Lochard Energy

MAY 2022

Winton Energy Reserve 1 Facility

Preliminary Groundwater Assessment

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Winton Energy Reserve 1 Facility
Preliminary Groundwater Assessment

Lochard Energy

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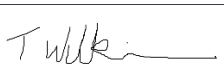
Prepared by:	Tim Wilkinson	1/9/2021	
Reviewed by:	Ray Hatley	2/9/2021	
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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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1 Project Background

1.1 Project description

Lochard Energy (Iona Operations) Pty Ltd, an energy infrastructure company based in Australia, is seeking to develop the land for an energy hub at 386 Lee Road, Winton (the subject site). The proposed energy hub is known as Winton Energy Reserve 1 facility (the project).

The project will utilise hybrid technology with Li-Ion batteries and fast-start high-efficiency duel-fuel gas reciprocating engines and will comprise:

- A 200-megawatt (MW) Gas-Powered Generator (GPG) facility and adjoining ~200 metre (m) gas pipeline including metering station.
- A Battery Energy Storage System (BESS) facility. The BESS facility will supply and absorb 200MW real power with 400-megawatt-hour (MWh) energy storage capacity.
- A single electrical substation for both battery and GPG which then feeds into the local network.
- A ~3 kilometre (km) 220-kilovolt (kV) underground transmission line from the Glenrowan Terminal Station (GTS) to the subject site. The transmission line will cross the Hume Freeway and follow the existing AusNet easement northwest from the GTS. It will then head east within the road reserve of Lee Road before entering the subject site.

The project is located approximately 9 km north east of Benalla and 175 km north east of Melbourne within the Rural City of Benalla (Local Government Area). A concept layout plan for the project is provided on Figure 1.1.

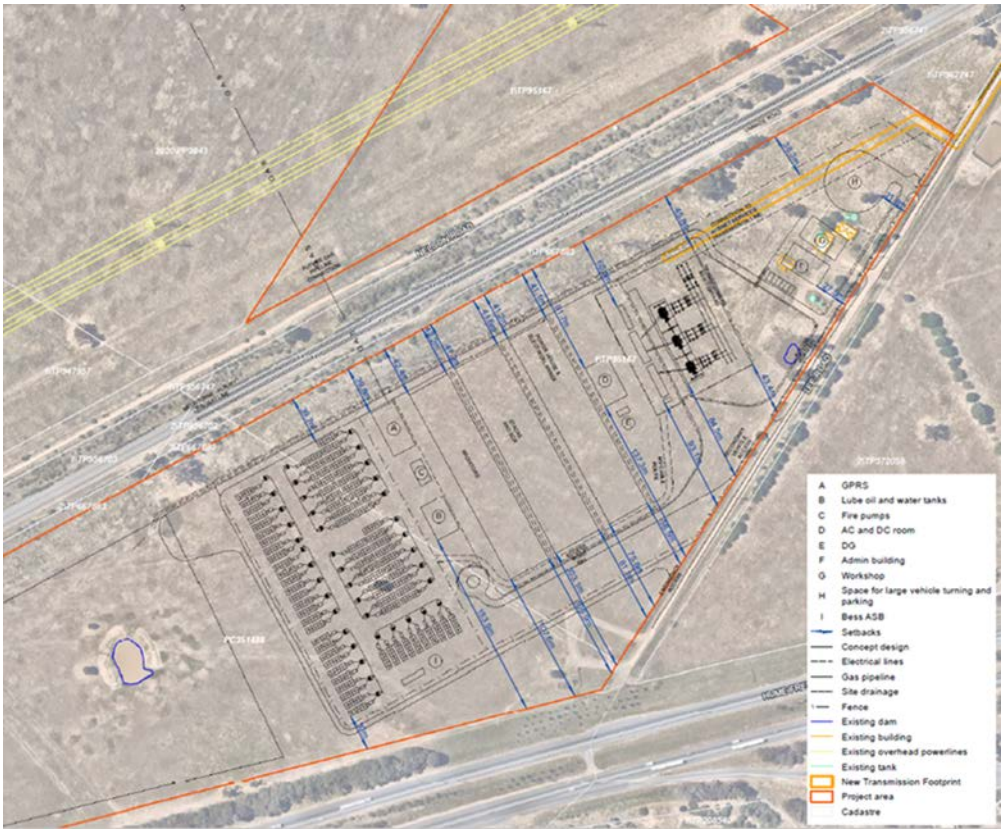


Figure 1.1 Concept layout plan

1.2 Study area

The proposal study area comprises of approximately 40.35 hectare (ha) area of land which is separated into two portions: the northern lot; and the southern lot. The portions are separated by Nelson Road. The northern lot is approximately 5.3 ha whilst the southern lot is approximately 35.05 ha. The project development area will be located within the southern lot as shown in .

