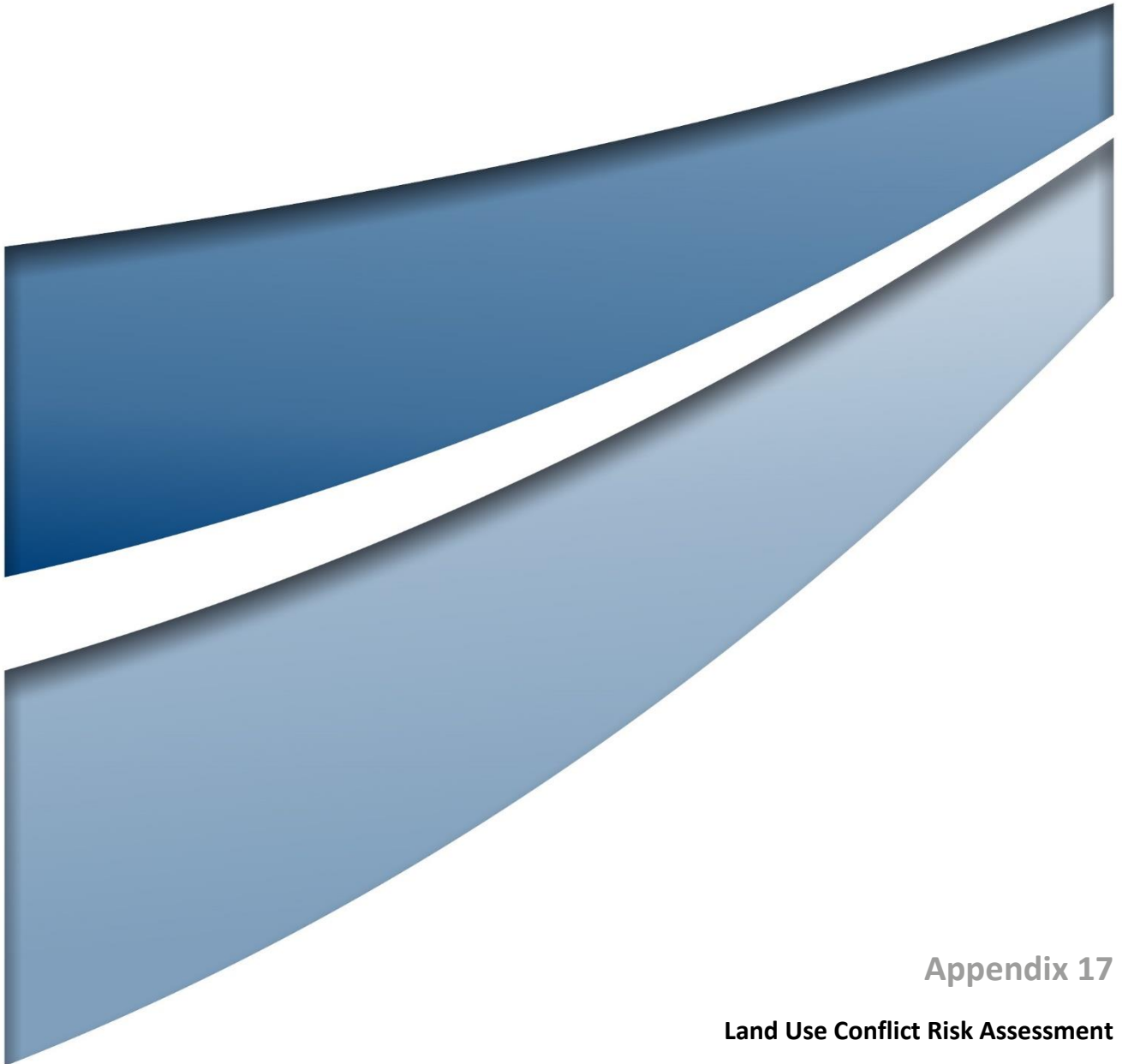




Appendix 17

Land Use Conflict Risk Assessment

JUNCTION RIVERS WIND PROJECT

Land Use Conflict Risk Assessment

FINAL

May 2024



JUNCTION RIVERS WIND PROJECT

Land Use Conflict Risk Assessment

FINAL

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

Project Director: Paul Douglass
Project Manager: Lachlan Sweeney
Report No. 22601/R04
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.

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1.0 Introduction

Windlab Developments Pty Ltd (Windlab) has engaged Umwelt to conduct a Land Use Conflict Risk Assessment (LUCRA) as part of the Environmental Impact Statement (EIS) for the State Significant Development (SSD) Application for the proposed Junction Rivers Wind Project (the Project). The Project is located approximately 15 kilometres (km) south of Balranald, 140 km west of Hay and 20 km northeast of the New South Wales (NSW) and Victorian border within the southern section of the Murray-Darling Basin. The Project is within the Murray River Local Government Area (LGA) and immediately east of Balranald LGA (refer to **Figure 1.1**).

1.1 Project Overview

The Project includes the construction, operation, and decommissioning of up to 96 wind turbine generators (WTG), up to four battery energy storage system (BESS) facilities or up to four static synchronous compensator (STATcom) facilities, and associated facilities including operation and maintenance buildings, access roads, civil works, electrical infrastructure and temporary construction facilities (refer to **Figure 1.2**). The Project will have a capacity of approximately 750 megawatts (MW).

The Project is located within the South-West Renewable Energy Zone (SW REZ), which the NSW Government has identified as a target area for renewable energy development in its Transmission Infrastructure Strategy (NSW Government, 2023b) and Electricity Infrastructure Roadmap (NSW Government, 2023a). The Project is planned to connect to the existing Transgrid 220 kV transmission line and/or the Project EnergyConnect 330kV transmission line which both pass through the northern portion of the Project Area.

The Project Area covers an area of approximately 16,367 hectares (ha) with a Development Footprint of 768 ha. Land use within the Project Area and surrounding area is primarily composed of agricultural activities supported by associated rural residences. Areas in and adjacent to the Project Area have been extensively cleared of native vegetation. The primary agricultural activities within the Project Area include intensive cropping (cereals and legumes) and grazing of livestock.

The Project is expected to operate for up to 35 years. After the 35-year operating period, the wind farm could be kept running by maintaining turbines beyond their design life if still economic, decommissioned by removing infrastructure and returning the site to its existing land capability, or repurposed with new infrastructure subject to technical feasibility and planning consents.

1.2 Purpose and Scope of Works

1.2.1 Purpose

The purpose of this LUCRA is to identify and assess the potential for land use conflicts with neighbouring land uses and implement mitigation measures to minimise potential impacts. The aims of a LUCRA (DPI, 2011), as defined by the Department of Primary Industries (DPI) are to:

- accurately identify and address potential land use conflict issues and risk of occurrence before a new land use proceeds or a dispute arises;

- objectively assess the effect of a proposed land use on neighbouring land uses;
- increase the understanding of potential land use conflict to inform and complement development control and buffer requirements; and
- highlight or recommend strategies to help minimise the potential for land use conflicts to occur and contribute to the negotiation, proposal, implementation and evaluation of separation strategies.

1.2.2 Scope of the Assessment

This LUCRA has been prepared in accordance with the *Land Use Conflict Risk Assessment Guide* (DPI, 2011) (the 'Guideline') provided by the NSW DPI. This assessment has also been prepared to meet the Department of Planning, Housing and Infrastructure (DPHI) Secretary's Environmental Assessment Requirements (SEARs) for the Project, re-issued on 19 December 2023. The SEARs require the '*completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide*', as well as '*a soil survey to determine the soil characteristics and consider the potential for erosion to occur*'.

The Guideline sets out four steps in undertaking the assessment:

Step 1: Gather information – including describing the proposed land use change, the proposed development, and activities associated with it as well as understanding the site history and other land uses and environmental considerations.

Step 2: Evaluate the risk level of each activity – using the risk assessment matrix to identify the level of risk of a land use conflict arising from the activity.

Step 3: Identify risk management strategies – including the identification and prioritisation of management strategies for each activity, and the re-assessment of risk based on these strategies, with performance targets for each activity.

Step 4: Record the results of the LUCRA – summarising the key issues, their risk level, and the recommended management strategies.

