Western Renewables Link

TECHNICAL REPORT

S Groundwater Impact Assessment

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EES Technical Report S

Groundwater Impact Assessment

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Glossary

Term	Definition
aquifer	A water-bearing geological formation, the layers of soil and rock that contain useable quantities of groundwater. Aquifers lie beneath all parts of Victoria and represent the saturated zone below ground. Aquifers may be confined between geological layers of low permeability (for example clay) or be unconfined.
AusNet	AusNet Transmission Group Pty Ltd
BOM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority. CMAs are responsible for the integrated planning and coordination of land, water and biodiversity management. CMAs are established under the *Catchment and Land Protection Act 1994* (CaLP Act).
DEECA	Department of Energy, Environment and Climate Action, formerly known as Department of Environment, Land, Water and Planning (DELWP)
DTM	Digital Terrain Model
DTP	Department of Transport and Planning
environment	The *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Eighth edition, DTP, 2023) define the 'environment' broadly: the environment encompasses all physical, biological, social, spiritual and economic systems, processes and attributes.
Environment Effects Act	*Environment Effects Act 1978*
EES	Environment Effects Statement
EPA	Environment Protection Authority Victoria
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPRs	Environmental Performance Requirements
GDE	Groundwater dependent ecosystem
GIS	Geographical Information Systems
groundwater	Groundwater is water that is beneath the earth's surface in pores and crevices of rocks and soil.
Groundwater Management Area (GMA)	A Groundwater Management Area (GMA) is an area where groundwater has been intensively developed or has the potential to be. GMAs have boundaries defined for the purposes of setting a permissible consumptive volume for ongoing management.
Groundwater Management Unit (GMU)	Groundwater Management Units (GMU) define areas where specific rules are used to manage the resource according to the needs of groundwater users and the environment. There are two types of Groundwater Management Units: Water Supply Protection Areas, and Groundwater Management Areas.
kV	kilovolt
licensed bore	A bore that has been issued with a licence to extract groundwater by the relevant water authority.
mAHD	Metres above Australian Height Datum
MCA	Multi-Criteria Analysis
NEM	National Electricity Market
PCRZ	Public Conservation and Resource Zone
Planning and Environment Act	*Planning and Environment Act 1987*
PPF	Planning Policy Framework
Principal Contractor	During the construction stage, there will be multiple principal contractors and sub-contractors involved in the delivery of the different project components. This EES refers to Principal Contractor as a catch all term for the contractor responsible for the works.

Term	Definition
Project Area	The Project Area encompasses all areas that would be used to support the construction and operational components of the Project considered in the EES. The Project Area is contained within the Project Land and encompasses the following: ▪ Permanent infrastructure: - Transmission tower structures - Upgrade and connection to the Bulgana Terminal Station - Connection to the Sydenham Terminal Station - An upgrade of Elaine Terminal Station - The new 500kV terminal station near Bulgana - Access tracks required for operation ▪ Temporary construction areas and infrastructure: - Distribution line crossovers - Hurdles - Laydown areas - Stringing pads - Access tracks - Tower assembly areas - Workforce accommodation facilities.
Project Land	The Project Land encompasses all land parcels that could be used for the purpose of temporary Project construction and permanent operational components. The Project Land corresponds with the extent of the Specific Controls Overlay proposed in the draft Planning Scheme Amendment for the Project. This generally includes the entire land parcel intersected by a Project component.
Proposed Route	The Proposed Route is approximately 100 to 170m wide and encompasses the nominal future easement for the proposed new transmission line (including a buffer either side), and the terminal station areas. The Proposed Route is located within the Project Area.
registered bore	A bore with a works identification number issued by the relevant water authority, and included in State groundwater bore dataset.
SMO	Salinity Management Overlay
SOBN	State Observation Bore Network
SRW	Southern Rural Water
Terminal station	Terminal stations control the flow of power on transmission lines and reduce the voltage for supply to substations and large industrial customers.
the Project	Western Renewables Link (formerly the Western Victoria Transmission Network Project)
Transmission line	A transmission line is a conductor, or conductors designed to carry electricity or an electrical signal over large distances with minimum losses and distortion.
Transmission towers	The structures used for overhead powerlines are typically towers, however very large poles are also sometimes used. There are two main structure types used for transmission powerlines, suspension towers which are used when the powerline is straight and strain structures which are used when the powerline is turning.
Water authorities	This term includes Southern Rural Water, Goulburn-Murray Water and Grampians-Wimmera Mallee Water. Their responsibilities include:

Term	Definition
	▪ The supply of drinking and recycled water, and the removal and treatment of sewage and trade waste – known as 'urban' water services. ▪ Water delivery for irrigation, domestic and stock purposes, drainage and salinity mitigation – known as 'rural' water services. ▪ Provide water for environmental purposes, manage bulk water storages and designated recreational areas, and help the Minister for Water operate the Victorian Water Register. ▪ Operate and maintain infrastructure that enables them to perform their responsibilities, including treatment plants, pumping stations, pipes, channels, reservoirs, dams, gates and meters.
watertable	The watertable represents the boundary between the unsaturated and saturated zones below ground. It is the top of an unconfined aquifer.
220kV	220kV transmission line
500kV	500kV transmission line

Executive summary

The Western Renewables Link (the Project) proposes a new transmission line starting at Bulgana, near Stawell in Victoria's west, and extending approximately 190km to Sydenham in Melbourne's north-west. The Project will enable the connection of new renewable energy generated in western Victoria into the National Electricity Market and increase the Victorian transmission capacity. The Project is being delivered by AusNet Transmission Group Pty Ltd (AusNet).

This Groundwater Impact Assessment forms part of the Environment Effects Statement (EES) prepared for the Project in accordance with the *Environment Effects Act 1978*. This report and the methodology applied in preparing this report, responds to the requirements set out in the EES scoping requirements. The purpose of this report is to characterise groundwater conditions within the study area, assess potential groundwater issues associated with the Project, including any potential changes to the existing groundwater environment within the study area and define the Environmental Performance Requirements (EPRs) necessary to meet the EES evaluation objectives. The study area for this report is the same as the Project Land but portioned into three geographical areas to align with area of common groundwater conditions across the Project.

Overview

Groundwater refers to water located beneath the earth's surface. Groundwater is part of the water cycle: it is rainfall that has seeped through the ground and become stored in porous soils and rocks. Groundwater can occur in spaces between soil and rock particles or in fissures and fractures in the rock itself. Soils and rocks that transmit large quantities of groundwater are known as aquifers. The top of this saturated ground is known as the watertable. Soil and rock that restricts groundwater flow are called aquitards. In some areas, groundwater plays an important role in sustaining aquatic and terrestrial ecosystems. These Groundwater Dependent Ecosystems (GDEs) rely on groundwater to support function, which encompasses springs, rivers, wetlands, vegetation, irrigation, and industrial uses. Groundwater is also utilised by registered extraction bores for stock, domestic, irrigation and industrial uses.

The Project has potential to interact with groundwater where the depth of earthworks (such as levelling at terminal stations) or construction (such as tower footings) are below the watertable. The Project has the potential to impact on groundwater if earthworks and construction are not planned and managed with respect to hydrogeological conditions encountered (such as aquifer, groundwater level and quality), use and value of the groundwater resource and relevant legislation and guidelines.

Existing conditions

Existing groundwater conditions for the study area have been described based on three main areas:

- The western portion of the study area, where a shallow (<5m) watertable resides in alluvial valleys and a deep (up to 50m) watertable resides in outcropping bedrock. The aquifers of interest to the Project have low yield potential and salinity between 1,200 to 5,400 mg/L total dissolved solids, resulting in no registered local groundwater users (bores). Conversely, areas of shallow watertable (mainly along drainage lines and waterways) support aquatic and terrestrial GDEs.
- The central portion of the study area, where the main aquifer of relevance to the Project is the Newer Volcanics basalt, which hosts the watertable. Depth to groundwater varies, with shallow occurrence along drainage lines and plains. Depth to groundwater increases (up to 50m) in areas of high elevation and outcropping bedrock. Salinity is generally of potable quality, and this has led to widespread groundwater use (bores) in the Loddon Water Supply Protection Area and Bungaree Groundwater Management Area. A number of aquatic and terrestrial GDEs are also supported by watertable aquifers.
- The eastern portion of the study area, where the main aquifer of relevance to the Project is the Newer Volcanics basalt, which hosts the watertable, but groundwater is of poorer quality than the central study area. There are several groundwater users in the study area, as well as aquatic and terrestrial GDEs.

The assessment of existing groundwater conditions concluded that the Project is likely to intersect groundwater at most transmission tower locations. It is not yet confirmed whether groundwater will be encountered during works at terminal station locations (as depth of below ground works is dependent on geotechnical investigations and the degree of earthworks that occur) but is generally considered unlikely given the expected shallow nature of works.

Impact assessment key findings

The potential to impact groundwater is largely related to below-ground works that may intersect groundwater, and how those interactions are managed. Key findings of the groundwater impact assessment include:

- The Project is not expected to result in significant adverse effects on groundwater levels, flow, quality, and yield – potential impacts are considered negligible, or minor based on existing conditions within the study area, the Project description and the construction methodologies proposed.
- Construction, operation, and decommissioning stages of the Project can be managed through proposed management and mitigation measures such that the objective of avoiding and minimising adverse impact to the environmental value of groundwater can be met.
- Key mitigation strategies to manage potential for impact to groundwater during construction include:
  - Inclusion of physical buffer distances from identified groundwater users and GDEs.
  - Site walkover and landholder consultation prior to works (1) to inspect and identify any potential below-ground infrastructure (bores, drainage systems) within and adjacent the construction footprint in addition to those identified in this report, and (2) as a means for management where extraction bores are within physical buffer distances.
  - Development of a Groundwater Management Plan for inclusion into the Construction Environmental Management Plan (CEMP) that outlines the specific controls that would avoid or minimise risks to the environmental value of groundwater.

In response to the EES evaluation objective, impacts of the Project on groundwater have been assessed and mitigation measures have been identified to maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows, and prevent adverse effects on protected beneficial uses (environmental values). With the implementation of recommended mitigation measures, the residual impacts on groundwater are considered to be negligible.

Environmental Performance Requirements

To meet the EES objective of maintaining the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses, two EPRs have been recommended in order to meet the EES evaluation objective, namely:

- GW1: Site works to reduce potential of direct physical impact to groundwater receptors
- GW2: Develop and implement a Groundwater Management Plan as part of the CEMP that outlines the specific controls that would avoid or minimise risks to the environmental value of groundwater.

1. Introduction

1.1 Background

The Western Renewables Link (the Project) proposes a new transmission line starting at Bulgana, near Stawell in Victoria's west, and extending approximately 190km to Sydenham in Melbourne's north-west. The Project will enable the connection of new renewable energy generated in western Victoria into the National Electricity Market and increase the Victorian transmission capacity. The Project is being delivered by AusNet Transmission Group Pty Ltd (AusNet).

The Project was originally referred to the former Minister for Planning under the *Environment Effects Act 1978* (Environment Effects Act) on 9 June 2020 by AusNet and it was determined that an Environment Effects Statement (EES) was required. On 22 August 2023, the Minister for Planning determined that the Project has the potential to cause significant environmental effects and that an EES was required to inform decision-makers in the granting of key approvals for the Project. In summary the key changes in the new proposed Project scope are:

- The urgent Sydenham Terminal Station Rebuild will be assessed and approved separately. A connection into the Sydenham Terminal Station forms part of Western Renewables Link scope
- The 220kV portion of the transmission line is proposed to be uprated to 500kV
- The new terminal station north of Ballarat will no longer be required
- A new 500kV terminal station at Bulgana will be required including a new 220kV connection to the existing Bulgana Terminal Station.

The Commonwealth Government's Department of Agriculture, Water and the Environment (DAWE) — now Department of Climate Change, Energy, the Environment and Water (DCCEEW) — has also confirmed that the Project is a 'controlled action' and will require assessment and approval under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (EPBC Act). The Commonwealth has determined that it will use the bilateral assessment agreement and rely on the Victorian Government's assessment process (EES) to inform an approval decision under the EPBC Act.

1.2 Purpose of this report

The purpose of this report is to assess the potential groundwater impacts associated with the Project and to define any Environmental Performance Requirements (EPRs) necessary to determine the environmental outcomes that the Project must meet, to be achieved through the implementation of mitigation measures during construction, operation and decommissioning, and address the EES evaluation objectives.

Groundwater refers to water located beneath the earth's surface. Groundwater is part of the water cycle: it is rainfall that has seeped through the ground and become stored in porous soils and rocks. Groundwater can occur in tiny spaces between soil and rock particles or in fissures and fractures in the rock itself. Soils and rocks that transmit large quantities of groundwater are known as aquifers. The top of this saturated ground is known as the watertable. Soil and rock that restricts groundwater flow are called aquitards. Aquifers can be recharged from rainfall or interaction with surface water. Groundwater elevation varies spatially: it can be shallow in areas of low-lying topography and in the presence of surface water recharge, and deep in areas of high topography and low recharge. Groundwater quality also varies spatially: it can be naturally saline due to salt from rock and can also become contaminated due to industrial discharges, agricultural practices, landfill, and other processes. In some areas, groundwater plays an important role in sustaining aquatic and terrestrial ecosystems. These Groundwater Dependent Ecosystems (GDEs) rely on groundwater to support function, which encompasses springs, rivers, wetlands, vegetation, irrigation, and industrial uses.

The Project has potential to interact with groundwater where the depth of earthworks (such as levelling at terminal stations) or construction (such as tower footings) are below the watertable. The Project has the potential to impact on groundwater if earthworks and construction are not planned and managed with respect to

hydrogeological conditions encountered, use and value of the groundwater resource and relevant legislation and guidelines.

1.3 Structure of the report

The report is structured in the following way:

- **Introduction** (this section) which provides background details for the Project and outlines the purpose and structure of the Groundwater Impact Assessment.
- **EES scoping requirements** (Section 2) where the EES scoping requirements relevant to groundwater are set out, and an indication of where each component of the EES scoping requirements has been considered and addressed in the Groundwater Impact Assessment.
- **Project description** (Section 3), where Project components and activities relevant to the assessment are explained including the locations and activities with the highest associated groundwater impacts.
- **Legislation, policy, and guidelines** (Section 4) which lists the Commonwealth, state and other documents relevant to the assessment.
- **Method** (Section 5) where the approach applied to assess potential groundwater impacts associated with the Project is explained.
- **Existing conditions** (Section 6) which identifies existing hydrogeological conditions, in terms of groundwater level, recharge processes, quality, use, and receptors (such as bores, wetlands, rivers).
- **Impact assessment** (Section 7 to Section 10), where initial and residual groundwater impacts during the construction, operation and decommissioning of the Project, including potential cumulative impacts from other nearby developments and projects are evaluated. Measures to mitigate or otherwise effectively manage the potential impacts are also presented here.
- **Environmental Performance Requirements** (Section 11) which set out the environmental outcomes to be achieved through the implementation of mitigation measures during construction, operation and decommissioning. While some EPRs are performance based to allow flexibility in how they will be achieved, others include more prescriptive measures that must be implemented. Compliance with the EPRs will be required as a condition of the Project's approval.
- **Conclusion** (Section 12) where the objectives, methods, outcomes and recommendations of the assessment are presented.

1.4 Related studies

This report should be read in conjunction with the following related technical reports, from which this report draws specific information:

- Technical Report A: Biodiversity Impact Assessment: describes terrestrial and aquatic habitats within the study area, some of which (as identified in this report) are groundwater dependent. Impacts related to biodiversity are assessed in Biodiversity Impact Assessment.
- Technical Report N: Climate Change Assessment: describes the expected effects of climate change as related to the Project.
- Technical Report Q: Geology and Soils Impact Assessment: describes the existing conditions of geology and soils, including soil salinity and compressibility.
- Technical Report R: Contaminated Land Impact Assessment: describes potential sources of groundwater contamination, which is relevant when considering potential for impact of the Project to groundwater.
- Technical Report T: Surface Water Impact Assessment: identifies waterways and wetlands within the Project Area, some of which (as identified in this report) are groundwater dependent.

2. EES scoping requirements

The Scoping Requirements – Western Renewables Link Environment Effects Statement (DTP, 2023) set out in detail the matters to be investigated, assessed, and documented in the EES for the Project and are referred to in this report as the EES scoping requirements.

2.1 EES evaluation objectives

The EES scoping requirements specify evaluation objectives which provide a framework to guide an integrated assessment of environmental effects of the Project, in accordance with the *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978, Eighth edition, 2023*. The evaluation objectives identify desired outcomes in the context of key legislative and statutory policies, as well as the principles and objectives of ecologically sustainable development and environmental protection, including net community benefit.

The evaluation objective relevant to the groundwater assessment is set out in Section 4.6 (Catchment values and hydrology) of the EES scoping requirements:

> *Maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses.*

In order to meet the evaluation objective, it is necessary to understand the potential impact of the Project on functions and values of groundwater so that impacts can be appropriately avoided or mitigated. Understanding these potential impacts requires an impact assessment, for which the starting point is a clear understanding of the existing conditions.

2.2 Assessment of specific environmental effects

The EES scoping requirements set out the key issues that the Project poses to the achievement of the evaluation objective, together with the features and values of the existing environment that are to be characterised – these are referred to as the 'existing conditions'. The scoping requirements also list potential effects of the Project and identify where mitigation measures may be required.

The scoping requirements pertaining to groundwater are set out in Section 4.6 (Catchment values and hydrology) of the scoping requirements. These are reproduced in Table 2-1, together with directions to the reader as to where these items have been addressed in this report (and other reports as applicable).

Table 2-1: Groundwater scoping requirements

Aspect	Scoping requirement	Relevant sections
Key issues	Potential for the project to have significant impact on waterways, floodplains, and wetland systems.	▪ Sections 6, 7 and 8. ▪ Surface Water Impact Assessment covers surface water environments in detail.
	Potential for adverse effects on nearby and downstream water environments due to changed water quality or impacts on groundwater or waterway conditions during construction.	▪ Sections 6, 7 and 8 ▪ Surface Water Impact Assessment covers surface water environments in detail.
	Potential for adverse effects on the functions, values, and beneficial uses of groundwater due to the project's activities, including water extraction, interception or diversion of flows, discharges or seepage from tower foundations or other earthworks and changes to salinity.	▪ Sections 6, 7 and 8 ▪ Surface Water Impact Assessment covers surface water environments in detail

Aspect	Scoping requirement	Relevant sections
	Potential for disturbance of contaminated, saline, dispersive or acid sulphate soils	▪ Sections 6, 7 and 8 ▪ Contaminated Land Impact Assessment covers contaminated, saline, dispersive or acid sulphate soils in detail
	Potential for erosion resulting from construction and operation due to vegetation loss or other factors	▪ Geology and Soils Impact Assessment covers potential for erosion ▪ Surface Water Impact Assessment covers erosion ▪ Biodiversity Impact Assessment covers potential impacts on vegetation
Existing environment	Characterise the groundwater (including depth, quality, and availability to licence/use) and surface water environments and drainage features in the project area of interest and its environs.	▪ Section 6 ▪ Surface Water Impact Assessment covers surface water environments in detail
	Characterise the interaction between surface water and groundwater within the project and broader area.	▪ Section 6
	Characterise the wetland systems in the project area of interest and its environs including the extent, types and condition of wetlands that could be impacted by the project, having regard to terrestrial and aquatic habitat, including as habitat corridors or linkages.	▪ Section 6 describes wetlands with potential for groundwater dependence within the study area. ▪ Surface Water Impact Assessment describes wetland occurrence within the study area. ▪ Biodiversity Impact Assessment describes associated terrestrial and aquatic habitat within the study area
	Characterise soil types and structures in the study area and identify the potential location and disturbance of dispersive, acid sulphate, saline or potentially contaminated soils, or soils of other special characteristics that could affect or be affected by the project.	▪ Refer to the Geology and Soils Impact Assessment and Contaminated Land Impact Assessment. Key outcomes as related to groundwater are described in Section 6
Mitigation measures	Identify and evaluate aspects of project works and operations, and proposed design refinement options or measures, that could avoid or minimise significant effects on water and catchment environments.	▪ Sections 7 and 8 ▪ Surface Water Impact Assessment covers surface water environments in detail
	Describe further potential and proposed design options and measures that could avoid or minimise significant effects on beneficial uses of surface water, groundwater and downstream water environments during the project's construction and operation, including response measures for environmental incidents.	▪ Sections 7 and 8 ▪ Surface Water Impact Assessment covers surface water environments in detail
	Describe further potential and proposed design options and measures that could avoid or minimise significant effects on soil stability.	▪ Refer to Geology and Soils Impact Assessment
	Describe available options for treatment or disposal of the various categories of solid and liquid wastes generated by the project.	▪ Refer to Contaminated Land Impact Assessment
Likely effects	Assess the potential effects of the project on surface water and groundwater environments and beneficial uses, including on permanent and ephemeral waterways, floodplains, and wetland systems in or near the project area of interest and its environs, considering appropriate climate change scenarios.	▪ Sections 7 and 8 ▪ Surface Water Impact Assessment covers surface water environments in detail

Aspect	Scoping requirement	Relevant sections
	Identify and assess potential effects of the project on soil stability, erosion and the exposure and disposal of contaminated or hazardous soils (e.g., acid sulphate soils).	▪ Refer to Geology and Soils Impact Assessment and Contaminated Land Impact Assessment
	Identify potential environmental effects resulting from the generation, storage, treatment, transport, and disposal of solid and liquid wastes, including soil, from project construction and operation.	▪ Section 7 and 8 ▪ Refer to Geology and Soils Impact Assessment and Contaminated Land Impact Assessment
Performance criteria	Describe proposed measures to manage and monitor effects on catchment values and identify likely residual effects.	▪ Section 7.4, Section 11
	Describe contingency measures for responding to unexpected but foreseeable impacts such as disturbance of acid sulphate, saline, dispersive or contaminated soils	▪ Refer to Geology and Soils Impact Assessment and Contaminated Land Impact Assessment

3. Project description

3.1 Project overview

The Project aims to address the current constraints of the western Victorian transmission network by providing the additional capacity, reliability and security needed to drive the development of further renewable electricity generation in western Victoria. By doing so, the Project supports the transition from coal-generated electricity to renewables and the efficient connection of renewable electricity into the National Electricity Market.

The Project comprises the construction and operation of a new approximately 190km overhead double circuit 500kV transmission line between Bulgana in Victoria's west and Sydenham in Melbourne's north-west. To support the connection of the new transmission line, the following works are proposed:

- The construction and operation of a new 500kV terminal station near Bulgana, and a 220kV transmission line connection to the existing Bulgana Terminal Station
- Expansion of the existing Bulgana Terminal Station
- Connection works at the Sydenham Terminal Station including the modification of a bay and a bay extension with associated infrastructure
- Upgrade of the existing Elaine Terminal Station, through the diversion of an existing line.
- Protection system upgrades at connected terminal stations.

The Project's main features are summarised in Figure 3-1 and the location is shown in Figure 3-2.

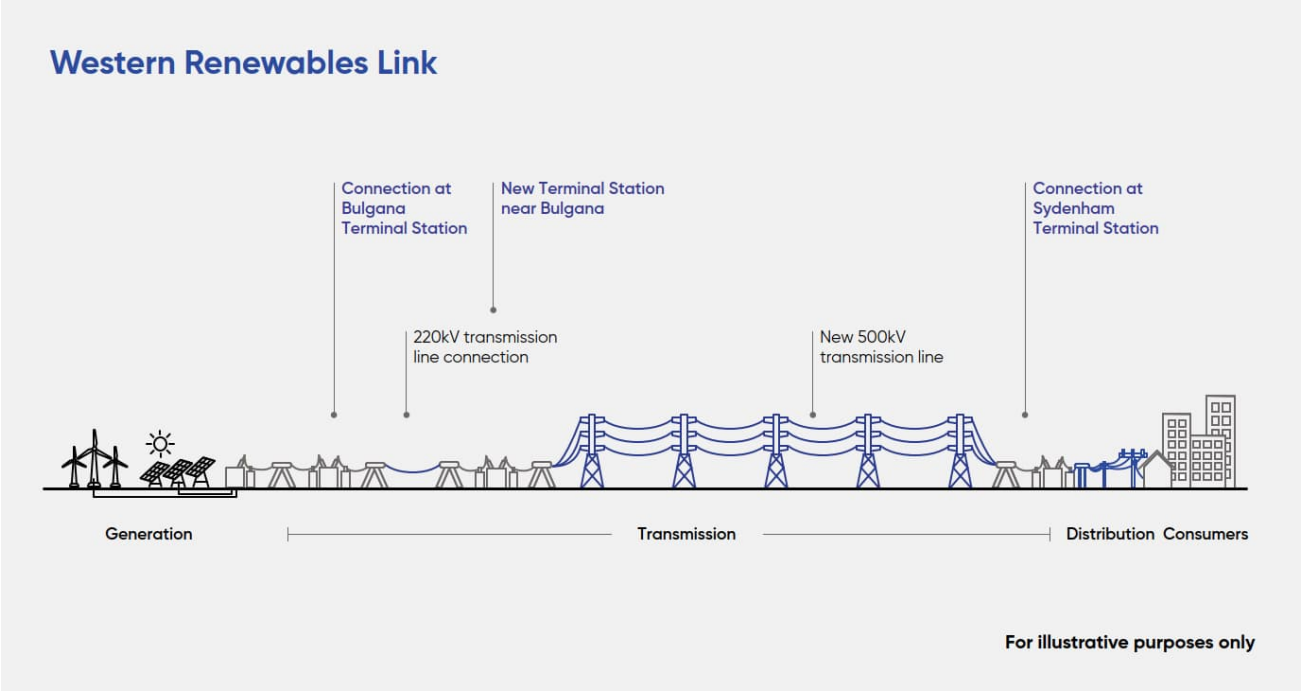

Figure 3-1: Western Renewables Link (Source: AusNet, 2024)

The Project can be described by the following key terms:

- **Project Land**: The Project Land encompasses all land parcels that could be used for the purpose of temporary Project construction and permanent operational components. The Project Land is shown in Figure 3.2.
- **Project Area**: The Project Area is contained within the Project Land and encompasses all areas that would be used to support the construction and operation of the Project. The Project Area is shown in Figure 3.2.

- **Proposed Route**: The Proposed Route is approximately 100 to 170m wide and encompasses the nominal future easement for the proposed new transmission line (including a buffer either side), and the terminal station areas. The Proposed Route is located within the Project Area.

The Proposed Route commences at the existing Bulgana Terminal Station with a 220kV transmission line connection to the new 500kV terminal station approximately 2.3km to the north-east. The Proposed Route then runs from the new 500kV terminal station to the north of the existing Ballarat to Horsham transmission line, where it runs parallel to the existing transmission line for approximately 60km. East of Lexton, the Proposed Route deviates from the Ballarat to Horsham transmission line, passing through the northern section of the Waubra Wind Farm between Mount Bolton and Mount Beckworth. Continuing east, the Proposed Route passes south of the Berry Deep Lead gold mining precinct and north of Allendale and Kingston. North of Kingston the Proposed Route turns south-east to Mount Prospect. From Mount Prospect to near Dean, the Proposed Route is adjacent to the existing Ballarat to Bendigo transmission line. Near Dean, the Proposed Route deviates from the existing transmission line to run south, then east through Bolwarrah, Bunding and Myrniong to Darley. The Proposed Route then continues eastward crossing Merrimu Reservoir north of Long Forest and along the northern boundary of MacPherson Park at Melton, connecting to the existing electricity network at the Sydenham Terminal Station.

The Project crosses six local government areas (LGAs), namely:

- Shire of Northern Grampians
- Shire of Pyrenees
- City of Ballarat
- Shire of Hepburn
- Shire of Moorabool
- City of Melton.

For the purposes of this Groundwater Impact Assessment, the 'study area' adopted is based on the Project Area. This is further discussed in Section 5.2.

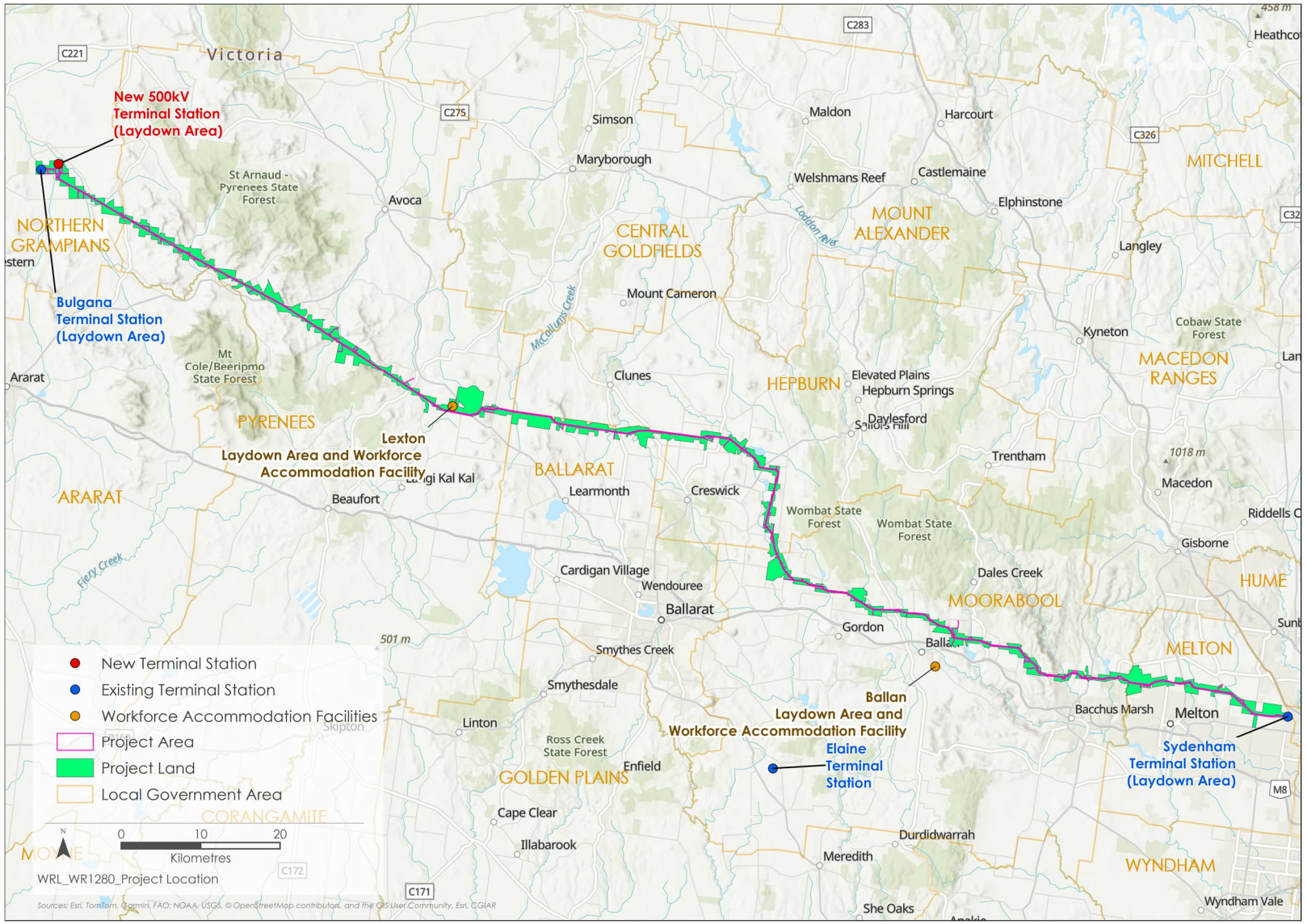

Figure 3-2: Project location (Source: Jacobs 2025)

3.2 Project infrastructure

The Project includes both permanent and temporary infrastructure, as described in sections 3.2.1 and 3.2.2. The Project has been progressively refined from an initial broad area of interest as described in **EES Chapter 5: Project development**.

3.2.1 Permanent infrastructure

The proposed Project includes the construction of infrastructure listed in Table 3-1. Further detail is provided in **EES Chapter 6: Project description**.

Table 3-1: Project infrastructure – key components*

Double circuit lattice towers	418 double circuit towers.
Single circuit lattice towers	36 single circuit towers (18 sets of two side-by-side).
Approximate length of 500kV transmission line route	Approximately 190km, between Bulgana in Victoria's west to Sydenham in Melbourne's north-west.
Approximate length of 220kV transmission line route	Approximately 2.5km, between the existing Bulgana Terminal Station to the new terminal station.
Terminal stations	A new 500kV terminal station and associated infrastructure near Bulgana to be connected to the existing Bulgana Terminal Station via a 220kV connection.
	Expansion of the existing Bulgana Terminal Station to support connection of the new 500kV terminal station near Bulgana.
	A connection to the Sydenham Terminal Station, including the modification of a 500kV bay and a new 500kV bay extension with associated infrastructure.
	Relocation and diversion of existing 220kV transmission lines at Elaine Terminal Station.

* Note: These figures are approximate and subject to final detailed design, which will consider further landholder consultation and geotechnical, site and other investigations.

For the safe and reliable operation of the transmission line, an easement is needed for the operation of the transmission line, and other related infrastructure to protect public safety and to provide access for maintenance and repair purposes. The transmission line easements will be typically between 70 and 100m wide for the Project.

The transmission line design requirements are specified by the Australian standard AS/NZS 7000:2016 Overhead Line Design and AusNet's Electricity Safety Management Scheme. Key assumptions and considerations of the transmission towers that will form part of the Project and have been used as the basis of this report are described below.

- Transmission towers (towers) support the overhead conductors (wires or lines) at the required height above the ground to meet regulations and safety requirements. The preferred tower configuration will be a galvanised steel lattice structure similar to those found elsewhere across Victoria and within the national network. The typical tower height for the Project is between 60 to 80m.
- Each tower has four footings which will typically be 1.8m in diameter and 9m deep. The four footings base width will be between 10 to 17m wide. During construction, ground disturbance around each tower will typically be no greater than 50 by 70m.
- The spacing or span length between each tower is determined by the height from the ground that the conductors need to be to achieve the required ground clearance in the middle of the span. Typical span length is between 450 to 550m for the transmission line. Longer span lengths are possible over sensitive areas or to avoid impacts, however, longer spans require taller towers to provide safe ground clearances and wider easements to allow for greater sway of the conductors. Similarly, where it is difficult to achieve the

required ground clearance in the middle of the span, due to topography or obstacles, the tower span may be reduced.

- Each span comprises 26 conductors, made up of 12 conductors on each side of the tower cross arms and two ground wires across the top of the tower. Each conductor is approximately 32mm thick and made of aluminium wire strands with a steel core.

As part of the Project, the existing Bulgana Terminal Station will be expanded to support the connection of the new 500kV terminal station into the existing 220kV switchyard. The new 500kV terminal station will support the connection of the Project transmission line and future connections. The new terminal station will require additional land to the north-east of the existing Bulgana Terminal Station.

Upgrades required at Elaine Terminal Station will involve the relocation of existing 220kV transmission lines and diversion of an existing 220kV line into the terminal station. The footprint of the terminal station will not change, and all new equipment will be approximately the same height and scale as existing structures and equipment at the Elaine Terminal Station.

Connection works are proposed at Sydenham Terminal Station. The existing Sydenham Terminal Station will be re-built through the Sydenham Terminal Station Rebuild Project, prior to the Project works. The Project will connect into Sydenham through the modification of a 500kV bay and new 500kV bay extension.

3.2.2 Temporary infrastructure

During construction there will be additional work areas, including vehicle access tracks, temporary tower stringing pads, distribution line crossover points, potential hurdle locations, temporary laydown areas and workforce accommodation facilities.

Temporary laydown areas associated with the terminal stations and the transmission line will be used to sort materials, pre-assemble Project components and store equipment, vehicles and other supplies that support construction activities. Temporary fencing, gates, security systems and lighting will also be installed at the laydown areas. The Project will establish five laydown areas; two of which will be located at existing terminal station sites (Bulgana and Sydenham), one at the new 500kV terminal station near Bulgana, and an additional two sites at intermediate locations between the stations south-east of Lexton and south-east of Ballan. The two intermediate laydown areas are required for the construction of the transmission line. The size of each site (including workforce accommodation facilities) will vary depending on storage requirements. The site south-east of Lexton will be up to approximately 12ha and the site south-east of Ballan will be up to approximately 24ha.

AusNet proposes to utilise temporary construction workforce accommodation facilities to accommodate construction workforce personnel. Two facilities are proposed; one in each of the western and eastern portions of the Project, co-located with each of the intermediate laydown areas. Each facility will have capacity for up to 350 personnel and will provide individual accommodation units, a communal kitchen and meals area, laundry, gym facilities, mobile and Wi-Fi boosters and serviced cleaning. The layouts of the proposed accommodation facilities will be determined by the Principal Contractor.

3.3 Summary of key Project activities

3.3.1 Construction

Construction of the Project will include preparatory activities (e.g., site investigations, establishment of laydown areas etc.), establishment of temporary infrastructure (such as water and wastewater infrastructure and power supplies), construction of towers and transmission line stringing works; construction works at terminal stations; site rehabilitation works; and pre-commissioning activities.

The overall construction duration of the Project is approximately two years. This schedule is dependent on adjustments required to deliver the Project and the granting of approvals within certain timeframes. For tower assembly and transmission line stringing, work will not be constant, with specialist crews following each other along the route doing specific jobs (clearing, site preparation, tower construction, conductor stringing, site rehabilitation, etc). As each work crew leaves a site (or property) there may be days, weeks, or possibly months of

inactivity until the next crew arrives. The cumulative duration of construction work at each tower (i.e., time on each property) will be approximately 9 to 22 weeks (over a two year period). Once construction is complete, site rehabilitation will occur and commissioning activities will include final inspections and other safety and pre-operational checks. Construction of the Project is anticipated to commence in late 2026 and be completed by late 2028.

Key activities associated with the construction of towers include:

- Site preparations, including necessary vegetation clearance
- Construction of vehicle access tracks and minor upgrades to existing roads and tracks
- Tower foundation construction
- Tower structure assembly and erection
- Transmission line stringing works
- Commissioning
- Site rehabilitation.

The works proposed at the new 500kV terminal station near Bulgana, the existing Bulgana Terminal Station and Sydenham Terminal Station will be constructed over a period of approximately 20 months, with key activities including:

- Site preparations, access and necessary vegetation clearance
- Earthworks
- Construction of footings, foundations and drainage systems
- Installation of structures and equipment
- Commissioning
- Landscaping and rehabilitation.

3.3.2 Operations

The operation and maintenance of transmission lines are subject to stringent regulatory controls for public safety and the uninterrupted supply of electricity. All transmission line operators are required to comply with these controls and provide regular reports to the relevant authorities, including Energy Safe Victoria.

The key operation stage activities for the transmission line include:

- Scheduled inspections of the transmission line and easement (either by vehicle patrols or LiDAR/aerial surveys)
- Ongoing vegetation management to maintain safety clearances under the transmission line
- Tower maintenance inspections
- Repairs and maintenance to address issues found in above inspections.

While the terminal stations are operated remotely, staff are present at stations for inspections or maintenance. Routine inspections will occur bi-monthly, with personnel checking the overall condition of the terminal station's assets.

3.3.3 Decommissioning

The Project's transmission line is designed for a service life of 80 years, while the terminal station works have been designed for a minimum life of 45 years. The terminal station works will be maintained and upgraded to enable the terminal stations to remain operational for the service life of the transmission line. At the end of the service life of the transmission line, the infrastructure will either be decommissioned or upgraded to extend its

service life to maintain the security and reliability of the transmission network as determined by the network planner at that time. In the event of decommissioning, the key activities may involve:

- Lowering the overhead transmission line and ground wires to the ground and cutting them into manageable lengths to roll onto drums or reels for disposal as scrap metal
- Removing insulators and line hardware from structures at the site and disposal at an approved waste facility
- Dismantling towers in manageable sections, removing from the site and selling steel as scrap
- Excavation of footings below finish surface level
- Decommissioning and removal of terminal stations
- Easement restoration and rehabilitation, where required.

3.3.4 Activities relevant to the Groundwater Impact Assessment

The Project has potential to interact with groundwater where the depth of earthworks (such as levelling at terminal stations) or construction (such as tower footings) are below the watertable. The Project has the potential to impact on groundwater if earthworks and construction are not planned and managed with respect to groundwater conditions encountered, use and value of the groundwater resource and relevant legislation and guidelines. Project activities relevant to the groundwater impact assessment have been described below.

Transmission towers – hardstands

Hardstands at the base of the towers will support the towers and will also be used to laydown materials, store equipment and assemble parts for the towers during the Project's construction. Construction of the tower hardstands will depend on the specific soil and rock type, considering water levels, soil bearing capacity, construction constraints, rock levels and soil properties.

Transmission towers – below ground works

Transmission tower dimensions are shown in Figure 3-3. Each transmission tower includes construction of four foundation footings. Geotechnical assessments will be conducted prior to construction to determine the appropriate foundation type for each structure. The choice of foundation is dependent on the specific soil and rock type considering water levels, soil bearing capacity, construction constraints, rock levels and soil properties. The structure type, height and soil conditions on site will determine the dimensions of the foundation.

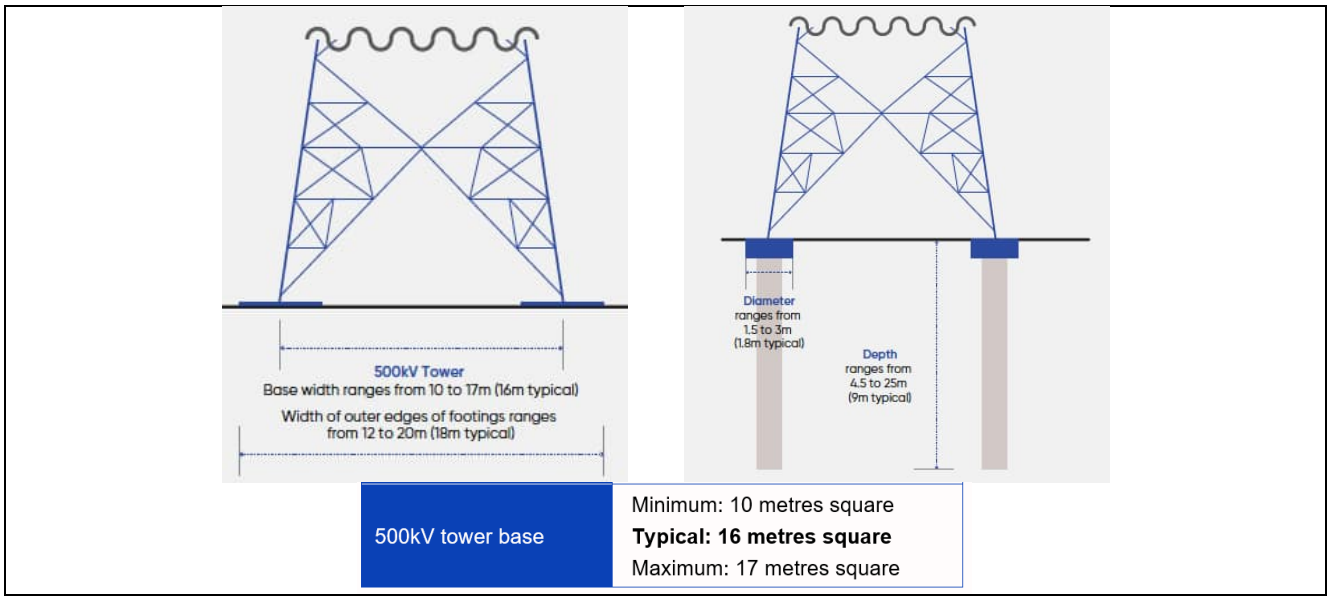

Figure 3-3: Proposed transmission line tower base dimensions and tower footings (Source: AusNet, 2025)

The likely construction method for the tower footings is bored piles. Construction of structure foundations will initially require placement of temporary pegs on site to mark out the location of the drilling. Once pegs are in position heavy-duty machines will be utilised for drilling of the foundations, the depth of the excavation will be dependent on the geotechnical condition of the surrounding soil. Typical pile depth is 9m. In unstable ground conditions, steel liners may be inserted into the foundation to stabilise the excavation. Temporary formwork will be used for the foundation sections above ground, concrete will be poured in accordance with standard construction practice and formwork will be removed after curing is complete. Backfilling will then be completed either using the excavated material, if suitable, or otherwise imported fill shall be used.

Bentonite is occasionally used to assist in stability of bored piles. Exceptional sub-surface conditions may require more than bentonite (i.e., specific drilling fluids). However, this is expected to be a rare occurrence, limited to a small number of locations (if any) and would be risk-assessed as appropriate prior to use.

The depth and location of below ground works will determine whether groundwater is encountered. If groundwater is encountered during piling activities, it is likely piling activities will be conducted in 'wet conditions'[1]. Under this scenario, for cement installation, a tremie pipe[2] is lowered to the bottom of the drilled/excavated hole and cement is pumped. The cement will displace the groundwater (in the form slurry) at the surface of the bored pile. The slurry displaced by the cement will include a mixture of groundwater, cement, and drill cuttings. The slurry will be managed using standard construction practices for containment and prevention from entering waterways.

If groundwater is encountered or the excavations are filled by rainwater, the excavation may be dewatered. This activity is typically done via a sump pump at the base of the excavation immediately prior to the placement of cement (i.e., a once off extraction event of one bored hole volume may take place to facilitate concrete installation). Detailed planning for these sites is limited to sites of significance; early geotechnical investigations will install monitoring wells in areas considered high risk to identify potential for impact and enable appropriate planning.

[1] The alternative is piling under 'dry' conditions, where groundwater dewatering takes place to facilitate a dry excavation and dry conditions for infrastructure and cement installation. This has not been proposed in the construction methodology.

[2] A tremie pipe is used for underwater concreting. A tremie pipe is a watertight vertical pipe extending from above surface to the bottom of where it is placed, usually the bottom of a borehole. It is used to pump concrete below the water surface during concreting operations.

In terms of surface seals (i.e. preventing preferential pathways in the annulus of the piled borehole), piles are completed with a low-permeability clay layer at-grade. A concrete plinth or pile cap is installed above-grade, sealing the pile and excavated annulus.

Powercor distribution line crossovers

At approximately 70 locations, existing power distribution lines cross-over the path of the Proposed Route. These distribution lines are operated by Powercor and supply lower voltage electricity (240V to 66kV) to individual residential customers, farmers, and commercial businesses. Distribution line crossover services are proposed to be placed underground, where they intersect with the Project easement. Work will involve trenching an area of approximately 600mm wide and 1m deep. The length of the trench will be dependent on the angle at which the crossover lines intersect with the Project transmission line. Trenches are expected to be 100 to 300m long. The detailed design and construction of each distribution line crossover point will be undertaken by Powercor.

Terminal stations – site preparation

Surfaces at each terminal station site will be prepared using a cut and fill process to bench the construction pad. The extent of the earthworks is contingent upon each terminal station's geotechnical profile and surveys completed in advance. Extensive below ground works have not been nominated for the Project at terminal stations but given the extent of earthworks will be determined by geotechnical assessment, there is potential some works may be below natural surface with the potential for interaction with groundwater. Potential below ground works include levelling, and construction of the footings, foundations, and drainage systems.

Temporary hardstands, likely unpaved, will be prepared in vicinity to construction activities.

Physical presence of structures

The physical presence of towers and terminal stations includes the construction of impermeable surfaces, above and below ground, both of which have potential to impact on or interact with groundwater.

Management of water

Nominated Project activities do not include groundwater extraction for consumptive purposes during construction, operation, or decommissioning. The potential to encounter groundwater during below ground works is an activity included for consideration in the impact assessment.

Site rehabilitation

Access tracks will remain in place following construction of the towers. If required by the landholder or due to site sensitivity, access tracks will be ploughed to aerate the soil and the imported materials substantially removed.

Vegetation clearing

Deep rooted vegetation within the Project Area may have the potential to interact with groundwater. If this vegetation is removed as part of construction, there is potential for groundwater levels to rise. Any vegetation clearance required will be undertaken in accordance with planning and regulatory approvals issued for the Project and with AusNet's Vegetation Management Plan, which sets out transmission line and easement vegetation management practices.

AusNet is required to maintain clearance spaces within the easement and manage fuel hazards impacting on tower infrastructure to enable safe and reliable operation of the transmission line and manage risks associated with bushfire. All vegetation clearance within the transmission line easement will comply with the National Code of Practice for Electric Line Clearance under the Electricity Safety (Electric Line Clearance) Regulations 2020.

Vegetation management during operation

Standard techniques such as manual tree removal, the use of mechanical equipment and slashing will be used to maintain appropriate vegetation in the easement. Herbicides may be used to control weeds in some sections of the easement to meet AusNet's obligations under the *Catchment and Land Protection Act 1994*. The use of herbicides to control vegetation during the operation of the Project has the potential to interact with groundwater and has been included for consideration in the impact assessment.

Decommissioning

Footings for transmission towers and terminal station structures are typically excavated out to a maximum of 1m below finished surface level, with the lower end of the footing remaining in place (AusNet, 2020). Hence decommissioning work will not encounter or interact with groundwater.

4. Legislation, policy, and guidelines

This section provides an overview of key Commonwealth and State legislation relevant to groundwater matters, including identifying primary and likely secondary approval requirements for the Project.