1.3 Purpose of this technical report

WSP has been requested by Lochard Energy to prepare the Preliminary Groundwater Assessment to support the statutory planning approvals for the proposal. The purpose of the preliminary assessment report is to identify potential impacts and recommend appropriate design and management measures for the construction and operation of the Facility.

1.4 Scope of works

The following scope was completed as part of the preliminary groundwater assessment:

1 A review of available local geological and hydrogeological information, including:
   - a search of the Water Measurement Information System (WMIS) bore database (DELWP, 2021)
   - a search of the Visualising Victoria's Groundwater website (Federation University, 2021)
   - a search of the Groundwater Dependent Ecosystems Atlas (BoM, 2021)
   - review of readily available data/reports from previous and current studies.

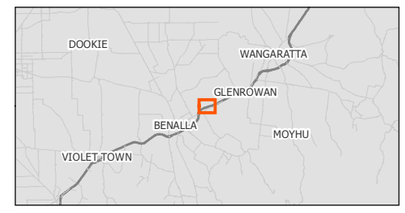
2 Characterisation of the hydrogeological environment near the proposed Facility, including:
   - depth to groundwater
   - groundwater quality (salinity) and segment for environmental values
   - aquifer and aquitard layers
   - sensitive receptors, including groundwater users and groundwater dependent ecosystems (GDE).

3 A preliminary groundwater assessment which includes an assessment of:
   - potential impacts on groundwater levels, quality and sensitive receptors in accordance with Victorian legislative and policy requirements
   - potential direct and indirect impacts associated with the construction and operational phases of the project
   - practical measures to avoid or mitigate impacts, and residual impacts on groundwater following implementation of these measures.

Lochard Energy
Reserve 1 Facility: Winton

Figure 1.2
Proposed Project Location

- Watercourse
- Project area
- Project 1km Buffer



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A3

1:15,000 Date: 2/09/2021

Data sources: - DELWP, Geoscience Australia

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2 Groundwater Legislation

2.1 Legislation, policy, standards and guidelines

The following sections outline the Victorian legislations, policy, and guidelines relevant to water resource management for the groundwater study area.

2.2 Victorian legislation

The framework for the management of groundwater in Victoria is established primarily through the:

- *Water Act 1989* – deals with the sustainable, efficient and equitable management and allocation of groundwater resources.
- *Environment Protection Act 2017* – empowers the Environment Protection Authority Victoria (EPA Victoria) to implement regulations, maintain Environment Reference Standard (ERS), manage waste and protect the environment from pollution. The Act also regulates the discharge or emission of waste to water, land or air by a system of Works Approvals and licences.

Several subordinate legislation and guidelines exist which further expand on the *Water Act 1989* and the *Environment Protection Act 2017*. ERS set out Victorian Government policies that control and reduce environmental pollution and have been formulated for discharges to land, water, atmosphere, and noise emissions. These policies protect the environment and human activities (environmental values) from pollution caused by waste discharges and noise, and are subordinate documents to the *Environment Protection Act 2017*.

The ERS sets out the regulatory framework for the quality of groundwater and surface water in Victoria. The significance of contaminant impact upon groundwater and surface water is assessed in conjunction with the applicable environmental values(s). The ERS defines a range of environmental values for specific segments of the water environment. For groundwater, this is based on salinity. For surface water, this is based on a geographical region of the water body.

The ERS (Part 5, Division 2, Clause 14), states that the *segment* of the water environment is determined by the 'background' water quality level of Total Dissolved Solids (TDS) in groundwater. The segments and their environmental values are summarised in Table 2.1 and Table 2.2.

Table 2.1 Segments (Government of Victoria, 2018)

SEGMENT	A1	A2	B	C	D	E	F
TDS range (mg/L)	0–600	601–1,200	1,201–3,100	3,101–5,400	5,401–7,100	7,101–10,000	>10,001

Table 2.2 Protected environmental values of the segments (Government of Victoria, 2018)

ENVIRONMENTAL VALUES	SEGMENTS (mg/L TDS)						
	A1	A2	B	C	D	E	F
Water dependent ecosystems and species	✓	✓	✓	✓	✓	✓	✓
Potable water supply (desirable)	✓						
Potable water supply (acceptable)		✓					
Potable mineral water supply	✓	✓	✓	✓			