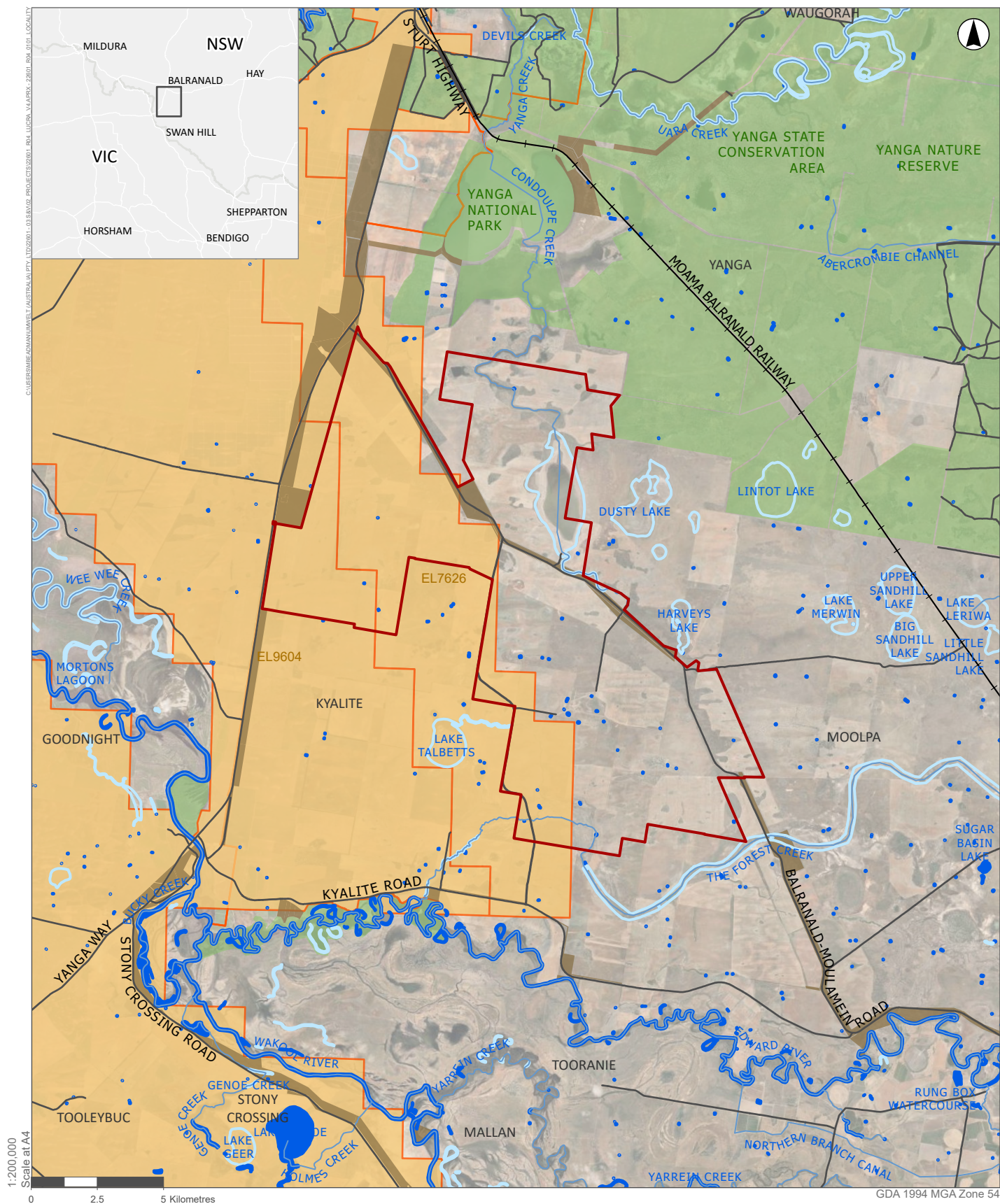


FIGURE 1.1
Locality

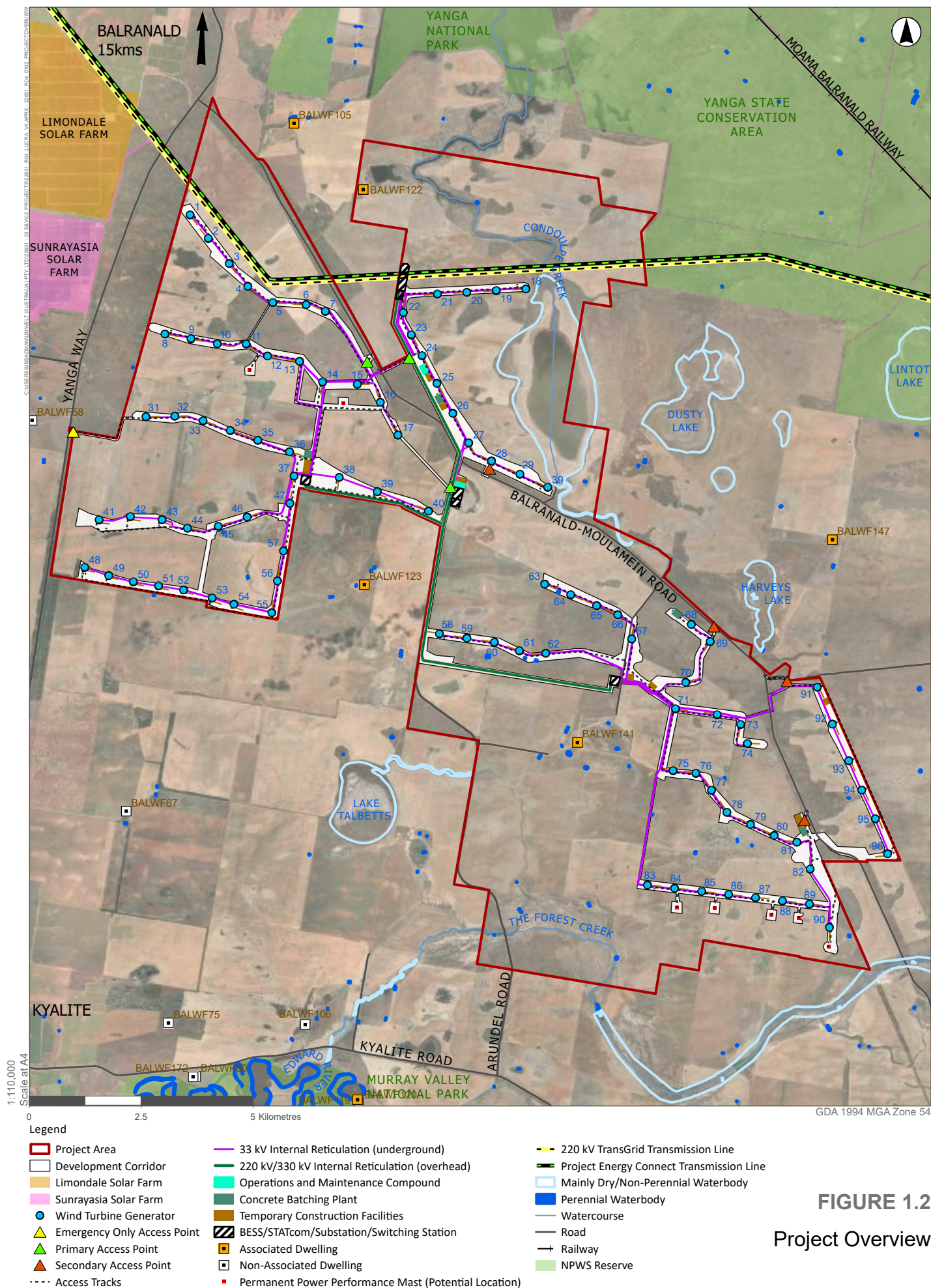


FIGURE 1.2
Project Overview

2.0 Background Information

2.1 Location and Zoning

As discussed in **Section 1.0**, the Project will be located approximately 15 km south of Balranald and 20 km northeast of the NSW and Victorian border, within the Murray River LGA (refer to **Figure 1.1**) and immediately east of Balranald LGA.

The Project Area is zoned RU1 – Primary Production under the Wakool Local Environment Plan (LEP) 2013 as shown on **Figure 2.1**. Land to the north and northeast of the Project Area is zoned C1 – National Parks and Nature Reserves, with a portion of land to the immediate west of the Project Area zoned RU3 Forestry. Land to the south of the Project Area is also zoned RU1 – Primary Production (refer to **Figure 2.1**).

Electricity generating works are not permitted within the RU1 zoning, however, due to the operation of Clause 2.36(1)(b) of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Infrastructure SEPP), the Project is permissible with development consent.

The objectives of each relevant zone appear in **Table 2.1**.

Table 2.1 Environmental Planning Instrument Zone Objectives

Environmental Planning Instrument and Zone	Objectives
Wakool LEP 2013 RU1 – Primary Production	- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base. - To encourage diversity in primary industry enterprises and systems appropriate for the area. - To minimise the fragmentation and alienation of resource lands. - To minimise conflict between land uses within this zone and land uses within adjoining zones. - To promote the use of agricultural land for efficient and effective agricultural production without the encroachment of urban land uses. - To allow the development of processing, service and value-adding industries related to agriculture and primary industry production. - To allow the development of complementary non-agricultural land uses that are compatible with the character of the zone.
Wakool LEP 2013 C1 – National Parks and Nature Reserves	- To enable the management and appropriate use of land that is reserved under the <i>National Parks and Wildlife Act 1974</i> or that is acquired under Part 11 of that Act. - To enable uses authorised under the <i>National Parks and Wildlife Act 1974</i>. - To identify land that is to be reserved under the <i>National Parks and Wildlife Act 1974</i> and to protect the environmental significance of that land.
Wakool LEP 2013 RU3 – Forestry	- To enable development for forestry purposes. - To enable other development that is compatible with forestry land uses.

The Project Area is considered suitable for the Project with respect to the objectives of the RU1 zone, noting that associated landowners will continue to undertake agricultural activities on their land largely unaffected by the Project (excluding the specific areas hosting infrastructure and some disruption during construction works on each individual property). Within the Project Area, WTGs are located such that they would not impact on land uses or zone objectives of land adjacent to the Project Area. As the Project will operate concurrently with the existing land use, it is considered a complementary non-agricultural land use which is compatible with the zone. The Project is therefore considered consistent with the objectives of the RU1 land use zone identified in **Table 2.1**. The Project will provide for the ongoing agricultural use of the land as the Project will only occupy small areas of each land holding and the proposed activities are compatible with ongoing agricultural land uses on the balance of the Project Area. It is also noted that the Project will provide an additional diversified income stream for associated landholders, providing capacity for investment in their properties and increased security of income in periods of drought or other climatic conditions/events affecting agricultural productivity.

The Project Area is considered suitable for the Project with respect to the objectives of the C1 zone, noting that:

- there will be no impacts to land that is reserved under the *National Parks and Wildlife Act 1974* or that is acquired under Part 11 of that Act
- the Project will not impact land use authorised under the *National Parks and Wildlife Act 1974*
- the Project will not impact to the ability to identify land that is to be reserved under the *National Parks and Wildlife Act 1974*.

The Project Area is considered suitable for the Project Area with respect to the objectives of the RU3 zone, noting that:

- there will be no impact to the ability to enable development for forestry purposes
- the Project will not impact the enablement of other development that is compatible with forestry land uses.

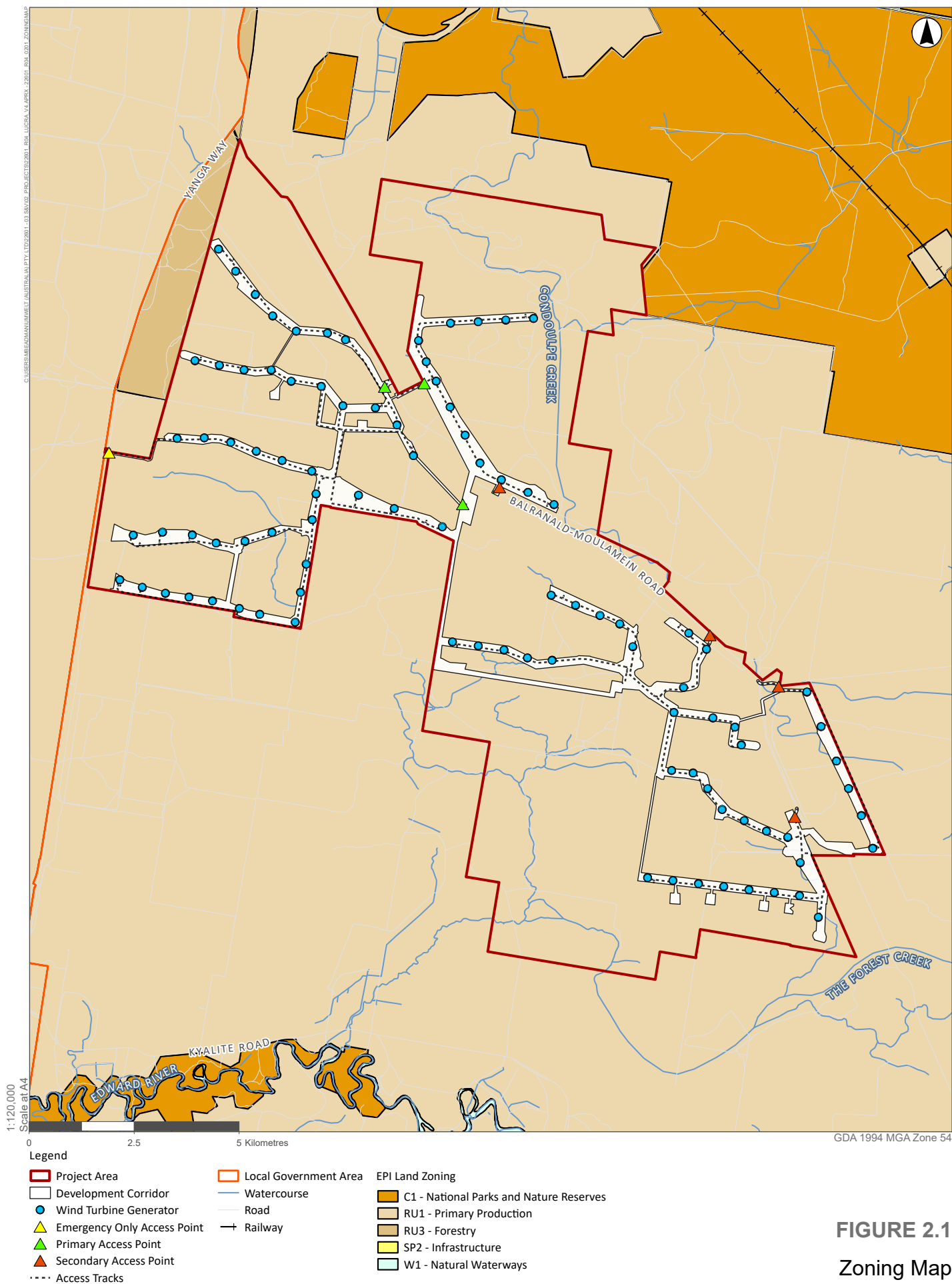


FIGURE 2.1
Zoning Map

There are seven private landholdings within the Project Area along with some small areas of Crown Land easements traversing the Project Area such as Travelling Stock Reserves (TSR), roads and waterways. Windlab has agreements with the associated owners granting Windlab the option to lease the land for the Project which is planned to have a construction period of 48 months and up to 35-years of operations.

