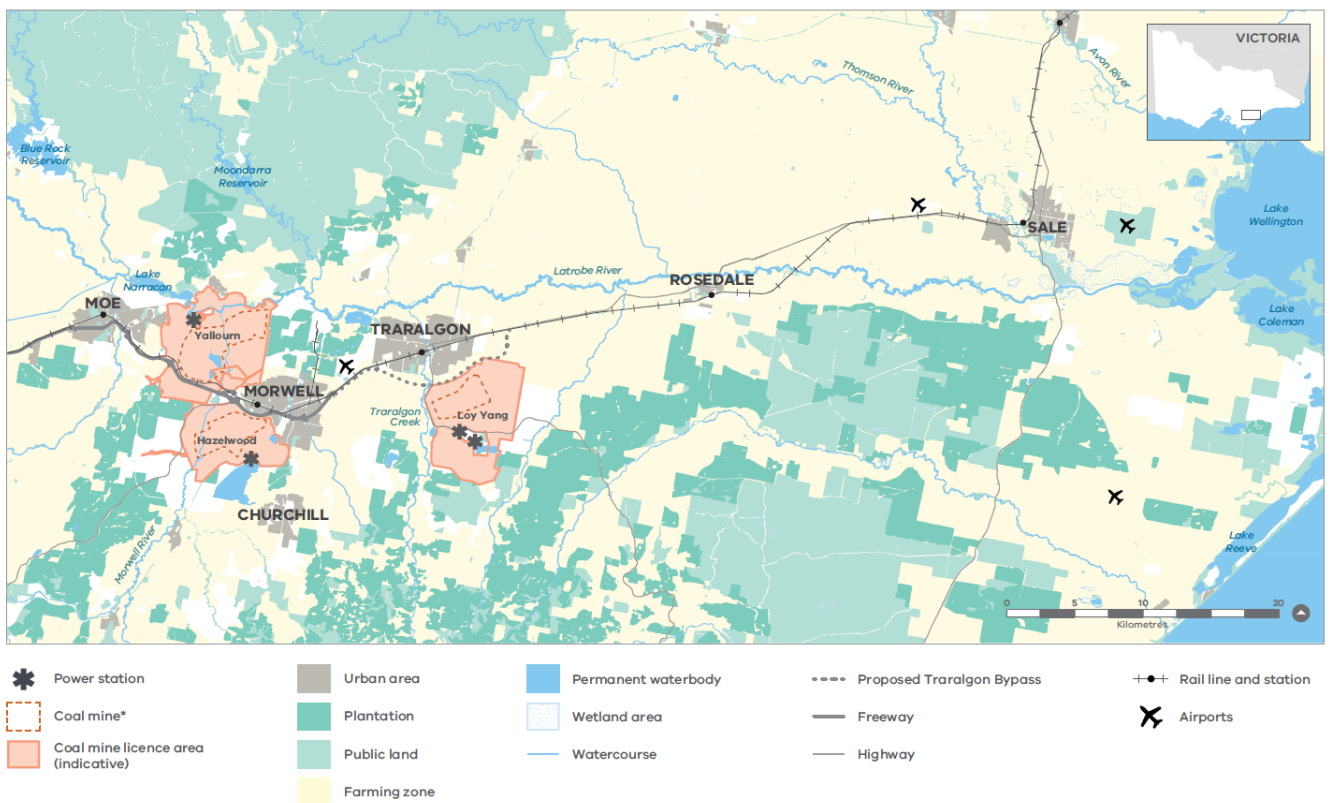


Figure 3.1 – Generalised features the Latrobe Valley³ showing relative locations of the coal mines

3.1.2 Economy

The regional economy is across a range of industries, including electricity generation and associated coal mining, agriculture, forestry, paper production, food processing, manufacturing, health, education and services. As the regional centre for Gippsland, Latrobe City is also home to a number of service providers and government agencies.⁴

3.1.3 Climate

The regional climate is considered temperate⁵. In the Latrobe Valley, February is the warmest month with an average temperature range of 12.9 to 26.7°C. The coldest month is July, with an average temperature range of 3.7 to 13.6°C. Most rain occurs in late winter and spring, and average yearly rainfall is in the area is 735 mm.⁶

³“Hazelwood Mine Fire Inquiry Report 2015/16 Volume 4 – Mine Rehabilitation”, Board of Inquiry Hazelwood Mine Fire Inquiry, April 2016, page 27

⁴“Hazelwood Mine Fire Inquiry Report 2015/16 – Volume IV – Mine Rehabilitation”, Hazelwood Mine Fire Inquiry, April 2016, <http://hazelwoodinquiry.vic.gov.au/201516-report/volume-iv-mine-rehabilitation/index.html>, page 28

⁵ Under the Koppen-Geiger climate classification scheme.

⁶ Bureau of Meteorology – Climate data online for Station 085280, accessed October 2019

3.2 Aboriginal and non-Aboriginal Cultural Heritage

Aboriginal and non-Aboriginal Cultural Heritage receptors identified in the Latrobe Valley include:

- Aboriginal Cultural Heritage – Aboriginal Places are recorded in all three mine licence areas. A number of archaeological assessments have been undertaken for Loy Yang, Hazelwood and Yallourn coal mines. There are over 360 registered cultural heritage places (Aboriginal Places) recorded within the region broadly encompassing the three coal mines.⁷ These comprise artefact scatters, scarred trees, archaeological deposits and low-density artefact distributions. For the purposes of this study, Aboriginal cultural heritage has been divided into a further two receptor sub-categories:
 - Intangible cultural heritage receptors (to be determined through consultation with GLaWAC); and
 - Tangible cultural heritage receptors.
- 'Non-aboriginal' Cultural Heritage – Over 150 non-Aboriginal cultural heritage sites are listed on the Latrobe Valley Heritage Overlay⁸, Victorian Heritage Register, and Victorian Heritage Inventory (archaeological) in the Latrobe Valley area. These include homestead and other rural occupation sites, residences, school, churches and other township buildings, and some early mining sites. The Latrobe City Heritage Study⁹ identified 152 individual historical heritage places of local significance, 14 heritage precincts, six Victorian Heritage Register places of state significance, 38 places of potential significance to be further investigated, and nine historical heritage places related to electricity generation.

Subsequent work by GLaWAC and the DELWP Aboriginal Water Unit will provide additional information relating to the Aboriginal cultural heritage values relevant to rehabilitation of the Latrobe Valley coal mines in a regional context.

3.3 Environment

Environment receptors identified in the Latrobe Valley include:

- Rivers, Waterways and Natural Lakes – The Latrobe and Morwell Rivers pass through the Latrobe Valley. Latrobe River originates on the Mount Baw Baw Plateau and passes through relatively flat plains towards Lake Wellington¹⁰. It is fed by notable tributaries including Tanjil River, Tyers River, Thomson River and Rintoul's Creek. Many waterways in the region away from uncleared areas are stressed, with sites on the Latrobe River downstream of Blue Rock Reservoir in poor or very poor condition¹¹. Morwell River on the other hand, is unregulated with sections closer to mines highly modified¹². The focus of this report is on the water resources of the Latrobe Valley, as these water resources are part of the broader water resources¹³ of the:
 - Gippsland groundwater basin (approximately 46,000 km²); and
 - Latrobe River catchment (approximately 4,680 km²).
- Terrestrial habitats – There are four *Environment Protection and Biodiversity Conservation Act 1999* listed ecological communities in the Gippsland Basin bioregion and three are critically endangered (e.g. Gippsland Red Gum Grassy Woodland).
- Listed species – There are approximately 115 flora and fauna species listed under *Environment Protection and Biodiversity Conservation Act 1999* with their terrestrial habitats within the Gippsland Bioregion

⁷Victorian Aboriginal Heritage Register, Aboriginal Affairs, <https://applications.vic.gov.au/apps/achris/public/public-registry/home>

⁸ Searches of heritage register data undertaken on Victorian Government Hermes Interactive Map online <http://services.land.vic.gov.au/maps/hermes.jsp> on 23 November 2016 by Jacobs.

⁹*Latrobe City Heritage Study – Volume 3: Heritage place and precinct citations, amendments C14*, Latrobe City Council – prepared by Context, 2010, http://www.latrobe.vic.gov.au/Building_and_Planning/Planning/Heritage

¹⁰ *Seasonal Watering Plan 2018-2019*. Victorian Environmental Water Holder. http://www.vewh.vic.gov.au/_data/assets/pdf_file/0006/505275/Seasonal-Water-Plan-2018-web.pdf

¹¹ *Index of Stream Condition: The third benchmark of Victorian river condition (2004-2019)*. Department of Primary Industries and Environment.

¹² *Gippsland Region Sustainable Water Strategy (2011)* Department of Sustainability and Environment. https://www.water.vic.gov.au/_data/assets/pdf_file/0026/52883/DSE_GRWS_accessible_linked.pdf

¹³ "Review of baseline data on water resources in the Latrobe Valley" – DEWLP 2017

- Water Dependent Habitats for listed species – In addition to terrestrial habitats, the Gippsland Bioregion also comprises 55 water-dependent habitats of marine, intertidal and migratory bird species. Furthermore, of the 3,187 vegetation assets of the Gippsland Bioregion listed in the *Environment Protection and Biodiversity Conservation Act 1999*, 962 are considered Groundwater Dependent Ecosystems (i.e. groundwater-dependent habitats) by the National Atlas of Groundwater Ecosystems.
- Wetlands – There are approximately 8,350 wetlands that have been classified in the Gippsland Basin bioregion.¹⁴ Many parts of the Gippsland Lakes, including Lake Wellington, are recognised as wetlands of international significance under the Ramsar Convention on Wetlands.

3.4 Infrastructure

Infrastructure receptors identified in the Latrobe Valley include:

- Airports – The Latrobe Regional Airport has two runways and a commercial-industrial precinct with direct taxiway access to the main runway. It is located approximately 500m north-west of the Princes and the Gippsland Railway.
- Alternate energy sources – There is no alternate energy generation currently being conducted in the Latrobe Valley, however the region has a unique infrastructure network and industrialised background that may lend itself to future investment in solar, wind, biofuel generation and waste to energy generation.
- Bridges – There are a variety of different types of bridges in the region. Some of these have shallow footings and are founded in soil or have distributed foundations; others are substantial structures that have piles or other deep foundations. These structures are different to culverts or small-scale drainage features, which are not considered as valued and so are excluded.
- Electricity Transmission Network – There is a high voltage 500kV transmission line located to the south of the Hazelwood Power Station and mine and a high voltage 500kV transmission line running north between Morwell and Traralgon. High voltage networks connect Yallourn Power Station, Hazelwood Power Station and Loy Yang Power Station. These assets are owned by AusNet.
- Extractive Industries – In addition to open-cut excavation of brown coal reserves, the Latrobe Valley has a number of smaller-scale extractive industries including aggregate, crushed rock, and fertiliser dust quarries.
- Gas and liquid pipelines - APA Group and Esso Australia Resources operate gas transmission/distribution pipelines in the Latrobe Valley. CarbonNet propose construction of a pressurised pipeline for CO₂ sequestration and transfer to an offshore injection at geological storage site(s) in Bass Strait.
- Industry and Manufacturing – The Latrobe Valley has strong industrial capabilities and may attract future investment in logistics and manufacturing (e.g. existing industrial use zones in Traralgon and Morwell).
- Power Generation – The majority of Victoria's electricity is presently generated from Loy Yang and Yallourn. Jeeralang Power Station is a 450MW gas turbine power station located 6km south of Morwell which is used exclusively as a peaking facility.
- Rail – VLine operates the train route from Melbourne to Bairnsdale which passes in close proximity to Yallourn's mining licence boundary.
- Road – Freeway/State Maintained – There are numerous arterial roads and freeways that are managed by VicRoads including Hyland Highway, Princes Highway and Strzelecki Highway. The proposed Traralgon Bypass may be located between Loy Yang and Traralgon.
- Road – Local Council - Roads which are the responsibility of the local council to maintain are included in this category (e.g. Latrobe Road). In some cases, this includes road reserves that are not currently open to the public.
- Telecommunications – The Latrobe Valley has a broad array of telecommunications infrastructure (public-switched telephone network, fixed-line network cables and infrastructure).

¹⁴ Context Statement for the Gippsland Basin Bioregion, Australian Government, 2015, <https://www.bioregionalassessments.gov.au/assessments/11-context-statement-gippsland-basin-bioregion/1171-ecological-systems>

3.5 Land

Land receptors identified in the Latrobe Valley include:

- Agriculture – Intensive agriculture and horticulture, irrigated agriculture and horticulture, primary production support infrastructure, dairying, grazing and cropping. Agriculture in the area immediately surrounding the coal mines include grazing, dairying and some cropping.
- Coal reserves – Approximately 50 per cent of the Latrobe Valley's estimated 65 billion tonnes of brown coal reserves have been identified as 'potentially economic'.
- Forestry Plantations – Currently timber production is a key land use in and around the coal mines. Large timber plantations are located to the west of the Hazelwood coal mine and immediately south of the Yallourn coal mine. Significant plantations exist on adjoining land immediately to the east of the Yallourn coal mine between the mine and Australian Paper's Maryvale paper mill. Further plantations exist to the south and east of the Maryvale paper mill. Plantations adjoin land to the south and east of Loy Yang's external overburden dump.
- Protected Public Land – Crown land occurs in small parcels, streamside reserves and plantations. The Latrobe Valley has national (e.g. West Gippsland Catchment) and state parks (e.g. Tyers Park).
- Recreation – Recreational activities include fishing and hunting. There are 92 recreation areas related to water in the Latrobe Basin.
- Townships/Settlements – The community of the Latrobe Valley is spread across the numerous regional centres and rural townships (e.g. Moe, Yallourn North, Morwell and Traralgon) and farm holdings. The largest townships are Traralgon, Moe, Newborough, Yallourn North and Morwell which, with Churchill, collectively form the "Latrobe City". Current population is just above 75,000 people with more than 95% centred in the Latrobe City. Some parts of the region are zoned residential but are not currently developed and these potential features will be considered.
- Waste Management – The Latrobe Valley has a municipal landfill located south of the Loy Yang Mine and various transfer stations for waste separation and recycling purposes. Due to the Latrobe Valley's large and existing industrial use zones, the region may lend itself to future waste processing, recycling and/or compositing facilities.

3.6 Water

Water receptors identified in the Latrobe Valley include:

- Aquifers and Groundwater Use – Three regional hydrogeological systems (i.e. near-surface shallow aquifer, Morwell Formation aquifer, and Traralgon Formation aquifer) underlie the Latrobe Valley region and groundwater is abstracted for varying uses. Certain areas of each aquifer are assigned in Groundwater Management Areas. The abstraction and use of groundwater for public purposes (i.e. pumping of town water-supply bores) or private use (e.g. irrigation) is regulated by Southern Rural Water.
- Dams, Artificial Lakes and Reservoirs – Significant amounts of water for residential, industrial, irrigation and commercial use (involving some 65,000 properties in the Latrobe Valley), is sourced from water storages in the region, namely Lake Narracan and Blue Rock, Moondarra and Buckley's Hill reservoirs. Furthermore, a number of water storages for industrial purposes are associated with the open-cut mining and power generation operations, namely Hazelwood Pondage and Loy Yang High Water Level Storage.
- Drains – A network of storm-water infrastructure underlies the Latrobe Valley. Specifically, the Morwell Main Drain, which was constructed in the 1950's and re-aligned in the 1970's, collects run-off from parts of Morwell and industrial areas north-east of the Hazelwood Mine, the Princes Freeway, and a small amount of run-off from the Hazelwood Mine and conveys water to wetlands adjacent to the Morwell River. The Morwell West drain collects stormwater from the west area of the township and transfers water via an open channel along the eastern margin of Yallourn mine to the Latrobe River.

- Fisheries – Recreational and commercial fish stocks are throughout the Latrobe River catchment (e.g. Gippsland Lakes) and the adjacent near shore and off-shore marine environments. Fisheries include prawn, scallop and vertebrate fish¹⁵.
- Water Delivery Infrastructure – Water for potable, irrigation and recycled purposes is delivered across the Latrobe Valley via a network of above and below ground water delivery infrastructure. The water delivery network is inclusive of private/public groundwater bores, pipelines and storage tanks for irrigation and potable purposes. Recycled water is produced via treatment of wastewater at the Gippsland Water Factory and delivered to the Australian Paper Mill in Maryvale for industrial use.
- Wastewater Infrastructure – Wastewater (i.e. sewage) generated in the Latrobe Valley (namely Traralgon, Morwell, Moe, Newborough and Churchill) is delivered via a network of above and below ground sewerage infrastructure and processed at three water treatment plants located at Moe, Morwell and the Gippsland Water Factory.
- Water rights and entitlement holders for consumptive uses – Water rights holders and entitlement holders exist throughout the catchment area.
- Water Supply Catchment (Surface Water) – Within the Latrobe Valley are two Declared Water Supply Catchments – Billy’s Creek Catchment (total catchment area of approximately 20 km²) and Merriman’s Creek Catchment (total catchment area of approximately 544 km²). The catchments cumulatively form the potable water supply for Seaspray and the regions between these townships.
- Environmental Water Reserve. Key components of the Environmental Water Resource include passing flows, Environmental Entitlements, and above-cap water.
 - Passing flows are water that is released from storages (such as reservoirs) to operate river and water distribution systems. Passing flows help maintain environmental values and other community benefits.
 - There are two Environmental Entitlements in the Latrobe River system which are held by the Victorian Environmental Water Holder (VEWH). The Minister for Water issues environmental entitlements under the Act so that water can be managed to meet needs like fish spawning triggers or to maintain critical habitats during drought.
 - Above cap water is the water which is left over after passing flows have been met and all take under an entitlement or right has been extracted. In unregulated systems, this is most of the flow in the river that remains after water users have extracted water available under their entitlements or right. In regulated systems this is the flow in the river which is not allocated under entitlements and is not meeting a requirement downstream. This may occur when storages spill and there is not sufficient airspace in storages or consumptive demand downstream to make use of this water.

¹⁵ It is noted that the Hazelwood Cooling Pond contained Barramundi for a while during the preparation of this report.

4. Recognised Regional Receptors

This section lists the Latrobe Valley’s recognised regional receptors by identifying those listed in public documents as described in Section 0. The recognised regional receptors, as listed in Table 4-1 to Table 4-5, are a subset of the receptor inventory presented in Section 3. Refer to Appendix F for more detail.

4.1 Aboriginal and non-Aboriginal Cultural Heritage

Table 4-1 - List of Recognised Regional Receptors – Aboriginal and non-Aboriginal Cultural Heritage

Sub-Categories	List of Recognised Regional Receptors
Aboriginal cultural heritage	Tangible <ul style="list-style-type: none"> • 360 Aboriginal Places recorded in Latrobe Valley including along Morwell River • Aboriginal Places are recorded in all three mine licence areas • Broader/regional values including intangible and cultural values of the area Intangible <ul style="list-style-type: none"> • Aboriginal cultural significant attached to water places and form • Post-European settlement water flow and availability patterns that support specific social activities
non-Aboriginal cultural heritage	<ul style="list-style-type: none"> • 14 heritage precincts • 152 individual historical heritage places of local significance • 38 places of potential significance to be further investigated • 6 Victorian Heritage Register places of state significance • Arva • Australian Paper Mill (APM Staff House 2, APM Staff Housing group, APM Staff House 3, APM Staff House 1) • Burn Brae • Cairnbrook Farm Complex • Eastern Railway Line • Gormandale Cooperative Creamery and Butter Building (former) • Hazelwood Open Cut • Hazelwood Power Station • Horseshoe Vale Homestead • Hoyles Residence (former) • Lilitree • Loy Yang Open Cut (upon closure) • Morwell National Park (original) • Morwell Open Cut • Morwell Power Station • St Marks Anglican Church • Star Hotel (former) • The Great Morwell Brown Coal Mine • Traralgon Courthouse and Post Office • Traralgon Hotel • Traralgon Park Homestead • Yallourn North Extension Open Cut • Yallourn North Open Cut • Yallourn Open Cut (upon closure) • Yinnar Butter Factory (former)

4.2 Environment

Table 4-2 – List of Recognised Regional Receptors - Environment

Sub-Categories	List of Recognised Regional Receptors
Listed species¹⁶	<ul style="list-style-type: none"> • Bird species (Musk Duck, Powerful Owl and Eastern Great Egret) • Gippsland Dolphin • Fish species (Australian Grayling and Eastern Dwarf Galaxias) • Frog species (Growling Grass Frog, Bell Frog, Burrowing Frog and Spotted Tree Frog) • Invertebrates (Giant Gippsland Earthworm) • Mammals (Australian Fur Seal, Blue Whale, Grey-headed flying fox, Long-footed potoroo, Humpback Whale and Southern Right Whale) • Plant species/aquatic flora (Matted Flax Lilly, Strzelecki Gum, Aniseed Boronia, Dwarf Kerrawang, Leafy Greenhood, Maroon Leak-orchid, River Swamp Wallaby-grass Swamp Everlasting and Swamp Greenhood) • Reptiles (Leatherback Turtle) • 55 bird habitats (marine/intertidal/migratory e.g. Eastern Great Egret)
Rivers, waterways and natural lakes	<ul style="list-style-type: none"> • Morwell River Yallourn to the east • Latrobe River Yallourn to the north and lower reaches • Tanjil River (feed to Latrobe River) (Declared Water Supply Catchment) • Tyers River (feed to Latrobe River) (Declared Water Supply Catchment) • Rintoul's Creek (feed to Latrobe River) • Traralgon Creek (near Loy Yang) • Flynn's Creek (near Loy Yang) • Bennett's Creek • Lake Wellington • Lake Victoria • Sheepwash Creek (near Loy Yang)
Terrestrial habitats	<ul style="list-style-type: none"> • Native vegetation in West Gippsland Catchment • Four threatened ecological communities in the Gippsland Basin (Gippsland Red Gum grassy woodland, Littoral Rainforest and Coastal Vine Thicket, Seasonal Herbaceous wetlands, and White Yellow-Box grassy woodland) • Gippsland Red Gum Community
Water-Dependent Habitats	<ul style="list-style-type: none"> • Groundwater Dependent Ecosystems – specific habitats and aquatic flora which are groundwater-dependant, such as wetlands as defined by the GDE atlas
Wetlands	<ul style="list-style-type: none"> • Gippsland Lakes Ramsar Site • 24 water dependent wetlands in the Gippsland Basin (excluding Lake Victoria and Lake Wellington) • Lake Wellington Wetlands • Lake Victoria Wetlands • Morwell River Wetlands bordering Yallourn • Lower Latrobe Wetlands (Sale Common, Dowd Morass, Heart Morass)

¹⁶ As strictly specified under *Environment Protection and Biodiversity Conservation Act 1999*.