ENVIRONMENTAL VALUES	SEGMENTS (mg/L TDS)						
	A1	A2	B	C	D	E	F
Agriculture and irrigation (irrigation)	✓	✓	✓				
Agriculture and irrigation (stock watering)	✓	✓	✓	✓	✓	✓	
Industrial and commercial use	✓	✓	✓	✓	✓		
Water-based recreation (primary contact recreation)	✓	✓	✓	✓	✓	✓	✓
Traditional Owner cultural values	✓	✓	✓	✓	✓	✓	✓
Buildings and structures	✓	✓	✓	✓	✓	✓	✓
Geothermal properties	✓	✓	✓	✓	✓	✓	✓

EPA Victoria may determine these environmental values do not apply to groundwater where:

- there is insufficient aquifer yield to sustain the environmental value having regard to variation within the aquifer and reasonable bore development techniques to improve yield; or
- the application of groundwater, such as for irrigation, may be a risk to the environmental values of land or the broader environment due to the soil properties; or
- the background water quality level exceeds (or is less than, in the case of indicators such as pH, dissolved oxygen and many biological indicators) the relevant objectives specified in **Table 2.2** and as a result the environmental values cannot be achieved.

2.3 Victorian Aquifer Framework

The *Victorian Aquifer Framework* was developed for the management and reporting of groundwater resources. The framework comprises three levels for managing and reporting on groundwater:

- Groundwater Management Basins;
- Groundwater Catchments; and
- Groundwater Management Units.

2.3.1 Groundwater Management Basins and Groundwater Catchments

Groundwater Management Basins and Groundwater Catchments are used for planning and reporting on groundwater conditions. These areas represent regions of connected groundwater resources and are based on groundwater flow systems, as well as administration and surface water management boundaries.

The Facility is within the:

- Goulburn Murray Basin (Murray Basin) Groundwater Management Basin
- Goulburn-Broken Groundwater catchment.

2.3.2 Groundwater Management Units

Groundwater Management Units 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:

Water Supply Protection Areas

A Water Supply Protection Area (WSPA) is an area declared under the *Water Act 1989* to protect the groundwater or surface water resources through the development of a statutory management plan. There are currently 16 WSPAs declared in Victoria. There is no declared groundwater WSPA over the Facility's location.

Groundwater Management Areas

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 Volumes (PCV) for ongoing groundwater usage management.

The proposed Facility is within the Broken Groundwater Management Area.

2.3.3 Broken Groundwater Management Area

The Broken Groundwater Management Area (GMA) is located upstream of Lake Nillahcootie. The Broken GMA extends from the Victorian Alps to just south of the Murray River. It includes the Broken River and Broken Creek catchments. Groundwater resources in the Broken GMA occur within sedimentary (alluvial) aquifers which form part of the Goulburn-Murray Sedimentary Plain Sustainable Diversion Limit (SDL) and fractured rock aquifers that are part of the Goulburn-Murray Highlands SDL units. Both SDL units are set by the Murray Darling Basin Plan.

2.3.4 Groundwater licencing requirements

Rural Water corporations are responsible for assessing licence applications, deciding whether to issue licences and the terms and conditions on which the licence is issued. In the case that excavations penetrate the water table and dewatering is required, a licence to take groundwater must be sought from Goulburn-Murray Water.

The discharge of dewatered groundwater to the environment or to drainage infrastructure will need to be licensed by Goulburn-Murray Water, however water disposal to a licensed facility will not require a licence. An assessment of volume and water chemistry will need to be carried out to assess the most appropriate discharge method and obtain the relevant approvals if needed.

3 Existing Environment

3.1 Site detail summary

A summary of the site setting is provided in Table 3.1.

Table 3.1 Summary of Site Details

PARAMETER	SITE DETAILS
Site address	386 Lee Road, Winton
Title information	Plan PC351488 and B Lot 1 TP95167
Land area	403,498 m^2 (40.35 ha)
Local council	Rural City of Benalla
Zoning and overlays	— Farming Zone (FZ) Other: — Designated Bushfire Prone Areas
Current site use(s)	— Vacant land — Farmhouse/residential in the north east end of the southern lot — Existing gas pipeline and power transmission within the Facility site
Proposed site use	— Energy Reserve 1 Facility: hybrid technology with Li-ion batteries and fast-start high-efficiency dual-fuel gas reciprocating engines BESS, GPG and gas pipeline.
Surrounding land uses	— **North**: undeveloped vacant land and partly bound to Nelson Road — **East**: undeveloped vacant land and partly bound to Lee Road — **South:** Hume Highway follow by undeveloped vacant land, Mokoan Rest Area (160 south-east), residential/farmhouses (300 m south and 1 km south-west), Winton Bushland Reserve (388 m south), Winton Fire Station (760 south-west), former Esso service station (750 m south-west), Winton Motor Raceway and campground (790 m south-west). — **West:** undeveloped vacant land and Seven Mile Creek (approximately 350 m).

