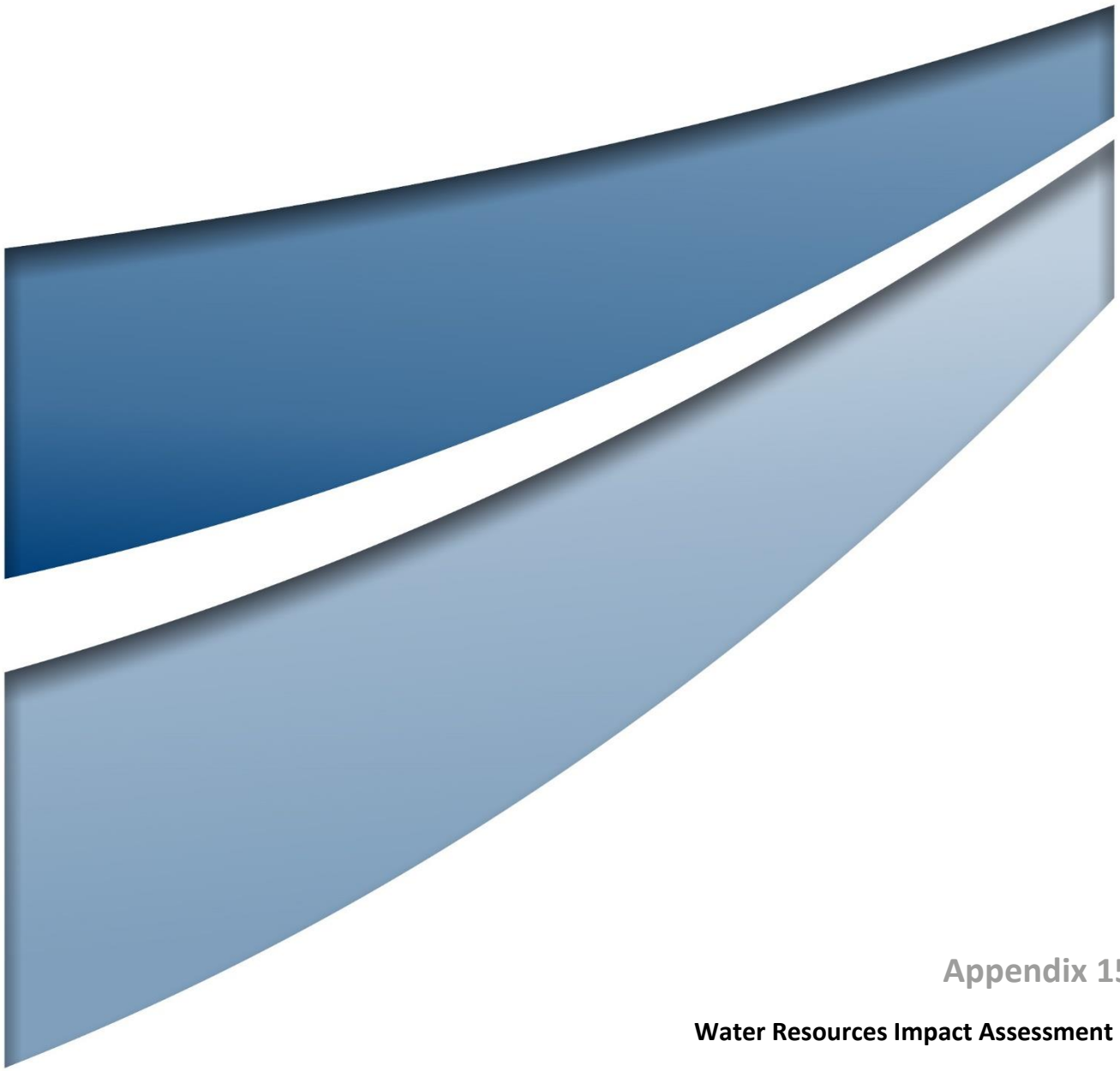

Appendix 15

Water Resources Impact Assessment

umwelt
Environmental & Social Consultants

windlab

JUNCTION RIVERS WIND PROJECT

Water Resources Impact Assessment

FINAL

May 2024

JUNCTION RIVERS WIND PROJECT

Water Resources Impact Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Windlab

Project Director: Paul Douglass
Project Manager: Lachlan Sweeney
Report No. 22601/R03
Date: May 2024

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	Lachlan Sweeney	23/05/2024	Paul Douglass	23/05/2024

Abbreviations

Term/Abbreviation	Definition
AHD	Australian Height Datum. A common national surface level datum approximately corresponding to mean sea level.
ARR	Australian Rainfall and Runoff. Guidelines prepared by the Institute of Engineers Australia for the estimation of design floods.
ASS / PASS	Acid Sulfate Soils or Potential Acid Sulfate Soils
BESS	Battery Energy Storage System
CEMP	Construction Environmental Management Plan
GW	Gigawatt
GWh	Gigawatt-hour
ICNIRP	International Commission on Non-Ionizing Radiation Protection
kL	Kilolitre, one thousand litres
km	Kilometres
kV	Kilovolt
m AHD	Metres Australian Height Datum (AHD)
m/s	Metres per second. Unit used to describe the velocity of floodwaters.
m^3/s	Cubic metres per second or “cumecs”. A unit of measurement of creek or river flows or discharges. It is the rate of flow of water measured in terms of volume per unit time.
MHRDC	Maximum Harvestable Right Dam Capacity
ML	Megalitre, one million litres
MW	Megawatt
NVR Map	Native Vegetation Regulatory Map
WAL	Water Access License
WSP	Water Sharing Plan
WTG	Wind Turbine Generator

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1.0 Introduction

1.1 Project Overview

Windlab Pty Ltd (Windlab) proposes to develop the Junction Rivers Wind Project (the Project), located approximately 15 kilometres (km) south of Balranald and 140 km west of Hay. The Project is within the Murray River Local Government Area (LGA) and immediately east of Balranald LGA (refer to **Figure 1.1**).

Windlab proposes to develop the Project to generate renewable wind energy to supply the National Electricity Market (NEM). The Project will have a capacity of approximately 750 megawatts (MW), with the construction and operation of up to 96 wind turbine generators (WTG), up to four battery energy storage system (BESS) or static synchronous compensator (STATcom) facilities and associated infrastructure and facilities including operation and maintenance buildings, access roads, civil works, electrical infrastructure and temporary facilities for the construction phases. The Project Area encompasses approximately 16,367 hectares (ha), while Project infrastructure will cover approximately 768 ha (development footprint).

The Project is State Significant Development (SSD-30448824) as defined under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) and will require development consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.2 Project Design

The key components of the Project are:

- up to 96 (3 blade) WTGs with a maximum total height (tip height) of 300 metres (m)
- electrical connections between the proposed WTGs and substations/switching stations consisting of a combination of underground cables and overhead powerlines
- substations/switching stations and transmission connections to connect the proposed WTGs to the existing 220 kV transmission line and/or the Project EnergyConnect transmission line
- up to four BESS facilities (to a total of 200 megawatts (MW) with a 4 hour delivery capacity), or up to four STATCOM facilities
- other associated infrastructure including access roads and tracks, operation and maintenance buildings and construction facilities
- temporary on-site concrete batching plants and rock crushing facilities during the construction phases
- targeted road network upgrades to facilitate delivery of WTG components to the site as required.

The Project may be constructed in two stages. Stage 1 would see the construction of up to 30 WTGs and required ancillary infrastructure and Stage 2 would see the construction of the remaining WTGs and required ancillary infrastructure. The Project infrastructure layout will be finalised during the detailed design phase. An overview of the Project is provided in **Figure 1.2**.