There are two existing mineral exploration licences across part of the Project Area. Exploration Licence 7626 (EL 7626), held by Iluka Resources Limited (refer to **Figure 1.1**) relates to potential Group Ten (10) minerals. It is understood that exploration activities have been undertaken in relation to EL 7626. EL 9604 held by Murray Basin Critical Minerals Pty Ltd (refer to **Figure 1.1**) also relates to potential Group Ten (10) minerals.

The WTGs associated with the Project are not permanent infrastructure and will not prevent future recovery of any viable resources in the EL areas following the end of Project operations.

During the EIS process, it was identified that EL 9097, held by Viewmont Gold Pty Ltd, occurred across part of the Project Area. It is noted that EL 9097 has subsequently expired and is no longer valid.

2.2 Topography and Elevation

The topography of the Project Area is primarily flat with scattered sand hills. The Project Area has an elevation ranging from 50 m Australian Height Datum (AHD) to 80 m AHD. The Project Area is in close proximity to the Hay Plains, which have been identified as the flattest land mass in the Southern Hemisphere.

2.3 Existing Land Use

The Project Area and surrounding area is characterised by existing agricultural land use with associated rural residences. Land within and surrounding the Project Area has been subject to extensive historical vegetation clearing associated with historic agricultural land uses. Agriculture is the predominant land use in the Project Area, primarily intensive cropping (cereals and legumes) and grazing.

The land within the Project Area is Class 4, 5, and 6 under the Land and Soil Capability Assessment Scheme (LSC) (refer to **Figure 2.2** and **Table 2.2**). The LSC assessment scheme uses the biophysical features of the land and soil to derive detailed rating tables for a range of land and soil hazards. Each hazard is given a rating between 1 (best, highest capability land) and 8 (worst, lowest capability land), and the final LSC class of the land is based on the most limiting hazard (OEH, 2012).

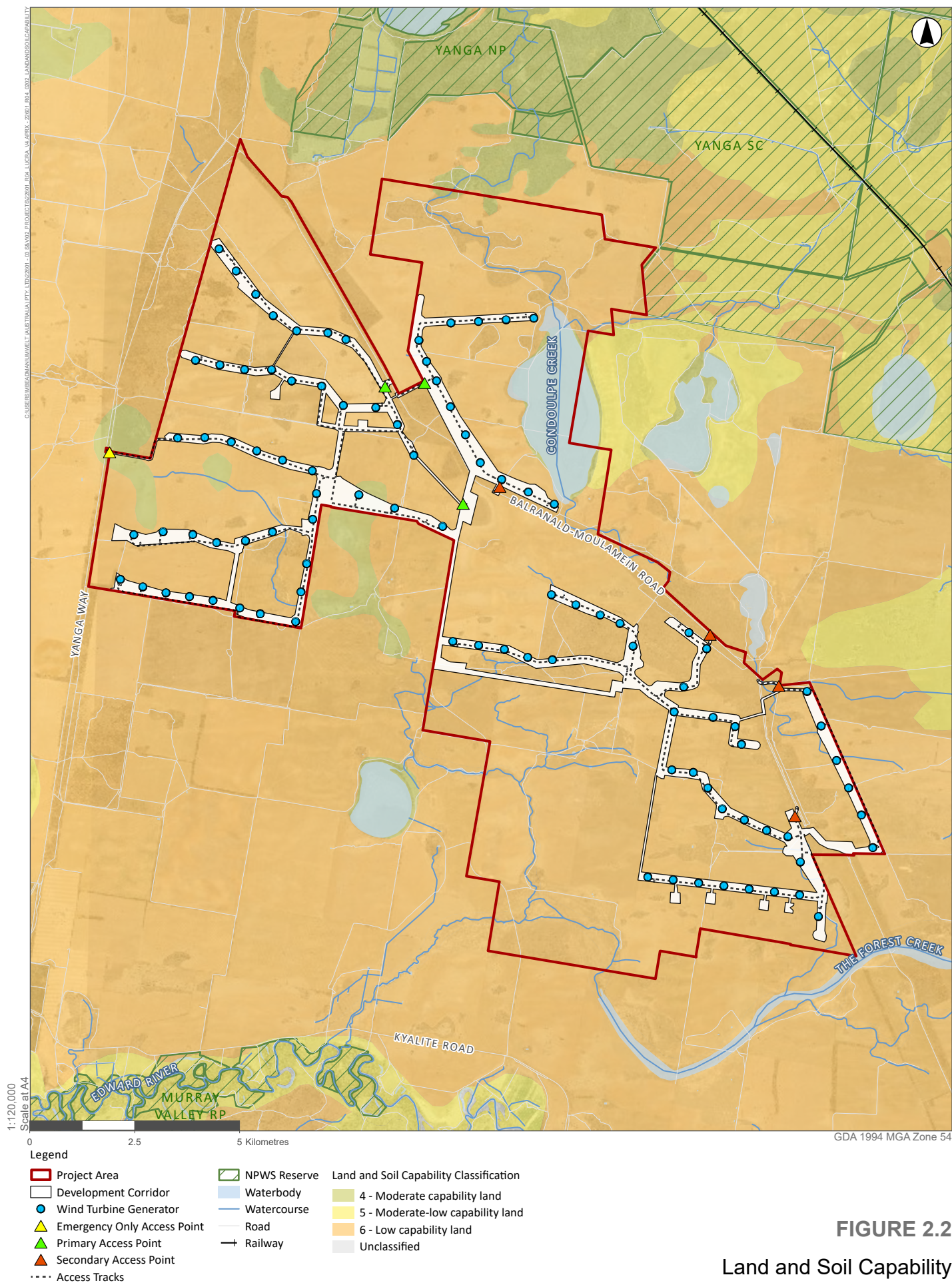


FIGURE 2.2

Land and Soil Capability

Table 2.2 LSC Classes Within the Project Area

Class	Hectares Within Project Area	Hectares Within Development Corridor	Hectares Within Development Footprint	Hectares Within Development Footprint (%)
Class 1 – Extremely high capability land	0	0	0	0%
Class 2 – Very high capability land	0	0	0	0%
Class 3 – High capability land	0	0	0	0%
Class 4 – Moderate capability land	715.25	40.36	14.76	1.90%
Class 5 – Moderate-low capability land	35.22	0	0	0%
Class 6 – Low capability land	15,616.76	2,056.61	754.12	98.10%
Class 7 – Very low capability land	0	0	0	0%
Class 8 – Extremely low capability land	0	0	0	0%
Total	16,367.23	2,096.97	768.88	100.00%

The Project has the potential to impact up to 40.36 ha of Class 4 land within the Development Corridor (14.76 ha within the Development Footprint), however, much of this impact is for installation of services (roads, electrical network etc.). Importantly, the Project's Development Footprint would utilise less than 2% of the Class 4 land located within the Project Area, also noting that there is more than 19 million ha of Class 4 land within NSW.

Areas of native vegetation on the Project Area are present generally in the form of small areas of native grassland/woodland and isolated paddock trees. here is one minor creek that traverses the Project Area.

TSRs occur in proximity and within the Project Area (refer to **Figure 1.1**). Consultation with associated landowners identified that the TSRs are rarely, if ever, used and that due to a lack of watering points, some TSRs are unfit for use. Should landowners want to utilise a TSR during the Project's construction period, Windlab would consult with them to confirm timing, duration and likely route of stock movements along the TSR so they could be scheduled and managed to occur in conjunction with construction activities and traffic movements.

2.4 Proposed Land Use

The Project will extend the current land use from agriculture to include electricity generation. During the construction and operation periods, it is proposed that agricultural activities will be maintained within the Project Area as the design is compatible with ongoing agricultural land uses on these properties including, but not limited to, intensive cropping and grazing. There will be some localised disruption during construction where agricultural activities may be ceased in a particular area for a period of time whilst construction activities are completed, with activities to resume once construction is complete in that area.

Following Aboriginal cultural heritage surveys undertaken for the Project, the location of Aboriginal cultural heritage items identified during the assessment have been recorded, demarcated in the field and exclusion areas established via fencing. The establishment of the exclusion fencing is impacting agricultural yield, enabling weeds to grow due to lack of ground cover, and increasing safety risks for crop sowing/harvest and the operation of motorbikes/vehicles throughout the Project Area.

The Project will be constructed on multiple work fronts which provides for flexibility in the construction schedule. Windlab and the construction team will actively liaise with the landowners to schedule construction activities around agricultural activities, particularly the annual end of year harvest, as far as possible.

2.5 Regional Land Use

As described in **Section 2.3**, land within and surrounding the Project Area has been subject to extensive historical vegetation clearing associated with agricultural land uses. Agriculture is the predominant land use in both the Project Area and the surrounding region.

More recently, renewable energy developments have been established in the locality as part of the transition to renewable energy within the SW REZ. These include the Limondale Solar Farm and Sunraysia Solar Farm, both operational facilities located approximately 1 km west of the Project Area. Limondale Solar Farm has a generating capacity of 250 MW and Sunraysia Solar Farm has a generating capacity of 200 MW. Cadell Orchards and Canally Orchards (part of Australian Farming Services) have operations adjacent to the Project Area.

Directly to the north and northeast of the Project Area is Yanga National Park (66,734 ha), Yanga Nature Reserve (1,939 ha), and Yanga State Conservation Area (34,557 ha). Each is valued for recreational tourism, fishing, hiking, bird watching and scenic views.

The Project is located approximately 15 km south of Balranald and 140 km west of Hay. Balranald has a population of 2,208 people (ABS, 2023), which provides a range of services for the region. The next nearest larger population centre is Swan Hill (Victoria), which is located approximately 80 km south of the Project Area and has a population of 10,869 people (ABS, 2023).

2.6 Land Ownership

There are seven private landholdings within the Project Area along with some minor areas of Crown Land easements traversing the Project Area as TSRs, roads and waterways.

This assessment identifies three categories of dwellings:

- **Host Dwellings** – those dwellings located within the Project Area and located on land hosting infrastructure associated with the Project. The host landholders have agreements in place with Windlab.
- **Associated Dwellings** – dwellings not located on land within the Project Area or hosting infrastructure, however, the Proponent has a negotiated agreement in place with the landowner regarding Project impacts and are therefore associated with the Project.

- **Non-associated Dwellings** – dwellings located outside of the Project Area and not associated with the Project.

Land ownership and associated and non-associated dwellings in the vicinity of the Project Area are shown on **Figure 2.3**.