3.2 Location, topography and surrounding land use

The proposed Facility is within former agricultural land, 9 km east of the township of Benalla and just north of the Winton township in the north-eastern region of Victoria. The Winton wetland is directly north of the proposed Facility area. The topography is generally higher at the southern end and lower in the west and north, with the surface elevation varying between 180 metres Australian height datum (mAHD) in the south to 170 mAHD to the north and west. Surrounding land uses identified within 150 m of the site comprises of vacant land in all directions.

3.3 Climate

The local area climate is characterised as temperate area with a mean annual rainfall of 652.8 mm/yr measured at the Bureau of Meteorology (BoM) Station #082002 at Benalla (Shadforth St) from 1806 to 2006 and #082170 (Benalla airport) from 2006 to present. Average monthly rainfall is relatively consistent over the year, although rainfall can higher in the spring and autumn months. Monthly climate averages are summarised in Table 3.2.

Table 3.2 Monthly climate averages

MONTH	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Rainfall (mm)	40.6	44.9	61.6	71.5	60.7	48.0	40.8	43.3	61.6	72.1	60.8	46.8
Temperature (ºC)	31	30.8	27.4	22.2	17.4	13.8	12.8	14.6	17.7	21.4	25.4	28.8

3.4 Geology

The proposed Facility lies within the Quaternary Shepperton Formation comprising of clay, sand, silt and poorly-sorted lenticular gravel. The Shepperton Formation is dissected by flood plain alluvium with terraces 1-10 m above present river channels with well developed soil 2-3 m thick. The Shepperton Formation overlies the sedimentary basement rocks of the Adaminaby Group (Pinnak Sandstone). Table 3.3 details the site stratigraphy.

Table 3.3 Stratigraphic units

UNIT NAME	DESCRIPTION	THICKNESS
Shepperton Formation	Unconsolidated to poorly consolidated mottled variegated clay, silty clay with lenses of polymictic, coarse to fine sand and gravel; partly modified by pedogenesis, includes intercalated red-brown paleosols. Forms extensive flat alluvial floodplains	0 – 9 m
Adaminaby Group	Marine: sandstone, mudstone, siltstone, minor chert	9 – 200 m

3.5 Hydrogeology

The groundwater resource units present at the area have been identified using the Department of Environment, Land, Water and Planning (DELWP) interactive online map. The groundwater resource unit report is provided in Appendix A. All identified units are presented in Table 3.4 and discussed in more detail below.

Table 3.4 Groundwater resource units

GROUNDWATER LAYERS (AQUIFERS AND AQUITARDS)	ESTIMATED DEPTH BELOW SURFACE (m)	DEPTH TO WATER TABLE (m)	GROUNDWATER SALINITY (mg/L)	CHARACTERISTICS
UTQA Upper Tertiary / Quaternary Aquifer; comprising: Shepparton Formation (Murray)	0-9	<5	500 - 1000	Layered clay, sands and silt

BSE* Mesozoic and Palaeozoic Bedrock (basement) Adaminaby Group (Pinnak Sandstone)	9-200	N/A	1001 – 3,500	Sedimentary (fractured rock): Sandstone, siltstone, mudstone, shale

** Mesozoic and Palaeozoic Bedrock (BSE)*

3.5.1 UTQA - Upper Tertiary / Quaternary Aquifer; comprising: Shepparton Formation (Murray)

The Quaternary Shepparton Formation (QTQA) is variable in composition, generally consisting of clays and silts with isolated lenses of sands and gravels. Permeability of the fine sediments is poor, while the more permeable gravel lenses are deposited along the ancestral Broken River valley to the west of the site. The alluvial water bearing zones generally have highly variable hydraulic conductivities, exhibiting higher flows in water bearing zones dominated by sand and gravel and lower flows in zones with high silts and clay content.

3.5.2 BSE - Mesozoic and Palaeozoic Bedrock (basement)

Underlying the QTQA is the basement (BSE) fractured bedrock aquifer, which are present throughout much of the Broken GMA. These include Mesozoic and Palaeozoic aged sedimentary (mudstone, siltstone and sandstone), metamorphic (schist and phyllite) and intrusive (granite) rocks. The primary porosity (intergranular void space) of the Mesozoic and Palaeozoic bedrock aquifer strata is generally low as the sediments are fully lithified, leading to very low hydraulic conductivities in the matrix where there is minimal fracturing. Groundwater flow is usually dominated by the secondary porosity, and as such, is highly variable and dependant on the density and distribution of structural defects (including fractures, joints and bedding planes) to provide conduits for groundwater flow. The bedrock aquifer is an important source of domestic water supply for residents without access to reticulated water. It is also used to support industrial, commercial and agricultural industries.