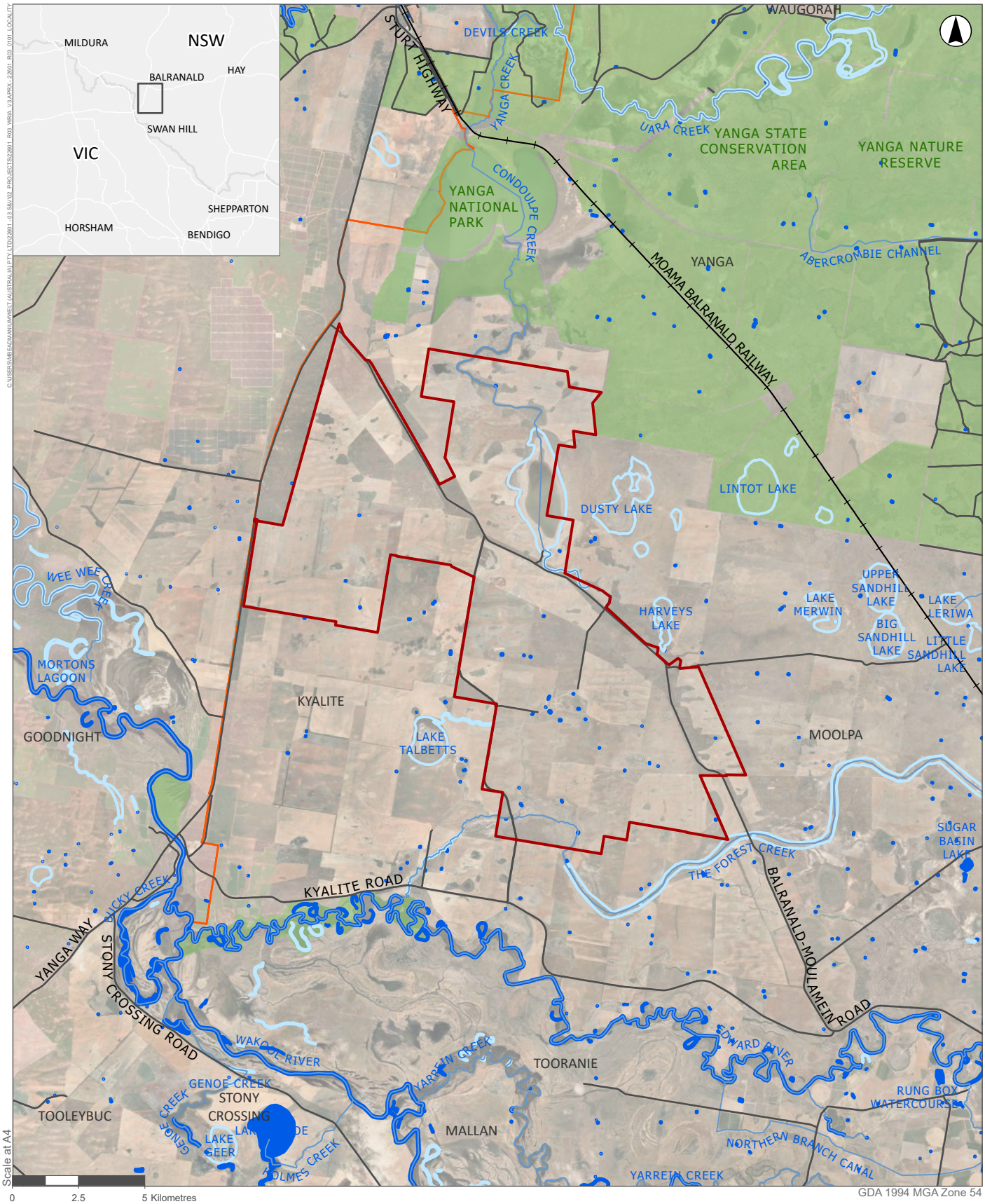
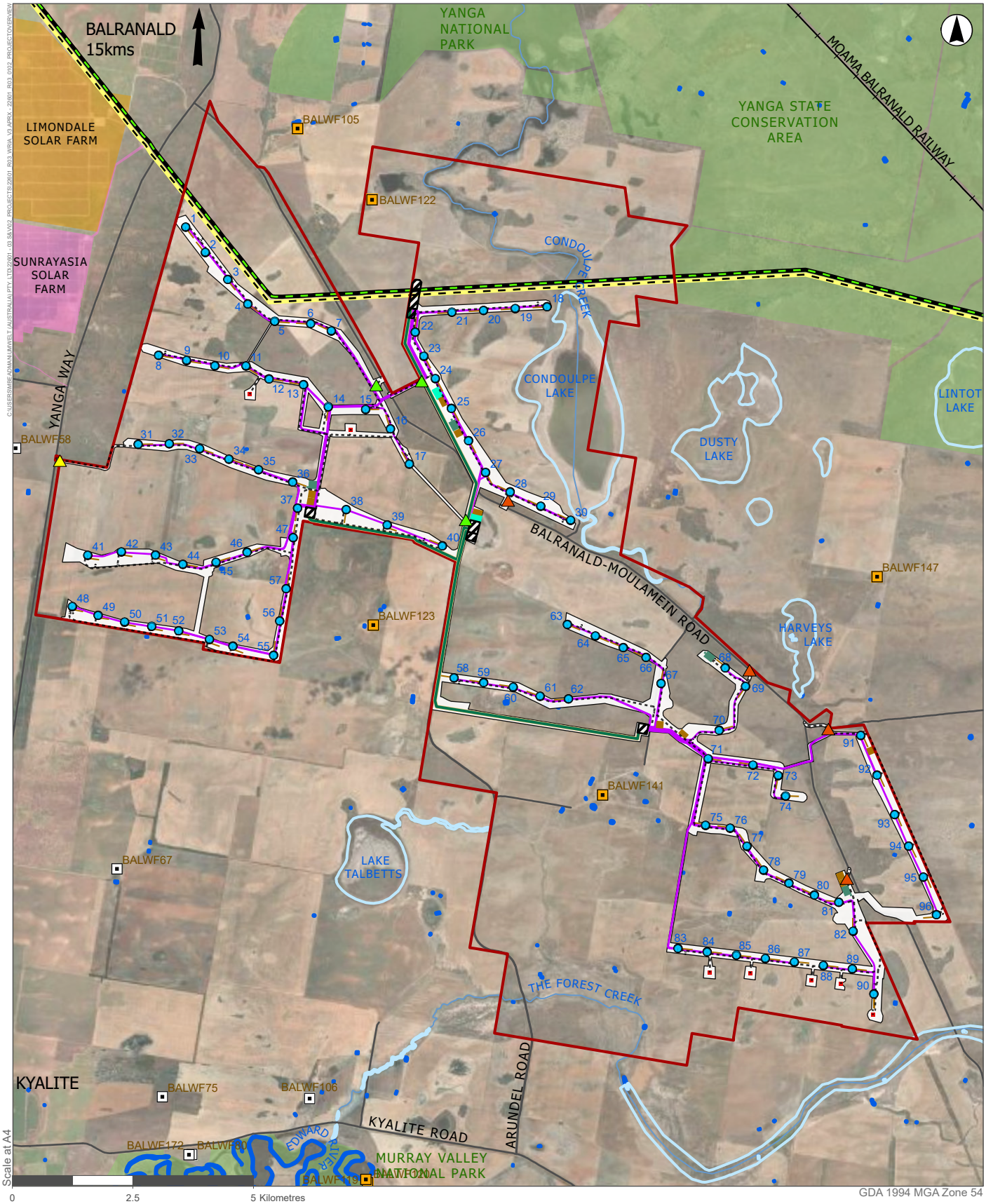


FIGURE 1.1

Locality

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)



Legend

- Project Area
- Development Corridor
- Limondale Solar Farm
- Sunrayasia Solar Farm
- Wind Turbine Generator
- Emergency Only Access Point
- Primary Access Point
- Secondary Access Point
- Access Tracks
- 33 kV Internal Reticulation (underground)
- 220 kV/330 kV Internal Reticulation (overhead)
- Operations and Maintenance Compound
- Concrete Batching Plant
- Temporary Construction Facilities
- BESS/STATcom/Substation/Switching Station
- PROP_Windlab_Dwellings_Houses_240513_GDA20z54
- Associated Dwelling
- Non-Associated Dwelling
- Permanent Power Performance Mast (Potential Location)
- 220 kV TransGrid Transmission Line
- Project Energy Connect Transmission Line
- Mainly Dry/Non-Perennial Waterbody
- Perennial Waterbody
- Watercourse
- Road
- Railway
- NPWS Reserve

FIGURE 1.2

Project Overview

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

1.3 Purpose and Scope of this Report

This Water Resources Impact Assessment (WRIA) has been prepared by Umwelt (Australia) Pty Ltd (Umwelt) in accordance with the Secretary's Environmental Assessment Requirements (SEARs) (dated 19 December 2023) issued by the Department of Planning and Environment (DPE) (now Department of Planning, Housing and Infrastructure (DPHI)) as presented in **Section 1.5**.

This WRIA considers the potential impacts of the Project on water resources in the vicinity of the Project Area, and includes:

- assessments of the following for all phases of the Project:
    - potential impacts on groundwater levels, groundwater quality and groundwater dependent ecosystems (GDEs)
    - potential impacts on soils and stream health (water quality and stream stability) due to erosion and sedimentation
    - potential impacts to groundwater and surface water availability including for downstream water users
    - available and secure water sources to meet Project water demands and any associated water licensing requirements
- identification of any mitigation and management measures to minimise potential impacts of the Project on water and soil resources.

1.4 Statutory Context, Policy and Guidelines

This report has been prepared in accordance with the guidelines and legislation identified below.

General

- NSW *Water Management Act 2000* (WM Act)
- NSW *Water Act 1912* (Water Act)
- relevant Water Sharing Plans within the Project Area.

Groundwater

- NSW State Groundwater Policy Framework Document and component policies (DPE)
- NSW Aquifer Interference Policy 2012 (DPE)
- National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC).

Surface Water

- NSW Government Water Quality and River Flow Objectives at http://www.environment.nsw.gov.au/ieo/
- Australian Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia, 2018) (ANZG, 2018)
- Managing Urban Stormwater: Soils and construction (Landcom, 2004) and Volume 2 (Department of Environment and Climate Change, 2008)
- Storing and Handling Liquids: Environmental Protection – Participants Handbook (Department of Environment and Climate Change, 2007).

Guidelines for Controlled Activities on Waterfront Land:

- Guidelines for riparian corridors on waterfront land (DPE Water, 2018)
- Guidelines for instream works on waterfront land (DPE Water, 2022)
- Guidelines for vegetation management plans on waterfront land (DPE Water, 2022)
- Guidelines for watercourse crossings on waterfront land (DPE Water, 2022)
- Controlled Activities on Waterfront Land: Controlled activity exemptions on waterfront land (DPE Water, 2022).

1.5 Summary of SEARs

The SEARs identify matters that must be addressed in the Environmental Impact Statement (EIS). **Table 1.1** references the relevant requirements for water and soils, and where the SEARs have been addressed in this report.