4.1 Commonwealth legislation

Table 4.1: Key Commonwealth legislation relevant to groundwater

Legislation	Relevance to this report
Environment Protection and Biodiversity Conservation Act 1999	
The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal framework to protect and manage matters of national environmental significance (MNES), which include: world heritage properties; national heritage places; wetlands of international importance (Ramsar); listed threatened species and communities; listed migratory species; Commonwealth marine areas; the Great Barrier Reef Marine Park; nuclear actions; and water resources, in relation to coal seam gas and large coal mining development. Any project that is likely to have a significant impact on MNES, must be referred to the Commonwealth Minister for the Environment and Water via the Department of the Climate Change, Energy, the Environment and Water (DCCEEW) for a decision on whether the Project is a 'controlled action' requiring assessment and approval under the EPBC Act.	The Project was referred to the Commonwealth Minister for the Environment, who determined that the Project is a 'controlled action' requiring assessment and approval under the EPBC Act before it can proceed. The Minister's referral decision (EPBC 2020/8741) issued on 2 September 2020 determined that the Project is a 'controlled action' due to its potential to have a significant impact on listed threatened species and communities, and further stipulates that the Project will be assessed under the bilateral (assessment) agreement between the Commonwealth and Victorian Governments. The proposed action referred was varied on 20 November 2024 to reflect the Project description. Under the Victorian *Environment Effects Act 1978*, the EES process is an accredited assessment process under the bilateral (assessment) agreement.

4.2 State legislation

Table 4-2: Key State legislation relevant to groundwater

Legislation	Relevance to this report
Environment Effects Act 1978	
The *Environment Effects Act 1978* provides for the assessment of projects that are capable of having a significant effect on the environment by enabling the Minister administering the Act to decide that an EES should be prepared. An EES may be required where: There is a likelihood of regionally or State significant adverse environmental effects There is a need for an integrated assessment of potential environmental effects (including social and economic effects) of a project and relevant alternatives Normal statutory processes would not provide a sufficiently comprehensive, integrated, and transparent assessment.	On 22 August 2023, the Minister for Planning determined that the Project requires assessment through an EES under the Environment Effects Act, due to matters as set out in the Statement of Decision on Referral No. 2023R-04, and summarised below: ▪ The area of interest for the project supports significant environmental values and other social values, potential aggregate impacts on which are of at least regional significance. ▪ Multiple alignment and design alternatives for the project within the area of interest require rigorous and transparent assessment and refinement. ▪ An EES responds to community interest in project siting, alignment and design alternatives by providing appropriate opportunities for public input. The Minister for Planning issued the EES scoping requirements in November 2023 (Section 2), which have informed this assessment.
Environment Protection Act 2017	
The *Environment Protection Act 2017* (Environment Protection Act) is the current regulatory mechanism for protecting Victoria's water environments from pollution, which came into force on 1 July 2021.	The general environmental duty requires identification of all risks and implementation of effective control measures in order to minimise the risk of harm. The duty includes having a 'state of knowledge' regarding risks the Project may have on human health and the environment and steps you

Legislation	Relevance to this report
The Act introduces a risk-based approach to preventing environmental harm and includes a general environmental duty. The general environmental duty will require people to take reasonably practicable steps to eliminate, or otherwise reduce risks of harm to human health and the environment from pollution and waste.	should take to eliminate or reduce risks. This guides the approach to managing impacts on groundwater and associated environments during the Project. Key subordinate instruments which dictate policies to establish environmental quality objectives associated with groundwater are created under this legislation. Other duties of relevance to the Project and groundwater include: ▪ Transitional duty relating to material harm (Section 28), i.e., the Project must not engage in conduct that results in material harm to human health or the environment from pollution or waste. ▪ Duties relating to pollution incidents (Sections 29, 30, 31 and 32), i.e., if the Project is responsible for a pollution incident, you must restore affected areas back to their original state. ▪ Duty to manage contaminated land (Section 39), i.e., when contamination is present, or suspected to be present, the Project has a duty to manage the risks from that contamination. ▪ Duty to notify of contaminated land (Section 40), i.e., the Project will need to notify EPA of contamination if it is 'notifiable contamination'. The Environment Protection Act requires certain types of contamination of land and groundwater to be notified to EPA.
Environment Protection Regulations 2021	
The Environment Protection Regulations 2021 (Regulations) support the objectives of the legislation – to prevent or minimise risks of harm to human health or the environment from pollution or waste. The Regulations contain detailed obligations to manage risks to air and water. For water, the Regulations: ▪ prohibit the discharge of waste from vessels except in specific circumstances. For example, when cleaning the vessel in the water. ▪ regulate the approval of discharges of wastewater in special water supply catchments ▪ prescribe the clean up of non-aqueous phase liquids ▪ create a new permit requirement to legally discharge waste to aquifers.	The Regulations support harm minimisation to groundwater and waterways from Project related activities. Displaced groundwater or groundwater slurry produced from construction activities is classified as a waste as will be managed in accordance with these regulations.
Water Act 1989	
The *Water Act 1989* (Water Act) provides the legal framework for managing Victoria's water resources. Its purpose is to promote the orderly, equitable and efficient use of water resources. The Water Act applies to the management of groundwater and imposes licensing requirements in relation to the dewatering of groundwater.	In the context of groundwater, this Act establishes Department of Energy, Environment, and Climate Action (DEECA) as the authority responsible for the sustainable, efficient, equitable management and allocation of groundwater. For groundwater in the study area, DEECA has delegated this responsibility to Southern Rural Water, Grampians Wimmera Mallee Water and Goulburn Murray Water, whose responsibilities include licensing any extraction from and injection to the groundwater system. Groundwater dewatering and recharge through bores requires a licence from these authorities (for construction of bores and for pumping from/to bores) if required. Section 33d of the Water Act relates to damage and interference with State Observation Bore Network (SOBN) bores. The Project has a responsibility to prevent damage to SOBN bores by the Project.

4.3 Policy, guidelines and standards

Table 4-3: Policy, guidelines and standards relevant to groundwater

Policy, Guidelines and Standards	Relevance to this report
Environment Reference Standard	
The Environment Reference Standard is a tool made under the *Environment Protection Act 2017*. The Environment Reference Standard: ▪ identifies environmental values that the Victorian community want to achieve and maintain ▪ provides a way to assess those environmental values in locations across Victoria. The Environment Reference Standard refers to the total dissolved solids segments of groundwater but has replaced the term 'beneficial use' with the term 'environmental value'.	The Environment Reference Standard is not a compliance standard. The Environment Reference Standard sets out indicators and objectives to be used to assess if the environmental value is being achieved, maintained, or threatened in relation to water (surface water and groundwater), which is relevant in assessing impacts of the Project.
Australian Standard 2159-2009: Piling-design and installation	
This sets out minimum requirements for the design construction and testing of piled footings for the towers. The standard sets the criteria for determining the level of groundwater aggressivity to concrete and steel structures.	The design of the towers will need to take into account potential aggressive ground conditions in accordance with this standard.
Civil construction, building and demolition guide (EPA Pub 1834.1)	
This guide supports the civil construction, building and demolition industries to eliminate or reduce the risk of harm to human health and the environment through good environmental practice.	Approach to risk management has been considered in this impact assessment and controls will be included in the Project CEMP.
EPA Environmental guidelines for construction: guide to preventing harm to people and the environment (Pub 1820.1)	
These guidelines provide overarching approaches to common hazards in construction, including management of waste and contaminated land. It provides information on how to manage risks and outlines the legal obligations under the *Environment Protection Act 2017*.	Approach to risk management has been considered in this impact assessment and controls will be included in the Project CEMP.
EPA Publication 668: Hydrogeological assessment (groundwater quality) guidelines	
These guidelines described how hydrogeological assessments should be completed with regards to building a conceptual model and identification of sources of groundwater contamination.	The approach to conceptualising groundwater systems described in this publication has been incorporated into this impact assessment (Section 6). Sources of contamination that may affect the environmental value of groundwater have been identified in the Contaminated Land impact assessment.
National Water Quality Management Strategy, 2018	
The National Water Quality Management Strategy provides information that is applicable to all types of water in Australia, including fresh water, marine water, groundwater, estuarine water, and recycled water; and that will support different purposes of the water, such as for drinking, the environment, primary industry, recreation, industry, and cultural and spiritual values. The National Water Quality Management Strategy provides guidance and policy on water quality management, particularly about the quality of water that will be fit for purpose.	Under the National Water Quality Management Strategy are a series of guidelines which establish requirements of water quality that will be fit for purpose (water quality that will be suitable for the current uses and values), such as water for drinking and the environment and managing water quality from human-induced processes such as industrial discharges and run-off from urban areas. These guidelines inform the quality of groundwater to be maintained for the Project.

5. Method

5.1 Overview

This section describes the method that was used to assess the potential impacts of the Project. Risk screening was applied to prioritise the key issues for impact assessment. Measures to avoid, minimise and manage potential effects have then been developed to address these impacts. The following sections outline the method adopted for the groundwater impact assessment.

5.2 Study area

The study area for the Groundwater Impact Assessment is the same as the Project Land (as described in Section 3.1) portioned into three geographical areas to align with areas of common groundwater conditions across the Project:

- Western portion of the study area – covers the existing Bulgana Terminal Station and the new 500kV terminal station to the most easterly extent of the Pyrenees Formation, along the Proposed Route
- Central portion of the study area – from the Pyrenees Formation to the eastern boundary of the Bungaree Groundwater Management Area
- Eastern portion of the study area – from the eastern boundary of the Bungaree Groundwater Management Area to the end of the Proposed Route at the Sydenham Terminal Station. The area includes the existing Elaine Terminal Station.

These areas are shown in Figure 5-1. Consideration has been made to groundwater and groundwater receptors adjacent to the study area where they are considered hydraulically connected, relevant and of importance to the impact assessment undertaken within the Project Land.

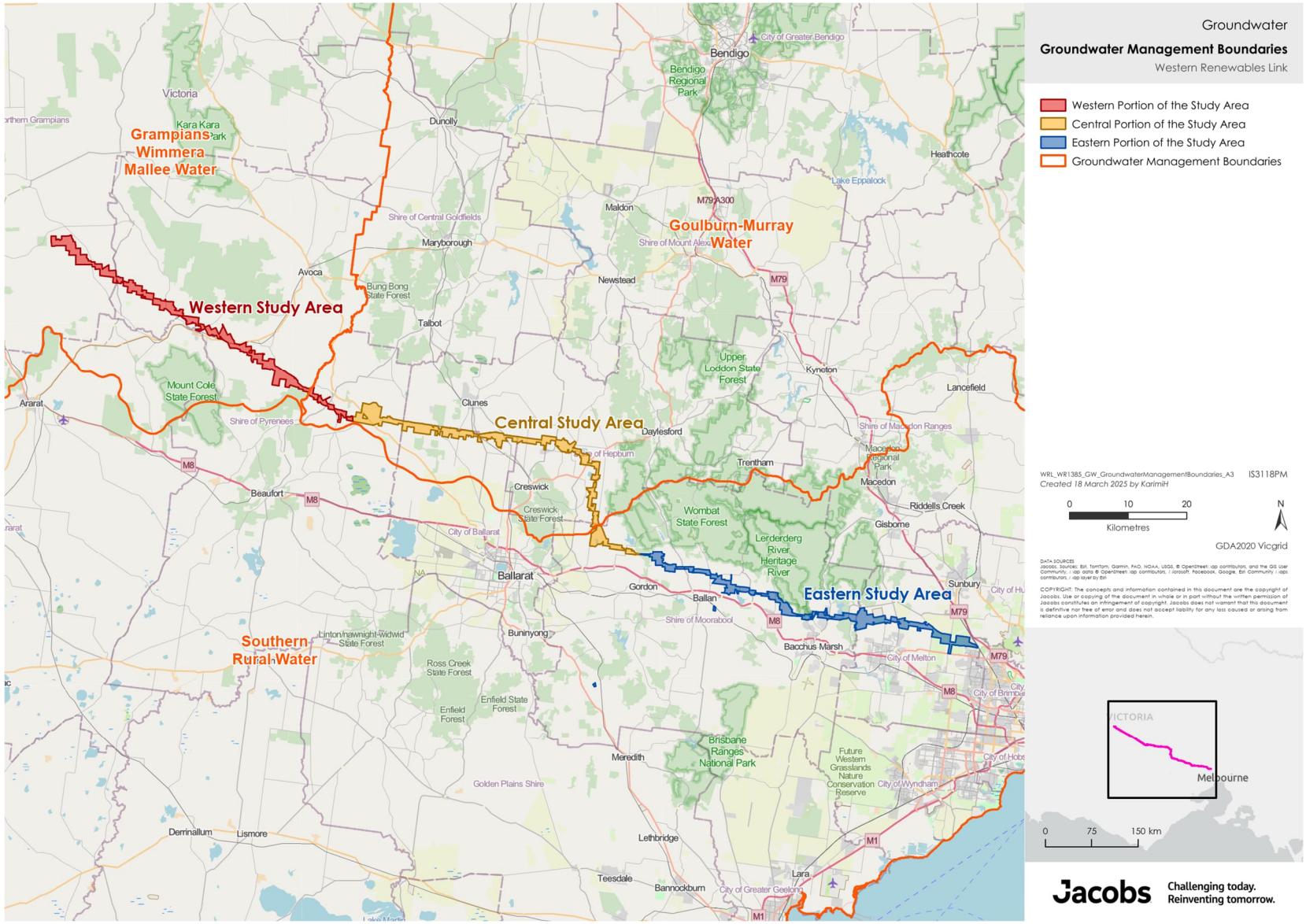

Figure 5-1: Groundwater study areas for groundwater existing conditions

5.3 Existing conditions

The existing conditions assessment was used to characterise the current condition and values of the physical, biological, and social environment. The study of the existing groundwater conditions comprised of desktop assessment. Groundwater conditions and impacts are closely related to the Surface Water, Geology and Soils, Contaminated Land and Biodiversity impact assessments, and these interactions are noted throughout the assessment and cross-referenced to other technical studies where relevant.

Consistent with the EES scoping requirements, the study of existing conditions was intended to characterise groundwater conditions by preparing a hydrogeological conceptual model to identify and determine:

- Major aquifers present (with particular focus on those within 25m of the surface, as these have potential to be intersected by the Project), groundwater levels, groundwater flow directions, potential for groundwater-surface water interactions, groundwater salinity and associated environmental values
- Local groundwater users (e.g., bores and groundwater fed dams)
- Springs and GDEs.

5.4 Risk screening

A risk screening process was undertaken to identify the groundwater-related risks associated with the design, construction, operation and decommissioning of the Project and to provide for the appropriate level of investigation (i.e., that the level of investigation is proportionate to the relative environmental risk). The outcomes of the risk assessment identified the key issues that were taken forward into the impact assessment stage (see Sections 7, 8, 9 and 10).

5.5 Impact assessment method

The method for the Groundwater Impact Assessment included:

- Identifying key issues (as described in Section 5.4) to be addressed in the impact assessment
- Identifying potential impacts of Project construction, operation, and decommissioning including the likely extent, magnitude and duration of changes to groundwater level, flow, quality or availability to receptors, according to the impact ratings developed for groundwater and summarised below (Table 5-1)
- Measuring potential impacts of the Project against the existing conditions by assessing the significance of the impacts, taking into consideration mitigation measures. Mitigation measures to reduce the potential impacts have been recommended in accordance with the mitigation hierarchy (avoid, minimise, manage, rehabilitate and offset) and these have then informed the development of EPRs
- Evaluation of the significance of impacts based on the sensitivity of protected environmental values and groundwater receptors, potential longevity of the impact (short or long term) and severity of the impact (whether the impact is observable or measurable). Any areas of the Project where a potential long-term or high consequence with likely to almost certain likelihood of impact occurrence were recommended for quantitative assessment. Criteria were set to define the significance of an impact, as described in Table 5-1
- Identifying any other potential developments that could lead to cumulative impacts when considered together with the Project
- Prepare EPRs to define the environmental outcomes to be achieved through the implementation of mitigation measures during construction, operation and decommissioning. While some EPRs are performance based to allow flexibility in how they will be achieved, others include more prescriptive measures that must be implemented. Compliance with the EPRs will be required as a condition of the Project's approval
- Determining the residual impacts associated with the construction, operation, and decommissioning of the Project, and evaluating their significance in accordance with the criteria described above.

Groundwater related fieldwork was not conducted; a desktop assessment of the Project design and existing groundwater conditions was sufficient to identify potential groundwater risks and impacts and develop mitigation measures. Other technical reports have included extensive field surveys (Biodiversity Impact Assessment), or site visits (Contaminated Land Impact Assessment and Geology and Soils Impact Assessment) that provided additional information for the groundwater assessment.

Table 5-1: Criteria for determining significance of groundwater impact

Significance of impact	Description
Negligible	Negligible (no measurable) change to groundwater level, groundwater quality, ecosystem function or environmental value.
Minor	Changes to groundwater levels, flow or quality, or release of pumped groundwater into the environment, results in either of the following in the study area: ▪ Localised, small and short-term (less than one month) degradation of water quality. Water quality remains within the long-term historical background range and returns to pre impact conditions without observable consequence to ecosystem function. No change to environmental value. ▪ Localised, small and short-term (less than one month) change in groundwater level without observable consequence to users or ecosystem function.
Moderate	Changes to groundwater levels, flow or quality, or release of pumped groundwater into the environment, results in either of the following in the study area: ▪ Water quality impact that exceeds background conditions for an extended period of time (up to six months) and extends downstream beyond the immediate impact zone. No change to environmental value. ▪ Local change in groundwater level with observable environmental stress on local ecosystems, or observable loss of pumping head for local groundwater users.
Major	Changes to groundwater levels, flow or quality, or release of pumped groundwater into the environment, results in either of the following in a widespread area: ▪ Water quality exceeds background conditions and exceeds Environment Reference Standard criteria with impact to environmental value for an extended period of time (up to one year), covering an area downstream of the immediate impact zone. ▪ Major change in groundwater level with measurable impacts to connected ecosystems or bore users (affects areas beyond project footprint).
Severe	Changes to groundwater levels, flow or quality, or release of pumped groundwater into the environment, results in either of the following in a widespread area: ▪ Total loss of biological functions and processes, possibly irreversible, long term harm to native flora and fauna. Ecosystem is unable to recover and rehabilitation to previous condition is not possible. Regional impacts. ▪ Permanent groundwater level change causing long term impacts to ecosystems or bore users, regional impacts. ▪ Permanent change to environmental value causing long term impacts to ecosystems or bore users, regional impacts.

5.6 Stakeholder engagement

Stakeholders and the community were consulted to support the preparation of this report and to inform the development of the Project and understanding of its potential impacts. Table 5-2 lists specific engagement activities that have occurred in relation to groundwater, with more general engagement activities occurring at all stages of the Project. Feedback received during community consultation sessions is summarised in Section 5.7 relevant to the Groundwater Impact Assessment.

Table 5-2: Stakeholder engagement undertaken for groundwater

Stakeholder	Relevance
DEECA (formerly known as DELWP)	Groundwater is managed under the Water Act. Under the Water Act the State Government has the right to the use, flow, and control of all water in a waterway as well as all groundwater. DEECA is the overseeing regulator of groundwater resources in Victoria.
EPA	The EPA is Victoria's environmental regulator, responsible for the State legislation and several guidelines/standards referred to in this impact assessment. They have an interest in understanding the potential for environmental harm as a result of the Project.
Catchment Management Authorities (CMAs): Wimmera, North Central, Corangamite, Glenelg Hopkins and Melbourne Water	In Victoria, Integrated Catchment Management underpins sustainable management of land and water resources and contributes to biodiversity management. Victoria's framework for the integrated management of catchments is established under the *Catchment and Land Protection Act 1994* (CaLP Act). Hence, the CMAs have an interest in the appropriate management of groundwater.
Hepburn Shire Council	Hepburn Shire Council includes several natural groundwater-sourced mineral springs. These springs have environmental and economic (tourism) value to the Shire and hence the Council have an interest in any potential for impacts to mineral springs.
Southern Rural Water, Goulburn-Murray Water, Grampians-Wimmera Mallee Water	Rural Water Corporations (Southern Rural Water and Goulburn-Murray Water) are responsible for issuing groundwater licences for any water other than mains supply (which is managed by urban water authorities). Hence, they have an interest in ensuring groundwater resources remain available to users and the environment. Grampians-Wimmera Mallee Water is also a rural water authority in the Project Area; due to limited groundwater use in the area, discussions with the authority were limited. The Rural Water Corporations across the study area are shown in Appendix F.

The outcomes of the stakeholder consultation are summarised in Table 5-3. Input from stakeholders was considered in both establishment of existing conditions and the impact assessment, where relevant.

Table 5-3: Stakeholder consultation outcomes

Stakeholder	Matters discussed related to groundwater	How information was incorporated into assessment
Wimmera CMA	▪ Key Project issue is the location of towers in relation to waterways. ▪ Groundwater is not used heavily in the area as surface dams are the primary water supply. ▪ Mitigation strategies should consider buffers for waterways and vegetation areas.	▪ Buffers for waterways and vegetation areas included as a mitigation strategy.
North Central CMA	▪ The Project is not expected to impact groundwater. In particular, towers are expected to have limited to no impact to groundwater as they are "clean sites" i.e., no runoff issues like other infrastructure, such as residential sites. ▪ Mitigation strategies should consider buffers for waterways and appropriate controls during piling if groundwater is encountered. The typical setback for waterways and wetlands is 30m, which can be increased if the waterway has additional significance.	▪ Buffers for waterways included as a mitigation strategy (referred to Surface Water Impact Assessment).
Glenelg Hopkins CMA	▪ There are no areas of significance related to groundwater in the Glenelg Hopkins area of the Project.	

Stakeholder	Matters discussed related to groundwater	How information was incorporated into assessment
Corangamite CMA	▪ The Project is not expected to impact groundwater. ▪ There are no areas of significance related to groundwater in the Corangamite area of the Project. ▪ Mitigation strategies should consider waterway buffers of 100m for major waterways and 30m for minor waterways.	▪ Buffers for waterways included as a mitigation strategy (referred to Surface Water Impact Assessment)
Melbourne Water	▪ Mitigation strategies should consider buffers from waterways, which are dependent on Strahler stream order (20m, 30m or 50m).	▪ Buffers for waterways included as a mitigation strategy (referred to Surface Water Impact Assessment)
Goulburn-Murray Water	▪ Concerns regarding potential for groundwater contamination at terminal station sites due to the storage of oils. ▪ There are areas around the Newlyn Zone where groundwater use is restricted. ▪ Objectives of EES groundwater impact assessment should align with the Loddon Highlands Water Supply Protection Area. ▪ Within the study area, there are 11 licensed bores.	▪ Sought feedback from AusNet and included clarity in Section 3.3.4. ▪ Have noted that a requirement to dewater within a groundwater management area must have the volume estimated and communicated to the relevant water authority.
Southern Rural Water	▪ The accuracy of state-provided bore location information is low and there is a possibility that unregistered bores may be encountered. ▪ There is potential that a tower could be sited on-top of an old bore. Mitigation strategies should consider a field review. ▪ Mitigation strategies should consider buffers of 50m for all bores. The objective of the buffer is to protect bores from poor quality water generated from piling activities. ▪ Key Project issues to consider are: ▪ Sensitivity around the Bungaree Area which supports potato farms. Farms rely on spring fed dams and groundwater usage is not high. Farmers have mains systems installed across paddocks that will require siting prior to underground works. ▪ Bottling companies source water from springs in Bungaree area – these companies would have concerns over groundwater quality if affected. ▪ Moorabool River is an area of sensitivity and is GDE.	▪ Buffers from existing bores included as a mitigation strategy. ▪ Consultation with landholders and site walkovers as a mitigation strategy to prevent impacts to existing infrastructure (bores, pipe networks).
Grampians-Wimmera Mallee Water	▪ Within the study area, there are no licensed bores, and therefore no expected impact. ▪ Stock and Observation bores are available through state-based datasets.	▪ State-based datasets used for the existing conditions and impact assessment reporting.
Hepburn Shire Council	▪ Issue raised regarding indigenous heritage ▪ Issue raised regarding mineral spring locations ▪ Noted the following studies will be commissioned over the next 12 months that may intersect the Project corridor: ▪ Agricultural and Rural Settlement Strategy ▪ Natural Mineral Springs Study ▪ Indigenous Heritage Strategy	▪ Traditional Owner cultural values included when describing value of groundwater. ▪ Mineral springs noted in existing conditions.

Stakeholder	Matters discussed related to groundwater	How information was incorporated into assessment
EPA	▪ Groundwater displaced to the surface will be "waste" as defined by the Act and will need to be managed in accordance with the Regulations (potentially requiring a permission from EPA). ▪ There needs to be consideration of the installation of tower footings to create preferential pathways for impacts to reach groundwater from the surface. ▪ There needs to be consideration of the risk to and mitigation of groundwater quality from construction activities.	▪ Groundwater/slurry "waste" produced during piling activities has been included in the Groundwater Management Plan EPR. ▪ Mitigation strategies described for preferential pathways and groundwater quality risks.
DEECA	▪ DEECA comfortable with 50m to 100m buffer from SOBN bores. ▪ If SOBN bores are going to be within fenced construction areas, access must be allowed to the bores and DEECA notified. Location of the bores must be clearly marked and delineated to avoid damage to the bores. ▪ Section 33d of the Water Act relates to the damage and interference with SOBN bores and can incur 3 months in prison.	▪ Buffers from SOBN bores included as a mitigation strategy, including requirement for ongoing access.
Agriculture Victoria	▪ Concern raised regarding of bushfire impact to groundwater. ▪ There needs to be consideration of the installation of tower footings to create preferential pathways for impacts to reach groundwater from the surface. ▪ Concern raised regarding the aggressivity of groundwater to tower piles. ▪ Concern raised regarding perched aquifer systems. ▪ Concern raised regarding land clearing. ▪ Concern raised regarding volcanic cones being a source of recharge to the aquifer.	▪ Consultation with the bushfire specialists to determine risk to groundwater. Further information is provided in the Bushfire Impact Assessment. ▪ Mitigation strategy described for preferential pathways. ▪ The purpose of the EES impact assessment is to assess the impact of the Project on the environment. Groundwater aggressivity on piling and foundations is a design risk and provided works are carried out in accordance with Australian Standard 2159-2009: Piling-design and installation, design will account for the aggressivity of groundwater. The standard has been included Section 4.3. ▪ The potential for impact of vegetation removal (land clearing) on groundwater has been considered in Section 7. If significant areas of deep-rooted vegetation are nominated for removal, the groundwater impact assessment should be revisited and wording to this effect has been included in Section 12.1. ▪ A description of volcanic cones in the Newer Volcanics basalt aquifer has been provided in Section 6.
City of Melton	▪ Concern raised regarding displacing groundwater during piling in wet conditions and generating groundwater discharged in the event of piling in dry conditions. ▪ Concern raised regarding understanding locations where piling under dry conditions is required.	▪ Mitigation strategy regarding discharge management noted as part of Groundwater Management Plan. ▪ Sought feedback from AusNet on piling methodology and included clarity in Section 3.3.4.

5.7 Community feedback

In addition to consultation undertaken with specific stakeholders, consultation has been ongoing with the community throughout the design development and the EES process. Contributions from the community have been received via a range of engagement events, the Project website, email, and telephone hotline. Feedback relevant to groundwater was received through community consultation sessions and the gathering of Social Pinpoint data provided by the community. This data was provided via an online mapping tool, which asked stakeholders to provide feedback on what is important to individuals and communities in their local area. The online mapping tool was available between June and October 2020. Specific areas of interest are noted in Table 5-4 and further detailed in Section 6.

Table 5-4: Areas of groundwater related interest noted by community via online mapping tool

Study area	Areas of interest
Western portion of the study area	No groundwater users or groundwater dependent ecosystems were identified through community feedback collected during community consultation on the Project.
Central portion of the study area	A number of groundwater use sites of significance were identified and these have been described in Table 6-13. A number of groundwater sites of environmental significance were identified and these have been described in Table 6-15.
Eastern portion of the study area	A number of groundwater use sites of significance were identified and these have been described in Table 6-21. No groundwater dependent ecosystems were identified through community feedback collected during consultation on the Project.

5.8 Data sources

Data sources used in the preparation of this report are summarised in Table 5-5.

Table 5-5: Data sources: groundwater

Data	Source
Depth to watertable	DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857
Groundwater salinity	DELWP, 2018, Watertable Salinity, http://data2.cerdi.edu.au/dataset/vvg_vaf_watertable_salinity_tds100_20170508_raw_3857
Groundwater dependant ecosystems	Bureau of Meteorology, 2012, National Atlas of Groundwater Dependant Ecosystems (GDE Atlas), http://www.bom.gov.au/water/groundwater/gde/ [3]
Spring locations	DELWP, 2022, Spring locations, https://discover.data.vic.gov.au/dataset/spring-locations , accessed 21 February 2022
Surface Geology	DJPR, 2023, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12
Geological mapping	VandenBerg, A., 1997a, 1:250,000 geological map series, Ballarat, SJ 54-8, Geological Survey of Victoria VandenBerg, A., 1997b, 1:250,000 geological map series, Melbourne, SJ 55-5, Geological Survey of Victoria
Groundwater users	DEECA 2024, Groundwater sites, https://data.water.vic.gov.au/ , accessed 21 May 2024 Shugg, A., 2021, Victorian Mineral Springs Database, https://www.vvg.org.au/vvg_layer_details.php?layer_id=1524 , accessed 13 September 2021
Southern Rural Water (SRW) licensed bores	SRW, 2021, Licensed bores, provided through personal comms with SRW on 24 November 2021 SRW were approached to provide an updated dataset in 2024, but this was not made available for the report.

[3] The GDE Atlas is regularly updated with regional mapping where available, however no local studies have been conducted in the study area.

Data	Source
GMW licensed bore	GMW, 2024, Western Vic transmission lines – Licensed bores within and 1km adjacent to the Project Area, provided through personal comms with Goulburn-Murray Water on 24 September 2024. This data has been derived from the Water Register and has some discrepancies with the locations of bores with the same ID in the state dataset. GMW have confirmed that the Water Register is treated as the source of truth.
GWM Water licensed bores	GWW, 2024, Western Vic transmission lines – Licensed bores within and 1km adjacent to the Project Area, provided through personal comms with Grampians Wimmera Mallee Water on 16 September 2024.
Water courses	DELWP, Vicmap Hydro 1:25,000 https://discover.data.vic.gov.au/dataset/vicmap-hydro-1-25000
Wetlands	Ramsar Wetlands – https://discover.data.vic.gov.au/dataset/ramsar-wetland-areas-in-victoria-at-1-25-000 Directory of Important Wetlands – https://discover.data.vic.gov.au/dataset/victorian-wetlands-listed-in-a-directory-of-important-wetlands-in-australia

5.9 Assumptions, limitations and uncertainties

The following assumptions, limitations and uncertainties apply to this impact assessment:

- Depth to watertable – This dataset is a model of watertable depth at 100m resolution containing interval values of 50m. The model was compiled as the difference between Digital Terrain Model (DTM) and watertable elevation in Meters above Australian Height Datum (mAHD). It uses point measurement data from state observation monitoring bores and interpolation considering the DTM. Field investigations (such as observations during piling) are required to determine depth to groundwater.
- Groundwater salinity – This dataset is a model that considers available groundwater salinity data and interpolates it between bore sites based on catchment area. Groundwater salinity data is represented by shallow aquifer salinity and does not represent deeper or confined groundwater quality (which may differ from shallow groundwater quality and is unlikely to be intersected or interacted with by the Project).
- Bore location data – This dataset is compiled from bore construction licences and bore completion reports submitted to water authorities. Data submitted to authorities can often be incomplete location accuracy provided may be poor (owing to handheld GPS rather than survey data, for example). The dataset only includes registered bores – there may be unregistered bores or bores installed prior to accurate record keeping. The data can become out of date if new bores are installed since the data was accessed.
- Spring locations – This dataset is a collation of various datasets that indicate spring locations across Victoria. The dataset may be incomplete (i.e., there may be additional springs present across the Project) owing to the temporal variability in spring presence (and therefore identification during times of assessment).
- GDE Atlas – This dataset was generated using a methodology reliant on remote sensing. The dataset provides an understanding of landscapes that potentially use groundwater, however without ground data, actual rates of groundwater use cannot be determined. The dataset does not contain information regarding the degree of dependency on groundwater or the amount of groundwater used. The maps should not be used as an absolute assessment of where GDEs exist or how much groundwater is being used by terrestrial vegetation, unless integrated with site specific hydrogeological and plant water use assessments. Further, groundwater use by vegetation may be perennial, seasonal, or restricted to dry periods. Even for the same species, the amount of groundwater use will vary depending on specific circumstances.
- Licensed bores – A dataset was obtained from SRW in 2021 and has not been able to be updated for the current revision of the impact assessment. Hence, there may be additional users with licences not shown in this assessment.
- The report has been written at a point in time and is based on information provided by AusNet Services on the Project (Project components and location of components). The report should be read in full with no

excerpts to be representative of the findings. The report has been prepared exclusively for Jacobs' client and no liability is accepted for any use or reliance on the report by third parties.

6. Existing conditions

6.1 Western portion of study area

6.1.1 Geological setting

The western portion of the study area is characterised by Quaternary alluvial surficial deposits, predominantly associated with surface water features, incised into outcropping Cambrian bedrock. A predominant feature of the alluvial units is the Shepparton Formation and White Hills Gravel, comprised of gravel, sand, silt and clay. Colluvial deposits, including granite derived colluvium, are also present and are associated with changes in terrain. The outcropping bedrock (or Pyrenees Formation) is comprised of sandstone and siltstone. The major geological features are listed in Table 6-1 and are illustrated in Figure 6-1.

Table 6-1: Key geological units: Western portion of the study area

Age	Unit name	Description	Geological profile
Quaternary	Alluvial and colluvial deposits, including White Hills Gravel	Gravel, sand, silt	Unconsolidated
	Shepparton Formation	Fluvial gravel, sand, silt, clay	
Tertiary	White Hills Gravel	Conglomerate, sand, silt, clay	
Devonian	Granite and granodiorite	Intrusive granite	Consolidated
	Warrack Formation	Sandstone, interbedded siltstone, and shale	
Cambrian	Pyrenees Formation (bedrock)	Marine sandstone, siltstone, schist	

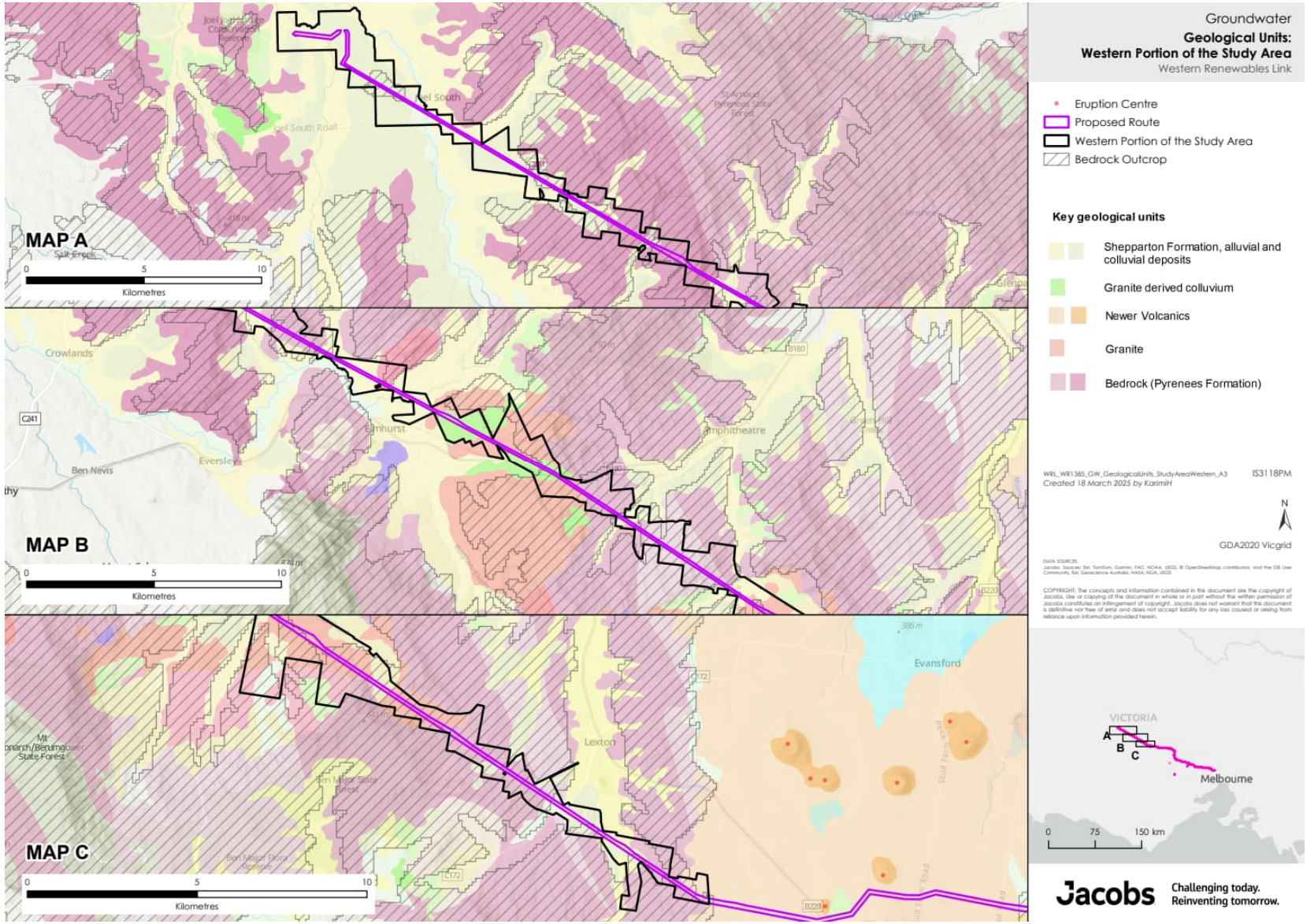

Figure 6-1: Geological map: Western portion of the study area

6.1.2 Hydrogeological setting

The hydrogeological setting of the western portion of the study area can be described based on the following aquifer types:

- Alluvial aquifers: The valleys incised into the bedrock are filled with sand, gravel and clay and are associated with creeks and rivers. These aquifers host the watertable and are generally in direct hydraulic connection with the surficial water feature that they are associated with.
- Weathered zone aquifers: The upper zone of fractured rock aquifers typically includes a weathered profile, which can present as a silt, sand, or clay, derived from the original rock. The weathered profile may host groundwater but will not always be present as an aquifer (i.e., if the weathered profile has a high clay content, it may act as a confining aquitard). Thickness of these unconfined aquifers varies across the study area and yield is low.
- Fractured rock aquifers: Fractured rock aquifers are predominant across the study area. The yield of fractured rock aquifers is dependent on the number, sizing, spacing and interconnectivity of fractures and joints.

Based on the geological and hydrogeological setting, the following aquifer units are of most relevance (horizontal and vertical) to the study area (with Victorian Aquifer Framework Hydrogeological Units Number[4] shown in brackets):

i. Alluvial (including the Shepparton Formation) and colluvial aquifers.

Several creeks and rivers are associated with the alluvial depositions across the study area, including Wimmera River and Avoca River. The unconfined alluvial and colluvial aquifers (101) and Shepparton Formation (104) are recharged directly from rainfall and the surrounding rock. As such, groundwater quality varies and is often similar to that of the surrounding rock aquifer, generally being less than 1000mg/L total dissolved solids and up to 10,000mg/L with bore yields of less than 12L/s (Nahm, 1985). Bore yield depends on the size, shape, and thickness of the alluvial deposit, which varies across the study area. The average thickness is expected to be 11m (VAF, 2012). Specific to the new 500kV terminal station near Bulgana, the site is directly underlain by alluvial and colluvial deposits.

ii. Bedrock aquifer (weathered zone and fractured rock aquifers)

The bedrock aquifer is referred to as the Pyrenees Formation (133), which features sandstone and siltstone with granite intrusions. The bedrock unit functions as a fractured rock aquifer, however, owing to the generally low permeability (GHD, 2012), it is not considered significant in terms of regional groundwater flow or groundwater use. Where the bedrock outcrops (i.e., no overlying alluvial sediments), the aquifer is unconfined and is recharged directly through rainfall. Weathering in the upper profile may provide confining conditions locally. Where the unit underlies younger aquifer, it becomes confined.

6.1.3 Groundwater levels and flow

Based on state-wide mapping, expected depth to watertable varies across the study area from less than 5m to greater than 50m. Areas where the depth to watertable is shallow (less than 5m) correspond to incised valleys featuring surface water. Areas with deeper watertable occurrence are associated with outcropping bedrock in areas of high elevation. Over half of the western portion of the study area is expected to have groundwater within 10m of the surface, including the new 500kV terminal station near Bulgana, and based on a typical transmission tower piling depth of 9m, groundwater is likely to be encountered at some piling locations. Depth to watertable is shown in Figure 6-2 and Table 6-2.

[4] DELWP, 2019

Groundwater flow direction within the study area follows a subdued version of topography. Locally, groundwater flows towards the valleys and is discharged to creeks and rivers. Regionally, groundwater flow is in both a northerly and southerly direction, depending on the surface elevation, as the study area crosses a ridgeline in the topography.

Table 6-2: Western portion of the study area: depth to groundwater (DELWP, 2023b)

Percentage of study area	Depth to watertable (m below surface)
32%	<5
26%	5.01 to 10
24%	10.01 to 20
14%	20.01 to 50
4%	>50

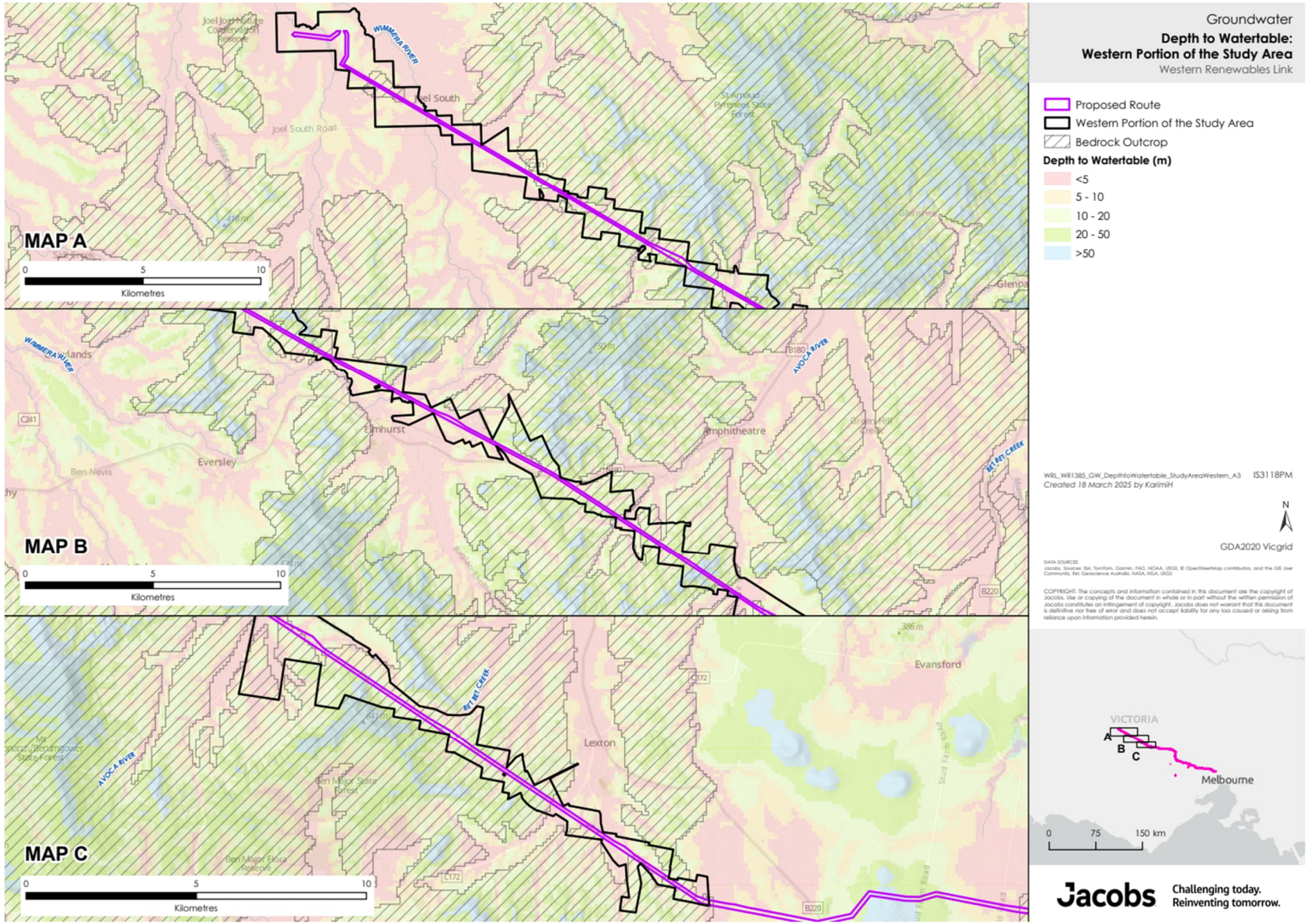

Figure 6-2: Depth to watertable map: Western portion of the study area

6.1.4 Groundwater recharge and discharge

The recharge process for both aquifers of relevance (alluvial/colluvial aquifers and bedrock aquifer) is through direct rainfall infiltration. Discharge from both aquifers is expected to be towards valleys and into creeks and rivers.

6.1.5 Groundwater-surface water interaction

There is expected to be a high-degree of groundwater-surface water interaction in the Western portion of the study area. As described above, groundwater is expected to discharge into creeks and rivers via alluvial valleys and incised drainage lines. Shallow groundwater elevation is also evidence of the potential for interaction. Details on existing surface water conditions are described in the Surface Water Impact Assessment.

6.1.6 Groundwater salinity and protected environmental value

Groundwater salinity within the study area is expected to vary from less than 600 to 3,100mg/L total dissolved solids (DELWP, 2018). At the new 500kV terminal station near Bulgana, groundwater salinity is expected to be 1,201 – 5,400 mg/L total dissolved solids. Groundwater salinity across the study area is illustrated in Figure 6-3. The Environmental Reference Standard under the *Environment Protection Act* (2017) describes 'environmental values' as the uses, attributes and functions of the environment that Victorians value. For groundwater, 'environmental value' is categorised into segments which define geographic areas that share levels of total dissolved solids. The percentage of the study area per segment is shown in Table 6-3. Groundwater salinity for the majority of the study area is classed into Segment B, where the following environmental values must be protected:

- Water dependent ecosystems and species
- Potable mineral water supply
- Agriculture and irrigation – irrigation
- Agriculture and irrigation – stock watering
- Industrial and commercial
- Water based recreation – primary contact
- Traditional Owner cultural values
- Buildings and structures
- Geothermal properties.

A summary of the protected environmental values and corresponding salinity segment are provided in Appendix A.

Table 6-3: Summary of groundwater salinity and environmental values: Western portion of the study area (DELWP, 2018)

Percentage of study area	Salinity (mg/L Total Dissolved Solids)	Groundwater segment
2%	<600	A1
2%	600 to 1200	A2
70%	1,200 to 3,100	B
25%	3,101 to 5,400	C
1%	No data	-

All of the study area is covered by Salinity Provinces as defined by Agriculture Victoria. Salinity Provinces provide a framework for describing land and water (both surface and groundwater) salinity in Victoria. These are specific geographic areas where the landscape setting and physical processes contributing to salinity are similar, and where salinity management options are also similar. Each Province contains discrete salinity impacted areas where there is a concentration or higher incidence of land and/or water salinisation which can be explained by a particular landscape setting, groundwater process or groundwater flow system. Poor surface water and soil management can result in increased saline discharges into nearby water bodies. Additionally, saline soil and groundwater can affect the upper metres of a pile driven into the soil where corrosive salts can accumulate (AS 2159-2009) and can affect earthworks (e.g., soil reuse). Salinity Provinces that apply to the study area are shown in Figure 6-3. The details are provided in Table 6-4. Soil salinity is described in detail in Geology and Soils Impact Assessment.

A Salinity Management Overlay seeks to reduce the impacts that occurs through the accumulation of salts in the root zone and on the soil surface, usually by the evaporation of saline groundwater from a shallow watertable. This planning overlay seeks to align compatible development with site capability, and the retention of vegetation complies with the objectives of any salinity management plan for the area; and to prevent damage to buildings and infrastructure from saline discharge and a shallow watertable. There are no Salinity Management Overlay areas in the Western study area.