4.3 Infrastructure

Table 4-3 – List of Recognised Regional Receptors - Infrastructure

Sub-Categories	List of Recognised Regional Receptors
Airports	<ul style="list-style-type: none"> Latrobe Regional Airport
Alternate Energy Sources	<ul style="list-style-type: none"> Future biofuels facility for the processing of agricultural or timber residuals located in the mine scale or inter-mine scale Future waste to energy facility located in the mine scale or inter-mine scale
Bridges	<ul style="list-style-type: none"> Any structure that supports a road or pedestrian crossing, other than a culvert crossing
Coal Fired Power Generation	<ul style="list-style-type: none"> Loy Yang Power Station Yallourn Power Station Carbon Capture Storage Site Yallourn North mine void and rehabilitated land
Gas Fired Power Station	<ul style="list-style-type: none"> Jeeralang Power Station
Electricity Transmission Network	<ul style="list-style-type: none"> High voltage (500 - 220kV) networks connect Yallourn Power Station, Hazelwood Power Station and Loy Yang Power Station to the national grid A 500kV transmission line is located to the south of the Hazelwood Power Station and mine (running to Cranbourne) with another 500kV transmission line running north between Morwell and Traralgon (running to South Morang).
Extractive Industry¹⁷	<ul style="list-style-type: none"> Yallourn North quarry Operating coal mines Yallourn Operating coal mine Loy Yang
Gas and liquid pipelines	<ul style="list-style-type: none"> APA VTS Australia Pipeline Australian Gas Networks Pipeline Energy Australia (Yallourn) Pipeline Esso Australia Resources Pipeline Proposed CarbonNet CO₂ Pipeline
Industry and Manufacturing	<ul style="list-style-type: none"> Future logistics and manufacturing (undertaken in existing industrial use zones in Traralgon and Morwell)
Rail	<ul style="list-style-type: none"> Melbourne to Traralgon Line (adjacent to Yallourn and past Morwell)
Road – Freeway/State Maintained	<ul style="list-style-type: none"> Princes Freeway (Southern urban boundary of Morwell and the northern boundary of the Hazelwood coal mine) Proposed Traralgon Bypass (between Loy Yang and Traralgon) Hyland Highway (adjacent to Loy Yang) Strzelecki Highway (adjacent to Hazelwood)
Road – Local Council maintained	<ul style="list-style-type: none"> All roads that are maintained by Latrobe City Council (e.g. Latrobe Road adjacent to Yallourn)
Tele-communications	<ul style="list-style-type: none"> Base Stations and network cables located in the zone between Hazelwood and Yallourn (other base stations and cables will exist but could not be positively located by this study. The corridor listed here is considered the area of focus, but should further LVRRS studies identify additional areas of concern this may need to be added)

¹⁷ It is noted that the Hazelwood Open Cut and Hazelwood Power Station exist at the time preparing the Recognised Receptor Report. The Hazelwood Open Cut and Power Station are being decommissioned. The Open Cut is proposed to be replaced by a mine void waterbody. Therefore the Power Station and Mine Void are not considered receptors.

4.4 Land

Table 4-4 – List of Recognised Regional Receptors - Land

Sub-Categories	List of Recognised Regional Receptors
Coal Reserve	<ul style="list-style-type: none"> Coal Reserves/coalfields - Driffield East, Churchill, Churchill North, Loy Yang East, Coalville (black coal), Corridor, Driffield, Maryvale East, Fernbank, Flynn, Gormandale, Hazelwood (remaining resource), Latrobe River, Morwell Township, Rosedale, Tyres, Traralgon Creek, Yinnar
Cropping	<ul style="list-style-type: none"> Cropping
Dairying	<ul style="list-style-type: none"> Dairying
Forestry plantations	<ul style="list-style-type: none"> Timber production and plantations
Grazing	<ul style="list-style-type: none"> Grazing
Intensive agriculture	<ul style="list-style-type: none"> Future intensive agricultural activities (such as broiler farms or piggeries) Intensive Agriculture Potential future intensive agriculture such as non soil based vegetable herb growing (in greenhouses) located in close proximity mine void waterbodies Potential future processing of vegetables located in close proximity to mine void waterbodies
Irrigated agriculture and horticulture	<ul style="list-style-type: none"> Irrigated agriculture and horticulture
Multiple use public	<ul style="list-style-type: none"> Potential future tourism (arts and culture) and recreation (bike paths) at Yallourn, Hazelwood, Loy Yang
Primary production support infrastructure	<ul style="list-style-type: none"> Future non soil based vegetable herb growing (in greenhouses) located in close proximity to proposed mine void waterbody (lightweight structure) Future processing of vegetables in the mine scale or inter-mine scale
Protected public land	<ul style="list-style-type: none"> National Parks in West Gippsland Catchment Moondarra State Park Tyers Park Woorabinda Education Area Traralgon South Flora and Fauna Reserve Coalville G219 Bushland Reserve Sayers Trig Bushland Reserve Jeeralang North Education Area Gormandale Flora Reserve Narracan State Forest Current Tenements – Extractives, Exploration, Prospecting, Petroleum, Geothermal, Retention Licences, Mining Licences
Recreation	<ul style="list-style-type: none"> 92 recreation areas related to water in the Gippsland Basin Fishing and hunting
Specialist Facilities	<ul style="list-style-type: none"> Potential future education and training facilities (relating to land rehabilitation, mining, environmental science and clean energy technologies) located in close proximity to the potential mine void waterbodies
Townships/ Settlements	<ul style="list-style-type: none"> Southern urban area of Morwell (existing urban areas, proposed future residential and existing residential opportunity) Urban buffer between Yallourn coal mine and Morwell which includes open space and existing urban areas Traralgon, Morwell, Yallourn North, Moe, Churchill, Newborough inclusive of zones: <ul style="list-style-type: none"> Central Business District/Activity Centre Existing urban areas, future urban use Existing industrial areas, future industrial, future bulky goods Proposed public Open Space, Existing Open Space, Amenity Lifestyle Precinct Proposed urban land north of the Loy Yang Mine Other proposed urban land types that are included as proposed in the municipal planning schemes

Sub-Categories	List of Recognised Regional Receptors
Waste management	<ul style="list-style-type: none"> • Potential future waste process such as organics recycling and composting facility located in close proximity of the potential mine void waterbodies

4.5 Water

Table 4-5 – List of Recognised Regional Receptors - Water

Sub-Categories	List of Recognised Regional Receptors
Aquifers and Groundwater Use	<ul style="list-style-type: none"> • Near-surface shallow aquifer system • The Morwell Formation aquifer system • The Traralgon Formation aquifer system • Moe Groundwater Management Area • Rosedale Groundwater Management Areas – Zone 1 and 2 • Stratford Groundwater Management Areas – Zone 1 and 2 • Sale Water Supply Protection Area
Dams, artificial lakes & reservoirs	<ul style="list-style-type: none"> • Lake Narracan • Blue Rock Reservoir • Buckley’s Hill Reservoir • Hazelwood Pondage • Yallourn North Extension Open Cut pit lake • Loy Yang High Water Level Storage • Moondarra Reservoir • Rehabilitated Mine Void Waterbodies • Ridge basin • Pine Gully Reservoir • ROS (regional Outfall System) and SWOP (Saline water outfall pipeline)
Drains	<ul style="list-style-type: none"> • Morwell Main Drain • Drains associated with railway line and embankment
Fisheries	<ul style="list-style-type: none"> • Gippsland Lakes Fishery
Water Delivery Infrastructure	<ul style="list-style-type: none"> • Gippsland Water Factory – recycled water production • Irrigation Infrastructure (bores, pipes etc.) – Public and Privately owned • Potable Infrastructure (pipes and tanks etc.) – Public and Privately owned • Town water bores
Wastewater Infrastructure	<ul style="list-style-type: none"> • Moe and Morwell Waste Water Treatment Plant Township Sewerage Infrastructure (Traralgon, Morwell, Moe, Newborough, Churchill) • Gippsland Water Factory – water treatment
Water Rights and Entitlement Holders	<ul style="list-style-type: none"> • Water rights and entitlement holders as listed in the Victorian Water Register (this includes Environment Entitlements but see below for Environmental Water Reserve) • Riparian right holders
Water supply catchment	<ul style="list-style-type: none"> • Merriman’s Creek (Seaspray) (Declared Water Supply Catchment) • Billy’s Creek (Declared Water Supply Catchment)
Environmental Water Reserve	<ul style="list-style-type: none"> • Including passing flows, Environmental Entitlements, and above cap water.

5. Recognised Regional Receptors – Quantitative Assessment

The receptors identified for quantitative assessment in this section are a subset of the recognised regional receptors listed in Section 4 and Appendix F.

Receptors were identified for quantitative analysis that met the following criteria:

- The receptors were assessed as having a likely causal pathway with one, two or more mine void waterbodies (i.e. a potential cumulative impact); and
- The receptor is assessed as having a reasonable potential for a material impact from regional rehabilitation.

Refer to Appendix E for an overview of the recognised regional receptors to be quantitatively assessed.

5.1 Aboriginal and non-Aboriginal Cultural Heritage

Table 5-1 – Aboriginal and non-Aboriginal Heritage Receptors

Sub-Category	Receptor	Rationale for quantification
Aboriginal cultural heritage	<ul style="list-style-type: none"> • Over 360 Aboriginal Places (tangible values) recorded within the Latrobe Valley • Tangible cultural heritage receptors cannot be specifically detailed due to the confidentiality associated with these sacred sites, however comprise the following site types: <ul style="list-style-type: none"> • Artefact scatters • Earth features • Scarred trees • Quarries • Broader/regional values including the intangible values (cultural values) of the area. 	<p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> • Two or more mines being rehabilitated. Further investigation and consultation with the relevant Registered Aboriginal Party (RAP) would be required to determine the extent of potential impact. <p><i>Due to level of uncertainty, receptors are proposed to be quantified</i></p> <p>Additional work by Traditional Owners to identify specific receptors for quantitative assessment to be conducted as part of the LVRRS</p>

5.2 Environment

Table 5-2 – Environment Receptors

Sub-Category	Receptors	Rationale for quantification
Rivers, waterways and natural lakes	<ul style="list-style-type: none"> • Morwell River Yallourn to the east and adjacent to Hazelwood mine • Latrobe River Yallourn to the north and lower reaches • Tanjil River (feed to Latrobe River) (Declared Water Supply Catchment) • Tyers River (feed to Latrobe River) (Declared Water Supply Catchment) • Traralgon Creek (near Loy Yang) • Flynns Creek (near Loy Yang) • Sheepwash Creek (near Loy Yang) • Bennett’s Creek • Lake Wellington • Lake Victoria 	<p>Receptors materially linked due to:</p> <ul style="list-style-type: none"> • Close proximity - Rivers and waterways are adjacent to potential mine void waterbodies. • Groundwater and surface water interactions. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> • Altered flow rates and runoff volumes • Flooding events • Changes in water quality •

Sub-Category	Receptors	Rationale for quantification
	<p>Note quantification assessment includes:</p> <ul style="list-style-type: none"> Merriman's Creek (Seaspray) (Declared Water Supply Catchment) Billy's Creek (Declared Water Supply Catchment) 	
Listed Species	<ul style="list-style-type: none"> Fish (Australian Grayling, Eastern Dwarf Galaxias) Frogs (Bell Frog, Growling Grass Frog, Burrowing Frog, Spotted Tree Frog) Birds (Musk Duck, Eastern Great Egret) 	<p>Receptors materially linked due to:</p> <ul style="list-style-type: none"> Species that have habitats in wetlands (including floodplain wetlands) closer to the mine. Less likely with increasing distance and wetland volume. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Disruption to flows (wetland/river connectivity and flow) Changes in temperature regimes Changes in water quality (potential for increased nutrient and sediment loads) Changes in water quantity Potential competition and predation from introduced fish species such as trout <p><i>Due to level of uncertainty, impacts on these receptors are proposed to be quantified</i></p>
Wetlands	<ul style="list-style-type: none"> Lower Latrobe Wetlands (Sale Common, Dowd Morass, Heart Morass) Gippsland Lakes Ramsar site(s) inclusive of Lake Wellington and Lake Victoria Wetlands Morwell River Wetlands bordering Yallourn 	<p>Receptors materially linked due to:</p> <ul style="list-style-type: none"> Connection to rivers and waterways with changes in water quality and quantity lead to associated impact on wetland water levels and water regime, water quality, algal bloom risk, supported habitat and species <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Changes to water quality, flows, sediment transport Linkage and impact less likely with increasing distance and wetland volume. For example, unlikely to materially affect entire Gippsland Lakes site.

5.3 Infrastructure

Table 5-3 – Infrastructure Receptors

Sub-Category	Receptors	Rationale for quantification
Bridges	<ul style="list-style-type: none"> All bridges on roads in the inter-mine area. This excludes culverts. 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/rebound resulting from mine void water filling, potentially resulting in heave, cracking <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability damage or failure. Foundation and footing design will have assumed certain ground movement conditions that could be significantly altered by mine void waterbody development.

Sub-Category	Receptors	Rationale for quantification
Electricity Transmission Network	<ul style="list-style-type: none"> High Voltage Transmission Line – South of Hazelwood High Voltage Transmission Line – Morwell to Traralgon 	<p>Receptors materially linked due to:</p> <ul style="list-style-type: none"> Potential for ground movement caused by subsidence/rebound resulting from mine void filling. Clear pathway from large scale failures of mine void pit walls <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Extractive Industry	<ul style="list-style-type: none"> Operating coal mines Yallourn Operating coal mines Loy Yang Yallourn North mine void 	<p>Receptors materially linked due to:</p> <ul style="list-style-type: none"> Groundwater levels rising due to mines ceasing de-watering <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Gas Fired Power Generation	<ul style="list-style-type: none"> Jeeralang Power Station 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/rebound resulting from mine void filling. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Gas and liquid pipelines	<ul style="list-style-type: none"> APA VTS Australia Pipeline Australian Gas Networks Pipeline Energy Australia (Yallourn) Pipeline Esso Australia Resources Pipeline Proposed CarbonNet CO₂ Pipeline 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/rebound resulting from mine void filling, resulting in heave, cracking Long term ground stress relief to the rehabilitated mine void has a realistic probability of affecting the receptor. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Rail	<ul style="list-style-type: none"> Melbourne to Traralgon (adjacent to Yallourn and past Morwell) 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/rebound resulting from mine void filling, resulting in heave, cracking Long term ground stress relief to the rehabilitated mine void has a realistic probability of affecting the receptor. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Road – Freeway/State maintained	<ul style="list-style-type: none"> Princes Highway (southern urban boundary of Morwell and northern boundary of Hazelwood to Yallourn mine) Strzelecki Highway (adjacent to Hazelwood) Proposed Traralgon Bypass (between Loy Yang and Traralgon) Hyland Highway (adjacent to Loy Yang) 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/rebound resulting from mine void filling, resulting in heave, cracking Long term ground stress relief to the rehabilitated mine void has a realistic probability of affecting the receptor. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Road – Local Council maintained	<ul style="list-style-type: none"> Latrobe Road (adjacent to Yallourn) 	

Sub-Category	Receptors	Rationale for quantification
Telecommunications	<ul style="list-style-type: none"> Telecommunications Infrastructure (e.g. base stations) 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/rebound resulting from mine void filling, resulting in heave, cracking <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability

5.4 Land

Table 5-4 – Land receptors

Sub-Category	Receptors	Rationale for quantification
Townships/ Settlements	<ul style="list-style-type: none"> Southern urban boundary of Morwell (zoned General Residential) Urban buffer between Yallourn coal mine and Morwell which includes open space and existing urban areas Current and proposed future land south of Traralgon and north of the Loy Yang mine 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Inter-mine area is vulnerable to ground movement caused by subsidence/settlement rebound resulting from mine void filling, resulting in heave, cracking and seismic movement <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability The issue to be tested is the effect of ground movement on standard residential and commercial design based on current design and building codes. Some aspect will need to consider the changed standards over time and whether specific areas are at risk.
Irrigated agriculture and horticulture	<ul style="list-style-type: none"> Irrigated agriculture and horticulture 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Potential for water take to affect reliability or access to entitlement. Changes in water quality (potential for increased nutrient and sediment loads) See also sub-category - Water rights and entitlement holders.
Dairying	<ul style="list-style-type: none"> Dairying 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Potential for water take to affect reliability or access to entitlement. Changes in water quality (potential for increased nutrient and sediment loads) See also sub-category - Water rights and entitlement holders.

5.5 Water

Figure 5.1 illustrates the location of the Latrobe River basin. For the LVRRS, the impacts are most likely to be downstream of the major storages (Moondarra and Blue Rock reservoirs and Lake Narracan). As such, the focus is not on the National Park areas and other upper reaches of the catchment.

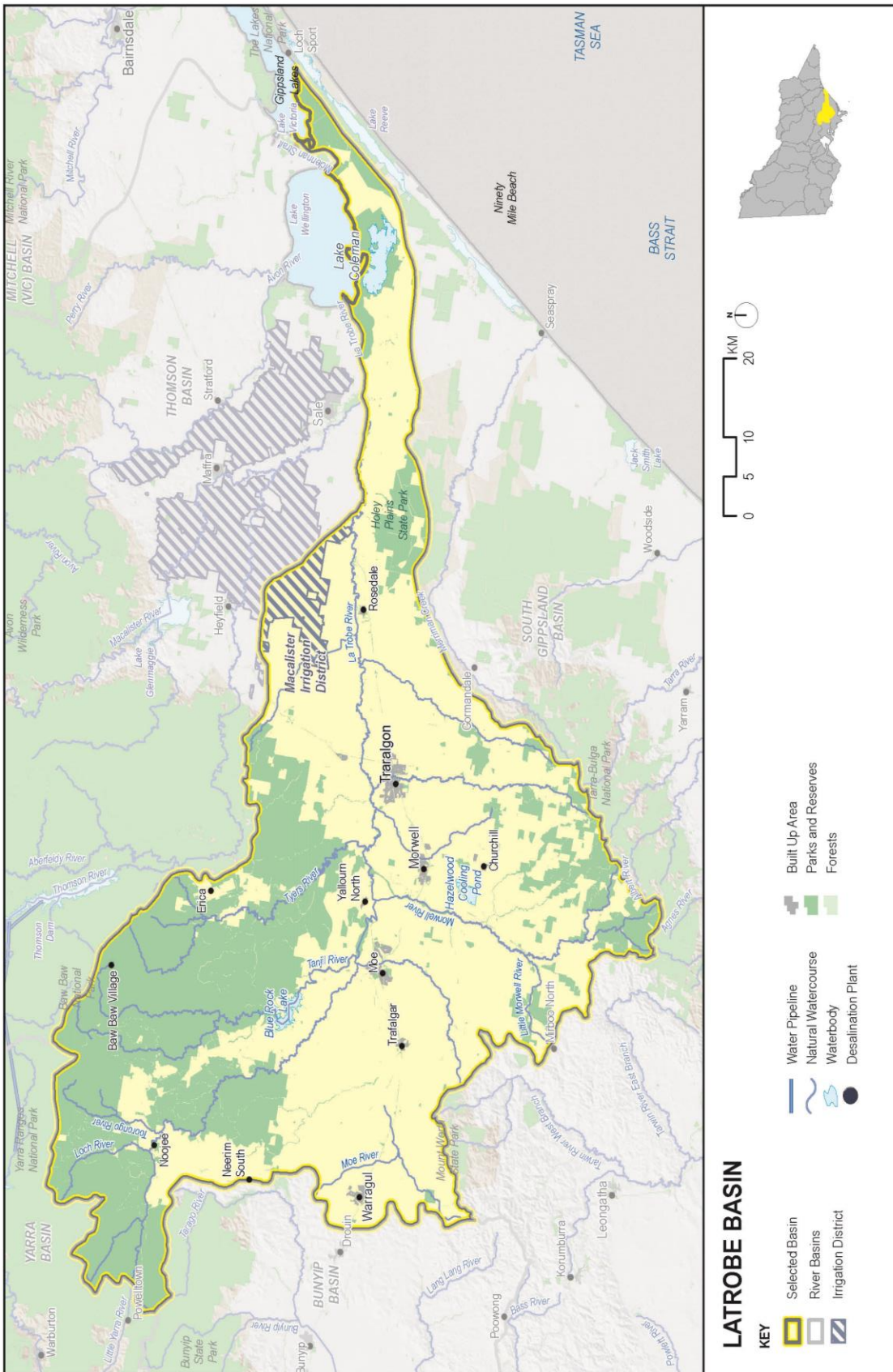


Figure 5.1 – Location of the Latrobe River Basin¹⁸ (note the relevant groundwater aquifer is more extensive than the surface water catchment shown here).

¹⁸ Source: Department of Environment, Land, Water and Planning

Table 5-5 – Water Receptors

Sub-Category	Receptors	Rationale for quantification
Aquifers and Groundwater Use	<ul style="list-style-type: none"> Near-surface shallow aquifer system The Morwell Formation aquifer system The Traralgon Formation aquifer system Moe Groundwater Management Area <p>Note quantification assessment includes:</p> <ul style="list-style-type: none"> Rosedale Groundwater Management Areas - Zone 1 and 2 Stratford Groundwater Management Areas - Zone 1 and 2. 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Directly linked to mine operations. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Altered groundwater levels/pressures/elevations Changes in water quality Some degree of beneficial effect is possible and needs to be considered in materiality.
Dams, artificial lakes and reservoirs	<ul style="list-style-type: none"> Buckley's Hill Reservoir Rehabilitated Mine Void Waterbodies Lake Narracan Blue Rock Reservoir Moondarra Reservoir 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Potential for water take and use to affect available water for these receptors. Also potential for ground movement to affect stability of structures. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability Potentially reduced water availability Potential for changes to recreational patterns at Lake Narracan depending on its operation.
Drains	<ul style="list-style-type: none"> Morwell Main Drain 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Possible pathway through block failure. Potential for ground movement caused by subsidence/rebound resulting from mine void filling to change drainage direction. Located within the inter-mine scale <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Potential increased risk of instability
Water Rights and Entitlement Holders	<ul style="list-style-type: none"> Water Entitlement Holders as listed in the Victorian Water Register (this includes Environment Entitlements but see below for Environmental Water Reserve) Riparian rights holders 	<p>Receptor materially linked due to:</p> <ul style="list-style-type: none"> Potential for water take to affect reliability or access to entitlement. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Changed flows in the Latrobe River system
Environmental Water Reserve	<ul style="list-style-type: none"> Including passing flows, Environmental Entitlements, and above cap water¹⁹ 	<p>Receptor Materially Linked due to:</p> <ul style="list-style-type: none"> Potential for water take to affect amount of water within the Environmental Water Reserve and reliability of Environmental Entitlements. <p>Potential for material impact to receptor from:</p> <ul style="list-style-type: none"> Changed flows in the Latrobe River system

¹⁹ This receptor could be considered in the environmental category or in the water category. It has been included in water as it defined by the flow (volume and rate) rather than by a specific environmental feature

5.6 Ownership

Ownership of the quantitatively assessed receptors is complex and varied. Many of the receptors are in State ownership, although separate departments or agencies are the custodian or holder of the asset. In some cases, the responsibility for the physical object differs from the responsibility for it. For example, objects of Aboriginal cultural heritage and significance may be included on private land.

As this structure is complex, ownership details have been defined as both the authority that enables the management or protection of receptors, and custodians of data used to prepare the spatial database of quantitative receptors that accompanies this report.

Receptor owners and the number of assets per owner is provided in Appendix F.

6. Recognised Regional Receptors – Qualitative Assessment

Receptors that are to be qualitatively assessed have been defined on the basis of materiality and also on the understanding of impacts.

Receptors were identified for qualitative assessment that met the following criteria:

- Any receptor where the pathway for impact is not clear or cannot be quantified based on current knowledge, but for which the possibility of impact needs to be assessed; and
- Any receptor where there is a low likelihood of a causal pathway (even if the consequence of impact is considered to be of interest to stakeholders).

6.1 Aboriginal and non-Aboriginal Cultural Heritage

Table 6-1 – Aboriginal and non-Aboriginal Cultural Heritage Receptors

Sub-Category	Receptor	Rationale for qualitative assessment
Aboriginal cultural heritage	<p>Tangible</p> <ul style="list-style-type: none"> • Aboriginal Places are recorded in all three mine licence areas. <p>Intangible</p> <ul style="list-style-type: none"> • Aboriginal cultural significant attached to water places and form • Post-European settlement water flow and availability patterns that support specific social activities 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> • Individual archaeological/physical Aboriginal Places (e.g. stone artefact scatters, scarred trees, etc.) associated with mine areas would only be potentially impacted by the rehabilitation of each mine individually, and therefore is not a regional effect. • Responsibility of each mine to manage, not materially linked by two or more mines. • May relate to intangible values associated with water use. <p><i>Some aspects of Aboriginal cultural heritage may be difficult to assess quantitatively due to the absence of suitable metrics, but still need to be considered as potentially impacted receptors. Such receptors will be assessed qualitatively.</i></p> <p><i>Additional work by Traditional Owners to identify specific receptors for qualitative assessment will be conducted as part of the LVRRS</i></p>
non-Aboriginal cultural heritage	<ul style="list-style-type: none"> • 152 individual historical heritage places of local significance • 14 heritage precincts • 6 Victorian Heritage Register places of state significance • 38 places of potential significance to be further investigated • Hazelwood Open Cut • Hazelwood Power Station • The Great Morwell Brown Coal Mine • Yallourn North Open Cut • Yallourn Open Cut • Yallourn North Extension • Morwell Open Cut • Loy Yang Open Cut • La Mode Factory 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> • The historical heritage places/precincts as individual places/precincts would only be impacted by one mine void waterbody. • These places/precincts and their related heritage values (particularly for the Yallourn and Loy Yang mines) would need to be assessed and the impacts to each individual mine managed. • The overall heritage values related to mining in the Latrobe Valley more broadly could potentially be subject to cumulative impacts by mine void waterbodies, but if the heritage impacts are managed and minimised at an individual mine level, this cumulative impact to mining heritage would also be minimised.