Table 1.1 SEARs Items and Responses

Requirement	Section
Water and Soils – including: • an assessment of the likely impacts of the development (including flooding and flood modelling) on surface water and groundwater resources traversing the site and surrounding watercourses (including their Strahler Stream Order), drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils, related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts;	**Section 2.0**, **Section 4.0** and **Section 5.0** Flooding – refer to **Appendix 16** of the EIS
• a site water balance for the development, quantify water demand, identify water sources (surface and groundwater), including any licensing requirements, and determine whether an adequate and secure water supply is available for the development;	Site water balance – refer to **Appendix 16** of the EIS **Section 2.6**, **Section 2.8**, **Section 3.3**

Requirement	Section
• where the project involves works within 40 metres of the high bank of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI *Guidelines for Controlled Activities on Waterfront Land* (2018) and (if necessary) *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (DPI, 2003); and *Policy & Guidelines for Fish Habitat Conservation & Management* (DPI, 2013);	**Section 3.2**
• a description of the measures to minimise surface and groundwater impacts, including how works on erodible soil types would be managed and any contingency requirements to address residual impacts in accordance with the *Managing Urban Stormwater: Soils and Construction* series of guidelines;	**Section 3.1.1.1** and **Section 3.1.2**
• an assessment of risks of dust generation and propose mitigation measures designed in accordance with the *Approved Methods and Guidelines for the Modelling and Assessment of Air Pollutants in New South Wales* (DECC, 2005).	**Section 6.9** of the EIS

2.0 Existing Environment

2.1 Hydrology

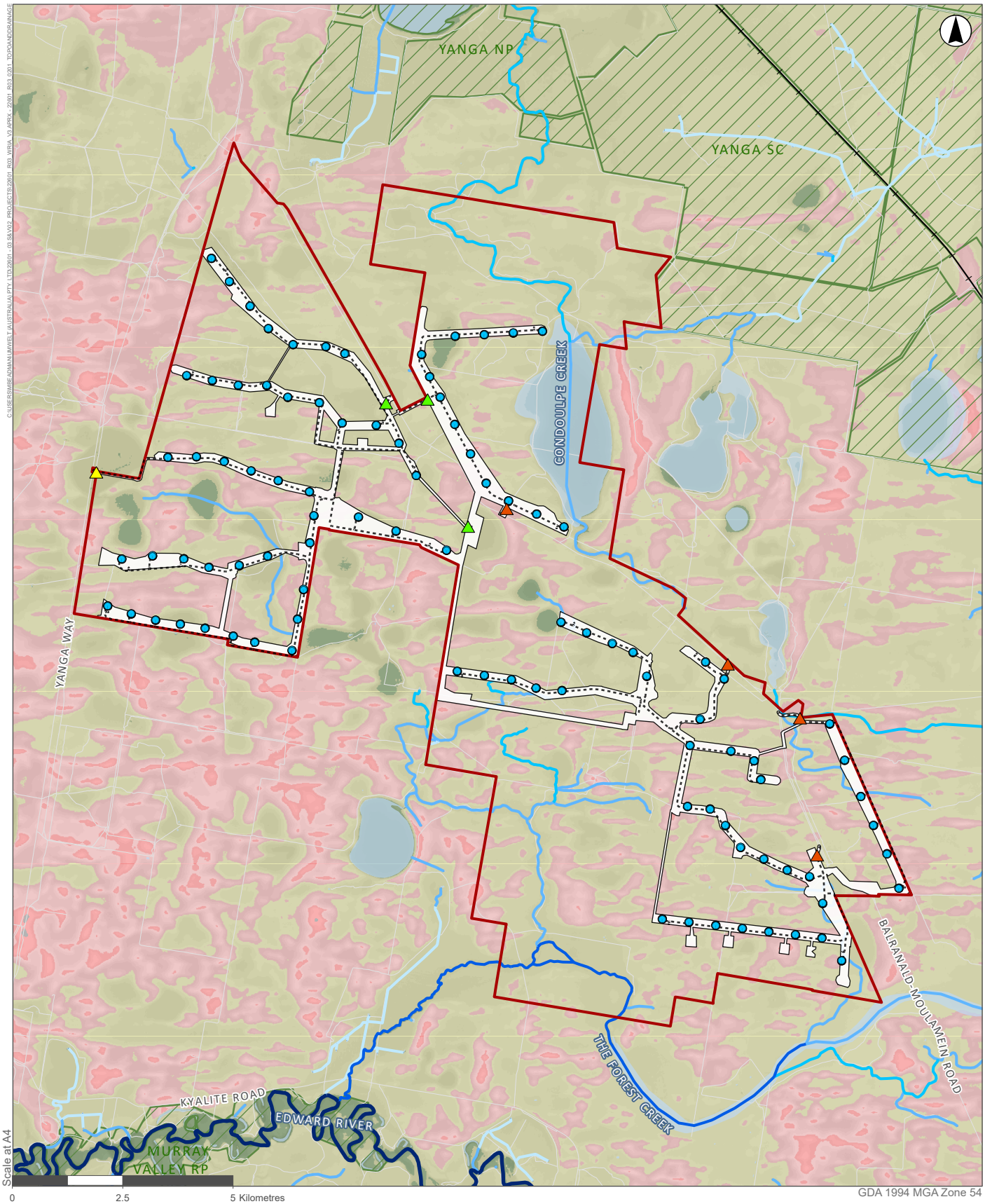
The Project Area is located on the lower Murrumbidgee floodplain, within the Murrumbidgee and Murray River catchment systems. Due to the nature of the surrounding environment, a variety of localised depressions, such as lakes and dams, are located within the Project Area. The topography (refer to **Figure 2.1**) of the Project Area is relatively flat, with an average slope of approximately 0.8%. Elevations within the Project Area generally range between approximately 50 m AHD in the vicinity of Condoulpe Lake, up to approximately 80 m AHD on isolated high points within the undulating landscape of the Project Area.

The Project Area is located within a complex hydrological context, with significant river systems to both the north and south of the Project Area. To the east of the Project Area, an array of streams and creeks diverge from the Murrumbidgee River at Darlington Point. These creek systems dissipate into lakes and localised depressions within the topography, before flowing east towards the Project Area.

In the local catchment, the majority of the flow paths within the Project Area are unnamed and generally without a well-defined drainage channel. Watercourses within the Project Area are predominantly 1st and 2nd order streams, with one 3rd order stream (based on the Strahler stream ordering system). In the northern part of the Project Area, Condoulpe Creek, a 1st order stream, flows north through the Project Area into Condoulpe Lake. Condoulpe Creek continues through and north of Condoulpe Lake, flowing in a northwestern direction through the Project Area towards Yanga Lake. Yanga Lake, located approximately 5 km north of the Project Area boundary, discharges into Yanga Creek, a tributary of the Murrumbidgee River. In the southern part of the Project Area the 1st and 2nd order unnamed streams flow towards the south to discharge into The Forest Creek. The Forest Creek, a 3rd order stream, is located towards the southeast of the Project Area, and flows to the southwest, discharging into Edward River, approximately 5 km southwest of the Project Area boundary. The Edward River flows in a southwest direction and discharges into Wakool River, a tributary of the Murray River.

There are small farm dams, localised depressions and lakes present within the Project Area.

The identified watercourse alignments within the Project Area are shown in **Figure 2.1**.



Legend

- Project Area
- Development Corridor
- Wind Turbine Generator
- Emergency Only Access Point
- Primary Access Point
- Secondary Access Point
- Access Tracks
- NPWS Reserve
- Waterbody
- Watercourse
- Road
- Railway

Elevation m(AHD)

Value

- 50.001 - 55
- 55.001 - 60
- 60.001 - 65
- 65.001 - 70
- 70.001 - 75
- 75.001 - 80

Strahler Stream Order

- 0
- 1
- 2
- 3
- 5 and above

FIGURE 2.1

Topography and Hydrological Context

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

2.2 Climate

The closest active Bureau of Meteorology (BoM) daily rainfall gauge to the centre of the Project Area with long term continuous records is Balranald (RSL) (Station 049002), approximately 15 km to the north of the Project Area. The Balranald (RSL) gauge covers a continuous record of over 144 years from 1879 to present.

Climate data was obtained from the SILO database of historical climate records for Australia hosted by the Queensland Government's Department of Environment and Science (DES). This service interpolates raw rainfall and evaporation records obtained from the Bureau of Meteorology (BOM) to provide a spatially and temporally complete climate dataset. Climate data between 01/01/1900 to 31/12/2022 was obtained for SILO grid point -34.9 Latitude and 143.6 Longitude, which is a grid point within the Project Area.

Table 2.1 presents the annual rainfall and evaporation statistics based in the Project Area climate data sourced for SILO grid point -34.9 Latitude and 143.6 Longitude. Monthly rainfall is presented in and **Table 2.2**. The data presented in **Table 2.1** and **Table 2.2** demonstrates that the Project Area has very low rainfall and high evaporation and that the annual SILO rainfall data statistics are comparable with those based on recorded data at the Balranald BoM station (Station 049002).

Table 2.1 Annual Rainfall (mm), 1900 to 2022

Statistic	BoM Rainfall (Station 049002)	SILO Rainfall	SILO Evaporation
10th percentile	201	183	1693
50th percentile	312	313	1799
90th percentile	470	456	1933
Average	327	320	1804

Table 2.2 Monthly Average Rainfall (mm), 1900 to 2022

Month	Rainfall
January	22.6
February	24.4
March	21.8
April	24.1
May	31.1
June	29.4
July	26.1
August	29.5
September	29.1
October	31.7
November	29.4
December	26.0

2.3 Soils

Modelled soil properties sourced from *Digital soil maps for key soil properties over New South Wales* (DPE, 2022) for the Project Area are presented in **Table 2.3**.

Table 2.3 Modelled Soil Parameters

Parameter	Value	
	0–30 cm Depth	30–100 cm Depth
Soil Erodibility, k factor (as used in the Revised Universal Soil Loss Equation (RUSLE))	0.02–0.07	
Clay Percentage	22–69%	33–54%
Silt Percentage	3–20%	5–24%
Sand Percentage	21–62%	21–50%
pH ($CaCl_2$)	6.4–7.8	7.2–8.2
Electrical Conductivity (dS/m)	0.1–0.3	0.2–0.9
Cation Exchange Capacity (cmolc/kg)	20–42	24–57
Soil Organic Carbon	0.6–1.1%	0.3–0.4%
Exchangeable Sodium Percentage (ESP)	1.5–4.5%	2.6–8.9

The parameters presented in **Table 2.3** indicate the Project Area soils:

- are fine textured (sand <70%)
- are moderately erodible to highly erodible
- have a generally neutral pH
- are non-saline
- consist of non-sodic topsoil, with an ESP <6% and are not expected to be dispersive
- consist of some slightly sodic subsoils, with ESP >6% and may exhibit dispersive behaviour
- have a moderate to high cation exchange capacity but low soil organic carbon and are likely to be moderately fertile.