The local water table is present in the sedimentary aquifers of the QTQA.

3.6 Groundwater levels and flow direction

A search of groundwater level data for bores within one kilometre of the proposed Facility, within the Water Measurement Information System (WMIS), returned zero water level records. Groundwater level estimates from Visualising Victoria's Groundwater (VVG) map shows groundwater is generally less than 5 metres below ground level (mBGL) across the site, with a small portion to the south of the site inferred to be between 5 to 10 mBGL. The regional shallow groundwater flow direction is likely a subdued reflection of topography and would likely flow north-north west towards the Winton wetland, which is the closest topographically low area.

3.7 Groundwater quality

Groundwater salinity on the sedimentary plains north of Benalla tends to be between borderline potable and brackish with salinity levels ranging from 1,000 mg/L up to 35,000 mg/L (GMW, 2016). Locally, groundwater resource reports show the water table salinity (QTQA alluvial aquifers) has a Total Dissolved Solids (TDS) between 3,500 to 7,000 mg/L (DELWP, 2021) and is categorised as Segment C type (see Tables 2.1 and 2.2). This translates into the groundwater having the potential to be used for all environmental values detailed in Table 2.2, except for potable water supply and agriculture irrigation.

A search of the WMIS identified 10 bores (out of 23) within one kilometre of the proposed Facility (refer Section 3.9.1) with water quality data. All are screened in the underlying BSE fractured rock aquifer. No local groundwater quality data was identified for bores screened within the UTQA alluvial sediments.

Groundwater quality from the ten local bores screened in the underlying BSE fractured rock aquifer is summarised in **Table 3.5**. The observed results indicate that groundwater salinity is potentially fresher in the underlying fractured rock aquifer than the Quaternary Shepparton Formation alluvial aquifers.

Table 3.5 Local groundwater quality

PARAMETER NAME	UNIT OF MEASURE	AVERAGE	MINIMUM	MAXIMUM
Electrical Conductivity	µS/cm @ 25°C	852.9	430	2700
Salinity (TDS)*	mg/L	554.4	279.5	1,755
Bicarbonate (HCO3)	mg/L	297.4	207.3	384
Calcium (Ca)	mg/L	10.5	1	39
Carbonate (CO3)	mg/L	18.7	12	30
Chloride (Cl)	mg/L	93.7	31	520
Hardness (CaCO3)	mg/L	53.0	53	53
Hardness (CaCO3 calc.)	mg/L	112.2	23	455
Iron (Undigested), as Fe	mg/L	0.1	0.1	0.1
Iron (total as Fe)	mg/L	3.5	0.3	8
Magnesium (Mg)	mg/L	19.4	5	86
Nitrate & Nitrite (as N)	mg/L	0.1	0.1	0.1
Nitrate + Nitrite (as N)	mg/L	0.2	0.2	0.2
Nitrate (N)	mg/L	0.3	0.2	0.5
Potassium	mg/L	3.2	1.6	7
Silica (total as SiO2)	mg/L	27	27	27
Sodium (Na)	mg/L	147.6	77	380
Sulphate (SO4)	mg/L	30.2	5	110
Total Alkalinity (CaCO3)	mg/L	303.3	170	520
Total Dissolved Solids (at 105C)	mg/L	407.8	407.8	407.8

Note: * TDS = Electrical conductivity * 0.65

3.8 Recharge and discharge

The primary recharge mechanism to the groundwater systems is by direct rainfall infiltration within the groundwater catchment. The proportion of net rainfall recharging the groundwater systems depends largely on the characteristics of the surface geology, soils, topography, the land use and depth to the water table. Recharge is expected to be low where the surface is covered by residual clayey soils and colluvium with a low hydraulic conductivity.

The UTQA Shepparton Formation alluvial aquifer is predominantly recharged by direct rainfall and interactions with surface water features during periods of high flow or flood conditions where the water table is below the stream water level. Recharge rates will largely depend on the river stage and hydraulic characteristics of the river bed material and underlying geology.

Discharge from the Shepparton Formation alluvial aquifer occurs via baseflow contribution to surface water features where the water level in a stream is below the surrounding groundwater level. Baseflow discharge mainly occurs near the Broken River west of Benalla and not in the small surface water features near the proposed Facility site. Vertical infiltration from the shallow alluvial system down to the underlying fractured rock aquifer and evapotranspiration from the vegetation, soil and surface water bodies are the main mechanism of groundwater discharge in the area near the proposed Facility. The evapotranspiration rate depends on land use and depth to groundwater.