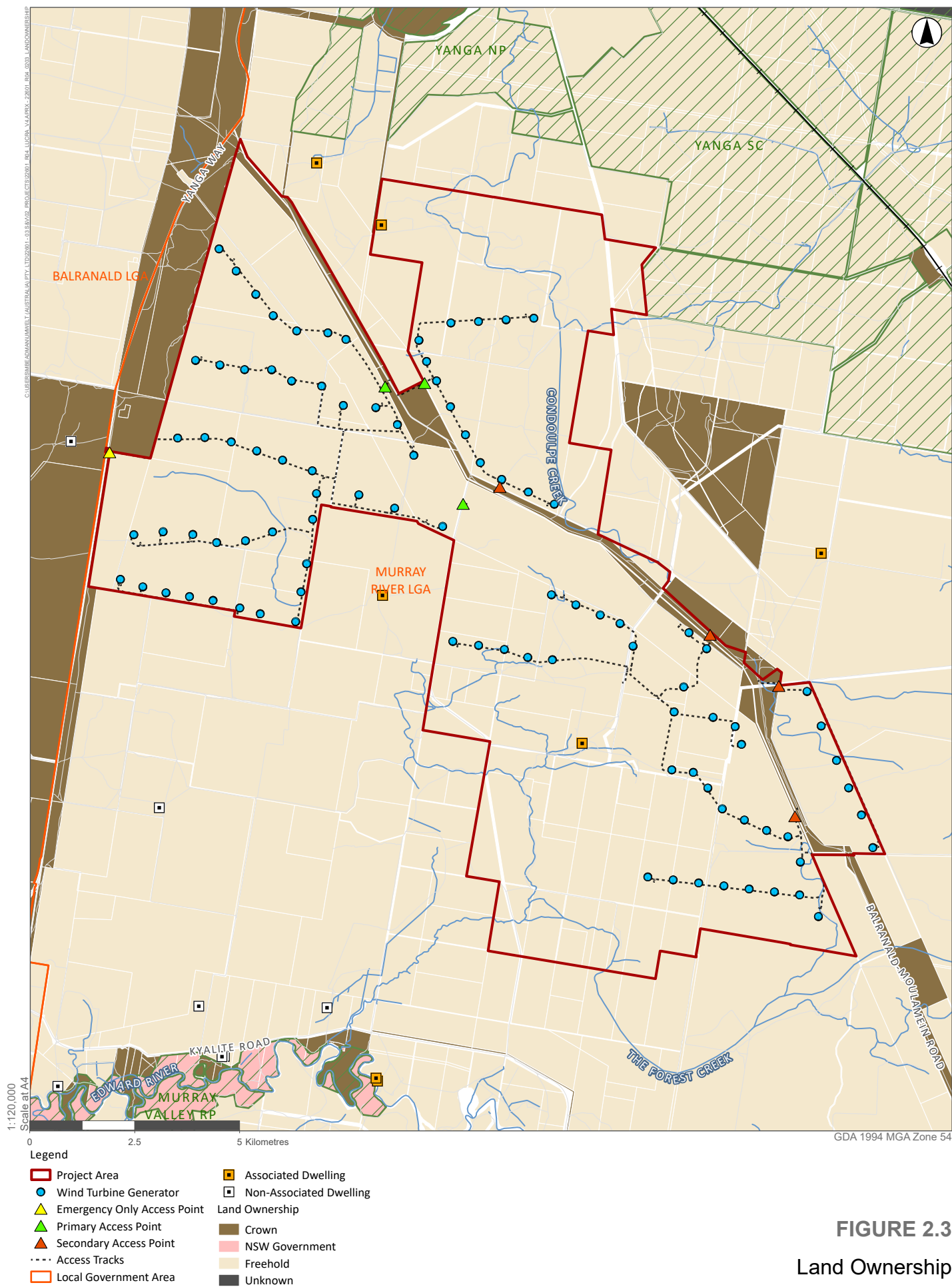


FIGURE 2.3

Land Ownership

2.7 Site Selection

Windlab selected the proposed Project Area as it considered that it provides the optimal combination of:

- high quality wind resource
- availability of land of a suitable scale for a viable commercial-scale wind farm project and low density of housing
- within the SW REZ and close proximity to the associated existing and proposed high voltage transmission network
- overall positive sentiment within the local community regarding renewable energy, including interest from landowners in being involved in the wind farm
- access to major transport networks, including the Sturt Highway, to the north of the Project Area
- compatible land use zoning within both the Project Area and adjacent land holdings
- low number of residential receptors in the local area
- low level of environmental constraints that can be managed with appropriate mitigation and management
- landscape suitable for minimising the risk of substantial soil erosion during earthworks.

2.8 Site History

The Project Area has historically been used for agricultural and pastoral purposes since the mid nineteenth century. Umwelt (2024a) has undertaken a review of the historic context of the site (and broader region) including relevant western exploration and pioneers, and the development of pastoralism, agriculture, transport, towns and settlements. The detailed findings of this review are outlined in **Section 6.6** of the EIS.

The landscape within and surrounding the Project Area is characterised by extensive historical clearing for agricultural and rural development. Remaining areas of native vegetation and habitat have been surveyed for their biodiversity value and assessed as part of the EIS (refer to **Section 6.4** of EIS).

2.9 Soils Within the Project Area

As discussed in **Section 1.2.2**, the SEARs require ‘a soil survey to determine the soil characteristics and consider the potential for erosion to occur’. To address this requirement, a desktop assessment was undertaken to characterise land and soil capability specific to the Project Area. The SEARs requirements were further addressed through a soil survey which was completed across the Project Area. **Section 2.9.1** and **Section 2.9.2** summarise the desktop assessment and soil survey, respectively.

2.9.1 Desktop Assessment

As discussed in **Section 2.3**, the Project Area includes predominantly low capability land (also refer to **Figure 2.2**) with some areas of moderate and moderate-low capability. The erosion potential of these land and soil capability categories are included in *The land and soil capability assessment scheme: Second approximation* (OEH, 2012):

- **Class 6 – Low capability land** (15,616.76 ha within the Project Area) Includes land that will be subject to severe wind erosion when cultivated and left exposed. Further, the land may have very severe limitations due to off-site effects such as salinity and the impact of soil erosion on water and air quality. Soil erosion can be very severe without adequate erosion control measures.
- **Class 5 – Moderate-low capability land** (35.22 ha within the Project Area) Includes land that will be subject to wind erosion when cultivated and left bare. Additionally, soil erosion can be severe without adequate erosion control measures.
- **Class 4 – Moderate capability land** (715.25 ha within the Project Area) Includes land that has cropping limitations because of erosion hazard, weak structure, salinity, acidification, shallowness of soils, climate, wetness, stoniness or a combination of these factors. Required erosion control practices include advanced conservation tillage, pasture cropping, well-planned rotations and maintenance of ground cover. Further, erosion problems encountered in these lands include sheet, rill and gully erosion as well as wind erosion and soil structure decline under cropping.

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	
	0–30cm Depth	30–100cm 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.

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).

An erosion hazard assessment was undertaken in accordance with Chapter 4.4.1 of Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom, 2004) (the ‘Blue Book’) as part of the Water Resources Impact Assessment (WRIA) completed for the Project (Umwelt, 2024b). The WRIA notes that, according to Table 4.2 of the ‘Blue Book’, the Project Area has a soil loss class of 1, a very low erosion hazard. The WRIA also notes that 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, having a very high erosion hazard and therefore works should be scheduled outside of higher rainfall periods (October to April) if possible and where not possible additional erosion control measures should be implemented. Refer to the WRIA (Umwelt 2024b) for further details.

2.9.2 Soil Survey

A geotechnical investigation within the Project Area was conducted between April 2022 and June 2022 by CMW Geosciences. The geotechnical investigation included a soil survey to confirm soil characteristics across the Project Area, with survey results and interpretation appearing in full in **Appendix 1**. Soil samples were taken from eight boreholes and 15 test pit locations throughout the Project Area.

The survey included easting and northing coordinates for boreholes and test pits, photographs of soil sampling sites, and data related to the composition of soils, as shown in **Appendix 1**. Samples were submitted to a National Association of Testing Authorities (NATA) accredited laboratory for analysis. The interpretive report prepared by CMW Geosciences 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.

2.10 Consultation

Windlab recognises the importance of stakeholder engagement to the success of this Project and has been liaising with stakeholders on an ongoing basis since landholder discussions commenced in May 2019. In addition to community stakeholders, ongoing consultation has been undertaken with Murray River Council and Balranald Shire Council, government agencies, functional stakeholders (e.g. service providers), businesses and various non-government organisations and interest groups. This includes a comprehensive engagement process undertaken with the Aboriginal community.

Windlab has undertaken detailed engagement with landowners who are potential hosts of wind farm infrastructure to outline the key activities in the development of wind farms and how Windlab works with landowners to manage and mitigate potential impacts throughout the life of the Project. In this regard, Windlab has worked closely with host landowners to shape the design of the Project and seek feedback on the proposed mitigation and management measures.

There are seven private landholdings within the Project Area, owned by four separate host landowners. Windlab has negotiated agreements with all host landowners hosting WTGs and infrastructure for the Project, and some neighbouring landowners who own a residence that is adjacent to, or within close proximity to the Project, that may be impacted by construction and/or operation. These agreements were reached through extensive consultation and address any potential land use conflicts that could occur between Windlab and the landholders (refer to Figure 2.3).

Windlab has made significant Project design changes to accommodate host landowner requirements to maintain existing agricultural activities, including realignment of internal tracks, siting of WTGs and electrical reticulation infrastructure. Examples include siting of internal tracks and WTGs to facilitate continued cropping patterns in particular paddocks, and the selection of either overhead or underground electrical reticulation lines in particular locations to maximise safety for landowners and contractors when using large machinery and vehicles.

In addition to the engagement undertaken by Windlab discussed above, further engagement has been undertaken as part of the Social Impact Assessment (SIA) for the Project following the requirements of the NSW Government guidelines and assessment standards including, but not limited to, the NSW DPIE Social Impact Assessment Guideline for State Significant Projects (2023) (the SIA Guideline), the Undertaking Engagement Guidelines for State Significant Projects (DPIE, 2021) and the SEARs.

2.11 Compatibility with Existing Land Uses

The Project will modify the existing land use within the Project Area by adding a utility scale energy generating wind facility to an existing agricultural land use that will continue, with the two land uses coexisting in the Project Area. This change of land use needs to be considered for its compatibility with the current surrounding land uses and to determine if there is a need for any mitigation measures to ensure compatibility. The following sections identify any potential incompatibilities (in the absence of mitigation measures as required by the LUCRA assessment guidelines) between the surrounding land use and the proposed land use.

2.11.1 Construction

During construction, the main potential incompatibilities identified (without mitigation) are:

- increased noise from construction vehicles and construction activities (additional to what is reasonably expected from agricultural production)
- dust generated by construction vehicles and during construction activities such as land clearing and site preparation, but predominantly due to additional vehicles using unsealed roads
- traffic generated by construction vehicles and component haulage (if unmitigated/scheduled would be solid impact on local farmers during harvest season)
- visual impacts during construction activities (including for passing motorists)
- erosion and sediment runoff and impacts on surface water quality
- damage to local roads from vehicles, including light vehicles and trucks
- road incidents with road users, livestock and/or farm machinery crossing or using roads at slow speeds.

The need for heavy earthworks and compaction during construction will be minimised as much as practicable although some grading and levelling is likely to be required for the substations, battery storage facilities and for wind turbine sites.

2.11.2 Operation

During operation, the main potential incompatibilities identified (without mitigation) are:

- potential loss of local amenity and visual amenity (for surrounding non-associated residents and passing motorists)
- altered bushfire risk profile for surrounding lands due to the presence of the Project
- inadequate management of invasive weeds and feral pests.

2.11.3 Decommissioning

During and following decommissioning, the main potential risks identified (without mitigation) are:

- inadequate removal of infrastructure including commercial and industrial waste
- land not left in an acceptable condition to be utilised for agricultural production
- increased noise from vehicles (additional to what is reasonably expected from agricultural production) associated with decommissioning activities
- damage to local roads from vehicles, including light vehicles and trucks
- road incidents with livestock and/or farm machinery crossing or using roads at slow speeds
- dust generated by vehicles/machinery during decommissioning activities (such as site rehabilitation).