The Geotechnical Interpretative Report (CMW Geosciences, 2022) prepared for the Project identifies the soils in the Project Area as consisting of the Woorinen Formation as described below:

- Topsoil (typically less than 400 mm) – typically comprised of loose to medium dense clayey sand or silty sand as well as some stiff to very stiff sandy clay.
- Subsoil (clay) – predominantly stiff to hard clay in consistency with fine to medium grained gravel or fine to coarse grained sand. Typically, red brown, pale grey and brown orange or dark brown in colour.
- Subsoil (sand) – weakly to strongly cemented clayey sands, medium dense to very dense. Generally red brown and grey in colour.

Acid sulfate soil (ASS) mapping is sourced from the Seed Dataset provided by the DPE (2021). A review of the ASS mapping indicates that there are no known occurrences of ASS within the Project Area (OEH, 2010).

2.4 Water Quality

2.4.1 NSW Water Quality Objectives

The NSW Water Quality Objectives (WQOs) have been developed by the NSW Government from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC & ARMCANZ, 2000) to guide plans and actions to achieve healthy waterways. The WQOs are based on measurable environmental values (EVs) for protecting aquatic ecosystems, recreation, visual amenity, drinking water and agricultural water. The Project Area is located in both the Murrumbidgee and Lake George, and Murray Catchment Management Areas (CMAs). The WQOs for each CMA have been developed to achieve suitable water quality for the protection of:

- aquatic ecosystems
- livestock water supply
- irrigation water supply
- homestead water supply
- drinking water
- primary and secondary contact recreation
- visual amenity
- aquatic foods.

Based on the likely construction activities and operations at the Project and the environmental values listed above, the water quality objectives considered relevant to the Project for lowland rivers within the Murray River and Murrumbidgee River and Lake George CMAs, are presented in **Table 2.4**.

Table 2.4 Project Relevant Water Quality Objectives

Parameter	Units	Value/Range
pH	-	6.5 to 8.5
Salinity (Electrical conductivity)	µS/cm	125 to 2,200
Turbidity	NTU	2 to 50[1]
Total Phosphorus	µg/L	50[2]
Total Nitrogen	µg/L	500[2]
Visual clarity and colour	-	Natural visual clarity should not be reduced by more than 20%. Natural hue of the water should not be changed by more than 10 points on the Munsell Scale. The natural reflectance of the water should not be changed by more than 50%.
Surface films and debris	-	Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour. Waters should be free from floating debris and litter.

[1]Tubidity limit for Murray River CMA used, having the lower limit between the two CMAs

[2] Value for rivers in the Murray-Darling Basin (NSW Government, 2006)

2.5 Wetlands

NSW wetland mapping is sourced from the Sharing and Enabling Environmental Data (SEED) Dataset provided by the DPE (2011). A review of the mapping indicated that there are no wetlands located within the Project Area, however there are an abundance of wetlands located within the surrounding downstream environment (refer **Figure 2.2**).

The review of the mapping indicated that wetland ecosystems are present south and southwest of the Project Area, within the Edward River and Wakool River riparian corridors. Runoff from the Project Area that flows into The Forest Creek will drain towards the Edward River and the Wakool River. North of the Project Area, wetland ecosystems are identified within Yanga Lake and the Murrumbidgee River. Any runoff from the Project that is received by Condouple Lake will flow downstream to Yanga Lake during high rainfall events.

Although these wetland environments are located at some distance downstream of the Project Area, there is potential for sediment and other pollutants entrained in runoff from the Project Area to enter these sensitive ecosystems.

2.6 Groundwater

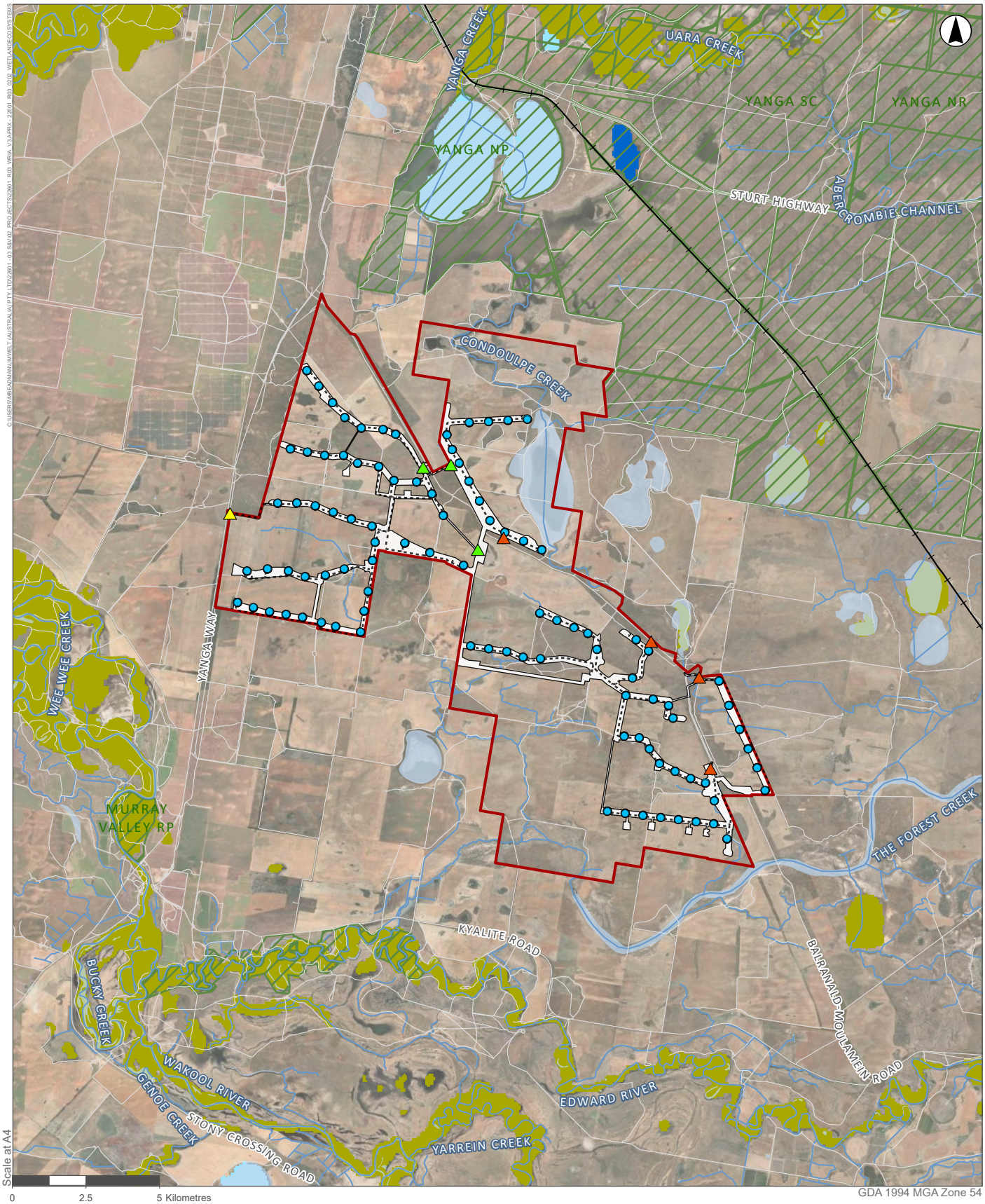
The broad Project Area spans a number of regional groundwater sources, including Murrumbidgee and Murray alluvial aquifers and the Lachlan Fold Belt Murray-Darling Basin hard rock aquifer, as described in **Section 2.7**.

A review of WaterNSW's real time monitoring "All Groundwater Map" (https://realtimedata.waternsw.com.au/water.stm) on 22 September 2023 identified one current groundwater bore within the Project Area (WaterNSW, 2021). The groundwater bore (GW032872) is located within the northern portion of the Project Area with another groundwater bore (GW404517) located close to the northern boundary of the Project Area. A number of discontinued groundwater bores with varying proximity to the Project Area were also identified from the WaterNSW "All Groundwater Map". Details of the identified groundwater bores (current and discontinued), including bore owner, bore purpose, bore depth and the minimum recorded depth to groundwater are presented in **Table 2.5** with the bore locations within and surrounding the Project Area shown on **Figure 2.3**.

While the purpose of the discontinued NSW Office of Water owned bores is only provided for one of their six bores listed, it is expected that they were all for monitoring purposes. The groundwater bore data presented in **Table 2.5** indicates that the groundwater table in the vicinity of the Project Area ranges from approximately 5.5 metres below ground level (mbgl) (to the north east of the Project Area) to approximately 14.47 mbgl (to the east of the Project Area). Groundwater bores closest to the Project Area have minimum recorded depths ranging from 9.00 mbgl to 14.47 mbgl.

Geotechnical investigations undertaken by Windlab did not encounter groundwater over the depth of auger drilling within each borehole, or within test pit excavations from surface to termination depth, which ranged from 4.8 m to 9.8 m across the Project Area. Groundwater depth was not able to be inferred during washbore drilling, due to the method of drilling adopted which required water re-circulation within the borehole.

Excavations associated with the Project are anticipated to be limited to 5 mbgl (for wind turbine gravity foundations), the geotechnical investigations and data presented in **Table 2.5** indicate that the Project is unlikely to interact with groundwater.