Sub-Category	Receptor	Rationale for qualitative assessment
	<ul style="list-style-type: none"> • Morwell Power Station • Australian Paper Mill (APM Staff House 2, APM Staff Housing group, APM Staff House 3, APM Staff House 1) • Yinnar Butter Factory (former) • St Marks Anglican Church • Horseshoe Vale Homestead • Hoyles Residence (former) • Cairnbrook Farm Complex • Morwell National Park (original) • Eastern Railway Line • Traralgon Courthouse and Post Office • Gormandale Cooperative Creamery and Butter Building (former) • Burn Brae • Traralgon Park Homestead • Traralgon Hotel • Star Hotel (former) • Lilitree • Arva 	<p>There may be instances where individual heritage sites need to be quantified if LVRRS geotechnical studies show significant spatial scale of significant settlement or rebound</p>

6.2 Environment

Table 6-2 – Environment Receptors

Sub-Category	Receptor	Rationale for qualitative assessment
Rivers, natural lakes & waterways¹	<ul style="list-style-type: none"> • Rintoul's Creek 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> • Not linked to source from which water for mine rehabilitation is likely to be sourced. Flows into the Latrobe River downstream of mine voids. <p>Receptor unlikely to be materially impacted by</p> <ul style="list-style-type: none"> • Altered flow rates • water quality.
Terrestrial habitats	<ul style="list-style-type: none"> • Native vegetation in West Gippsland • Four threatened ecological communities in the Gippsland Basin (Gippsland Red Gum grassy woodland, Littoral Rainforest and Coastal Vine Thicket, Seasonal Herbaceous wetlands, and White Yellow-Box grassy woodland) • Gippsland Red Gum Community 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> • No specific groundwater dependent ecosystems are known from the area. • Few receptors remain on the valley floor • Bio-Sites (reflecting natural areas) are scarce on the Valley floor, other than the local natural water ways that are listed as Bio-Sites.
Listed species	<ul style="list-style-type: none"> • Plant species/aquatic flora (Matted Flax Lilly, Strzelecki Gum, Aniseed Boronia, Dwarf Kerrawang, Leafy Greenhood, Maroon Leak-orchid, River Swamp Wallaby-grass, Swamp Everlasting and Swamp Greenhood) 	<ul style="list-style-type: none"> • For threatened species, the likelihood of pathway for threatened species is generally low. A number of the threatened tree species are known from around the mining areas, some may be remnant but more likely these have been planted. These have been mapped so a spatial appreciation can be determined. • Other threatened species are less likely to occur given the more limited habitat on which they depend. Potential for some of the aquatic bird species to benefit from the pond creation.

Sub-Category	Receptor	Rationale for qualitative assessment
		<p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Impacts would largely relate to local to regional groundwater changes and the association the ecological receptors (threatened species and communities) have with groundwater conditions. The potential for there to be cumulative impacts are related to ground water level movements, however with limited receptors and unlikely impact, the cumulative impact is not considered relevant and impacts considered unlikely.
	<ul style="list-style-type: none"> Birds (55 of the 83 listed species) 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Mostly marine/intertidal/migratory and are therefore unlikely to be linked. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Unlikely to occur or be impacted by ground movement.
	<ul style="list-style-type: none"> Mammals (Australian Fur Seal, Blue Whale, Grey-headed flying fox, Long-footed potoroo, Humpback Whale and Southern Right Whale) Gippsland Dolphin 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Generally limited area of total habitat affected by water management. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Unlikely to occur or be impacted by ground movement.
	<ul style="list-style-type: none"> Reptiles (Leatherback Turtle) Invertebrates (Giant Gippsland Earthworm) 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> No clear evidence of critical water requirements. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Unlikely to occur or be impacted.
<p>Water Dependent Habitats</p>	<ul style="list-style-type: none"> Groundwater Dependent Ecosystems (GDEs) 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Groundwater effect is likely to be recovery of groundwater level returning to previous levels. Groundwater level rise may cause rebound of sediments, but this is not expected to be material for GDEs, thus is not included. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Low potential for pathway with material effect.
<p>Wetlands</p>	<ul style="list-style-type: none"> 24 water dependent wetlands in the Gippsland Basin (excluding Lake Victoria and Lake Wellington) 	<p>Receptor material linkage</p> <ul style="list-style-type: none"> The system is dependent on impacts relating to changes in Latrobe River - primarily changes to water quality, flows, sediment transport – which then flow into wetlands with associated impact on wetland water levels and water regime, water quality, algal bloom risk, supported habitat and species. The exact pathway is thus also related to any impacts on the rivers. <p>Receptor impact likelihood</p> <ul style="list-style-type: none"> The likelihood of the pathway depends on such factors as lakes, volumes and quality of water, disruption to flows. Likely/highly likely for wetlands (including floodplain wetlands) closer to the mine and therefore more likely to be affected. Less likely with increasing distance and wetland volume; for example: unlikely to materially affect entire Gippsland Lakes site.

Sub-Category	Receptor	Rationale for qualitative assessment
		<ul style="list-style-type: none"> Additional mine void waterbodies will add to likelihood of impact in the Latrobe River, as associated wetland systems.
<p>1. During stakeholder workshops the Macalister and Thomson Rivers were identified as potential receptors for mine rehabilitation if additional water would need to be released from dams on these rivers to offset the impacts on the Gippsland Lakes caused by increased diversions from the Latrobe River for mine rehabilitation. As these options were not proposed for mine rehabilitation, they were not considered further.</p>		

6.3 Infrastructure

Table 6-3 – Infrastructure Receptors

Sub-Category	Receptor	Rationale for qualitative assessment
Airports	<ul style="list-style-type: none"> Latrobe Regional Airport 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Distance from outside the inter-mine scale <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Potential for ground movement due to mine void filling.
Alternative Energy Sources	<ul style="list-style-type: none"> Future biofuels facility for the processing of agricultural or timber residuals located in the mine scale or inter-mine scale Future waste to energy facility located in the mine scale or inter-mine scale 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Located within the inter-mine scale (likely to only affect large assets close to the mine voids). <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Design and siting of future structures in the intra and inter-mine scale will be informed by the known risks associated with ground movement and water quality and therefore can be accommodated.
Coal Fired Power Generation	<ul style="list-style-type: none"> Loy Yang Power Station Yallourn Power Station Carbon Capture Storage Site Yallourn North mine void and rehabilitated land 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Located within the inter-mine scale (likely to only affect large assets close to the mine voids). Inter-mine scale is vulnerable to ground movement caused by subsidence/settlement rebound resulting from mine void waterbody filling, resulting in heave, cracking and seismic movement. No clear pathway identified for Carbon Capture site. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Design and siting of structures in the intra and inter-mine scale should accommodate gradual and uniformed rebound. No specific Carbon Capture site identified for ground movement effects to be located. The dominant impact for power stations is the mine that they are associated with and they are not likely to be materially impacted from other pits, so fall within the mine scale. The assets for the Carbon Capture site have not been built but it is expected that the designs will take into account the potential for rehabilitation induced effects.
Industry and Manufacturing	<ul style="list-style-type: none"> Future logistics and manufacturing (undertaken in existing industrial use zones in Traralgon and Morwell) 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> The actual locations and scale of the future development is not clear and so cannot provide a clear site to apply a test. <p>Receptor unlikely to be materially impacted</p>

Sub-Category	Receptor	Rationale for qualitative assessment
		<ul style="list-style-type: none"> Actual locations are not defined to test ground movement.
Telecommunications	<ul style="list-style-type: none"> Telecommunications Infrastructure (Base Stations) across the Latrobe basin but which are outside the Tertiary sedimentary basin Network cables outside of the Tertiary sedimentary basin 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Telecommunication assets located outside of the Tertiary (geology) material are considered not to have an effective pathway for impacts from mine void water body formation. <p>Receptor unlikely to be materially impacted by</p> <ul style="list-style-type: none"> Ground movement caused by subsidence/rebound resulting from mine void filling is unlikely to propagate beyond the Tertiary basin.

6.4 Land

Table 6-4 – Land Receptors

Sub-Category	Receptors	Rationale for qualitative assessment
Coal Reserve	<ul style="list-style-type: none"> Driffield East, Churchill, Churchill North, Loy Yang East, Coalville (black coal), Corridor, Driffield, Maryvale East, Fernbank, Flynn, Gormandale, Latrobe River, Morwell Township, Rosedale, Tyres, Traralgon Creek, Yinnar, Hazelwood (remaining resource). 	<p>Receptor likely to be materially linked due to mine void water bodies</p> <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Minimal biophysical impacts in terms of accessing the coal. Likely to have economic impacts in terms of increasing cost to access the coal as will limit future coal mine rehabilitation options.
Protected Public Land	<ul style="list-style-type: none"> Tyers Park Woorabinda Education Area Traralgon South Flora and Fauna Reserve Coalville G219 Bushland Reserve Sayers Trig Bushland Reserve Jeeralang North Education Area Gormandale Flora Reserve Narracan State Forest Moondarra State Park National Parks in West Gippsland Catchment Current Tenements – Extractives Current Tenements – Retention Licences Current Tenements – Mining Licences 	<p>Receptor unlikely to be materially linked</p> <ul style="list-style-type: none"> Given the protected public land is located generally at catchment scale unlikely to be materially linked <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Qualitative assessment required for impacts that may result from changes hydrological circumstances.
Townships/Settlements	<ul style="list-style-type: none"> Traralgon, Morwell, Yallourn North, Moe, Churchill, Newborough inclusive of zones: <ul style="list-style-type: none"> Central Business District/Activity Centre Existing urban areas, future urban use Existing industrial areas, future industrial, future bulky goods Proposed public Open Space, Existing Open Space, Amenity Lifestyle Precinct 	<p>Receptor unlikely to be materially linked</p> <ul style="list-style-type: none"> These areas are generally located significant distances from the mine sites due to residential use being a sensitive use and not suitable to neighbour a mine thus making material link less likely. The majority of the recreation areas are located within the townships as a result of a need to be in populated areas. There are multiple other land uses located between the recreation areas and the mine sites and it is expected that these uses may act as buffers to reduce impact on recreation areas. <p>Receptor may be materially impacted</p>

Sub-Category	Receptors	Rationale for qualitative assessment	
		<ul style="list-style-type: none"> Impacts recreational land to be qualitatively assessed. Has the potential to be materially impacted as fields are required to be flat and well-draining. 	
Intensive agriculture	<ul style="list-style-type: none"> Future intensive agricultural activities (such as broiler farms or piggeries) Intensive agriculture Potential future intensive agriculture such as non soil based vegetable herb growing (in greenhouses) located in close proximity to mine void waterbodies Potential future processing of vegetables located in close proximity to potential mine void waterbodies 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Located within the inter-mine scale (likely to only affect large assets close to the mine voids). Inter-mine scale is vulnerable to ground movement caused by subsidence/settlement rebound resulting from mine void filling, resulting in heave, cracking and seismic movement. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> If rebound is uniform intensive agriculture operations / infrastructure should not be materially impacted. See water rights and entitlement holders 	
Cropping	<ul style="list-style-type: none"> Cropping 	<p>Receptor unlikely to be materially linked</p> <ul style="list-style-type: none"> Rainfall dependent and therefore unlikely to have a causal pathway. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Without pathway unlikely to be materially impacted by changes in water quality, quantity 	
Grazing	<ul style="list-style-type: none"> Grazing 		
Forestry plantations	<ul style="list-style-type: none"> Timber production and plantations 		
Multiple Public Use	<ul style="list-style-type: none"> Future tourism (arts and culture) and recreation (bikes paths) at Yallourn Future tourism (arts and culture) and recreation (bike paths) at Hazelwood Future tourism (arts and culture) and recreation (bike paths) at Loy Yang 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Located within the inter-mine scale (likely to only affect large assets close to the mine voids). Inter-mine scale is vulnerable to ground movement caused by subsidence/settlement rebound resulting from mine void filling, resulting in heave, cracking and seismic movement. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Design and siting of future structures in the intra and inter-mine scale will be informed by the known risks associated with ground movement and water quality and therefore can be accommodated. Future light weight structures are identified as being plausible within the intra-mine scale. 	
Primary production and support infrastructure	<ul style="list-style-type: none"> Future non soil based vegetable herb growing (in greenhouses) located in close proximity to potential mine void water body (lightweight structure) Future processing of vegetables in the mine scale or inter-mine scale 		
Specialist Facilities	<ul style="list-style-type: none"> Potential future education and training facilities (relating to land rehabilitation, mining, environmental science and clean energy technologies) located in close proximity to the potential mine void water bodies 		
Waste management	<ul style="list-style-type: none"> Future waste process Future organics recycling and composting facility located in the mine scale or inter-mine scale Landfills 		
Recreation	<ul style="list-style-type: none"> 92 recreation areas related to water in Latrobe Basin Fishing and hunting Future fishing 		<p>Receptor materially linked due to connection to rivers and waterways</p> <p>Recreational use patterns unlikely to materially change in response to changes in flows except at the extremes.</p>

6.5 Water

Table 6-5 – Water Receptors

Sub-Category	Receptors	Rationale for qualitative assessment
Dams, artificial lakes and reservoirs	<ul style="list-style-type: none"> Loy Yang High Water Level Storage 	<p>Receptor unlikely to be materially linked</p> <ul style="list-style-type: none"> Potential for ground movement due to mine void filling <p>There are known faults underneath the dam</p> <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> The receptor remains of interest as a dam wall failure would likely flood Traralgon.
	<ul style="list-style-type: none"> Hazelwood Pondage Yallourn North Extension Open Cut pit lake 	<p><i>Is strictly not an on-going asset but is it a recognised regional receptor and therefore warrants qualitative assessment.</i></p>
Wastewater Infrastructure	<ul style="list-style-type: none"> Moe and Morwell Waste Water Treatment Plant Gippsland Water Factory – water treatment 	<p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Significant distance to mine void water bodies <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Location of plants would only be impacted by significant ground movement from subsidence or induced by mine void waterbody seismicity.
Water Delivery Infrastructure	<ul style="list-style-type: none"> Irrigation Infrastructure – Publicly and Privately Owned 	<p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> If rebound is uniform the irrigation infrastructure should not be materially impacted.
	<ul style="list-style-type: none"> Gippsland Water Factory – recycled water production Groundwater monitoring bore network Potable Infrastructure (pipes and tanks etc.) – Public and Privately owned Town water bores 	<p>Receptor unlikely to be materially linked due to:</p> <ul style="list-style-type: none"> Flows generally unrelated to river flow and more related to town water use. <p>Receptor unlikely to be materially impacted</p> <ul style="list-style-type: none"> Receptors located outside area of expected material impact.
Drains	<ul style="list-style-type: none"> Drains associated with railway line and embankment 	<p>Small structures that are considered part of the railway receptor</p>
Fisheries	<ul style="list-style-type: none"> Gippsland Lakes Fishery 	<p>Pathway not defined for material effect.</p> <ul style="list-style-type: none"> However, note that if water from mine rehabilitation does disrupt the Environmental Water Reserve such that spawning triggers aren't provided, it could potentially causally affect fisheries within the Gippsland Lakes.

6.6 Ownership

Ownership of the qualitatively assessed receptors is complex and varied. Many of the receptors are in State ownership, although separate departments or agencies are the custodian or holder of the asset. In some cases, the responsibility for the physical object differs from the responsibility for it. For example, objects of Aboriginal cultural heritage and significance may be included on private land.

As this structure is complex, ownership details have been defined as both the authority that enables the management or protection of receptors, and custodians of data used to prepare the spatial database of qualitative receptors that accompanies this report.

Receptor owners and the number of assets per owner is provided in Appendix F.

Appendix A. Stakeholders Consulted

Stakeholders consulted as part of the identification and categorisation of regional receptors included:

- Aboriginal Victoria
- AGL (Loy Yang)
- APA VTS Australia
- AusNet
- Baw Baw Shire Council
- CarbonNet
- Department of Economic Development, Jobs, Resources and Transport
- Department of Environment, Land, Water and Planning (including Regional Gippsland)
- Energy Australia (Yallourn)
- ENGIE & Mitsui (Hazelwood)
- Esso Australia Resources
- Gippsland Water
- Gunaikurnai Land and Waters Aboriginal Corporation
- Latrobe City Council
- Latrobe Valley Authority
- Latrobe Valley Rehabilitation Advisory Committee
- NBN Co
- Parks Victoria
- Southern Rural Water
- Telstra
- VicForests
- VicRoads
- Victorian Planning Authority
- VicTrack
- VLine
- Wellington Shire Council
- West Gippsland CMA

Appendix B. Glossary and Receptor Inventory Sub-Category Definitions

B.1 Glossary

Receptor: Any physical entity, process or value, which may potentially be directly or indirectly impacted by regional rehabilitation scenarios. A receptor may be part of the natural or built environment.

Recognised Receptor: A receptor that has a level of recognition at State or Federal level, such as by inclusion in a management plan, recognised in a formal protection or management framework or protected under legislation. Recognition was typically described in a publicly available document (refer to Appendix C and Appendix F).

Materiality: Is the “*threshold of likely or potential cumulative impact on receptors based on contextual information and is based on judgement following consideration of proximity, causal pathway and expected level of exposure*”. Also see Appendix D for further description of materiality.

Publicly available document: A document: created through official mandate (legislation or policy direction); subject to public review and comment during their development; transparent about methods for nomination of recognition; and taken into consideration in decision making by the responsible agency.

B.2 Aboriginal and non-Aboriginal Cultural Heritage

Table 6-6 – Aboriginal and cultural heritage receptors

Sub-Categories	Description
Aboriginal cultural heritage	Aboriginal places may include: ²⁰ <ul style="list-style-type: none"> • Archaeological sites (tangible) – sites comprising physical remains of Aboriginal occupation. • Historical sites (intangible) – sites of Aboriginal use and occupation dating to contact and post-contact periods. • Mythological sites (intangible) – places that are important because of their traditional or contemporary social or cultural significance.
non-Aboriginal cultural heritage	A heritage place may be a site, area, building, group of buildings, structure, archaeological site, tree, garden or other place of cultural significance and its associated land. ²¹

B.3 Environment

Table 6-7 – Environment receptors

Sub-Category	Description
Listed species	Listed species and ecological communities are prescribed protection under state or commonwealth legislation (e.g. <i>Flora and Fauna Guarantee Act 1988</i>).
Rivers, waterways and natural lakes	<ul style="list-style-type: none"> • A river, creek, stream or watercourse • A natural channel in which water regularly flows, whether or not the flow is continuous • A channel formed wholly or partly by the alteration or relocation of a waterway • A lake, lagoon, swamp or marsh, being any of: <ul style="list-style-type: none"> • A natural collection of water (other than water collected and contained in a private dam or a natural depression on private land) into or through or out of which a current that forms the whole or part of the flow of a river, creek, stream or watercourse passes, whether or not the flow is continuous; • A collection of water (other than water collected and contained in a private dam or a natural depression on private land).

²⁰ *Aboriginal places, objects and land management*, Aboriginal Victoria, <http://www.vic.gov.au/aboriginalvictoria/heritage/aboriginal-cultural-heritage-of-victoria/aboriginal-places-objects-and-land-management.html>

²¹ *About Heritage in Victoria*, Heritage Victoria, <https://www.heritage.vic.gov.au/about-heritage-in-victoria/heritage-in-victoria>

Sub-Category	Description
	<ul style="list-style-type: none"> Land on which, as a result of works constructed on a waterway, water collects regularly, whether or not the collection is continuous Land which is regularly covered by water from a waterway but does not include any artificial channel or work which diverts water away from such a waterway If any land forms part of a slope rising from the waterway to a definite lip, the land up to that lip
Terrestrial habitats	An ecosystem or habitat on land, including vegetation communities
Water-Dependant Habitats	A habitat potentially impacted by changes in groundwater and/or surface water; includes groundwater dependent ecosystems. Some ecological assets solely depend on incident rainfall and will not be considered as water dependent if evidence does not support a linkage to groundwater or surface water.
Wetlands	Areas whether natural, modified or artificial, subject to permanent or temporary inundation, that hold static or very slow-moving water and develop, or have the potential to develop, biota adapted to inundation and the aquatic environment. This includes waterbodies such as lakes, swamps, fens, marshes, peatlands, springs and supratidal and intertidal (but not subtidal) areas.

B.4 Infrastructure

Table 6-8 – Infrastructure receptors

Sub-Category	Description
Airports	Tract of land or water with facilities for the landing, take-off, shelter, supply, and repair of aircraft, especially one used for receiving or discharging passengers and cargo at regularly scheduled times.
Alternative Energy Sources	Location where electricity is generated from sources other than brown coal prior to delivery of electricity to consumers.
Bridges	The area of land occupied by piers and abutments and the zone of ground surrounding that is relied upon for stability.
Coal Fired Power Generation	Location where electricity is generated from brown coal prior to delivery of electricity to consumers.
Electricity Transmission Network	Transmission networks transport electricity from generators to distribution networks in metropolitan and regional areas.
Extractive Industry	The extraction or removal of stone from land if a primary purpose of the extraction or removal is the sale or commercial use of the stone or the use of the stone in construction, building, road or manufacturing works. ²²
Gas Fired Power Generation	Location where electricity is generated from the combustion of natural gas to delivery of electricity to consumers.
Gas and liquid pipelines	Transmission pipelines transport natural gas from processing or storage facilities over long distances to domestic markets. CarbonNet has undertaken feasibility studies for various CO ₂ pipelines options and may be constructed by a future private sector operator of a CCS network, with construction being required to meet existing Australian Standards and regulatory framework for oil and gas and liquid pipelines. No specific location for CarbonNet assets was able to be provided for this assessment.
Industry and Manufacturing	The manufacturing industry is involved in transforming materials, substances or components into new products. ²³
Rail	The area of land in the rail reserve and associated infrastructure developed for public and commercial rail services. ²⁴

²² Mineral Resources (Sustainable Development) Act 1990 http://www.austlii.edu.au/cgi-bin/viewdoc/au/legis/vic/consol_act/mrda1990432/s4.html

²³ Manufacturing Industry Fact Sheet, <https://www.business.gov.au/info/plan-and-start/develop-your-business-plans/industry-research/manufacturing-industry-fact-sheet>

²⁴ Rail Network Third Party Access Guidelines and Assessment Process, <https://www.victrack.com.au/en/working-with-victrack/our-capabilities/property/third-party-access>

Sub-Category	Description
Road – Freeway/State Maintained	Roadway – the area of land in the road reserve and associated infrastructure developed for driving and riding of motor vehicles but does not include a driveway. ²⁵ The State Government are responsible for freeways except for those that are privately operated.
Road – Local Council maintained	Roadway – the area of land in the road reserve and associated infrastructure developed for driving and riding of motor vehicles but does include a driveway. ²⁶ Local Councils are responsible for municipal roads.
Telecommunications	Telecommunications systems transmit, process and store information as electrical or optical signals. Includes base stations, transmission stations and above/below cabling.