3.0 Land Use Conflict Risk Assessment

3.1 Introduction

The LUCRA assessment process, based on the *Land Use Conflict Risk Assessment Guide* (DPI, 2011), utilises a ‘probability and consequence’ risk assessment matrix (refer to **Table 3.1**) to estimate the potential for land use conflicts. It assesses the environmental, public health and amenity impacts according to the *probability of occurrence* and *consequence of the impact*.

Table 3.1 LUCRA Risk Rating Matrix

Consequence	Probability				
	A	B	C	D	E
1	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5	11	7	4	2	1

The risk rating matrix yields a risk ranking from 25 to 1. It covers each combination of five levels of ‘probability’ (a letter A to E as defined in **Table 3.2**) and five levels of ‘consequence’, (a number 1 to 5 as defined in **Table 3.3**) to identify the risk ranking of each impact. For example an activity with a ‘probability’ of D and a ‘consequence’ of 3 yields a risk rank of 9.

Higher risk ratings, those ranked 11 or above, are shaded red and require consideration of controls to lower the potential of land use incompatibilities.

Table 3.2 Probability Descriptions

Level	Descriptor	Description
A	Almost Certain	Common or repeating occurrence.
B	Likely	Known to occur, or ‘it has happened’.
C	Possible	Could occur, or ‘I’ve heard of it happening’.
D	Unlikely	Could occur in some circumstances, but not likely to occur.
E	Rare	Practically impossible.

Table 3.3 Consequence Descriptions

Level	Descriptor	Description
1	Severe	- Severe and/or permanent damage to the environment. - Irreversible. - Severe impact on the community. - Neighbours are in prolonged dispute and legal action involved.
2	Major	- Serious and/or long-term impact to the environment. - Long-term management implications. - Serious impact on the community. - Neighbours are in serious dispute.
3	Moderate	- Moderate and/or medium-term impact to the environment and community. - Some ongoing management implications. - Neighbour disputes occur.
4	Minor	- Minor and/or short-term impact to the environment and community. - Can be effectively managed as part of normal operations. - Infrequent disputes between neighbours.
5	Negligible	- Very minor impact to the environment and community. - Can be effectively managed as part of normal operations. - Neighbour disputes unlikely.

3.2 Initial Risk Identification and Risk Ranking

Table 3.4 contains an initial risk evaluation of activities that may cause potential land use conflict, considered in the absence of mitigation or management measures which are described in **Section 3.3**. Other risks associated with social amenity and broader land use conflicts (e.g. impacts on services, availability of accommodation, employee availability etc.) have been addressed in the SIA and are not repeated here.

Table 3.4 Initial Risk Evaluation

Activity	Identified Potential Conflict	Risk Rating (unmitigated)
Construction	Generation of dust on site due to site preparation and other construction related activities as well as increased traffic movements on unsealed roads which can impact human and environmental health.	8
	Increased traffic movements to and from the Project Area potentially resulting in traffic hazards, particularly on Arundel Road, Balranald-Moulamein Road, and Yanga Road.	17
	Excessive noise generated during construction of the Project above relevant criteria – impacting amenity.	8
	Land erosion as a result of construction activities resulting in sediment runoff entering nearby water bodies, impacting water quality and beneficial use of the water (irrigation or stock water).	8
	Increased traffic volumes potentially impacting/degrading the physical condition of local roads, particularly Arundel Road, Balranald-Moulamein Road, and Yanga Road.	12

Activity	Identified Potential Conflict	Risk Rating (unmitigated)
	Possibility of vehicles during construction or operation being involved in an accident with livestock or farm machinery on roads.	9
	Increased traffic movements to and from the Project Area potentially disrupting crop harvesting activities of neighbouring farm sites.	13
	Possible impact to TSRs arising from construction activities, potentially limiting TSR access and usage.	7
Operation	Poor weed and invasive pest management associated with the Project that may spread or impact neighbouring land.	5
	Loss of local amenity and visual amenity from the Project.	17
	Increased bushfire risk from within the Project Area due to mechanical failure.	14
	Poorly maintained fences resulting in livestock, native animals or pests accessing the operational wind farm areas.	5
	Wind turbines, temporary calibration meteorological masts, permanent power performance masts, and overhead powerlines potentially preventing private aviation operations including crop and pest spraying within and surrounding the Project Area.	13
Decommissioning	Increased traffic volumes potentially impacting/degrading the physical condition of local roads, particularly Arundel Road, Balranald-Moulamein Road, and Yanga Road.	8
	Increased traffic movements to and from the Project Area potentially resulting in traffic hazard.	13
	Excessive noise generated during decommissioning of the Project above relevant criteria – impacting amenity.	8
	Generation of dust on site due to site rehabilitation and other decommissioning related activities as well as increased traffic movements on unsealed roads which can impact human and environmental health.	5
	Inadequate removal of infrastructure including commercial and industrial wastes.	9
	Land not left in an acceptable condition to be utilised for agricultural production following decommissioning.	9

3.3 Risk Mitigation Measures

A range of risk management strategies (mitigation measures) have been identified in **Table 3.5** to reduce the risk rating of the potential land use incompatibilities highlighted in **Table 3.4**, and thus reduce the risk associated with land use conflicts for the Project. The objective is to identify and define controls that lower the risk ranking score to 10 or below.

In any risk management process it is possible that, in some instances, the risk profile may not be reduced further, despite appropriate and significant mitigation measures being applied. This is in principle due to the risk probability being at its lowest pre-mitigation measure application, with neither the risk probability or consequence able to reduce further following mitigation measures being applied. All mitigation measures proposed by Windlab have, however, resulted in the reduction of risk rating to below 10 for all identified potential conflicts (refer to **Table 3.5**).

It is also noted that a key mitigation measure is the landholder agreements that Windlab has reached with host and neighbouring landholders (host and associated landholders). The revised risk rating outlined below is based on impacts on non-associated landholders (refer to **Section 2.6**).