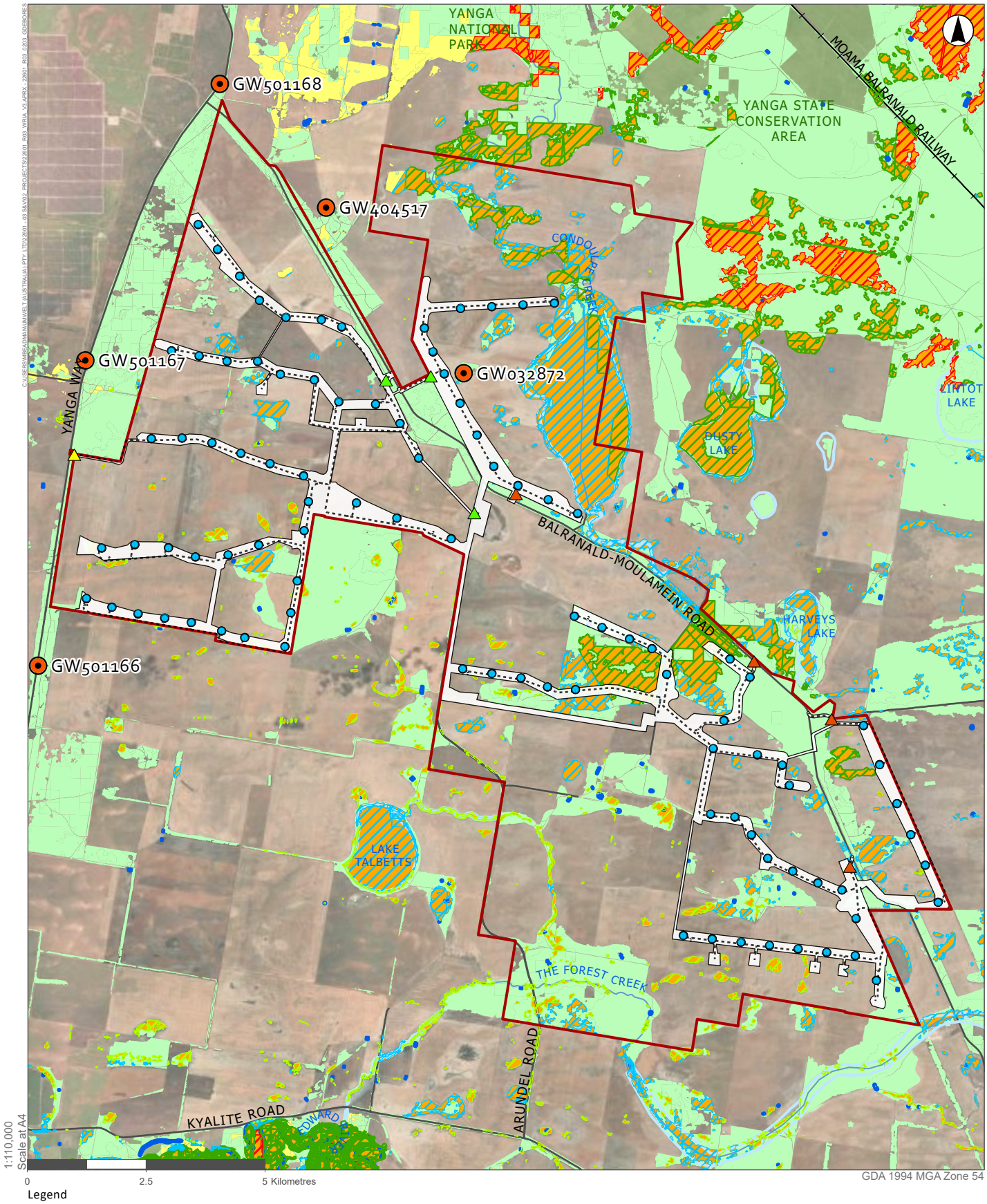
Legend

- Project Area
- Development Corridor
- Wind Turbine Generator
- Emergency Only Access Point
- Primary Access Point
- Secondary Access Point
- Access Tracks
- NPWS Reserve
- Waterbody
- Watercourse
- Road
- Railway
- Floodplain Wetland
- Freshwater Lake
- Reservoir

FIGURE 2.2

Wetland Ecosystems

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)



Legend

- Project Area
- Development Corridor
- Wind Turbine Generator
- Emergency Only Access Point
- Primary Access Point
- Secondary Access Point
- Access Tracks
- Mainly Dry/Non-Perennial Waterbody
- Perennial Waterbody
- Watercourse
- Road
- Railway
- NPWS Reserve
- Groundwater Bores

Terrestrial GDE Probability
- High
- Medium
- Low

Aquatic GDE Probability
- Very High
- High
- Medium
- Low

FIGURE 2.3

Groundwater Dependent Ecosystems and Groundwater Bores

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022)

Table 2.5 Groundwater Bores

Bore ID	Distance from Project Area (m) / Direction	Owner	Purpose	Minimum Recorded Depth (mbgl)	Depth to Water (mbgl)
GW032872	-[1]	Private	General Use	253.00	-[2]
GW404517	466 / N	Private	Stock, Domestic	15.00	9.00
GW501165[3]	7,707 / SSW	NSW Office of Water	-[2]	20.25	16.42
GW501166[3]	1,268 / SSW	NSW Office of Water	-[2]	12.20	10.35
GW501167[3]	1,287 / W	NSW Office of Water	-[2]	18.20	14.47
GW501168[3]	350 / N	NSW Office of Water	-[2]	12.00	9.65
GW501256[3]	6,240 / S	NSW Office of Water	-[2]	11.00	7.30
GW084087[3]	6,188 / NNE	NSW Office of Water	Monitoring	12.35	5.64[4]

[1] Bore is within Project Area.
[2] Information not provided in bore log.
[3] Discontinued bore.
[4] Depth in mbgl was estimated based on depth recorded as "metres below measuring point" and the assumption that the depth was measured below the top of the PVC casing which is indicated on the bore log as being 0.30 m above ground level.

2.6.1 Groundwater Dependant Ecosystems

A Groundwater Dependent Ecosystem (GDE) is an ecosystem which relies on the availability of groundwater to maintain structure and function. Terrestrial (including riparian vegetation) GDEs are dependent on the subsurface presence of groundwater, and generally use groundwater to a depth of approximately 10 mbgl. Aquatic (including baseflow systems and swamps) GDEs are dependent on the surface expression of groundwater. Ecosystems are classified as:

- High potential – ecosystems which have a high groundwater interaction (indicating a strong possibility the ecosystem is interacting with groundwater).
- Moderate potential – ecosystems which have a moderate potential for groundwater interaction.
- Low potential – ecosystems which have a low potential for groundwater interaction (indicating relatively unlikely that the ecosystem will be interacting with groundwater and may include ecosystems which do not interact with groundwater).

A review of the GDE mapping provided by the BoM (2017) indicates that terrestrial and aquatic GDEs of high, medium and low potential were identified within and surrounding the hydrological features of the Project Area (BoM, 2017). The GDEs within and surrounding the Project Area are shown in **Figure 2.3**.

2.6.2 Groundwater Vulnerability

Groundwater vulnerability is described by the NSW Government (2023) as the vulnerability or risk of aquifers to contamination, relating to physical characteristics of the location, such as the depth to the water table and soil type. A review of mapping provided by the NSW Government (2014) identified no areas of groundwater vulnerability within or in close proximity to the Project Area. Locations of groundwater vulnerability were identified along the Murrumbidgee River system and surrounding creek systems, approximately 4.5 km north of the Project Area.

2.7 Water Extraction

Water Sharing Plans (WSPs) have been developed under the *Water Management Act 2000* (WM Act) to protect the environmental health of water sources, whilst securing sustainable access to water for all users. The WSPs specify maximum water extractions and allocations and provide licensed and unlicensed water users with a clear picture of when and how water will be available for extraction. The Project Area is located within the Murrumbidgee and Murray regions and is therefore subject to the following WSPs:

Murrumbidgee Region

Surface water for the Project within the Murrumbidgee region is managed under the following WSP:

- Murrumbidgee Unregulated River Water Sources 2012 – the Project Area is located within the Murrumbidgee Western Water Source in the Unregulated Murrumbidgee Gogeldrie to Welmby Extraction Management Unit (DPE, 2012).

Groundwater for the Project within the Murrumbidgee region is managed under the following WSPs:

- Murrumbidgee Alluvial Groundwater Sources 2020 – the Project Area is located within the Lower Murrumbidgee Deep Groundwater Source and the Lower Murrumbidgee shallow Groundwater Source (DPE, 2020a).
- NSW Murray-Darling Basin (MDB) Fractured Rock Groundwater Sources 2020 - the Project Area is located within the Lachlan Fold Belt MDB Groundwater Source (DPE, 2020b).

Murray Region

Surface water for the Project within the Murray region is managed under the following WSP:

- Murray Unregulated River Water Sources 2011 - the southern extent of the Project is located within the Murray Below Mulwala Water Source in the Unregulated Middle Murray Extraction Management Unit (DPE, 2011).

Groundwater for the Project within the Murray region is managed under the following WSP:

- Murray Alluvial Groundwater Sources 2020 - the southern extent of the Project is located within the Lower Murray Groundwater Source in the Lower Murray Shallow (Western) Management Zone (DPE, 2020c).

The Project is unlikely to harvest surface water except for the purpose of containing runoff from disturbed areas to minimise pollutants discharging to the receiving surface water environment during the construction phase of the Project.