B.5 Land

Table 6-9 – Land receptors

Sub-Category	Description
Coal Reserve	Areas where geology indicates substantial coal deposits are present and has been identified in strategic plans and forward assessment by DJPR and precursor organisations. Typically, these are defined by the coal reserve overlays in the planning scheme. There is some consideration of coal reserve associated with the current mines that needs to be made.
Cropping	The cultivation of plants or agricultural produce, such as grain, vegetables, or fruit, often as a monoculture.
Dairying	Dairying is a type of agriculture, using intensive grazing of cows to produce milk. Appropriate farm and district infrastructure that is vital to the industry.
Forestry plantations	Forestry plantations are a farmed crop that is harvested on a short rotation to provide a financial return to investors. Forestry plantations are purpose planted for harvest rather than native forests.
Grazing	Grazing is a method of feeding in which herbivores feed on plants such as grasses.
Intensive agriculture	Intensive agriculture involves the use of large amounts of capital and labour to increase yields e.g. the use of heavy machinery, fertilisers, herbicides and pesticides for growing crops and medication for animals.
Irrigated agriculture & horticulture	The supply of water to land or greenhouses to promote growth of agricultural produce e.g. pasture, crops, vegetables, fruit, grapes etc.
Multiple use public	Future public land use options
Primary production support and infrastructure	Infrastructure specifically purposed to enable primary production e.g. milk processing plants.
Protected public land	Parks, conservation and other reserves managed under Victoria legislation
Recreation	Areas designated for use by the public for recreational purposes zoned PPRZ, PCRZ or PUZ.
Specialist Facilities	Facilities provided either by government or non-government agencies for the benefit of, and use of, the community (such as schools, churches, hospitals and theatres).
Townships/Settlements	Land used for accommodation including dwelling (building used as a self-contained residence), group accommodation, residential building and village. ²⁷

²⁵ VicRoads – Register of Public Roads”, <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/RoadManagementAndDesign/RoadManagementActRegulationsCodes/RegisterOfPublicRoads.htm>, Road design standards and notes – Technical Notes, <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/RoadManagementAndDesign/DesignStandardsManualsNotes/TechnicalPublications/TechnicalNotes.htm>

²⁶ VicRoads – Register of Public Roads”, <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/RoadManagementAndDesign/RoadManagementActRegulationsCodes/RegisterOfPublicRoads.htm>, Road design standards and notes – Technical Notes, <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/RoadManagementAndDesign/DesignStandardsManualsNotes/TechnicalPublications/TechnicalNotes.htm>

²⁷ Victorian Planning Provisions Clause 70 Definitions - Clause 74 Land Use Terms”, <http://planningschemes.dpcd.vic.gov.au/schemes/vpps/74.pdf>

Sub-Category	Description
Waste management	The disposal of landfill and recyclable waste provides the community with waste disposal and recycling solutions.

B.6 Water

Table 6-10 – Water receptors

Sub-Category	Definition
Aquifers and Groundwater Use	"Aquifer" means a geological structure or formation or an artificial land fill permeated or capable of being permeated permanently or intermittently with water. ²⁸ The groundwater contained in an aquifer is commonly abstracted and used for a variety of beneficial uses including irrigation and potable supply.
Dams, artificial lakes & reservoirs	A dam is a wall or earthen embankment that holds back water to form a basin, lake or reservoir.
Drains	A channel or pipe carrying off surplus liquid, especially rainwater/stormwater or liquid waste.
Environmental Water Reserve	The <i>Water Act 1989</i> (Vic) establishes the Environmental Water Reserve, which consists of water held in environmental entitlements, along with other water in the system that can contribute to environmental outcomes, such as passing flows, and 'above cap' water.
Fisheries	Commercial fishing in Gippsland Lakes ²⁹
Water Delivery Infrastructure	<ul style="list-style-type: none"> • Civil infrastructure (channels, pipelines, regulators, meters) used to distribute bulk (potable and non-potable) water to customers including irrigation infrastructure (bores, pipes etc.) – public and privately owned. • Water pipelines which convey water from a reservoir or dam. • Bores used to supply groundwater for urban (potable) purposes.
Wastewater Infrastructure	Sewerage is the infrastructure that conveys sewage to a treatment plant or at the point of discharge into the environment. It is the system of pipes, chambers, manholes, etc. that conveys the sewage.
Water Rights and Entitlement Holders	Water rights holders are those landholders that own a water-use licence, an entitlement to irrigate specific parcel or parcels of land ³⁰ or a take and use licence, a fixed term entitlement to take and use water from a waterway, catchment dam, spring, soak or aquifer. See also Environmental Water Reserve in relation to Environmental Entitlements.
Water supply catchment (surface water)	"Catchment" means an area which, through run-off or percolation, contributes to the water in a stream or stream system which is used for water supply. ³¹

²⁸ Victorian Water Act 1989 as amended

²⁹ http://agriculture.vic.gov.au/_data/assets/pdf_file/0004/314329/The_Gippsland_Lakes_fishery.pdf

³⁰ <http://waterregister.vic.gov.au/water-entitlements/about-entitlements/water-use-licences>

³¹ *Catchment and Land Protection Act 1994* – Section 3 definitions.

Appendix C. Publicly Available Documents

This appendix lists the publicly available documents consulted to identify recognised regional receptors.

C.1 Aboriginal and Historical Cultural Heritage

- Acts and Legislation:
 - *Heritage Act 2017*
 - *Heritage Rivers Act 1992*
 - *Aboriginal Heritage Act 2006* (Victorian Aboriginal Heritage Register accessed through the Aboriginal Cultural Heritage Register and Information System)
 - *Aboriginal Heritage Regulations 2007*
 - *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- Commonwealth Government Registers:
 - National Heritage List
- Regional Strategies and Plans:
 - Gunaikurnai Whole of Country Plan
 - Coal Mining Heritage Study in Victoria
 - Latrobe City Heritage Study
 - Latrobe Valley Heritage Overlay

C.2 Environment

- Acts and Legislation:
 - *Planning and Environment Act 1987*
 - *Environment Protection and Biodiversity Conservation Act 1999*
 - *Flora and Fauna Guarantee Act 1988 (Rare and Threatened Species Listings)*
- Victorian Government Policies:
 - Biodiversity 2037 Strategy
 - State Environment Protection Policies, especially SEPP Waters
- Regional Strategies and Plans:
 - West Gippsland Catchment Management Authority Native Vegetation Plan
 - West Gippsland Catchment Management Authority Regional Catchment Strategy
 - Gippsland Basin Bioregional Assessment
 - Water Asset Information Tool (WAIT) database
- Mine Operator Documents:
 - Mine Work Plans or documents demonstrating commitment to conservation areas (where published)

C.3 Infrastructure

- Acts and Legislation:
 - *National Parks Act 1975*
 - *Forests Act 1958*
 - *Planning and Environment Act 1987 (Latrobe Planning Scheme, Wellington Planning Scheme)*

- *Pipelines Act 2005*
- *Pipelines Regulations 2017*
- Victorian Government Policies:
 - Victorian Coal Statement
- Regional Strategies and Plans:
 - Gippsland Regional Growth Plan
 - Regional Landscape Assessment Study
 - Regional Agribusiness Plans
 - Morwell West Development Plan

C.4 Land

- Acts and Legislation:
 - *National Parks Act 1975*
 - *Forests Act 1958*
 - *Planning and Environment Act 1987 (Latrobe Planning Scheme, Wellington Planning Scheme)*
 - *Pipelines Act 2005*
 - *Pipelines Regulations 2017*
- Victorian Government Policies:
 - Victorian Coal Statement.
- Regional Strategies and Plans:
 - Gippsland Regional Growth Plan
 - Regional Landscape Assessment Study
 - Regional Agribusiness Plans
 - Morwell West Development Plan

C.5 Water

- Acts and Legislation:
 - *Water Act 1989*
 - *Catchment and Land Protection Act 1994*
- International Agreements and Conventions:
 - Ramsar Convention on Wetlands
 - Ramsar Management Plan
- Victorian Government Policies:
 - Water for Victoria
- Regional Strategies and Plans:
 - Gippsland Region Sustainable Water Strategy
 - West Gippsland Catchment Management Authority Regional Catchment Strategy
 - West Gippsland Catchment Management Authority Waterway Strategy
 - Gippsland Water Urban Water Strategy
 - GLAWAC Regional Water Management Plan
 - Groundwater Management Area Plans

Appendix D. Approach to Determining Materiality

The concept of materiality reflects considerations similar to those used in determining significant impact and associated terms applied in an EES under the *Environment Effects Act 1978* including:

Potential magnitude, extent and duration of adverse effects on environmental assets [valued regional receptors] in the short, medium and longer term, as a result of the development, operation and where relevant, decommissioning of a project.

D.1 Determining Materiality for Recognised Regional Receptors

Determining materiality is a three-stage process requiring input from stakeholders.

- Stage One - Investigate likely causal pathways for impacts from the creation and long-term existence of mine void waterbodies (both partial and full) based on expert and stakeholder opinion collated during the workshops held to help describe these effects and then further built upon by using Jacobs specialist staff and other Jacobs resources.
- Stage Two - High-level qualitative assessment of materiality to identify those recognised regional receptors with the potential to be significantly affected by the cumulative impacts of water-based rehabilitation considering both likelihood and consequence based on expert and stakeholder opinion collated during the workshops held to help describe these effects and then further built upon by using Jacobs specialist staff and other Jacobs resources.
- Stage Three - Categorisation of recognised regional receptors according to materiality including cumulative effects.

D.1.1 Stage One: Specifying Pathways, Duration, Extent and Magnitude

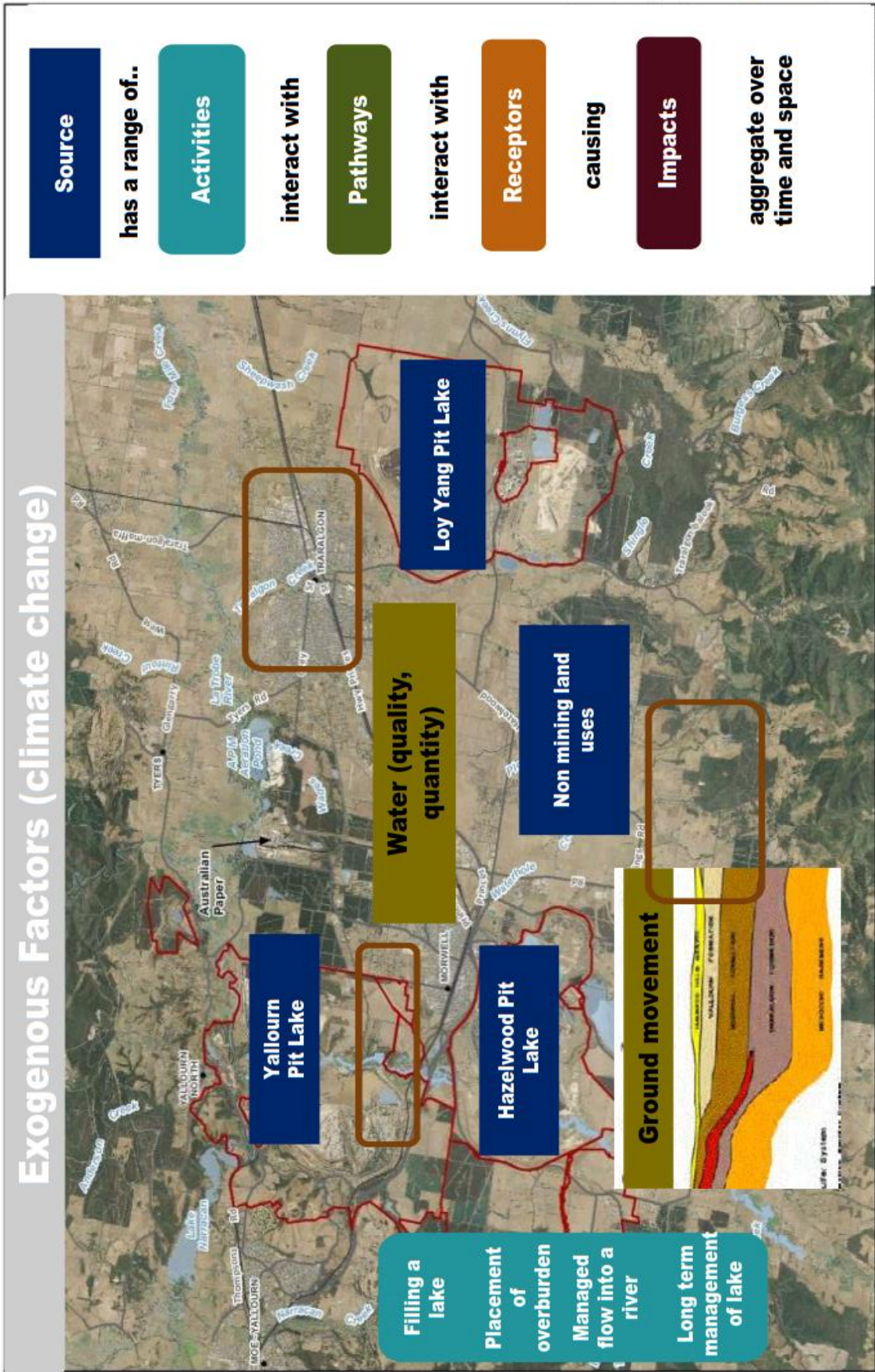
Stage 1 applies the Source – Pathway – Receptor Model (Figure D.1).

The sources are a configuration of mine void waterbodies at Yallourn, Hazelwood and Loy Yang. If a receptor has a pathway from a systemic relationship to closure and rehabilitation of the mines that requires its consideration in the LVRRS, that receptor is identified as potentially materially affected.

There are two pathways for the purposes of the LVRRS:

- 1) Ground movement – concerned with the potential impact of rebound (rising ground-levels due to rising groundwater levels) and mine void waterbody induced seismicity, stress relief, and block failure; and
- 2) Water pathways – concerned with upstream and downstream (surface and groundwater) changes in water quality and quantity in the regional catchment area.

The receptors are drawn from the receptor inventory.



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Figure D.1 – Source-Pathway-Receptor Model

Key considerations for determining if a recognised regional receptor could be materially linked are provided below.

- Source:
 - What are the components and related primary impacts associated with the mine void waterbodies in each rehabilitation scenario?
- Pathway:
 - Likelihood: What is the likely causal pathway of impact?
 - Magnitude and extent: How far could the pathways extend?
 - Timing: When are these impacts likely to occur?
 - Duration: For how long are they likely to occur?
- Receptor:
 - Is there any threshold of magnitude associated with the impact e.g. if the impact is below XX it will not be measurable?

Consideration of causal pathways may be informed by understanding the relative likelihood of the link such as those categorised below:

- Category 1 – Remote – Never heard of a pathway but not impossible in situation and time frame.
- Category 2 – Unlikely – May have a pathway, but only in exceptional circumstances.
- Category 3 – Possible – Clear evidence to suggest that a pathway exists and is possible in this situation.
- Category 4 – Likely – It is likely that there is a pathway, but not certain to occur.
- Category 5 – Highly Likely – It is almost certain that a pathway is present and is likely to be in effect.

Similarly, the consequence of an impact (e.g. catastrophic vs insignificant) is also considered in the preliminary screening of material impact pathways.

D.1.2 Stage Two: High-level Assessment of Materiality

Based on the analysis in Stage One of the likely causal pathways, receptors were assessed to consider if the pathway is attributed to the mine void waterbodies. This involved consideration of:

- Which receptors will be materially linked by the cumulative impacts from the mines? For example:
 - Receptors in the inter-mine area unless it can be determined there are NO likely pathway(s) from a mine void waterbody to link the receptor.
 - Water dependent receptors in the catchment where the pathways from one or multiple mine void waterbodies is direct and likely.
 - Any direct impact from one or more mine void waterbodies on a listed threatened species/critical infrastructure.
- Which receptors are highly unlikely to have any interaction with the direct or indirect pathways for cumulative impact from more than one mine void waterbody? This may be because there is only causal pathway(s) from one waterbody, the time horizon makes linkage unlikely or exposure time is limited to a specific occurrence within the resilience of the receptor. These receptors will undergo a qualitative analysis.
- Which receptors MAY be affected by one or more cumulative impacts from two or three mine void waterbodies?

D.1.3 Stage Three: Categorisation of Recognised Regional Receptors According to Materiality

The third stage involved documenting the recognised regional receptors according to:

- Impacts on receptors to be quantified – where the potential for a material impact on a valued regional receptor is deemed to exist, and which may require to have that potential impact qualitatively assessed to inform developing the LVRRS; and
- Impacts on receptors to be qualitatively assessed – where the potential for a material impact on a valued regional receptor is deemed to be weak or is difficult to quantify due to lack of data, and which may require to have that potential impact qualitatively assessed to inform developing the LVRRS.

Appendix E. Overview of Recognised Regional Receptors to be Quantitatively Assessed

E.1 Aboriginal and non-Aboriginal Cultural Heritage

E.1.1 Aboriginal Cultural Heritage

Prior to the European settlement of Victoria, the Latrobe Valley was occupied by the *Gunai* people (now represented by Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC)), whose land extended 'between the Tarwin River and the Snowy River and north to the alps'.³² This landscape was rich in natural resources and characterised by a system of large rivers and lakes, large expanses of open woody vegetation and extensive mountain ranges. The *Gunai* referred to by Clark (1998) as the *Brabralung* was comprised of five, possibly six, clan or land owning groups – *Brataualong*, *Braiakaulung*, *Tatungalung*, *Brabralung*, *Krauatungalung* and *Bidawal* – which were divided into multiple clans.³³ It is thought that two clan names were potentially variants of one another due to locational grounds.³⁴ *Brabralung* is thought to have meant 'manly' and 'belonging to'.³⁵ The *Brayakaulung* clan was associated with the Latrobe Valley.

There are over 360 registered Aboriginal cultural heritage places (Aboriginal Places) recorded within the region broadly encompassing the three coal mines³⁶. These mainly comprise artefact scatters, however scarred trees, archaeological deposits and low density artefact distributions are also recorded.

Archaeological assessments have been undertaken in the region encompassing the three coal mines (excluding the mining licence areas). Whilst archaeological assessments have not been undertaken at the mine license areas, there are Aboriginal Places recorded in association with all three locations. Not all of this area has been covered by archaeological survey and therefore there is high potential for as yet unrecorded Aboriginal Places to be found based on the areas of cultural heritage sensitivity identified. Crown land across this area is subject to a determined Native Title claim and Indigenous Land Use Agreements may exist for public land in the area.

Numerous Aboriginal Places are recorded along the Morwell River and there are minor distributions along other waterways. Numerous Aboriginal Places also occur away from the major and minor waterways.

Additionally, intangible values associated with Aboriginal cultural significance attached to waterways will be present in the region.

Level of Protection Afforded to Receptor

Areas of cultural heritage sensitivity which may trigger the need for a statutory approval (depending on the activity) under the *Aboriginal Heritage Act 2006* are within 200 m of a named waterway and within 50 m of a registered cultural heritage place.

Aboriginal heritage is regulated by several acts and Government departments and agencies:

- Aboriginal Victoria (*Aboriginal Heritage Act 2006* (as amended 2016) (State), Aboriginal Heritage Regulations 2018 (State), *Traditional Owner Settlement Act 2010* (State))
- Commonwealth Department of Environment and Energy (*Environment Protection and Biodiversity Conservation Act 1999*, *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*)
- National Native Title Tribunal (*Native Title Act 1993* (Commonwealth))

³² Wesson, S (2000) An Historical Atlas of the Aborigines of Eastern Victoria and Far South-eastern New South Wales. Clayton: School of Geography and Environmental Science, p 17.

³³ Clark, I (1998) Place Names and Land Tenure - Windows into Aboriginal Landscapes; Essays in Victorian Aboriginal History. Melbourne: Heritage Matters, p 184.

³⁴ Clark, I (1998) Place Names and Land Tenure - Windows into Aboriginal Landscapes; Essays in Victorian Aboriginal History. Melbourne: Heritage Matters, p 184.

³⁵ Clark, I (1998) Place Names and Land Tenure - Windows into Aboriginal Landscapes; Essays in Victorian Aboriginal History. Melbourne: Heritage Matters, p 184.

³⁶ Victorian Aboriginal Heritage Register, Aboriginal Affairs, <https://applications.vic.gov.au/apps/achris/public/public-registry/home>

- Gunaikurnai Traditional Owner Land Management Board and Gunaikurnai Land and Waters Aboriginal Corporation represent Indigenous interests in the areas.

E.1.2 non-Aboriginal Cultural Heritage

European settlement of the Latrobe Valley began with the arrival of the first squatters in the early 1840s, with pastoralism reaching its peak in the 1850s. Subsequent division and selection of land saw the development of dairying, and agriculture, with timber getting and milling occurring amongst the extensive areas of forest and woodlands from initial settlement. The enormous deposits of coal under the Latrobe Valley have been a key influence in shaping the landscape and townscapes of the Latrobe Valley, transforming it from an agricultural to industrial region. In the 1920s the State Electricity Commission of Victoria began mining brown coal, making Latrobe Valley responsible for meeting the majority of Victoria's electricity needs. The Latrobe Valley is characterised by the dramatic industrial landscape associated with Victoria's historic and current power needs.³⁷

Over 150 historical heritage sites are listed on the Heritage Overlay (local), Victorian Heritage Register (state), and Victorian Heritage Inventory (archaeological) in the Latrobe Valley area. These include homestead and other rural occupation sites, residences, school, churches and other township buildings, and some early mining sites.

The Latrobe City Heritage Study³⁸ identified 152 individual historical heritage places of local significance, 14 heritage precincts, six Victorian Heritage Register places of state significance, 38 places of potential significance to be further investigated, and nine historical heritage places related to electricity generation (a key historical theme for the local government area (LGA)). Most of these would now be included on the Latrobe Heritage Overlay. While this study was comprehensive, it indicates that further investigation is required into pre-contact and post-contact Aboriginal heritage places, historical archaeological sites and cultural landscapes for the Latrobe LGA. This indicates that further heritage sites may exist in the LGA that have not yet been identified.

The key historical themes for the Latrobe area, and therefore the types of heritage places present, include pastoralism, cropping, forestry, mining, paper and clothing manufacturing, and the roads, rail, water and town infrastructure associated with these activities.

A comprehensive Coal Mining Heritage Study³⁹ for Victoria identified six key sites in the Latrobe Valley:

- The Great Morwell Brown Coal Mine
- Yallourn North Open Cut
- Yallourn Open Cut
- Yallourn North Extension Open Cut
- Morwell Open Cut
- Loy Yang Open Cut

These have all been assessed as having heritage significance, with the key features of heritage value having been identified. These are not necessarily listed on heritage registers at this point, but their heritage value needs to be considered in any future rehabilitation activities. This will be particularly important in light of the recent community nomination of Hazelwood Power Station to the Victorian Heritage Register⁴⁰, and the pending decision by the Heritage Council over the registration of Morwell Power Station and Briquette Factory⁴¹.

Level of Protection Afforded to Receptor

Heritage places listed on the Victorian Heritage Register or the Victorian Heritage Inventory are protected by the *Heritage Act 2017*, and approvals are required to remove, relocate, demolish, damage, develop, excavate or

³⁷ *Latrobe City Heritage Study, Volume 1: Thematic Environmental History*, Context Heritage, 2010.

³⁸ *Latrobe City Heritage Study, Volumes 1-3*, Context Heritage, 2010.

³⁹ *Coal Mining Heritage Study in Victoria*, J. Vines, Heritage Victoria, 2008.

⁴⁰ <http://www.abc.net.au/news/2017-09-19/hazelwood-power-station-nominated-for-heritage-protection/8960676>

⁴¹ <https://heritagecouncil.vic.gov.au/registrations-reviews/registration-hearings/scheduled-registration-hearings/>

alter these places. Additionally, all archaeological sites older than 75 years are protected by the *Heritage Act 2017* and approvals are required to undertake works within these sites.

Local heritage places listed on the Heritage Overlay are protected by the provisions of the local planning scheme, and planning approval may be required from the Latrobe City Council to undertake works within a place listed on the Heritage Overlay.

Historical heritage places are also protected by the National Heritage List and Commonwealth Heritage List under the *Environment Protection and Biodiversity Conservation Act 1999*.