Table 6-4: Salinity Provinces: Western portion of the study area (DELWP, 2018)

Salinity province	Details
Elmhurst (includes the new 500kV terminal station near Bulgana)	A number of small salinity discharge sites are scattered within the upland alluvial plains, mainly adjacent to and along drainage lines. The discharge sites are mainly located in poorly drained low-lying areas, which are subject to intermittent flooding.
Amphitheatre	
Lexton	

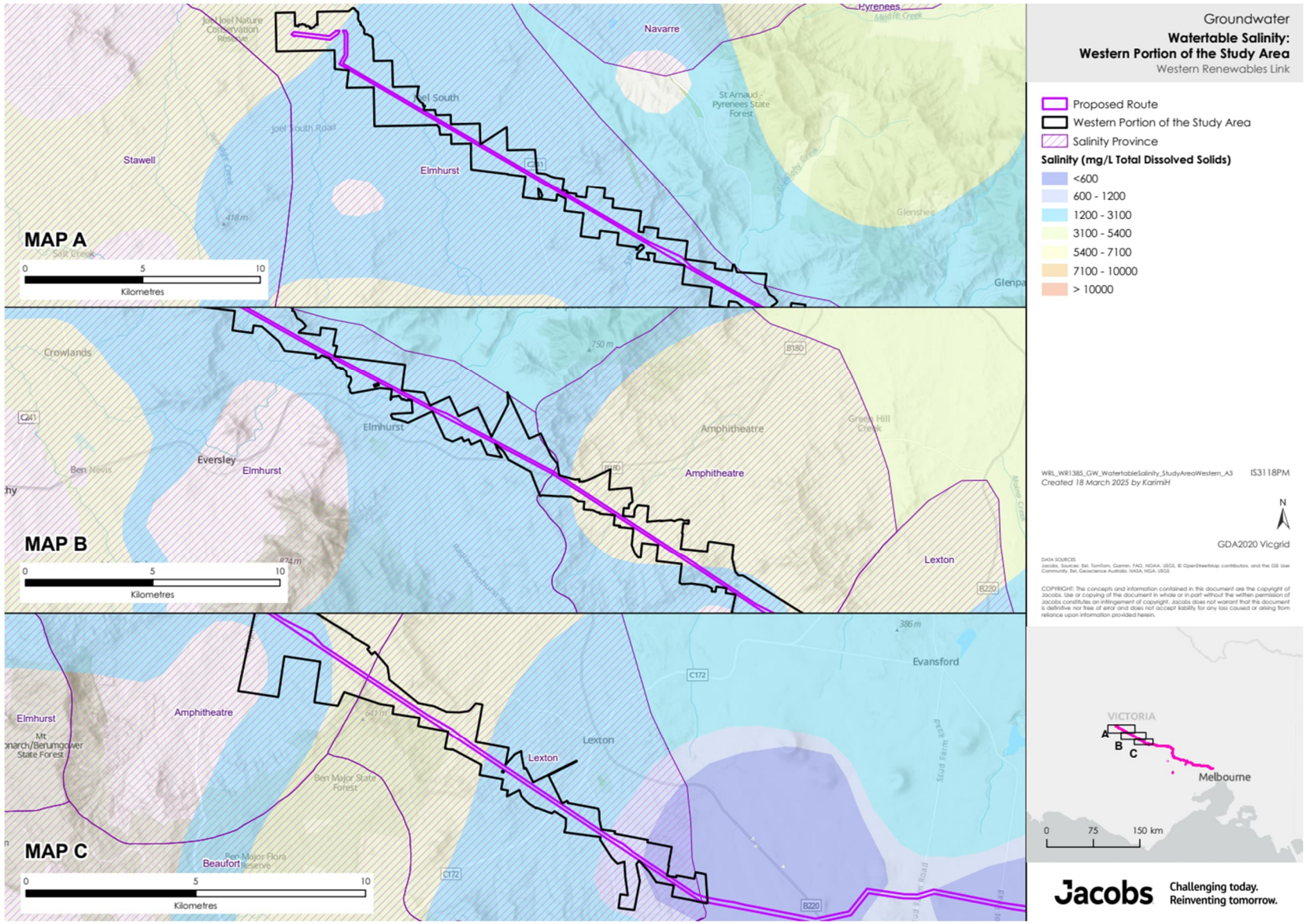

Figure 6-3: Groundwater salinity map: Western portion of the study area

6.1.7 Groundwater use and management

The water authorities responsible for groundwater licensing within the Western portion of the study area are Grampians Wimmera Mallee Water and Goulburn-Murray Water, as shown in Appendix F. Registered and licensed bores are shown in Figure 6-4 and listed in Appendix B and Appendix C. A summary of registered bores and purpose within the study area and 1km adjacent are listed in Table 6-5.

No additional groundwater users were identified through community feedback collected during consultation on the Project.

Table 6-5: Groundwater users and management: Western portion of the study area (DEECA 2024)

Water authority	Groundwater Management Area	Bores within and 1km adjacent	
		Registered bores	Licensed bores
Grampians Wimmera Mallee Water	Unincorporated[1]	1 with purpose type listed as agricultural, commercial or industrial 6 with purpose type listed as stock and domestic 22 with purpose type listed as observation 6 with purpose type listed as unknown	1 with purpose type listed as unknown
Goulburn-Murray Water	Loddon Highlands	3 with purpose type listed as stock and domestic 7 with purpose type listed as observation 3 with purpose type listed as unknown	None

Note:

1 Unincorporated Areas are areas where no significant development of the groundwater resource has occurred. This is usually because the resource is low yielding, or its quality has traditionally severely limited its use.

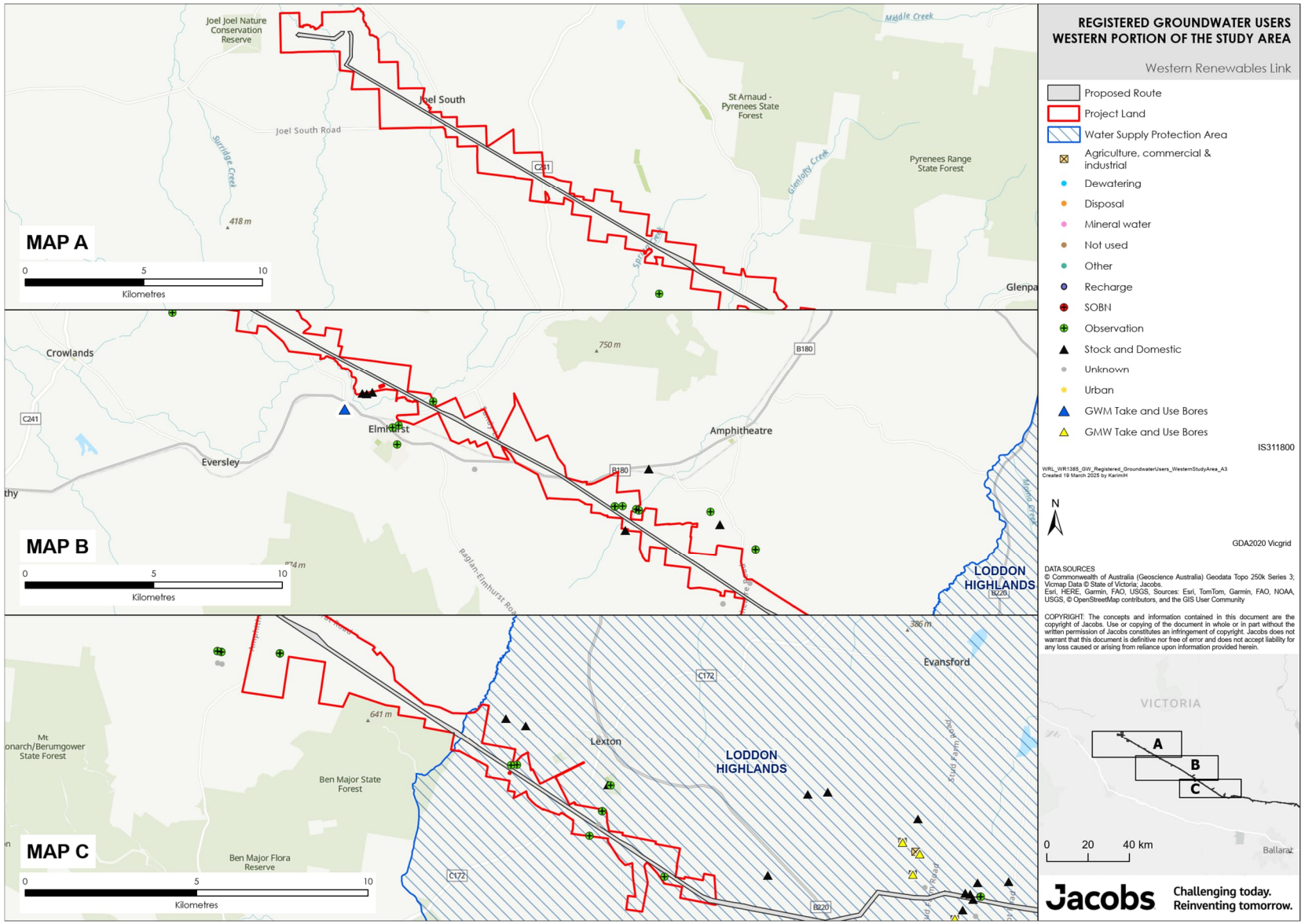

Figure 6-4: Registered bores within and 1km adjacent to Western portion of the study area

6.1.8 Groundwater dependent ecosystems

GDEs are ecosystems that rely wholly upon or in part on groundwater as part of their hydrology. Groundwater may sustain both aquatic and terrestrial biodiversity by supporting vegetation through deep root access, providing discharge to waterways as base flow or in some cases subterranean flow and providing important inflows to sustain wetlands. Understanding these GDEs is an important part of the hydrogeological conceptualisation and identification of Project related risks to groundwater. The National Atlas for GDEs (BOM, 2012) maps ecosystems and their potential for groundwater dependence. The Atlas contains information on three types of ecosystems:

- Aquatic ecosystems that rely on the surface expression of groundwater, this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands, and springs.
- Terrestrial ecosystems that rely on the subsurface presence of groundwater, this includes all vegetation ecosystems.
- Subterranean ecosystems, this includes cave and aquifer ecosystems.

In the case of the Western portion of the study area:

- All major surface water features within this western section are classed as having a high or moderate potential for groundwater dependence, which is consistent with the conceptual model which suggests that groundwater discharges into the alluvial valleys and incised drainage lines. This includes the Wimmera River, located adjacent to the new 500kV terminal station near Bulgana.
- Scattered areas of vegetation that are intersected by the western section primarily align with major surface water features and drainage line banks, with the former indicating a high potential for groundwater dependence and latter showing a moderate potential. Again, this is consistent with the expectation that depth to watertable in these areas is typically less than 5m below surface, which could be used by surrounding vegetation (Evan Dresel et al., 2010).
- Parts of the study area may be conducive to subterranean GDEs, specifically stygofauna. No local studies on subterranean ecosystems with potential for groundwater dependence are available within the western portion of the study area.

Potential groundwater dependent ecosystems are listed in Table 6-6 and shown in Figure 6-5 and Figure 6-6.

Table 6-6: Western portion of the study area: potential groundwater dependent ecosystems (BOM, 2012)

CMA	GDE type	High potential for groundwater dependence	Moderate potential for groundwater dependence	Unclassified potential for groundwater dependence
Wimmera CMA	Waterway	Glenlofty Creek, Glenpatrick Creek, Sandy Creek, Six Mile Creek, Spring Creek, Wimmera River	Sandy Creek, Six Mile Creek	-
	Wetland ("SRC_UFI" identification from GDE dataset shown in brackets)	-	-	19873
	Terrestrial	Vegetation along major waterways, scattered areas of vegetation	Forested area around Glen Lofty, scattered areas of vegetation	-
	Subterranean	Aquifers within the study area may be conducive to subterranean GDEs, specifically stygofauna.		

CMA	GDE type	High potential for groundwater dependence	Moderate potential for groundwater dependence	Unclassified potential for groundwater dependence
North Central CMA	Waterway	Amphitheatre Creek, Avoca River, Burnbank Creek, Glenlogie Creek	Bet Bet Creek	-
	Wetland ("SRC_UFI" identification from GDE dataset shown in brackets)	-	-	Unnamed wetlands (40703, 41600, 41652, 41655)
	Terrestrial	Vegetation along major waterways, scattered areas of vegetation	Lexton Bushland Reserve, scattered areas of vegetation	-
	Subterranean	Aquifers within the study area may be conducive to subterranean GDEs, specifically stygofauna.		

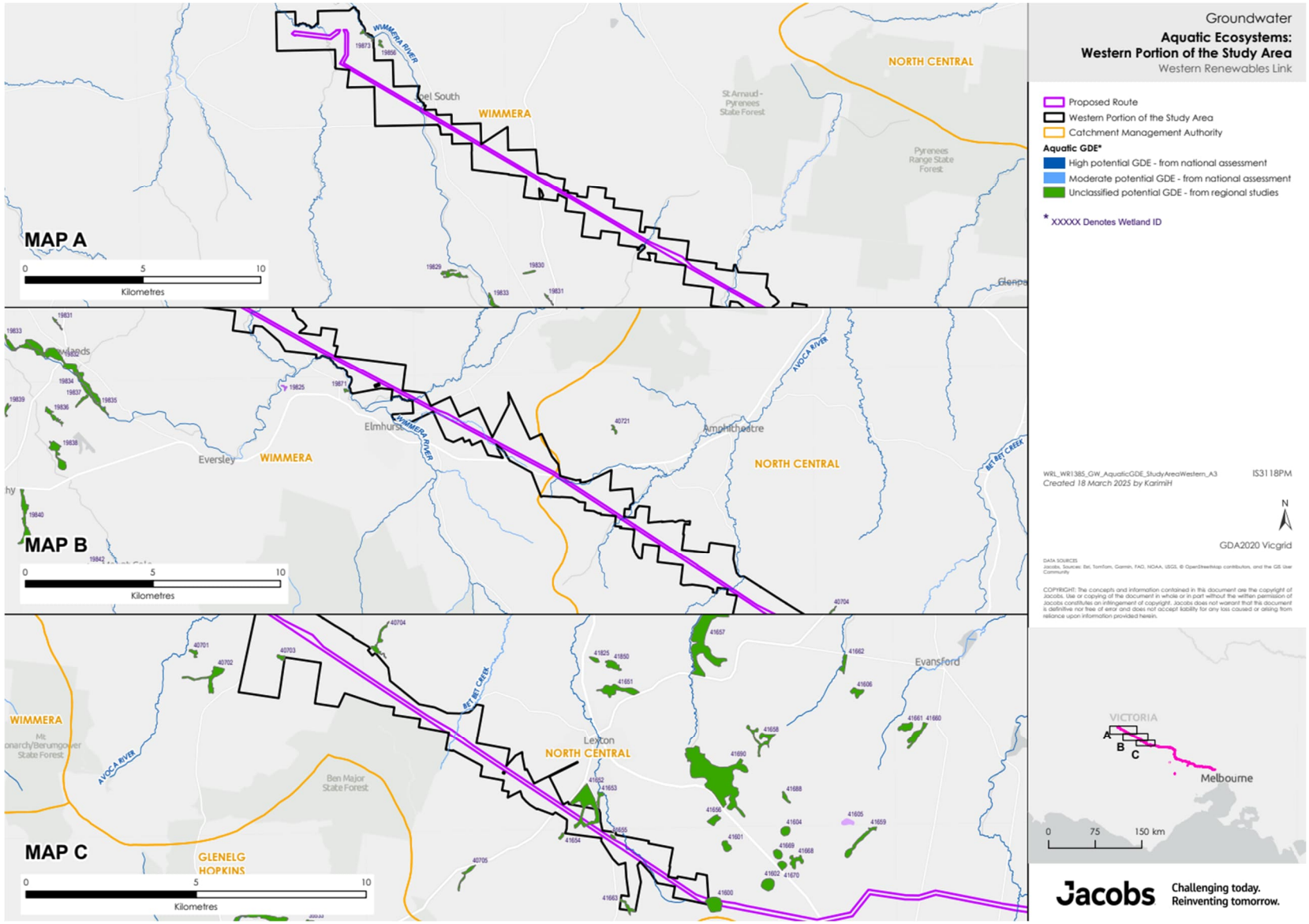

Figure 6-5: Aquatic ecosystems with potential for groundwater dependence: Western portion of the study area

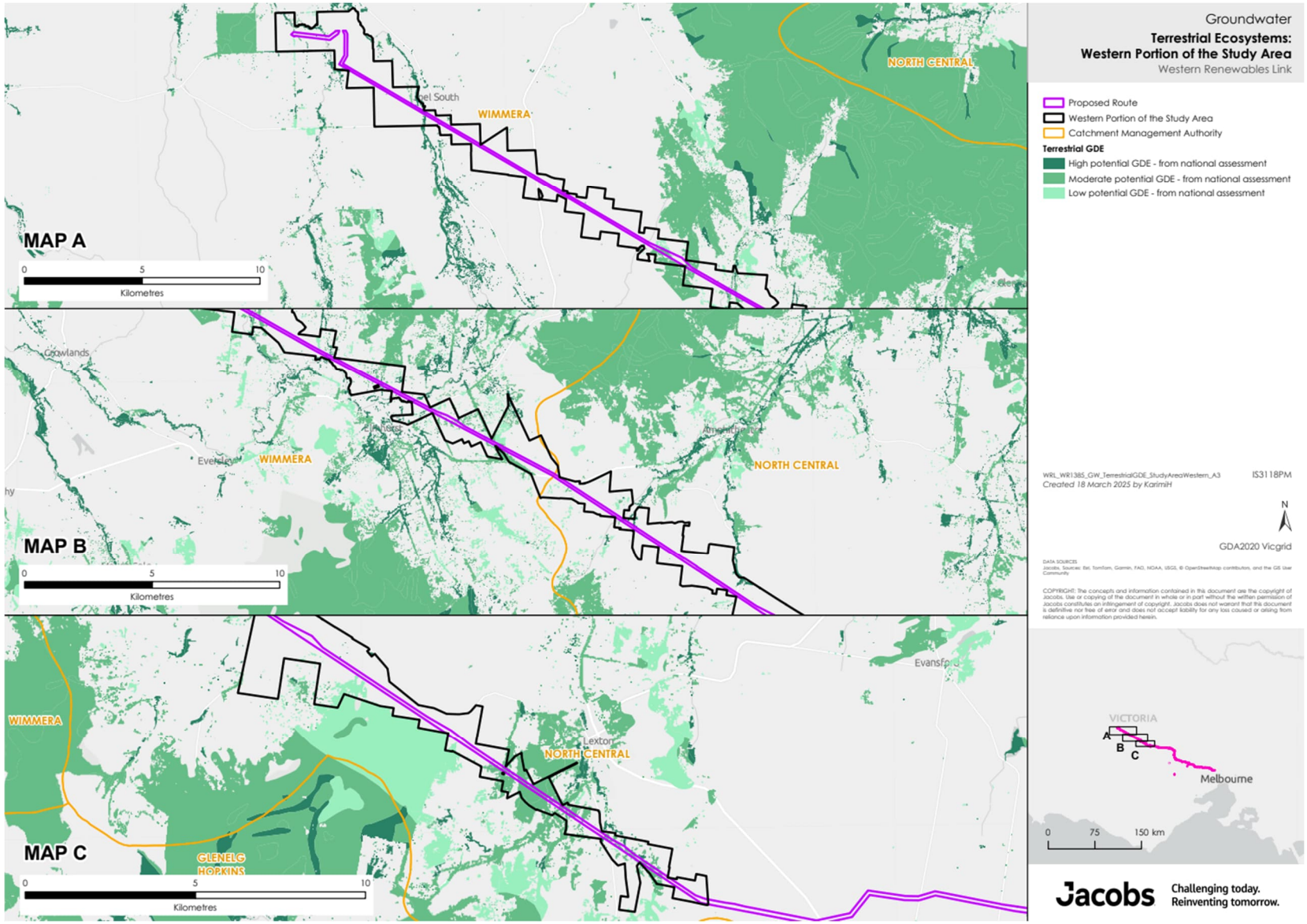

Figure 6-6: Terrestrial ecosystems with potential for groundwater dependence: Western portion of the study area

In addition to identified groundwater dependent ecosystems, groundwater sites of environmental significance were identified through previous community feedback collected during consultation on the Project in 2021. These are described in Table 6-7.

Table 6-7: Groundwater sites of environmental significance identified through community feedback: Western portion of the study area (BoM, 2012)

Feature	Location relative to study area	Description
Glenlofty Creek chain of ponds	The Social Pinpoint is approximately 1.2km north of study area, however the Creek system flows south towards the study area	Based on the National GDE database, Glenlofty Creek is an ecosystem with high potential groundwater dependence (national assessment), which intersected the study area and noted in Table 6-6.

6.1.9 Groundwater sources of contamination

Sources of groundwater contamination are described in detail in the Contaminated Land Impact Assessment. A summary is provided here to provide context to local environmental value of groundwater and existing conditions pertinent to groundwater that may affect or be impacted by the Project.

Acid sulfate soils

The western portion of the study area is identified as having "low to extremely low" probability of occurrence of acid sulfate soils (the dataset notes there is no necessary analytical data and hence classification is provisional).

Sources of contamination

The current predominant land use of the western portion of the study area is agriculture and farming. There is a presence of historical mining activities within this western area. Mining activities may have resulted in the spread of mine tailings, calcined sands, sludge, and other wastes that may contain high concentrations of heavy metals, such as arsenic and/or mercury. Therefore, the areas surrounding known mining sites (e.g., soil and groundwater) have the potential to have been contaminated as a result of the historic mining activities.

6.2 Central portion of study area

6.2.1 Geological setting

The geological setting of the central portion of the study area is characterised by alluvial deposition associated with surficial drainage lines and lava inundation from several local eruption centres filling in valleys created by the bedrock. The major geological features are summarised in Table 6-8 and illustrated in Figure 6-7.

Table 6-8: Key geological units: Central portion of the study area (VandenBerg, A., 1997b)

Age	Unit name	Description	Geological profile
Quaternary	Alluvial and colluvial deposits	Gravel, sand, silt	Unconsolidated
	Swamp and lake deposits	Silt, clay	
Quaternary-Tertiary	Shepparton Formation	Fluvial clay, sand, silt, gravel	Unconsolidated
	Newer Volcanics	Basalt	Consolidated
Tertiary	Calivil Formation	Conglomerate, sandstone, silt, clay	Unconsolidated
	White Hills Gravel	Conglomerate, sand, silt, clay	Unconsolidated
Devonian	Granite	Intrusive granite	Consolidated
Ordovician	Castlemaine – Lancefieldian	Marine sandstone, siltstone, shale, minor quartz conglomerate	Consolidated

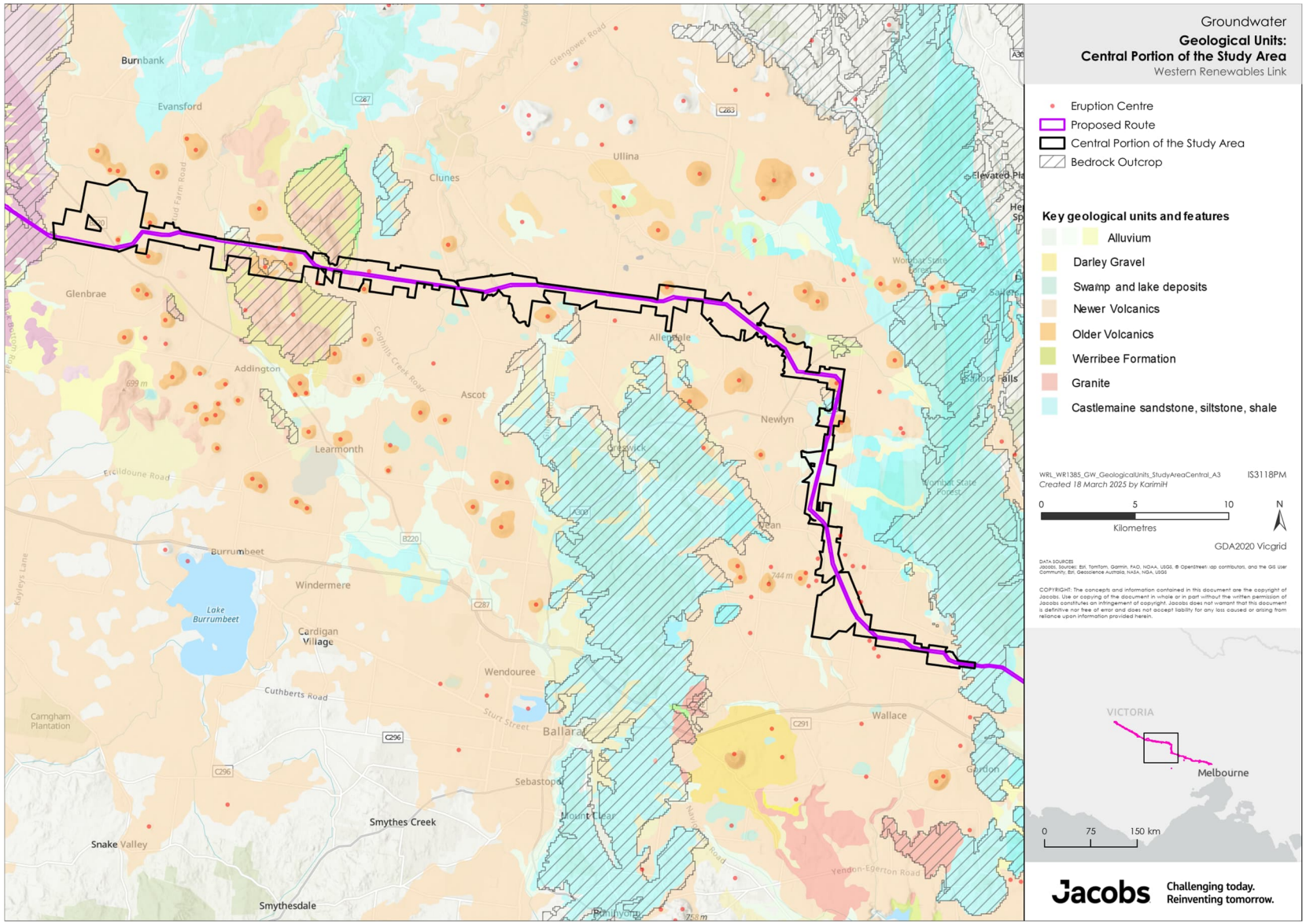

Figure 6-7: Geological map: Central portion of the study area

6.2.2 Hydrogeological setting

The hydrogeological setting of the central portion of the study area can be described based on the following aquifer types:

- Alluvial aquifers: The valleys incised into the bedrock (predominantly in the northern half of the study area) are filled with sand, gravel and clay and are associated with creeks and rivers. These aquifers host the watertable and are generally in direct hydraulic connection with the surficial water feature that they are associated with.
- Weathered zone aquifers: The upper zone of fractured rock aquifers typically includes a weathered profile, which can present as a silt, sand, or clay, derived from the original rock. The weathered profile may host groundwater but will not always be present as an aquifer (i.e., if the weathered profile has a high clay content, it may act as a confining aquitard). Thickness of these unconfined aquifers varies across the study area and yield is low.
- Fractured rock aquifers: Fractured rock aquifers are predominant across the study area. The yield of fractured rock aquifers is dependent on the number, sizing, spacing and interconnectivity of fractures and joints.

Based on the geological and hydrogeological setting, the following aquifer units are of most relevance (horizontal and vertical) to the study area (with Victorian Aquifer Framework Hydrogeological Units Number[5] shown in brackets):

i. Alluvial (including the Shepparton Formation) and colluvial aquifers

Alluvial aquifers feature along the northern half of the study area and less so in the southern half. Several creeks and rivers are associated with the alluvial depositions across the study area, including Wimmera River and Avoca River. The unconfined alluvial and colluvial aquifers (101) and Shepparton Formation (104) are recharged directly from rainfall and the surrounding rock. As such, groundwater quality varies and is often similar to that of the surrounding rock aquifer, generally being less than 1000mg/L total dissolved solids and up to 10,000mg/L with bore yields of less than 12L/s (Nahm, 1985). Bore yield depends on the size, shape, and thickness of the alluvial deposit, which varies across the study area. The average thickness is expected to be 11m (VAF, 2012).

ii. Newer Volcanics aquifer (weathered zone and fractured rock aquifers)

The Newer Volcanics aquifer (102) is the predominant surficial unit for the study area and the aquifer covers much of western Victoria. It is unconfined fractured rock aquifer and hosts the watertable, but weathering in the upper profile may provide confining conditions locally. Eruption centres are numerous and scattered across the area – these volcanic cones are a source of recharge to the aquifer, where fresher water and higher aquifer permeability is expected. Yield of the Newer Volcanics aquifer varies significantly owing to multiple lava flows having differing hydraulic characteristics. Transmissivity of the unit is dependent on the abundance of joints and is generally in the vicinity of 300m^2/day for closely jointed basalts and less than 50m^2/day for poorly jointed basalt (Nahm, 1985). Thickness across the study area varies between 10 to 80m (based on local drilling logs) with an average thickness of 30m (VAF, 2012). Underlying the Newer Volcanics is the bedrock unit.

iii. Bedrock aquifer (weathered zone and fractured rock aquifers)

The bedrock aquifer is referred to as the Castlemaine Supergroup (134), which is comprised of sandstone and siltstone with granite intrusions. The bedrock unit functions as a fractured rock aquifer, however, owing to the generally low permeability (GHD, 2012), it is not considered significant in terms of regional groundwater flow or groundwater use. Where the bedrock outcrops (i.e., no overlying alluvial sediments or Newer Volcanics), the aquifer is unconfined and is recharged directly through rainfall. Mineral springs outside of the study area (such as Hepburn Mineral Springs) are sourced from this aquifer where it outcrops. Fissures and fractures in the aquifer

[5] DELWP, 2019

contribute to the occurrence of the mineral water (Nahm, 1985). Weathering in the upper profile may provide confining conditions locally. Where the unit underlies younger aquifers, it becomes confined. Transmissivity is low, ranging from $2m^2$/day to $40m^2$/day, and storage coefficient also varies widely ($2.7x10^{-4}$ to $6.6x10^{-1}$) owing to the uneven distribution of fractures in the formation (Nahm, 1985).

6.2.3 Groundwater levels and flow

Based on state-wide mapping, the expected depth to the watertable varies across the study area from less than 5m to greater than 50m, with groundwater typically occurring 10 to 20m below surface. Areas where the depth to watertable is shallow (less than 5 m) correspond to valleys featuring surface water. Areas with deeper watertable occurrence are associated with outcropping bedrock in areas of high elevation. Almost half of the study area is expected to have groundwater within 10m of the surface and based on a typical transmission tower piling depth of 9m, groundwater is likely to be encountered at some piling locations. Depth to the watertable is shown in Figure 6-8 and Table 6-9.

Groundwater flow direction within the study area follows a subdued version of topography. Locally, groundwater flows towards the valleys and is discharged to creeks and rivers. Regionally, groundwater flow is in both a northerly and southerly direction, depending on the surface elevation, as the study area crosses a ridgeline.

Table 6-9: Central portion of the study area: depth to groundwater (DELWP, 2023b)

Percentage of study area	Depth to watertable (m below surface)
22%	<5
24%	5.01 to 10
33%	10.01 to 20
16%	20.01 to 50
5%	50.01 to 100

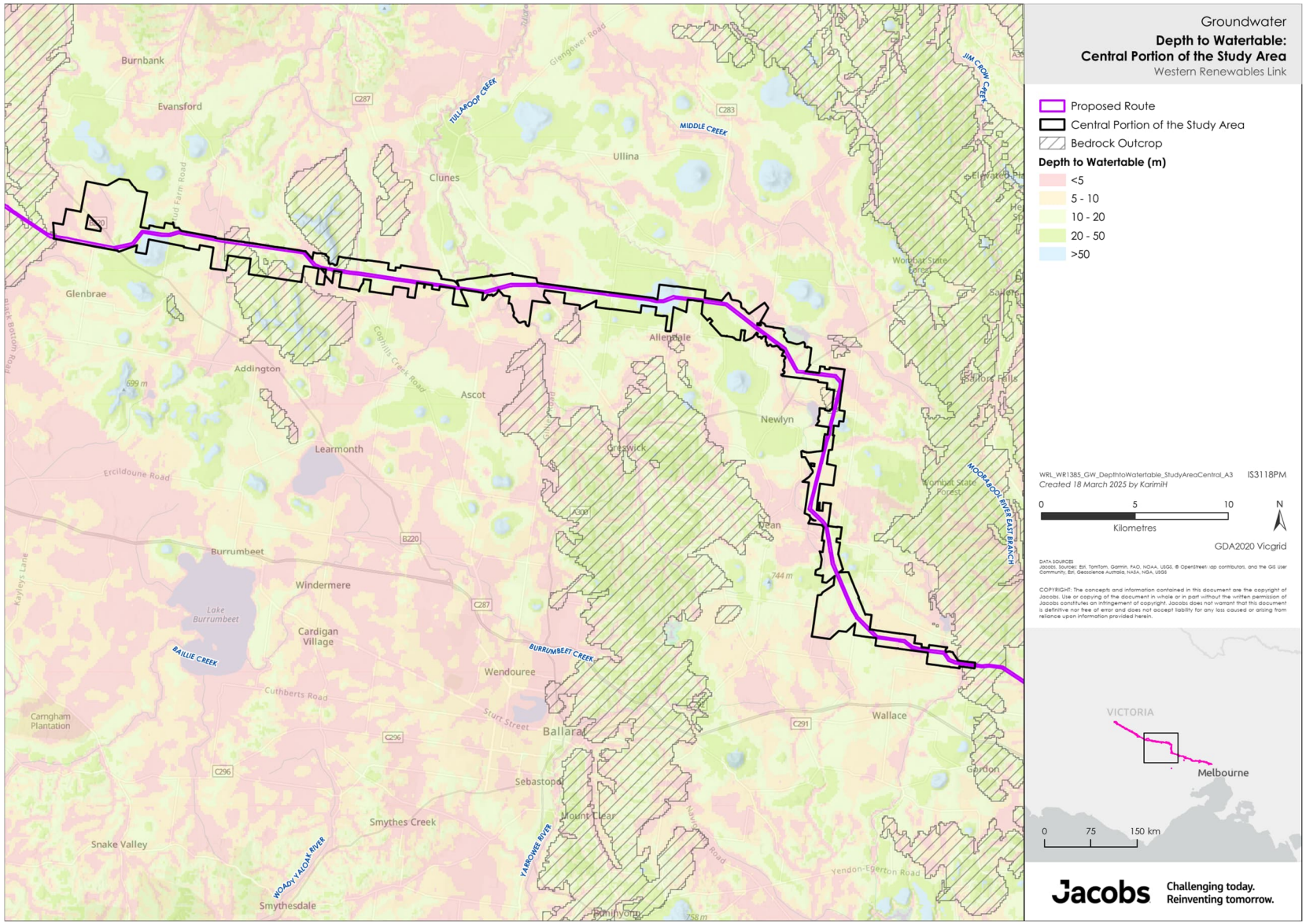

Figure 6-8: Depth to watertable map: Central portion of the study area

6.2.4 Groundwater recharge and discharge

The recharge process for the aquifers of relevance (alluvial/colluvial aquifers, Newer Volcanics and bedrock aquifer, all of which outcrop to the surface) is through direct rainfall infiltration. Discharge from the aquifers is expected to be towards valleys and into creeks and rivers.

6.2.5 Groundwater-surface water interactions

There is expected to be a high-degree of groundwater-surface water interaction in the central portion of the study area. As described above, groundwater is expected to discharge into creeks and rivers via alluvial valleys and incised drainage lines. Shallow groundwater elevation is also evidence of the potential for interaction. Details on existing surface water conditions are described in the Surface Water Impact Assessment.

6.2.6 Groundwater salinity and protected environmental value

Groundwater salinity within the central portion of the study area is expected to vary from less than 600 to 3,100mg/L total dissolved solids (DELWP, 2018). Groundwater quality is typically fresher in the basaltic plains, likely owing to the influence of direct rainfall recharge and the absence of surrounding bedrock. Groundwater salinity across the study area is illustrated in Table 6-10. The percentage of the study area per groundwater segment is shown in Table 6-10. A significant proportion of groundwater salinity within the study area is classed into Segment A1, where all of the following environmental values must be protected:

- Water dependent ecosystems and species
- Potable water supply – desirable
- Potable water supply – acceptable
- Potable mineral water supply
- Agriculture and irrigation – irrigation
- Agriculture and irrigation – stock watering
- Industrial and commercial
- Water based recreation – primary contact
- Traditional Owner cultural values
- Buildings and structures
- Geothermal properties.

A summary of the protected environmental values and corresponding salinity segment are provided in Appendix A.

Table 6-10: Summary of groundwater salinity and environmental values: Central portion of the study area (DELWP, 2018)

Percentage of study area	Salinity (mg/L Total Dissolved Solids)	Groundwater segment
71%	<600	A1
14%	601 to 1,200	A2
14%	1,200 to 3,100	B
1%	3,101 to 5,400	C

Most of the study area is covered by the Upper Loddon Volcanic Plains salinity management province, shown in Figure 6-9 and described in Table 6-11. Refer to Section 6.1.6 for a description of the framework that Salinity

Provinces provide. Soil salinity is described in detail in Geology and Soils Impact Assessment. There are no Salinity Management Overlay areas in the central portion of the study area.

Table 6-11: Salinity Provinces: Central portion of the study area (DELWP, 2018)

Salinity province	Details
Upper Loddon Volcanic Plains	Salinity occurs at three distinct areas, all of which are outside the study area: Long Swamp (near Joyces Creek), Glengower and Smeaton.
Upper Moorabool	Salinity mainly found in slight depressions in basalt plains areas to the south of the Proposed Route.

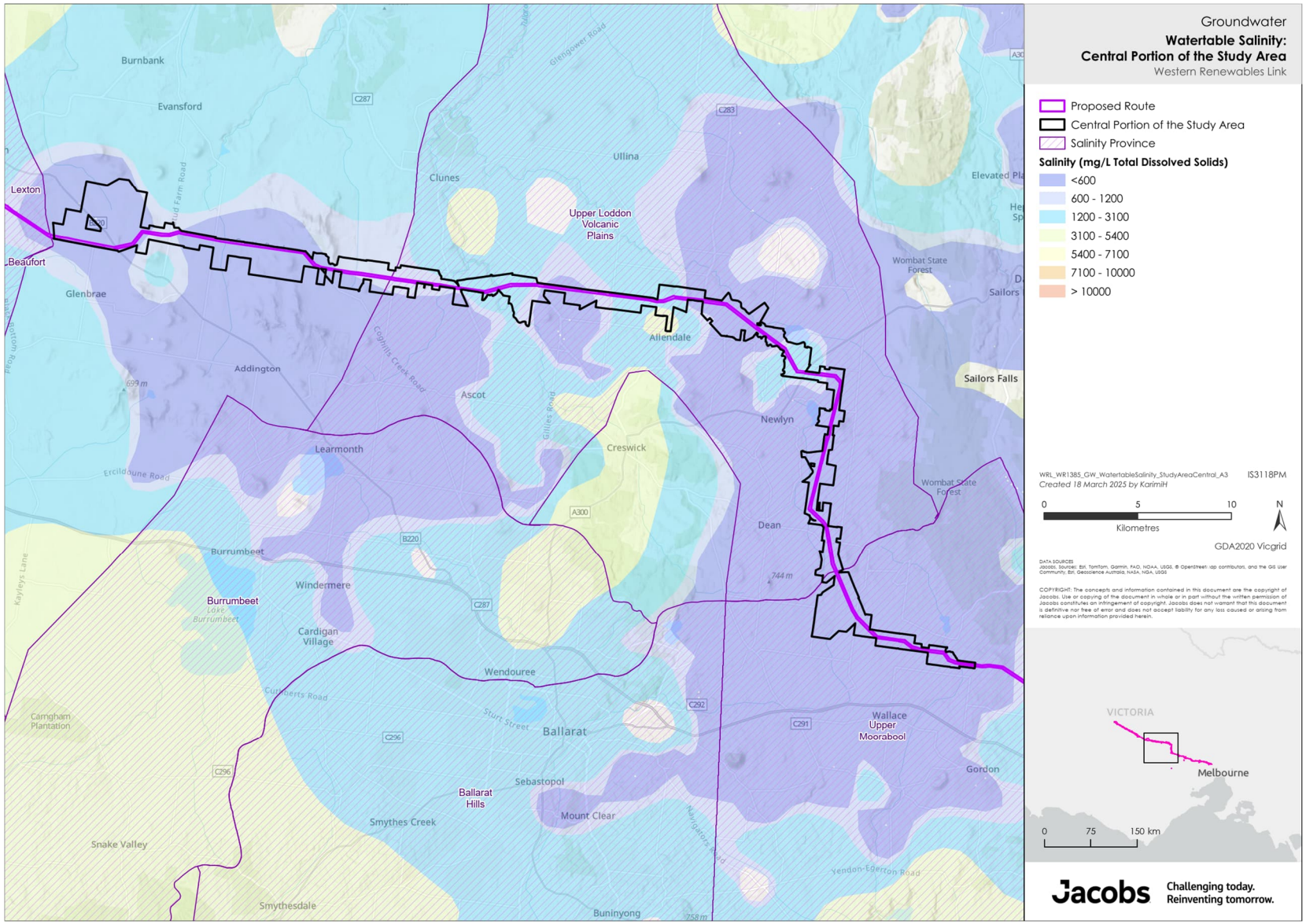

Figure 6-9: Groundwater salinity map: Central portion of the study area

6.2.7 Groundwater use and management

The water authorities responsible for groundwater licensing within the central portion of the study area are Goulburn-Murray Water and Southern Rural Water, as shown in Appendix F.

There is widespread extractive groundwater use within the central portion of the study area. Bores in the area primarily target the Newer Volcanics aquifer, owing to shallow depth and suitable groundwater salinity. The location of the groundwater users is shown in Figure 6-10 and summarised in Table 6-12. Location information is included in Appendix B and Appendix C. Groundwater is managed in two areas:

- Loddon Highlands Water Supply Protection Area[6]: A Permissible Consumptive Volume (PCV) currently applies to the Loddon Highlands Water Supply Protection Area, which limits the amount of groundwater allocated in this management unit. PCV for the Loddon Highlands Water Supply Protection Area is 20,697ML/year. A total of 20,502ML/year is currently allocated (State of Victoria, 2021).
- Bungaree Groundwater Management Area: The PCV for the Bungaree Groundwater Management Area is 5,334ML/year, which applies to all of the aquifers identified as relevant to the study area within the management area. A total of 5,293ML/year is currently allocated (State of Victoria, 2021).

Whilst the Castlemaine Supergroup hosts mineral springs, no mineral springs on the Victorian Mineral Springs Database are noted in this central section of the study area (Shugg, 2021).

Table 6-12: Groundwater users and management in the central portion of the study area (DEECA 2024)

Water authority	Management Area	Bores within and 1km adjacent	
		Registered bores	Licensed bores
Goulburn-Murray Water	Loddon Highlands Water Supply Protection Area	5 agriculture, commercial and industrial 142 stock and domestic 29 observation 122 other 1 State Observation Bore Network 43 unknown (no registered use)	23 agriculture, commercial and industrial 19 stock and domestic 2 urban 15 unknown
	Bungaree Groundwater Management Area	9 agriculture, commercial and industrial 9 stock and domestic 1 not used 3 observation 11 other 6 unknown (no registered use) 1 urban	1 agriculture, commercial and industrial 7 unknown

[6] Water Supply Protection Areas are areas declared by the Minister for Water under the Act to protect stressed groundwater or surface water resources through the implementation of a detailed management plan for the area. Loddon Highlands WSPA Groundwater Management Plan was approved by the Minister for Water on 21 November 2012 and provides protection for existing users and the environment by supporting a cap on licence entitlement; restricting the extraction of groundwater when triggered; and placing limits on the concentration of groundwater pumping.

Water authority	Management Area	Bores within and 1km adjacent	
		Registered bores	Licensed bores
Southern Rural Water	Bungaree Groundwater Management Area	30 agriculture, commercial and industrial 62 stock and domestic 4 observation 1 other 4 State Observation Bore Network 33 unknown (no registered use)	19 agriculture, commercial and industrial 3 stock and domestic 16 unknown (no registered use)
	Unincorporated[1]	5 stock and domestic 1 unknown	1 unknown

Note:

1 Unincorporated Areas are areas where no significant development of the groundwater resource has occurred. This is usually because the resource is low yielding, or its quality has traditionally severely limited its use.

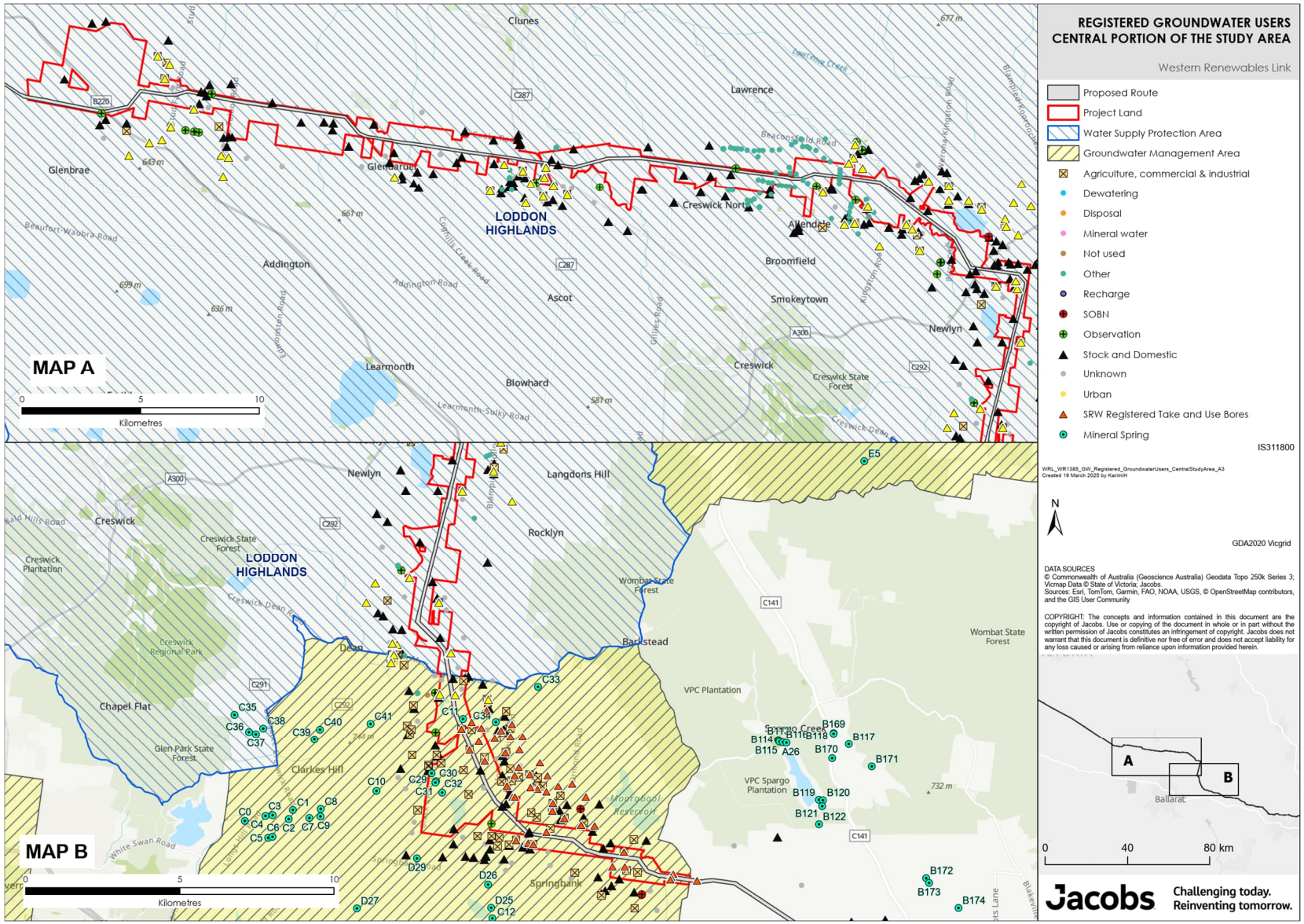

Figure 6-10: Registered bores within and 1km adjacent to Central portion of the study area

In addition to registered groundwater users, groundwater use sites of significance were identified through community feedback collected during consultation on the Project. These are described in Table 6-13.

Table 6-13: Groundwater usage sites of significance identified through community feedback: Central portion of the study area

Feature[1]	Location relative to study area	Description
Active bore pump and shed - 30m. Underground electricity to shed. Bore pump has artesian overflow due to flood risk and watertable rising in very wet seasons.	260m south of study area, close to Mount Greencock Creek	The Social Pinpoint data is located within the basaltic plains managed under the Loddon Highlands Water Supply Protection Area. This is a productive and developed groundwater source. There is no registered bore information nearby noted in available datasets.
Solar bore, pipes water across the farm, up to Cattle Station Hill to supply water to troughs throughout the farm and homestead gardens. Any maintenance on pipes requiring permission to repair, if delayed, could be detrimental to animal health.	Within study area, 397m south of transmission tower F6045DL	The Social Pinpoint data is located within the basaltic plains managed under the Loddon Highlands Water Supply Protection Area. This is a productive and developed groundwater source. There is no registered bore information nearby noted in available datasets.
Stock & Domestic Bore, 80 meters deep.	Within study area, 532m south of transmission tower F6025DL	The Social Pinpoint data is located within the basaltic plains managed under the Loddon Highlands Water Supply Protection Area. This is a productive and developed groundwater source. The closest registered bore noted in available datasets is WRK011286.
GMW bore surveying inspection pipe. Metal casing - prohibited in transmission line easement.	Within study area, 130m south of transmission tower F6034DL	This is referring to nearby observation bore 91875.
Water bore for the use of supplying water to stock and filling boom sprays.	Within study area, 344m south of transmission tower F6023DL	There are two noted pins in this area within the basaltic plains managed under the Loddon Highlands Water Supply Protection Area. This is a productive and developed groundwater source. The closest registered bore noted are 91981, 91948 and 91949.
Underground water system	Several points were made within the study area in the area of Glendaruel	The Social Pinpoint data is located within the basaltic plains managed under the Loddon Highlands Water Supply Protection Area. This is a productive and developed groundwater source.
Hand-made well	Within the study area in the area of Glendaruel	Located within the Loddon Highlands Water Supply Protection Area. The location of the well does not appear on the state registered bores list and is likely to be unlicenced and potentially used for stock and domestic purposes (if still in use and with value beyond historic value). Being hand-dug, it likely intersects either local alluvial material associated with unnamed drainage lines or the Newer Volcanics Basalt, being the major aquifer of the area, however depth to groundwater in the Newer Volcanics is expected to be greater than 10m. It may be that this well is of greater historic value than consumptive use value.