Incidental groundwater inflows into excavations for construction of up to 3 ML/year are exempt from licensing under Schedule 4, Part 1 of *the Water Management (General) Regulation 2018* (NSW Government, 2018). As indicated in Section 2.6, excavations associated with the Project are considered likely to be above the groundwater table. Any incidental groundwater take will be licensed in accordance with the WM ACT 2000 should groundwater inflows to excavations occur and exceed 3 ML/year.

2.8 Water Users

Surface Water

Licensed surface water users within the receiving environment immediately downstream of the Project vicinity that may potentially be impacted by the Project are located within the Murrumbidgee Western Water Source and the Murray Below Mulwala Water Source. A search of the NSW Water Register indicates that as of May 2024:

- 25 Water Access Licences (WALs) with a total of 14,960 unit shares were allocated in the Murrumbidgee Western Water Source. WAL 35294 has the largest share of entitlement in the water source, with 9,948 unit shares for irrigation under works approval 40CA414255. The predominant water use for WALs within the Murrumbidgee Western Water Source is irrigation.
- 99 WALs with a total of 27,732 unit shares were allocated in the Murray Below Mulwala water source. WAL 29767 has the largest share of entitlement in the water source, with 12,965 unit shares for irrigation under works approval 50CA508200. The predominant water use for WALs within the Murray Below Mulwala Water Source is irrigation.

Groundwater

Licensed groundwater users that may potentially be impacted by the Project are located within the Lower Murrumbidgee Deep Groundwater Source, the Lower Murrumbidgee Shallow Groundwater Source, the Lachlan Fold Belt MDB Groundwater Source and the Lower Murray Groundwater Source. A search of the NSW Water Register indicates that for the 2024/2025 financial year:

- 404 WALs with a total of 275,402 unit shares were allocated in the Lower Murrumbidgee Deep Groundwater Source. WAL 21439 has the largest share of entitlement in the groundwater source, with 12,500 unit shares for irrigation works approval 40CA403600.
- 30 WALs with a total of 5,201 unit shares were allocated in the Lower Murrumbidgee Shallow Groundwater Source. WAL 11885 has the largest share of entitlement in the groundwater source, with 1,374 unit shares for irrigation works approval 40CA403836.
- 1,111 WALs with a total of approximately 78,314 unit shares were allocated in the Lachlan Fold Belt MDB Groundwater Source. WAL 43328 has the largest share of entitlement in the groundwater source, with 3,375 unit shares, however, no works approval or water use was listed in the WaterNSW register. The predominant water use across the broader WSP area that includes the Lachlan Fold Belt MDB Water Source is irrigation.
- 364 WALs with a total of 84,789 unit shares were allocated in the Lower Murray Groundwater Source. WAL 12138 has the largest share of entitlement in the groundwater source, with 1,762 unit shares for irrigation under works approval 50CA504548.

There are no WALs associated with the landholdings on which the Project is located or immediately downstream of the Project Area.

There is one WaterNSW registered groundwater bore within the Project Area (WaterNSW, 2021). The groundwater bore (GW032872) is located within the northern region of the Project Area and is described as being drilled to 253 m in depth with an unknown standing water level. The bore was drilled in 1961 and is recorded as being used for general use. There is one groundwater bore (GW404517) close to the northern Project Area. The bore is described as being drilled in 1960 to a depth of 15 m, with a standing water level of 9 mbgl. The bore is recorded as being for stock and domestic purposes.

Both bores are classified as basic landholder right bores and do not have WALs. The locations of WaterNSW registered groundwater bores are shown on **Figure 2.3**.

3.0 Water Management

3.1 Erosion and Sediment Control

Throughout the construction phase of the Project, erosion and sediment controls (ESCs) will be established in general accordance with *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom, 2004) and *Volume 2* (Department of Environment and Climate Change, 2008) (i.e. the 'Blue Book').
The following sections outline the Project ESC design standards and anticipated ESCs to be implemented for the Project. Should the Project be approved, a detailed Construction Soil and Water Management Plan (CSWMP) will be prepared by a suitably qualified person to facilitate implementation of best practice ESCs during the construction phase of the Project.

3.1.1 Design Standard

3.1.1.1 Erosion Controls

An erosion hazard assessment has been undertaken in accordance with Chapter 4.4.1 of *Managing Urban Stormwater: Soils and construction - Volume 1* (Landcom 2004) (the Blue Book). The R-factor (rainfall erosivity) for the site was calculated using Equation (2) in Appendix A of Volume 1 of the 'Blue Book':

$$R = 164.74 \times 1.1177^{S} \times S^{0.6444}$$

where

S is the 2 year, 6 hour duration storm event intensity (based on Australian Rainfall and Runoff 1987 Intensity Frequency Duration data) – 5.10 mm/h

$$R = 164.74 \times 1.1177^{5.10} \times 5.10^{0.6444}$$

$$R = 830.3$$

The R-factor calculated for the entire Project Area is 830.3. Plotting the site slope using contours, measured to be approximately 0.8%, and the R-factor on *Figure 4.6* from *Volume 1* of the 'Blue Book' determines whether the site has a high or low erosion hazard. The Project Area slope was estimated based on the geospatial analysis to determine the average site slope of the existing landform. **Figure 3.1** presents the erosion hazard assessment plot for the Project Area and demonstrates that the site has a low erosion hazard. As such, standard erosion control measures will be applied during construction.

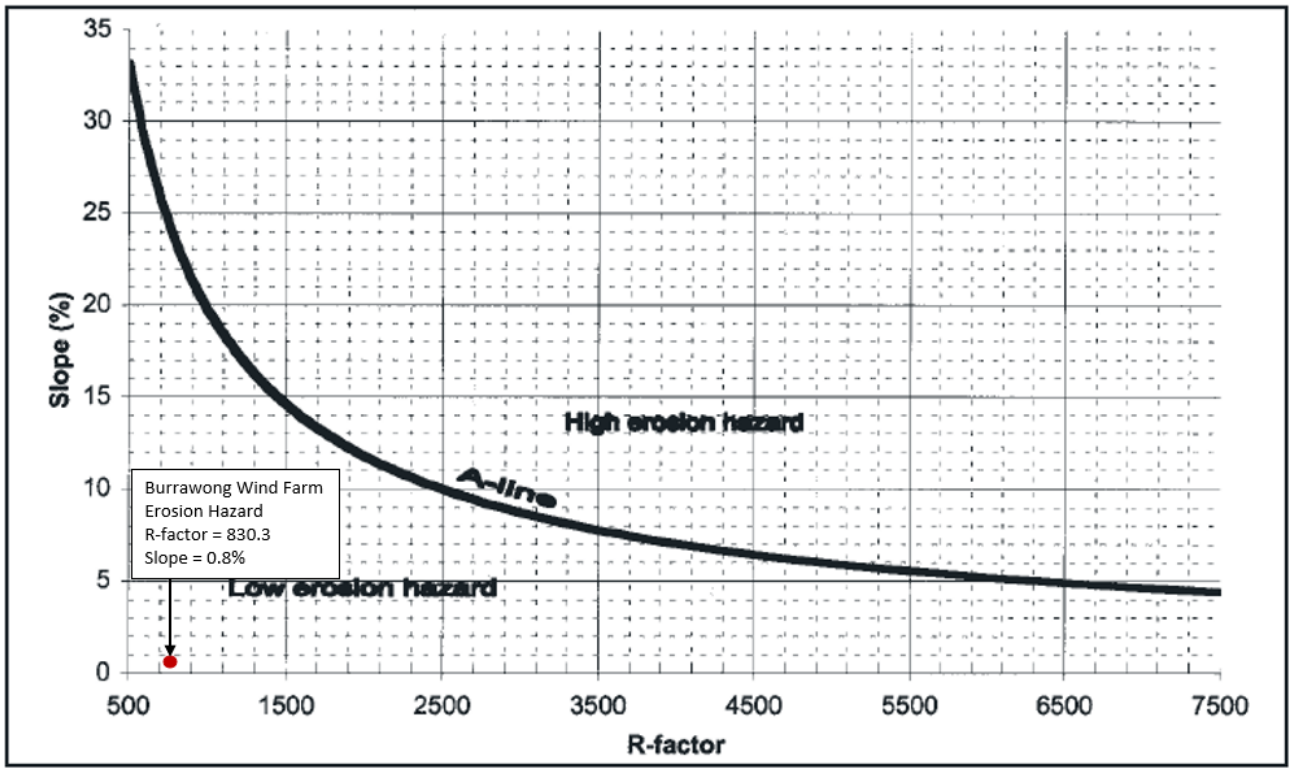


Figure 3.1 Erosion Hazard Assessment Plot

The annual soil loss for the Project Area has been estimated using the Revised Universal Soil Loss Equation (RUSLE) and *Table 4.2* of *Volume 1* of the 'Blue Book', as presented below.

RUSLE:

$$A = R \times k \times LS \times C \times P$$

where

		Value	Units
A	is the annual soil loss rate	to be calculated	tonnes/ha/ year
R	is the annual average rainfall erosivity calculated based on the 2 year, 6 hour duration ARI storm event intensity (refer to **Section 3.1.1.1**)	830.3	-
k	is the soil erodibility (increased by 20% due to dispersive subsoil, refer to **Table 2.3**)	0.084	-
LS	is the slope length gradient factor based on Table A1 of *Managing Urban Stormwater Volume 1* (Landcom, 2004) and is dependent on the slope length	0.15	-
C	is the ground cover factor sourced from Figure A5 of *Managing Urban Stormwater Volume 1* (Landcom, 2004) (no ground cover in this case)	1.0	-

		Value	Units
P	is the erosion control practise factor sourced from Table A2 of *Managing Urban Stormwater Volume 1* (Landcom, 2004) and is dependent on level of compaction and roughness of the disturbed surface (assume compacted and smooth)	1.3	-

$$A = 830.3 \times 0.084 \times 0.15 \times 1.0 \times 1.3$$

$$A = 14 \frac{tonnes}{ha.year}$$

According to *Table 4.2* of *Volume 1* of the 'Blue Book' the Project Area has a soil loss class of 1, a very low erosion hazard. *Figure 4.9* of *Volume 1* of the 'Blue Book' (Landcom, 2004) shows that the Project Area is located in rainfall distribution zone 12. *Table 4.3* of *Volume 1* of the 'Blue Book' identifies those times of the year that do not contribute significantly to the rainfall erosivity for different rainfall zones. Table 4.3 indicates that no timing restrictions apply for sites in rainfall distribution zone 12 with soil loss class 1. This applies to the majority of the Development Corridor with the exception of works on waterfront land as discussed below and in **Section 3.2**.