Extraction of groundwater from existing bores near the proposed Facility may also be considered a mechanism of discharge from the deeper BSE fractured rock groundwater systems. Small volume of groundwater is extracted by bores (both licensed, and domestic and stock) and estimated to be less than 1% of annual average recharge over the whole GMA (GMW, 2016). Ten stock and domestic bores are registered to the south west of the site in the township of Winton (refer Section 3.9).

3.9 Sensitive receptors

3.9.1 Groundwater users

A total of 23 groundwater bores were identified in the search within a one kilometre buffer and are shown on

Figure 3.1. Registered groundwater bores were identified using WMIS (DELWP, 2021). Of these bores, ten have environmental values of groundwater that are broken down in the following way:

- four domestic
- six domestic and stock.

Of the remaining bores, seven are groundwater investigation bores, and six are observation bores. Details of the ten groundwater bores with environmental values are provided in Table 3.6. They are all located within the township of Winton.

Table 3.6 Groundwater bore details

BORE ID	EASTING*	NORTHING*	ENVIRONMENTAL VALUE	DEPTH	GEOLOGY
103835	417809	5958735	Stock and domestic	42	-
103836	417776	5958713	Stock and domestic	48.1	42-46 m: SANDSTONE
103838	417779	5958797	Domestic	138	29-36 m: BASALT
103839	417826	5958824	Domestic	137	6-40 m: BASALT
103840	417882	5958826	Domestic	70.1	63-69 m: CLAY
103845	417593	5958524	Stock and domestic, miscellaneous	42.67	33.5-42.7 m: SHALE
103848	417840	5958837	Domestic	120	-
123619	417561	5958753	Stock and domestic	62	-
124897	417469	5958716	Stock and domestic	62	-
WRK081888	417486	5958684	Stock and domestic	90	-

Note: * Coordinate reference system: GDA94 zone 55

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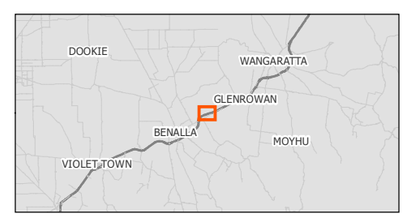
Figure 3.1
Registered Beneficial Groundwater Users Within 1 km of Proposed Facility

- Watercourse
- Project area
- Project 1km Buffer

Registered Beneficial Groundwater Users (Within 1km)

- Domestic
- Domestic and Stock



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Data sources: - DELWP, Geoscience Australia

3.9.2 *Groundwater dependent ecosystems*

Groundwater Dependent Ecosystems (GDEs) are communities of plants, animals and other organisms that depend on groundwater for survival (Department of Land and Water Conservation, 2002). A GDE may be either entirely dependent on groundwater for survival, or may use groundwater opportunistically or for a supplementary source of water (Hatton and Evans, 1998). In the Broken GMA groundwater dependent ecosystems include:

- ecosystems dependent on surface expression of groundwater (springs, wetlands, aquatic pools, baseflow); and
- ecosystems dependent on subsurface expression of groundwater where roots tap into the groundwater system (e.g. riparian and terrestrial vegetation).

A review of the Bureau of Meteorology Groundwater Dependent Ecosystems Atlas (GDE Atlas, published by the Australian Bureau of Meteorology). The GDE Atlas was developed as a national dataset of Australian GDEs to inform groundwater planning and management. The register indicates there are areas of low, moderate and high potential terrestrial GDE in the area. The search of the GDE Atlas identified high priority GDEs within two kilometres of the proposed Facility and are presented on Figure 3.2. There are three moderate and high priority terrestrial and two aquatic ecosystems identified:

- Terrestrial ecosystems are the Plains Woodland; Plains Grassy Woodland; and Plains Grassy Woodland/Gilgai Wetland Mosaic.
- Aquatic ecosystems are Bill Friday Swamp (wetland); and Seven Mile Creek (river).