E.2 Environment

E.2.1 Rivers, Waterways and Natural Lakes

The Morwell and Latrobe Rivers border Yallourn Open Cut to the east and north respectively. Several diversions of local water courses have been undertaken to progress and maintain mining operations which have affected and altered natural systems. These lakes and watercourses are still generally regarded as potential receptors but may have lower impacts compared with less altered areas.

Morwell River

The Morwell River is formed by the confluence of the West Branch and East Branch of the river, rising in the Strzelecki Ranges, below Boolarra South. Flowing in a general northerly direction, the river is joined by two minor tributaries before reaching its confluence with the Latrobe River, south of Yallourn North. The river descends 156 m over its 41 km course. The lower reaches of the river have been diverted around the Hazelwood and Yallourn open-cut coal mines by channels and other structures until it enters the Latrobe River.

A failure of the Morwell River Diversion within Yallourn Mine in June 2012 resulted in temporary inundation of the mine site and associated temporary reduction in power generation, and damage to the mine's infrastructure.

Latrobe River

The 270 km long Latrobe River is a perennial river with a catchment area of approximately 4,680 km². The Latrobe originates close to the little Yarra River not far from Powelltown, with additional tributaries in the southern slopes of the Baw Baw plateau, to the south of the Great Dividing Range. Flowing to the east, south and east again, the river passes through the Latrobe Valley (adjacent to Moe, Morwell, Traralgon, Rosedale and Sale) where it picks up tributaries from the Strzelecki Ranges, before discharging to the Gippsland Lakes at Lake Wellington.

The upper reaches of the Latrobe River catchment is mostly unregulated – the flow of water is not controlled by dams or weirs in the upper catchment. However, a significant portion of the mid and lower Latrobe River catchment is regulated and known as the Latrobe surface water regulated system. The river is a significant source of flows to the lower Latrobe wetlands (Sale Common, Dowd Morass and Heart Morass) and the Gippsland Lakes Ramsar Site (wetland of international significance).

Main tributaries of the river include Moe River, Narracan Creek, the Tanjil, Morwell and Tyers Rivers and Traralgon Creek as well as the Thomson and Macalister Rivers lower in the catchment.⁴²

Flynn's Creek (near Loy Yang), Sheepwash (near Loy Yang), Bennett's Creek

At Loy Yang mine, Sheepwash Creek has been diverted around the open cut mine and future diversions will be needed as the mine expands.

Other waterways in the Latrobe Valley area include Traralgon Creek, Flynn's Creek (both located near Loy Yang mine) and Bennett's Creek.

⁴² Review of baseline data on water resources in the Latrobe Valley, 2017

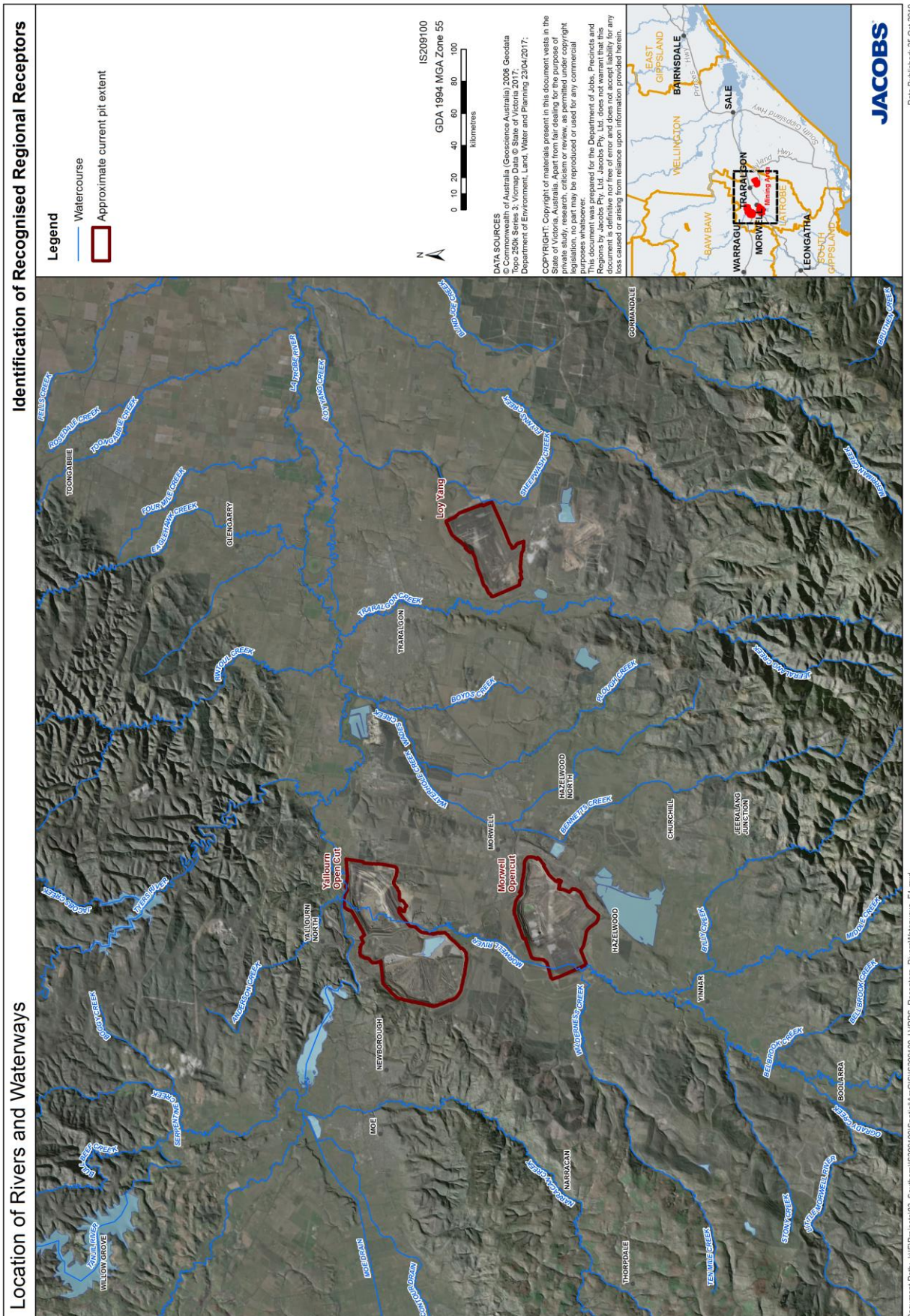


Figure E.1 – Location of Rivers and Waterways

Level of Protection Afforded to Receptor

The *Water Act 1989*⁴³ sets out Victoria's water entitlement and management framework. This framework is a rigorous system for protecting existing water users, the environment and the long-term condition of the water resource. All surface water and groundwater in the Latrobe Valley are fully allocated to water entitlements.

Under the *Water Act 1989*⁴⁴, the Minister for Water may issue a:

- Licence under Section 51⁴⁵ to take and use surface water or groundwater. In the Latrobe Valley, groundwater licences are administered by Southern Rural Water as the Minister's delegate; or
- Bulk entitlement to water to an authority (including a power generation company). A bulk entitlement is a right to take, use and supply water in a waterway, water in storage works of a water corporation and groundwater. Southern Rural Water is responsible for monitoring the compliance of bulk entitlement holders to their conditions and obligations.
- Environmental entitlements are legal rights to take and use water for the purpose of maintaining an Environmental Water Reserve or improving the environmental values and health of the water ecosystems and other users that depend on environmental condition. Environmental entitlements can be held by the Victorian Environmental Water Holder. There are two environmental entitlements in the Latrobe River system.

The Gippsland Region Sustainable Water Strategy was released in 2011 by the then Department of Environment and Primary Industries (now Department of Environment, Land, Water and Planning). The Sustainable Water Strategy "identifies threats to water availability in each region and identify policies and actions to help water users, water corporations and catchment management authorities manage and respond to those threats over the next 50 years".⁴⁶

Gippsland Water supplies water for residential, industrial and commercial use to 65,000 properties in the Gippsland area. Their Water Supply and Demand Strategy⁴⁷ sets out how future water demand in Gippsland is to be met and what are the key challenges affecting current and future supply.

E.2.2 Wetlands

The Gippsland Lakes and Hinterland area is a Landscape Priority Area under the West Gippsland Regional Catchment Strategy. Many parts of the Gippsland Lakes are recognised as wetlands of international significance under the Ramsar Convention on Wetlands. The area includes the lower reaches of the Latrobe River.

The Latrobe River system flows into the Gippsland Lakes Ramsar site.

⁴³ "Licence to take and use water - Section 51", Water Act 1989, http://www.austlii.edu.au/au/legis/vic/consol_act/wa198983/s51.html

⁴⁴ "Licence to take and use water - Section 51", Water Act 1989, http://www.austlii.edu.au/au/legis/vic/consol_act/wa198983/s51.html

⁴⁵ "Licence to take and use water - Section 51", Water Act 1989, http://www.austlii.edu.au/au/legis/vic/consol_act/wa198983/s51.html

⁴⁶ "Gippsland Region Sustainable Water Strategy", Department of Environment, Land, Water and Planning, <http://www.depi.vic.gov.au/water/governing-water-resources/sustainable-water-strategies/gippsland-region-sustainable-water-strategy>

⁴⁷ "2017 Urban Water Strategy", Gippsland Water, https://www.gippswater.com.au/application/files/6814/9931/0017/Gippsland_Water_-_Urban_Water_Strategy_2017.pdf

E.2.3 Water Dependent Habitats - Fish

Australian Grayling

The Australian Grayling (*Prototroctes maraena*) is endemic to south-eastern Australia, including Victoria, Tasmania and New South Wales. It is a migratory species that inhabits estuarine waters and coastal seas as larvae/juveniles, and freshwater rivers and streams as adults. The National Recovery Plan lists population information and includes the Thomson River and lower Latrobe River as an important river for Australian Grayling.

The Australian Grayling is a diadromous species, migrating between rivers, their estuaries and coastal seas, so relies on free access to a range of freshwater, estuarine and marine habitats for its survival. Australian Grayling spend most of their lives in freshwater, inhabiting rivers and streams, usually in cool, clear waters with a gravel substrate and alternating pool and riffle zones (Bishop & Bell 1978b; Berra 1982) but can also occur in turbid water (Jackson & Koehn 1988). The species can penetrate well inland and has been reported from over 100 km upstream from the sea (Jackson & Koehn 1988). Larvae and juveniles inhabit estuaries and coastal seas, and there appears to be an obligatory marine stage (Crook et al. in prep.), although their precise habitat requirements are not known.

Given the wide distribution and range of habitats used by the species throughout its life, it is not practical to specify habitat that is critical to survival as all habitat where Australian Grayling potentially occur is relevant. However, some habitats such as spawning, refuge and juvenile habitats are likely to be limited in distribution, yet crucial to the grayling's life cycle (from recovery plan).

Eastern Dwarf Galaxias

The Dwarf Galaxias is endemic to south-eastern Australia. On the mainland, it occurs from the Mitchell River Basin in central Gippsland, Victoria, to the Cortina Lakes, near the Coorong in South Australia. Distribution of populations is generally disjunct and patchy, due to the nature of its lowland, shallow, swampy habitat. Some wetlands where it occurs may partially or completely dry up during summer (Humphries 1986), and such wetlands rely on seasonal flooding plus linkages to other sites where the species occurs, for habitat and population replenishment. In ephemeral wetlands it is not clear if the Dwarf Galaxias is capable of aestivation over dry summer months, or if it relies on refuges such as freshwater crayfish burrows to survive until the waterbodies fill the following autumn and winter.

The natural degree of wetland connectivity to a more permanent waterbody (such as river or creek) may also be vital to their long-term survival (particularly during extended dry conditions) and must therefore be considered as part of the habitat requirement critical to survival. Appropriate hydrological conditions that regularly replenish the shallow freshwater habitats are essential for the survival of the Dwarf Galaxias, and the natural degree of wetland connectivity to a more permanent waterbody (such as river or creek) may also be vital to their long-term survival (particularly during extended dry conditions). Changes to natural flood and drying cycles, particularly in swamps and shallow creeks, through activities such as catchment clearing, establishing extensive plantations, construction of dams and direct abstraction of water, pose threats to Dwarf Galaxias habitat.

These activities may alter natural seasonal water levels at critical times of the year or may result in complete loss or permanent alteration of wetland habitats. Changes in the level of local water tables may also affect the hydrology of swamps and the ability to seek refuge in crayfish burrows.

E.2.4 Water Dependent Habitats – Frogs

Table 6-11 below lists the species of frogs protected under the EPBC and/or the *Flora and Fauna Guarantee Act 1988*.

Table 6-11 – Status of frogs in EPBC Act and/or Flora and Fauna Guarantee Act 1988

Type	Status
Growing Grass Frog (<i>Litoria raniformis</i>)	<ul style="list-style-type: none"> • EPBC – vulnerable • <i>Flora and Fauna Guarantee Act 1988</i> – listed
Giant Burrowing Frog (<i>Heleioporus australiacus</i>)	<ul style="list-style-type: none"> • EPBC – vulnerable • <i>Flora and Fauna Guarantee Act 1988</i> – listed
Spotted Tree Frog (<i>Litoria spenceri</i>)	<ul style="list-style-type: none"> • EPBC – endangered • <i>Flora and Fauna Guarantee Act 1988</i> – listed
Green and Golden Bell frog (<i>Litoria aurea</i>)	<ul style="list-style-type: none"> • EPBC – vulnerable

E.2.5 Water-Dependent Habitats – Birds

Table 6-12 below lists the species of birds protected under the EPBC and/or the *Flora and Fauna Guarantee Act 1988*.

Table 6-12 – Status of birds in EPBC Act and/or Flora and Fauna Guarantee Act 1988

Type	Status
Eastern Great Egret (<i>Ardea Modesta</i>)	<ul style="list-style-type: none"> • <i>Flora and Fauna Guarantee Act 1988</i> – listed
Musk Duck (<i>Biziura lobate</i>)	<ul style="list-style-type: none"> • Advisory List of Threatened Vertebrate Fauna in Victoria – vulnerable

Level of Protection Afforded to Water Dependent Receptors

The Regional Catchment Strategy⁴⁸ sets the environmental challenges, objectives and actions for land, water and biodiversity management in West Gippsland. The Regional Catchment Strategy is managed by the West Gippsland Catchment Management Authority. The Authority is responsible for managing land and water resources in the West Gippsland area.⁴⁹

The Latrobe Valley’s biodiversity is regulated, planned and managed in accordance with:

- *Flora and Fauna Guarantee Act 1998* (Victoria)
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
- Victorian Rare of Threatened Species Listings⁵⁰
- Advisory List of Threatened Vertebrate Fauna in Victoria⁵¹ (non-statutory listing)
- Victorian Government Biodiversity White Paper⁵²
- West Gippsland Catchment Management Authority Native Vegetation Plan⁵³
- West Gippsland Catchment Management Authority Regional Catchment Strategy⁵⁴

⁴⁸“*Regional Catchment Strategy*”, West Gippsland Catchment Management Authority, <http://www.wgcma.vic.gov.au/our-region/regional-catchment-strategy>

⁴⁹“*About West Gippsland Catchment Management Authority*”, West Gippsland Catchment Management Authority, <http://www.wgcma.vic.gov.au/#AboutUs>

⁵⁰“*Threatened species advisory lists*”, Department of Environment, Land, Water and Planning, <http://delwp.vic.gov.au/environment-and-wildlife/conserving-threatened-species-and-communities/threatened-species-protection-initiative/threatened-species-advisory-lists>

⁵¹ Advisory List of Threatened Vertebrate Fauna in Victoria, Department of Environment, Land, Water and Planning, https://www.environment.vic.gov.au/__data/assets/pdf_file/0014/50450/Advisory-List-of-Threatened-Vertebrate-Fauna_FINAL-2013.pdf

⁵²“*Regional Catchment Strategy*”, West Gippsland Catchment Management Authority, <http://www.wgcma.vic.gov.au/our-region/regional-catchment-strategy>

⁵³“*Native Vegetation Plan*”, West Gippsland Catchment Management Authority, 2003, <http://www.wgcma.vic.gov.au/wp-content/uploads/2016/04/2003-Native-Vegetation-Plan.pdf>

⁵⁴“*Securing Our Natural Future - A white paper for land and biodiversity at a time of climate change*”, Department of Sustainability and Environment, 2009

Key stakeholders involved in the regulation, planning and management of biodiversity include:

- Parks Victoria
- DELWP Biodiversity Branch
- Commonwealth Department of Energy and Environment
- West Gippsland Catchment Management Authority
- Latrobe City Council

E.3 Infrastructure

E.3.1 Electricity Transmission Networks

AusNet's high voltage power lines service Gippsland towns such as Leongatha, Yallourn and Morwell as well as the Hazelwood Mine and Power Station. The high voltage power lines are located in close proximity to Hazelwood coal mine's northern batters. A 500kV transmission line is located to the south of the Hazelwood Power Station and mine (running to Cranbourne) with another 500kV transmission line running north between Morwell and Traralgon (running to South Morang).

High voltage (500 - 220kV) networks connect Yallourn Power Station, Hazelwood Power Station and Loy Yang Power Station to the Australian Energy Market.

The Australian Energy Market Operator (AEMO) is responsible for operating Australia's electricity markets and power systems including the National Electricity Market (NEM), the interconnected power system in Australia's eastern and south-eastern seaboard.

The electricity transmission infrastructure is administered by asset managers and energy retailers. The region's electricity network owner, SP AusNet, has a long-term development plan outlining augmentation works required to meet expected load growth to 2041.⁵⁵

The Gippsland Regional Growth Plan⁵⁶ discusses the area's plant and electricity network centred in the Latrobe Valley as a significant asset for the region. The electricity generation has national strategic significance through its connection to the national grid.

⁵⁵ *Gippsland Regional Growth Plan*, Victoria Government, https://www.planning.vic.gov.au/__data/assets/pdf_file/0028/5896/Gippsland-Regional-Growth-Plan-May-2014.pdf

⁵⁶ *Gippsland Regional Growth Plan*, Victoria Government, https://www.planning.vic.gov.au/__data/assets/pdf_file/0028/5896/Gippsland-Regional-Growth-Plan-May-2014.pdf

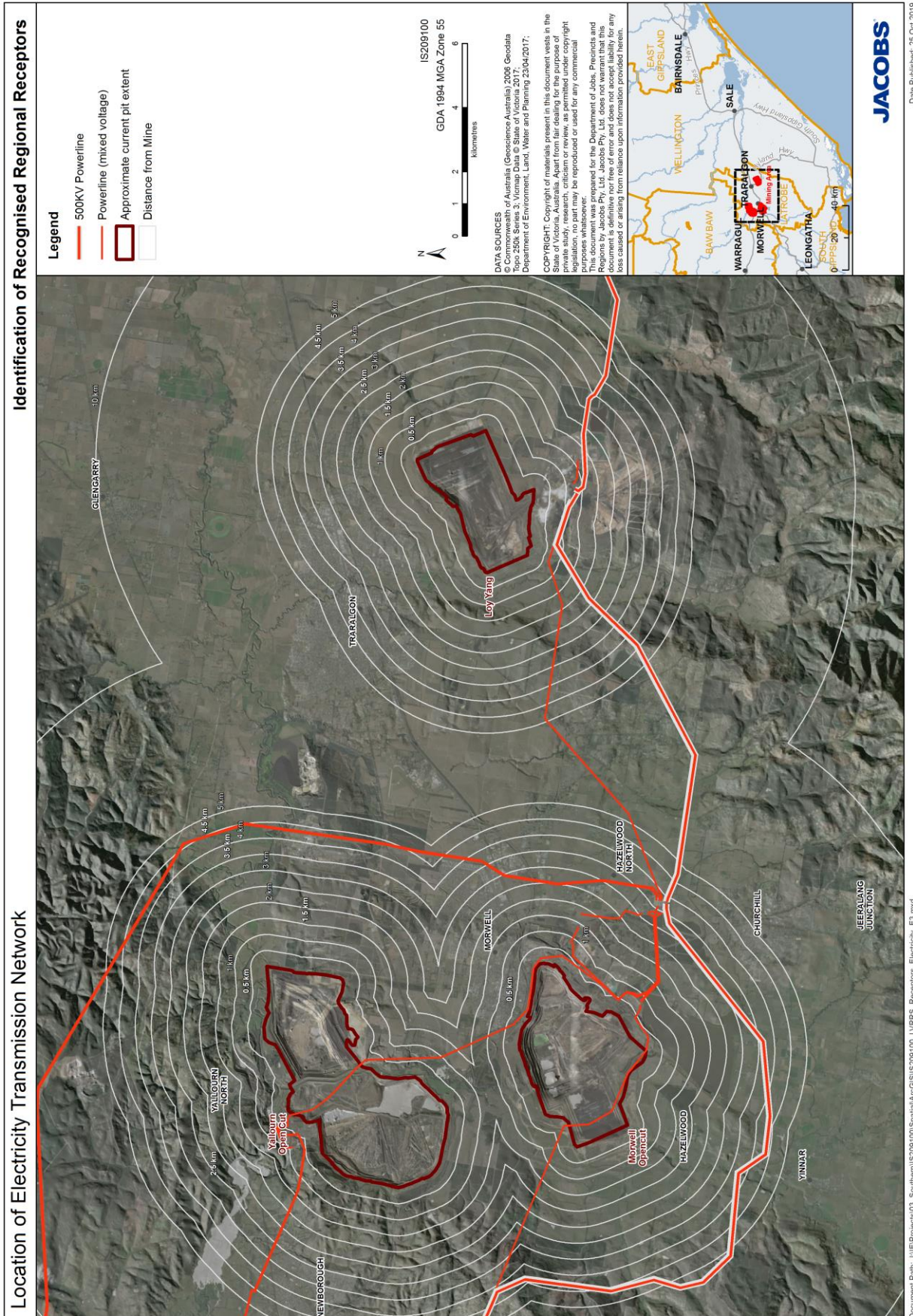


Figure E.3 – Location of the major elements of the electricity transmission network considered

Current Level of Protection Afforded to the Electricity Transmission Network Receptor

The safety of the electricity network is regulated through the *Electricity Act 1998* and corresponding regulations, administered by Energy Safe Victoria (ESV). The safety regulations that govern the safety of the electricity network include:

- *Electricity Safety (Electric Line Clearance) Regulations 2015*
- *Electricity Safety (Management) Regulations 2009*
- *Electricity Safety (Bushfire Mitigation) Regulations 2013*
- *Electricity Safety (Installation) Regulations 2009*

The *Electricity Industry Act 2000* regulates the Victorian electricity supply industry. It requires persons who generate, transmit, distribute, supply or sell electricity to obtain a license from the Essential Services Commission of Victoria (ESC), or a license exemption.

Live Work Latrobe (Housing Strategy, Industrial Land Use and Employment Strategy and Rural Land Use Strategy)⁵⁷ outlines the large prevalence of electricity infrastructure in the Latrobe Valley.

The Latrobe Planning Scheme applies controls to the use and development of land within 60 meters of a major electricity transmission line.

E.3.2 Roads – Freeway (State-Maintained) and Bridges

The M1 (or Princes Highway) is the main freeway that connects region to NSW and Melbourne. It begins at the NSW border and travels through Traralgon, Morwell, Moe, while passing all three coal mines (i.e. southern urban boundary of Morwell and northern boundary of Hazelwood to Yallourn mine). In the future the proposed Traralgon bypass may be located between Loy Yang and Traralgon. The only major road project currently underway in the area is the Princes Highway East Duplication Traralgon to Sale. The project allows for the proposed Traralgon bypass.

Strzelecki Highway connects the towns of Leongatha and Morwell and runs adjacent the Hazelwood Mine.

The Hyland Highway runs adjacent to the Loy Yang coal mine and connects the towns of Traralgon and Yarram. Latrobe Road runs adjacent to the Yallourn mine. All bridges on state-maintained roads in the inter-mine area are also included except for culverts as detailed in Section 5.