Note:

1 The description under 'feature' is how the feature is self-described by the community member and includes other values beyond the scope of this assessment.

6.2.8 Groundwater dependent ecosystems

Refer to Section 6.1.8 for a description of the term GDE. In the case of the central portion of the study area:

- Almost all major surface water features within the study area are classed as having a high or moderate potential for groundwater dependence, which is consistent with the conceptual model. Areas of shallow watertable depth may include the occurrence of groundwater fed springs, which is a near-surface groundwater source that may contribute to local surface water (Evan Dresel et al., 2010).
- Scattered areas of vegetation that are intersected by the central portion of the study area are mostly along the banks of drainage lines and major surface water features, which are listed as having a high or moderate potential for groundwater dependence. Again, this is consistent with the expectation that depth to watertable in these areas is typically less than 5m below surface, which could be used by surrounding vegetation (Evan Dresel et al., 2010).
- Parts of the study area may be conducive to subterranean GDEs, specifically stygofauna. No local studies on subterranean ecosystems with potential for groundwater dependence are available within the central portion of the study area.

Potential groundwater dependent ecosystems are listed in Table 6-14 shown in Figure 6-11, Figure 6-12 and Figure 6-13.

Table 6-14: Potential groundwater dependent ecosystems: Central portion of the study area (BOM, 2012)

CMA	GDE type	High potential for groundwater dependence	Moderate potential for groundwater dependence	Unclassified potential for groundwater dependence
North Central CMA	Waterway	Birch Creek, Glendaruel Creek, Langons Creek, Mount Greencock Creek, Tourello creek	Beckworth Creek, Birch Creek, Creswick Creek, Killkenny Creek, Pinchgut Creek, Rocky Lead Creek	-
	Wetland ("SRC_UFI" identification from GDE dataset shown in brackets)	-	-	A series of wetlands associated with unnamed waterways in vicinity to Sunraysia Highway in Lexton and Waubra (41601, 41602, 41601, 41604, 41669, 41670, 41668, 41659). A series of wetlands associated with Moorabool Reservoir. Other unnamed wetlands – 41787. Hepburn Lagoon and Newlyn Reservoir.
	Spring	Spring at top of watershed flows to Dean Reservoir (C11) – known GDE from regional study	-	
	Terrestrial	Vegetation along major waterways, scattered areas of vegetation	Lexton Bushland Reserve, scattered areas of vegetation	-
	Subterranean	Aquifers within the study area may be conducive to subterranean GDEs, specifically stygofauna.		

CMA	GDE type	High potential for groundwater dependence	Moderate potential for groundwater dependence	Unclassified potential for groundwater dependence
Corangamite CMA	Waterway	Moorabool River West Branch	-	-
	Wetland ("SRC_UFI" identification from GDE dataset shown in brackets)	-	-	A series of wetlands in vicinity to Moorabool Reservoir, Dallas Creek, and Moorabool River West Branch (55739, 55738, 55632, 55714, 55625).
	Terrestrial	Scattered areas of vegetation, vegetation along major waterways	Scattered areas of vegetation	Scattered areas of vegetation
	Subterranean	Aquifers within the study area may be conducive to subterranean GDEs, specifically stygofauna.		

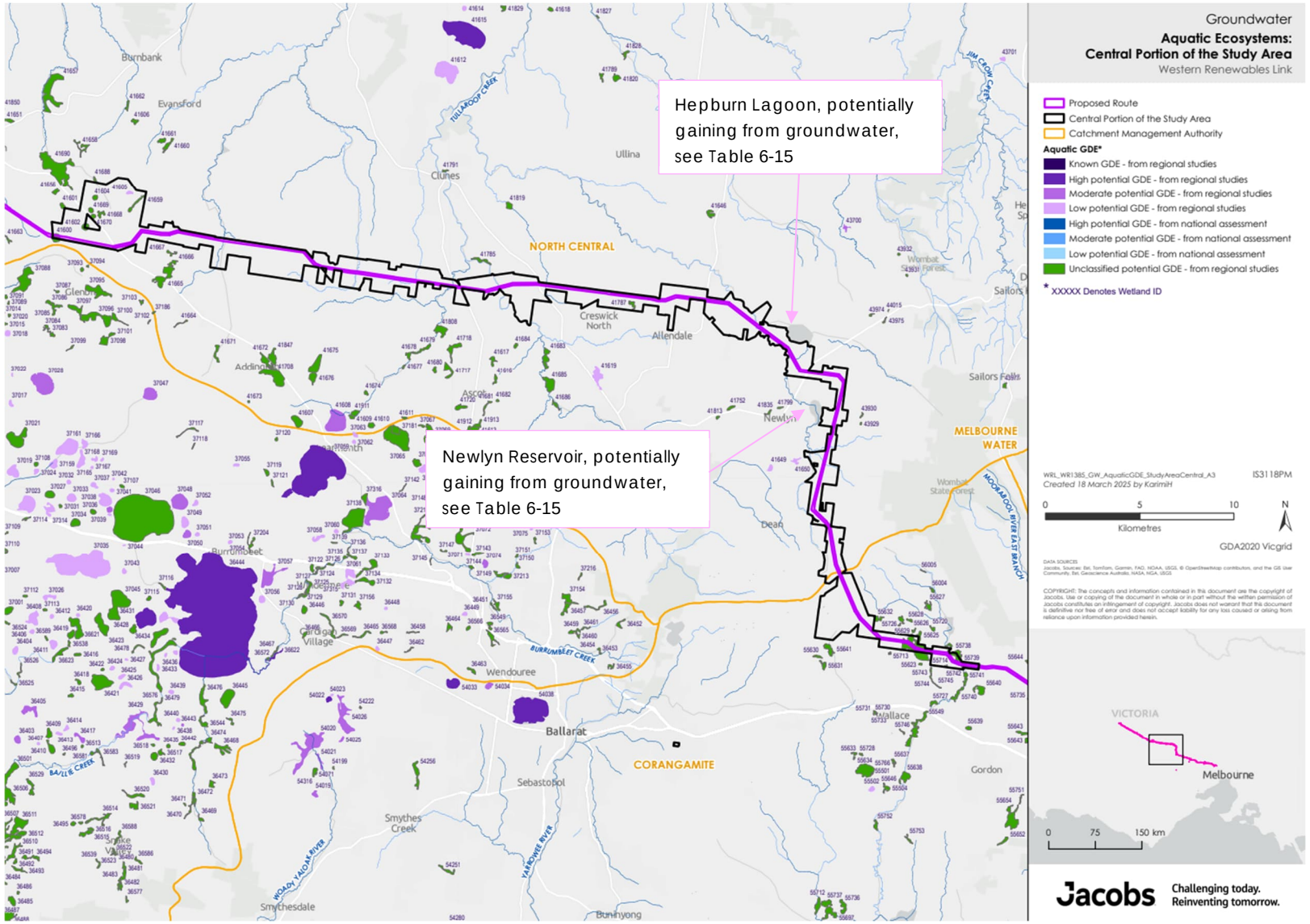

Figure 6-11: Central portion of the study area: aquatic ecosystems with potential for groundwater dependence, based on National dataset (BOM, 2012). Two water bodies with potential for groundwater dependence not included in the National dataset have been annotated.

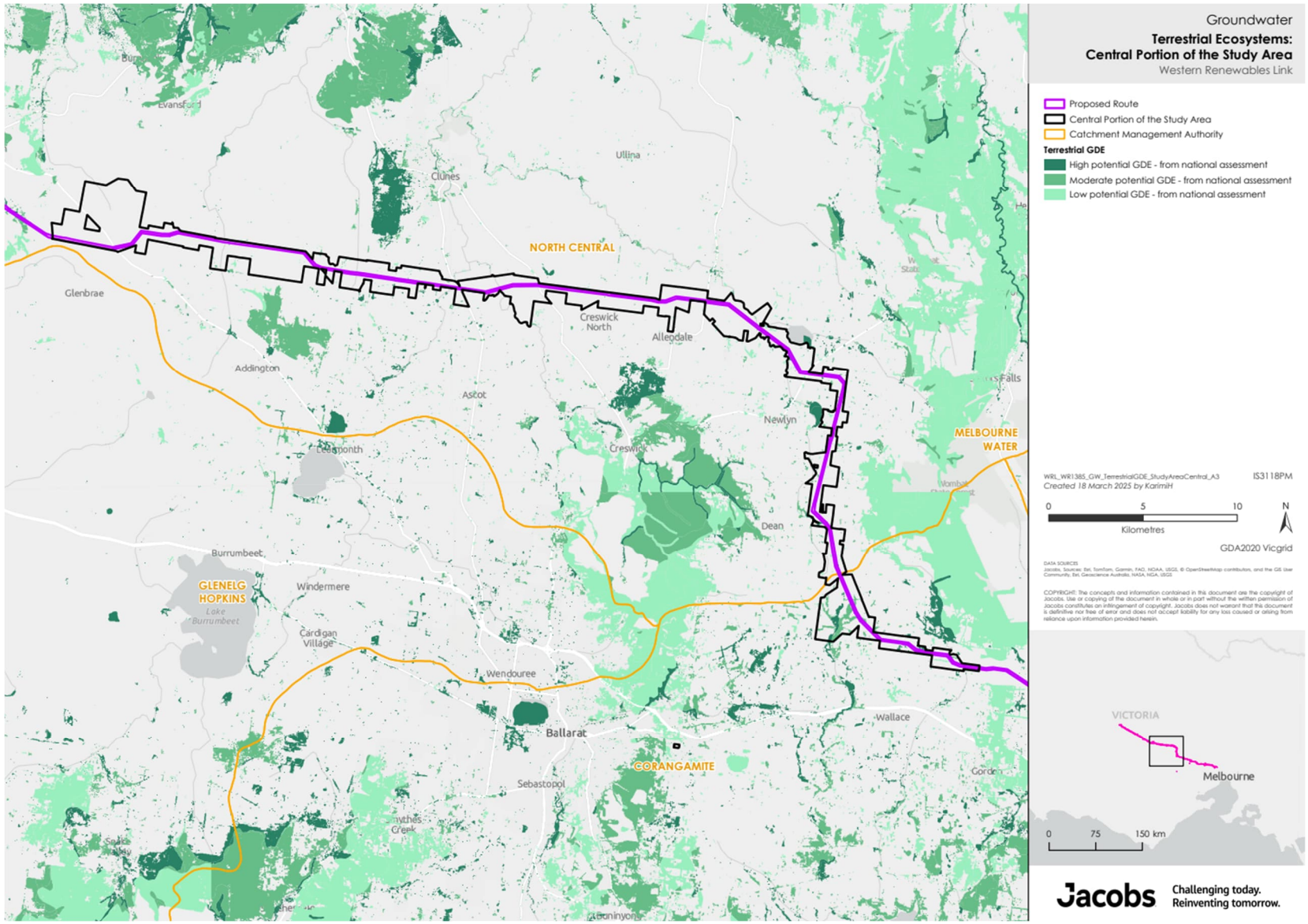

Figure 6-12: Central portion of the study area: terrestrial ecosystems with potential for groundwater dependence, based on National dataset (BOM, 2012)

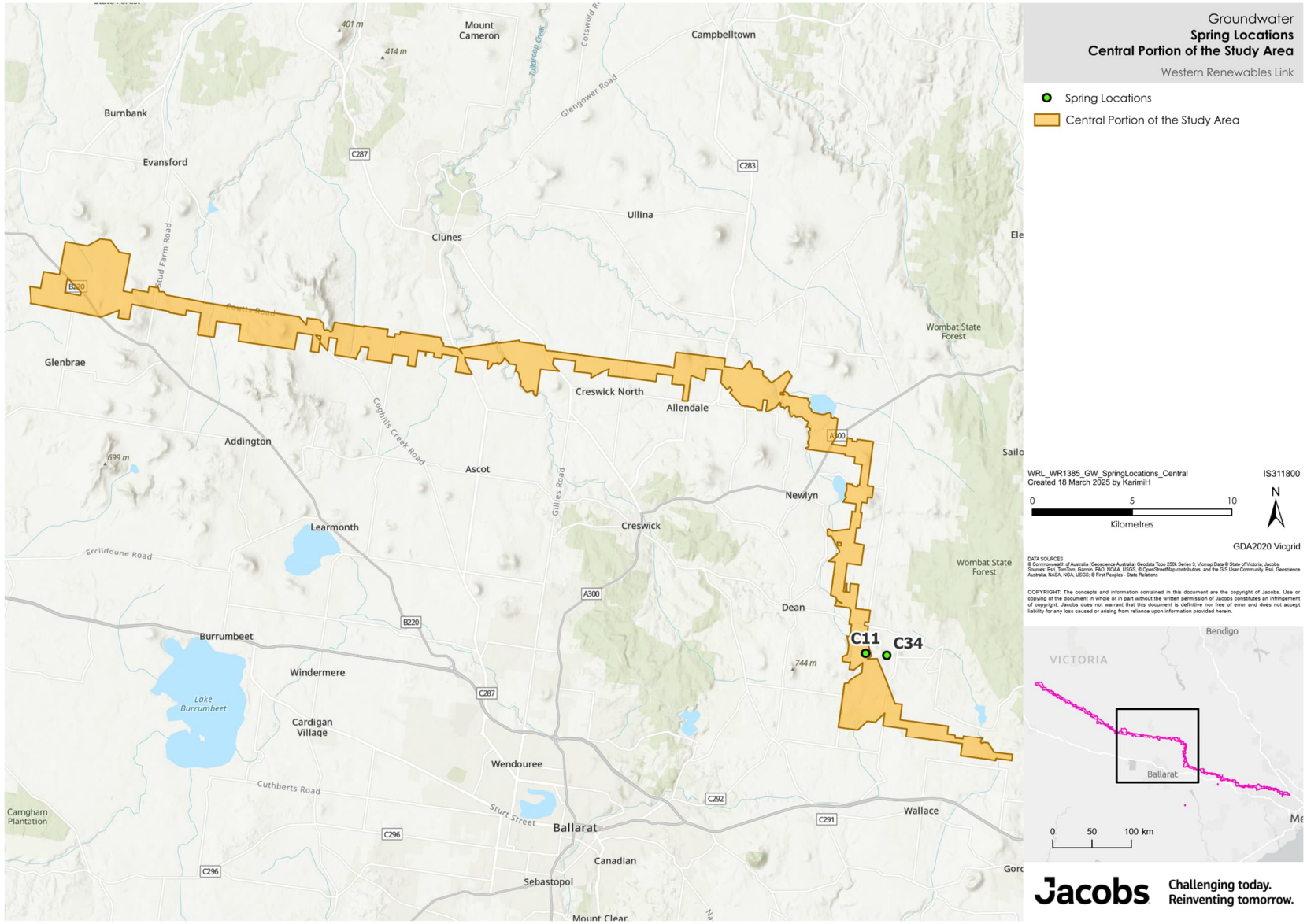

Figure 6-13: Central portion of the study area: spring locations

In addition to identified groundwater dependent ecosystems, groundwater sites of environmental significance were identified through previous community feedback collected during consultation on the Project in 2021. These are described in Table 6-15.

Table 6-15: Groundwater sites of environmental significance identified through community feedback: Central portion of the study area

Feature	Location relative to study area	Description
Kilkenny Creek	Within the study area, on the banks of the Kilkenny Creek at Pickfords Road	Based on the National GDE database, Kilkenny Creek is an ecosystem with moderate potential groundwater dependence (national assessment), which intersected the study area.
Birch Creek is an essential habitat for wildlife, especially platypus and birds.	Within the study area, on the banks of Birch Creek in Kingston	Based on the National GDE database, Birch Creek is an ecosystem with moderate potential groundwater dependence (national assessment), which intersected the study area. Stream bank shrubland on the banks of the creek are also noted as having moderate potential for groundwater dependence.
Hepburn Lagoon	20m north-west of the study area	Hepburn Lagoon is a historical, man-made lagoon. It is not noted as having potential for groundwater dependence in the national dataset. However, the study area includes waterways such as Birch Creek and Langdons Creek, both of which are recognised for their groundwater dependence, ranging from moderate to high. Hepburn Lagoon regulates Langdon's Creek flows for irrigation and domestic and stock supplies. A review of the full supply level (516mAHD) compared to local groundwater elevation (WRK952869 525mAHD and WRK952870 520mAHD) indicate the potential for the Lagoon to be gaining from groundwater.
Newlyn Reservoir	10m south-west of the study area	Newlyn Reservoir is a man-made reservoir located near Newlyn Reservoir Rd in Newlyn North. It is not noted as having potential for groundwater dependence in the national dataset. However, the study area demonstrates Birch Creek is recognised for its groundwater dependence and along the reservoir, it's moderately high. Newlyn Reservoir regulates Birch's Creek flows for irrigation, domestic and stock supplies and sometimes water for urban use is drawn from storage.

6.2.9 Groundwater sources of contamination

Sources of groundwater contamination are described in detail in the Contaminated Land Impact Assessment. A summary is provided here to provide context to local environmental value of groundwater and existing conditions pertinent to groundwater that may affect or be impacted by the Project.

Acid sulfate soils

Most of the central portion of the study area is identified as having low probability of occurrence of acid sulfate soils. However, some isolated areas of high probability of occurrence have been identified surrounding established waterbodies (e.g., reservoirs and wetlands), including Dean Reservoir, Hepburn Lagoon and Moorabool Reservoir.

Sources of contamination

The current predominant land use of the central portion of the study area is agriculture and farming. There is a presence of historical mining activities within this central area. Mining activities may have resulted in the spread of mine tailings, calcined sands, sludge and other wastes that may contain high concentrations of heavy metals, such as arsenic and/or mercury. Therefore, the areas surrounding known mining sites (e.g., soil and groundwater) have the potential to have been contaminated as a result of the historic mining activities.

6.3 Eastern portion of study area

6.3.1 Geological setting

The geological setting of the eastern portion of the study area is characterised by alluvial deposition associated with surficial drainage lines and lava inundation from several local eruption centres, filling in and overlying valleys created by the bedrock unit. The major geological features are summarised in Table 6-16 and illustrated in Figure 6-14.

Quaternary alluvial units are generally comprised of gravel, sand and silt and are typically constrained to the extent of surface water features. The alluvial units overlie the Tertiary Newer Volcanics basalt, which is the dominant surficial feature across the study area and is generally 50m thick. The unit was formed from basalt flows during volcanic activity over the past 4 million years and is most porous near the volcanic cones. The unit is thickest near the volcanic cones and where they flowed into and filled old river valleys (SRW, 2014). Underlying the Newer Volcanics at depth are the early Tertiary aged White Hills Gravel, Older Volcanics, Werribee Formation and, Permian age sedimentary rock, Bacchus Marsh Formation. Due to the presence of the Rowsley Fault, the Older Volcanics, Werribee Formation and Bacchus Marsh Formation outcrop to the surface south of Bacchus Marsh. The exception is Elaine Terminal Station, which is directly underlain by White Hill Gravel. Underlying all units and outcropping in some parts of the study area is the Ordovician bedrock, comprised of marine sandstone and siltstone, and referred to as the Castlemaine Supergroup.

Table 6-16: Key geological units: Eastern portion of the study area (VandenBerg, A., 1997b)

Age	Unit name	Description	Geological profile
Quaternary	Fluvial alluvium and colluvium	Gravel, sand, silt	Unconsolidated
Quaternary-Tertiary	Darley Gravel	Gravel, sand, silt	
	Newer Volcanics	Basalt, minor scoria, ash	Consolidated
Tertiary	White Hills Gravel	Conglomerate, sand, silt, and clay	Unconsolidated
	Older Volcanics (Pentland Hills Volcanic Group)	Basalt	Consolidated
	Werribee Formation	Sand, sandy, and silty clay	Unconsolidated
Permian	Bacchus Marsh Formation	Sandstone, mudstone, conglomerate	Consolidated
Ordovician	Castlemaine Group - Lancefieldian	Marine sandstone, siltstone, shale, chert	Consolidated

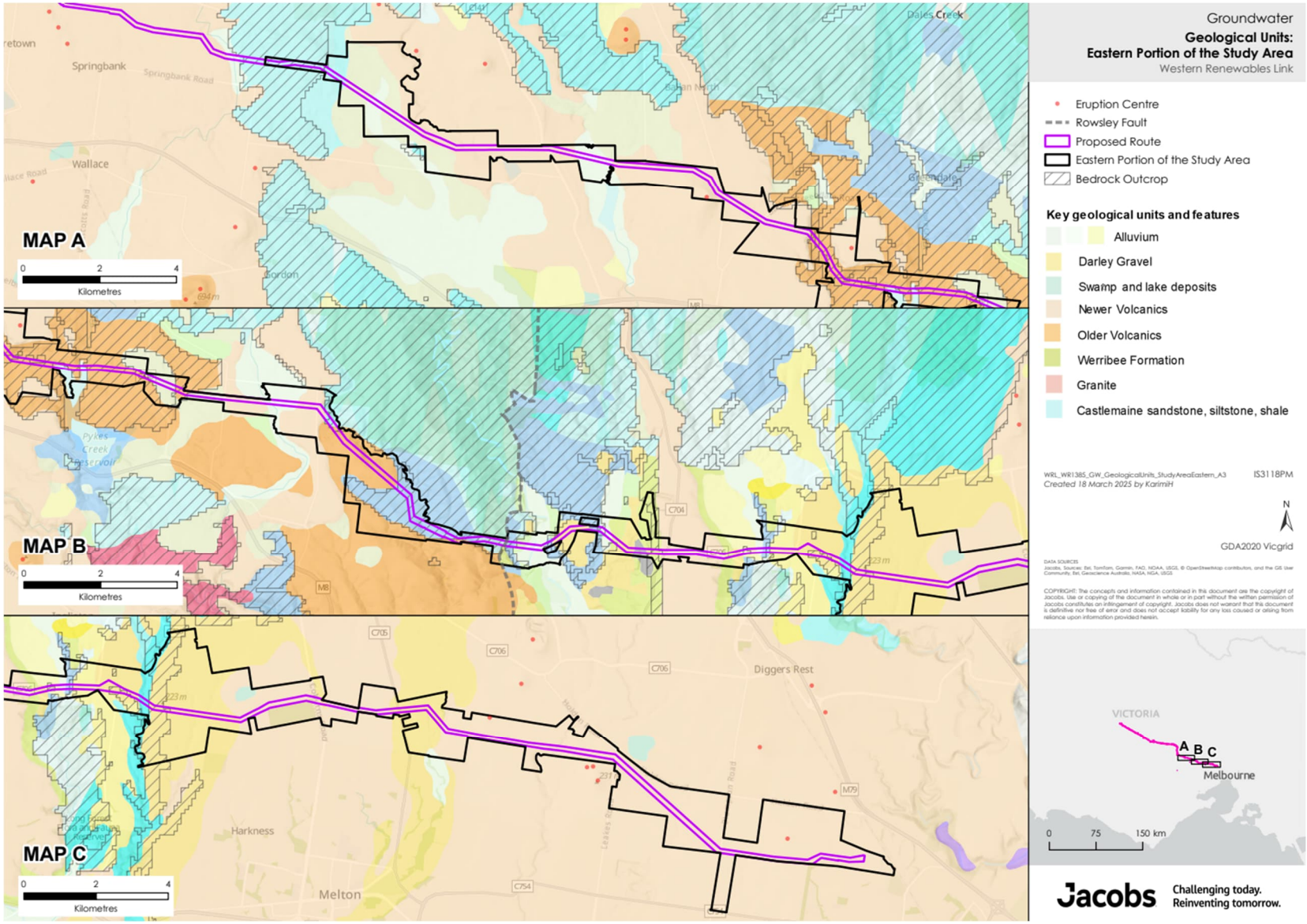

Figure 6-14: Geological map: Eastern portion of the study area

6.3.2 Hydrogeological setting

The hydrogeological setting of the eastern portion of the study area can be described based on the following aquifer types:

- Upper aquifers: This includes Quaternary alluvial units, White Hills Gravel and the Tertiary Newer Volcanics Basalt. They are the surficial units in parts of the study area, are unconfined and generally interact hydraulically with each other and adjacent surface water features.
- Lower aquifers and bedrock: While the lower aquifers are present across much of the regional area at depths greater than what will be interacted by the Project (over 50m below surface), in the eastern portion of the study area these aquifers are present at the surface owing to elevated topography (in the case of bedrock) and Rowsley Fault (in the case of the Werribee Formation and Older Volcanics).

Based on the geological and hydrogeological setting, the following aquifer units are of most relevance to the eastern portion of the study area in terms of both horizontal and vertical presence (with Victorian Aquifer Framework Hydrogeological Units Number[7] shown in brackets):

i. Alluvial aquifers, including the Darley Gravel

There is localised presence of alluvial aquifers (100) associated with creeks and rivers across the eastern portion of the study area. These aquifers will host the watertable locally and provide shallow groundwater conditions. The unconfined alluvial aquifers are recharged directly from rainfall and the surrounding rock. Bore yield depends on the size, shape, and thickness of the alluvial deposit, which varies across the study area. The average thickness is expected to be 13m (VAF, 2012).

ii. Newer Volcanics aquifer

The Newer Volcanics aquifer (102) is the primary surficial unit for the eastern portion of the study area and the aquifer covers a significant area beyond the study area. This unit directly underlies the Sydenham Terminal Station. It is unconfined in the absence of overlying alluvial units and hosts the watertable, but weathering (that presents as clay) in the upper profile may provide confining conditions locally. Eruption centres are numerous and scattered across the area – these volcanic cones are a source of recharge to the aquifer, where fresher water and higher aquifer permeability is expected. Yield of the Newer Volcanics aquifer varies significantly owing to multiple lava flows having differing hydraulic characteristics. Transmissivity of the unit is dependent on the abundance of joints and is generally in the vicinity of $300m^2$/day for closely jointed basalts and less than $50m^2$/day for poorly jointed basalt (Nahm, 1985). Thickness across the study area is generally around 50m. Underlying the Newer Volcanics are middle aquifer units.

iii. White Hills Gravel

The White Hills Gravel (105) is the primary surficial aquifer at Elaine Terminal Station. It is unconfined and hosts the watertable, with a thickness of around 7m before encountering the bedrock aquifer.

iv. Older Volcanics aquifer

The Older Volcanics aquifer (112) is present across much of the eastern portion of the study area at depth but outcrops to the surface within the study area east of Ballan. The outcropping area hosts a low yielding aquifer owing to a high degree of weathering (Nahm, 1974) and the quality is suitable only for stock purposes (Harris, 1974). Thickness may be up to 60m, and it is recharged directly from rainfall.

v. Werribee Formation

The Werribee Formation (111) is present at depth across the eastern portion of the study area eastwards from Bacchus Marsh, but due to a north-south trending fault line west of Bacchus Marsh (Rowsley Fault) it is present

[7] DELWP, 2019

at the surface west of Merrimu Reservoir. It is mainly sand and has clay and coal layers within it that act as aquitards. Where the unit outcrops, groundwater is suitable for stock watering only (Harris, 1974). East of Rowsley Fault, the aquifer underlies the Older Volcanics and is present at depths greater than what will be intersected by the Project. Thickness of the unit is generally 40m with transmissivity of 200m^2/day cand yield of 5L/s (Nahm, 1985).

vi. Bedrock aquifer

The sandstone and siltstone sediments of the Castlemaine Supergroup (134) form the bedrock of the eastern portion of the study area. These sediments form a fractured rock aquifer and have low hydraulic conductivity due to tight fracturing. Only in restricted areas regionally does the bedrock form a suitable source of groundwater as yield is usually low (generally less than 0.6L/s) and quality is dependent on areas of direct rainfall infiltration and the degree of weathering in the profile (Harris, 1974). Where the bedrock outcrops, the aquifer is unconfined and is recharged directly through rainfall. Mineral springs outside of the study area (such as Ballan Mineral Springs) are sourced from this aquifer where it outcrops. Fissures and fractures in the aquifer contribute to the occurrence of the mineral water (Nahm, 1985). Weathering in the upper profile may provide confining conditions locally. Where the unit underlies younger aquifer, it becomes confined.

6.3.3 Groundwater levels and flow

Based on state-wide mapping, the expected depth to the watertable varies within the eastern portion of the study area from less than 5m to greater than 50m. Areas where the depth to watertable is shallow (less than 5m) correspond to shallow plains of the Newer Volcanics and alluvial sequences associated with rivers and creeks. Areas with deeper watertable occurrence are associated with outcropping bedrock in areas of high elevation. Almost half of the study area is expected to have groundwater within 10m of the surface, including Sydenham Terminal Station and Elaine Terminal Station, and based on a typical transmission tower piling depth of 9m, groundwater is likely to be encountered at some piling locations. Depth to watertable is shown in Figure 6-15 and Table 6-17.

Groundwater flow direction across the eastern portion of the study area follows a subdued version of topography. Locally, groundwater flows towards these features and is discharged to creeks and rivers. Regionally, groundwater flows towards the south-east.

Table 6-17: Eastern portion of the study area: depth to groundwater (DELWP, 2020b)

Percentage of study area	Depth to watertable (m below surface)
16%	<5
31%	5.01 to 10
27%	10.1 to 20
20%	20.1 to 50
6%	50.1 to 100

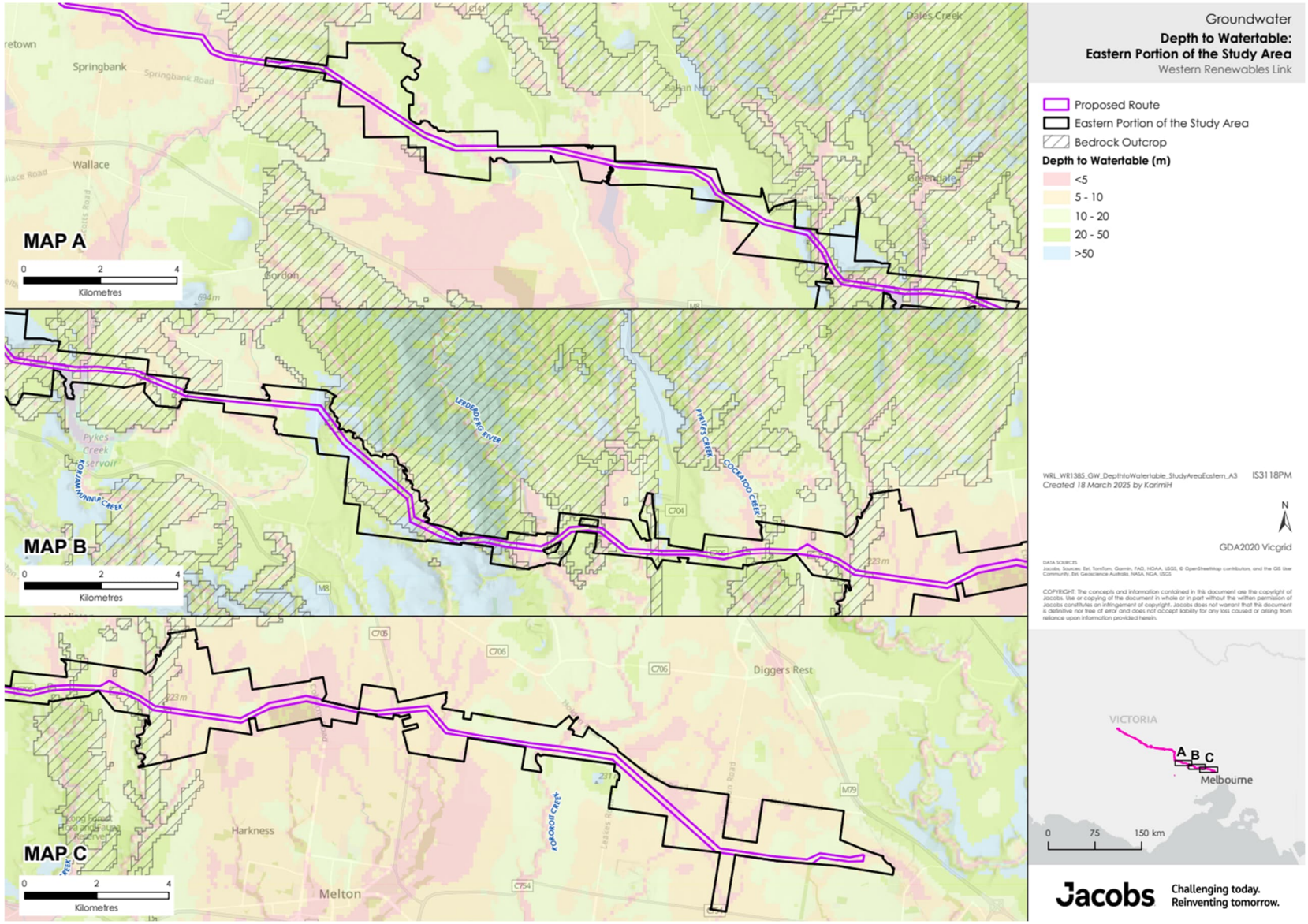

Figure 6-15: Depth to watertable map: Eastern portion of the study area

6.3.4 Groundwater recharge and discharge

The recharge process for the aquifers described above (noting Project relevance is where they outcrop to the surface) is through direct rainfall infiltration. Discharge from the aquifers is expected to be towards valleys and into creeks and rivers.

6.3.5 Groundwater-surface water interactions

There is expected to be a high-degree of groundwater-surface water interaction in the eastern portion of the study area. As described above, groundwater is expected to discharge into creeks and rivers via alluvial surficial drainage lines. Shallow groundwater elevation is also evidence of the potential for interaction. Details on existing surface water conditions are described in the Surface Water Impact Assessment.

6.3.6 Groundwater salinity and protected environmental values

Groundwater salinity across the eastern portion of the study area is expected to vary, with salinity level lowest, less than 600mg/L total dissolved solids at the boundary to the central portion of the study area and increasing moving east, where it is expected to be above 10,000mg/L total dissolved solids (DELWP, 2018), including at Sydenham Terminal Station. Groundwater salinity at Elaine Terminal Station is expected to be 3,100 – 5,400 mg/L total dissolved solids. Groundwater salinity across the study area is illustrated in Figure 6-16. Refer to Section 6.1.6 for a description of the term environmental value (in the context of salinity). The percentage of the study area per groundwater segment is shown in Table 6-18. The majority of groundwater salinity in the study area is Segment C, where the following environmental values must be protected:

- Water dependent ecosystems and species
- Potable mineral water supply
- Agriculture and irrigation – stock watering
- Industrial and commercial
- Water based recreation – primary contact
- Traditional Owner cultural values
- Buildings and structures
- Geothermal

A summary of the protected environmental values and corresponding salinity segment are provided in Appendix A.

Table 6-18: Summary of groundwater salinity and environmental value: Eastern portion of the study area (DELWP, 2018)

Percentage of study area	Salinity (mg/L Total Dissolved Solids)	Environmental values segment
1%	<600	A1
2%	601 to 1,200	A2
23%	1,200 to 3,100	B
38%	3,100 to 5,400	C
14%	5,400 to 7,100	D
20%	7,100 to 10,000	E
2%	>10,000	F

A limited extent of the eastern portion of the study area is covered by Salinity Provinces. Refer to Section 6.1.6 for a description of the framework that Salinity Provinces provide. Saline discharges are known to occur in these Salinity Provinces, particularly in low-lying drainage basins and basaltic plains. Salinity Provinces that apply to the study area are shown in Figure 6-16 and Table 6-19. Soil salinity is described in detail in Geology and Soils Impact Assessment. There are no Salinity Management Overlay[8] areas in the eastern portion of the study area.

Table 6-19: Salinity Provinces: Eastern portion of the study area (DELWP, 2018)

Salinity province	Details
Upper Moorabool	Salinity occurrence is mainly found in slight depressions in the basalt plains areas but has not been mapped within the study area.
Lancefield - Sunbury	Recorded salinity has been mapped along Kororoit Creek.

[8] See Section 6.1.6 for a description of Salinity Management Overlay planning areas

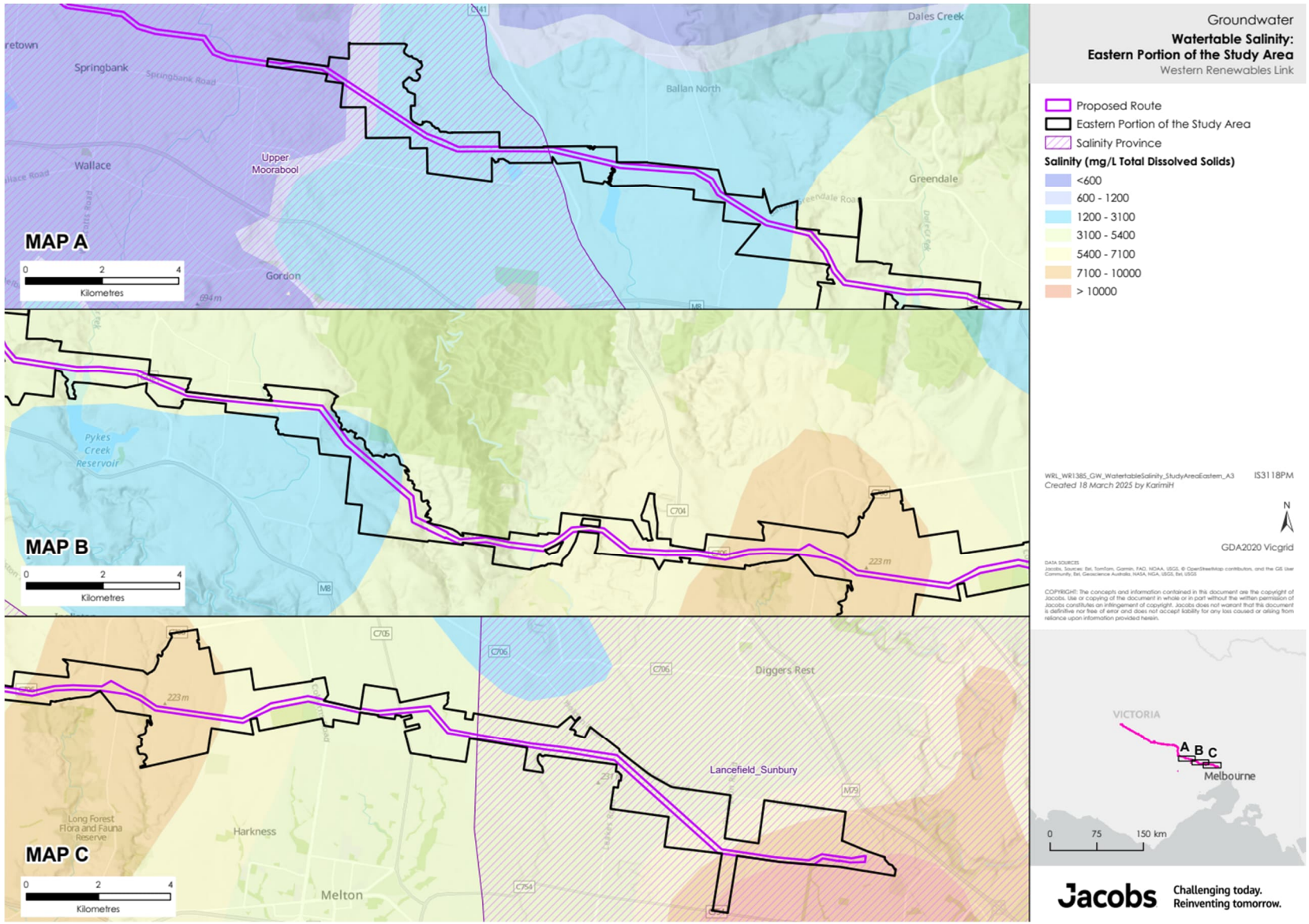

Figure 6-16: Groundwater salinity map: Eastern portion of the study area

6.3.7 Groundwater use and management

The water authority responsible for groundwater licensing within the eastern portion of the study area is Southern Rural Water, as shown in Appendix F. There are several groundwater bores registered for extractive use across this section of the study area. The locations of groundwater users are shown in Figure 6-17. Location information is included in Appendix B and Appendix C.

There is one registered mineral spring (Mineral Spring No. 74) at Lake Merrimu (Merrimu Reservoir). Records indicate that this spring is inundated by Lake Merrimu (Shugg, 2021).

Table 6-20: Groundwater users and management: Eastern portion of the study area (DEECA 2024)

Water authority	Management Area	Bores within and 1km adjacent	
		Registered bores	Licensed bores
Southern Rural Water	Unincorporated[1]	2 agricultural, commercial, industrial 57 stock and domestic 7 observation 96 other 1 SOBN 42 unknown (no registered use)	5 agricultural, commercial, industrial 1 dewatering 7 unknown (no registered use)
	Merrimu Groundwater Management Area	2 unknown (no registered use)	None

Note:

1 Unincorporated Areas are areas where no significant development of the groundwater resource has occurred. This is usually because the resource is low yielding, or its quality has traditionally severely limited its use.

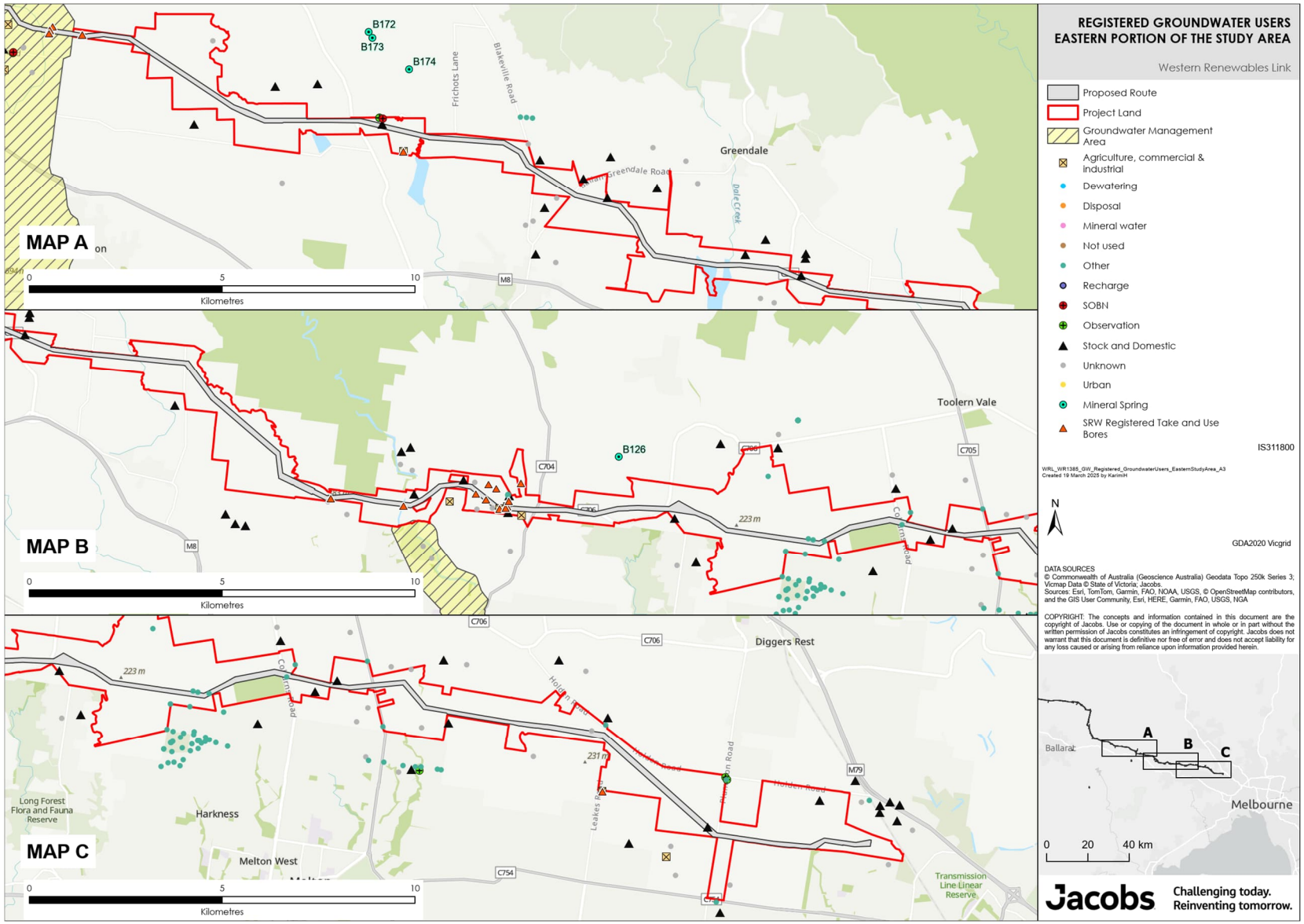

Figure 6-17: Registered bores within and 1km adjacent to Eastern portion of the study area

In addition to registered groundwater users, groundwater use sites of significance were identified through community feedback collected during consultation on the Project. These are described in Table 6-21.

Table 6-21: Groundwater sites of significance through community feedback: Eastern portion of the study area

Feature[1]	Location relative to study area	Description
Family farm, water catchment area, wedged tailed eagles flight path, high bush fire zone	Two points, one within the study area 333m south-west of F4398DL, on the banks of an unnamed watercourse, and one 470m west of the study area, both in the area of Gordon.	Aerial imagery indicates a dam on the unnamed watercourse. The watercourse has not been identified as a potential groundwater dependant ecosystem in the national dataset. No locally registered licenced or stock and domestic bores have been identified in the local area.
Spring water	Within study area, 183m south-west of F91DL and 172m east of Pyke's Creek Reservoir.	Dale Creek is a moderate potential GDE within close vicinity to the Social Pinpoint. There is potential for shallow groundwater conditions in this area.
House, sheds, truck storage, gardens, drainage	80m east of the study area in the area of Myrniong	There are no registered groundwater bores for extractive purposes in this area.

Note:

1 The description under 'feature' is how the feature is self-described by the community member and includes other values beyond the scope of this assessment.

6.3.8 Groundwater dependant ecosystems

Refer to Section 6.1.8 for a description of the term GDE. In the case of the eastern portion of the study area:

- All major surface water features within the study area are classed as having a high or moderate potential for groundwater dependence (Figure 6-18). The high potential for groundwater dependence is consistent with the conceptual model (described in Section 6.3.3) which suggests that groundwater discharges into the alluvial valleys and incised drainage lines.
- Scattered areas of vegetation across the study area are mostly along the banks of drainage lines and are listed as having a high to moderate potential for groundwater dependence (Figure 6-19). Again, this is consistent with the conceptual understanding, given that depth to watertable in these areas is expected to be typically less than 5m below surface.
- Parts of the study area may be conducive to subterranean GDEs, specifically stygofauna. No local studies on subterranean ecosystems with potential for groundwater dependence are available within the eastern portion of the study area.

Potential groundwater dependent ecosystems are listed in Table 6-22 and shown in Figure 6-18, Figure 6-19 and Figure 6-20 encompassing GDEs located 50m beyond the eastern study area.

Table 6-22: Potential groundwater dependent ecosystems: Eastern portion of the study area (BOM, 2012)

CMA	GDE type	High potential for groundwater dependence	Moderate potential for groundwater dependence	Unclassified potential for groundwater dependence
Melbourne Water	Waterway	Arnolds Creek East Branch, Djerriwarrh Creek, Goodman Creek, Korjamnunnip Creek, Kororoit Creek, Lerderderg River, Little Blind Creek, Pyrites Creek, Toolern Creek, Toolern Creek, Werribee River	Boggy Creek, Dale Creek, Djerriwarrh Creek, Korjamnunnip Creek, Myrniong Creek, Stony Hut Creek	-

CMA	GDE type	High potential for groundwater dependence	Moderate potential for groundwater dependence	Unclassified potential for groundwater dependence
	Wetland ("SRC_UFI" identification from GDE dataset shown in brackets)	200m east of the study area (70464).	A wetland in Plumpton (70473) – identified from regional studies	Unnamed wetlands (70517, 70572)
	Terrestrial	Scattered areas of vegetation, vegetation along major waterways	Scattered areas of vegetation, Long Forest Nature Conservation Reserve, fringe areas valley grassy forest of Lerderderg State Forest	-
	Subterranean	Aquifers within the study area may be conducive to subterranean GDEs, specifically stygofauna.		