Table 3.5 Mitigated Risk Rating

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Construction	Generation of dust on site due to site preparation and other construction related activities as well as increased traffic movements on unsealed roads which can impact human and environmental health.	8	The management of dust impacts will be detailed in the Construction Environmental Management Plan (CEMP). The CEMP will develop and implement protocols to minimise the air emissions during construction, including: • water suppression on exposed areas, unsealed roads and stockpile areas when required (if visible dust emissions are observed) • temporary seeding of topsoil stockpiles and covering, watering or other controls for stockpiled materials where applicable to reduce dust emissions • minimising disturbed areas as part of construction to the minimum area necessary • the location and scale of activities which generate dust emissions would be modified and limited during periods of dry and windy weather • engines to switch off when not in use for prolonged periods • development of a complaints procedure to promptly identify and respond to complaints • once construction has been completed, establish and maintain groundcover in accordance with the CEMP.	5	No exceedances of dust related air quality criteria.
Construction	Increased traffic movements to and from the Project Area potentially resulting in traffic hazards, particularly on Arundel Road, Balranald-Moulamein Road, and Yanga Road.	17	• Development of a Construction Traffic Management Plan (CTMP) detailing appropriate construction traffic controls and management measures in consultation with Councils and Transport for NSW (TfNSW). It is acknowledged that, on occasions, local traffic will be inconvenienced however the management measures within the CTMP would endeavour to mitigate impacts as far as practicable. The CTMP would detail the following: ○ transport routes and vehicle types, including OSOM ○ protocol for undertaking road dilapidation surveys including inspection regimes	9	No traffic incidents or near misses during construction that are directly related to the wind farm.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
			○ measures to be implemented to minimise traffic safety issues and disruption to local road users including consideration of cumulative impacts with other projects ○ drivers' code of conduct. • Undertake the proposed road and intersection upgrade works to the local road network to improve the local road network capacity. • Engagement of a licensed and experienced transport contractor with experience in transporting similar wind farm component loads. The contractor would be responsible for obtaining all required approvals and permits from the TfNSW and local Councils and for complying with conditions specified in the approvals. • Investigation of the opportunity for a car pooling initiative or provision of bus services for construction staff from nearby population centres to minimise light vehicle movements.		
Construction	Increased traffic volumes potentially impacting/ degrading the physical condition of local roads, particularly Arundel Road, Balranald-Moulamein Road, and Yanga Road.	12	• Liaising with TfNSW, Murray River Council, Balranald Shire Council, and key road users during the construction phase to ensure road surfaces are maintained. • Prior to commencement of construction, Windlab will establish and agree a road dilapidation program with the relevant Council for local roads used by Project construction phase traffic. • The CTMP would detail the following: ○ transport routes and vehicle types, including OSOM vehicles ○ protocol for undertaking road dilapidation surveys including inspection regimes ○ measures to be implemented to minimise traffic safety issues and disruption to local road users including consideration of cumulative impacts with other projects ○ drivers' code of conduct.	9	Any damaged or degraded roads caused by increased construction traffic is within expectations and able to be repaired.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Construction	Excessive noise generated during construction of the Project above relevant criteria – impacting amenity.	8	The construction noise and vibration impact assessment undertaken for the Project is preliminary only, and once more detailed schedules of plant and equipment, construction methods and work areas are known, a detailed Construction Noise and Vibration Management Plan (CNVMP) will be prepared. The CNVMP will include site and process specific noise management practices to mitigate the impact of construction noise (including traffic and blasting). This will include such measures as: • universal work practices, including employee training, and site management measures to minimise noise emissions • community consultation and notification prior to any construction activity outside standard work hours • plant and equipment selection, maintenance and inspection procedures • on-site controls (e.g., location of plant, alternatives to reversing alarms) • work scheduling during recommended standard hours where possible • transmission path and at-receiver considerations (e.g., acoustic screens or enclosures).	5	No unpredicted exceedances of the Construction Noise Guideline management levels.
Construction	Land erosion as a result of construction activities resulting in sediment runoff entering nearby water bodies, impacting the surrounding landholder water quality and beneficial use of the water (irrigation or stock water).	8	• Preparation and implementation of the CEMP to ensure ground disturbance is minimised and groundcover is maintained where practicable. • Erosion sediment control plans developed as part of the CEMP and erosion and sediment controls implemented for construction works. • Groundcover would be reinstated as soon as practicable following surface disturbance.	5	Groundcover is maintained where practical. Sediment and erosion controls are implemented in accordance with the site's CEMP.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Construction	Possibility of vehicles during construction or operation being involved in an accident with livestock or farm machinery on roads.	9	- Preparation and implementation of a CTMP highlighting the potential for livestock and or farm machinery (e.g. tractors) to be on or surrounding Arundel Road, Balranald-Moulamein Road, and Yanga Road, including appropriate driving around livestock (e.g. reduce speeds when approaching and travelling past loose stock). - Increased number of road warning signs.	5	No incidents with livestock or farm machinery.
Construction	Increased traffic movements to and from the Project Area potentially disrupting crop harvesting activities of neighbouring farm sites.	13	Consulting with surrounding landholders and scheduling construction deliveries and construction peaks outside the harvest window from November to January.	9	No incidents with farm machinery or farm-related vehicles.
Construction	Possible impact to TSRs arising from construction activities, potentially limiting TSR access and usage.	7	Although consultation with landowners has indicated that the local TSRs are rarely, if ever, used, Windlab will continue to consult with the community to confirm timing, duration and likely route of stock movements along the TSR so they could be scheduled and managed to occur in conjunction with construction activities and traffic movements.	5	No incidents with livestock, farm machinery or farm-related vehicles.
Operation	Poor weed and invasive pest management associated with the Project that may spread or impact neighbouring land.	5	- Preparation of an Operational Environmental Management Plan for the Project that includes controls for weed management including weed inspection and treatment/removal. - All machinery and equipment will be cleaned thoroughly prior to entering the Project Area. Cleaning must include the removal of all mud and plant matter, followed by washing with high pressure water. - Feral animal management will be implemented should any pest issues be identified. - Onsite rubbish receptacles and waste management activities will be managed to minimise the potential for any food sources to be available to feral animals.	3	Invasive weed species are managed so that no weeds from the site spread. No complaints from neighbours. No increase to feral animal populations as a result of operational activities.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Operation	Loss of local amenity and visual amenity from the Project.	17	- General principles employed through the Project design phase have reduced visual impact. These include siting, access, layout and other principles which directly impact the appearance of the wind farm. - Other principles have guided the design process of the Project: - controlling the location of different turbine types, densities and layout geometry to minimise visual impacts - lines of turbines reflect the contours of the natural landscape as best as possible - turbines are evenly spaced to give a regular pattern creating a better balance within the landscape. - Visual consistency will be achieved through the landscape via: - uniformity in the colour, design, rotational speed, height and rotor diameter of turbines. - the use of simple muted colours and non-reflective materials on turbines to reduce distant visibility and avoid drawing the eye - turbine blades, nacelles and towers appear as the same colour - unnecessary lighting, signage, logos, etc. will be avoided. - In consultation with landholders, screen planting will be implemented to assist in mitigating views of turbines from residential properties. - Where turbines are located close to dwellings or existing intervening vegetation is thin, supplementary planting will be undertaken. - If used, air navigation lighting will be spaced around the outer edges of the wind farm. Lights are not required on every tower. Where possible, careful consideration will be given to the selection of turbines requiring lighting to avoid unnecessary impact upon residences.	7	Implementation of the management and mitigation measures within a reasonable time frame and as agreed with landholders.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Operation	Increased bushfire risk from within the Project area due to mechanical failure.	14	- A Bush Fire Emergency Management Plan will be developed for the Project in accordance with PBP 2019 and in consultation with the NSW Rural Fire Service (RFS) (including any requirements in relation to aerial firefighting). Consultation will also be undertaken with NSW National Parks and Wildlife Service (NPWS) in relation to the adjoining Yanga National Park and associated bush fire management strategy. - The plan will identify all relevant bush fire risks and mitigation measures associated with the construction and operation of the Project, including: - Detailed measures to prevent or mitigate fires igniting, outlining: - Asset Protection Zone (APZ) locations and management requirements - any specific construction management requirements - access locations, passing bays and any alternate emergency access - management requirements in relation to aerial firefighting - water supply and location and any other bush fire suppression systems (including any drenching systems, static water supply, natural water sources) - construction work that should not be carried out during total fire bans - availability of fire-suppression equipment - storage and maintenance of fuels and other flammable materials. - Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate. - An appropriate bush fire emergency management and evacuation plan.	9	No fires caused by the construction, operation and decommissioning of the Project Area.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
			- The Project will facilitate improved ground-based emergency services access by virtue of the all-weather, low gradient access tracks and strategic location of firewater. Additionally, all construction and operational vehicles will be equipped with appropriate fire fighting equipment to act within the limits of equipment and training prior to emergency services arriving on site. - Operational staffing and associated maintenance regimes provide the opportunity for more regular observation of otherwise remote areas of sites, providing efficient reporting of potential bush fire issues. - With the implementation of a Bush Fire Emergency Management Plan in consultation with the RFS and NPWS, it is considered that potential bush fire risk associated with the Project can be appropriately managed.		
Operation	Poorly maintained fences resulting in livestock, native animals or pests accessing the operational wind farm areas.	5	- Ensure compound fences are maintained to a suitable standard. - Regular inspection of fences should be conducted to assess the condition of the fence, and any issues rectified as soon as practical.	2	Fences are repaired immediately following any identified damage.
Operation	Wind turbines, temporary calibration meteorological masts, permanent power performance masts, and overhead powerlines potentially preventing private aviation operations including crop and pest spraying within and surrounding the Project Area.	13	Providing location and height information of turbines, temporary calibration meteorological masts, permanent power performance masts, and overhead powerlines to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.	9	Implementation of the management and mitigation measures as agreed with landholders.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Decommissioning	Increased traffic volumes potentially impacting/degrading the physical condition of local roads, particularly Arundel Road, Balranald-Moulamein Road, and Yanga Road.	8	• Liaising with TfNSW, Murray River Council, Balranald Shire Council, and key road users regarding the ongoing maintenance of roads during the decommissioning phase to ensure that road surfaces are maintained. • Prepare Decommissioning and Rehabilitation Management Plan (DRMP) in consultation with TfNSW, Murray River Council, and Balranald Shire Council to detail the following for decommissioning: ○ transport routes and vehicle types, including OSOM ○ protocol for undertaking road dilapidation surveys including inspection regimes ○ measures to be implemented to minimise traffic safety issues and disruption to local road users including consideration of cumulative impacts with other projects ○ drivers' code of conduct. • Communication with the affected community regarding traffic movements.	5	Any damaged or degraded roads caused by increased traffic is to be repaired in a timely fashion.
Decommissioning	Increased traffic movements to and from the Project Area potentially resulting in traffic hazard.	13	• Liaising with TfNSW, Murray River Council, Balranald Shire Council, and key road users regarding the ongoing maintenance of roads during the decommissioning phase to ensure that road surfaces are maintained. • Prepare DRMP in consultation with TfNSW, Murray River Council, and Balranald Shire Council to detail the following for decommissioning: ○ transport routes and vehicle types, including OSOM ○ protocol for undertaking road dilapidation surveys including inspection regimes ○ measures to be implemented to minimise traffic safety issues and disruption to local road users including consideration of cumulative impacts with other projects ○ drivers' code of conduct.	9	No traffic incidents during decommissioning that are directly related to the Project.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
			- Communication with the affected community regarding traffic movements. - Schedule construction traffic deliveries such that it is as evenly dispersed as practicable. - Restrict construction to the day-time operating hours for the construction site, subject to the justifications for activity outside of this time as detailed in the construction management plan.		
Decommissioning	Excessive noise generated during decommissioning of the Project above relevant criteria – impacting amenity.	8	- Incorporation of relevant noise controls in the DRMP prepared to guide the implementation of the decommissioning phase. - Ensure the community has details of the project manager and/or site environmental representative to report noise issues to. - Works, including heavy vehicle movements into and out of the site, will generally be restricted to the standard hours of 7 am to 6 pm Monday to Friday, and between 8 am and 1 pm on Saturdays. - Works carried out outside of the standard hours will be limited to: - works that do not cause noise emissions above 35 dB(A) at any nearby non-associated dwellings - the delivery of materials as requested by Police or other authorities for safety reasons - removal of wind farm components via OSOM vehicles - emergency work to avoid the loss of lives, property, and/or to prevent environmental harm - works where the proponent demonstrates and justifies a need to operate outside the recommended standard hours. - Should any other works be required outside of the specified hours, they will only be carried out with the prior consent of DPE or as otherwise directed in consent conditions.	5	No unpredicted exceedances of the Construction Noise Guideline management levels.

Activity	Identified Potential Conflict	Risk Rating (unmitigated)	Risk Reduction Management Strategy (mitigation measures)	Risk Rating (mitigated)	Performance Target
Decommissioning	Generation of dust on site due to site rehabilitation and other decommissioning related activities as well as increased traffic movements on unsealed roads which can impact human and environmental health.	5	The management of dust impacts will be detailed in a DRMP for the decommissioning phase. Develop and implement protocols to minimise the air emissions during decommissioning, including: • water suppression on exposed areas and unsealed internal access roads when required (if visible dust emissions are observed) • temporary seeding of topsoil stockpiles and covering, watering or other controls for stockpiled materials where applicable to reduce dust emissions • minimising disturbed areas as part of decommissioning to the minimum area necessary • the location and scale of activities which generate dust emissions would be modified and limited during periods of dry and windy weather • engines to switch off when not in use for prolonged periods • development of a complaints procedure to promptly identify and respond to complaints • once decommissioning has been completed, establish and maintain groundcover in accordance with the DRMP.	3	No exceedances of adopted dust criteria.
Decommissioning	Inadequate removal of infrastructure including commercial and industrial wastes.	9	• Removal of infrastructure and remediation of Project Area to an agreed standard as stipulated in land contracts with Project landowners. • Removal of infrastructure (except where certain infrastructure is agreed to be retained with the landholder) and remediation of disturbed areas.	6	All Project wastes are removed. Materials are recycled where feasible and practical.
Decommissioning	Land not left in an acceptable condition to be utilised for agricultural production following decommissioning.	9	• Development of a DRMP prior to decommissioning which guides the rehabilitation of the Project Area to a condition that is generally consistent with the condition that existed prior to construction of the wind farm.	6	Rehabilitation completed to the criteria identified in the DRMP.

3.4 Key Potential Land Use Conflicts

As indicated in **Table 3.5**, the identified potential risks can be effectively managed through the identified controls and no high (red) residual risks would remain following the implementation of the identified controls. In some instances, the resulting risk would be reduced below the no Project scenario (e.g. bushfire management may be significantly improved through the development of the Project as improved bushfire response ability will be provided by the Project). The potential land use conflict issues are addressed in further detail in the relevant technical assessment reports appended to the EIS.

Following a review of the potential land use conflict risks identified in **Table 3.4** and **Table 3.5**, the potential land use conflicts with the highest remaining risk post implementation of controls, were traffic, aviation operations, bushfire risk and visual. These are discussed below.

3.4.1 Traffic

The construction period is expected to generate the largest increase in traffic accessing the Project Area, with management strategies to mitigate potential conflicts with surrounding landholders outlined in Section 6.7 of the Junction Rivers Wind Farm EIS (Umwelt, 2024a) and the Traffic and Transport Assessment (refer to Appendix 14 of EIS).

With the implementation of the proposed mitigation measures (as discussed in **Table 3.5**), the potential for land use conflicts due to increased traffic volumes during construction can be managed to a low risk. This is not to indicate that there will not be impacts, however, these impacts can be effectively managed and the road network (including the proposed upgrades) has adequate capacity to cater for the predicted traffic volumes. Prior to the commencement of construction, a CTMP will be prepared in accordance with relevant guidelines and in consultation with TfNSW, Murray River Council, Balranald Shire Council, and any other relevant stakeholders. The CTMP will outline how construction activities would avoid, mitigate and manage risks involving construction activities, users of the traffic and transport network and residents, incorporating the management commitments made in the EIS. This risk will further decrease during the operational phase, as there will only be low traffic volumes associated with this phase of the Project. Workers travelling to the Project Area on public roads will be required to comply with the Project's CTMP.

Any changes to traffic as a result of the Project are unlikely to impact the use of TSRs as consultation with landowners has indicated that the local TSRs are rarely, if ever, used.

Traffic Impacts to Local Road Conditions

During the construction phase, there is a risk that increased traffic volumes may impact on the physical condition of access roads (Arundel Road, Balranald-Moulamein Road, and Yanga Road). Various measures, including management practices, and physical measures such as road improvements will be implemented to mitigate these risks.

3.4.2 Private Aviation Operations

The Aviation Impact Assessment (AIA) (Aviation Projects, 2024) identified that local aerial application operations (i.e., private aviation operations) including crop and pest spraying are conducted within and surrounding the Project Area.

Due to the nature of the private aviation operations, pilots are subject to rigorous training and assessment requirements to obtain and maintain their licence to operate. The Aerial Application Association of Australia (AAAA) has a formal risk management program (which is recommended for use by its members) to assess the risks associated with their operations and implement applicable treatments to ensure an acceptable level of safety can be maintained. Aerial application operators generally align their positions with the AAAA policies (Aviation Projects, 2023).