All waterfront land (i.e. land within 40 m of the top of bank of a defined watercourse) is considered by the 'Blue book' to be of soil loss class 6, have a very high erosion hazard and therefore timing restrictions apply to any works on these lands. **Table 3.1** presents the recommended timing restrictions for soil loss class 6 lands in rainfall distribution zone 12 adapted from the *Table 4.3* of the 'Blue Book'.

Table 3.1 Timing Restrictions for Soil Loss Class 6 Lands in Rainfall Distribution Zone 12[1]

Half of Month	1st	2nd
January	Yes	Yes
February	Yes	Yes
March	Yes	Yes
April	Yes	No
May	No	No
June	No	No
July	No	No
August	No	No
September	No	No
October	No	Yes
November	Yes	Yes
December	Yes	Yes

[1] *Adapted from Table 4.3 of Managing Urban Stormwater Volume 1 (Landcom, 2004) for rainfall Distribution Zone 12.*

Where scheduling of works outside of periods of high rainfall erosivity is not possible or is impractical, erosion control measures should be implemented to ensure disturbed lands have C-factors less than 0.1 (i.e. more than approximately 60% ground cover) when the three day forecast indicates that rain is likely.

3.1.1.2 Drainage Controls

All temporary drainage controls are to be designed to have non-erosive hydraulic capacity to convey runoff from a 10-year Average Recurrence Interval (ARI) or 20 year ARI critical duration storm event based on a duration of disturbance for each works area of < 12months and > 12 months respectively and a sensitive receiving environment, as per *Table 6.1* of *Volume 2D: Main Road Construction* of the 'Blue Book' (DECC, 2008).

3.1.1.3 Sediment Controls

The 'Blue Book' recommends that sediment basins are used when the soil loss rate exceeds 150 m^3/year (approximately 200 tonnes/year) for the total area to be disturbed. For individual works areas where greater than 14.2 ha is to be disturbed, sediment basins may be required to be installed during construction. The design standard for sediment basins for the Project Area (based on Blue Book design criteria) assuming fine/dispersive soils (worst case) and a soil hydrologic group of D (worst case, high runoff potential) is presented in **Table 3.2**. However, the use of sediment basins will depend on the practicality of draining disconnected disturbed areas of less than 14.2 ha to a sediment basin (i.e. if the disturbed areas are distributed across catchments where the topography does not facilitate drainage to a single sediment basin).

Table 3.2 Sediment Basin Design Standard

Basin Type	Duration of Disturbance	Storm Event[1]	Storm Event Rainfall Depth (mm)[2]	Volumetric Runoff Coefficient (Cv)[3]	Sediment Basin Embankment & Spillways	Sediment Zone Capacity
D	< 6 months	5 day 80th percentile	6.6	0.39	20-year ARI	6 months soil loss as calculated by RUSLE
D	6 - 12 months	5 day 85th percentile	9.2	0.39	50-year ARI	

1 Based on a sensitive receiving environment.

2 5 day rainfall depth calculated from rainfall records from Bom weather station 049002 at Balranald (Rsl).

3 Refer to Table F2 of Volume 1 of the 'Blue Book'.

All temporary sediment controls will be designed and installed to be structurally sound during a 10-year ARI or 20 year ARI critical duration storm event based on a duration of disturbance for each works area of <12 months and >12 months respectively and a sensitive receiving environment, as per *Table 6.1* of *Volume 2D*: *Main Road Construction* of the 'Blue Book' (DECC, 2008).

3.1.2 General Erosion and Sediment Control Strategy

All ESCs are to be installed, managed and maintained in general accordance with the 'Blue Book' *Volume 1* (Landcom, 2004) and *Volume 2C* (DECC, 2008) to:

- divert clean water around site
- prevent sediment moving off-site and sediment laden water entering any watercourse, drainage line, or drain inlet
- reduce water velocity and capture sediment on site
- minimise the amount of material transported from site to surrounding pavement surfaces.

3.1.2.1 General Site Management

The following ESC management strategies will be implemented for the Project.

1. To minimise ground disturbance, construction and operational activities including vehicle and machinery movements, stockpiling, temporary vehicle parking and material laydown will be restricted to designated work areas. The disturbance boundary is to be clearly delineated with construction fencing or barrier tape.
2. All fuels, chemicals and liquids will be stored in an impervious bunded area, a minimum of 50 m away from drainage lines or waterways.
3. Refuelling of plant and equipment is to be undertaken in an impervious bunded area located a minimum of 50 m from drainage lines or waterways.
4. Emergency spill kits are to be kept on site at all times. All workers are to be made aware of the location of the spill kits and trained in their use.
5. Any concrete washout undertaken on site (during construction phase) will be in a bunded area that is not on waterfront land and at least 10 m from drains.
6. Where possible, topsoil will be stripped and handled only when it is moist (not wet or dry) to avoid decline of soil structure.
7. Topsoil stockpiles will be stabilised with vegetation (seeded) if they are to be inactive for long periods.
8. Stockpiles of erodible material that have the potential to cause environmental harm if displaced will be located away from concentrated surface flow and excessive up-slope stormwater surface flows.
9. Wherever reasonable and practicable, “clean” surface waters must be diverted away from sediment control devices and any untreated, sediment-laden waters.
10. All runoff from the works is to be passed through sediment controls.
11. Sediment traps should be located as close to the source of the sediment as practicable.
12. Sediment control devices must be de-silted and made fully operational as soon as reasonable and practicable after a sediment-producing event. Sediment traps should be maintained to ensure that no more than 30% of their design capacity is lost to accumulated sediment.
13. Sediment removed from any trapping device is to be disposed of in locations where further erosion and consequent pollution to downslope lands and waterways will not occur.
14. Temporary soil and water management structures are to be removed only after the Project Area is stabilised appropriately.

3.2 Construction on Waterfront Land

As a SSD, the Project, if approved, will be exempt from the requirement to acquire Controlled Activity Approvals (CAAs) for works on waterfront land (works within 40 m of the top of bank of a waterway) under s.4.41(1)(g) of the *Environmental Planning and Assessment Act 1979*. Notwithstanding the exemption from requiring CAAs, all works on waterfront land will be undertaken in accordance with DPEs *Guidelines for Controlled Activities on Waterfront Land*.

There are ephemeral streams traversing the Project Area (refer to **Section 2.1** and **Figure 2.1**) and while the Project design has aimed to avoid works close to or within waterways, waterway crossings will be required for internal site access roads. Project waterway crossings will be designed to minimise impacts on stream stability and fish passage and will be designed with reference to the following documents in addition to DPEs *Guidelines for Controlled Activities on Waterfront Land*:

- *Why Do Fish Cross the Road? Fish Passage Requirements for Waterway Crossings (NSW Department of Primary Industries* (DPI) Fisheries, 2003).
- *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management* (NSW DPI, 2013).

For works on waterfront land, the following measures will be incorporated into the design of the works and controls included in the CSWMP:

- A site-specific erosion and sediment control plan will be prepared for all works on waterfront land.
- Where practicable, infrastructure will be maintained outside of the vegetated riparian zone.
- Utilise stream crossings for co-location of services to avoid the need to trench through stream beds wherever practicable.
- Rehabilitate disturbed areas and provide scour protection to bed and banks as required to mitigate any areas with increased potential for erosion due to changes in flow regimes associated with Project infrastructure.
- Where practicable, undertake works on waterfront land during periods of low rainfall erosivity from mid-April to mid-October (refer to **Table 3.1**).

During detailed design, consultation will be undertaken with DPI Fisheries to determine if any of the proposed waterway crossings require consideration of fish passage. For any crossings that do require consideration of fish passage, the relevant DPI Fisheries guidelines will be considered during the detailed design process.

3.3 Water Supply

The Project will require a water supply for construction, operational and decommissioning phases. During construction, water will primarily be used for Soil and fill conditioning, dust suppression, concrete production and washout, vehicle and equipment wash down, and amenities. A site water balance for the Project was prepared by WRM (2024) and is presented in **Appendix 16**. The site water balance identified the total water demand to be 400 to 500 ML for the 48 month construction period. This includes:

- Peak daily demand of 600–700 kL/day raw with 40 kL/day potable water.
- Average daily demand of 300–350 kL/day raw with 20 kL/day of potable water.

Water for construction phase demands will be supplied from one or a combination of the following sources:

- Mains water supply, Balranald Shire Council and potentially Murray River Shire Council (via water truck).
- Harvested runoff from farm dams under agreement with host or local landholders.
- Groundwater from licenced bores under agreement with host or local landholders.
- Extraction from Edward River and/or Wakool River to south of Project Area under agreement with host or local landholders.
- Harvested runoff from disturbed areas captured in excavations or sediment basins/traps constructed to prevent sediment transport off-site.
- Recycling and reusing water.

During operations, approximately 0.2 ML/year would be required for dust suppression, vehicle washdown and amenities. A static water supply would also be established and maintained for fire protection. Water to meet operational amenity demands will be likely be supplied from Balranald Shire Council (potable water).