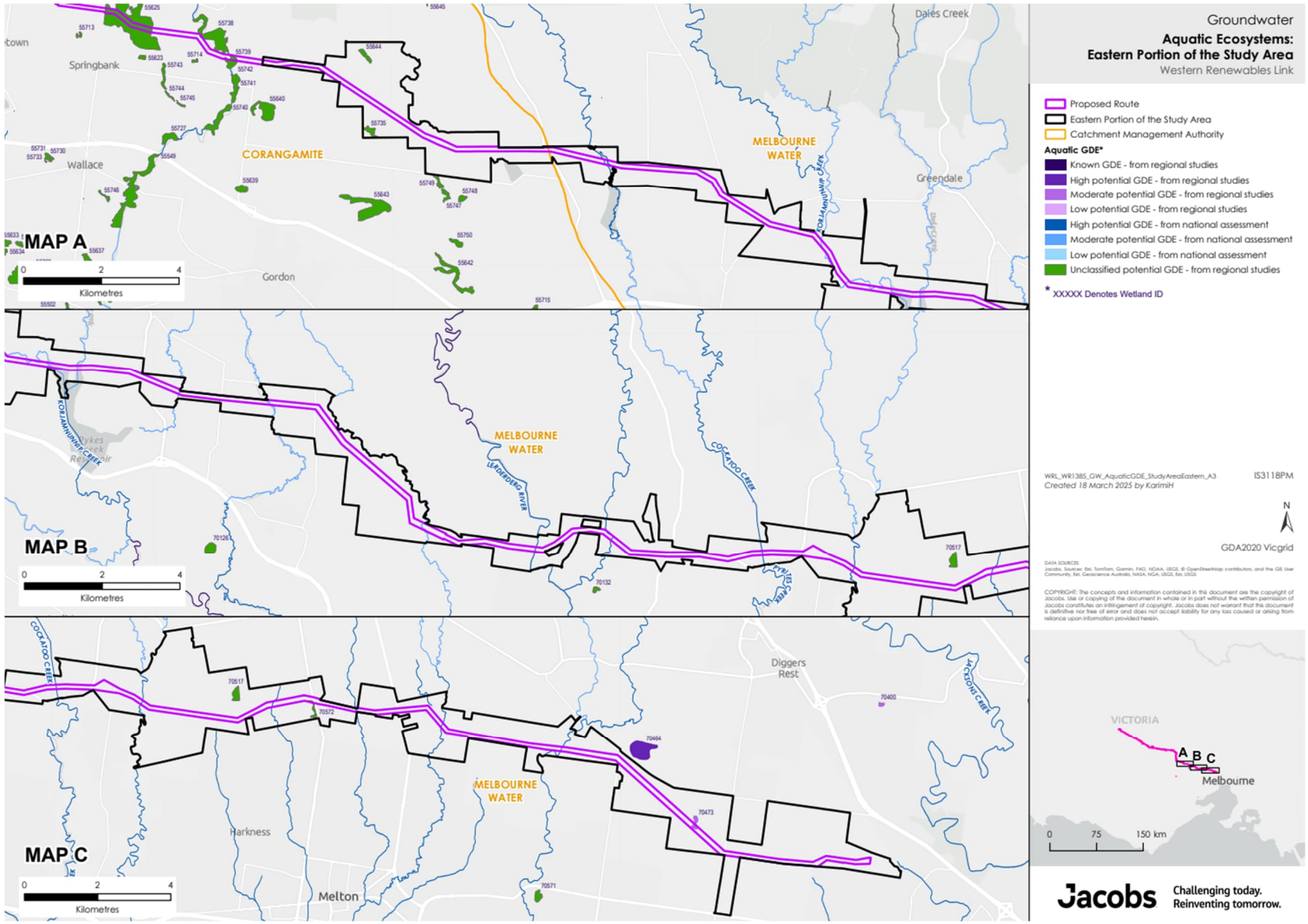

Figure 6-18: Aquatic ecosystems with potential for groundwater dependence: Eastern portion of the study area

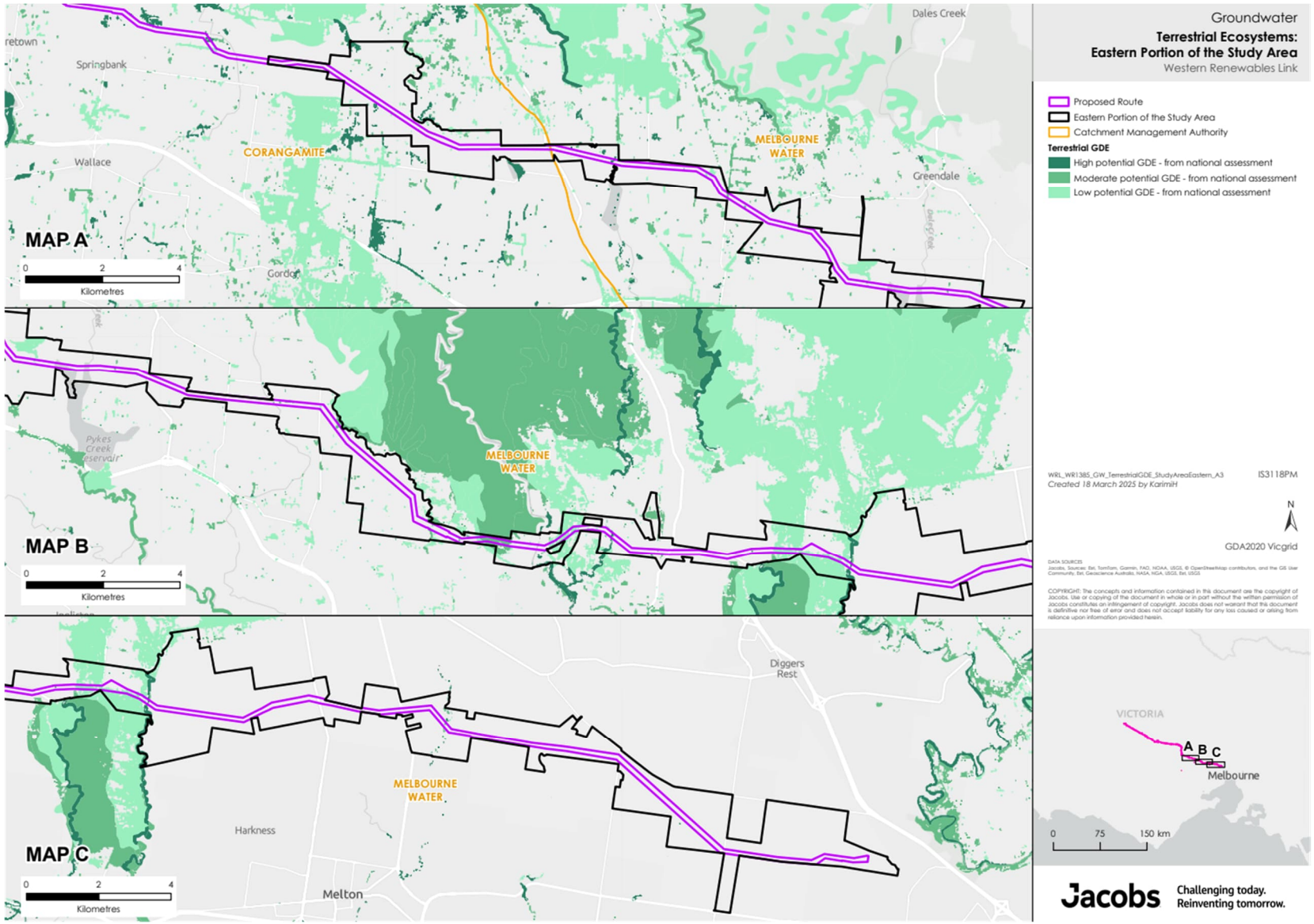

Figure 6-19: Terrestrial ecosystems with potential for groundwater dependence: Eastern portion of the study area

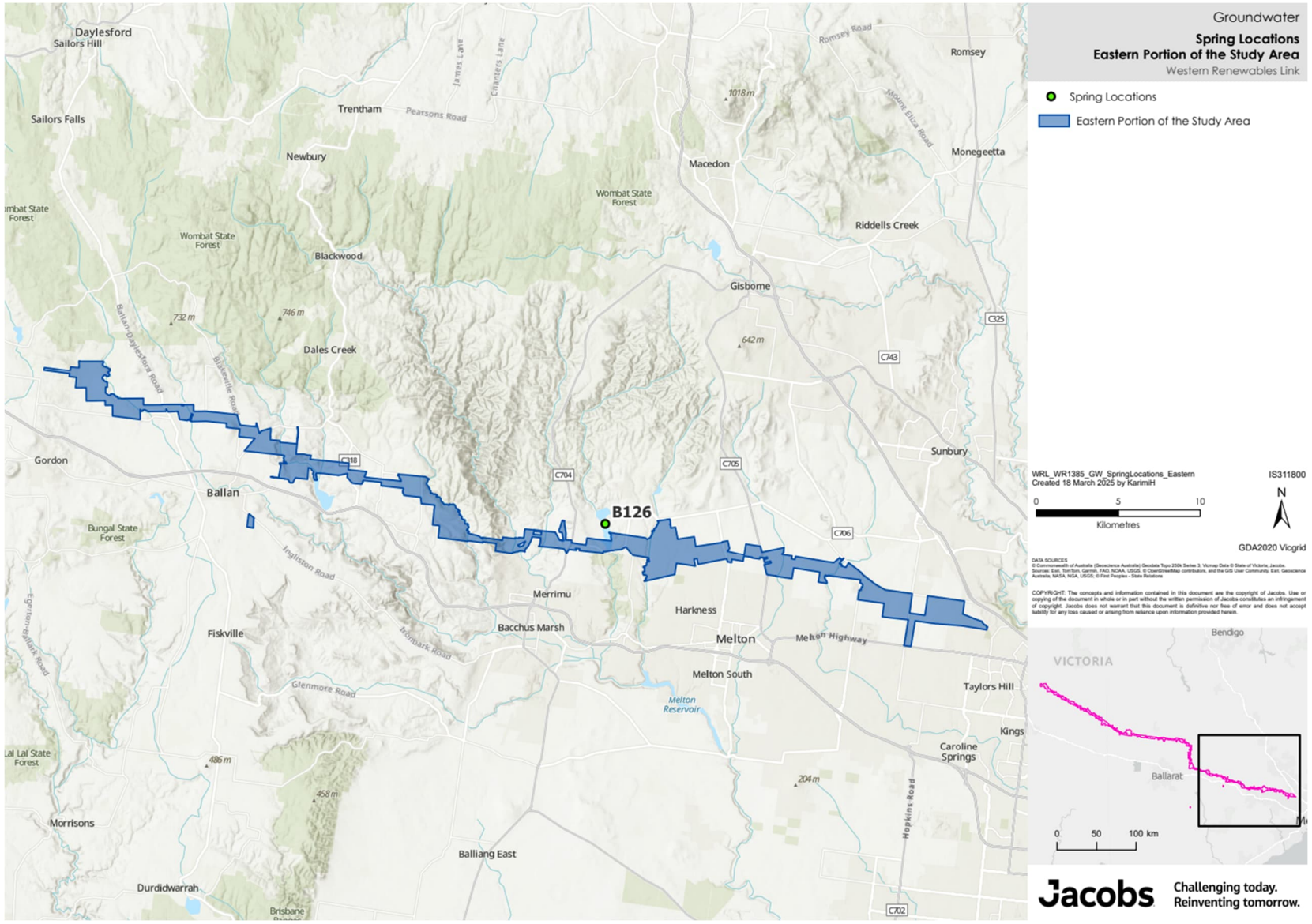

Figure 6-20: Spring locations: Eastern portion of the study area

In addition to identified groundwater dependent ecosystems, groundwater sites of environmental significance were identified through previous community feedback collected during consultation on the Project in 2021. These are described in Table 6-23.

Table 6-23: Groundwater sites of environmental significance identified through community feedback: Central portion of the study area

Feature	Location relative to study area	Description
Creek system, springs, water catchment area not shown on this map	219 m north-east of F4652DL, 236 m east of F4525DL and 230 m east of F4505DL on the banks of Korkuperrimul Creek.	This Social Pinpoint intersects Korkuperrimul Creek, a GDE with moderate potential noted in Table 6-22.

6.3.9 Groundwater sources of contamination

Sources of groundwater contamination are described in detail in the Contaminated Land Impact Assessment. A summary is provided here to provide context to local environmental value of groundwater and existing conditions pertinent to groundwater that may affect or be impacted by the Project.

Acid sulfate soils

Most of the eastern portion of the study area is identified as having "low to extremely low" probability of occurrence of acid sulfate soils. However, some isolated areas of high probability of occurrence of acid sulfate soils have been identified surrounding established waterbodies (e.g., reservoirs and wetlands), including Pykes Creek Reservoir and Merrimu Reservoir.

Sources of contamination

The current land use within the eastern portion of the study area is predominantly agriculture and farming, with localised areas of potentially contaminating activities including sand quarries, an open cut coal mine, landfills, and a recycled water treatment plant. Areas of historical mining activity have been identified within the study area, most notably surrounding Ballarat and Creswick. Areas surrounding known gold mining sites have the potential to have been contaminated (e.g., soil and groundwater) as a result of the historic mining activities.

6.4 Groundwater values

The value of groundwater can be described as the availability of groundwater as a resource to receptors. The availability of groundwater as a resource is limited in two ways, groundwater level and groundwater quality.

- Groundwater level is related to groundwater flow direction (in terms of hydraulic gradients) and is considered a combined metric in that respect.
- Groundwater quality relates to the physical, chemical, and biological characteristics of water and the measure of its condition relative to the requirements for one or more biotic species and or to any human need or purpose. The environmental value of groundwater quality described in the Environmental Reference Standard is based on background salinity (total dissolved solids) data. Protected environmental values are provided for each segment and groundwater quality indicators and objectives are established in the National Water Quality Management Strategy to protect each environmental value.

Groundwater receptors are defined as those that rely on groundwater as a resource, such as:

- Aquatic ecosystems that rely on the surface expression of groundwater, this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands, and springs
- Terrestrial ecosystems that rely on the subsurface presence of groundwater, this includes all vegetation ecosystems
- Groundwater users who extract groundwater using wells or bores for consumptive purposes, including irrigation, stock, and domestic use.

With regards to aquatic and terrestrial ecosystems (GDEs), potentially highest-value GDEs are expected to occur in the groundwater interactive landscapes (i.e., areas where there is a shallow depth to groundwater) (Evan Dresel, 2010). A change in groundwater level caused by the Project has the potential to limit the availability of accessible water to these ecosystems (i.e., groundwater level falls below the root zone of plants, or the base of creeks). The quality of groundwater to support these ecosystems is based on the natural salinity level of the groundwater, which is defined into segments by the Environmental Reference Standard. A change to water quality will affect how these ecosystems function. Degradation of groundwater quality by release of pollutants can cause harm to the connected ecosystems.

With regards to extractive users, bores are installed to a depth that allows sufficient water level in the bore for pumping for the intended purpose (frequent or infrequent pumping, short or long durations of pumping). A change in groundwater level caused by the Project has the potential to limit the availability of accessible water to nearby bores (i.e., groundwater level falls below the pump intake or base of the screen). Bores are installed with an understanding of the available water quality and the suitability for use for a range of potable and non-potable applications, including the salinity segments outlined in the Environmental Reference Standard. A change in water quality will affect how the groundwater can be used. Degradation of groundwater quality by release of pollutants can cause harm to the receptor of the use (e.g., stock, pastures).

7. Construction impact assessment

7.1 Key issues

The potential to impact groundwater is largely related to below-ground works that may intersect groundwater, and how those interactions are managed. The nature of interaction between construction features and groundwater (based on existing conditions, Section 6) is summarised in Table 7-1.

A risk screening assessment was undertaken to identify the key construction activities that have potential to impact groundwater. This process was used as a screening tool to prioritise the focus of the groundwater impact assessment. The initial risk rating is based on compliance with legislation and standard construction requirements that are typically incorporated into projects of a similar type, scale, and complexity. The key issues and impacts identified for groundwater are discussed according to the following themes:

- Groundwater levels, flow and recharge:
  - Dewatering beyond what is specified in the Project methodology.
  - Reduction in groundwater recharge rates due to the physical presence of above ground infrastructure (impervious surfaces).
  - Reduction in aquifer storage capacity from the physical presence of above ground infrastructure (compressibility).
  - Change in groundwater flow direction from the physical presence of below ground infrastructure (low permeability foundations).
  - Increase (rise) in groundwater levels due to removal of vegetation.
- Groundwater quality:
  - Degradation to groundwater quality from leaks and spills of construction material and preferential pathways from runoff.
  - Degradation of waterway quality from displaced groundwater.
- Groundwater receptors:
  - Direct physical impact of siting towers and other below ground works on or near bores or GDEs.

Of these potential issues, degradation of groundwater quality, degradation of waterways and wetland water quality, dewatering beyond what is specified in the Project methodology were assessed to pose a **low risk** after implementation of standard controls. Standard controls refer to those outlined in:

- Controls outlined in EPA Publication1834.1 Civil construction, building and demolition guide (EPA, 2023), as relevant to erosion, sediment, contaminated land and contaminated groundwater, chemicals and waste. This includes controls for management measures of the collection, containment and transport of groundwater or slurry discharged or displacement displaced from below ground construction. Groundwater displaced to the surface will be "waste" as defined by the Environment Protection Act 2017. Wastes will be classified, managed, and disposed in accordance with EPA Publication 1827.2: Waste classification assessment protocol (EPA, 2021a), EPA Publication 1968.1: Guide to classifying industrial waste (EPA, 2021b), and EPA Publication 1828.3: Waste disposal categories-characteristics and thresholds (EPA, 2024). Waste will be managed in accordance with the Environment Protection Regulations 2021. These measures should be implemented to prevent any waste reaching waterways, as well as ensuring open holes are bunded to prevent preferential pathways during construction.
- Controls outlined in EPA Publication 1698 Liquid handling and storage guidelines (EPA, 2018a) and EPA Publication 1700 Preventing liquid leaks and spills from entering the environment (EPA, 2018b). These documents provide guidance on the prevention of leaks and spills entering the environment. This includes controls such as using secondary containment (bunded) areas to store or transfer liquids, safe pouring and

decanting methods, and spill kits to prevent migration of liquid. These measures should be implemented to prevent any onsite spills reaching the watertable.

- Controls as described in EPA Publication 655.1: Acid sulfate soil and rock, for management of acid sulfate soils (EPA, 2009).

Low risk is primarily the result of the effectiveness of the controls and the low significance of impacts (based on sensitivity of the environmental value and likelihood of occurrence). Reduction in aquifer recharge and storage and change in groundwater flow direction were assessed to pose a **very low risk**, noting that these impacts are not clearly managed by standard construction practices.

With regards to vegetation removal, the Biodiversity Impact Assessment describes that significant effort has been made in order to avoid and minimise the degree of vegetation removal, however some impacts (and the degree of vegetation removal) is unavoidable.

An assessment of the significance of the above residual impacts after following the relevant mitigation strategies have been described in the following sections.

Table 7-1: Summary of construction feature interaction with groundwater

Construction feature	Nature of groundwater interaction
Towers	▪ The piling methodology does not include dewatering as a standard requirement. In cases where groundwater is encountered, piling will be undertaken in what is known as 'wet conditions' and cement will be installed via a tremie pipe to pump cement at depth within the borehole, which will displace standing groundwater. ▪ The depth and dimension of all below ground works are dependent on the outcomes of initial ground investigations. ▪ Half (50.9%) of the study area is expected to encounter groundwater within 10m of natural surface, and based on a typical piling depth of 9m, groundwater is likely to be encountered by approximately 218 of the 454 planned transmission towers. Expected depth to watertable, groundwater salinity and surficial geology for each tower location is provided in Appendix D. ▪ Siting of towers has potential for direct physical impact if installed on or very close to an existing groundwater receptor.
Terminal stations	▪ Groundwater is expected to be encountered within 10m of natural surface. Earthworks are planned, and the exact depth of below-natural surface work has not been finalised. The anticipated scope of below-ground activities encompasses site levelling, the construction of footings, foundations, and drainage systems. As such, given the shallow nature of works, the likelihood of encountering groundwater is considered low. ▪ In addition to below ground works, there are some aspects of the above ground construction works that have potential to impact groundwater quality (in terms of the introduction of contaminants), groundwater level and therefore groundwater values.
Laydown areas and workforce accommodation facilities	▪ Works at laydown areas and workforce accommodation facilities are above ground and as such no interaction with groundwater is anticipated. No bores or aquatic groundwater dependent ecosystems (such as wetlands and waterways) have been identified (based on desktop information) within the boundaries of laydown areas and workforce accommodation facilities. There are some aspects that have potential to impact groundwater quality such as leaks and spills from construction vehicles and storage of materials. Potential contamination associated with groundwater from the construction of laydown areas and workforce accommodation facilities are discussed in the Contaminated Land Impact Assessment.

Construction feature	Nature of groundwater interaction
Powercor distribution line crossovers	▪ Work will involve trenching an area approximately 600mm wide and 1m deep. ▪ Detail design of each distribution line crossover point is the responsibility of Powercor. No provision of groundwater dewatering as part of trenching works has been nominated. ▪ Of the approximately 70 crossover locations, approximately 22 are expected to encounter groundwater within 5m of natural surface and hence groundwater may be encountered by trenching activities and require management. Expected depth to watertable, groundwater salinity and surficial geology for each distribution line crossover is provided in Appendix E. ▪ Siting of crossovers has potential for direct physical impact if installed on or very close to an existing groundwater receptor.
Transmission line	▪ As described in the Biodiversity impact assessment, vegetation clearance for the Project will be undertaken in accordance with the planning and regulatory approvals issued for the Project and AusNet's Vegetation Management Plan (AusNet 2019). The Vegetation Management Plan sets out transmission line and easement management practices and, is required by AusNet to comply with the Code of Practice for Electric Line Clearance. The potential for impact to groundwater when vegetation is removed is that groundwater levels may rise, although the impacts from this process are expected to be very small.

7.2 Impact assessment

7.2.1 Groundwater levels, flow and recharge

7.2.1.1 Dewatering beyond what is specified in the Project methodology

Typically, construction dewatering is undertaken to lower (drawdown) the groundwater level within excavations for the duration of construction. When groundwater is drawn down within an excavation, it also lowers the groundwater level immediately adjacent to it. The drawn down groundwater level propagates outwards from the excavation as dewatering continues. The magnitude and extent of the drawdown depends on the hydraulic properties of the aquifer and duration of dewatering. The potential impact to groundwater from dewatering is the lowering of the groundwater level which can limit resource availability for GDEs and users. Lowering the groundwater level may also lead to the degradation of groundwater quality by mobilising contaminant plumes and exposing acid sulfate soils.

The construction methodology does not include groundwater dewatering, and the following components of the construction method have been assessed in terms of significance of impacts to groundwater:

- In the case of the transmission tower piles, the proposed methodology includes piling in wet conditions (i.e., if groundwater is encountered, construction will occur without the need for groundwater dewatering).
    - There may be some Project locations where extraction of groundwater (or rainwater) within the excavation immediately prior to the installation of cement is required. This will involve an extraction event to lower groundwater level to the bottom of the excavation or remove standing water from the excavation. The impact to environmental values from this activity is expected to be negligible as the expected duration is short (less than 1 day) which means that the propagation of drawdown beyond the excavation will be limited and temporary, noting that propagation of drawdown is a result of both duration of dewatering and aquifer properties. Given the limited and temporary nature of drawdown, the significance of residual impact is expected to be negligible.
    - If groundwater is encountered unexpectedly during construction, the methodology and management is expected to be the same (i.e., either construct in wet conditions or undertake a short extraction event).
- In the case of terminal station earthworks, earthworks that raise the final level will limit the potential for below ground works, which limits potential to interact with groundwater.
    - As with piling, any groundwater extraction that is required is likely to have a short duration, which will limit propagation of drawdown. Consequently, it is unlikely that drawdown of measurable significance will be observed at nearby GDEs or groundwater users, and hence impact will be negligible.

- In the case of Powercor distribution line crossovers, the trenching activity has not outlined provision for dewatering, likely due to the shallow (1m) trench and the limited extent groundwater will be encountered:
  - Among the approximately 70 distribution line crossovers, approximately 22 crossovers are situated in areas with the depth to groundwater of <5m (Appendix E) and hence groundwater may be encountered. The remaining crossovers have an expected watertable depth greater than 5m from natural surface and therefore have a lower likelihood of encountering groundwater.
  - If groundwater was encountered during construction in areas where depth to watertable is expected to be less than 5m, management might involve dewatering – this will be determined as part of Powercor's detailed design. Potential for impact will require consideration as part of detailed design.

7.2.1.2 Reduction in groundwater recharge rates

The physical presence of above ground infrastructure (i.e., impervious surfaces) has the potential to cause a reduction in rainfall recharge to the aquifer, which can result in a decline in groundwater level, which affects users and GDE health.

The aquifers of interest to the Project are regional-scale aquifers. The small surface area of impervious surfaces constructed at the surface by the Project relative to the scale of individual aquifers means the potential reduction in recharge is expected to have negligible effect on groundwater recharge processes. Hence, the environmental value of groundwater is not expected to be influenced by this activity and no specific mitigation strategies are recommended.

7.2.1.3 Reduction in aquifer storage capacity

The physical presence of above ground infrastructure has the potential to compress underlying material resulting in less aquifer storage capacity which raises the watertable and impacts GDEs and existing groundwater users (bores).

Compressibility impacts to aquifers will be a function of the depth to watertable and whether the infrastructure is sited on consolidated or unconsolidated material. Design of towers and terminal stations will need to consider areas where groundwater is expected to be shallow (i.e., within 5m of surface) in unconsolidated material. Given the expected footprint of the terminal stations and towers compared to the regional extent of most aquifers in the study area, any change to water level is expected to be limited (either highly localised or almost no change within the natural variability of groundwater) and short-term (within construction timeframe) as the aquifer will reach a new equilibrium. The environmental value is not expected to be measurably impacted by this Project activity and hence impact is expected to be negligible. Geotechnical due diligence prior to works will provide sufficient mitigation for any potential impacts and this has been described in the following section.

7.2.1.4 Change in groundwater flow direction

The physical presence of below ground infrastructure (i.e., low permeability foundations) has the potential to cause a change to local groundwater flow direction (if the foundations are below the watertable) with the potential to damage GDE health due to a decline in available groundwater.

The comparatively small scale of the building and pylon foundations relative to the scale of individual aquifers means that groundwater flow rate or direction (if intersected by these features) is unlikely to be measurably affected, and therefore any impact to local GDEs and users is negligible. Hence, the environmental value of groundwater is not expected to be influenced by this activity and no specific mitigation strategies are recommended.

7.2.1.5 Increase (rise) in groundwater levels due to vegetation removal

Trees mostly take up groundwater from the capillary fringe as oxygen is required for plant respiration, rather than direct uptake from the saturated zone of an aquifer (i.e. groundwater). As water is removed by transpiration, it is continually replenished by groundwater through capillary rise. Groundwater forms only part of the overall

water requirement for vegetation – vegetation will extract water from sources where the combination of soil moisture content, root density and hydraulic conductivity requires the least amount of energy. The depth to which plant roots can grow is a key constraint in their ability to exploit groundwater. Various studies have reviewed rooting depths of different types of vegetation; as summarised by NSW DPI (2016), rooting depths of relevance to the study area include:

- <5m for shrubs and herbaceous species
- <17m for woodland and woody tree species
- 10 to 40m for eucalyptus species.

To assess the potential for impact of vegetation removal on groundwater, the areas of planned vegetation removal noted in the Biodiversity Impact Assessment were reviewed to identify areas that met the following criteria:

- Mass areas of vegetation removal, rather than singular trees; generally, where removal is >1 Ha (10,000m^2).
- Densely vegetated (rather than sparse trees).
- Expected depth to groundwater is <10m below surface (overall) and <20m (areas of high permeability geology, such as alluvial aquifers).
- The proportion of proposed vegetation removal with respect to the remaining adjacent vegetation is greater than 10%.

The following areas of vegetation removal met these criteria and have been assessed in terms of potential for groundwater impact:

- Vegetation between tower F6119DL and F6116DL, in vicinity to Mile Creek Road and Forest Road, Lexton (Western portion of the study area) (Figure 7-1):
  - Surficial geology is characterised by White Hills Gravel. Depth to groundwater varies along the transmission line from <5m to 20m. Areas of shallow groundwater are associated with an unnamed wetland of unclassified groundwater dependence.
  - The GDE atlas notes this is grassy dry forest with some of the extent having moderate potential for groundwater dependence. Vegetation to be removed is 12% of the wider area, noting that there is an easement of vegetation cleared immediately adjacent to the proposed removed area.
  - There is potential for groundwater levels to increase, however, given the wider area is noted as having depth to groundwater up to 20m below surface, the overall significance of impact is expected to be minor once the local area reaches equilibrium after removal.
- Vegetation between F6260DL and F6259DL, south of Coutts Road, Waubra (Central Portion of the study area) (Figure 7-2):
  - Surficial geology is characterised by colluvium overlying the Newer Volcanics. Depth to groundwater is expected to be 5 – 10m.
  - Vegetation to be removed is 12% of the local area. The vegetation is not noted as having potential for groundwater dependence.
  - The vegetated area is bounded to the north and south by unnamed watercourses that flow north-west into McCallum Creek from the topographic high of Mount Gap, located 2.6km south-east.
  - There is potential for groundwater levels to increase, however, given the wider area is noted as having depth to groundwater up to 10m below surface, and the controlling nature of adjacent watercourses, the overall significance of impact is expected to be minor once the local area reaches equilibrium after removal.
- Vegetation adjacent to F4488DL in an area north of Wilson Reservoir (Figure 7-3):
  - Surficial geology is characterised by the Newer Volcanics. Depth to groundwater is expected to be 5 – 20m.

- The GDE atlas notes this herb-rich foothill forest, with some of the extent having moderate to high potential for groundwater dependence. Vegetation to be removed is 15% of the local area and is located on the bank of drainage lines that lead to Wilson Reservoir in the south.
- There is potential for groundwater levels to increase, however, given the wider area is noted as having depth to groundwater up to 20m below surface, and the controlling nature of adjacent watercourses, the overall significance of impact is expected to be minor once the local area reaches equilibrium after removal.

Overall, the expected significance of impact from vegetation removal for the Project is minor as per the criteria in Table 5-1, however in practice the impact could be classed as negligible given the impact on groundwater level would not be measurable using conventional methods of groundwater monitoring at the identified sites.

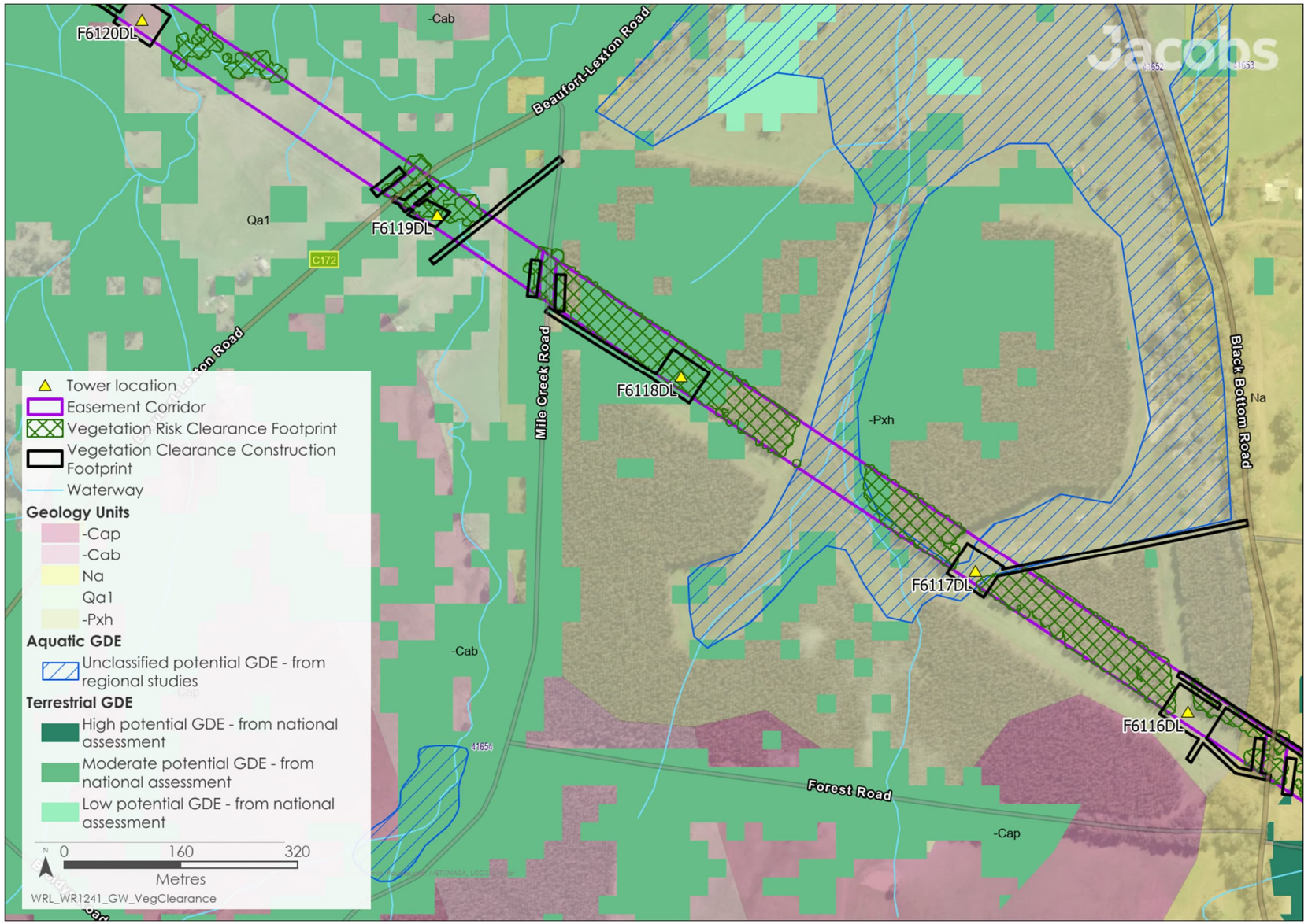

Figure 7-1: Vegetation between tower F6119DL and F6116DL, in vicinity to Mile Creek Road and Forest Road, Lexton (Western portion of the study area)

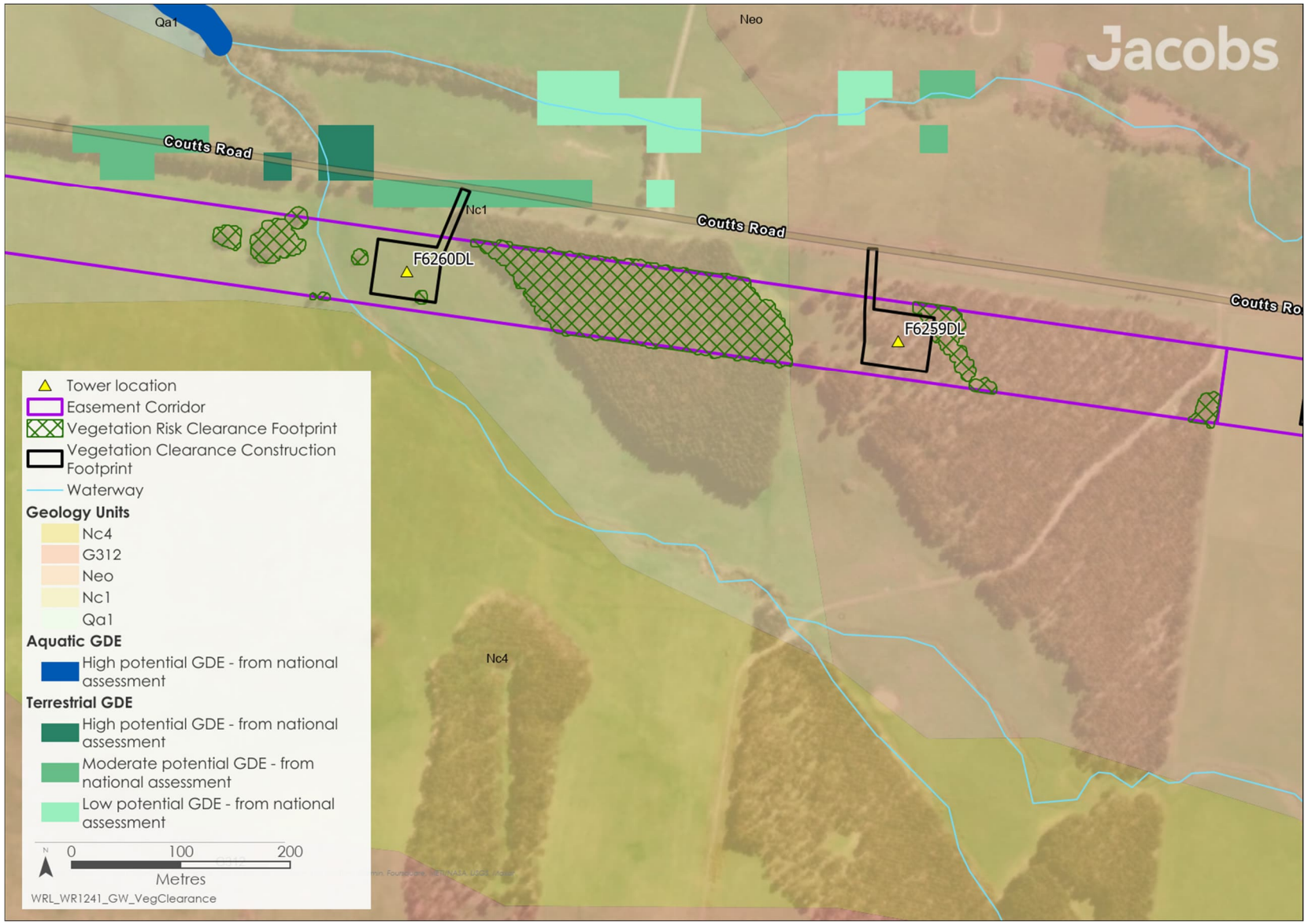

Figure 7-2: Vegetation between F6260DL and F6259DL, south of Coutts Road, Waubra (Central portion of the study area)

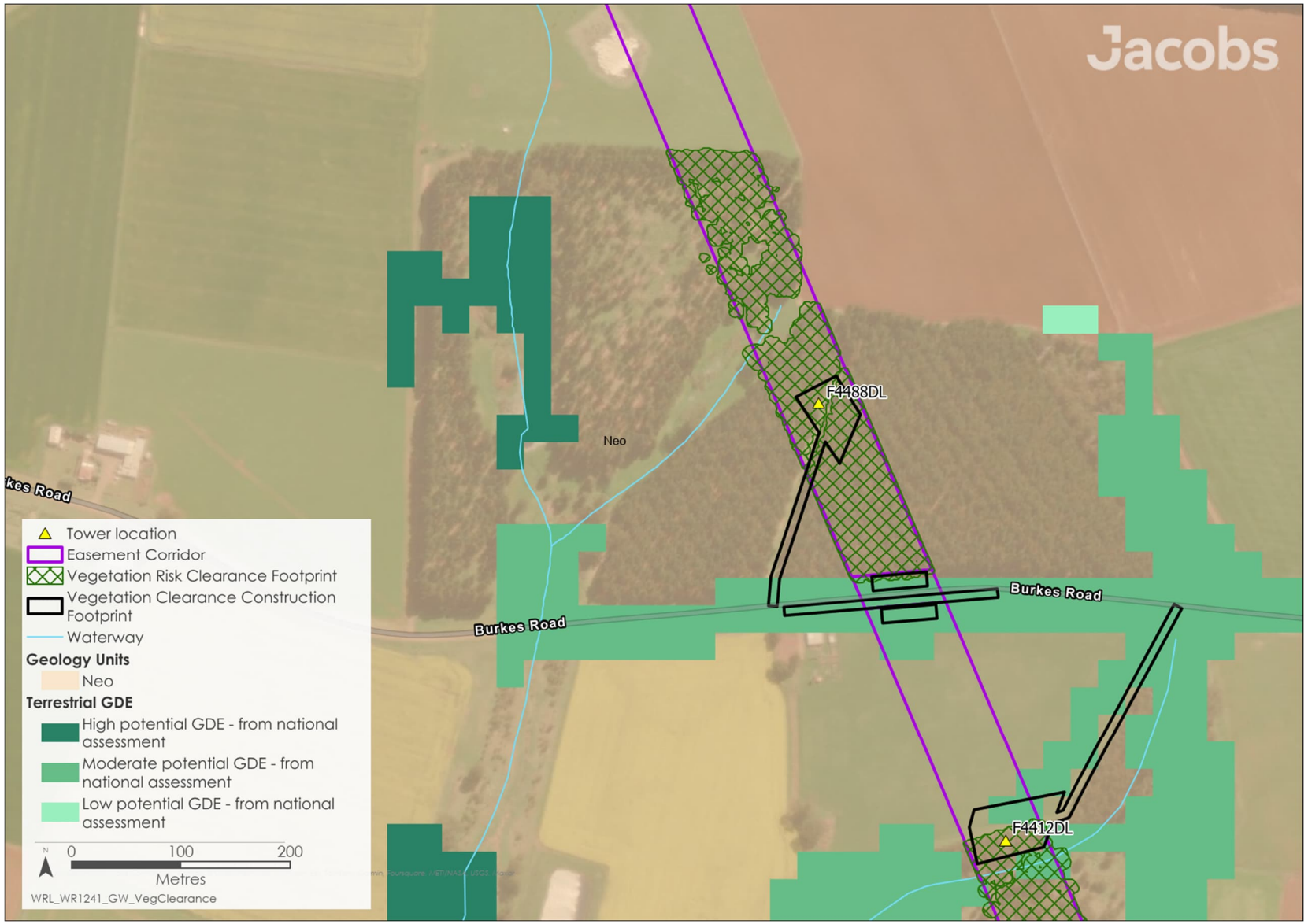

Figure 7-3: Vegetation adjacent to F4488DL in an area north of Wilson Reservoir

7.2.2 Groundwater quality

7.2.2.1 Degradation to groundwater quality

Construction activities related to the generation of spoil, storage, treatment and transport of materials, temporary laydown areas, and disposal of solid and liquid wastes have the potential to enter groundwater through leaks and spills, which can affect groundwater quality and subsequently environmental value of groundwater. Implementation of standard controls (described in Section 7.1) can effectively manage the potential for impact and hence the significance of residual impact is expected to be negligible.

Construction activities that involve excavations below the watertable create the potential for a preferential pathway to groundwater through two mechanisms:

- When an excavation (e.g. borehole, trench) is left open, it can create direct pathways for various contaminants, including surface runoff to enter the excavation area and potentially contaminate groundwater. Additionally, the process of excavation can increase the permeability of the surrounding soil, making it easier for water and contaminants to infiltrate groundwater. Implementation of standard controls (described in Section 7.1) can effectively manage the potential for impact and hence the significance of residual impact is expected to be negligible.
- After construction, if surface seals are at or below grade and compromised, surface runoff can enter and potentially contaminate groundwater. The potential for impact can be eliminated or minimised through appropriate design.
    - The current design of transmission tower foundations includes completing piles with a clay layer at-grade and concrete pile caps above-grade. On this basis, the potential to impact the value of groundwater through the introduction of contaminants is minimised as far as reasonably practicable, and hence significance of residual impact is expected to be negligible.
    - Detailed design of distribution line crossovers is the responsibility of Powercor and outside the scope of the EES. Given the shallow nature of the trench, the significance of residual impact is expected to be negligible.

7.2.2.2 Degradation of waterways and wetland water quality

Any discharge (slurry, water, groundwater, seepage) from piling will be “waste” as defined under the Environment Protection Act and will be removed and disposed in accordance with EPA requirements (as outlined in Section 7.1). Water will not be discharged in an uncontrolled manner and if required, temporary site drainage will be constructed to manage potential overflow.

Construction activities that generate groundwater inflow and slurry require management to prevent the waste entering waterways or wetlands and causing temporary damage to aquatic ecosystems. Implementation of standard controls (described in Section 7.1) can effectively manage the potential for impact and hence the significance of residual impact is expected to be negligible.

7.2.3 Groundwater receptors

7.2.3.1 Physical impact of siting of towers and other below ground works

Siting towers and other below ground works (such as distribution line crossovers and excavations at terminal stations) has potential for direct physical impact if installed on or very close to an existing groundwater receptor. An assessment was run to determine if any tower, distribution line crossovers or terminal station is within the following siting buffers:

- 100m of registered or identified groundwater extraction bores (i.e., all extractive bores and excluding bores for monitoring specific purposes)
- 100m of SOBN bores

- 50m or related waterway buffer identified EPR SW1 of aquatic GDEs.

Towers, crossovers and terminal stations that intersect the nominated buffers are listed in Appendix G alongside details on surficial geology, depth to groundwater and potential for groundwater dependence (for GDEs only). A summary of the potential physical impact is provided below.

Tower locations

There are five bores that intersect tower buffers in the central portion of the study area and four bores that intersect tower buffers in the eastern portion of the study area. A summary of the hydrogeological characterisation of the tower sites and likelihood of encountering groundwater during piling is described in Table 7-2. For eight of the nine tower locations (excludes F4387DL), it is recommended that the bore owner is engaged with to check that the bore exists. If the bore exists, undertake a site-specific groundwater assessment to evaluate potential for physical impact. The assessment should consider a review of the piling construction method and local geotechnical and groundwater conditions. If impact is identified, implement site-specific monitoring and mitigation strategies to minimise impact.

There are 15 aquatic GDEs intersecting the 50m buffer of transmission towers. The GDEs are located across the study area. The Surface Water Impact Assessment considers set-back distances for towers from waterways. Set-back distances are based on discussions with CMAs and Melbourne Water. The recommended setbacks are:

- For CMAs:
  - 30m horizontal distance from the top of the bank.
- Melbourne Water management areas:
  - 20m for first and second order streams
  - 30m for third order streams
  - 50m for fourth order or higher streams, as per Waterway Corridors, Guidelines for greenfield development areas within the Port Phillip and Westernport Region (Melbourne Water 2013).

The distances nominated in the Surface Water Impact Assessment aim to minimise flow disruption and bank erosion. In terms of groundwater impact, there is no significant physical impact expected from siting works within the assessed buffers, given the majority of the GDEs are located outside of the CMA/Melbourne Water setback distances (minimum 20m distance).

The GDEs that are located within the CMA/Melbourne Water setback distance include:

- The western boundary of wetland 41600 is currently 30m from F6107DL and the eastern boundary intersects directly with F6106DL (located within the western extent of the study area)
- Amphitheatre Creek is 18m from F6161DL
- Three towers (F136DL, F138DL and F4487DL) are within the extent of wetland 55625 in the central study area
- F6106DL is within the extent of wetland 41600 in the central study area.

The significance of the physical impact is expected to be minor. In the event of dewatering, it is essential to implement additional mitigation strategies as outlined in Section 8.3.

Distribution line crossovers

There are 15 bores located within 100m of distribution line crossovers:

- Three licensed bores
- 11 registered bores
- One SOBN bore.

In terms of direct physical impact, depending on final design of the crossovers, they may be within the area planned for trenching. It is recommended that bore owners are engaged with to firstly identify if the bore exists and secondly make arrangements if works will intersect with the bore. This may include re-routing the trenching or providing a replacement bore if it will be damaged.

The SOBN bore (WRK992389) is within 100m of distribution line crossover DLIS_23 in the eastern portion of the study area. The bore appears to be within the easement designated for crossover works and there is potential for direct physical impact (damage) to the SOBN bore. It is recommended that works are reviewed to prevent physical impact to the SOBN bore, and that provision of access arrangements are made with DEECA for the duration of works.

Of the 15 bores identified above, seven sites have the potential to intersect groundwater (i.e., groundwater is expected to be <5m at these locations). In the event of dewatering, it is essential to implement additional mitigation strategies as outlined in Section 8.3.

There are eight locations where distribution line crossovers are within 50m of a GDE, which includes Wimmera River, Glenlofty Creek, Birch Creek, Creswick Creek, Korkuperrimul Creek and two wetlands. The management of the interaction will be dependent on the location and construction methodology proposed for these sites. In the event of dewatering, it is essential to implement additional mitigation strategies as outlined in Section 8.3.

Terminal stations

Wimmera River is 50m from Bulgana Terminal Station and hence direct physical impact to the GDE is unlikely. There are no bores that intersect terminal stations.

Table 7-2: Bores intersecting the designated buffer zone around transmission towers

Structure Number (tower)	Works ID	Groundwater receptor	Purpose	Study area	Hydrogeological characterisation[1] [2]	Likelihood of tower to encounter groundwater[3]	Recommended management response
F4406DL	WRK053311	Licenced bore (SRW)	Irrigation	Central Study Area	Castlemaine Group aquifer, with depth to groundwater expected to be 5 – 10m below surface. Both bores are expected to be screened in this unit, although drilling and construction information is unavailable on the state database.	The piling borehole may encounter groundwater, particularly if piles at this location exceed 9m.	Engage with bore owners to check that the bores exist. If the bores exist, undertake a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies.
F4406DL	WRK053312	Licenced bore (SRW)	Irrigation	Central Study Area			
F4489DL	WRK039894	Licenced bore (SRW)	Irrigation	Central Study Area	Newer Volcanics aquifer, which typically has a low permeability but can vary depending on the interconnection of fractures. Depth to groundwater expected to be 10 – 20m below surface.	Piling borehole is expected to be largely dry and will only intersect groundwater if depths exceed 10m.	Engage with bore owner to check that the bore exists. If the bore exists, undertake a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies.
F4624DL S (New)	53257	Registered bore	Domestic and stock	Central Study Area	Newer Volcanics aquifer, with depth to groundwater expected to be 5 – 10m below surface. Both bores are expected to be screened in this unit, with potential to screen the lower Castlaine Group bedrock. 5325 was drilled in 1976 and installed to a depth of 78m (no screen information) with a yield of 2.5L/s. WRK987773 is 80m deep, with no other information available.	Piling borehole may encounter groundwater, particularly if piles at this location exceed 9m.	Engage with bore owners to check that the bores exist. If the bores exist, undertake a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies.
F4624DL S (New)	WRK987773	Registered bore	Unknown	Central Study Area			

Structure Number (tower)	Works ID	Groundwater receptor	Purpose	Study area	Hydrogeological characterisation[1] [2]	Likelihood of tower to encounter groundwater[3]	Recommended management response
F4426DL	WRK036200	Licenced bore (SRW)	Industrial or commercial	Eastern Study Area	The bore is likely associated with the Boral Quarry in Coimadai. No construction or drilling information for this bore is available on the state database. Groundwater at the site is characterised by the outcropping Werribee Formation aquifer, with depth to groundwater expected to be 10 – 20m below surface.	Piling borehole is expected to be largely dry and will only intersect groundwater if depths exceed 10m.	Engage with bore owner to check that the bore exists. If the bore exists, undertake a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies.
F4459SL-A	333586	Registered bore	Other	Eastern Study Area	Drilling information indicates the bore was drilled in 1983 to a depth of 1.58m. Groundwater at the site is characterised by the Newer Volcanics aquifer, with depth to groundwater expected to be <5m below surface.	The piling borehole is likely to encounter groundwater.	Engage with bore owner to check that the bore exists. If the bore exists, undertake a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies.
F59DL	WRK038451	Licenced bore (SRW)	Industrial or commercial	Eastern Study Area	The bore is likely associated with the Boral Quarry in Coimadai. § Available desktop information on the bore suggests it was drilled in 1982 and installed to a depth of 132m (screened 3 – 132 mBNS). Geological data indicates that bore is sited in Quaternary alluvium to a depth of 10m, followed by fractured bedrock (Castlemaine Supergroup). Desktop information suggests depth to watertable is 10 to 20m from surface, suggesting the watertable is within the bedrock. The bedrock is expected to have a low permeability.	Piling borehole is expected to be largely dry and will only intersect groundwater if depths exceed 10m.	Engage with bore owner to check that the bore exists. If the bore exists, undertake a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies.