The Gippsland Transport Strategy 2008-2020⁵⁸ was developed to guide collective effort in improving the region's transport infrastructure and services. The strategy recognises the importance of maintaining these external road linkages from the region to major domestic markets.

The Gippsland Freight Strategy⁵⁹ sets out necessary actions to enable the efficient movement of the growing freight task to accommodate new and emerging industries. The strategy identifies investment into critical infrastructure, including upgrades to the Princes Highway and Strzelecki Highway.

⁵⁷ *Live Work Latrobe (Housing Strategy, Industrial Land Use and Employment Strategy and Rural Land Use Strategy)*, Latrobe City, http://www.latrobe.vic.gov.au/Building_and_Planning/Development/Current_Strategic_Projects/Live_Work_Latrobe_Housing_Strategy_Industrial_Land_Use_and_Employment_Strategy_and_Rural_Land_Use_Strategy

⁵⁸ *Gippsland Transport Strategy 2008-2020*, Gippsland Local Government Network, 2008, http://www.southgippsland.vic.gov.au/download/downloads/id/439/gippsland_transport_strategy_glgn_2008_-_2020.pdf

⁵⁹ *Gippsland Freight Strategy*, Gippsland Local Government Network, 2013, <http://railfreightalliance.com/wp-content/uploads/2014/06/Gippsland%20Freight%20Strategy%202013.pdf>

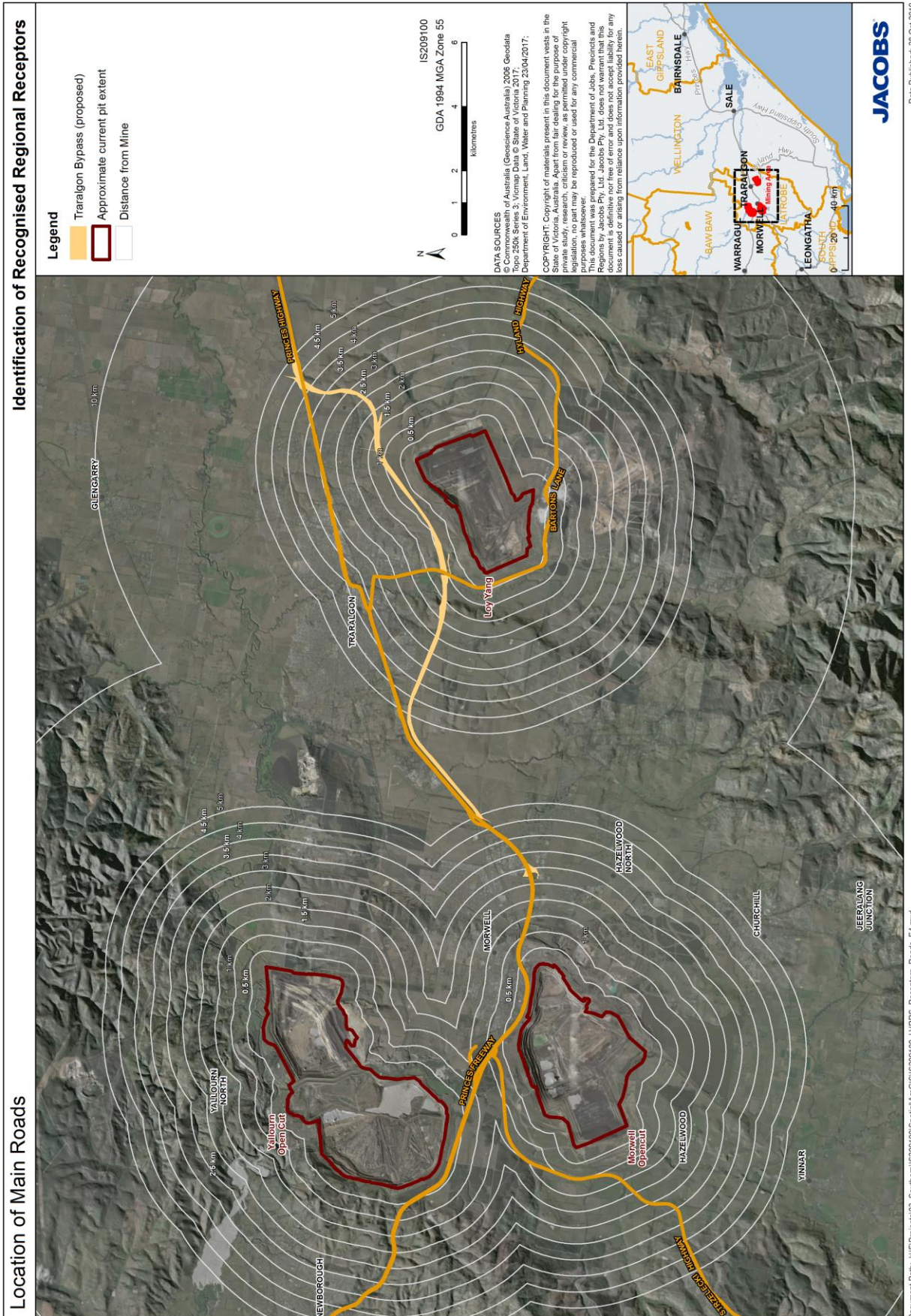


Figure E.4 – Location of major roads (in yellow).

Current level of Protection Afforded to the State Maintained Roads Receptor

The purpose of the *Road Management Act 2004* is to establish a coordinated management system for public roads that will promote safe and efficient state and local public road networks, as well as the responsible use of roads. VicRoads is responsible for administering this Act.

The Austroads *Guide to Road Design* (parts 1 to 8) are overarching documents that provide the framework for design and management of freeways across Australia. Additionally, Austroads also released an updated *Guide to Bridge Technology*⁶⁰ which provided a framework for planning, construction, design and management of new and older bridges – this is in accordance with AS 5100 (Bridge Design)

VicRoads is responsible for the planning, development and maintenance of major highways and thoroughfares, as well as associated road related infrastructure. The Strzelecki Highway, Highland Highway, Princes Highway and Latrobe Road are all Road Zone Category 1 Roads in which VicRoads are the coordinating roads authority.

The Latrobe Planning Scheme applies controls to the use and development of land adjacent to Category 1 Roads.

⁶⁰ *Guide to Bridge Technology, 2018* – Austroads 2018, <https://austroads.com.au/publications/bridges/agbt-set>

E.3.3 Roads – Local Council Maintained Roads and Bridges

Latrobe Road runs adjacent to the Yallourn mine, begins at Morwell and travels north towards the Latrobe River.

All bridges on local council maintained roads in the inter-mine area are also included except for culverts as detailed in Section 5.

The Latrobe Road Management Plan 2017⁶¹ was developed in accordance of Division 5 of the *Road Management Act 2004*. The plan addresses the maintenance standards and systems for road management functions and the levels of service for Latrobe City's bridges, paths, road pavement and associated infrastructure.

The Bridge and Major Culvert Asset Management Plan 2009-2013⁶² was developed to improve Latrobe City Council's long-term strategic management of its bridges and major culverts to ensure infrastructure is sustainable, appropriate and responsive to the changing community.

Current level of protection afforded to Local Council Maintained Roads and Bridges Receptor

The purpose of the *Road Management Act 2004* is to establish a coordinated management system for public roads that will promote safe and efficient state and local public road networks, as well as the responsible use of roads. Latrobe City Council is responsible in developing a Road Management Plan in response to the *Road Management Act 2004*. This includes:

- Austroads *Guide to Road Design* (Parts 1 to 8) are over-arching documents that provide the framework for design and management of freeways across Australia; and
- Austroads updated *Guide to Bridge Technology* which provided a framework for planning, construction, design and management of new and older bridges – this is in accordance with AS 5100 (Bridge Design).

E.3.4 Gas and Liquid Pipelines

Several entities operate gas transmission/distribution pipelines in the Latrobe Valley (see Figure E.5). They include⁶³:

- APA VTS Australia (Operations) Pty Ltd (Pipeline licences 50, 67, 75) – pipeline used to transport natural gas including Morwell to Dandenong, Maryvale, and Longford to Dandenong;
- Australian Gas Networks (Vic) Pty Ltd (Pipeline licence 215) – pipeline used to transport natural gas to Melbourne and supports offshoots to other towns en-route;
- Energy Australia (from Yallourn) has an application for a gas transmission line pending with the DJPR (Pipeline licence 272) from Yallourn mine to the main corridor;
- Esso Australia Resources Pty Ltd operates pipelines (LPG-PL 27/34, Oil (suspended) - PL 35/126 and Oil - PL 282); and
- CarbonNet has undertaken feasibility studies for various CO₂ pipeline options. The feasibility studies undertaken by CarbonNet parallel existing pipeline corridors.

Gippsland produces 97% of Victoria's natural gas, from offshore east of Ninety Mile Beach. The Gippsland Regional Growth Plan⁶⁴ discusses the importance of gas production and transmission as a driver of economic growth in both Gippsland and Victoria. The strategy advocates for the expansion of production in alternative locations.

⁶¹ *Road Management Plan 2017*, Latrobe City, 2017, http://www.latrobe.vic.gov.au/files/63bcc9c3-e8d8-4666-887a-a85c00e1b6e7/Road_Management_Plan_2017-2021_Ver_4_-_Adopted_Webpage_21082017.docx

⁶² *Bridge and Major Culvert Asset Management Plan 2009-2013*, Latrobe City, 2009, http://www.latrobe.vic.gov.au/files/46d6c83f-4a93-412e-a3b6-a0c300f2d511/Bridge_Major_Culvert_Asset_Management_Plan_2009-2013_adopted_15_June_2009.pdf

⁶³ Earth Resources - GeoVic - Explore Victoria Online - Department of Economic Development, Jobs, Transport and Resources http://er-info.dpi.vic.gov.au/sd_weave/anonymous.html 2016

⁶⁴ *Gippsland Regional Growth Plan*, Victoria Government, https://www.planning.vic.gov.au/__data/assets/pdf_file/0028/5896/Gippsland-Regional-Growth-Plan-May-2014.pdf

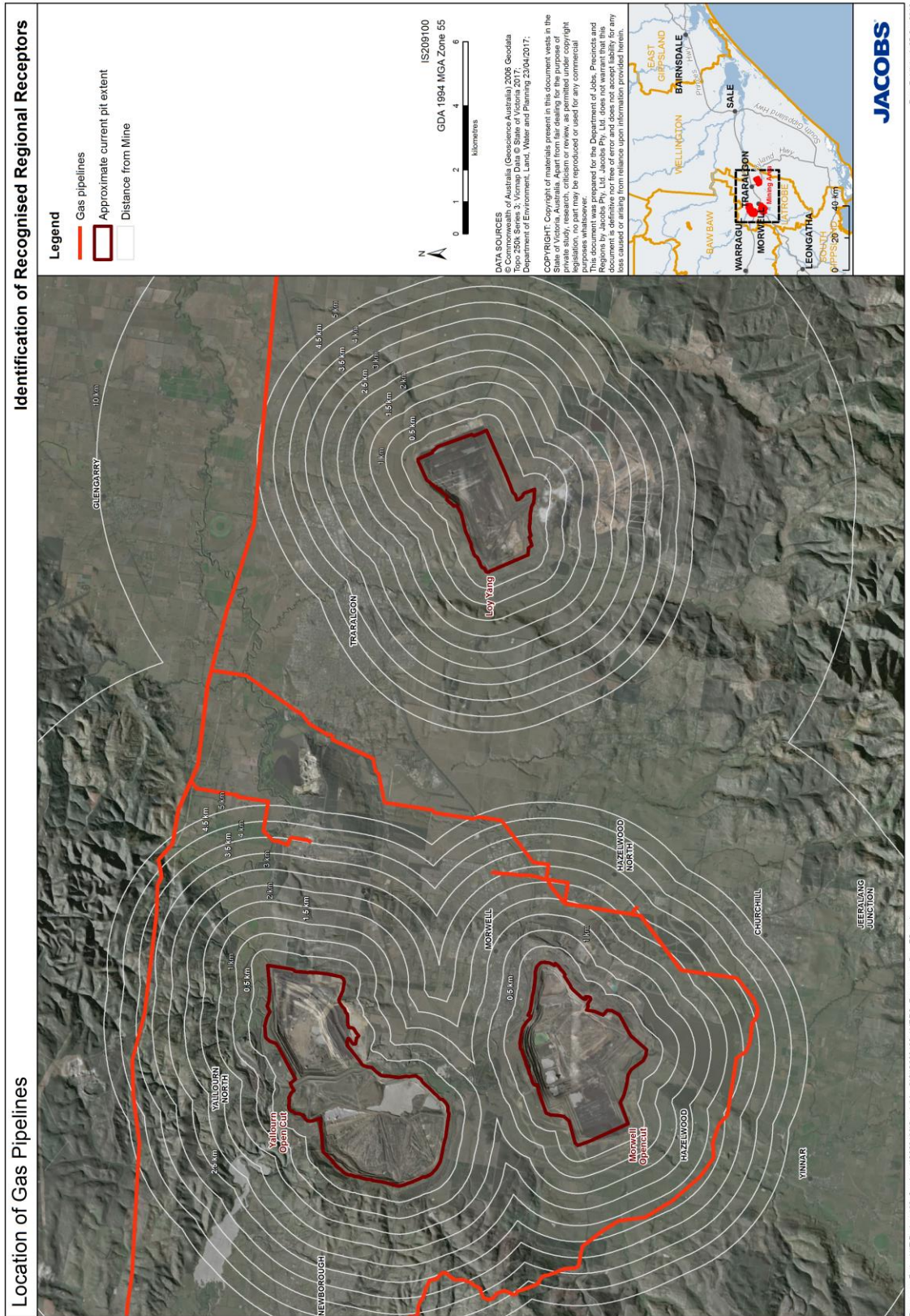


Figure E.5 – Location of Gas and petroleum liquid pipelines in the Latrobe Valley⁶⁵

⁶⁵ Source: Department of Jobs, Precincts and Regions

Current Level of Protection Afforded to the Gas and Liquid Pipelines Receptor

The establishment or relocation of the gas transmission pipeline is regulated by DJPR through the *Pipelines Act 2005*. The operation and maintenance of licensed pipelines is governed by the *Pipelines Act 2005* and the *Pipelines Regulations 2017* and is administered by Energy Safe Victoria. The requirements include compliance with AS 2885.3-2012, and the need for any change that may introduce a risk to the pipeline to be assessed as per the Safety Management Study process outlined in AS 2885.1-2012 or the upcoming release of AS 2885 Part 6 (AS 2885.6-2018).

The *Gas Safety Act 1977* applies, provisioning the safe distribution and use of gas.

The following regulations are applicable:

- *Gas Safety (Gas Installation) Regulations 2008*
- *Gas Safety (Safety Case) Regulations 2008*
- *Gas Safety (Gas Quality) Regulations 2017*

The Latrobe Planning Scheme applies controls to the use and development of land for the purpose of a utility installation in which a pipeline is assessed under.

E.3.5 Operating Coal Mines

The majority of Victoria’s electricity (approximately 85%) is presently generated from brown coal fired power stations in the Latrobe Valley, located in Loy Yang and Yallourn with an operating coal mine located at each site respectively.

The operation and maintenance of the Loy Yang and Yallourn power stations is privately managed by AGL and Energy Australia respectively, with generated electricity sold on Australia’s National Electricity Market.

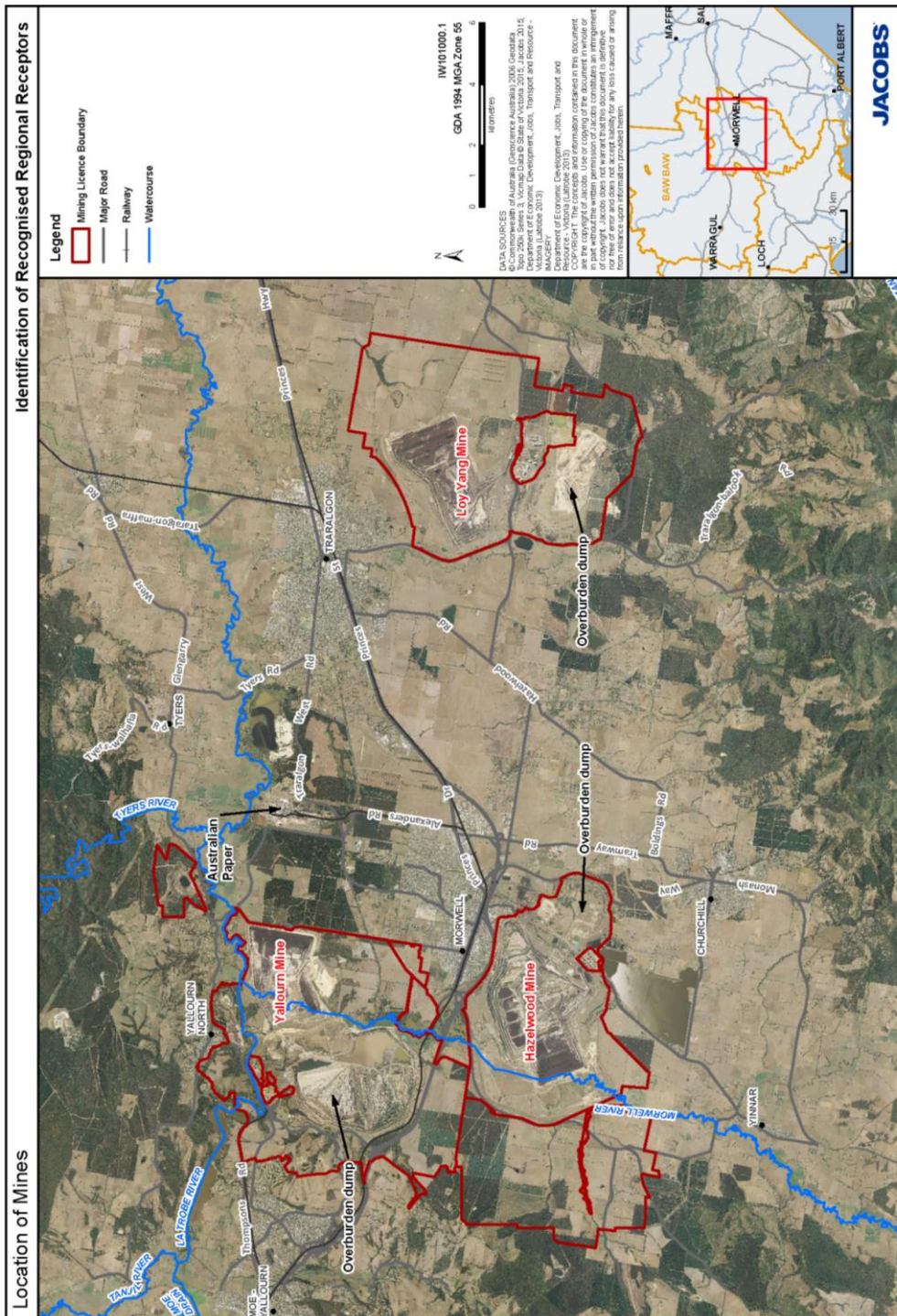


Figure E.6 – Aerial image of coal fired power stations

Current Level of Protection Afforded to the Operating Coal Mines Receptor

The purpose of the *Mineral Resources (Sustainable Development) Act 1990* is to encourage mineral exploration and economically viable mining and extractive industries which make the best use of, and extract the value from, resources in a way that is compatible with the economic, social and environmental objectives of the State.

The Latrobe Planning Scheme applies controls to the use and development of land adjacent to a coal mine.

E.3.6 Gas Fired Power Station

Jeeralang Power Station is a 450MW gas turbine power station located 6 km south of Morwell. It is used exclusively as a peaking facility and is owned by Ecogen Energy.

Current Level of Protection Afforded to the Gas Fired Power Station Receptor

Gas fired power generation is regulated by *Electricity Industry Act 2000*, which requires persons who generate, transmit, distribute, supply or sell electricity to obtain a licence from the Essential Services Commission of Victoria. In addition to this the *Electricity Safety Act 1998* provides for the safety of electricity supply and use in Victoria, and the efficiency of electricity equipment. This is administered by Energy Safe Victoria.

The *Energy Safe Victoria Act 2005* establishes Energy Safe Victoria (ESV) as the safety regulator for Victoria for electricity and gas.

The Latrobe Planning Scheme applies controls to the use and development of land adjacent to a gas fired power station.

E.3.7 Rail

The Melbourne to Bairnsdale train line passes in close proximity to Yallourn's mining licence boundary. The train line is owned by VicTrack and operated by V/Line. V/Line and Public Transport Victoria are responsible for the planning, development and maintenance of the Melbourne to Traralgon rail services.

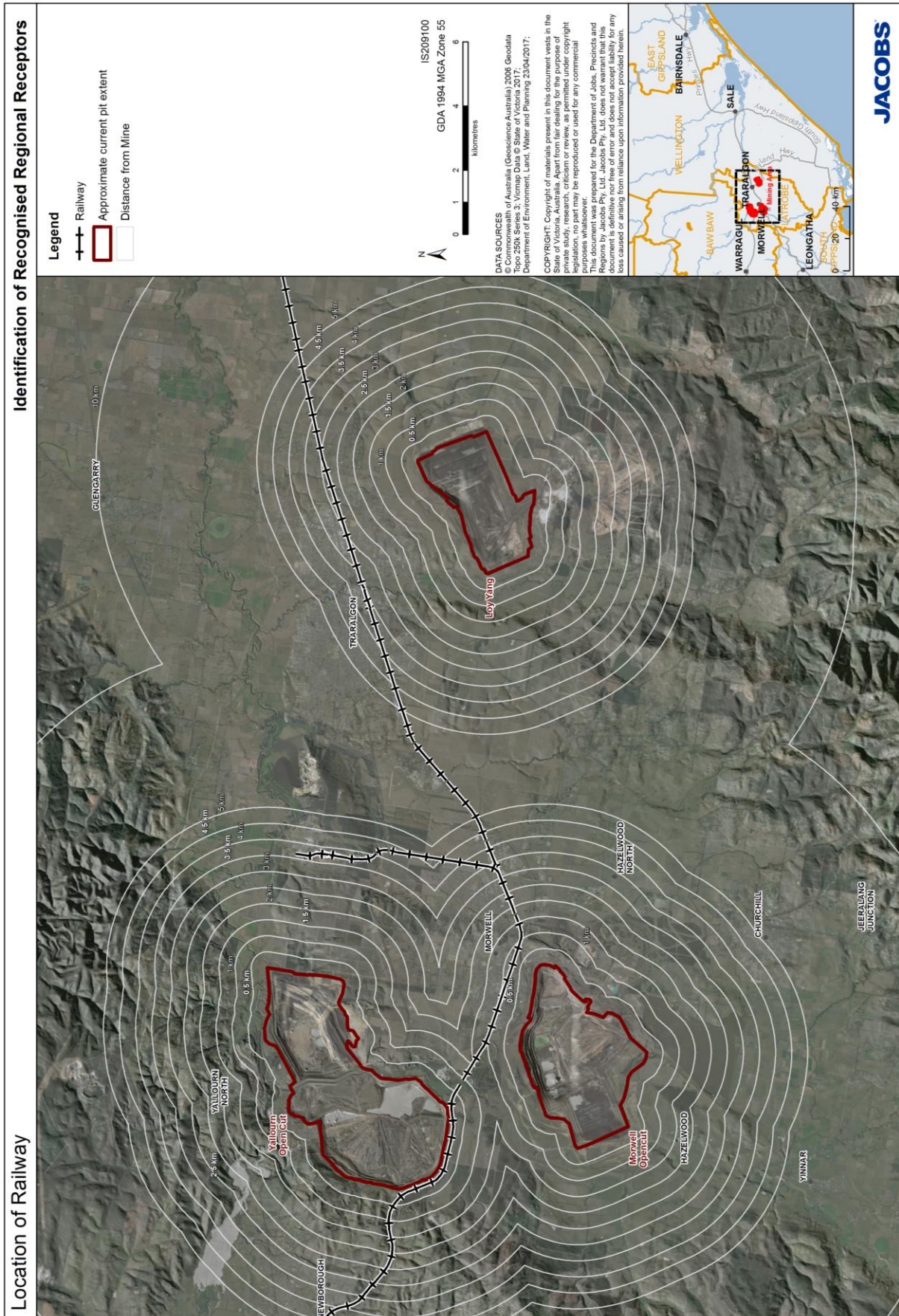


Figure E.7 – Location of rail network

Current Level of Protection Afforded to the Rail Receptor

The regime for the management of rail infrastructure is set out in the *Rail Management Act 1996* (Victoria).