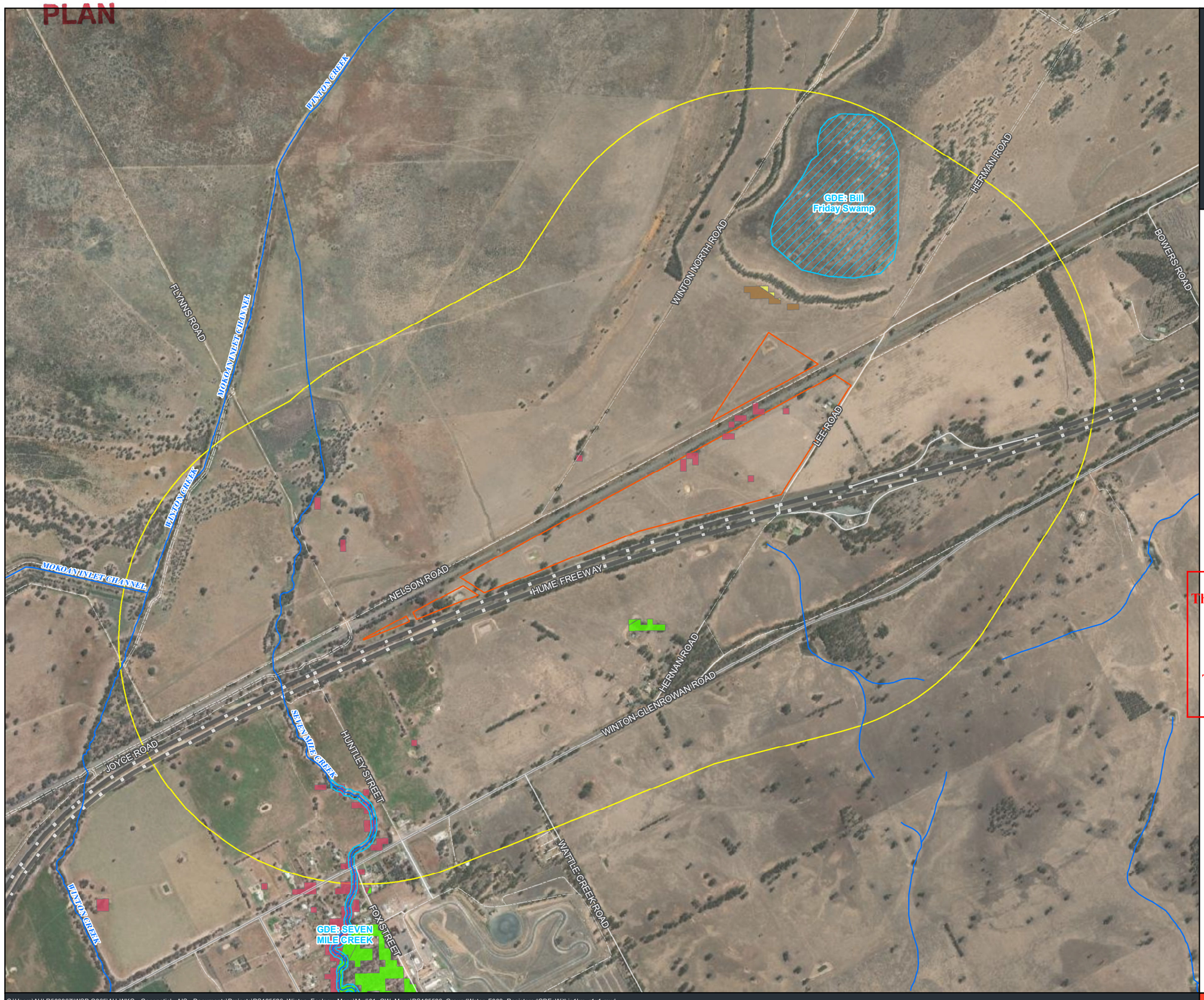

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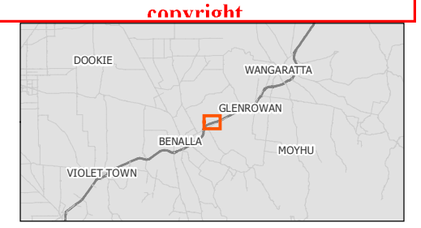
Figure 3.2
Registered GDEs Within
1 km of Proposed Facility

- Watercourse
- Project area
- Project 1km Buffer
- Aquatic GDE (Moderate or High Potential)

Terrestrial GDE (Moderate or High Potential)

- Box Ironbark Forest
- Creekline Grassy Woodland
- Plains Grassy Woodland
- Plains Grassy Woodland/Gilgai Wetland Mosaic
- Plains Woodland



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A3

1:15,000 Date: 2/09/2021

Data sources: - Bureau of Meteorology, DELWP, Geoscience Australia

3.10 Existing environment summary

As indicated in Section 2, the proposed Facility is in the Broken GMA. The local water table is the alluvial aquifer of the Shepparton Formation (UTQA, Table 3.4**)**, consisting of clays and silts with isolated lenses of sands and gravels. Permeability of the fine sediments is poor, while the more permeable gravel lenses are deposited along the ancestral Broken River valley. Beneath the alluvial aquifer is the BSE fractured rock aquifer, which is present throughout much of the Broken GMA.