Structure Number (tower)	Works ID	Groundwater receptor	Purpose	Study area	Hydrogeological characterisation[1] [2]	Likelihood of tower to encounter groundwater[3]	Recommended management response
F4387DL	WRK974466	Registered bore	Unknown	Adjacent to Eastern Study Area	Available desktop information on the bore suggests it was drilled to a total depth of 150m. No other details on construction or date installed are available. Groundwater is expected to be >50m below surface at this location. It is likely this bore was a historical investigation site with no extractive or consumptive purpose.	The piling borehole is unlikely to encounter groundwater.	Piling, provided it is not directly located on top of the site, is expected to have no impact.

Notes:

1 Based on DJPR, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12

2 Based on DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857

3 Based on typical piling depth of 9m and noting piling can be up to 25m (below ground).

7.3 Mitigation of impacts

Mitigation strategies for groundwater impacts during construction of the Project have been outlined below. The mitigation strategies include planning and due diligence prior to undertaking ground disturbance activities, as well as development and implementation of a Groundwater Management Plan for inclusion in the Construction Environmental Management Plan for the Project. These mitigation strategies have informed the development of the EPRs described in Section 11.

1) To minimise potential for direct physical impact of construction on groundwater receptors, buffers should be considered for transmission towers, Powercor distribution line crossovers, and below ground works at terminal stations. If planned works will be within the specified buffers, as described in Section 7.2.3.1, conduct a site-specific groundwater assessment to evaluate potential for physical impact. If impact is identified, implement site-specific monitoring and mitigation strategies. The buffers distances are as follows, noting they are for physical distancing only and do not consider dewatering impacts:
    a) 100m of registered or identified groundwater extraction bores (i.e., all extractive bores and excluding bores for monitoring specific purposes).
    b) 100m of SOBN bores.
    c) 50m or related waterway buffer identified EPR SW1 of aquatic GDEs.
2) Consult with the landholder and undertake a site walkover to inspect or identify groundwater bores or areas where sub-surface infrastructure is present (such as supply mains) within and adjacent the construction footprint in addition to those identified in this report (noting the accuracy of data presented in this report, see Section 5.8).
    a) If additional bores are discovered, these should be discussed with the landholder and the relevant water authority and considered against nominated buffers above.
    b) If sub-surface infrastructure is identified, potential for impact should be discussed with the landholder.
3) Develop and implement a Groundwater Management Plan included as part of the CEMP that outlines the specific controls that would avoid or minimise risks to the environmental value of groundwater. The Plan should include the following, as a minimum:
    a) Controls outlined in EPA Publication1834.1 Civil construction, building and demolition guide (EPA, 2023), as relevant to erosion, sediment, contaminated land and contaminated groundwater, chemicals and waste. This includes controls for management measures of the collection, containment and transport of groundwater or slurry discharged or displacement displaced from below ground construction. Groundwater displaced to the surface will be "waste" as defined by the *Environment Protection Act 2017*. Wastes will be classified, managed, and disposed in accordance with EPA Publication 1827.2: Waste classification assessment protocol (EPA, 2021a), EPA Publication 1968.1: Guide to classifying industrial waste (EPA, 2021b), and EPA Publication 1828.3: Waste disposal categories-characteristics and thresholds (EPA, 2024). Waste will be managed in accordance with the Environment Protection Regulations 2021. These measures should be implemented to prevent any waste reaching waterways, as well as ensuring open holes are bunded to prevent preferential pathways during construction.
    b) Controls outlined in EPA Publication 1698 Liquid handling and storage guidelines (EPA, 2018a) and EPA Publication 1700 Preventing liquid leaks and spills from entering the environment (EPA, 2018b). These documents provide guidance on the prevention of leaks and spills entering the environment. This includes controls such as using secondary containment (bunded) areas to store or transfer liquids, safe pouring and decanting methods, and spill kits to prevent migration of liquid. These measures should be implemented to prevent any onsite spills reaching the watertable.
    c) Controls as described in EPA Publication 655.1: Acid sulfate soil and rock, for management of acid sulfate soils (EPA, 2009).
    d) Planned protocols in the event that dewatering is required (i.e., a Dewatering Plan). Significant dewatering is not planned as part of construction activities, but it may occur and it has potential to

impact the environmental value of groundwater. The potential for impact by dewatering on groundwater receptors or areas of potential groundwater contamination is dependent on the duration of dewatering and aquifer properties (such as thickness and hydraulic conductivity). Therefore, the cone of depression generated by dewatering may be much larger than the physical buffer distances for siting infrastructure nominated above. If dewatering is required, buffer distances may need to be increased. The Dewatering Plan would manage the potential impacts to groundwater users or GDEs, as well as the potential of exposing acid sulfate soils or mobilising known groundwater contaminants. The Plan should include, but not be limited to, provision of the following activities:

i. Review of geotechnical survey data to determine sub-surface conditions.

ii. Estimation of drawdown and cone of depression based on planned dewatering duration and conditions encountered.

iii. Review of this report for the identification of nearby receptors (GDEs, waterways) or sensitive sites (acid sulfate soils, contamination sources) within the expected cone of depression. If potential impacts are identified, consider the proposed construction method and timing to minimise or eliminate impacts. If there is high uncertainty, high risk, or if impacts cannot be mitigated through design, construction methodology, and timing, install a groundwater bore and undertake investigations to determine groundwater level, groundwater quality and hydraulic conductivity. Design and implement a field monitoring program before, during and after dewatering to monitor and manage impacts. Develop site-specific mitigation strategies to prevent adverse outcomes.

iv. Estimation of extraction volume. If the activity is within a Groundwater Management Area, the volume should be communicated to the Rural Water Authority.

v. Groundwater inflow management planning.

vi. Groundwater discharge options assessment and management planning.

7.4 Residual impacts

As described in Section 7.2 the potential for the Project to encounter groundwater during construction activities is not expected to result in significant adverse effects on groundwater levels, flow, quality (including salinity), and yield. With the implementation of the mitigation strategies described in Section 7.3, residual impacts from Project construction activities across the Project Area to the environmental value of groundwater will be minor to negligible as groundwater impacts are likely to be temporary and limited to the immediate area of ground works:

- Residual impacts to groundwater levels, flow and recharge during construction are considered to be minor to negligible. The removal of patches of vegetation in three areas along the Proposed Route may result in an increase in groundwater levels; however, no significant impacts are expected. Planned protocols will be followed in the event that dewatering is required, managing potential adverse impacts.
- Residual impacts to groundwater quality (including salinity) during construction are considered to be negligible. The Groundwater Management Plan will include controls to manage contamination risks, and all surface seals will be designed to minimise the risk of contaminants entering groundwater.
- Residual impacts to groundwater bores or GDEs during construction are considered to be minor to negligible. Where buffer distances cannot be achieved to groundwater receptors, site-specific assessments will be undertaken, and monitoring and mitigation strategies will be implemented where impacts are identified.

Residual impacts are likely to be unavoidable only when mitigation measures cannot be fully implemented, for example where the placement of tower footings is planned on-top of existing bores. In these cases, agreement between the landholder and the Project regarding bore abandonment and replacement can be made.

With the implementation of measures to comply with EPRs, it is considered that the construction of the Project will meet the groundwater aspects of the evaluation objective “Maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses”.

7.5 Climate change scenario

7.5.1 Background

Potential impacts of the Project to groundwater have been considered in terms of climate change. The DEECA guidelines for assessing the impact of climate change on water availability in Victoria (DELWP, 2020c) provides the approach for applying a climate change scenario to the assessment of the Project's impacts on groundwater. To this end, the cumulative impact of the Project and the potential impact to groundwater under a climate change scenario has been considered.

Climate change may affect rates of recharge and the future availability of groundwater. Climate change may increase the frequency of high intensity rain events that provide significant recharge events for systems. It may also alter irrigation practices in response to changes to rainfall and stream availability. Aquifers that will be intersected by the Project are all aquifers that receive diffuse rainfall recharge and are susceptible to impacts from climate change. Groundwater recharge is a 'threshold' process with a minimum amount of rainfall required to generate any recharge. In Victoria, groundwater recharge is most significant during winter and spring. During these seasons, rainfall can maintain a higher moisture content in the soil profile to facilitate recharge to the watertable. During summer and autumn, evaporation rates exceed precipitation and so do not generally facilitate recharge events.

7.5.2 Assessment

An assessment of climate change as related to the Project is included in Climate Change Assessment. The projected changes in groundwater recharge due to climate change are (DELWP, 2020c):

- Reductions in winter rainfall when diffuse recharge occurs will impact on recharge in the longer term (hundreds of years).
- Increased summer rainfall is unlikely to increase recharge but may reduce extraction rates in areas of groundwater use (i.e., in dryland agricultural areas or where farm dams are used) thereby reducing declines in groundwater levels.

In terms of the combined effect of climate change and potential construction impacts of the Project:

- In a scenario where groundwater recharge is increased, groundwater will be encountered at a shallower depth. The significance of the residual impacts of the Project after following relevant mitigation strategies under this scenario is expected to be negligible owing to the regional-scale nature of the aquifers (see Section 7.2.1.2).
- In a scenario where groundwater recharge is decreased, groundwater will be encountered at a deeper depth. The significance of the residual impacts of the Project after following relevant mitigation strategies under this scenario is expected to be negligible owing to the regional-scale nature of the aquifers (see Section 7.2.1.2).

8. Operations impact assessment

8.1 Key issues

The potential to impact groundwater during operation of the Project is largely related to above ground operations and infrastructure as there are no operations works that are expected to extract or interact with groundwater (beyond those identified during the construction stage).

A risk screening assessment was undertaken to identify the key operation activities that have potential to impact groundwater. This process was used as a screening tool to prioritise the focus of the groundwater impact assessment. The initial risk rating is based on compliance with legislation and standard construction requirements that are typically incorporated into projects of a similar type, scale, and complexity.

The key issues assessed in the risk screening process were the potential for:

- Degradation to groundwater quality from herbicide application (as part of easement vegetation management).
- Reduction in groundwater recharge rates due to the physical presence of above ground infrastructure (impervious surfaces).

Of these potential impacts, degradation of groundwater quality was assessed to pose a low risk after implementation of existing AusNet operational procedures. Low risk is primarily the result of the effectiveness of the controls and the low significance of impacts (based on sensitivity of the environmental value and likelihood of occurrence). Reduction in aquifer recharge was assessed to pose a very low risk, noting that these impacts are not clearly managed by standard construction practices.

An assessment of the significance of the residual impacts after following relevant mitigation strategies have been described in the following sections.

8.2 Impact assessment

8.2.1 Degradation to groundwater quality

The Project activity of the application of herbicides has the potential to introduce contaminants to groundwater. In addition, the storage of chemicals at terminal stations raises the potential for groundwater contamination via leaks and spills. Surface seals of below-ground works are required to prevent creation of preferential pathways with which contaminants can enter groundwater.

Controls outlined in EPA Publication 1698 Liquid handling and storage guidelines (EPA, 2018a) and EPA Publication 1700 Preventing liquid leaks and spills from entering the environment (EPA, 2018b) can be used to prevent herbicides or effluent from onsite wastewater storages from entering groundwater, or to minimise the volume of a leak or spill that would enter groundwater if a leak or spill were to accidentally occur. Through implementation of these controls, the risk of harm to human health and the environment from pollution or waste would be minimised, so far as reasonably practicable, and the potential for residual impacts to groundwater quality and associated environmental values is expected to be negligible.

The potential for creating preferential pathways for groundwater contamination can be eliminated or minimised through appropriate design of surface seals. The current design of transmission tower foundations includes completing piles with a clay layer at-grade and concrete pile caps above-grade. On the current understanding the potential to impact the value of groundwater through the introduction of contaminants is minimised as far as reasonably practicable, and hence significance of residual impact is expected to be negligible.

There is no intent to store chemicals at terminal station sites other than for short periods during maintenance. Some equipment such as transformers contain oil and are contained within a bunded area. The design includes an oily water treatment downstream so that any water exiting the site is clean and within Environment Protection

Authority Victoria (EPA) guidelines. In the event of system maintenance or failure there is a main valve that can be closed to prevent water exiting the site if required.

8.2.2 Reduction in groundwater recharge rates

The physical presence of above ground infrastructure (i.e., impervious surfaces) has the potential to cause a reduction in rainfall recharge to the aquifer, which can result in a decline in groundwater level, which affects users and GDE health.

The aquifers of interest to the Project are regional-scale aquifers. The small surface area of impervious surfaces constructed at the surface by the Project relative to the scale of individual aquifers means the potential reduction in recharge is expected to have negligible effect on groundwater recharge processes and groundwater value. Hence, the environmental value of groundwater is not expected to be influenced by this activity and no specific mitigation strategies are recommended. Residual impacts to the environmental value of groundwater would be negligible.

8.3 Mitigation of impacts

AusNet have existing operational procedures in place that, when implemented for Western Renewables Link, have the capacity to mitigate potential to impact the environmental value of groundwater. These include:

- In the application of herbicides for weed control, use contractors who hold a commercial operating licence for the use of herbicides and application of herbicides in accordance with the *Agricultural and Veterinary Chemicals (Control of Use) Act 1992*.
- Appropriate controls for the storage and handling of waste, including on-site wastewater storages systems. Wastes will be classified, managed, and disposed in accordance with EPA Publication 1827.2: Waste classification assessment protocol (EPA, 2021a), EPA Publication 1968.1: Guide to classifying industrial waste (EPA, 2021b), and EPA Publication 1828.3: Waste disposal categories-characteristics and thresholds (EPA, 2024).
- Appropriate management of accidental leaks or spills of chemicals used at the terminal stations, for example those outlined in EPA Publication 1698 (EPA, 2018a) and EPA Publication 1700 (EPA, 2018b).

8.4 Residual impacts

As described in Section 8.2, the potential impacts to groundwater quality from herbicide application can be effectively minimised through existing AusNet operation plans, meaning residual impacts are expected to be negligible. The assessment of the potential for impact to groundwater recharge rates concluded that the Project is expected to have negligible effect on groundwater recharge processes and groundwater value and no specific mitigation strategies are required.

With the implementation of measures to comply with EPRs, it is considered that the operation of the Project meets the groundwater aspects of the evaluation objective “Maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses”.

8.5 Climate change scenario

An assessment of climate change as related to the Project is included in Climate Change Assessment. The effect of climate change on groundwater has been described in Section 7.5. In terms of the combined effect of climate change and potential operational impacts of the Project:

- In a scenario where groundwater recharge is increased, groundwater will be encountered at a shallower depth. The significance of the residual impacts of the Project after following relevant mitigation strategies under this scenario is expected negligible.

- In a scenario where groundwater recharge is decreased, groundwater will be encountered at a deeper depth. The significance of the residual impacts of the Project after following relevant mitigation strategies under this scenario is expected negligible.

9. Decommissioning impact assessment

There are no Project activities described in the decommissioning stage that are considered to have potential for impact to groundwater level, flow, or quality. Tower and terminal station footings are typically excavated out to a maximum of 300mm below finished surface level and hence decommissioning work will not encounter or interact with groundwater. Any decommissioning work should be carried out in accordance with the controls outlined in EPA Publication1834.1 Civil construction, building and demolition guide (EPA, 2023), as relevant to erosion, sediment, contaminated land and contaminated groundwater, chemicals and waste.

10. Cumulative impacts

A cumulative impact assessment considers the impacts of a project together with the impacts of other relevant projects that may interact spatially and temporally to change the level of impact on environmental, social or cultural values. EES Chapter 4: EES assessment framework and approach identifies relevant future projects that are proportionate to the scale and potential significance of the impacts of Western Renewables Link Project (WRL); that have sufficient information publicly available in an EES or an environmental approvals application; and that have a spatial and temporal relationship to WRL. Cumulative impacts may occur when incremental, successive and combined effects of actions or projects are added to other proposed actions or projects.

Cumulative groundwater impacts may arise from the interaction of construction and operational activities of WRL, and other developments and activities in the area, both current and future. When considered in isolation, specific WRL impacts may be considered manageable. These manageable impacts may, however, be more substantial, when the impact of multiple projects on the same receptors is considered.

Of the 23 shortlisted projects identified in EES Chapter 4: EES assessment framework and approach, the following have been considered as potentially relevant to groundwater:

- Victoria to New South Wales Interconnector West (VNI West)
- Nyaninyuk Wind Farm
- Expansion of sand quarries to the north of Bacchus Marsh
- Elaine Solar Farm
- Toolern Vale Solar Farm
- Akaysha (Elaine) Battery Energy Storage System.

These projects have been identified as relevant based on expected works below ground, spatial overlap with the study area and temporal overlap with regards to the Project construction timing. A qualitative significance assessment has been applied for evaluating cumulative impacts from Western Renewables Link and surrounding projects. For further detail of the potential cumulative groundwater impacts, refer to Table 10-1.

Within the transmission line easement, new bores can be installed in the future provided a risk assessment is undertaken to consider proximity to structures. No excavation work is to commence until AusNet has responded to a Dial Before You Dig enquiry and issued a permit to work adjacent to a high voltage electrical apparatus, which is the standard practice for new bore installation. Removal of pumps from existing bores within the transmission line easement will require a similar assessment and AusNet approval for consideration of plant interaction with overhead wires, which is standard practice. Hence, no additional management has been considered for cumulative impacts.

Table 10-1: Relevant future projects with the potential for cumulative groundwater impacts

Project	Nature of potential for groundwater impact	Cumulative impact with the Western Renewables Link
VNI West	Detailed design is not yet finalised; and it remains uncertain whether either of the two current options will proceed. Both of which involve the installation of a 500kV circuit overhead transmission line to connect to Western Renewables Link. This would have temporary groundwater impact associated with piling activities and primarily occur during the construction stage.	The VNI West project is expected to have localised and temporary impact on groundwater, much the same as Western Renewables Link. VNI West will connect to Western Renewables Link at Bulgana via a new terminal station. Cumulatively, the expected impact on groundwater is anticipated to be limited.

Project	Nature of potential for groundwater impact	Cumulative impact with the Western Renewables Link
Nyaninyuk Wind Farm	This is currently in the planning and approvals stage, and as a result, the detailed design has not been finalised yet. It involves 58 wind turbines with a total capacity of 330 megawatts, located between Evansford, Clunes and Waubra. Construction, which may include pilings or foundations, is expected to temporarily influence local groundwater during this stage.	The Nyaninyuk wind farm is located east within the Specific Control Area between Evansford to Waubra. Nyaninyuk Wind Farm is expected to have localised and temporary impact on groundwater, thus limiting the potential for cumulative groundwater impacts.
Expansion of sand quarries to the north of Bacchus Marsh	Boral and Hanson have proposals to expand sand quarrying operations to the north of Bacchus Marsh. Depending on the nature of expansion, operation has the potential to affect groundwater level and groundwater quality.	The quarry will likely be subjected to a groundwater monitoring program to monitor for potential groundwater impact outside of the quarry footprint. Provided the project impacts are contained and given that the assessment of the Western Renewables Link impacts to groundwater are short-term or not measurable, the cumulative impact with the Western Renewables Link is expected to be limited.
Elaine Solar Wind Farm	Connection of this solar energy facility will require construction of transmission towers and infrastructure to connect to Elaine Terminal Station. Construction of towers would have temporary groundwater impact associated with piling activities and primarily occur during the construction stage.	Transmission tower construction is expected to have localised and temporary impact on groundwater, thus limiting the potential for cumulative groundwater impacts.
Toolern Solar Farm	This project is adjacent to Project Land and includes a 12.5MW solar farm and utility installation, associated infrastructure, earthworks, access and removal of native vegetation. Construction of transmission towers would have temporary groundwater impact associated with piling activities and primarily occur during the construction stage. As noted in the Minister's submission[9], a preliminary geotechnical investigation provided with the permit application determined that the proposed use and development of the land would not result in significant impacts on groundwater, and that groundwater inflow was not encountered during investigations.	If groundwater is encountered during construction, piling for towers is expected to have localised and temporary impact on groundwater, thus limiting the potential for cumulative groundwater impacts.
Alaysha (Elaine) Battery Energy Storage System	A 311MW Battery Energy Storage System (BESS) proposed to be developed adjacent the existing Elaine Terminal Station. The development will include battery units, associated infrastructure, grid connection, access roads, vegetation screening and security fencing. Options for connection to Elaine Terminal Station include an above ground and below ground option. Construction of transmission towers or trenching activities would have temporary groundwater and primarily occur during the construction stage.	If groundwater is encountered during construction of towers or trenching for the below ground cable, there is expected to be a localised and temporary impact on groundwater, thus limiting the potential for cumulative groundwater impacts.

[9] https://www.austlii.edu.au/cgi-bin/viewdoc/au/cases/vic/VCAT/2022/179.html

11. Environmental Performance Requirements

Environmental Performance Requirements (EPRs) set out the environmental outcomes to be achieved through the implementation of mitigation measures during construction, operation and decommissioning. While some EPRs are performance based to allow flexibility in how they will be achieved, others include more prescriptive measures that must be implemented. Compliance with the EPRs will be required as a condition of the Project's approval.

To meet the EES evaluation objective of maintaining the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses, the EPRs outlined in Table 11-1 are recommended.

Table 11-1: Groundwater Environmental Performance Requirements

EPR code	Environmental Performance Requirements	Project component	Stage
GW1	**Site works to reduce potential of direct physical impact to groundwater receptors** 1) Prior to commencement of construction, apply buffers around known and identified groundwater receptors (where practicable) to minimise potential for direct physical impact of construction. These buffers are to apply to the construction of transmission towers, Powercor distribution line crossovers and below ground works at terminal stations. The buffer distances to be applied to groundwater receptors are as follows, noting they are for physical distancing only and do not consider dewatering impacts: a) Bores (i.e., all extractive bores and excluding bores for monitoring specific purposes): 100m b) SOBN bores: 100m c) Aquatic groundwater dependant ecosystems: 50m or related waterway buffer identified in EPR SW1. 2) If planned works for transmission towers, Powercor distribution line crossovers and below ground works at terminal stations are located within the buffers specified in item 1): a) Consult with the landholder and undertake a site walkover to inspect or identify groundwater bores or areas where sub-surface infrastructure is present (such as supply mains) within and adjacent the construction footprint. i. If additional bores or potential GDEs are discovered, these must be discussed with the landholder and the relevant water authority and considered against the nominated physical distancing buffers listed above in item 1. ii. If sub-surface infrastructure is identified (such as drains, mains), potential for physical impact must be discussed with the landholder. b) Conduct a site-specific groundwater risk assessment to evaluate potential for physical impact c) If potential impacts are identified, prepare and implement site-specific monitoring and mitigation strategies if necessary. These requirements must be incorporated into the Groundwater Management Plan as required by EPR GW2.	Transmission towers Terminal stations Powercor distribution line crossovers	Design, Construction

GW2	**Develop and implement a Groundwater Management Plan** 1) Prior to commencement of Project construction and as part of the CEMP (EPR EM2), develop, implement and maintain a Groundwater Management Plan in consultation with EPA and relevant water authorities that details the specific controls that would avoid or minimise risks to the environmental value of groundwater. 2) The Groundwater Management Plan must include the following, as a minimum: a) Controls outlined in EPA Publication1834.1 Civil construction, building and demolition guide (EPA, 2023), as relevant to erosion, sediment, contaminated land and contaminated groundwater, chemicals and waste. This includes controls for management measures of the collection, containment and transport of groundwater or slurry discharged or displacement displaced from below ground construction. Groundwater displaced to the surface will be "waste" as defined by the Environment Protection Act 2017. Wastes will be classified, managed, and disposed in accordance with EPA Publication 1827.2: Waste classification assessment protocol (EPA, 2021a), EPA Publication 1968.1: Guide to classifying industrial waste (EPA, 2021b), and EPA Publication 1828.3: Waste disposal categories-characteristics and thresholds (EPA, 2024). Waste will be managed in accordance with the Environment Protection Regulations 2021. These measures should be implemented to prevent any waste reaching waterways, as well as ensuring open holes are bunded to prevent preferential pathways during construction (refer to EPR CL3). b) Controls outlined in EPA Publication 1698 Liquid handling and storage guidelines (EPA, 2018a) and EPA Publication 1700 Preventing liquid leaks and spills from entering the environment (EPA, 2018b). This includes controls such as using secondary containment (bunded) areas to store or transfer liquids, safe pouring and decanting methods, and spill kits to prevent migration of liquid. These measures should be implemented to prevent any onsite spills reaching the watertable. c) Controls as described in EPA Publication 655.1: Acid sulfate soil and rock, for management of acid sulfate soils (EPA, 2009). d) Provision of access arrangements to DEECA in the event that State Observation Bore Network bores are located within a fenced construction area. e) Protocols in the event of dewatering for towers and terminal stations. The dewatering protocols must include, but not be limited to: i. Review of geotechnical survey data to determine sub-surface conditions. ii. Estimation of drawdown and cone of depression based on planned dewatering duration and conditions encountered. iii. Estimation of extraction volume. If the activity is within a Groundwater Management Area, the volume should be communicated to the relevant Water Authority. iv. Identification of receptors (GDEs, waterways, users) or sensitive sites (acid sulfate soils, contamination sources as identified through EPR CL1) within the expected cone of depression. If potential for impact to receptors is identified, consider the proposed construction method and timing to minimise or eliminate impacts. v. If there is high uncertainty, high risk, or if impacts cannot be mitigated through design, construction methodology, and timing, install a groundwater bore and undertake investigations to	Transmission towers Terminal stations Powercor distribution line crossovers	Design, Construction

EPR code	Environmental Performance Requirements	Project component	Stage
	determine groundwater level, groundwater quality and hydraulic conductivity. vi. Design and implement a field monitoring program before, during and after dewatering to monitor and manage impacts. vii. Develop site-specific mitigation strategies to mitigate potential impacts. viii. Groundwater inflow management planning. ix. Groundwater discharge options assessment and management planning.		

12. Conclusion

The Project has potential to interact with groundwater where the depth of earthworks (such as levelling at terminal stations) or construction (such as tower footings) are below the watertable. The Project has the potential to impact on groundwater if earthworks and construction are not planned and managed with respect to hydrogeological conditions encountered (groundwater level and quality), use and value of the groundwater resource and relevant legislation and guidelines. This report has set out to consider the existing conditions pertinent to groundwater and how they relate to the Project in order to maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses (environmental values).

12.1 Impact assessment

The impact assessment has been completed on the study area using readily available desktop information, Social Pinpoint data, and input from the stakeholder engagement process. The Project is likely to intersect groundwater at a number of transmission tower locations. It is not yet confirmed whether groundwater will be encountered during works at terminal station locations (as depth of below ground works is dependent on geotechnical investigations and the degree of earthworks that occur) but is generally considered unlikely given the expected shallow nature of proposed construction works. Encountering groundwater is not expected to result in significant adverse effects on groundwater levels, flow, quality, and yield. Groundwater impacts are likely to be limited to the immediate area of the locations of below ground works and be temporary in nature. There are towers and distribution crossovers that are within 100m of groundwater bores and hence engagement with landholders on whether the bores exist and if they do, site specific assessments will be required to appropriately plan for and mitigate physical impacts. Therefore, potential impacts are considered negligible, or minor based on existing conditions within the study area, the Project description and the construction methodologies proposed.

The assessment has shown that the construction, operation, and decommissioning stages of the Project can be managed such that the objective of avoiding and minimising adverse impact to the environmental value of groundwater can be met.

In response to the EES evaluation objective, impacts of the Project on groundwater have been assessed and mitigation measures have been identified to maintain the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses. With the implementation of mitigation measures, the residual impacts on groundwater are considered to be negligible.

The Groundwater Impact Assessment should be considered and revised in the event of:

- Change in methodology or conditions compared to what has been described in this report, in particular if:
  - piling in dry conditions is planned for a significant number of towers
  - there is intent for groundwater extraction (for example, for construction use)
  - there is intent to dispose to groundwater.

12.2 Environmental Performance Requirements

To meet the EES objective of maintaining the functions and values of aquatic environments, surface water and groundwater quality and stream flows and prevent adverse effects on protected beneficial uses, two EPRs are recommended:

- GW1: Site works to reduce potential of direct physical impact to groundwater receptors
- GW2: Develop and implement a Groundwater Management Plan as part of the CEMP that outlines the specific controls that would avoid or minimise risks to the environmental value of groundwater.

13. References

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Appendix A. Environmental values that apply to groundwater segments

Environmental value	Segment (mg/L TDS)						
	A1 (0 – 600)	A2 (601 – 1,200)	B (1,201 – 3,100)	C (3,101 – 5,400)	D (5,401 – 7,100)	E (7,100 – 10,000)	F (>10,001)
Water dependent ecosystems and species	✓	✓	✓	✓	✓	✓	✓
Potable water supply – desirable	✓						
Potable water supply – acceptable	✓	✓					
Potable mineral water supply	✓	✓	✓	✓			
Agriculture and irrigation – irrigation	✓	✓	✓				
Agriculture and irrigation – stock watering	✓	✓	✓	✓	✓	✓	
Industrial and commercial	✓	✓	✓	✓	✓		
Water based recreation – primary contact	✓	✓	✓	✓	✓	✓	✓
Traditional Owner cultural values	✓	✓	✓	✓	✓	✓	✓
Buildings and structures	✓	✓	✓	✓	✓	✓	✓
Geothermal properties	✓	✓	✓	✓	✓	✓	✓

Appendix B. Registered groundwater bores

B.1 Western portion of the study area

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water Authority
116790	722422	5868677	54	1/06/1989	Observation	Goulburn-Murray Water
117792	708222	5879577	54	8/07/1988	Observation	Grampians Wimmera Mallee Water
117793	708222	5879577	54	11/07/1988	Observation	Grampians Wimmera Mallee Water
117796	722822	5869377	54	22/11/1983	Observation	Goulburn-Murray Water
117797	722822	5869377	54	22/11/1983	Observation	Goulburn-Murray Water
117891	708522	5879577	54	1/06/1990	Observation	Grampians Wimmera Mallee Water
117892	713622	5874377	54	1/06/1990	Observation	Grampians Wimmera Mallee Water
117893	713622	5874377	54	1/06/1990	Observation	Grampians Wimmera Mallee Water
117894	713622	5874377	54	1/06/1990	Observation	Grampians Wimmera Mallee Water
117895	713622	5877677	54	1/06/1990	Observation	Grampians Wimmera Mallee Water
117896	713622	5877677	54	1/06/1990	Observation	Grampians Wimmera Mallee Water
46073	712265	5875607	54	1/09/1968	Unknown	Grampians Wimmera Mallee Water
46075	711797	5874173	54	24/11/1954	Unknown	Grampians Wimmera Mallee Water
63202	691342	5887824	54	31/12/1963	Observation	Grampians Wimmera Mallee Water
63205	698980	5884411	54	1/01/1988	Domestic and stock	Grampians Wimmera Mallee Water
63206	698762	5884355	54	1/01/1988	Domestic and stock	Grampians Wimmera Mallee Water
63207	698592	5884382	54	1/01/1988	Domestic and stock	Grampians Wimmera Mallee Water
65249	712265	5875607	54	24/03/1968	Unknown	Grampians Wimmera Mallee Water
65263	709602	5880997	54	15/01/1990	Domestic and stock	Grampians Wimmera Mallee Water
65559	699708	5882988	54	31/12/1963	Observation	Grampians Wimmera Mallee Water
65560	701332	5883929	54	31/12/1963	Observation	Grampians Wimmera Mallee Water
65561	699862	5882328	54	31/12/1963	Observation	Grampians Wimmera Mallee Water
65565	699862	5883001	54	31/12/1963	Unknown	Grampians Wimmera Mallee Water
75569	723100	5870119	54	31/12/1961	Observation	Goulburn-Murray Water
75574	722818	5871536	54	9/11/1959	Unknown	Goulburn-Murray Water
75576	722697	5868995	54	31/12/1960	Unknown	Goulburn-Murray Water
75600	722422	5868677	54	1/06/1989	Unknown	Goulburn-Murray Water
8002324	711922	5874137	54			Grampians Wimmera Mallee Water
8002902	713345	5876357	54			Grampians Wimmera Mallee Water
8003174	702832	5881240	54			Grampians Wimmera Mallee Water
WRK009452	723024	5870155	54	12/05/2004	Domestic and stock	Goulburn-Murray Water
WRK009461	720222	5870827	54		Observation	Goulburn-Murray Water
WRK081292	720131	5872213	54	1/08/2014	Domestic and stock	Goulburn-Murray Water
WRK083574	712277	5878720	54	6/01/2015	Domestic and stock	Grampians Wimmera Mallee Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water Authority
WRK083636	708590	5878650	54	15/01/2015	Domestic and stock	Grampians Wimmera Mallee Water
WRK088453	697881	5883793	54	23/08/2015	Agri, commerc, industrial	Grampians Wimmera Mallee Water
WRK090000	720700	5871975	54	18/11/2015	Domestic and stock	Goulburn-Murray Water
WRK950252	711804	5874520	54	27/05/2004	Observation	Grampians Wimmera Mallee Water
WRK950254	711918	5874490	54	27/05/2004	Observation	Grampians Wimmera Mallee Water
WRK956146	676098	5901274	54	5/06/2003	Observation	Grampians Wimmera Mallee Water
WRK956206	709148	5879386	54	2/11/2004	Observation	Grampians Wimmera Mallee Water
WRK956207	709148	5879386	54	6/02/2006	Observation	Grampians Wimmera Mallee Water
WRK956208	709048	5879436	54	2/11/1998	Observation	Grampians Wimmera Mallee Water
WRK956212	699949	5883064	54	25/05/2007	Observation	Grampians Wimmera Mallee Water
WRK957940	720397	5870831	54	19/04/2006	Observation	Goulburn-Murray Water
WRK957941	724555	5867393	54	18/10/2007	Observation	Goulburn-Murray Water
WRK957967	711930	5879213	54	4/06/2007	Observation	Grampians Wimmera Mallee Water
WRK957970	711918	5874487	54	25/05/2007	Observation	Grampians Wimmera Mallee Water
WRK957971	711804	5874519	54	25/05/2007	Observation	Grampians Wimmera Mallee Water