The Connecting Regional Victoria Plan for Gippsland⁶⁶ outlines a range of measures to ensure the rail infrastructure is able to support the region's needs. This includes improving the reliability, frequency and timeliness of services between Melbourne and Traralgon but no major line upgrades.

Other documents that prioritise rail infrastructure at a regional level include:

- Gippsland Transport Strategy (2008)⁶⁷
- Gippsland Freight Strategy (2013)⁶⁸
- Latrobe Valley and East Gippsland Rail-freight Task Assessment (2012)

The Latrobe Planning Scheme applies controls to the use and development of land in which a rail line transects.

E.3.8 Telecommunications

The fixed-line network cables and infrastructure that facilitate telecommunications between Hazelwood (area) and Yallourn (area) is owned by Telstra. Telecommunications services to the transport and government sector are provided by VicTrack which is a licensed telecommunication provider, with network infrastructure that includes the railway corridor. In addition to the fixed line infrastructure, there is an extensive mobile tower network, that is connected by either fixed line or wireless methods as well.

Figure E.8 shows the telecommunication mobile / transmitting and radio base stations in the Latrobe Valley. The blue dots represent an Australian Communications and Media Authority (ACMA) site with at least one assignment (that is a service that is assigned or managed by ACMA) and the green dots represent an ACMA site with no assignments (but which will still have other radio infrastructure). The base stations include towers and associated communication infrastructure. These may be mobile, radio frequency or microwave equipment and may include NBN equipment.

⁶⁷ Source: Department of Economic Development, Jobs, Transport and Resources
http://economicdevelopment.vic.gov.au/__data/assets/pdf_file/0003/1308918/CRV-Gippsland.pdf

⁶⁷ *Gippsland Transport Strategy 2008-2020*, Gippsland Local Government Network, 2008,
http://www.southgippsland.vic.gov.au/download/downloads/id/439/gippsland_transport_strategy_glgn_2008_-_2020.pdf

⁶⁸ *Gippsland Freight Strategy*, Gippsland Local Government Network, 2013, <http://railfreightalliance.com/wp-content/uploads/2014/06/Gippsland%20Freight%20Strategy%202013.pdf>

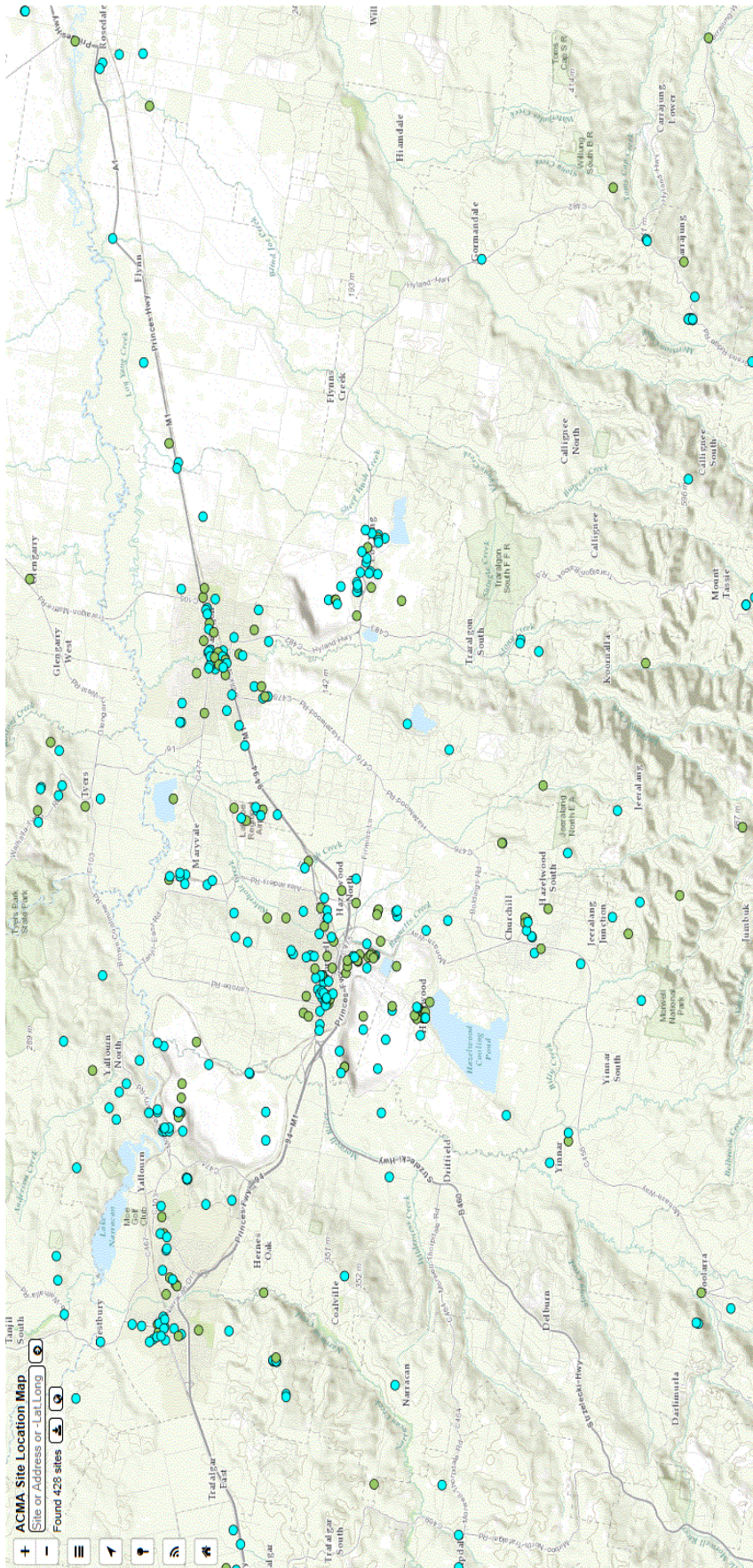


Figure E.8 – Location of telecommunication assets (base stations) in the Latrobe Valley (Source ACMA website)

Level of Protection Afforded to the Telecommunications Receptor

The *Australian Telecommunications Act 1997* outlines that telecommunication carriers are responsible for the maintenance and installation of new infrastructure on public and private properties. ACMA provide technical standards relating to personal health and safety and protecting the integrity of the telecommunications network.

Regional infrastructure such as telecommunications services is recognised under the Gippsland Regional Growth Plan⁶⁹ as being necessary to support the future growth in the Gippsland region.

E.4 Land

E.4.1 Towns

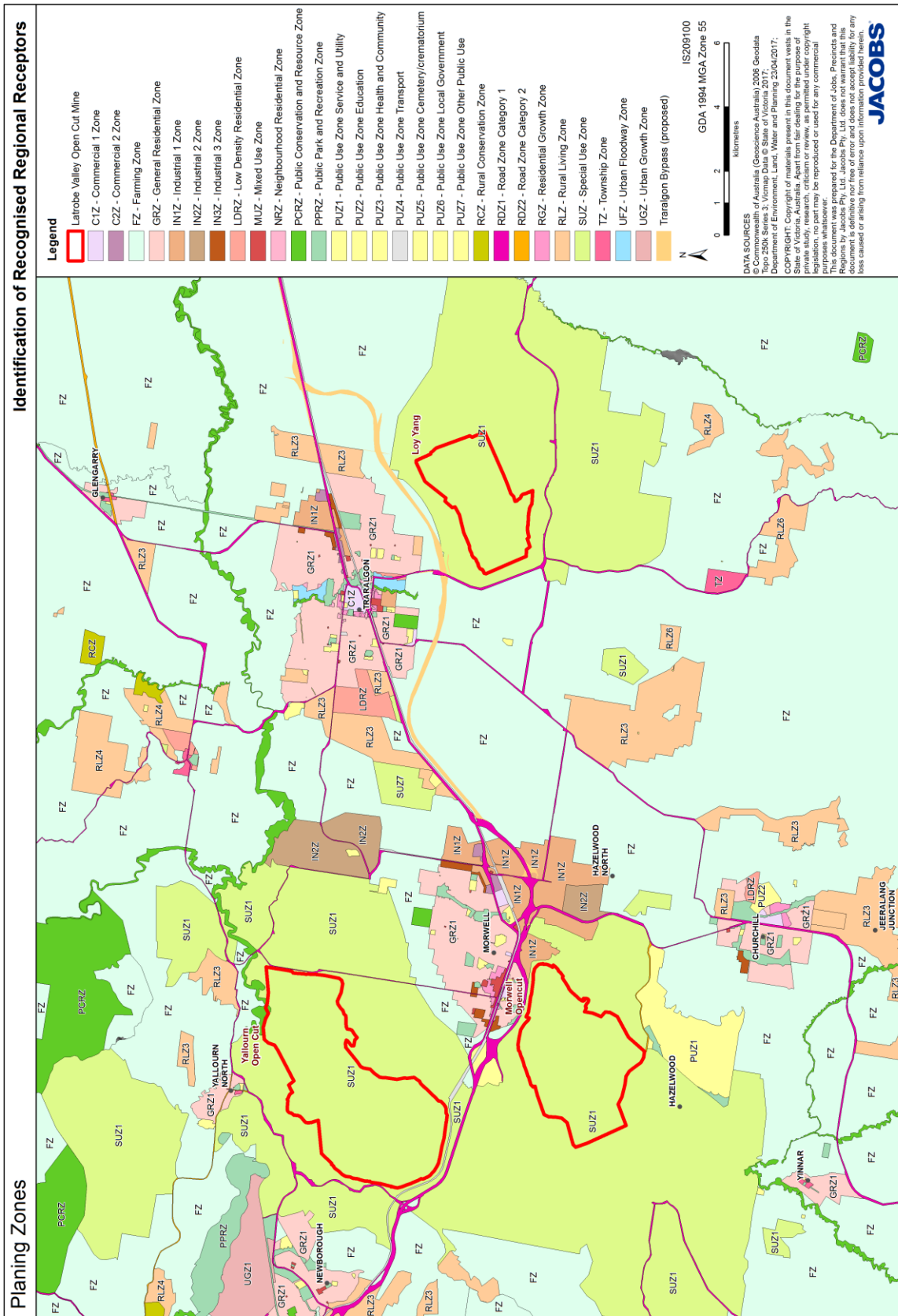
There are a large number of towns and urban areas throughout the region. This receptor includes all of the residential and urban land types within the region. These are well defined by the various municipal planning schemes and are publicly published on-line. The receptor database includes all the urban areas that are included in the planning schemes. As they are too numerous to list in detail here and not all will be relevant in future studies (depending on the findings of later stages of the LVRRS), the figures and discussions below only present some selected and high-profile areas. For the full listed, please refer to the receptor database or the planning maps available online.

This receptor also includes areas that are proposed and thus fall into the category of “reasonably foreseeable” as a receptor. These are also included in the full database listing.

By way of example, Traralgon is located approximately 2km to the north of Loy Yang mine at present and future growth that has been recognised by reviews of land use (the Traralgon Growth Areas Review) has indicated growth of residential land to the south, potentially to within 1km of the Loy Yang mine lease boundary. The southern urban boundary of Morwell (zoned General Residential) is located approximately 60m from the Special Use Zone containing the Hazelwood coal mine (Northern Mine wall).

Depending on the extent of possible future effects there are a wide range of urban and residential areas that could be materially affected, and these will need to be assessed on a case by case basis in future stages of the LVRRS. This study notes the potential material links and designates the receptors for quantitative assessment. Figure E.9 illustrates the local government planning zones in the area which illustrates different land receptor types.

⁶⁹ *Gippsland Regional Growth Plan*, Victoria Government, https://www.planning.vic.gov.au/__data/assets/pdf_file/0028/5896/Gippsland-Regional-Growth-Plan-May-2014.pdf



Date Published: 25 Oct 2019

Figure E.9 – An illustration of the urban and residential land types within the vicinity of the pits that form part of this receptor type.

Level of Protection Afforded to Towns Receptor

Protection is provided through the provisions of the planning schemes and the *Planning and Environment Act 1987*. This protection is comprehensive and has a high level of process and review associated with it.

Latrobe City Council is responsible for approving future residential, commercial and industrial development for the vast majority of the Latrobe Valley (Baw Baw Shire and Wellington Shire Council have responsibility for areas of the Latrobe Valley outside of Latrobe City). Latrobe City Council⁷⁰ has a number of endorsed development plans for townships including the Morwell West Development Plan. The Morwell West Development Plan is adjacent to the urban buffer between Yallourn coal mine and Morwell.⁷¹

E.5 Water

There are several different water receptor types, and these are covered in the sub-categories below.

E.5.1 Drains

The Morwell Main Drain is located adjacent to the Hazelwood coal mine (between the Princes Freeway and the coal mine).

Level of Protection Afforded to the Drains Receptor

The management of storm water infrastructure is the responsibility of the Latrobe City Council, under the *Local Government Act 1989*.

E.5.2 Aquifers and Groundwater Use

A system of groundwater aquifers is intersected by and underlie the coal mines. The three major aquifer systems that have the greatest impact on the three coal mines are the:

- Upper (or near-surface and shallow) aquifer system;
- Middle (including the Morwell Formation) aquifer system; and
- Lower (including the Traralgon Formation) aquifer system.

The Gippsland groundwater basin is a large sedimentary basin (covering about 46,000 km²) which extends offshore beneath Bass Strait (approximately two-thirds is located offshore).

The groundwater basin is subdivided for management purposes into three broad layers; the upper, middle and lower aquifers. The aquifer layers are generally separated from one another by aquitards.

The upper aquifers of the Gippsland basin occur along the river valleys, floodplains and near the coast. They consist of coarse sand and thick gravel sediments at shallow depths. They also feature the clay aquitard of the Haunted Hills Formation, which overlies most of the sedimentary basin. The upper aquifers occur at or near the ground surface, so they receive recharge directly from rainfall, streamflow or floods, and discharge to streams and lakes.

Middle aquifers cover a large part of the Gippsland groundwater basin from Moe to Bairnsdale. They comprise thick seams of sand aquifers separated by aquitards. The aquitards are generally clay or coal seams in the north-west of the Gippsland groundwater basin, and limestone in the east and centre of the basin. Recharge is thought to occur from leakage through the overlying and surrounding sediments, and discharge is to the limestone aquitards to the east of the basin and along the coast.

Lower aquifers extend across the Gippsland basin and offshore. They comprise thick sand sediments that rise to the surface in the west and along the basin margin but are very deep along the coast and offshore. These

⁷⁰"Endorsed Development Plans", Latrobe City Council, http://www.latrobe.vic.gov.au/Building_and_Planning/Development/Endorsed_Development_Plans

⁷¹"Morwell Development Plan", Latrobe City Council, October 2015, http://www.latrobe.vic.gov.au/Building_and_Planning/Development/Endorsed_Development_Plans, page 5

aquifers are overlain by the upper and middle aquifers together with thick silt, clay, coal and limestone aquitards, while underlain by basement rock. Where the lower aquifers occur at or near the surface, they receive direct recharge from rainfall and river leakage, while in the deeper basin recharge occurs by downward leakage. Discharge occurs offshore in Bass Strait.⁷²

The three main lignite bearing sequences identified in the Latrobe Valley are the Traralgon, Morwell and Yallourn formations. Non-coal, interseam material comprises sand, silt and clay. The interseam lithology varies rapidly across the valley and contain local and regional scale aquifers.

Two major Tertiary aquifer systems (Morwell Formation Aquifer System and the M2/Traralgon Formation Aquifer System) are partially separated by aquitards consisting of coal, clay and silt. A group of generally unconfined to semi confined aquifers (Pliocene to recent) represent a third, shallow regional aquifer system (Shallow Aquifer System). Figure E-10 shows a schematic hydrogeological cross section from the Yallourn East Mine Field Mine, through Hazelwood Mine and eastward to the Loy Yang Mine, defining the major aquifers within the Latrobe Valley mining area.⁷³

⁷² "Review of baseline data on water resources in the Latrobe Valley" (Report in preparation by DJPR)

⁷³ *Hazelwood Mine Fire Inquiry Report 2015/2016 – Volume IV, Mine Rehabilitation*, Hazelwood Mine Fire Inquiry, April 2016, <http://hazelwoodinquiry.vic.gov.au/201516-report/volume-iv-mine-rehabilitation/index.html>

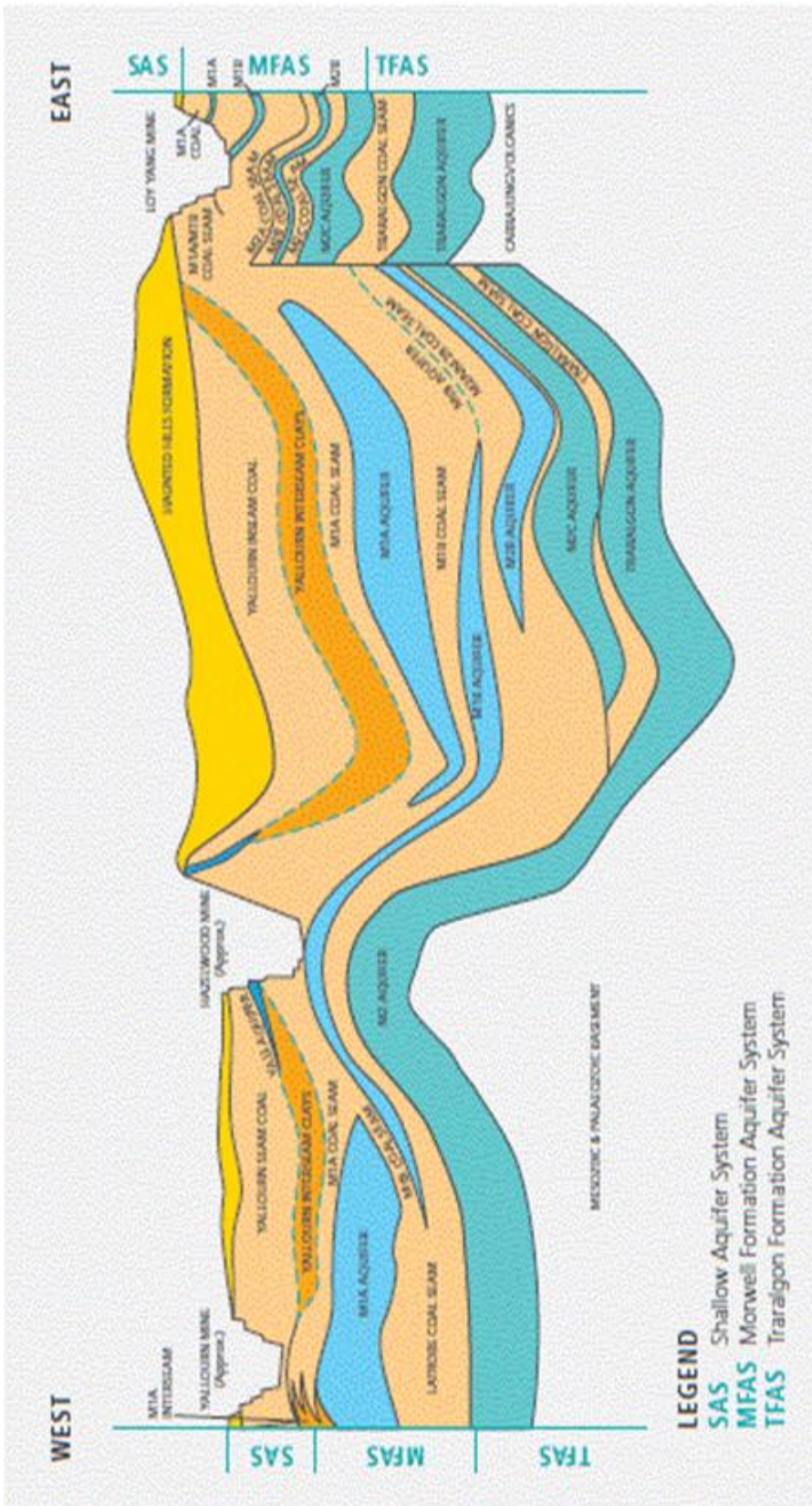


Figure E-10 Schematic drawing representing hydrogeological features of the Latrobe Valley aquifer systems and mines⁷⁴

⁷⁴"Hazelwood Mine Fire Inquiry Report 2015/2016 – Volume IV, Mine Rehabilitation", Hazelwood Mine Fire Inquiry, April 2016, <http://hazelwoodinquiry.vic.gov.au/201516-report/volume-iv-mine-rehabilitation/index.html>, page 31

Level of Protection Afforded to Aquifers and Groundwater Use Receptor

The *Victorian Water Act 1989* requires that anyone wishing to extract groundwater (except domestic and stock users) must apply for a groundwater abstraction licence. Groundwater abstraction licences are issued by the relevant rural water corporation to protect the rights of licence holders, ensure that water is shared amongst users and to ensure that environmental requirements are protected.

Under the Victorian *Environment Protection Act 1970*, the State Environment and Protection Policy (Waters) maintains and, where necessary, improves groundwater quality to a standard that protects existing and potential beneficial uses of groundwater. It sets a consistent approach to, and provides quality objectives for, groundwater protection throughout Victoria.

E.5.3 Water Rights and Entitlement Holders

Water entitlements consider surface water and groundwater resources for both consumptive and environmental purposes at all phases of the water cycle.

The Victorian Minister for Water issues entitlements under the *Water Act 1989*, which include:

- Bulk entitlements
- Environmental entitlements (one component of the Environmental Water Reserve – see also below)
- Water shares
- Water licences

Furthermore, the *Water Act 1989* allows individuals to take water for domestic and stock purposes from a range of surface water and groundwater sources without a licence. These domestic and stock rights are defined under section 8(1) and section 8(4)(c) of the *Water Act 1989* and are not formally issued. They include farm dams for domestic and stock purposes.

- The Environmental Water Reserve (EWR) is the legally recognised amount of water set aside to meeting environmental water needs. The objective of the EWR is to preserve the environmental values and health of water ecosystems’ – as defined in the *Water Act 1989*. Key components of the EWR include: passing flows, Environmental Entitlements, and above-cap water.
 - Passing flows are water that is released from storages (such as reservoirs) to operate river and water distribution systems. Passing flows help maintain environmental values and other community benefits.
 - There are two Environmental Entitlements in the Latrobe River system which are held by the Victorian Environmental Water Holder (VEWH). The Minister for Water issues environmental entitlements under the Act so that water can be managed to meet needs like fish spawning triggers or to maintain critical habitats during drought.
 - Above cap water is the water which is left over after passing flows have been met and all take under an entitlement or right has been extracted. In unregulated systems, this is most of the flow in the river that remains after water users have extracted water available under their entitlements or right. In regulated systems this is the flow in the river which is not allocated under entitlements and is not meeting a requirement downstream. This may occur when storages spill and there is not sufficient airspace in storages or consumptive demand downstream to make use of this water.

Level of Protection Afforded to Water Rights and Entitlement Holders Receptor as well as Environmental Water Reserve Receptor

The Victorian government manages the allocation of all water resources (surface water and groundwater) across the state in accordance with the *Water Act 1989*.

Appendix F. Receptor Inventory

In the table below, the receptor owner/custodian has been identified, as well as the document/s that provide for the protection of the receptor. A spatial database that defines the extent of most of the receptors (where they have mapped boundaries) has also been provided as part of this work.