The depth to water is generally less than 5 mBGL across the site and likely flows in north-north east direction towards the Winton wetland. The water table salinity is 3,500 to 7,000 mg/L (DELWP, 2021). There are no environmental values users extracting groundwater from the shallow alluvial aquifer. The deeper BSE fractured rock aquifer are confined to semi-confined, and is generally low yielding (typically less than 0.5 L/sec), with groundwater and groundwater flow occurring in secondary porosity fractures and joints. There are ten local environmental values (stock and domestic) users extracting groundwater from the BSE fractured rock aquifer in the Winton township. A summary of the water table data is provided in Table 3.7.

Table 3.7 Summary of UTQA groundwater information

FLOW DIRECTION(1)	DEPTH TO WATER(2)	AVERAGE BORE YIELD (L/S) (3)	MINIIMUM TDS RANGE (2)	ENVIRONMENTAL VALUES SEGMENT(4)
N - NE	<5 m	0.5 L/s	3,500 mg/L	C

(1) Groundwater flow direction is inferred to follow the local topography. (2) Groundwater resource report water table salinity (Appendix A) (DELWP, 2021). (3) Broken Groundwater Management Area Local Management Plan (GMW, 2016). (4) Refer to Table 2.2

4 Preliminary Groundwater Impact Assessment

4.1 Potential impacts and mitigation measures

A preliminary groundwater impact assessment has been completed following a review of available information in the vicinity of the proposed Facility. The assessment includes consideration of the source of potential impacts to both groundwater levels and quality of the local groundwater system during construction and operation of the proposed Facility. Potential impacts to groundwater and mitigation measures associated with the proposed Facility are outlined in Table 4.1.

Table 4.1 Summary of potential impacts and proposed mitigation measures

POTENTIAL IMPACTS	POTENTIAL SOURCE	PROPOSED MITIGATION MEASURES	POTENTIAL IMPACT ON FACILITY DESIGN
Contamination of groundwater system	Accidental spills and leaks of fuels, oil, battery fluid, leaking dirty water dams	Mitigation measures include: — appropriate design of refuelling areas with drainage and collection ponds to capture any spills or leaks — nominated and bunded fuel and chemical storage areas — nominated point for refuelling and fluid top up vehicles and plant — spill kits for cleaning up chemical, oil and fuel spillages — project environmental management plans outlining responsibilities and maintenance trigger and equipment inspections frequency — personnel purpose trained.	Facility infrastructure design to consider mitigation and control measures or structures to limit uncontrolled releases to the environment
Reduction in groundwater levels affecting existing users / sensitive receptors such as registered and unregistered groundwater bores, GDEs	Groundwater intercepted during excavation works during construction phase of Facility	In the event that groundwater is encountered during construction works then: — estimate magnitude of impact using analytical calculation methods — comparison of groundwater levels to detailed design documents to assess potential for groundwater interception — return dewatered groundwater back to the environment after suitable treatment (if necessary and practicable) — “make-good” provisions by providing alternative water supplies if required.	No material impact on Facility design. Potential impacts limited to construction period. Licence for groundwater ‘take’ may be required

5 Conclusion and recommendations

Lochard Energy propose to develop an Energy Reserve 1 Facility that will utilise hybrid energy generation technology including gas powered generation, and a battery energy storage system at the Winton site.

Based on the findings of this preliminary groundwater assessment, the potential for the construction and operational phases of the project to lead to groundwater related impacts is low as there is no interaction with groundwater during construction or operation of the currently proposed Facility.

There is potential for groundwater quality impacts from uncontrolled fuel and chemicals spills from vehicles and Facility equipment. This risk will be mitigated by appropriate design of Facility infrastructure to capture, contain and manage any spills or leaks. Procedures detailed in a project environmental management plan will also be followed.

It is recommended that an intrusive groundwater assessment, consisting of the installation of shallow monitoring bores should be undertaken prior to the planned construction works. Site specific groundwater data will inform the Facility design and ensure any potential environmental risk can be assessed and managed accordingly. Installation of shallow monitoring bores intercepting the water table will be utilised to monitor the local groundwater conditions (levels and quality) and detect any changes to the groundwater resource that may occur during the operating life of the Facility. The installation and management of the shallow monitoring bores will be done in accordance with Construction and Environmental Management Plan (CEMP) for the Facility. Locations of the proposed monitoring bores will be targeted in between the proposed Facility and local sensitive receptors (stock and domestic bores and GDE's including the Winton wetland).

6 Limitations

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7 References

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Groundwater resource report

Appendix A

Limitations

Appendix B