B.2 Central portion of the study area

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
101480	759038	5837677	54	31/12/1941	Observation	Southern Rural Water
101482	758662	5837307	54	31/12/1965	Other	Southern Rural Water
101524	757487	5837724	54	14/01/1975	Domestic and stock	Southern Rural Water
101532	759075	5838103	54	1/02/1976	Domestic and stock	Southern Rural Water
101533	758086	5837881	54	18/05/1976	Domestic and stock	Southern Rural Water
101536	758841	5837757	54	17/07/1976	Domestic and stock	Southern Rural Water
101538	758663	5837933	54	2/03/1977	Domestic and stock	Southern Rural Water
101540	757420	5838781	54	4/01/1977	Domestic and stock	Southern Rural Water
101553	757859	5838017	54	1/01/1980	Domestic and stock	Southern Rural Water
101563	758407	5837470	54	10/04/1981	Domestic and stock	Southern Rural Water
101602	758471	5837227	54	24/04/1985	Domestic and stock	Southern Rural Water
101615	758221	5837277	54	29/03/1986	Domestic and stock	Southern Rural Water
101620	758071	5838317	54	25/03/1986	Unknown	Southern Rural Water
101630	758721	5837377	54	13/01/1988	Domestic and stock	Southern Rural Water
101646	757671	5837187	54	1/10/1988	Domestic and stock	Southern Rural Water
101647	758721	5837417	54	1/02/1989	Domestic and stock	Southern Rural Water
101701	758661	5837377	54	26/02/1991	Domestic and stock	Southern Rural Water
111539	758661	5837537	54	5/12/1991	Domestic and stock	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
111899	237792	5843164	55	15/01/1992	Agri,commerc,industrial	Southern Rural Water
111900	237132	5843484	55	7/12/1991	Agri,commerc,industrial	Southern Rural Water
114206	729242	5865577	54	20/08/1992	Domestic and stock	Goulburn-Murray Water
114304	758381	5837377	54	15/12/1992	Domestic and stock	Southern Rural Water
116010	734007	5865037	54	19/07/1993	Agri,commerc,industrial	Goulburn-Murray Water
119331	237577	5843895	55	12/11/1993	Observation	Southern Rural Water
119332	235705	5846827	55	2/12/1993	Observation	Goulburn-Murray Water
119339	242497	5841697	55	9/11/1993	Observation	Southern Rural Water
119340	242500	5841698	55	10/11/1993	Observation	Southern Rural Water
119819	236941	5857967	55	11/12/1993	Domestic and stock	Goulburn-Murray Water
122152	747267	5862127	54	2/08/1994	Observation	Goulburn-Murray Water
122657	742937	5862718	54	5/07/1994	Domestic and stock	Goulburn-Murray Water
123217	740528	5864906	54	1/03/1994	Domestic and stock	Goulburn-Murray Water
124141	742303	5862158	54	27/01/1995	Domestic and stock	Goulburn-Murray Water
124164	237427	5847661	55	13/02/1995	Domestic and stock	Goulburn-Murray Water
124466	241192	5841744	55	17/08/1994	Domestic and stock	Southern Rural Water
124470	241312	5841834	55	18/08/1994	Domestic and stock	Southern Rural Water
124480	758167	5838243	54	9/01/1995	Agri,commerc,industrial	Southern Rural Water
124890	753487	5862206	54	26/02/1995	Domestic and stock	Goulburn-Murray Water
126123	241163	5841584	55			Southern Rural Water
128038	238002	5846224	55	1/01/1967	Agri,commerc,industrial	Southern Rural Water
128921	238441	5845415	55	18/11/1995	Agri,commerc,industrial	Southern Rural Water
129708	242253	5841804	55	18/01/1997	Domestic and stock	Southern Rural Water
129888	730100	5865017	54	3/05/1997	Agri,commerc,industrial	Goulburn-Murray Water
131387	234568	5854659	55	22/01/1997	Domestic and stock	Goulburn-Murray Water
131813	237383	5847814	55	23/01/1995	Agri,commerc,industrial	Goulburn-Murray Water
132108	242212	5843484	55		Agri,commerc,industrial	Southern Rural Water
132325	758381	5837197	54	10/02/1998	Domestic and stock	Southern Rural Water
132684	236112	5849407	55	30/10/1997	Domestic and stock	Goulburn-Murray Water
132830	237372	5842744	55	4/07/1997	Domestic and stock	Southern Rural Water
136439	742100	5862336	54	2/03/1998	Domestic and stock	Goulburn-Murray Water
137362	763218	5861589	54	9/08/1998	Domestic and stock	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
138337	237433	5855434	55	1/05/1998	Agri,commerc,industrial	Goulburn-Murray Water
138556	750228	5860356	54	19/01/1995	Domestic and stock	Goulburn-Murray Water
138813	747986	5861983	54	26/11/1996	Observation	Goulburn-Murray Water
139433	752038	5863457	54	25/10/1998	Domestic and stock	Goulburn-Murray Water
141068	747650	5862790	54	3/12/1998	Observation	Goulburn-Murray Water
141407	236554	5849901	55			Goulburn-Murray Water
144062	235663	5848104	55	24/02/2000	Observation	Goulburn-Murray Water
144063	235663	5848104	55	24/02/2000	Observation	Goulburn-Murray Water
144991	240456	5844434	55	30/04/2001	SOBN	Southern Rural Water
144992	240459	5844434	55	30/04/2001	SOBN	Southern Rural Water
144993	240463	5844431	55	30/04/2001	SOBN	Southern Rural Water
301310	757821	5837977	54	20/09/1968	Unknown	Southern Rural Water
302011	236813	5853784	55	28/08/1981	Other	Goulburn-Murray Water
302708	237163	5855784	55		Other	Goulburn-Murray Water
302709	237263	5855834	55		Other	Goulburn-Murray Water
302710	237163	5855784	55		Other	Goulburn-Murray Water
305985	764791	5849372	54		Other	Goulburn-Murray Water
305986	764881	5849357	54		Other	Goulburn-Murray Water
305987	765299	5849289	54		Other	Goulburn-Murray Water
305988	764830	5849362	54		Other	Goulburn-Murray Water
305989	235096	5848084	55		Other	Goulburn-Murray Water
305990	235096	5848084	55		Other	Goulburn-Murray Water
305991	235096	5848084	55		Other	Goulburn-Murray Water
305992	235096	5848084	55		Other	Goulburn-Murray Water
305993	235096	5848084	55		Other	Goulburn-Murray Water
305994	235096	5848084	55		Other	Goulburn-Murray Water
305995	235096	5848084	55		Other	Goulburn-Murray Water
305996	235096	5848084	55		Other	Goulburn-Murray Water
305997	235096	5848084	55		Other	Goulburn-Murray Water
305998	235096	5848084	55		Other	Goulburn-Murray Water
305999	235096	5848084	55		Other	Goulburn-Murray Water
307609	746143	5862370	54	17/09/1968	Other	Goulburn-Murray Water
307610	746144	5862383	54	27/06/1967	Other	Goulburn-Murray Water
307611	746143	5862370	54	9/01/1968	Other	Goulburn-Murray Water
307612	746143	5862370	54	25/06/1968	Other	Goulburn-Murray Water
307613	746215	5861861	54	2/04/1968	Other	Goulburn-Murray Water
307614	746171	5862703	54	25/06/1968	Other	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
307615	745809	5861882	54	1/04/1969	Other	Goulburn-Murray Water
327370	756622	5860677	54		Other	Goulburn-Murray Water
327371	756622	5860677	54		Other	Goulburn-Murray Water
327372	756622	5860677	54		Other	Goulburn-Murray Water
327373	756622	5860677	54		Other	Goulburn-Murray Water
327374	756622	5860677	54		Other	Goulburn-Murray Water
327375	756622	5860677	54		Other	Goulburn-Murray Water
327376	756622	5860677	54		Other	Goulburn-Murray Water
327377	756622	5860677	54		Other	Goulburn-Murray Water
327378	756622	5860677	54		Other	Goulburn-Murray Water
327379	756414	5861029	54		Other	Goulburn-Murray Water
327380	758222	5862027	54		Other	Goulburn-Murray Water
327381	757972	5862077	54		Other	Goulburn-Murray Water
327382	757946	5862322	54		Other	Goulburn-Murray Water
327383	756872	5863077	54		Other	Goulburn-Murray Water
327392	759425	5862638	54		Other	Goulburn-Murray Water
327393	759685	5862485	54		Other	Goulburn-Murray Water
327394	759100	5862986	54		Other	Goulburn-Murray Water
327395	758839	5863089	54		Other	Goulburn-Murray Water
327396	758740	5863158	54		Other	Goulburn-Murray Water
327397	758550	5863168	54		Other	Goulburn-Murray Water
327407	756283	5860960	54		Other	Goulburn-Murray Water
327408	756119	5860994	54		Other	Goulburn-Murray Water
327409	756135	5860802	54		Other	Goulburn-Murray Water
327415	757776	5861530	54		Other	Goulburn-Murray Water
327416	757928	5861509	54		Other	Goulburn-Murray Water
327417	758142	5861472	54		Other	Goulburn-Murray Water
327418	757612	5861551	54		Other	Goulburn-Murray Water
327419	757473	5861571	54		Other	Goulburn-Murray Water
327420	757260	5863071	54		Other	Goulburn-Murray Water
327421	757566	5863080	54		Other	Goulburn-Murray Water
327426	760729	5859376	54		Other	Goulburn-Murray Water
327433	756714	5863087	54		Other	Goulburn-Murray Water
327434	756497	5863073	54		Other	Goulburn-Murray Water
327435	756206	5863114	54		Other	Goulburn-Murray Water
327436	755968	5863177	54		Other	Goulburn-Murray Water
327437	755803	5863199	54		Other	Goulburn-Murray Water
327438	755664	5863206	54		Other	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
327439	756649	5862823	54		Other	Goulburn-Murray Water
327442	757213	5861699	54		Other	Goulburn-Murray Water
327443	757036	5861721	54		Other	Goulburn-Murray Water
327444	756811	5861797	54		Other	Goulburn-Murray Water
327445	756622	5861845	54		Other	Goulburn-Murray Water
327446	758256	5863375	54		Other	Goulburn-Murray Water
327447	758085	5863269	54		Other	Goulburn-Murray Water
327449	759519	5863448	54		Other	Goulburn-Murray Water
327450	765209	5852179	54		Other	Goulburn-Murray Water
327451	765210	5852192	54		Other	Goulburn-Murray Water
327452	765209	5852179	54		Other	Goulburn-Murray Water
327453	765210	5852205	54		Other	Goulburn-Murray Water
327454	765209	5852179	54		Other	Goulburn-Murray Water
327455	765209	5852179	54		Other	Goulburn-Murray Water
327456	765210	5852192	54		Other	Goulburn-Murray Water
327457	765209	5852179	54		Other	Goulburn-Murray Water
327458	765210	5852192	54		Other	Goulburn-Murray Water
327461	755194	5863218	54		Other	Goulburn-Murray Water
327462	755194	5863218	54		Other	Goulburn-Murray Water
327463	755206	5863218	54		Other	Goulburn-Murray Water
327464	755206	5863218	54		Other	Goulburn-Murray Water
327465	755206	5863205	54		Other	Goulburn-Murray Water
327466	755206	5863218	54		Other	Goulburn-Murray Water
327467	755206	5863218	54		Other	Goulburn-Murray Water
327468	755206	5863218	54		Other	Goulburn-Murray Water
327469	755206	5863218	54		Other	Goulburn-Murray Water
327470	755206	5863218	54		Other	Goulburn-Murray Water
327471	755206	5863218	54		Other	Goulburn-Murray Water
327473	755520	5861458	54		Other	Goulburn-Murray Water
327474	755343	5861467	54		Other	Goulburn-Murray Water
327478	755514	5863252	54		Other	Goulburn-Murray Water
327493	760458	5860510	54	31/12/1914	Other	Goulburn-Murray Water
327494	760490	5860623	54	31/12/1914	Other	Goulburn-Murray Water
327495	760397	5860310	54	31/12/1914	Other	Goulburn-Murray Water
327497	760385	5860094	54	31/12/1914	Other	Goulburn-Murray Water
327498	760322	5859855	54	31/12/1914	Other	Goulburn-Murray Water
327501	757374	5862111	54	31/12/1914	Other	Goulburn-Murray Water
327502	758503	5863489	54	31/12/1915	Other	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
327503	760078	5861993	54	31/12/1915	Other	Goulburn-Murray Water
327504	760030	5861550	54	31/12/1915	Other	Goulburn-Murray Water
327505	760038	5861715	54	1/05/1915	Other	Goulburn-Murray Water
327506	760072	5861866	54	31/12/1915	Other	Goulburn-Murray Water
327507	760086	5862133	54	31/12/1915	Other	Goulburn-Murray Water
327508	757375	5862123	54	31/12/1915	Other	Goulburn-Murray Water
327509	758501	5861758	54	31/12/1915	Other	Goulburn-Murray Water
327510	758697	5861608	54	31/12/1915	Other	Goulburn-Murray Water
327511	761211	5860076	54	31/12/1925	Other	Goulburn-Murray Water
327512	761129	5860449	54	31/12/1925	Other	Goulburn-Murray Water
327513	761424	5860255	54	31/12/1925	Other	Goulburn-Murray Water
327514	761129	5860449	54	31/12/1925	Other	Goulburn-Murray Water
327515	761142	5860448	54	31/12/1925	Other	Goulburn-Murray Water
327516	761129	5860449	54	31/12/1926	Other	Goulburn-Murray Water
327517	761143	5860461	54	31/12/1926	Other	Goulburn-Murray Water
327518	761143	5860461	54	31/12/1926	Other	Goulburn-Murray Water
327519	761148	5860804	54	31/12/1926	Other	Goulburn-Murray Water
327520	761135	5860805	54	31/12/1926	Other	Goulburn-Murray Water
327521	761148	5860804	54	31/12/1926	Other	Goulburn-Murray Water
327522	761135	5860805	54	31/12/1926	Other	Goulburn-Murray Water
327523	759633	5860070	54	31/12/1927	Other	Goulburn-Murray Water
327525	757135	5861194	54	7/01/1969	Other	Goulburn-Murray Water
327526	756656	5861271	54	1/04/1969	Other	Goulburn-Murray Water
329884	748162	5863539	54		Other	Goulburn-Murray Water
329885	748162	5863552	54		Other	Goulburn-Murray Water
329886	748176	5863564	54		Other	Goulburn-Murray Water
329887	748176	5863577	54		Other	Goulburn-Murray Water
329888	748176	5863564	54		Other	Goulburn-Murray Water
329889	748176	5863577	54		Other	Goulburn-Murray Water
329890	748176	5863564	54		Other	Goulburn-Murray Water
329891	748176	5863577	54		Other	Goulburn-Murray Water
329892	748175	5863551	54		Other	Goulburn-Murray Water
45794	735101	5863670	54	31/12/1960	Unknown	Goulburn-Murray Water
45795	736581	5863261	54	31/12/1960	Unknown	Goulburn-Murray Water
45799	738822	5865021	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
45800	738427	5865080	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
45803	734298	5864230	54	15/04/1996	Domestic and stock	Goulburn-Murray Water
52455	764580	5861852	54	1/01/1970	Domestic and stock	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
52457	234814	5856711	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52458	235889	5857342	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52459	235216	5857915	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52460	235323	5857899	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52461	237414	5855254	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52462	237222	5855392	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52463	237418	5855589	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52468	234433	5857646	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52469	765368	5857527	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
52470	765566	5857083	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
52471	234505	5856896	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52472	235611	5854679	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
52473	237133	5858244	55	9/06/1972	Domestic and stock	Goulburn-Murray Water
52477	235544	5858774	55	19/03/1978	Domestic and stock	Goulburn-Murray Water
52487	235763	5858584	55	18/03/1983	Unknown	Goulburn-Murray Water
52488	237263	5856434	55	12/04/1983	Unknown	Goulburn-Murray Water
52489	235274	5858912	55	9/04/1983	Domestic and stock	Goulburn-Murray Water
52490	765172	5856777	54	4/07/1983	Domestic and stock	Goulburn-Murray Water
52491	237513	5855284	55	25/06/1983	Unknown	Goulburn-Murray Water
52495	763422	5859277	54	1/09/1983	Unknown	Goulburn-Murray Water
52496	237413	5857984	55	18/03/1983	Unknown	Goulburn-Murray Water
52502	236413	5854384	55	10/05/1984	Unknown	Goulburn-Murray Water
52503	236610	5857749	55	11/02/1983	Domestic and stock	Goulburn-Murray Water
52504	236263	5857184	55	3/08/1983	Unknown	Goulburn-Murray Water
52505	236213	5857984	55	19/02/1984	Domestic and stock	Goulburn-Murray Water
52506	235313	5858034	55	14/11/1984	Unknown	Goulburn-Murray Water
52507	235263	5857784	55	14/11/1984	Unknown	Goulburn-Murray Water
52511	235613	5856514	55	12/06/1983	Unknown	Goulburn-Murray Water
52513	237713	5856034	55	15/03/1983	Agri,commerc,industrial	Goulburn-Murray Water
52520	235813	5858044	55	28/05/1988	Domestic and stock	Goulburn-Murray Water
52537	235177	5858514	55	1/01/1988	Domestic and stock	Goulburn-Murray Water
52541	236063	5855664	55	30/01/1991	Domestic and stock	Goulburn-Murray Water
53145	237396	5843238	55	31/12/1968	Unknown	Southern Rural Water
53147	237302	5845044	55	31/12/1968	Unknown	Southern Rural Water
53156	235002	5843545	55	31/12/1968	Unknown	Southern Rural Water
53163	237842	5843457	55	30/04/1968	Agri,commerc,industrial	Southern Rural Water
53164	238999	5845513	55	31/12/1967	Domestic and stock	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
53172	240615	5844738	55	31/12/1964	Unknown	Southern Rural Water
53175	241514	5842000	55	31/12/1967	Domestic and stock	Southern Rural Water
53182	235753	5846069	55	1/01/1970	Domestic and stock	Southern Rural Water
53183	237025	5842818	55	1/01/1970	Domestic and stock	Southern Rural Water
53196	238039	5844573	55	1/01/1970	Domestic and stock	Southern Rural Water
53197	237419	5842876	55	1/01/1970	Domestic and stock	Southern Rural Water
53200	238848	5843127	55	1/01/1970	Domestic and stock	Southern Rural Water
53203	234796	5846751	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
53206	241455	5843378	55	1/01/1970	Domestic and stock	Southern Rural Water
53207	237184	5845646	55	1/01/1970	Domestic and stock	Southern Rural Water
53212	236017	5842813	55	1/01/1970	Domestic and stock	Southern Rural Water
53216	235486	5845597	55	7/12/1970	Domestic and stock	Southern Rural Water
53226	237412	5842846	55	30/04/1974	Domestic and stock	Southern Rural Water
53227	765013	5845657	54	25/03/1974	Domestic and stock	Goulburn-Murray Water
53228	239781	5844391	55	30/11/1973	Domestic and stock	Southern Rural Water
53229	239816	5844083	55	6/12/1973	Domestic and stock	Southern Rural Water
53234	764921	5845336	54	17/06/1974	Unknown	Southern Rural Water
53251	238734	5843003	55	1/01/1970	Unknown	Southern Rural Water
53253	238204	5845298	55	21/07/1976	Agri,commerc,industrial	Southern Rural Water
53257	238791	5843642	55	20/11/1976	Domestic and stock	Southern Rural Water
53258	238814	5843688	55	1/11/1976	Domestic and stock	Southern Rural Water
53273	236638	5845613	55	1/08/1980	Agri,commerc,industrial	Southern Rural Water
53278	237913	5844484	55	1/07/1982	Domestic and stock	Southern Rural Water
53289	239513	5842584	55	26/03/1983	Unknown	Southern Rural Water
53291	242763	5841834	55	6/02/1983	Unknown	Southern Rural Water
53292	242773	5841844	55	17/03/1983	Unknown	Southern Rural Water
53297	235708	5846422	55	28/02/1983	Domestic and stock	Goulburn-Murray Water
53314	241062	5844634	55	17/02/1983	Domestic and stock	Southern Rural Water
53316	238172	5843230	55	27/03/1984	Domestic and stock	Southern Rural Water
53321	239432	5843024	55	30/03/1983	Unknown	Southern Rural Water
53329	237913	5842634	55	8/02/1985	Unknown	Southern Rural Water
53330	238263	5842634	55	9/02/1985	Unknown	Southern Rural Water
53331	237887	5845262	55	23/05/1985	Agri,commerc,industrial	Southern Rural Water
53333	235812	5846134	55	10/11/1985	Domestic and stock	Southern Rural Water
53334	238132	5844864	55	27/11/1985	Domestic and stock	Southern Rural Water
53337	236663	5843434	55	31/08/1983	Unknown	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
53338	236362	5843234	55	31/08/1983	Domestic and stock	Southern Rural Water
53339	240563	5844184	55	31/12/1984	Domestic and stock	Southern Rural Water
53342	238613	5843184	55	30/06/1984	Domestic and stock	Southern Rural Water
53344	236362	5843734	55	24/12/1987	Domestic and stock	Southern Rural Water
53347	237900	5845495	55	27/07/1987	Domestic and stock	Southern Rural Water
53351	237543	5843398	55	1/04/1989	Domestic and stock	Southern Rural Water
53354	240012	5844584	55	1/12/1989	Domestic and stock	Southern Rural Water
53361	238013	5842777	55	1/04/1989	Domestic and stock	Southern Rural Water
53367	241072	5842271	55	10/04/1990	Domestic and stock	Southern Rural Water
53370	241222	5843204	55	31/03/1991	Domestic and stock	Southern Rural Water
55416	746556	5864004	54	31/12/1960	Domestic and stock	Goulburn-Murray Water
55426	746591	5864209	54	6/05/1985	Domestic and stock	Goulburn-Murray Water
55432	742572	5865277	54	28/10/1987	Unknown	Goulburn-Murray Water
57580	756172	5860727	54	31/12/1984	Domestic and stock	Goulburn-Murray Water
58766	765002	5849067	54	31/12/1958	Urban	Goulburn-Murray Water
58779	765266	5848984	54	30/11/1968	Agri,commerc,industrial	Goulburn-Murray Water
58786	234879	5846739	55	31/12/1968	Agri,commerc,industrial	Goulburn-Murray Water
58789	237692	5846674	55	31/12/1970	Agri,commerc,industrial	Southern Rural Water
58791	237901	5846137	55	1/01/1970	Domestic and stock	Southern Rural Water
58792	237956	5845949	55	1/01/1970	Domestic and stock	Southern Rural Water
58794	237718	5846956	55	1/01/1970	Domestic and stock	Southern Rural Water
58795	237898	5846992	55	1/01/1970	Domestic and stock	Southern Rural Water
58796	237937	5846977	55	1/01/1970	Domestic and stock	Southern Rural Water
58797	237934	5847429	55	1/01/1970	Domestic and stock	Southern Rural Water
58798	235772	5847984	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
58799	237198	5848446	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
58806	236625	5848640	55	1/01/1970	Domestic and stock	Goulburn-Murray Water
58807	765242	5850157	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
58808	764861	5849384	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
58810	236731	5848691	55	15/03/1974	Domestic and stock	Goulburn-Murray Water
58811	234923	5846901	55	13/11/1974	Agri,commerc,industrial	Goulburn-Murray Water
58812	236526	5848248	55	13/06/1975	Unknown	Goulburn-Murray Water
58813	236581	5848511	55	20/06/1975	Agri,commerc,industrial	Goulburn-Murray Water
58814	234777	5847017	55	24/09/1976	Agri,commerc,industrial	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
58815	235061	5853000	55	3/11/1976	Domestic and stock	Goulburn-Murray Water
58817	235663	5851185	55	1/02/1978	Domestic and stock	Goulburn-Murray Water
58818	235786	5849913	55	1/02/1978	Domestic and stock	Goulburn-Murray Water
58819	235905	5851177	55	26/09/1978	Unknown	Goulburn-Murray Water
58822	235499	5851714	55	31/12/1983	Domestic and stock	Goulburn-Murray Water
58824	234988	5847622	55	1/04/1980	Domestic and stock	Goulburn-Murray Water
58830	236142	5849402	55	27/05/1983	Domestic and stock	Goulburn-Murray Water
58831	237862	5846854	55	27/07/1982	Agri,commerc,industrial	Southern Rural Water
58832	235418	5848034	55	20/05/1983	Not used	Goulburn-Murray Water
58833	234963	5847694	55	27/06/1983	Agri,commerc,industrial	Goulburn-Murray Water
58834	235113	5847184	55	30/06/1983	Unknown	Goulburn-Murray Water
58836	765372	5851177	54	12/08/1983	Unknown	Goulburn-Murray Water
58843	237513	5848534	55	26/09/1984	Unknown	Goulburn-Murray Water
58846	236388	5848934	55	12/01/1983	Unknown	Goulburn-Murray Water
58847	235963	5850784	55	10/01/1983	Unknown	Goulburn-Murray Water
58849	234813	5848184	55	7/07/1985	Domestic and stock	Goulburn-Murray Water
58853	238112	5847234	55	31/12/1983	Unknown	Southern Rural Water
58856	764822	5849717	54	1/01/1988	Unknown	Goulburn-Murray Water
58861	765230	5849396	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
62775	729115	5864762	54	31/12/1960	Unknown	Goulburn-Murray Water
62807	728983	5865360	54	26/01/1978	Domestic and stock	Goulburn-Murray Water
64881	746422	5862397	54	29/09/1955	Unknown	Goulburn-Murray Water
64884	741537	5862426	54	31/12/1960	Unknown	Goulburn-Murray Water
64886	739945	5863108	54	31/12/1960	Unknown	Goulburn-Murray Water
64889	740959	5863513	54	31/12/1960	Unknown	Goulburn-Murray Water
64920	742270	5862822	54	5/02/1973	Domestic and stock	Goulburn-Murray Water
64940	741613	5862549	54	4/02/1980	Domestic and stock	Goulburn-Murray Water
64947	747121	5862124	54	4/05/1983	Domestic and stock	Goulburn-Murray Water
64950	741322	5863677	54	1/08/1982	Domestic and stock	Goulburn-Murray Water
64959	745522	5863027	54	7/05/1983	Domestic and stock	Goulburn-Murray Water
64967	744172	5863377	54	8/08/1983	Domestic and stock	Goulburn-Murray Water
64972	743272	5863477	54	1/02/1984	Unknown	Goulburn-Murray Water
64973	743282	5863487	54	2/02/1984	Unknown	Goulburn-Murray Water
64979	745522	5863027	54	26/04/1985	Domestic and stock	Goulburn-Murray Water
64985	745762	5861777	54	1/07/1986	Domestic and stock	Goulburn-Murray Water
64992	746622	5863777	54	12/02/1987	Domestic and stock	Goulburn-Murray Water
65002	746322	5862277	54	23/09/1989	Unknown	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
65006	746796	5862394	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65008	745798	5861955	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65009	745538	5864015	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65011	747058	5862053	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65018	746749	5861527	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65041	747124	5862136	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65043	746108	5862008	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65044	746152	5862248	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65045	746285	5862021	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
65046	746307	5862178	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
75573	731932	5865097	54	23/03/1973	Unknown	Goulburn-Murray Water
75585	733679	5866849	54	1/05/1972	Domestic and stock	Goulburn-Murray Water
75587	733449	5866530	54	24/04/1973	Domestic and stock	Goulburn-Murray Water
75588	733526	5866376	54	30/05/1973	Domestic and stock	Goulburn-Murray Water
75590	730114	5865371	54	24/05/1985	Domestic and stock	Goulburn-Murray Water
75594	733211	5866075	54	8/05/1985	Domestic and stock	Goulburn-Murray Water
75599	729422	5869677	54	22/12/1986	Domestic and stock	Goulburn-Murray Water
75602	733582	5865857	54	24/05/1990	Unknown	Goulburn-Murray Water
75604	733307	5866572	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
75606	734177	5864604	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
80720	242612	5843484	55	24/05/1983	Domestic and stock	Southern Rural Water
91789	763702	5860249	54	31/12/1929	Domestic and stock	Goulburn-Murray Water
91810	764261	5861150	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
91835	763401	5861656	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91836	763596	5861832	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91837	765441	5860480	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91841	764992	5860811	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91866	760994	5859807	54	31/12/1924	Domestic and stock	Goulburn-Murray Water
91867	761213	5859859	54	31/12/1924	Domestic and stock	Goulburn-Murray Water
91868	761142	5860448	54	1/06/1926	Observation	Goulburn-Murray Water
91869	761143	5860461	54	31/12/1927	Domestic and stock	Goulburn-Murray Water
91870	757061	5861237	54	1/06/1927	Domestic and stock	Goulburn-Murray Water
91874	759172	5861477	54	2/06/1987	Unknown	Goulburn-Murray Water
91875	759058	5861472	54	22/06/1987	Observation	Goulburn-Murray Water
91876	755692	5862376	54	23/07/1987	Observation	Goulburn-Murray Water
91877	759811	5860544	54	4/03/1955	Unknown	Goulburn-Murray Water
91880	762995	5860834	54	31/12/1960	Domestic and stock	Goulburn-Murray Water
91881	761313	5862968	54	31/12/1968	Domestic and stock	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
91903	764820	5851080	54	1/10/1979	Agri,commerc,industrial	Goulburn-Murray Water
91905	764492	5850722	54	19/02/1981	Domestic and stock	Goulburn-Murray Water
91909	764922	5853677	54	8/02/1983	Domestic and stock	Goulburn-Murray Water
91936	765422	5855327	54	12/12/1982	Domestic and stock	Goulburn-Murray Water
91943	763272	5859387	54	2/04/1989	Domestic and stock	Goulburn-Murray Water
91948	759702	5861407	54	1/02/1989	Domestic and stock	Goulburn-Murray Water
91949	759732	5861337	54	1/04/1986	Domestic and stock	Goulburn-Murray Water
91952	764656	5850621	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91959	762563	5859312	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91960	762598	5859524	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91961	762039	5859628	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91975	764590	5853949	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91981	759682	5861417	54	12/01/1991	Domestic and stock	Goulburn-Murray Water
91982	764722	5852837	54	16/10/1990	Unknown	Goulburn-Murray Water
91983	763742	5857037	54	1/01/1988	Domestic and stock	Goulburn-Murray Water
91986	758222	5859817	54	5/03/1991	Domestic and stock	Goulburn-Murray Water
91987	758242	5859657	54	8/03/1991	Domestic and stock	Goulburn-Murray Water
96417	747360	5861851	54	6/09/1954	Unknown	Goulburn-Murray Water
96418	749652	5861157	54	20/09/1954	Unknown	Goulburn-Murray Water
96421	747468	5862311	54	31/12/1970	Domestic and stock	Goulburn-Murray Water
96424	747948	5863105	54	27/01/1973	Domestic and stock	Goulburn-Murray Water
96426	751023	5859958	54	26/11/1974	Domestic and stock	Goulburn-Murray Water
96427	751676	5861661	54	22/11/1974	Domestic and stock	Goulburn-Murray Water
96428	748898	5863500	54	30/06/1974	Domestic and stock	Goulburn-Murray Water
96429	748321	5861118	54	7/01/1977	Domestic and stock	Goulburn-Murray Water
96433	748214	5862882	54	1/04/1982	Domestic and stock	Goulburn-Murray Water
96438	747932	5861387	54	25/09/1989	Domestic and stock	Goulburn-Murray Water
96441	751722	5861677	54	11/11/1990	Domestic and stock	Goulburn-Murray Water
96442	751722	5861677	54	21/11/1990	Domestic and stock	Goulburn-Murray Water
96443	751722	5861677	54	21/11/1990	Domestic and stock	Goulburn-Murray Water
SP060413	234628	5860308	55	1/03/2008	Agri,commerc,industrial	Goulburn-Murray Water
SP068045	765305	5852039	54	24/11/2008	Observation	Goulburn-Murray Water
SP068047	764163	5858023	54	29/11/2008	Observation	Goulburn-Murray Water
SP068048	764159	5858024	54	30/11/2008	Observation	Goulburn-Murray Water
SP068051	763393	5862183	54	21/11/2008	Unknown	Goulburn-Murray Water
SP068052	763394	5862180	54	21/11/2008	Unknown	Goulburn-Murray Water
SP068053	760682	5860815	54	14/07/2009	Observation	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
SP068057	761042	5862924	54	16/05/2009	Observation	Goulburn-Murray Water
SP068058	761046	5862922	54	7/05/2009	Domestic and stock	Goulburn-Murray Water
SP068242	749929	5861813	54	17/01/2009	Observation	Goulburn-Murray Water
SP068752	764154	5858024	54	10/12/2008	Observation	Goulburn-Murray Water
SP068753	764149	5858025	54	16/12/2008	Observation	Goulburn-Murray Water
SP069835	761054	5862921	54	12/05/2009	Observation	Goulburn-Murray Water
WRK005836	747690	5861299	54	31/12/1968	Domestic and stock	Goulburn-Murray Water
WRK005837	747532	5861548	54	20/01/1983	Agri,commerc,industrial	Goulburn-Murray Water
WRK005838	746720	5862655	54	20/01/1983	Agri,commerc,industrial	Goulburn-Murray Water
WRK005881	764575	5860483	54	31/12/1970	Domestic and stock	Goulburn-Murray Water
WRK005948	764639	5861248	54	16/10/1972	Agri,commerc,industrial	Goulburn-Murray Water
WRK005963	761611	5858842	54	2/07/1987	Domestic and stock	Goulburn-Murray Water
WRK006217	731908	5867808	54	25/01/1977	Agri,commerc,industrial	Goulburn-Murray Water
WRK006223	732014	5865213	54	31/12/1970	Urban	Goulburn-Murray Water
WRK006323	236105	5857059	55	31/12/1970	Domestic and stock	Goulburn-Murray Water
WRK006411	762775	5859707	54	15/10/1980	Agri,commerc,industrial	Goulburn-Murray Water
WRK006518	747611	5862343	54	22/09/1989	Domestic and stock	Goulburn-Murray Water
WRK006558	731037	5864510	54	22/03/1983	Domestic and stock	Goulburn-Murray Water
WRK006647	236406	5854665	55	26/03/1983	Agri,commerc,industrial	Goulburn-Murray Water
WRK006762	760608	5859834	54	15/11/1984	Agri,commerc,industrial	Goulburn-Murray Water
WRK006789	763295	5858572	54	9/01/1983	Agri,commerc,industrial	Goulburn-Murray Water
WRK006833	761114	5860428	54	23/09/1985	Agri,commerc,industrial	Goulburn-Murray Water
WRK006844	763202	5859209	54		Agri,commerc,industrial	Goulburn-Murray Water
WRK006997	732965	5865800	54	25/05/1990	Domestic and stock	Goulburn-Murray Water
WRK007011	731952	5865137	54	26/02/1993	Urban	Goulburn-Murray Water
WRK007049	745310	5861875	54	20/10/1994	Agri,commerc,industrial	Goulburn-Murray Water
WRK007512	760173	5859808	54	1/01/1970	Domestic and stock	Goulburn-Murray Water
WRK007539	745935	5862952	54	1/07/1997	Domestic and stock	Goulburn-Murray Water
WRK007545	734082	5863937	54	8/11/1996	Domestic and stock	Goulburn-Murray Water
WRK007657	748546	5861566	54	15/10/1998	Agri,commerc,industrial	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK007720	237548	5856707	55	12/06/1998	Agri,commerc,industrial	Goulburn-Murray Water
WRK007809	764130	5851066	54	4/11/1997	Domestic and stock	Goulburn-Murray Water
WRK007822	235309	5856994	55	18/06/1998	Agri,commerc,industrial	Goulburn-Murray Water
WRK008180	235719	5851033	55	30/10/1997	Agri,commerc,industrial	Goulburn-Murray Water
WRK008181	236110	5849412	55		Agri,commerc,industrial	Goulburn-Murray Water
WRK008188	747651	5862775	54	22/01/1999	Domestic and stock	Goulburn-Murray Water
WRK008189	747990	5861980	54	9/11/1998	Domestic and stock	Goulburn-Murray Water
WRK008190	763020	5859484	54	28/02/1997	Domestic and stock	Goulburn-Murray Water
WRK008676	754616	5863411	54		Domestic and stock	Goulburn-Murray Water
WRK008873	734586	5866847	54		Domestic and stock	Goulburn-Murray Water
WRK008886	757102	5861450	54		Domestic and stock	Goulburn-Murray Water
WRK008898	737468	5865107	54	1/02/2004	Domestic and stock	Goulburn-Murray Water
WRK008964	754613	5862122	54		Domestic and stock	Goulburn-Murray Water
WRK009097	746528	5862484	54		Domestic and stock	Goulburn-Murray Water
WRK009151	235618	5859531	55	10/05/2003	Agri,commerc,industrial	Goulburn-Murray Water
WRK009172	764953	5850182	54		Domestic and stock	Goulburn-Murray Water
WRK009331	237271	5852368	55	1/08/2003	Domestic and stock	Goulburn-Murray Water
WRK009390	754169	5861462	54		Domestic and stock	Goulburn-Murray Water
WRK009534	731802	5867159	54	1/07/2002	Agri,commerc,industrial	Goulburn-Murray Water
WRK009587	759236	5859700	54		Agri,commerc,industrial	Goulburn-Murray Water
WRK009590	235345	5856963	55	16/10/2003	Agri,commerc,industrial	Goulburn-Murray Water
WRK009656	236204	5856910	55	1/01/2004	Domestic and stock	Goulburn-Murray Water
WRK009659	758022	5859573	54		Domestic and stock	Goulburn-Murray Water
WRK009717	727572	5867329	54	15/10/2003	Domestic and stock	Goulburn-Murray Water
WRK009728	732018	5868780	54	1/08/2005	Domestic and stock	Goulburn-Murray Water
WRK009760	234709	5856193	55	7/11/2003	Agri,commerc,industrial	Goulburn-Murray Water
WRK009887	738773	5864728	54		Domestic and stock	Goulburn-Murray Water
WRK009891	760764	5863169	54	25/10/1999	Domestic and stock	Goulburn-Murray Water
WRK010075	746670	5863842	54	19/02/2005	Domestic and stock	Goulburn-Murray Water
WRK010175	235378	5858031	55	2/05/2004	Domestic and stock	Goulburn-Murray Water
WRK010180	234985	5859065	55	20/06/2004	Domestic and stock	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK010299	732967	5865795	54	1/11/2004	Agri,commerc,industrial	Goulburn-Murray Water
WRK010339	734350	5863753	54	6/03/1995	Domestic and stock	Goulburn-Murray Water
WRK010420	741605	5862695	54	15/10/2004	Domestic and stock	Goulburn-Murray Water
WRK010880	760212	5860089	54		Domestic and stock	Goulburn-Murray Water
WRK011106	747026	5862106	54	2/05/2002	Domestic and stock	Goulburn-Murray Water
WRK011198	753027	5861061	54	3/02/2006	Domestic and stock	Goulburn-Murray Water
WRK011285	754181	5861453	54	16/03/2006	Domestic and stock	Goulburn-Murray Water
WRK011286	755473	5862154	54	16/03/2006	Domestic and stock	Goulburn-Murray Water
WRK011306	760842	5862794	54		Domestic and stock	Goulburn-Murray Water
WRK011618	755203	5861230	54		Domestic and stock	Goulburn-Murray Water
WRK012039	736288	5865989	54		Domestic and stock	Goulburn-Murray Water
WRK012402	764617	5858167	54	7/12/2006	Domestic and stock	Goulburn-Murray Water
WRK013598	235633	5859504	55	3/07/1990	Agri,commerc,industrial	Goulburn-Murray Water
WRK013924	234633	5860229	55	1/03/2008	Domestic and stock	Goulburn-Murray Water
WRK014757	747531	5861540	54	17/01/2008	Agri,commerc,industrial	Goulburn-Murray Water
WRK015047	747698	5862757	54		Agri,commerc,industrial	Goulburn-Murray Water
WRK016077	765307	5852041	54	24/11/2008	Observation	Goulburn-Murray Water
WRK016079	764162	5858022	54	29/11/2008	Observation	Goulburn-Murray Water
WRK016269	733745	5866425	54	2/04/2009	Observation	Goulburn-Murray Water
WRK016270	733756	5866421	54	23/04/2009	Observation	Goulburn-Murray Water
WRK016676	764144	5858028	54	16/12/2008	Observation	Goulburn-Murray Water
WRK032515	241992	5842484	55	19/04/1997	Agri,commerc,industrial	Southern Rural Water
WRK032558	242352	5842424	55	3/09/1997	Agri,commerc,industrial	Southern Rural Water
WRK032815	238180	5847148	55			Southern Rural Water
WRK032818	234820	5846755	55			Goulburn-Murray Water
WRK038430	238164	5844938	55	1/02/1977	Domestic and stock	Southern Rural Water
WRK039851	238392	5843384	55	29/01/1997	Agri,commerc,industrial	Southern Rural Water
WRK039852	241532	5842604	55	4/09/1997	Domestic and stock	Southern Rural Water
WRK039856	237353	5847944	55	1/01/1967	Agri,commerc,industrial	Goulburn-Murray Water
WRK039858	239492	5843784	55	13/05/1998	Agri,commerc,industrial	Southern Rural Water
WRK039859	238062	5845083	55	16/03/1998	Agri,commerc,industrial	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK039862	239213	5845144	55	12/07/2001	Agri,commerc,industrial	Southern Rural Water
WRK039864	239056	5845416	55	1/03/2001	Agri,commerc,industrial	Southern Rural Water
WRK039865	238441	5845415	55	11/07/2001	Agri,commerc,industrial	Southern Rural Water
WRK039866	238776	5845514	55	6/02/2001	Agri,commerc,industrial	Southern Rural Water
WRK039869	236820	5844829	55	31/12/1968	Agri,commerc,industrial	Southern Rural Water
WRK039870	235492	5845709	55	31/12/1970	Agri,commerc,industrial	Southern Rural Water
WRK039875	238757	5843328	55	31/12/1965	Unknown	Southern Rural Water
WRK039876	238786	5843307	55	31/12/1966	Unknown	Southern Rural Water
WRK039877	240576	5843982	55	31/12/1968	Agri,commerc,industrial	Southern Rural Water
WRK039880	237308	5846043	55	31/12/1970	Agri,commerc,industrial	Southern Rural Water
WRK039882	235757	5846076	55	1/01/1970	Agri,commerc,industrial	Southern Rural Water
WRK039884	237592	5843496	55	9/11/1973	Agri,commerc,industrial	Southern Rural Water
WRK039886	239800	5844846	55	1/08/1973	Agri,commerc,industrial	Southern Rural Water
WRK039888	234959	5846064	55	15/03/1974	Agri,commerc,industrial	Goulburn-Murray Water
WRK039892	241933	5842604	55	1/10/1977	Domestic and stock	Southern Rural Water
WRK039894	236818	5846288	55	2/10/1978	Agri,commerc,industrial	Southern Rural Water
WRK039895	237549	5843092	55	1/02/1980	Domestic and stock	Southern Rural Water
WRK039899	238950	5843270	55	1/12/1982	Agri,commerc,industrial	Southern Rural Water
WRK039901	241761	5842222	55	2/03/1983	Domestic and stock	Southern Rural Water
WRK039902	242284	5841258	55	31/01/1983	Agri,commerc,industrial	Southern Rural Water
WRK039903	235912	5845814	55	20/02/1983	Agri,commerc,industrial	Southern Rural Water
WRK039907	240863	5843734	55	12/05/1985	Domestic and stock	Southern Rural Water
WRK039908	239942	5844134	55	27/03/1983	Agri,commerc,industrial	Southern Rural Water
WRK039910	236758	5842847	55	31/08/1983	Domestic and stock	Southern Rural Water
WRK039916	238153	5845681	55	31/12/1976	Agri,commerc,industrial	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK039917	236873	5846939	55	31/12/1968	Agri,commerc,industrial	Southern Rural Water
WRK039918	236868	5847179	55	31/12/1965	Unknown	Goulburn-Murray Water
WRK039921	238113	5846998	55	31/12/1968	Agri,commerc,industrial	Southern Rural Water
WRK039923	237979	5847567	55	1/01/1970	Agri,commerc,industrial	Southern Rural Water
WRK039943	239551	5844361	55	5/07/2003	Agri,commerc,industrial	Southern Rural Water
WRK039948	234809	5846970	55			Goulburn-Murray Water
WRK046541	240315	5842365	55	1/06/2001	Agri,commerc,industrial	Southern Rural Water
WRK046623	241200	5841650	55	15/02/2003	Agri,commerc,industrial	Southern Rural Water
WRK046667	239561	5844604	55	5/07/2003	Agri,commerc,industrial	Southern Rural Water
WRK047177	239031	5845124	55	31/12/2008	Agri,commerc,industrial	Southern Rural Water
WRK047860	765510	5844248	54		Agri,commerc,industrial	Southern Rural Water
WRK056100	731545	5868111	54	1/04/2010	Agri,commerc,industrial	Goulburn-Murray Water
WRK057174	744354	5864440	54	8/06/2010	Domestic and stock	Goulburn-Murray Water
WRK057565	241899	5843079	55	3/04/2008	Agri,commerc,industrial	Southern Rural Water
WRK058357	731967	5865140	54	27/10/2010	Observation	Goulburn-Murray Water
WRK058807	732944	5864879	54	28/09/2010	Observation	Goulburn-Murray Water
WRK059433	765060	5849317	54	9/05/2011	Agri,commerc,industrial	Goulburn-Murray Water
WRK059464	764906	5849344	54	15/05/2011	Agri,commerc,industrial	Goulburn-Murray Water
WRK059465	765098	5849326	54	8/05/2011	Agri,commerc,industrial	Goulburn-Murray Water
WRK060084	758874	5837875	54	14/12/2010	Domestic and stock	Southern Rural Water
WRK061061	760832	5863269	54	19/02/2011	Observation	Goulburn-Murray Water
WRK061407	764447	5851680	54	1/05/2012	Domestic and stock	Goulburn-Murray Water
WRK061735	758486	5837218	54	9/04/2011	Domestic and stock	Southern Rural Water
WRK067082	741119	5863257	54	18/11/2011	Domestic and stock	Goulburn-Murray Water
WRK067094	733142	5864836	54	5/12/2011	Observation	Goulburn-Murray Water
WRK067096	732581	5864950	54	6/12/2011	Observation	Goulburn-Murray Water
WRK067097	732581	5864950	54	7/12/2011	Observation	Goulburn-Murray Water
WRK067285	760675	5862596	54	5/12/2011	Agri,commerc,industrial	Goulburn-Murray Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK068036	734531	5864616	54	25/01/2012	Domestic and stock	Goulburn-Murray Water
WRK068037	734395	5864640	54	19/01/2012	Domestic and stock	Goulburn-Murray Water
WRK071705	731975	5865133	54	1/11/2012	Urban	Goulburn-Murray Water
WRK073286	236545	5846964	55	2/02/2013	Agri,commerc,industrial	Southern Rural Water
WRK073313	765926	5845682	54	16/02/2013	Agri,commerc,industrial	Southern Rural Water
WRK077057	232912	5861827	55	17/10/2014	Domestic and stock	Goulburn-Murray Water
WRK078165	238164	5843220	55	26/02/2014	Agri,commerc,industrial	Southern Rural Water
WRK079350	763990	5857527	54	11/02/2015	Observation	Goulburn-Murray Water
WRK081066	739432	5864010	54	1/10/2014	Domestic and stock	Goulburn-Murray Water
WRK083269	227924	5860807	55	15/10/2015	Agri,commerc,industrial	Goulburn-Murray Water
WRK083674	228976	5859766	55	1/08/2015	Domestic and stock	Goulburn-Murray Water
WRK090337	728838	5869617	54	17/11/2015	Domestic and stock	Goulburn-Murray Water
WRK091333	235904	5857956	55	2/03/2016	Domestic and stock	Goulburn-Murray Water
WRK092033	764848	5849092	54	16/11/2015	Agri,commerc,industrial	Goulburn-Murray Water
WRK950002	743947	5863150	54		Domestic and stock	Goulburn-Murray Water
WRK952869	234949	5859045	55	7/03/2005	Observation	Goulburn-Murray Water
WRK952870	234949	5859045	55	7/03/2005	SOBN	Goulburn-Murray Water
WRK952871	729075	5865806	54	22/01/2005	Observation	Goulburn-Murray Water
WRK955329	732135	5866755	54	1/01/1950		Goulburn-Murray Water
WRK955403	746347	5862346	54	1/01/1950		Goulburn-Murray Water
WRK955484	734151	5864211	54	1/01/1950		Goulburn-Murray Water
WRK955490	748751	5861827	54	1/01/1950		Goulburn-Murray Water
WRK955496	748386	5861912	54	1/01/1950		Goulburn-Murray Water
WRK955506	746387	5862318	54	1/01/1950		Goulburn-Murray Water
WRK958682	240200	5842180	55	16/03/2001		Southern Rural Water
WRK963544	236233	5848606	55	26/02/2004	Domestic and stock	Goulburn-Murray Water
WRK963746	238469	5845786	55			Southern Rural Water
WRK972712	758469	5837241	54			Southern Rural Water
WRK972937	758410	5837319	54			Southern Rural Water
WRK972938	758737	5837887	54			Southern Rural Water
WRK973605	235860	5848528	55			Goulburn-Murray Water
WRK976847	238074	5842394	55			Southern Rural Water
WRK977255	758481	5837355	54			Southern Rural Water
WRK980764	757053	5838785	54			Southern Rural Water
WRK980886	765070	5842860	54	30/04/2007	Domestic and stock	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK982011	237367	5846947	55			Southern Rural Water
WRK982662	758385	5838430	54			Southern Rural Water
WRK984749	765148	5844971	54			Southern Rural Water
WRK984889	757602	5838660	54	11/12/2008	Domestic and stock	Southern Rural Water
WRK985910	235074	5843893	55			Southern Rural Water
WRK986308	238864	5844281	55	18/08/2008	Agri,commerc,industrial	Southern Rural Water
WRK986309	239051	5844131	55	18/08/2008	Agri,commerc,industrial	Southern Rural Water
WRK987119	235634	5845896	55			Southern Rural Water
WRK987773	238730	5843577	55			Southern Rural Water
WRK987925	237703	5845998	55			Southern Rural Water
WRK989851	243007	5841204	55			Southern Rural Water
WRK991954	235634	5848660	55			Goulburn-Murray Water
WRK992384	242505	5841700	55	15/09/2009	SOBN	Southern Rural Water

B.3 Eastern portion of the study area

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK991488	256693	5836569	55			Southern Rural Water
WRK992115	282662	5834186	55			Southern Rural Water
WRK992391	252042	5840228	55	21/09/2009	Observation	Southern Rural Water
WRK992390	252039	5840228	55	20/09/2009	Observation	Southern Rural Water
WRK992389	252127	5840210	55	20/09/2009	SOBN	Southern Rural Water
WRK991757	295968	5827747	55			Southern Rural Water
WRK990497	249551	5838484	55			Southern Rural Water
WRK987636	285635	5833204	55			Southern Rural Water
WRK984250	274882	5832093	55			Southern Rural Water
WRK983417	280103	5830740	55			Southern Rural Water
WRK983156	301622	5827394	55			Southern Rural Water
WRK981727	301880	5828960	55	29/06/2007	Domestic and stock	Southern Rural Water
WRK981726	301880	5828960	55	29/06/2007	Domestic and stock	Southern Rural Water
WRK981725	301880	5828960	55	19/07/2007	Domestic and stock	Southern Rural Water
WRK981721	301370	5828930	55	28/06/2007	Domestic and stock	Southern Rural Water
WRK981720	301370	5828930	55	26/06/2007	Domestic and stock	Southern Rural Water
WRK981719	301370	5828930	55	26/06/2007	Domestic and stock	Southern Rural Water
WRK982804	247676	5842118	55			Southern Rural Water
WRK979638	273182	5833058	55			Southern Rural Water
WRK978845	259268	5835111	55			Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK978547	260331	5838702	55			Southern Rural Water
WRK978363	260012	5839279	55			Southern Rural Water
WRK978306	259150	5839610	55			Southern Rural Water
WRK975341	247234	5839972	55	28/09/2006	Domestic and stock	Southern Rural Water
WRK975892	245463	5843347	55			Southern Rural Water
WRK974466	271014	5832204	55			Southern Rural Water
WRK973680	255890	5837517	55			Southern Rural Water
WRK973232	256680	5838237	55			Southern Rural Water
WRK964964	262380	5835647	55			Southern Rural Water
WRK967067	266990	5834626	55	11/10/2004	Domestic and stock	Southern Rural Water
WRK965655	256822	5834241	55			Southern Rural Water
WRK965377	289197	5829612	55	16/04/2004	Domestic and stock	Southern Rural Water
315723	297375	5829503	55	3/07/1969	Other	Southern Rural Water
333583	283159	5834561	55	31/12/1962	Other	Southern Rural Water
333549	283619	5831489	55		Other	Southern Rural Water
113038	289408	5829569	55	18/11/1992	Observation	Southern Rural Water
333548	283493	5831515	55		Other	Southern Rural Water
333547	282417	5833101	55		Other	Southern Rural Water
106978	287534	5833098	55	31/12/1958	Unknown	Southern Rural Water
106976	290574	5832330	55	31/12/1958	Unknown	Southern Rural Water
106975	289439	5830678	55	31/12/1958	Unknown	Southern Rural Water
106973	288035	5831163	55	31/12/1958	Unknown	Southern Rural Water
106972	289137	5832180	55	31/12/1958	Unknown	Southern Rural Water
WRK962302	287223	5831879	55	29/09/2003	Domestic and stock	Southern Rural Water
WRK960449	297314	5825722	55	30/11/2002	Domestic and stock	Southern Rural Water
WRK964669	262022	5835752	55			Southern Rural Water
WRK972164	262120	5837300	55	2/01/2006	Domestic and stock	Southern Rural Water
WRK972088	257842	5832217	55			Southern Rural Water
106971	288617	5832236	55	31/12/1958	Unknown	Southern Rural Water
106970	287751	5830798	55	31/12/1958	Unknown	Southern Rural Water
WRK057867	295854	5827476	55	13/02/2010	Agri,commerc,industrial	Southern Rural Water
106963	286655	5831571	55	31/12/1919	Domestic and stock	Southern Rural Water
106962	282654	5833848	55	31/12/1919	Domestic and stock	Southern Rural Water
67410	294262	5831072	55	31/12/1970	Domestic and stock	Southern Rural Water
109586	297388	5829503	55	4/08/1971	Observation	Southern Rural Water
109585	297388	5829503	55	4/08/1971	Observation	Southern Rural Water
WRK039201	255913	5839634	55	23/11/1982	Unknown	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
WRK042445	273736	5830789	55	20/04/1983	Unknown	Southern Rural Water
WRK051533	252040	5840229	55	20/09/2009	Observation	Southern Rural Water
WRK032791	294163	5829134	55	12/01/2000	Agri,commerc,industrial	Southern Rural Water
WRK041103	276040	5831960	55	27/04/2004	Agri,commerc,industrial	Southern Rural Water
WRK046772	252677	5839380	55	30/05/2005	Agri,commerc,industrial	Southern Rural Water
WRK043075	275623	5832142	55	10/04/1971	Dewatering	Southern Rural Water
WRK038452	275663	5832184	55	31/12/1988	Agri,commerc,industrial	Southern Rural Water
WRK038451	275470	5832124	55	31/08/1982	Agri,commerc,industrial	Southern Rural Water
WRK046924	274518	5832857	55	27/07/2007	Domestic and stock	Southern Rural Water
67402	293669	5832242	55	31/12/1970	Unknown	Southern Rural Water
80723	250413	5841084	55	5/07/1986	Domestic and stock	Southern Rural Water
80718	252113	5840084	55	11/02/1983	Domestic and stock	Southern Rural Water
80716	249317	5840998	55	26/06/1979	Domestic and stock	Southern Rural Water
80703	257363	5838784	55	21/02/1983	Domestic and stock	Southern Rural Water
80697	256224	5839247	55	19/03/1973	Domestic and stock	Southern Rural Water
80696	257996	5838295	55	1/03/1974	Domestic and stock	Southern Rural Water
56053	273123	5833674	55	1/02/1990	Domestic and stock	Southern Rural Water
304113	275678	5832461	55	31/12/1969	Other	Southern Rural Water
114032	273243	5832464	55	22/05/1992	Domestic and stock	Southern Rural Water
79213	281163	5833934	55	20/04/1983	Domestic and stock	Southern Rural Water
79207	275772	5831021	55	21/02/1976	Unknown	Southern Rural Water
304112	275678	5832473	55	31/12/1969	Other	Southern Rural Water
304111	275642	5832156	55	31/12/1969	Other	Southern Rural Water
304110	275690	5832486	55	31/12/1969	Other	Southern Rural Water
304109	275690	5832486	55	31/12/1969	Other	Southern Rural Water
66147	256371	5838004	55	1/01/1988	Domestic and stock	Southern Rural Water
66144	257833	5832704	55	12/02/1989	Domestic and stock	Southern Rural Water
66143	257763	5832434	55	23/06/1985	Unknown	Southern Rural Water
66138	257724	5832308	55	15/06/1980	Domestic and stock	Southern Rural Water
77251	300887	5828996	55	31/12/1970	Unknown	Southern Rural Water
77247	299802	5829040	55	31/12/1970	Domestic and stock	Southern Rural Water
77246	301366	5828752	55	31/12/1970	Domestic and stock	Southern Rural Water
77245	301820	5828553	55	31/12/1970	Domestic and stock	Southern Rural Water
77244	301624	5829035	55	31/12/1970	Domestic and stock	Southern Rural Water
77242	297280	5826078	55	31/12/1970	Domestic and stock	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
77239	297524	5826777	55	31/12/1970	Unknown	Southern Rural Water
77230	302226	5828297	55	30/11/1961	Unknown	Southern Rural Water
77226	297347	5829564	55	7/10/1983	Observation	Southern Rural Water
73216	292355	5829999	55	31/12/1970	Unknown	Southern Rural Water
73215	296107	5826999	55	31/12/1970	Unknown	Southern Rural Water
73214	294879	5827821	55	31/12/1970	Domestic and stock	Southern Rural Water
73209	289440	5829574	55	31/12/1958	Unknown	Southern Rural Water
73387	246863	5843684	55	13/01/1985	Domestic and stock	Southern Rural Water
73321	289973	5832474	55	17/08/1988	Domestic and stock	Southern Rural Water
73260	289362	5829639	55	31/12/1970	Unknown	Southern Rural Water
72647	268886	5831560	55	1/01/1988	Domestic and stock	Southern Rural Water
72646	268621	5831602	55	1/01/1988	Domestic and stock	Southern Rural Water
72644	271513	5831884	55	11/05/1985	Unknown	Southern Rural Water
72628	273509	5831106	55	24/09/1973	Unknown	Southern Rural Water
72627	268363	5831847	55	2/04/1974	Domestic and stock	Southern Rural Water
304108	275678	5832486	55	31/12/1969	Other	Southern Rural Water
304107	275678	5832486	55	31/12/1969	Other	Southern Rural Water
60494	288009	5829893	55	31/12/1958	Unknown	Southern Rural Water
60492	288868	5829516	55	31/12/1958	Unknown	Southern Rural Water
60479	285186	5830723	55	31/12/1919	Domestic and stock	Southern Rural Water
67398	293852	5830706	55	31/12/1970	Unknown	Southern Rural Water
67393	300715	5829570	55	31/12/1970	Domestic and stock	Southern Rural Water
66136	256166	5836796	55	10/09/1979	Domestic and stock	Southern Rural Water
304106	275678	5832486	55	31/12/1969	Other	Southern Rural Water
56051	275713	5832184	55	30/11/1982	Unknown	Southern Rural Water
306137	288083	5829803	55	15/03/1983	Other	Southern Rural Water
306136	288480	5829766	55	15/03/1983	Other	Southern Rural Water
306135	288979	5829689	55	11/03/1983	Other	Southern Rural Water
306131	283545	5830461	55		Other	Southern Rural Water
56050	274813	5832784	55	10/12/1982	Unknown	Southern Rural Water
56049	275283	5832131	55	10/12/1982	Unknown	Southern Rural Water
56044	272889	5833557	55	19/06/2000	Domestic and stock	Southern Rural Water
56043	275688	5832037	55	31/12/1969	Domestic and stock	Southern Rural Water
50264	263173	5836954	55	1/01/1988	Domestic and stock	Southern Rural Water
50261	263163	5836834	55	25/01/1985	Domestic and stock	Southern Rural Water
50260	263063	5836384	55	7/02/1983	Domestic and stock	Southern Rural Water
50255	259277	5838584	55	26/09/1979	Domestic and stock	Southern Rural Water
50251	261603	5836902	55	21/12/1971	Domestic and stock	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
56042	275710	5832482	55	31/12/1969	Domestic and stock	Southern Rural Water
56046	272873	5833204	55	10/09/1973	Unknown	Southern Rural Water
333586	285914	5831929	55	5/12/1983	Other	Southern Rural Water
333585	287998	5832379	55	5/12/1983	Other	Southern Rural Water
306287	282885	5829631	55	22/06/1984	Other	Southern Rural Water
333582	283159	5834561	55	31/12/1962	Other	Southern Rural Water
333581	283159	5834561	55	31/12/1962	Other	Southern Rural Water
333580	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333579	283159	5834561	55	31/12/1961	Other	Southern Rural Water
309858	294213	5830863	55	16/07/1969	Other	Southern Rural Water
306314	283641	5830225	55	12/07/1984	Other	Southern Rural Water
306313	283842	5830321	55	12/07/1984	Other	Southern Rural Water
306310	283317	5829602	55	12/07/1984	Other	Southern Rural Water
306309	283942	5830258	55	12/07/1984	Other	Southern Rural Water
306308	283276	5829720	55	12/07/1984	Other	Southern Rural Water
306307	283738	5830164	55	12/07/1984	Other	Southern Rural Water
306304	283457	5829957	55	12/07/1984	Other	Southern Rural Water
306303	283493	5830139	55	12/07/1984	Other	Southern Rural Water
306302	283534	5830387	55	12/07/1984	Other	Southern Rural Water
306301	282952	5830156	55	10/05/1984	Other	Southern Rural Water
306300	282941	5830162	55	10/05/1984	Other	Southern Rural Water
306299	282992	5830194	55	10/05/1984	Other	Southern Rural Water
306298	282992	5830194	55	10/05/1984	Other	Southern Rural Water
306297	284114	5830188	55	12/07/1984	Other	Southern Rural Water
306296	283836	5830211	55	11/07/1984	Other	Southern Rural Water
306295	283684	5830223	55	11/07/1984	Other	Southern Rural Water
306294	283657	5830019	55	10/07/1984	Other	Southern Rural Water
306288	283197	5829561	55	2/07/1984	Other	Southern Rural Water
WRK991306	256081	5837628	55			Southern Rural Water
306285	283038	5829650	55	7/06/1984	Other	Southern Rural Water
306284	282978	5829922	55	7/06/1984	Other	Southern Rural Water
306283	283245	5830028	55	6/06/1984	Other	Southern Rural Water
306282	282943	5830156	55	6/06/1984	Other	Southern Rural Water
306281	283193	5830305	55	4/06/1984	Other	Southern Rural Water
306280	282997	5830456	55	1/06/1984	Other	Southern Rural Water
306279	283271	5830413	55	31/05/1984	Other	Southern Rural Water
306233	284298	5830989	55	6/12/1983	Other	Southern Rural Water
306228	282913	5831169	55	18/11/1983	Other	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
306225	289298	5829665	55	14/11/1983	Other	Southern Rural Water
306223	282766	5829991	55	10/11/1983	Other	Southern Rural Water
306219	283420	5831111	55	8/06/1983	Other	Southern Rural Water
306218	282915	5831170	55	7/06/1983	Other	Southern Rural Water
306217	282839	5830506	55	7/06/1983	Other	Southern Rural Water
306216	282764	5829985	55	6/06/1983	Other	Southern Rural Water
306215	282706	5829531	55	6/06/1983	Other	Southern Rural Water
306200	284420	5830099	55	25/05/1983	Other	Southern Rural Water
142049	292963	5832534	55	18/11/1999	Domestic and stock	Southern Rural Water
133106	280593	5830864	55	21/01/1998	Domestic and stock	Southern Rural Water
133102	290133	5830844	55	17/01/1998	Domestic and stock	Southern Rural Water
333578	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333577	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333576	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333575	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333574	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333573	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333572	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333571	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333570	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333569	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333568	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333567	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333566	283159	5834561	55	31/12/1961	Other	Southern Rural Water
141011	296913	5828284	55	11/01/1999	Domestic and stock	Southern Rural Water
142150	280013	5831984	55	13/01/1999	Domestic and stock	Southern Rural Water
333565	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333556	283159	5834561	55	31/12/1961	Other	Southern Rural Water
142364	274173	5832274	55	18/05/1998	Agri,commerc,industrial	Southern Rural Water
333564	283159	5834561	55	31/12/1961	Other	Southern Rural Water
132612	258053	5839364	55	24/10/1997	Domestic and stock	Southern Rural Water
333563	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333562	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333561	283159	5834561	55	31/12/1961	Other	Southern Rural Water
106989	285733	5832864	55	13/09/1982	Domestic and stock	Southern Rural Water
333560	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333559	283159	5834561	55	31/12/1961	Other	Southern Rural Water