F.1 Aboriginal and non-Aboriginal Cultural Heritage

Table 6-13 - List of recognised regional receptors for Aboriginal and Cultural Heritage

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
Aboriginal cultural heritage	<p>Tangible</p> <ul style="list-style-type: none"> Over 360 Aboriginal Places recorded in Latrobe Valley including along Morwell River Aboriginal Places are recorded in all three mine licence areas Broader/regional values including intangible and cultural values of the area <p>Intangible</p> <ul style="list-style-type: none"> Aboriginal cultural significance attached to water places and form Post-European settlement water flow and availability patterns that support specific social activities 	<ul style="list-style-type: none"> Aboriginal Victoria Gunaikurnai Land and Waters Aboriginal Corporation 	<ul style="list-style-type: none"> Aboriginal Victoria (<i>Aboriginal Heritage Act 2006 (as amended 2016)</i> (State), <i>Aboriginal Heritage Regulations 2018</i> (State), <i>Traditional Owner Settlement Act 2010</i> (State)) Commonwealth Department of Environment and Energy (<i>Environment Protection and Biodiversity Conservation Act 1999</i>, <i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>) National Native Title Tribunal (<i>Native Title Act 1993</i> (Commonwealth)) Gunaikurnai Traditional Owner Land Management Board and Gunaikurnai Land and Waters Aboriginal Corporation represent Indigenous interests in the areas.
non-Aboriginal cultural heritage	<ul style="list-style-type: none"> 14 heritage precincts 152 individual historical heritage places of local significance 38 places of potential significance to be further investigated 6 Victorian Heritage Register places of state significance 	<ul style="list-style-type: none"> Heritage Victoria Department of Economic Development, Jobs, Transport and Resources (DJPR) 	<ul style="list-style-type: none"> Latrobe City Heritage Study (2010) Latrobe City Heritage Strategy (2014) <i>Heritage Act 2017</i> (Vic)
	<ul style="list-style-type: none"> Australian Paper Mill (APM Staff House 2, APM Staff Housing group, APM Staff House 3, APM Staff House 1) Loy Yang Open Cut (upon closure) Morwell Open Cut Morwell Power Station The Great Morwell Brown Coal Mine Yallourn North Extension Open Cut 		

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
	<ul style="list-style-type: none"> • Yallourn North Open Cut • Yallourn Open Cut (upon closure) 		
	<ul style="list-style-type: none"> • Arva • Burn Brae • Cairnbrook Farm Complex • Eastern Railway Line • Gormandale Cooperative Creamery and Butter Building (former) • Hazelwood Open Cut • Hazelwood Power Station • Horseshoe Vale Homestead • Hoyles Residence (former) • Lilitree • Morwell National Park (original) • St Marks Anglican Church • Star Hotel (former) • Traralgon Courthouse and Post Office • Traralgon Hotel • Traralgon Park Homestead • Yinnar Butter Factory (former) 	<ul style="list-style-type: none"> • Department of Environment and Energy (DoEE) 	

F.2 Environment

Table 6-14 – List of recognised regional receptors for Environment

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
Listed species⁷⁵	<ul style="list-style-type: none"> Bird species (Powerful Owl and Eastern Great Egret) Gippsland Dolphin Frog species (Spotted Tree Frog) Invertebrates (Giant Gippsland Earthworm) Mammals (Australian Fur Seal, Blue Whale, Grey-headed flying fox, Long-footed potoroo, Humpback Whale and Southern Right Whale) Plant species/aquatic flora (Matted Flax Lilly, Strzelecki Gum, Aniseed Boronia, Dwarf Kerrawang, Leafy Greenhood, Maroon Leak-orchid, River Swamp Wallaby-grass Swamp Everlasting and Swamp Greenhood) Reptiles (Leatherback Turtle) 55 bird habitats (marine/intertidal/migratory e.g. Eastern Great Egret) 	<ul style="list-style-type: none"> Department of Environment, Land, Water and Planning (DELWP) 	<ul style="list-style-type: none"> Listed as threatened species and protected in the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
	<ul style="list-style-type: none"> Fish species (Australian Grayling and Eastern Dwarf Galaxias) Bird species (Musk Duck) Frog species (Green and Golden Bell Frog, Growling Grass Frog, Burrowing Frog, Spotted Tree Frog) 	<ul style="list-style-type: none"> Department of Environment, Land, Water and Planning (DELWP) 	<ul style="list-style-type: none"> Listed as vulnerable species and protected in the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
Rivers, waterways and natural lakes	<ul style="list-style-type: none"> Morwell River Yallourn to the east Latrobe River Yallourn to the north and lower reaches Tanjil River (feed to Latrobe River) (Declared Water Supply Catchment) Tyers River (feed to Latrobe River) (Declared Water Supply Catchment) Rintoul's Creek (feed to Latrobe River) 	<ul style="list-style-type: none"> DELWP West Gippsland Catchment Management Authority (CMA) 	<ul style="list-style-type: none"> Gippsland Region Sustainable Water Strategy (2017) West Gippsland Waterway Strategy (2014)

⁷⁵ As strictly specified under *Environment Protection and Biodiversity Conservation Act 1999*.

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
	<ul style="list-style-type: none"> • Traralgon Creek (near Loy Yang) • Flynns Creek (near Loy Yang) • Bennett's Creek • Lake Wellington • Lake Victoria • Sheepwash Creek (near Loy Yang) • 		
Terrestrial habitats	<ul style="list-style-type: none"> • Native vegetation in West Gippsland Catchment • Four threatened ecological communities in the Gippsland Basin (Gippsland Red Gum grassy woodland, Littoral Rainforest and Coastal Vine Thicket, Seasonal Herbaceous wetlands, and White Yellow-Box grassy woodland) • Gippsland Red Gum Community 	<ul style="list-style-type: none"> • West Gippsland CMA 	<ul style="list-style-type: none"> • Listed as threatened ecological communities and protected in in the <i>Environment Protection and Biodiversity Conservation Act 1999</i> • West Gippsland Catchment Management Authority Native Vegetation Plan (2003)
Water-Dependent Habitats	<ul style="list-style-type: none"> • Groundwater Dependent Ecosystems – specific habitats and aquatic flora which are groundwater-dependant, such as wetlands as defined by the GDE atlas 	<ul style="list-style-type: none"> • West Gippsland CMA 	<ul style="list-style-type: none"> • Groundwater Dependent Ecosystems are listed and protected in the <i>Environment Protection and Biodiversity Conservation Act 1999</i> • Gippsland Bioregional Assessment (2015)
Wetlands	<ul style="list-style-type: none"> • Gippsland Lakes Ramsar Site • 24 water dependent wetlands in the Gippsland Basin (excluding Lake Victoria and Lake Wellington) • Lake Wellington Wetlands • Lake Victoria Wetlands • Morwell River Wetlands bordering Yallourn 	<ul style="list-style-type: none"> • DELWP • Parks Victoria • EGCMA • WGCMA 	<ul style="list-style-type: none"> • <i>Water Act 1989</i> • West Gippsland Regional Catchment Strategy (2016) • West Gippsland Waterway Strategy (2014)
	<ul style="list-style-type: none"> • Lower Latrobe Wetlands (Sale Common, Dowd Morass, Heart Morass) 	<ul style="list-style-type: none"> • West Gippsland CMA 	<ul style="list-style-type: none"> • Gippsland Lake Ramsar Site listed and protected in the Gippsland Lakes RAMSAR Site Management Plan

F.3 Infrastructure

Table 6-15 – List of recognised regional receptors for Infrastructure

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
Airports	<ul style="list-style-type: none"> Latrobe Regional Airport 	<ul style="list-style-type: none"> Latrobe City Council 	<ul style="list-style-type: none"> Latrobe Regional Airport Master Plan (2015)
Alternate Energy Sources	<ul style="list-style-type: none"> Future biofuels facility for the processing of agricultural or timber residuals located in the mine scale or inter-mine scale Future waste to energy facility located in the mine scale or inter-mine scale 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> Gippsland Waste and Resource Recovery Implementation Plan (2017)
Bridges	<ul style="list-style-type: none"> Any structure that supports a road or pedestrian crossing, other than a culvert crossing. Key bridge structures have been identified along the Princes freeway – are associated with the road receptor location. No specific asset listed was able to be defined Key bridges are associated with the railway corridor and rail receptors. No specific asset list was provided. Coal haul rail line identified by status is unclear, is included with other mine infrastructure receptor class 	<ul style="list-style-type: none"> Vic Roads / Latrobe City Council VicTrack Mine owned railway lines 	<ul style="list-style-type: none"> Bridge & Major Culvert Asset Management Plan 2009-2013 <i>Road Management Act 2004</i>
Coal Fired Power Generation	<ul style="list-style-type: none"> Loy Yang Power Station 	<ul style="list-style-type: none"> AGL 	<ul style="list-style-type: none"> Gippsland Regional Growth Plan (2014) Hazelwood Mine Fire Inquiry, Implementation of Recommendations and Affirmations (2016)
	<ul style="list-style-type: none"> Yallourn Power Station 	<ul style="list-style-type: none"> Energy Australia 	
	<ul style="list-style-type: none"> Carbon Capture Storage Site 	<ul style="list-style-type: none"> DJPR 	
	<ul style="list-style-type: none"> Yallourn North mine void and rehabilitated land 	<ul style="list-style-type: none"> Energy Australia 	
Gas Fired Power Station	<ul style="list-style-type: none"> Jeeralang Power Station 	<ul style="list-style-type: none"> Ecogen Energy 	<ul style="list-style-type: none"> Gippsland Regional Plan (2015) Gippsland Regional Growth Plan (2014)
Electricity Transmission Network	<ul style="list-style-type: none"> High Voltage Transmission Line - South of Hazelwood High Voltage Transmission Line - Morwell to Traralgon 	<ul style="list-style-type: none"> AustNet Ausnet Electricity Distribution Companies 	<ul style="list-style-type: none"> Live Work Latrobe (Housing Strategy, Industrial Land Use and Employment Strategy and Rural Land Use Strategy) (2016) <i>Essentials Services Act 2001</i>

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
	<ul style="list-style-type: none"> High voltage (500 - 220kV) networks connect Yallourn Power Station, Hazelwood Power Station and Loy Yang Power Station to the national grid A 500kV transmission line is located to the south of the Hazelwood Power Station and mine (running to Cranbourne) with another 500kV transmission line running north between Morwell and Traralgon (running to South Morang). Other voltage transmission lines forming part of the distribution network (outside of the mine lease boundaries) 	<ul style="list-style-type: none"> VicTrack 	
Extractive Industry ⁷⁶	<ul style="list-style-type: none"> Yallourn North quarry 	<ul style="list-style-type: none"> L. V. Blue Metal 	<ul style="list-style-type: none"> <i>Mineral Resources (Sustainable Development) Act 1990</i> Gippsland Regional Growth Plan (2014)
	<ul style="list-style-type: none"> Operating coal mines Yallourn 	<ul style="list-style-type: none"> Energy Australia 	
	<ul style="list-style-type: none"> Operating coal mine Loy Yang 	<ul style="list-style-type: none"> AGL 	
Gas and liquid pipelines	<ul style="list-style-type: none"> APA VTS Australia Pipeline 	<ul style="list-style-type: none"> APA Group 	<ul style="list-style-type: none"> Live Work Latrobe (Housing Strategy, Industrial Land Use and Employment Strategy and Rural Land Use Strategy) (2016) Gippsland Regional Growth Plan (2014)
	<ul style="list-style-type: none"> Australian Gas Networks Pipeline 	<ul style="list-style-type: none"> Australian Gas Networks 	
	<ul style="list-style-type: none"> Energy Australia (Yallourn) Pipeline 	<ul style="list-style-type: none"> Energy Australia 	
	<ul style="list-style-type: none"> Esso Australia Resources Pipeline 	<ul style="list-style-type: none"> Esso Australia 	
	<ul style="list-style-type: none"> Proposed CarbonNet CO₂ Pipeline 	<ul style="list-style-type: none"> DJPR 	
Industry and Manufacturing	<ul style="list-style-type: none"> Future logistics and manufacturing (undertaken in existing industrial use zones in Traralgon and Morwell) 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> Morwell West development Plan, (2015) Traralgon West Structure Plan (2015) Live Work Latrobe / Latrobe Planning Scheme Amendment C105 (2018)
Rail	<ul style="list-style-type: none"> Melbourne to Bairnsdale Line (south of Yallourn mine and through Morwell and Traralgon) 	<ul style="list-style-type: none"> VicTrack 	<ul style="list-style-type: none"> Connecting Regional Victoria Plan for Gippsland Gippsland Transport Strategy (2008) Gippsland Freight Strategy (2013)

⁷⁶ It is noted that the Hazelwood Open Cut and Hazelwood Power Station exist at the time preparing the Recognised Receptor Report. The Hazelwood Open Cut and Power Station are being decommissioned. The Open Cut is proposed to be replaced by a mine void water body. Therefore the Power Station and Mine Void are not considered receptors.

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
Road – Freeway/State Maintained	<ul style="list-style-type: none"> • Princes Freeway (Southern urban boundary of Morwell and the northern boundary of the Hazelwood coal mine) • Proposed Traralgon Bypass (between Loy Yang and Traralgon) • Hyland Highway (adjacent to Loy Yang) • Strzelecki Highway (adjacent to Hazelwood) 	<ul style="list-style-type: none"> • VicRoads 	<ul style="list-style-type: none"> • Latrobe Valley and East Gippsland Rail-freight Task Assessment (2012) • Gippsland Transport Strategy, (2008) • Gippsland Freight Strategy (2013) specifically addresses the Princes Freeway, proposed Traralgon Bypass and Strzelecki Highway • Live Work Latrobe Background report (2016) specifically addresses the Princes Freeway, proposed Traralgon Bypass and Strzelecki Highway
Road – Local Council maintained	<ul style="list-style-type: none"> • All roads that are maintained by Latrobe City Council (e.g. Latrobe Road adjacent to Yallourn) 	<ul style="list-style-type: none"> • Latrobe City Council 	<ul style="list-style-type: none"> • Latrobe City Council Road Management Plan (2017)
Telecommunications	<ul style="list-style-type: none"> • Base Stations and network cables located throughout the region. Examples include • Cables in the zone between Hazelwood and Yallourn towns • Radio transmission and reception towers, including the mobile phone network and NBN. • Fibre Optic cable along the rail corridor 	<ul style="list-style-type: none"> • Telstra • Optus • NBN • VICTrack (rail corridor fibre optic cable) • A range of other providers 	<ul style="list-style-type: none"> • Gippsland Regional Growth Plan (2014) • <i>Telecommunications Act 1997 (Cth)</i> • <i>Radiocommunications Act 1992 (Cth)</i>

F.4 Land

Table 6-16 – List of recognised regional receptors for Land

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
Coal Reserve	<ul style="list-style-type: none"> Coal Reserves/coalfields - Driffield East, Churchill, Churchill North, Loy Yang East, Coalville (black coal), Corridor, Driffield, Maryvale East, Fernbank, Flynn, Gormandale, Hazelwood (remaining resource), Latrobe River, Morwell Township, Rosedale, Tyres, Traralgon Creek, Yinnar 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> Gippsland Regional Growth Plan (2014) State Resource Overlay within the Latrobe Planning Scheme
Cropping	<ul style="list-style-type: none"> Cropping 	<ul style="list-style-type: none"> Latrobe City Council 	<ul style="list-style-type: none"> Gippsland Food Plan (2014)
Dairying	<ul style="list-style-type: none"> Dairying 	<ul style="list-style-type: none"> Latrobe City Council 	<ul style="list-style-type: none"> Gippsland Food Plan (2014)
Forestry plantations	<ul style="list-style-type: none"> Timber production and plantations 	<ul style="list-style-type: none"> Vic Forests 	<ul style="list-style-type: none"> Gippsland Regional Growth Plan (2014)
Grazing	<ul style="list-style-type: none"> Grazing 	<ul style="list-style-type: none"> Latrobe City Council 	<ul style="list-style-type: none"> Gippsland Food Plan (2014)
Intensive agriculture	<ul style="list-style-type: none"> Future intensive agricultural activities (such as broiler farms or piggeries) Intensive Agriculture Potential future intensive agriculture such as non soil based vegetable herb growing (in greenhouses) located in close proximity mine void waterbodies Potential future processing of vegetables located in close proximity to mine void waterbodies 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> Planning for Intensive Agriculture in Gippsland (2016)
Irrigated agriculture and horticulture	<ul style="list-style-type: none"> Irrigated agriculture and horticulture 	<ul style="list-style-type: none"> Latrobe City Council 	<ul style="list-style-type: none"> Planning for Intensive Agriculture in Gippsland (2016) Gippsland Food Plan (2014)
Multiple use public	<ul style="list-style-type: none"> Potential future tourism (arts and culture) and recreation (bike paths) at Yallourn, Hazelwood, Loy Yang 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> Gippsland Tourism Strategic Direction, 2013-2018 (2013) Gippsland Regional Growth Plan (2014)
Primary production support infrastructure	<ul style="list-style-type: none"> Future non soil based vegetable herb growing (in greenhouses) located in close proximity to 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> Gippsland Food Plan (2014)

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
	<ul style="list-style-type: none"> proposed mine void water body (lightweight structure) Future processing of vegetables in the mine scale or inter-mine scale 		
Protected public land	<ul style="list-style-type: none"> National Parks in West Gippsland Catchment Moondarra State Park Tyers Park Woorabinda Education Area Traralgon South Flora and Fauna Reserve Coalville G219 Bushland Reserve Sayers Trig Bushland Reserve Jeeralang North Education Area Gormandale Flora Reserve Narracan State Forest 	<ul style="list-style-type: none"> Parks Victoria 	<ul style="list-style-type: none"> Moondarra State Park and Tyers Park Management Plan, 1991 Traralgon south recreation reserve master plan report, 2013
Recreation	<ul style="list-style-type: none"> 92 recreation areas related to water in the Gippsland Basin Fishing and hunting 	<ul style="list-style-type: none"> DELWP 	<ul style="list-style-type: none"> Gippsland Region Sustainable Water Strategy West Gippsland Fishery Management Plan (2008)
Specialist Facilities	<ul style="list-style-type: none"> Potential future education and training facilities (relating to land rehabilitation, mining, environmental science and clean energy technologies) located in close proximity to the potential mine void waterbodies 	<ul style="list-style-type: none"> DJPR & DELWP 	<ul style="list-style-type: none"> Live Work Latrobe Background report (2016)
Townships/ Settlements	<ul style="list-style-type: none"> Southern urban area of Morwell (existing urban areas, proposed future residential and existing residential opportunity) Urban buffer between Yallourn coal mine and Morwell which includes open space and existing urban areas 	<ul style="list-style-type: none"> Latrobe City Council 	<ul style="list-style-type: none"> Live Work Latrobe Background report (2016) refers to development of Morwell Morwell North West Development Plan (2010) Proposed urban land north of Loy Yang Mine

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
	<ul style="list-style-type: none"> • Traralgon, Morwell, Yallourn North, Moe, Churchill, Newborough inclusive of zones: • Central Business District/Activity Centre • Existing urban areas, future urban use • Existing industrial areas, future industrial, future bulky goods • Proposed public Open Space, Existing Open Space, Amenity Lifestyle Precinct • Proposed urban land north of the Loy Yang Mine. 		
Waste management	<ul style="list-style-type: none"> • Potential future waste process such as organics recycling and composting facility located in close proximity of the potential mine void waterbodies 	<ul style="list-style-type: none"> • Latrobe City Council 	<ul style="list-style-type: none"> • Gippsland Waste and Resource Recovery Implementation Plan (2017)

F.5 Water

Table 6-17 – List of recognised regional receptors for Water

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
Aquifers and Groundwater Use	<ul style="list-style-type: none"> Near-surface shallow aquifer system The Morwell Formation aquifer system The Traralgon Formation aquifer system Moe Groundwater Management Area Rosedale Groundwater Management Areas – Zone 1 and 2 Stratford Groundwater Management Areas – Zone 1 and 2 	<ul style="list-style-type: none"> Southern Rural Water 	<ul style="list-style-type: none"> <i>Environment Protection Act 1970</i> <i>Water Act 1989</i> State Environment Protection Policy (Groundwater of Victoria) (2002) Catchment Statement for Central Gippsland and Moe Groundwater Catchments (2014)
Dams, artificial lakes & reservoirs	<ul style="list-style-type: none"> Loy Yang High Water Level Storage 	<ul style="list-style-type: none"> AGL 	<ul style="list-style-type: none"> <i>Water Act 1989</i> State Environment Protection Policy (Waters of Victoria) Gippsland Region Sustainable Water Strategies (2017) Water storages for industrial purposes to be found in the Rehabilitation Plan and/or Operational Mine Plan for each respective mining company
	<ul style="list-style-type: none"> Lake Narracan Blue Rock Reservoir Buckley's Hill Reservoir Moondarra Reservoir 	<ul style="list-style-type: none"> Southern Rural Water Southern Rural Water Gippsland Water Gippsland Water 	
	<ul style="list-style-type: none"> Hazelwood Pondage 	<ul style="list-style-type: none"> ENGIE 	
	<ul style="list-style-type: none"> Yallourn North Extension Open Cut pit lake 	<ul style="list-style-type: none"> Energy Australia 	
	<ul style="list-style-type: none"> Rehabilitated Mine Void Waterbodies Ridge basin Pine Gully Reservoir ROS (regional Outfall System) and SWOP (Saline water outfall pipeline) 	<ul style="list-style-type: none"> DJPR (this is not resolved) Gippsland Water Gippsland Water Gippsland Water 	
Drains	<ul style="list-style-type: none"> Morwell Main Drain Drains associated with railway line and embankment 	<ul style="list-style-type: none"> Gippsland Water VicTrack 	<ul style="list-style-type: none"> Gippsland Water Urban Water Strategy (2017)
Fisheries	<ul style="list-style-type: none"> Gippsland Lakes Fishery 	<ul style="list-style-type: none"> DJPR 	<ul style="list-style-type: none"> <i>Fisheries Act 1995 (Vic)</i>
Water Delivery Infrastructure	<ul style="list-style-type: none"> Gippsland Water Factory – recycled water production 	<ul style="list-style-type: none"> Gippsland Water 	<ul style="list-style-type: none"> Gippsland Region Sustainable Water Strategies (2017)

Sub-Categories	List of Recognised Regional Receptors	Responsible Receptor Custodian	Basis of Receptor Protection
	<ul style="list-style-type: none"> Potable Infrastructure (pipes and tanks etc.) – Public and Privately owned 		
	<ul style="list-style-type: none"> Irrigation Infrastructure (bores, pipes etc.) – Public and Privately owned Town water bores 	<ul style="list-style-type: none"> Southern Rural Water 	
Wastewater Infrastructure	<ul style="list-style-type: none"> Moe and Morwell Waste Water Treatment Plant Township Sewerage Infrastructure (Traralgon, Morwell, Moe, Newborough, Churchill) Gippsland Water Factory – water treatment 	<ul style="list-style-type: none"> Gippsland Water 	<ul style="list-style-type: none"> Gippsland Region Sustainable Water Strategies (2017)
Water Rights and Entitlement Holders	<ul style="list-style-type: none"> Water rights and entitlement holders as listed in the Victorian Water Register (this includes Environmental Entitlements but see below for Environmental Water Reserve) Riparian right holders 	<ul style="list-style-type: none"> DELWP 	<ul style="list-style-type: none"> <i>Water Act 1989</i> Gippsland Region Sustainable Water Strategies (2017)
Water supply catchment	<ul style="list-style-type: none"> Merriman's Creek (Seaspray) (Declared Water Supply Catchment) Billy's Creek (Declared Water Supply Catchment) 	<ul style="list-style-type: none"> Southern Rural Water 	<ul style="list-style-type: none"> <i>Catchment and Land Protection Act 1994</i> Gippsland Water Urban Water Strategy (2017)
Environmental Water Reserve	<ul style="list-style-type: none"> Including passing flows, Environmental Entitlements, and above cap water 	<ul style="list-style-type: none"> DELWP - VEWH 	<ul style="list-style-type: none"> <i>Water Act 1989</i>

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