Water demands for the decommissioning phase will include water for dust suppression and amenities and while the total demand will be higher than operational water demands, the demand will be significantly lower than the construction phase given there would be no concrete batching during the decommissioning phase. Water to meet decommissioning demands would likely be supplied via the sources identified above for construction.

Any water supplied to the Project from existing groundwater or new bores will be sourced under agreement with relevant landholders while ensuring WALs, works approvals and water use approvals required under the WM Act (2000) are in place.

4.0 Impact Assessment

4.1 Surface Water Quality

4.1.1 Construction and Decommissioning

During construction and decommissioning of the Project, soils would be subject to disturbance, involving minor vegetation removal, excavation works and stockpiling of materials, which can potentially lead to sediments and/or pollutants mobilising in runoff and entering local waterways. Furthermore, this could result in the deterioration of EVs and WQOs (as outlined in **Section 2.4.1**), for example:

- Loss of topsoil resources on the land and ongoing erosion reducing the area of usable land, resulting in damage to private property for involved landholders.
- Water quality in farm dams is impacted such that it is not suitable for stock watering, health or aquatic fauna and flora, as well as increased turbidity and decrease in water quality to downstream waterways.

With the implementation of erosion and sediment control measures as well as appropriate measures to manage hazardous materials such as oils, fuels and other chemicals (outlined in **Section 3.1.1.1** and **Section 5.0**) potential construction-related stormwater pollution impacts can be appropriately managed and are expected to be negligible.

During the construction phase, there may be a requirement to construct waterway crossings to enable access across the Project Area. Provided waterway crossings are designed and constructed in accordance with relevant guidelines and in consultation with DPI Fisheries (refer to **Section 3.2**), the Project waterway crossings are not expected to result in any measurable impacts to stream health including water quality and fish passage.

With the implementation of measures outlined in **Section 5.0**, the potential water quality impacts would be adequately managed during the Project's construction and decommissioning phases.

4.1.2 Operation

Potential water quality impacts during the operational phase would be minimal, as the day-to-day activities associated with the Project generally have limited potential to result in impacts. Potential impacts during this phase would be limited to:

- Stormwater runoff from impervious surfaces resulting in localised erosion.
- Accidental spills or discharge through use and storage of chemicals such as fuel.
- Effluent discharges from on-site wastewater management system to receiving groundwater or surface water sources.

The potential for ongoing erosion post construction is considered to be low provided appropriate rehabilitation of disturbed areas is undertaken and any areas identified as exhibiting signs of erosion above expected background levels are addressed.

All hazardous materials and chemicals will be stored in accordance with relevant Australian standards and other state and local guidelines including the NSW EPA's *Storing and Handling Liquids: Environmental Protection – Participants Handbook*.

The on-site wastewater management system will be designed by a an appropriately qualified and experienced specialist in accordance with any local government standards and guidelines. Site specific soil testing will be undertaken to confirm the suitability and size of the effluent application area.

Based on the above, and with the implementation of management measures outlined in **Section 5.0**, water quality impacts during the operational phase of the Project are expected to be negligible.

4.2 Water Supply

As indicated in **Section 3.3**, water for the construction phase of the Project will be supplied from a combination of the following sources:

- Mains water supply, Balranald Shire Council and potentially Murray River Shire Council (via water truck).
- Harvested runoff from farm dams under agreement with host or local landholders.
- Groundwater from licenced bores under agreement with host or local landholders.
- Extraction from Edward River to south of Project Area under agreement with host or local landholders.
- Harvested runoff from disturbed areas captured in excavations or sediment basins/traps constructed to prevent sediment transport off-site.
- Recycling and reusing water.

Based on the estimated average water demand and initial discussions with Balranald Shire Council, it is likely that the majority of water could be sourced from the Balranald Shire Council mains water supply utilising an existing standpipe with an available draw of 30-40 litres/second. The Project will have multiple water tanks within the Project Area, to distribute and store water as required and to act as a buffer to temporary variations in water availability.

Water to meet operational amenity demands will be likely be supplied from Balranald Shire Council (potable water). Water demands during the decommissioning phase would likely be sourced from similar options to the construction phase.

Loss of catchment yield associated with containment of runoff from disturbed areas is expected to be negligible and will be temporary during the construction and decommissioning phases. As such, impacts on surface water availability to downstream water users are expected to be negligible.

4.3 Groundwater Impacts

4.3.1 Construction and Decommissioning

As described in **Section 2.6,** geotechnical investigations undertaken by Windlab did not encounter groundwater in auger drilling or within test pit excavations to depths of 4.8 m to 9.8 m across the Project Area. Further, groundwater bore data sourced from WaterNSW's real time monitoring website indicates the depth to groundwater in close proximity to the Project Area ranges from 9.00 to 14.47 mbgl. Given excavations associated with the Project are anticipated to be limited to 5 mbgl (for wind turbine gravity foundations), no interaction with the groundwater table is anticipated during construction or decommissioning. Given the depths to groundwater, any hydrocarbon/chemical spills are unlikely to infiltrate to the groundwater table. Interactions with the groundwater table are not expected at the decommissioning phase of the Project. As such, no impacts to groundwater resources or Groundwater Dependent Ecosystems (GDEs) are expected during the construction or decommissioning phases of the Project.

Should detailed Project design indicate Project construction activities will interact with the groundwater table, further assessment will be undertaken in accordance with the NSW Aquifer Interference Policy (NSW Government, 2012) and appropriate management measures would be developed to mitigate any potential impacts.

4.3.2 Operation

Interactions with the groundwater table are not expected during the operational phase of the Project. As such, no impacts to groundwater resources or Groundwater Dependent Ecosystems (GDEs) are expected during the operational phase of the Project.

5.0 Management and Mitigation Measures

Table 5.1 presents the proposed measures to be implemented as part of the Project to manage and minimise impacts on water resources.

Table 5.1 Management and Mitigation Measures relating to Water Resources

No	Management and mitigation measure	Timing
1	No sensitive infrastructure (e.g., substations) will be placed within 20 m of any Strahler 3 or above order stream.	Detailed design
2	All waterway crossings will be designed and constructed in accordance with the Department of Primary Industries, Office of Water, Guidelines for riparian corridors on waterfront land and guidelines for watercourse crossings on waterfront land.	Detailed design
3	Water sources would be confirmed during detailed design phase and in consultation with suppliers and landholders and be subject to availability. A water sourcing strategy will be developed so that water used during the construction phase does not impact on the availability of water to nearby/downstream landowners water users. Any water supplied to the Project from existing water sources will be sourced under agreement with relevant landholders while ensuring WALs, works approvals and water use approvals required under the WM Act (2000) are in place.	Detailed design
4	The on-site wastewater management system will be designed by an appropriately qualified and experienced specialist in accordance with any local government standards and guidelines. Site specific soil testing will be undertaken to confirm the suitability and size of the effluent application area.	Detailed design
5	A Construction Soil and Water Management Plan (CSWMP) will be prepared in consultation with NSW Water Group to outline measures to manage soil and water impacts associated with the construction and decommissioning works. The CSWMP will provide: • Measures to minimise/manage erosion and sediment transport both within the construction footprint and offsite including requirements for the preparation of erosion and sediment control plans (ESCP) for all progressive stages of construction. • Measures to manage waste including the classification and handling of spoil. • Procedures to manage unexpected finds of contaminated soils. • Measures to manage stockpiles of topsoil and spoil including locations, separation of materials and erosion and sediment control measures. • Hazardous material storage requirements and measures to manage accidental spills including the requirement to maintain materials such as spill kits. • Specific control measures for works on waterfront land which may include timing restrictions and wet weather protocols. • Design standards for drainage, erosion and sediment controls. • Detailed requirements for rehabilitation of disturbed areas to minimise the risk of ongoing erosion post construction.	Prior to construction

No	Management and mitigation measure	Timing
	• Erosion and sediment control measures will be implemented and maintained at all work sites in accordance with the principles and requirements in Managing Urban Stormwater - Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008b), commonly referred to as the "Blue Book".	
6	An Operational Environmental Management Plan (OEMP) will be developed for the Project, including measures to address potentially adverse impacts on the receiving environment surface water quality during the operational phase. This will include the development and appropriate maintenance of suitable ground cover around wind turbines, and grassed table drains near access tracks to minimise the potential for erosion and export of sediment. Additional measures for the treatment of Project Area stormwater runoff are not considered necessary.	Operation
7	All hazardous materials and chemicals will be stored in accordance with relevant Australian standards and other state and local guidelines including the NSW EPA's Storing and Handling Liquids: Environmental Protection – Participants Handbook.	All phases of Project

6.0 Conclusion

This WRIA has considered the potential impacts and determined appropriate measures to mitigate potential water resources impacts associated with the Project. The following conclusions are made with respect to the potential impacts on water resources:

- Impacts to surface water resources during the construction and decommissioning phases of the Project can be adequately managed to ensure negligible impacts by implementation of a CSWMP as described in **Table 5.1**.
- No adverse impacts on soil and surface water resources are expected during the operational phase provided rehabilitation is undertaken following ground disturbance in the construction phase. This will minimise the risk of ongoing erosion and ensure appropriate groundcover is maintained throughout the operational phase of the Project.
- No interaction with the groundwater table is anticipated throughout all phases of the Project and therefore, no impacts to groundwater resources or GDEs are expected.
- The potential for adverse impacts on the receiving surface water quality from point sources such as chemical storage and the on-Project Area wastewater management system can be adequately managed by implementation of appropriate hazardous materials storage and handling measures (that will be documented in an OEMP) and appropriate design and siting of the on-site wastewater management system.
- No impacts to the availability of supply to downstream and nearby water users (groundwater and surface water) as all water sourced for the Project will be undertaken in accordance with the WM Act 2000 and relevant WSPs.

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