Bore_ID	Easting	Northing	Map_zone	Drilled_Date	Use	Water authority
333558	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333557	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333555	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333554	283159	5834561	55	31/12/1961	Other	Southern Rural Water
333552	288436	5830702	55		Other	Southern Rural Water
333551	286129	5832250	55		Other	Southern Rural Water
333550	283911	5831460	55		Other	Southern Rural Water
311341	289873	5829614	55	8/06/1983	Other	Southern Rural Water
311310	289446	5829668	55	10/03/1983	Other	Southern Rural Water
311309	289970	5829600	55	10/03/1983	Other	Southern Rural Water
320300	256009	5840305	55		Other	Southern Rural Water
320299	255853	5840318	55		Other	Southern Rural Water
320298	255695	5840325	55		Other	Southern Rural Water
315727	301091	5829045	55	4/11/1971	Other	Southern Rural Water
315724	297177	5826331	55	7/08/1969	Other	Southern Rural Water

Appendix C. Licensed groundwater bores

C.1 Western portion of study area

Works_ID	Easting_VicGrid	Northing_VicGrid	Water Authority
<Null>	2342733.211	2479525.257	Grampians Wimmera Mallee Water

C.2 Central portion of study area

Works_ID	Easting_VicGrid	Northing_VicGrid	Water Authority
<Null>	2411675.528	2450433.472	Goulburn-Murray Water
<Null>	2411168.753	2447946.328	Goulburn-Murray Water
WRK005837	2393259.466	2459399.326	Goulburn-Murray Water
WRK005838	2392401.786	2460471.502	Goulburn-Murray Water
WRK005881	2410351.969	2459223.202	Goulburn-Murray Water
WRK005948	2410355.423	2459825.112	Goulburn-Murray Water
WRK005963	2407433.732	2457294.158	Goulburn-Murray Water
WRK006217	2377518.079	2464944.671	Goulburn-Murray Water
WRK006323	2413176.443	2455820.681	Goulburn-Murray Water
WRK006411	2408559.636	2458206.598	Goulburn-Murray Water
WRK006518	2393305.691	2460198.604	Goulburn-Murray Water
WRK006558	2376661.224	2461663.855	Goulburn-Murray Water
WRK006647	2413390.672	2453247.029	Goulburn-Murray Water
WRK006762	2406382.942	2458248.97	Goulburn-Murray Water
WRK006789	2409126.619	2457095.7	Goulburn-Murray Water
WRK006833	2406936.759	2458966.633	Goulburn-Murray Water
WRK006997	2378533.329	2463032.614	Goulburn-Murray Water
WRK007011	2377581.622	2462328.067	Goulburn-Murray Water
WRK007049	2391027.619	2459634.061	Goulburn-Murray Water
WRK007512	2405956.961	2458197.93	Goulburn-Murray Water
WRK007539	2391609.976	2460743.142	Goulburn-Murray Water
WRK007545	2379690.287	2461129.566	Goulburn-Murray Water
WRK007657	2394273.131	2459464.212	Goulburn-Murray Water
WRK007720	2414574.951	2455258.061	Goulburn-Murray Water
WRK007809	2410278.118	2449630.117	Goulburn-Murray Water
WRK008045	2414405.781	2453892.245	Goulburn-Murray Water
WRK008180	2412626.482	2449632.923	Goulburn-Murray Water
WRK008181	2412982.787	2448004.664	Goulburn-Murray Water
WRK008182	2413019.592	2448001.796	Goulburn-Murray Water
WRK008188	2393338.249	2460635.158	Goulburn-Murray Water
WRK008189	2393694.226	2459834.884	Goulburn-Murray Water

Works_ID	Easting_VicGrid	Northing_VicGrid	Water Authority
WRK008190	2408813.526	2457994.97	Goulburn-Murray Water
WRK009151	2412770.544	2458117.501	Goulburn-Murray Water
WRK009534	2377314.48	2464340.777	Goulburn-Murray Water
WRK009656	2413237.508	2455496.495	Goulburn-Murray Water
WRK009891	2406405.335	2461578.834	Goulburn-Murray Water
WRK010299	2378539.307	2463056.878	Goulburn-Murray Water
WRK010339	2380002.933	2461046.735	Goulburn-Murray Water
WRK011106	2392731.508	2459937.223	Goulburn-Murray Water
WRK013924	2411737.407	2458844.244	Goulburn-Murray Water
WRK014033	2411168.753	2447946.328	Goulburn-Murray Water
WRK014757	2392529.963	2459120.366	Goulburn-Murray Water
WRK015047	2393374.087	2460615.665	Goulburn-Murray Water
WRK015068	2406136.02	2460798.356	Goulburn-Murray Water
WRK015878	2411275.9	2448273.972	Goulburn-Murray Water
WRK015879	2411123.135	2448314.511	Goulburn-Murray Water
WRK016462	2412343.071	2455601.529	Goulburn-Murray Water
WRK032815	2415002.571	2445698.188	Southern Rural Water
WRK034630	2420997.46	2440633.492	Southern Rural Water
WRK039851	2415134.36	2441932.606	Southern Rural Water
WRK039852	2418255.252	2441085.861	Southern Rural Water
WRK039855	2414233.252	2446508.366	Goulburn-Murray Water
WRK039855	2414233.252	2446508.366	Goulburn-Murray Water
WRK039858	2416113.63	2442207.555	Southern Rural Water
WRK039859	2414838.862	2443694.353	Southern Rural Water
WRK039862	2416114.44	2443507.121	Southern Rural Water
WRK039865	2415087.981	2444030.912	Southern Rural Water
WRK039866	2415579.387	2444057.391	Southern Rural Water
WRK039875	2415497.182	2441869.059	Southern Rural Water
WRK039876	2415526.106	2441847.247	Southern Rural Water
WRK039877	2417239.001	2442428.399	Southern Rural Water
WRK039880	2414118.414	2444503.498	Southern Rural Water
WRK039886	2416497.185	2443687.875	Southern Rural Water
WRK039892	2418655.758	2441077.789	Southern Rural Water
WRK039894	2413621.379	2444868.007	Southern Rural Water
WRK039899	2415688.793	2441807.077	Southern Rural Water
WRK039907	2417682.296	2442401.921	Southern Rural Water
WRK039908	2416699.398	2442649.278	Southern Rural Water
WRK039916	2415241.951	2444873.341	Southern Rural Water

Works_ID	Easting_VicGrid	Northing_VicGrid	Water Authority
WRK039917	2413925.295	2445149.411	Southern Rural Water
WRK039918	2413688.782	2445776.257	Goulburn-Murray Water
WRK039924	2413158.675	2446651.292	Goulburn-Murray Water
WRK039924	2413158.675	2446651.292	Goulburn-Murray Water
WRK039925	2414643.465	2445495.935	Southern Rural Water
WRK039940	2415025.378	2443347.476	Southern Rural Water
WRK039943	2416312.939	2442883.774	Southern Rural Water
WRK039952	2414954.2	2445301.354	Southern Rural Water
WRK040372	2415217.632	2444297.051	Southern Rural Water
WRK040373	2415594.563	2443645.2	Southern Rural Water
WRK043737	2412659.354	2446674.959	Goulburn-Murray Water
WRK046667	2416328.125	2443126.371	Southern Rural Water
WRK047177	2415825.206	2443585.285	Southern Rural Water
WRK053310	2420227.101	2440839.922	Southern Rural Water
WRK053311	2420155.228	2440751.487	Southern Rural Water
WRK053312	2420133.319	2440661.982	Southern Rural Water
WRK056100	2377017.643	2465280.705	Goulburn-Murray Water
WRK057565	2418631.834	2441552.858	Southern Rural Water
WRK059464	2411130.471	2447952.708	Goulburn-Murray Water
WRK061407	2410607.844	2450276.291	Goulburn-Murray Water
WRK061408	2410568.411	2450262.616	Goulburn-Murray Water
WRK067285	2406339.261	2461007.019	Goulburn-Murray Water
WRK070510	2416149.471	2444023.206	Southern Rural Water
WRK071705	2377565.685	2462326.393	Goulburn-Murray Water
WRK073286	2413365.038	2445549.258	Southern Rural Water
WRK075804	2409502.838	2460047.528	Goulburn-Murray Water
WRK078124	2414787.829	2444767.09	Southern Rural Water
WRK078128	2414440.388	2445255.358	Southern Rural Water
WRK083269	2405046.394	2459564.513	Goulburn-Murray Water
WRK092033	2411078.359	2447695.418	Goulburn-Murray Water
WRK093276	2411189.411	2459218.633	Goulburn-Murray Water
WRK097095	2386995.904	2460224.884	Goulburn-Murray Water
WRK097539	2414175.475	2446143.725	Goulburn-Murray Water
WRK103049	2414009.507	2445581.464	Southern Rural Water
WRK105808	2406720.106	2460587.991	Goulburn-Murray Water
WRK107071	2415012.96	2443327.749	Southern Rural Water
WRK107072	2415095.11	2443335.988	Southern Rural Water
WRK109688	2411675.528	2450433.472	Goulburn-Murray Water

C.3 Eastern portion of study area

Works_ID	Easting_VicGrid	Northing_VicGrid	Water Authority
WRK032791	2470566.831	2426498.597	Southern Rural Water
WRK038451	2451946.817	2429887.016	Southern Rural Water
WRK038452	2452140.997	2429942.853	Southern Rural Water
WRK041103	2452497.78	2430545.965	Southern Rural Water
WRK043075	2452100.015	2429901.534	Southern Rural Water
WRK046772	2429322.935	2437626.032	Southern Rural Water
WRK046917	2452182.889	2430082.745	Southern Rural Water
WRK034420	2451858.808	2430404.656	Southern Rural Water
WRK036200	2451594.7	2430118.336	Southern Rural Water
WRK044993	2449455.487	2429959.16	Southern Rural Water
WRK045108	2451328.949	2430269.013	Southern Rural Water
WRK045748	2447567.781	2430150.571	Southern Rural Water
WRK059695	2451658.143	2430512.943	Southern Rural Water

Appendix D. Groundwater conditions at transmission tower locations

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F1041DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1042DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1043DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1044DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1045DL	Central Study Area	5 - 10	0 - 600	alluvium(Qa1): generic
F1046DL	Central Study Area	5 - 10	0 - 600	alluvium(Qa1): generic
F1047DL	Central Study Area	10 - 20	0 - 600	Shepparton Formation (Nws): generic
F1049DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1050DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1051DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1052DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F1053DL	Central Study Area	20 - 50	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F1054DL	Central Study Area	5 - 10	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F1055DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F106DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F107DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F108DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F109DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F110DL	Eastern Study Area	< 5	1201 - 3100	alluvium(Qa1): generic
F111DL	Eastern Study Area	< 5	1201 - 3100	alluvium(Qa1): generic
F112DL	Eastern Study Area	5 - 10	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F113DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F114DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F115DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F11DL	Eastern Study Area	5 - 10	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F136DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F138DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F139DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F143DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F144DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F145DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F14DL	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F22DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F23DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F24DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F25DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F26DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F27DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F28DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3001DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3002DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3003DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3004DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3005DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3006DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F3007DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4304DL	Eastern Study Area	20 - 50	7101 - 10000	Newer Volcanic Group - basalt flows (Neo): generic
F4305DL	Eastern Study Area	20 - 50	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4306DL	Eastern Study Area	20 - 50	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4307DL	Eastern Study Area	20 - 50	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4311DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4312DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4313DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4314DL	Eastern Study Area	5 - 10	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4350DL	Eastern Study Area	5 - 10	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4370DL	Eastern Study Area	5 - 10	7101 - 10000	Darley Gravel (Nxr): generic
F4373DL S	Eastern Study Area	20 - 50	7101 - 10000	Bacchus Marsh Formation (Pxb): generic
F4374DL S	Eastern Study Area	20 - 50	7101 - 10000	incised alluvium (Na): generic
F4380DL	Eastern Study Area	20 - 50	5401 - 7100	Darley Gravel (Nxr): generic
F4383DL	Eastern Study Area	10 - 20	5401 - 7100	alluvium(Qa1): generic
F4384DL	Eastern Study Area	5 - 10	3101 - 5400	colluvium(Qc1): generic
F4386DL	Eastern Study Area	>50	3101 - 5400	Castlemaine Group - Yapeenian(Ocy): generic
F4387DL	Eastern Study Area	>50	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F4389DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4390DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4391DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4392SL-A	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4392SL-B	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4393DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4394DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4395DL	Eastern Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F4396DL	Eastern Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F4397DL	Eastern Study Area	< 5	601 - 1200	alluvium(Qa1): generic
F4398DL	Eastern Study Area	5 - 10	601 - 1200	White Hills Gravel(-Pxh): generic
F4399DL	Eastern Study Area	5 - 10	601 - 1200	White Hills Gravel(-Pxh): generic
F4400DL	Eastern Study Area	10 - 20	0 - 600	Castlemaine Group - Castlemainian(Occ): generic
F4401DL	Eastern Study Area	20 - 50	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F4402DL	Eastern Study Area	20 - 50	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F4403DL	Eastern Study Area	10 - 20	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F4404DL	Eastern Study Area	10 - 20	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F4405DL	Central Study Area	5 - 10	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
F4406DL	Central Study Area	5 - 10	0 - 600	Castlemaine Group - Lancefieldian(Ocl): hornfels
F4407DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4408DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4409DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4410DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4411DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4412DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4417DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4418DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4419DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4424DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - scoria deposits(Nes): generic
F4426DL	Eastern Study Area	5 - 10	5401 - 7100	Werribee Formation (-Pxe): generic
F4427DL	Eastern Study Area	< 5	5401 - 7100	alluvium(Qa1): generic
F4450DL	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4451DL	Eastern Study Area	5 - 10	3101 - 5400	Darley Gravel (Nxr): generic
F4452DL	Eastern Study Area	5 - 10	3101 - 5400	Darley Gravel (Nxr): generic
F4453DL	Eastern Study Area	5 - 10	3101 - 5400	Darley Gravel (Nxr): generic
F4454DL	Eastern Study Area	< 5	3101 - 5400	Darley Gravel (Nxr): generic
F4455DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4456DL	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4457DL	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4458DL	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4459SL-A	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4459SL-B	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4460SL-A	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4460SL-B	Eastern Study Area	< 5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4461SL-A	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F4461SL-B	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4462SL-A	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4462SL-B	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4463SL-A	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4463SL-B	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4464SL-A	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4464SL-B	Eastern Study Area	< 5	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4487DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4488DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4489DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4490DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4491DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4493DL	Central Study Area	10 - 20	0 - 600	alluvium(Qa1): generic
F4505DL	Eastern Study Area	20 - 50	3101 - 5400	Bacchus Marsh Formation (Pxb): generic
F4515DL	Eastern Study Area	20 - 50	7101 - 10000	Darley Gravel (Nxr): generic
F4521DL	Eastern Study Area	20 - 50	3101 - 5400	Bacchus Marsh Formation (Pxb): generic
F4523DL	Eastern Study Area	>50	1201 - 3100	Pentland Hills Volcanic Group (-Pp): generic
F4524DL	Eastern Study Area	>50	1201 - 3100	Pentland Hills Volcanic Group (-Pp): generic
F4525DL	Eastern Study Area	>50	1201 - 3100	Pentland Hills Volcanic Group (-Pp): generic
F4566DL	Eastern Study Area	5 - 10	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F4567DL	Eastern Study Area	10 - 20	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F4568DL	Eastern Study Area	10 - 20	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F4569DL	Eastern Study Area	>50	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4570DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4571DL	Eastern Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4572DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4573DL	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4575DL	Eastern Study Area	20 - 50	5401 - 7100	Darley Gravel (Nxr): generic
F4576DL	Eastern Study Area	20 - 50	5401 - 7100	Darley Gravel (Nxr): generic
F4580DL	Eastern Study Area	10 - 20	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4581DL	Eastern Study Area	5 - 10	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4582DL	Eastern Study Area	5 - 10	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4583DL	Eastern Study Area	10 - 20	7101 - 10000	Newer Volcanic Group - basalt flows (Neo): generic
F4584DL	Eastern Study Area	5 - 10	7101 - 10000	Newer Volcanic Group - basalt flows (Neo): generic
F4585DL	Eastern Study Area	5 - 10	7101 - 10000	Newer Volcanic Group - basalt flows (Neo): generic
F4586DL	Eastern Study Area	5 - 10	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4587DL	Eastern Study Area	5 - 10	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F4588DL	Eastern Study Area	10 - 20	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4589DL	Eastern Study Area	5 - 10	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F4590DL	Eastern Study Area	5 - 10	5401 - 7100	Darley Gravel (Nxr): generic
F4592DL	Eastern Study Area	5 - 10	7101 - 10000	Darley Gravel (Nxr): generic
F4593DL	Eastern Study Area	5 - 10	7101 - 10000	Darley Gravel (Nxr): generic
F4594DL	Eastern Study Area	5 - 10	7101 - 10000	Darley Gravel (Nxr): generic
F4595DL	Eastern Study Area	5 - 10	7101 - 10000	Darley Gravel (Nxr): generic
F4597DL	Eastern Study Area	>50	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4598DL	Eastern Study Area	20 - 50	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4599DL	Eastern Study Area	5 - 10	3101 - 5400	alluvium(Qa1): generic
F4600DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4601DL	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
F4602DL	Eastern Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
F4603DL	Eastern Study Area	20 - 50	3101 - 5400	White Hills Gravel(-Pxh): generic
F4604DL	Eastern Study Area	< 5	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F4605DL	Eastern Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
F4606DL	Eastern Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
F4607DL	Eastern Study Area	5 - 10	3101 - 5400	White Hills Gravel(-Pxh): generic
F4608DL	Eastern Study Area	10 - 20	7101 - 10000	Darley Gravel (Nxr): generic
F4609DL	Eastern Study Area	20 - 50	7101 - 10000	Darley Gravel (Nxr): generic
F4610DL	Eastern Study Area	5 - 10	7101 - 10000	Darley Gravel (Nxr): generic
F4612DL	Eastern Study Area	10 - 20	7101 - 10000	Darley Gravel (Nxr): generic
F4613DL	Eastern Study Area	20 - 50	7101 - 10000	conglomerate and sandstone (Czg): generic
F4614SL-A	Eastern Study Area	5 - 10	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4614SL-B	Eastern Study Area	5 - 10	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4615SL-A	Eastern Study Area	5 - 10	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4615SL-B	Eastern Study Area	5 - 10	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4616DL	Eastern Study Area	10 - 20	10001 - 99999	Newer Volcanic Group - basalt flows (Neo): generic
F4617DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4618DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4619DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4620DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4621DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4622DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4623DL (New)	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F4624DL S (New)	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4625DL S (New)	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4626DL (New)	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4627DL (New)	Central Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F4628DL (New)	Central Study Area	20 - 50	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F4629DL (New)	Central Study Area	20 - 50	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F4630DL (New)	Central Study Area	>50	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F4631DL (New)	Central Study Area	>50	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F4632DL (New)	Central Study Area	>50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4633DL (New)	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4634DL (New)	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4635DL (New)	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4636DL (New)	Central Study Area	10 - 20	0 - 600	colluvium(Qc1): generic
F4637DL (New)	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4638DL (New)	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F4639DL (New)	Western Study Area	>50	1201 - 3100	Warrak Formation (-Caw): generic
F4640DL (New)	Western Study Area	5 - 10	1201 - 3100	Warrak Formation (-Caw): generic
F4641DL (New)	Western Study Area	10 - 20	1201 - 3100	Warrak Formation (-Caw): generic
F4642DL (New)	Western Study Area	10 - 20	1201 - 3100	Warrak Formation (-Caw): generic
F4643DL (New)	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F4644DL (New)	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F4645DL (New)	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F4646DL (New)	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F4647DL (New)	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F4648DL (New)	Western Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
F4649DL (New)	Eastern Study Area	>50	3101 - 5400	Bacchus Marsh Formation (Pxb): generic
F4650DL (New)	Eastern Study Area	>50	3101 - 5400	Bacchus Marsh Formation (Pxb): generic
F4651DL (New)	Eastern Study Area	>50	1201 - 3100	Pentland Hills Volcanic Group (-Pp): generic
F4652DL (New)	Eastern Study Area	>50	1201 - 3100	Castlemaine Group - Castlemainian(Occ): generic
F4653DL (New)	Western Study Area	5 - 10	0 - 600	Pyrenees Formation (-Cap): generic
F57DL	Eastern Study Area	20 - 50	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
F58DL	Eastern Study Area	10 - 20	5401 - 7100	quarry waste deposits (Qhq): generic
F59DL	Eastern Study Area	10 - 20	5401 - 7100	Darley Gravel (Nxr): generic
F6001DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - scoria deposits(Nes): generic
F6002DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - scoria deposits(Nes): generic
F6004DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6005DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6006DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6007DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6008DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6009DL	Central Study Area	< 5	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6010DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6011DL	Central Study Area	< 5	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6012DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6013DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6014DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6015DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6016DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6017DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6018DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6019DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6020DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F6021DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6022DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6023DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6024DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6025DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6026DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6027DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6028DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6029DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6030DL	Central Study Area	>50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6031DL	Central Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6032DL	Central Study Area	20 - 50	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6034DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6035DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6036DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6037DL	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6038DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6039DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6040DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6041DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6042DL	Central Study Area	< 5	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6043DL	Central Study Area	< 5	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6045DL	Central Study Area	5 - 10	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6046DL	Central Study Area	5 - 10	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6047DL	Central Study Area	5 - 10	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6048DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6049DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6050DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6052DL	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
F6053DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6054DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6055DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6056DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6057DL	Central Study Area	5 - 10	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6058DL	Central Study Area	< 5	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6059DL	Central Study Area	5 - 10	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6060DL	Central Study Area	5 - 10	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F6061DL	Central Study Area	5 - 10	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6062DL	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6063DL	Central Study Area	20 - 50	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6064DL	Central Study Area	20 - 50	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6065DL	Central Study Area	5 - 10	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6101DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6102DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6103DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6104DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6105SL-A	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6105SL-B	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6106DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6107DL	Western Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6108DL	Western Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6109DL	Western Study Area	10 - 20	0 - 600	Pyrenees Formation (-Cap): generic
F6110DL	Western Study Area	20 - 50	0 - 600	Pyrenees Formation (-Cap): generic
F6112DL	Western Study Area	< 5	601 - 1200	incised alluvium (Na): generic
F6113DL	Western Study Area	5 - 10	601 - 1200	White Hills Gravel(-Pxh): generic
F6114DL	Western Study Area	5 - 10	601 - 1200	incised alluvium (Na): generic
F6115DL	Western Study Area	< 5	601 - 1200	incised alluvium (Na): generic
F6116DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6117DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6118DL	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F6119DL	Western Study Area	< 5	1201 - 3100	alluvium(Qa1): generic
F6120DL	Western Study Area	10 - 20	1201 - 3100	Beaufort Formation(-Cab): hornfels
F6121DL	Western Study Area	10 - 20	1201 - 3100	Pyrenees Formation (-Cap): hornfels
F6122DL	Western Study Area	20 - 50	1201 - 3100	Pyrenees Formation (-Cap): hornfels
F6123DL	Western Study Area	20 - 50	1201 - 3100	Pyrenees Formation (-Cap): hornfels
F6124DL	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F6125DL	Western Study Area	20 - 50	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6126DL	Western Study Area	20 - 50	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6127DL	Western Study Area	10 - 20	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6128DL	Western Study Area	10 - 20	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6129DL	Western Study Area	10 - 20	3101 - 5400	Mount Lonarch Granite(G371): generic
F6130DL	Western Study Area	20 - 50	3101 - 5400	Mount Lonarch Granite(G371): generic
F6131DL	Western Study Area	5 - 10	3101 - 5400	Mount Lonarch Granite(G371): generic
F6132DL	Western Study Area	10 - 20	3101 - 5400	Mount Lonarch Granite(G371): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F6133DL	Western Study Area	10 - 20	3101 - 5400	incised colluvium (Nc1): generic
F6134DL	Western Study Area	10 - 20	3101 - 5400	incised colluvium (Nc1): generic
F6135DL	Western Study Area	20 - 50	3101 - 5400	Mount Lonarch Granite(G371): generic
F6136DL	Western Study Area	10 - 20	3101 - 5400	Mount Lonarch Granite(G371): generic
F6137DL	Western Study Area	10 - 20	1201 - 3100	Mount Lonarch Granite(G371): generic
F6138DL	Western Study Area	10 - 20	1201 - 3100	Mount Lonarch Granite(G371): generic
F6139DL	Western Study Area	< 5	1201 - 3100	Mount Lonarch Granite(G371): generic
F6140DL	Western Study Area	< 5	1201 - 3100	Mount Lonarch Granite(G371): generic
F6141DL	Western Study Area	< 5	1201 - 3100	Mount Lonarch Granite(G371): generic
F6142DL	Western Study Area	5 - 10	1201 - 3100	Mount Lonarch Granite(G371): generic
F6143DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6144DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6145DL	Western Study Area	20 - 50	1201 - 3100	Beaufort Formation(-Cab): hornfels
F6146DL	Western Study Area	>50	1201 - 3100	Beaufort Formation(-Cab): hornfels
F6147DL	Western Study Area	>50	1201 - 3100	Beaufort Formation(-Cab): hornfels
F6148DL	Western Study Area	20 - 50	3101 - 5400	Beaufort Formation(-Cab): hornfels
F6149DL	Western Study Area	20 - 50	3101 - 5400	Beaufort Formation(-Cab): hornfels
F6150DL	Western Study Area	20 - 50	3101 - 5400	Beaufort Formation(-Cab): hornfels
F6151DL	Western Study Area	10 - 20	3101 - 5400	Beaufort Formation(-Cab): hornfels
F6152DL	Western Study Area	20 - 50	3101 - 5400	Beaufort Formation(-Cab): hornfels
F6153DL	Western Study Area	10 - 20	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6154DL	Western Study Area	< 5	3101 - 5400	Shepparton Formation (Nws): generic
F6155DL	Western Study Area	20 - 50	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6156DL	Western Study Area	20 - 50	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6157DL	Western Study Area	5 - 10	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6158DL	Western Study Area	20 - 50	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6159DL	Western Study Area	20 - 50	3101 - 5400	Pyrenees Formation (-Cap): hornfels
F6160DL	Western Study Area	< 5	3101 - 5400	Glenlogie Granodiorite(G372): generic
F6161DL	Western Study Area	< 5	1201 - 3100	Glenlogie Granodiorite(G372): generic
F6162DL	Western Study Area	5 - 10	1201 - 3100	granite-derived colluvium (Qc4): generic
F6163DL	Western Study Area	10 - 20	1201 - 3100	granite-derived colluvium (Qc4): generic
F6164DL	Western Study Area	10 - 20	1201 - 3100	granite-derived colluvium (Qc4): generic
F6165DL	Western Study Area	10 - 20	1201 - 3100	Glenlogie Granodiorite(G372): generic
F6166DL	Western Study Area	10 - 20	1201 - 3100	Glenlogie Granodiorite(G372): generic
F6167DL	Western Study Area	10 - 20	1201 - 3100	Glenlogie Granodiorite(G372): generic
F6168DL	Western Study Area	5 - 10	1201 - 3100	Glenlogie Granodiorite(G372): generic
F6169DL	Western Study Area	10 - 20	1201 - 3100	Glenlogie Granodiorite(G372): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F6170DL	Western Study Area	< 5	1201 - 3100	granite-derived colluvium (Qc4): generic
F6171DL	Western Study Area	< 5	1201 - 3100	granite-derived colluvium (Qc4): generic
F6172DL	Western Study Area	< 5	1201 - 3100	granite-derived colluvium (Qc4): generic
F6173DL	Western Study Area	< 5	1201 - 3100	granite-derived colluvium (Qc4): generic
F6174DL	Western Study Area	< 5	1201 - 3100	granite-derived colluvium (Qc4): generic
F6175DL	Western Study Area	< 5	1201 - 3100	Glenlogie Granodiorite(G372): generic
F6176DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6177DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6178DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6179DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6180DL	Western Study Area	5 - 10	1201 - 3100	Elmhurst Granite(G373): generic
F6182DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6183DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6184DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6185DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6186DL	Western Study Area	< 5	1201 - 3100	alluvium(Qa1): generic
F6187DL	Western Study Area	>50	1201 - 3100	Pyrenees Formation (-Cap): generic
F6188DL	Western Study Area	20 - 50	1201 - 3100	Pyrenees Formation (-Cap): generic
F6189DL	Western Study Area	20 - 50	1201 - 3100	Pyrenees Formation (-Cap): generic
F6190DL	Western Study Area	20 - 50	1201 - 3100	Pyrenees Formation (-Cap): generic
F6191DL	Western Study Area	20 - 50	1201 - 3100	Pyrenees Formation (-Cap): generic
F6192DL	Western Study Area	10 - 20	1201 - 3100	Pyrenees Formation (-Cap): generic
F6193DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6194DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6195DL	Western Study Area	10 - 20	1201 - 3100	Shepparton Formation (Nws): generic
F6196DL	Western Study Area	>50	1201 - 3100	Warrak Formation (-Caw): generic
F6197DL	Western Study Area	>50	1201 - 3100	Warrak Formation (-Caw): generic
F6201DL	Western Study Area	10 - 20	1201 - 3100	Warrak Formation (-Caw): generic
F6203DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6204DL	Western Study Area	20 - 50	1201 - 3100	Warrak Formation (-Caw): generic
F6205DL	Western Study Area	5 - 10	1201 - 3100	Warrak Formation (-Caw): generic
F6206DL	Western Study Area	10 - 20	1201 - 3100	Warrak Formation (-Caw): generic
F6207DL	Western Study Area	5 - 10	1201 - 3100	Warrak Formation (-Caw): generic
F6208DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6209DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6210DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6211DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F6212DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6213DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6214DL	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F6215DL	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F6216DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6217DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6218DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6219DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6220DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6221DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6222DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6223DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6224DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6225DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6226DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6227DL	Western Study Area	< 5	1201 - 3100	Shepparton Formation (Nws): generic
F6228DL	Western Study Area	< 5	1201 - 3100	alluvium(Qa1): generic
F6229DL	Western Study Area	< 5	1201 - 3100	alluvium(Qa1): generic
F6230DL	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
F6231DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6232DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6233DL	Western Study Area	5 - 10	1201 - 3100	White Hills Gravel(-Pxh): generic
F6234DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6235DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6236DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6237DL	Western Study Area	< 5	1201 - 3100	White Hills Gravel(-Pxh): generic
F6246DL	Central Study Area	5 - 10	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
F6247DL	Central Study Area	10 - 20	0 - 600	dissected granite-derived colluvium (Nc4): generic
F6248DL	Central Study Area	10 - 20	0 - 600	dissected granite-derived colluvium (Nc4): generic
F6249DL	Central Study Area	5 - 10	0 - 600	dissected granite-derived colluvium (Nc4): generic
F6250DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6251DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6252DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6253DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6254DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6255DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6256DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic

Structure Number	Comments	Depth to groundwater (mBNS)	Groundwater salinity (mg/L TDS)	Surficial geology
F6257DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6258DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6259DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6260DL	Central Study Area	< 5	0 - 600	incised colluvium (Nc1): generic
F6261DL	Central Study Area	5 - 10	0 - 600	incised colluvium (Nc1): generic
F6262DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6263DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6264DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6265DL	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6266DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6278DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6279DL	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6281DL	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
F6283DL	Central Study Area	< 5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
F6284SL A&B (New)	Western Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
F6285DL A&B (New)	Western Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
F6286DL A&B (New)	Western Study Area	< 5	3101 - 5400	Shepparton Formation (Nws): generic
F6287DL A&B (New)	Western Study Area	< 5	3101 - 5400	Shepparton Formation (Nws): generic
F6288DL A&B (New)	Western Study Area	< 5	3101 - 5400	Shepparton Formation (Nws): generic
F6289DL A&B (New)	Western Study Area	< 5	3101 - 5400	Shepparton Formation (Nws): generic
F6290DL A&B (New)	Western Study Area	5 - 10	3101 - 5400	White Hills Gravel(-Pxh): generic
F6291DL A&B (New)	Western Study Area	5 - 10	3101 - 5400	White Hills Gravel(-Pxh): generic
F62DL	Eastern Study Area	20 - 50	5401 - 7100	Darley Gravel (Nxr): generic
F91DL	Eastern Study Area	20 - 50	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F92DL	Eastern Study Area	20 - 50	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F93DL	Eastern Study Area	5 - 10	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F94DL	Eastern Study Area	< 5	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F95DL	Eastern Study Area	< 5	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
F96DL	Eastern Study Area	20 - 50	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic

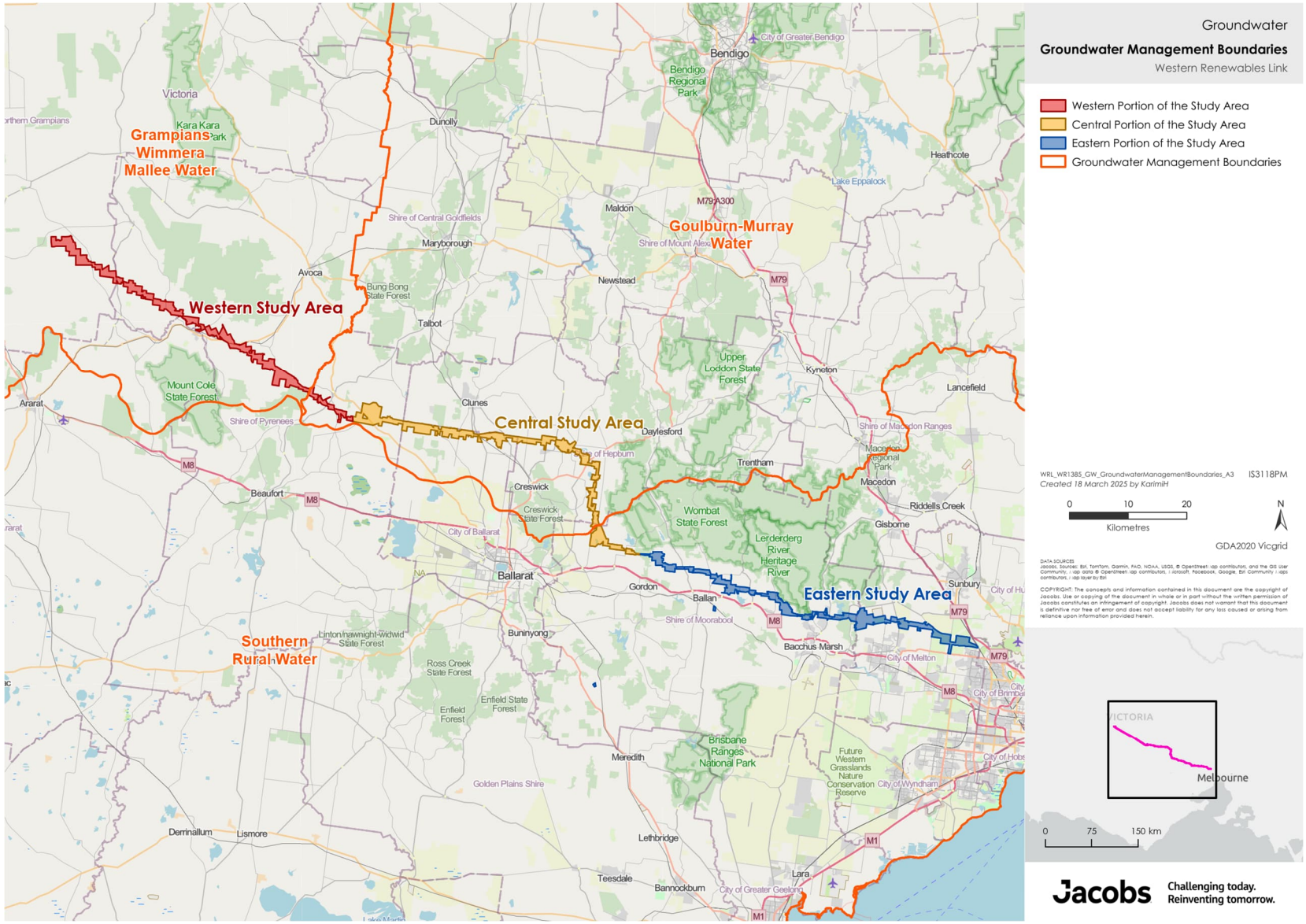
Appendix E. Groundwater conditions at distribution line crossovers

Crossing ID	Location	Depth to watertable (m)	Groundwater salinity, mg/L TDS	Surficial geology
DLIS_5	Eastern Study Area	<5	3101 - 5400	Darley Gravel (Nxr): generic
DLIS_6	Eastern Study Area	<5	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_9	Eastern Study Area	<5	7101 - 10000	conglomerate and sandstone (Czg): generic
DLIS_18	Eastern Study Area	<5	3101 - 5400	Bacchus Marsh Formation (Pxb): generic
DLIS_23	Eastern Study Area	<5	1201 - 3100	alluvium(Qa1): generic
DLIS_24	Eastern Study Area	<5	1201 - 3100	alluvium(Qa1): generic
DLIS_25	Central Study Area	<5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_30	Central Study Area	<5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_35	Central Study Area	<5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_40	Central Study Area	<5	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_43	Central Study Area	<5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_44	Central Study Area	<5	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_46	Western Study Area	<5	1201 - 3100	incised alluvium (Na): generic
DLIS_47	Western Study Area	<5	1201 - 3100	alluvium(Qa1): generic
DLIS_49	Western Study Area	<5	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_50	Western Study Area	<5	3101 - 5400	Shepparton Formation (Nws): generic
DLIS_53	Western Study Area	<5	1201 - 3100	alluvium(Qa1): generic
DLIS_54	Western Study Area	<5	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_58	Western Study Area	<5	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_60	Western Study Area	<5	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_62	Western Study Area	<5	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_64	Western Study Area	<5	1201 - 3100	White Hills Gravel(-Pxh): generic
DLIS_3	Eastern Study Area	10 - 20	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_7	Eastern Study Area	10 - 20	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_8	Eastern Study Area	10 - 20	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_10	Eastern Study Area	10 - 20	7101 - 10000	conglomerate and sandstone (Czg): generic
DLIS_14	Eastern Study Area	10 - 20	5401 - 7100	Werribee Formation (-Pxe): generic
DLIS_15	Eastern Study Area	10 - 20	5401 - 7100	Darley Gravel (Nxr): generic
DLIS_16	Eastern Study Area	10 - 20	3101 - 5400	alluvium(Qa1): generic
DLIS_19	Eastern Study Area	10 - 20	3101 - 5400	White Hills Gravel(-Pxh): generic
DLIS_21	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic

Crossing ID	Location	Depth to watertable (m)	Groundwater salinity, mg/L TDS	Surficial geology
DLIS_22	Eastern Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_26	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_27	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_31	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_32	Central Study Area	10 - 20	0 - 600	Castlemaine Group - Lancefieldian(Ocl): generic
DLIS_33	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_34	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_39	Central Study Area	10 - 20	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_41	Central Study Area	10 - 20	1201 - 3100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_42	Central Study Area	10 - 20	601 - 1200	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_48	Western Study Area	10 - 20	3101 - 5400	Mount Lonarch Granite(G371): generic
DLIS_51	Western Study Area	10 - 20	1201 - 3100	Glenlogie Granodiorite(G372): generic
DLIS_55	Western Study Area	10 - 20	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_56	Western Study Area	10 - 20	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_57	Western Study Area	10 - 20	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_59	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
DLIS_61	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
DLIS_63	Western Study Area	10 - 20	1201 - 3100	White Hills Gravel(-Pxh): generic
DLIS_11	Eastern Study Area	20 - 50	7101 - 10000	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_12	Eastern Study Area	20 - 50	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_13	Eastern Study Area	20 - 50	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_28	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_29	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_36	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_37	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_38	Central Study Area	20 - 50	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_1	Eastern Study Area	5 - 10	5401 - 7100	Newer Volcanic Group - basalt flows (Neo): generic

Crossing ID	Location	Depth to watertable (m)	Groundwater salinity, mg/L TDS	Surficial geology
DLIS_2	Eastern Study Area	5 - 10	3101 - 5400	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_4	Eastern Study Area	5 - 10	3101 - 5400	Darley Gravel (Nxr): generic
DLIS_20	Eastern Study Area	5 - 10	3101 - 5400	Pentland Hills Volcanic Group (-Pp): generic
DLIS_45	Central Study Area	5 - 10	0 - 600	Newer Volcanic Group - basalt flows (Neo): generic
DLIS_52	Western Study Area	5 - 10	1201 - 3100	Shepparton Formation (Nws): generic
DLIS_17	Eastern Study Area	>50	3101 - 5400	Bacchus Marsh Formation (Pxb): generic

Appendix F. Groundwater management boundaries



Appendix G. Details of physical impact assessment (Section 7.2.3.1)

Table G-1: Bores intersecting the 100m buffer zone around transmission towers

Structure Number (tower)	Works ID	Groundwater receptor	Purpose	Study area	Surface geology[1]	Depth to groundwater[2]
F4406DL	WRK05 3311	Licenced bore (SRW)	Irrigation	Central Study Area	Castlemaine Group - Lancefieldian(Ocl): hornfels	5 – 10 m
F4406DL	WRK05 3312	Licenced bore (SRW)	Irrigation	Central Study Area	Castlemaine Group - Lancefieldian(Ocl): hornfels	5 – 10 m
F4489DL	WRK03 9894	Licenced bore (SRW)	Irrigation	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	10 – 20 m
F4624DL S (New)	53257	Registered bore	Domestic and stock	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
F4624DL S (New)	WRK98 7773	Registered bore	Unknown	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
F4426DL	WRK03 6200	Licenced bore (SRW)	Industrial or commercial	Eastern Study Area	Werribee Formation (-Pxe): generic	10 – 20 m
F4459SL-A	33358 6	Registered bore	Other	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
F59DL	WRK03 8451	Licenced bore (SRW)	Industrial or commercial	Eastern Study Area	Darley Gravel (Nxr): generic	10 – 20 m
F4387DL	WRK97 4466	Registered bore	Unknown	Adjacent to Eastern Study Area	Pentland Hills Volcanic Group (-Pp): generic	>50 m

Notes:

1 Based on DJPR, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12

2 Based on DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857

Table G-2: Aquatic GDEs intersecting the 50m buffer zone around transmission towers

Structure Number (tower)	Name / Wetland "SRC_UFI"	Groundwater receptor	Potential for groundwater dependence	Study area	Surface geology[1]	Depth to groundwater[2]
F6107DL	41600	Wetland	Unclassified potential GDE - from regional studies	Western Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
F6112DL	BURNBANK CREEK	River	High potential GDE - from national assessment	Western Study Area	incised alluvium (Na): generic	<5 m
F6117DL	41652	Wetland	Unclassified potential GDE - from regional studies	Western Study Area	White Hills Gravel(-Pxh): generic	<5 m
F6161DL	AMPHITHEATRE CREEK	River	High potential GDE - from national assessment	Western Study Area	Glenlogie Granodiorite(G372): generic	<5 m
F6173DL	SANDY CREEK	River	Moderate potential GDE - from national assessment	Western Study Area	granite-derived colluvium (Qc4): generic	<5 m
F6177DL	GLENPATRICK CREEK	River	High potential GDE - from national assessment	Western Study Area	Shepparton Formation (Nws): generic	5 – 10 m
F6203DL	SPRING CREEK	River	High potential GDE - from national assessment	Western Study Area	Shepparton Formation (Nws): generic	<5 m
F1046DL	PINCHGUT CREEK	River	Moderate potential GDE - from national assessment	Central Study Area	alluvium(Qa1): generic	5 – 10 m
F136DL	55625	Wetland	Unclassified potential GDE - from regional studies	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
F138DL	55625	Wetland	Unclassified potential GDE - from regional studies	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
F4409DL	55738	Wetland	Unclassified potential GDE - from regional studies	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
F4487DL	55625	Wetland	Unclassified potential GDE - from regional studies	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
F4493DL	ROCKY LEAD CREEK	River	Moderate potential GDE - from national assessment	Central Study Area	alluvium(Qa1): generic	10 – 20 m
F6106DL	41600	Wetland	Unclassified potential GDE - from regional studies	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m

Structure Number (tower)	Name / Wetland "SRC_UFI"	Groundwater receptor	Potential for groundwater dependence	Study area	Surface geology[1]	Depth to groundwater[2]
F4350DL	70473	Wetland	Moderate potential GDE - from regional studies	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m

Notes:

1 Based on DJPR, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12

2 Based on DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857

Table G-3: Bores intersecting the 100m buffer zone around distribution line crossovers

Crossing ID	Works ID	Groundwater receptor	Purpose	Study area	Surface geology[1]	Depth to groundwater[2]
DLIS_26	53278	Registered bore	Domestic and stock	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	10 – 20 m
DLIS_27	53207	Registered bore	Domestic and stock	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	10 – 20 m
DLIS_29	WRK073286	SRW	Irrigation	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	20 – 50 m
DLIS_30	WRK039924	SRW	Irrigation	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_41	141068	Registered bore	Observation	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	10 – 20 m
DLIS_16	114032	Registered bore	Domestic and stock	Eastern Study Area	Bacchus Marsh Formation (Pxb): generic	10 – 20 m
DLIS_17	WRK045748	SRW	Domestic and Stock	Eastern Study Area	Bacchus Marsh Formation (Pxb): generic	>50 m
DLIS_17	WRK974466	Registered bore	Unknown	Adjacent to Eastern study area	Bacchus Marsh Formation (Pxb): generic	>50 m
DLIS_23	80718	Registered bore	Domestic and stock	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
DLIS_23	WRK992391	Registered bore	Observation	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
DLIS_23	WRK992390	Registered bore	Observation	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
DLIS_23	WRK051533	Registered bore	Observation	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
DLIS_23	WRK992389	Registered bore	SOBN	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m
DLIS_6	333586	Registered bore	Other	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_8	333550	Registered bore	Other	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	5 – 10 m

Notes:

1 Based on DJPR, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12

2 Based on DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857

Table G-4: Aquatic GDEs intersecting the 50m buffer zone around distribution line crossovers

Crossing ID	Name / Wetland "SRC_UFI"	Groundwater receptor	Potential for groundwater dependence	Study area	Surface geology[1]	Depth to groundwater[2]
DLIS_53	WIMMERA RIVER	River	High potential GDE - from national assessment	Western Study Area	alluvium(Qa1): generic	<5 m
DLIS_54	GLENLOFTY CREEK	River	High potential GDE - from national assessment	Western Study Area	Shepparton Formation (Nws): generic	<5 m
DLIS_25	55625	Wetland	Unclassified potential GDE - from regional studies	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_35	BIRCH CREEK	River	Moderate potential GDE - from national assessment	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_35	BIRCH CREEK	River	Moderate potential GDE - from national assessment	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_40	CRESWICK CREEK	River	Moderate potential GDE - from national assessment	Central Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_6	70572	Wetland	Unclassified potential GDE - from regional studies	Eastern Study Area	Newer Volcanic Group - basalt flows (Neo): generic	<5 m
DLIS_18	KORKUPERRIMUL CREEK	River	Moderate potential GDE - from national assessment	Eastern Study Area	Bacchus Marsh Formation (Pxb): generic	10 – 20 m

Notes:

1 Based on DJPR, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12

2 Based on DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857

Table G-5: Aquatic GDEs intersecting the 50m buffer zone around terminal stations

Terminal Station	Groundwater receptor	Potential for groundwater dependence	Study area	Surface geology[1]	Depth to groundwater[2]
Bulgana	Wimmera River	High potential GDE - from national assessment	Western Study Area	Shepparton Formation (Nws): generic	<5 m

Notes:

1 Based on DJPR, Victoria - Seamless Geology 2014, http://earthresources.efirst.com.au/product.asp?pID=1125&cID=12

2 Based on DELWP, 2018, Depth to watertable, http://data2.cerdi.edu.au/dataset/vvg_vaf_depth_watertable_swl100_raw_3857

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