The AIA notes that it is reasonable to conclude that safe aerial application operations would be possible on properties within the Project Area and on neighbouring properties, subject to implementing recommendations including, but not limited to providing details of the Project, including location and height information of WTGs, temporary calibration meteorological masts, permanent power performance masts, and overhead powerlines to landowners so that, when asked for hazard information on their property, the landowner may provide the aerial application pilot with all relevant information.

Other aviation impacts and mitigation measures are addressed within the EIS.

3.4.3 Bushfire Risk

Following the risk review and implementation of mitigation measures (refer to **Table 3.4** and **Table 3.5**), it was determined that although the likelihood of bushfire being started from within the Project Area from mechanical faults or other was inherently low (unlikely), the consequence was major. This risk will be further mitigated by the implementation of design and other controls to reduce this risk.

A Bushfire Emergency Management Plan will be developed for the Project in accordance with PBP 2019 and in consultation with the NSW Rural Fire Service (RFS) (including any requirements in relation to aerial firefighting). Consultation has been undertaken with NSW National Parks and Wildlife Services in relation to the interaction with the Yanga National Park and Yanga State Conservation Area and associated bushfire management strategies.

The Bushfire Emergency Management Plan will identify all relevant bushfire risks and mitigation measures associated with the construction and operation of the Project, including:

- detailed measures to prevent or mitigate fires igniting, outlining:
 - asset locations and management requirements
 - any specific construction management requirements
 - access locations, passing bays and any alternate emergency access
 - management requirements in relation to aerial firefighting
 - water supply and location and any other bush fire suppression systems (including any drenching systems, static water supply, natural water sources)
 - construction work that should not be carried out during total fire bans
 - availability of fire-suppression equipment
 - storage and maintenance of fuels and other flammable materials.

- notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate
- and appropriate bush fire emergency management and evacuation plan.

3.4.4 Visual

It is inevitable that the placement of large-scale wind turbines in a rural landscape will alter the existing landscape character of the area to some degree. The Project contrasts with the existing landscape character of the region which is typically rural, pastoral land with large expanses of vegetation.

Typically, the people most likely to experience visual impacts as a result of a wind farm are those located in close proximity to the site.

Windlab has negotiated seven Host Landholder Agreements for the Project.

In addition to Host Landholder Agreements, Windlab has three agreements in place with neighbouring landowners (identified as ‘associated landholders’) to address various impacts associated with the Project specific to their dwellings. The agreements were developed in accordance with the Wind Energy Guidelines and have been agreed between Windlab and the relevant landholder.

The impacts of the Project on these residences, whilst noted in some of the technical assessments as relevant, are addressed by the agreements in place.

Mitigation methods incorporated into the design process in conjunction with landscape and visual screening will have a positive effect on reducing any visual impact of the Project from the non-associated dwellings. Through the implementation of the mitigation methods described below, the Landscape and Visual Impact Assessment (Moir, 2023) found that it will be possible to significantly reduce the visual impact to an acceptable level through the following:

- General principles employed through the Project design phase have reduced visual impact. These include siting, access, layout and other principles which directly impact the appearance of the wind farm.
- Other principles have guided the design process of the Project:
 - controlling the location of different turbine types, densities and layout geometry to minimise visual impacts
 - lines of turbines reflect the contours of the natural landscape as best as possible
 - turbines are evenly spaced to give a regular pattern creating a better balance within the landscape.
- Visual consistency will be achieved through the landscape via:
 - uniformity in the colour, design, rotational speed, height and rotor diameter of turbines
 - the use of simple muted colours and non-reflective materials on turbines to reduce distant visibility and avoid drawing the eye

- turbine blades, nacelles and towers appear as the same colour
- unnecessary lighting, signage, logos, etc. will be avoided.
- In consultation with landholders, screen planting will be implemented to assist in mitigating views of turbines from residential properties.
- Where turbines are located close to dwellings or existing intervening vegetation is thin, supplementary planting will be undertaken.
- If used, air navigation lighting will be spaced around the outer edges of the wind farm. Lights are not required on every tower. Where possible, careful consideration will be given to the selection of turbines requiring lighting to avoid unnecessary impact upon residences.

4.0 Conclusions

This assessment has examined the potential land use conflicts that may arise from the Project during construction, operation, and decommissioning.

The land within the Project Area is Class 4, 5 and 6 under the LSC. Windlab will seek to minimise disturbance to areas of Class 4 land as far as practicable. Class 4 land represents 1.90% (14.76 ha) of the entire Development Footprint (768.88 ha). The majority of impacts from the Project will be to Class 6 land (98.10%, or 754.12 ha of the entire Development Footprint).

The Project will extend the current land use from agriculture to include electricity generation. The Project has been designed to be compatible with existing agricultural pursuits within the Project Area. Ongoing agricultural use of the land will continue with the wind farm during the construction, operation and decommissioning phases and the provision of income to host and other associated landholders will strengthen their ability to invest in their ongoing agricultural operations and provide alternate sources of income during drought or other less productive periods.

A risk identification and ranking process has been undertaken in accordance with DPI Guidelines. Key risks include those associated with traffic (during construction and decommissioning), visual amenity and bushfires. These issues have been subject to assessment as part of the EIS and appropriate management and mitigation measures have been identified which bring the residual risk ratings to below a “10” (i.e. acceptable according to the DPI Guidelines).

Windlab has committed to implement these management and mitigation measures as part of the Project. With the implementation of these measures, the potential impact of the extended land use on the surrounding land and land users will be minimal. Additionally, should decommissioning be required, all above ground structures not required for the ongoing agricultural use of the land, including the WTGs and substations will be removed and the land rehabilitated so that the areas occupied by the Project can return to agricultural use.

5.0 References

Aviation Projects (2024) Junction Rivers Wind Farm Aviation Impact Assessment.

Landcom (2004) Managing Urban Stormwater – Soils and Construction Volume 1.

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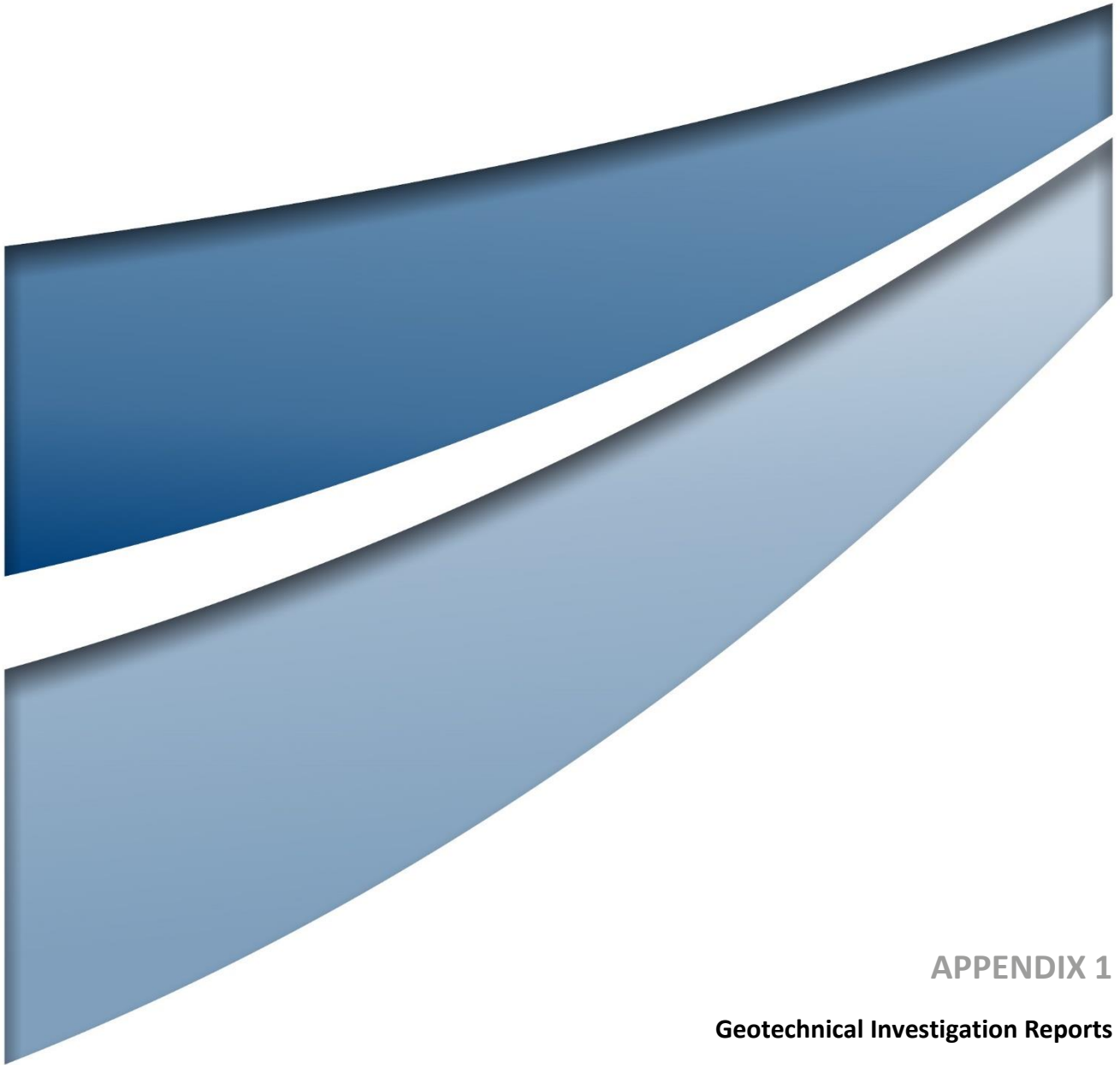
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Umwelt (Australia) Pty Limited (Umwelt) (2024b) Junction Rivers Wind Farm Water Resources Impact Assessment.



APPENDIX 1

Geotechnical Investigation Reports

3 June 2022

**BURRAWONG WIND FARM
BALRANALD, NEW SOUTH WALES**

GEOTECHNICAL FACTUAL REPORT

Windlab Developments Pty Ltd
MEL2022-0026AB Rev1

MEL2022-0026AB		
Date	Revision	Comments
6 May 2022	0	Preliminary Submission
3 June 2022	1	Updated Factual Report with Laboratory Test Results

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Appendix B – Site Photographs

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Appendix D – Geotechnical Laboratory Test Results

Appendix E – Electrical Resistivity Test Results

1 INTRODUCTION

CMW Geosciences (CMW) has been engaged by Windlab Developments Pty Ltd (Windlab) to undertake a geotechnical investigation for the proposed Burrawong Wind Farm (BWF) located near Balranald, New South Wales 2715.

This report presents the findings of our geotechnical investigation together with our factual geotechnical information based on encountered ground conditions. The geotechnical investigation was undertaken in accordance with our proposal MEL2022-0026AA Rev1 dated 16 March 2022. The works were commissioned by Windlab Developments Pty Ltd via a signed Investigative Works Services Agreement dated 29 March 2022.

1.1 Proposed Development

Windlab is currently in the process of defining the required civil scope of works for the proposed BWF, which comprises up to 107 turbines with associated civil and electrical works. The project size comprises approximately 15,000ha of land located about 15km south of Balranald. Figure 1 below provides a general site location.

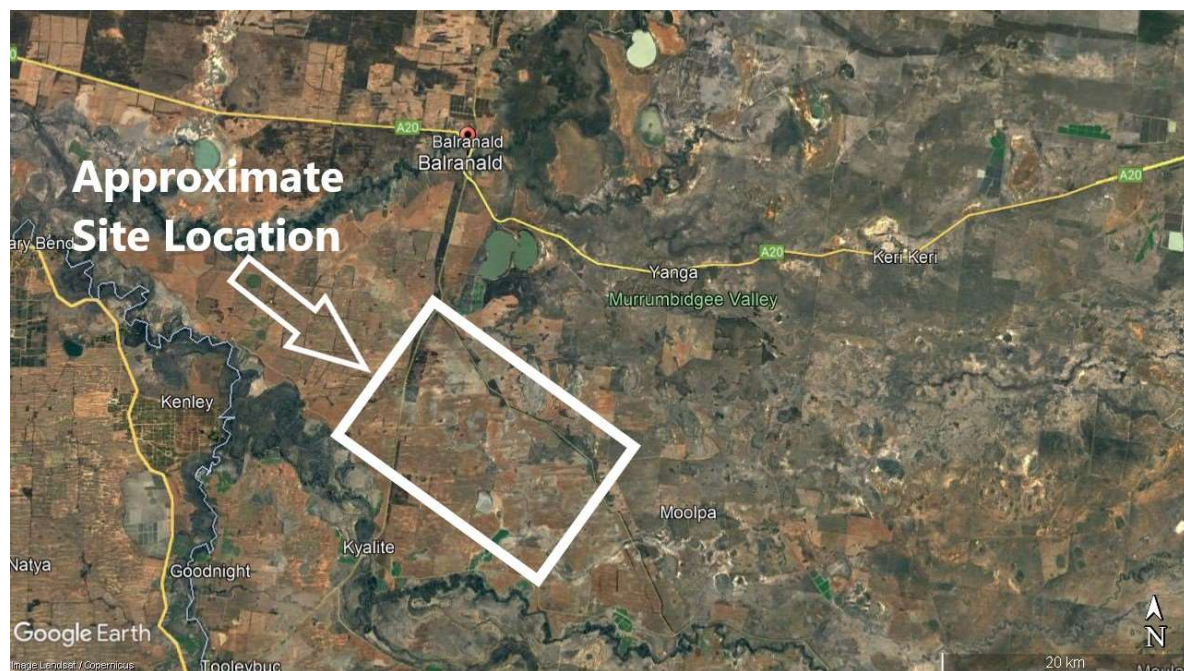


Figure 1: Approximate Site Location

The site has been divided into three sections, north, south, and west, separated by Balranald Road, which generally runs centrally through the site.

Turbine and test locations, and existing access tracks at the time of the field investigation were provided to CMW by Windlab through a series of KMZ files. The turbine test locations were named in accordance with the provided numbering system.

1.2 Purpose and Scope of the investigation

Between 20 April 2022 and 27 April 2022, a geotechnical site investigation was undertaken by CMW at eight (8) borehole locations and fifteen (15) test pit locations. The investigation scope was agreed in consultation with Windlab and reflected in the contract agreement document.

The scope of work for this investigation was prepared based on the requirements set out in 'Request for Proposal Geotechnical Studies' prepared by Windlab, dated 16 February 2022.

The scope of field works undertaken to inform the geotechnical study was also carried out in general accordance with our proposal and included:

- Eight (8) boreholes to a target depth of 20m using a combination of auger and wash boring drilling methods along with SPT test spaced at 1.5m.
- Excavate a total of fifteen (15) test pits to a target depth of 3.5m, or shallower upon refusal using a 14-tonne excavator. Each test pit was carried out at client provided locations. Test pits were accessed using the existing access tracks, where possible.
- Complete fifteen (15) electrical resistivity tests (ERT's) employing the Wenner method in accordance with IEEE81, with spacings of 1m, 2m, 4m, 8m, and 16m at test pit locations.
- Laboratory testing of:
 - 3 x Thermal resistivity tests with 4-point dry back curves;
 - 6 x Atterberg Limit tests;
 - 6 x Particle Size Distribution tests;
 - 6 x Emerson Dispersion tests;
 - 6 x Moisture Content tests;
 - 6 x Chemical Durability tests for aggressivity to steel and concrete; and
 - 3 x California Bearing Ratio (CBR) tests on near surface subgrade soils with associated compaction test.

2 REGIONAL SETTING

2.1 Site Description and Topography

The site is located approximately 15km south of Balranald, covering approximately 15,000ha. The site is located on land used primarily for agricultural operations such as livestock grazing and broad cropping. The borehole and test pit locations investigated by CMW were located north, south and west of Balranald Rd.

Ground surface elevation varies from the north to south end of site, with elevations generally between 60m to 80m AHD to the north and 50m to 80m AHD to the south, with a minimum elevation of 58m and maximum elevation of 78m.

Surface conditions were reasonably consistent across the site. Dunes of deep brownish sands and vegetated fields were present across the entire site. The crop field terrain generally consisted of clayey sands and gravels overlaying sandy clay. The livestock field had been less worked and generally consisted of grass and scrublands.

Existing access tracks provided access to most locations around the BWF site by 4WD vehicles. The presence of soft material along several tracks affected access for some vehicles, e.g., drill rig truck and support truck. Several tracks were also damp, following the rainfall, and resulted in reduced accessibility due to wet ground conditions.

The site can be accessed via Balranald Road which runs centrally through the site and provides access to the north and south of site, and Yanga Way which provides access to the Western end of site. An appropriate network of access roads will be required to facilitate access during construction and ongoing turbine maintenance.

Figures 2 and 3 provides typical conditions encountered on site, with further site photographs provided in Appendix B.



Figure 2 – General Site Conditions at TP08, Northern End of site



Figure 3 – General Site Conditions at TP12, Southern End of site

2.2 Site Geology

The Australian Geological Survey Organisation Network (AGSON) 1:250,000 scale map of Balranald indicates that the project site is underlain by Late Tertiary to Quaternary sedimentary deposits. We note that majority of the project site is underlain by Woorinen Formation (Qdw). A portion of northern, southern, and eastern side of the site is underlain by unconsolidated to poorly consolidated clays and sands of the Shepparton Formation (TQs). Alluvial floodplain and fan deposits appear to exist to south of the site (Qa). Table 1 provides a brief description of geological units presents across the site.

Table 1 – Summary of Regional Geology Units			
Era	Group	Geological Unit	Lithology Description
Quaternary	Woorinen Formation	Qw	Unconsolidated red-brown siliceous fine to medium grained silty sand, red calcareous silty clay, sandy clay, clay pellet aggregates
Quaternary	Coonambidgal Formation	Qa	Unconsolidated grey-brown micaceous silty clay, silt, polymictic sand, gravel
Late Tertiary and Quaternary	Shepparton Formation	TQs	Unconsolidated to poorly consolidated mottled variegated clay, silty clay; polymictic coarse to fine sand, gravel, and red brown palaeosols

2.3 Groundwater

A review of publicly available information on the Water NSW database shows two groundwater extraction bores located predominantly to the north of site, (10-13km) nearer to Balranald.

Reports of these two groundwater extraction bores show groundwater to be generally within the range of 9m below ground level with the other bore going as deep as 250m with no record of groundwater ingress.

3 FIELD INVESTIGATION

Prior to carrying out the fieldwork, an Occupational Health, Safety and Environmental Management (OHSEM) plan, along with relevant Safe Work Method Statements (SWMS) and Job Hazard Analysis (JHA) documents were prepared to support the safe operation of the field investigation. Following a dial before you dig search, the main components of the field investigation including boreholes and test pits was carried out between 20 April 2022 and 27 April 2022. Electrical Resistivity Testing were commenced on 20 April 2022 and was then carried out where possible during the field investigation until 25 April 2022. Field work was carried out under full time observations of a CMW Geotechnical engineer / engineering geologist in general accordance with the AS1726 (2017).

Investigation locations were positioned using a handheld GPS unit to the units' inherent accuracy (typically $\pm 5\text{m}$).

3.1 Borehole investigation

Borehole fieldwork was carried out between 20 April 2022 and 27 April 2022. Boreholes were drilled by drilling contractor Rockwell Drilling with a truck mounted scout drilling rig using a combination of solid auger and wash boring drilling techniques. Boreholes were advanced until suitable refusal (3xSPT), or a maximum depth of 20m was achieved.

Standard Penetration Tests (SPT) were carried out in the soil layers at 1.5m intervals. Following the investigation, the boreholes were reinstated with cuttings compacted as practical as possible to existing surface level. Table 2 below summarises the borehole ID, depth and location of the geotechnical investigation conducted.

Engineering logs of the subsurface conditions are presented in Appendix C. The locations of the respective sites referred to above are shown in Appendix A.

Table 2 - Summary of borehole locations

Location ID	Drilling Date	Borehole Depth (m)	Reason for termination	Easting (m)	Northing (m)
BH01	22/04/22	19.80	Target Depth	732512	6144355
BH02	21/04/22	19.77	Target Depth	732040	6140057
BH03	20/04/22	19.63	Target Depth	737459	6140389
BH04	23/04/22	19.80	Target Depth	738532	6143806
BH05	27/04/22	19.76	Target Depth	739499	6139055
BH06	26/04/22	19.95	Target Depth	742706	6135854
BH07	24/04/22	19.95	Target Depth	745969	6130652
BH08	25/04/22	19.95	Target Depth	746904	6134365

3.2 Test pit investigation

A total of fifteen (15) test pits were undertaken at client provided locations, or within a suitable offset agreed upon with the client prior to completion of each test pit. Test pits were carried out at turbine locations. Test pits were excavated using a 14-tonne Kobelco SK520 excavator between 20 April 2022 and 23 April 2022. The test pits were excavated to depths ranging from 1.0 to 3.5m using a 0.6m wide toothed bucket.

Following logging and sampling from a CMW engineer, test pit excavations were subsequently backfilled with spoil from the pit, compacted using the bucket and rolled with the excavator tracks as much as practically possible.

Dynamic Cone Penetrometer (DCP) testing was undertaken adjacent each test pit. Results of the DCP testing at test pit locations are presented on each respective test pit log.

Appendix C presents the test pit engineering logs. The locations of the test pits are shown in Appendix A.

Table 3 - Summary of test pit locations

Location ID	Depth (m)	Reason for termination	Easting (m)	Northing (m)
TP01	3.50	Target Depth Reached	731526	6146032
TP02	3.50	Target Depth Reached	734998	6145011
TP03	3.50	Target Depth Reached	730997	6142707
TP04	3.50	Target Depth Reached	729605	6139253
TP05	3.50	Target Depth Reached	732388	6138512
TP06	3.50	Target Depth Reached	734922	6143051
TP07	3.50	Target Depth Reached	736647	6145110
TP08	3.50	Target Depth Reached	739470	6141479

Table 3 - Summary of test pit locations				
Location ID	Depth (m)	Reason for termination	Easting (m)	Northing (m)
TP09	3.50	Target Depth Reached	737871	6141139
TP10	3.50	Target Depth Reached	737172	6137426
TP11	3.50	Target Depth Reached	740686	6138698
TP12	3.50	Target Depth Reached	743494	6137586
TP13	3.50	Target Depth Reached	743726	6134155
TP14	3.50	Target Depth Reached	743637	6132103
TP15	3.50	Target Depth Reached	746073,	6136661

3.3 Electrical Resistivity Testing

Fifteen (15) Electrical Resistivity Tests (ERT's) were undertaken using the 4-point Wenner array technique with a maximum electrode spacing of 16m at provided test pit locations.

ERT was completed using the Sonel MRU30 earth resistivity meter. Two orthogonal Wenner arrays sounding in North-South and East-West directions were completed.

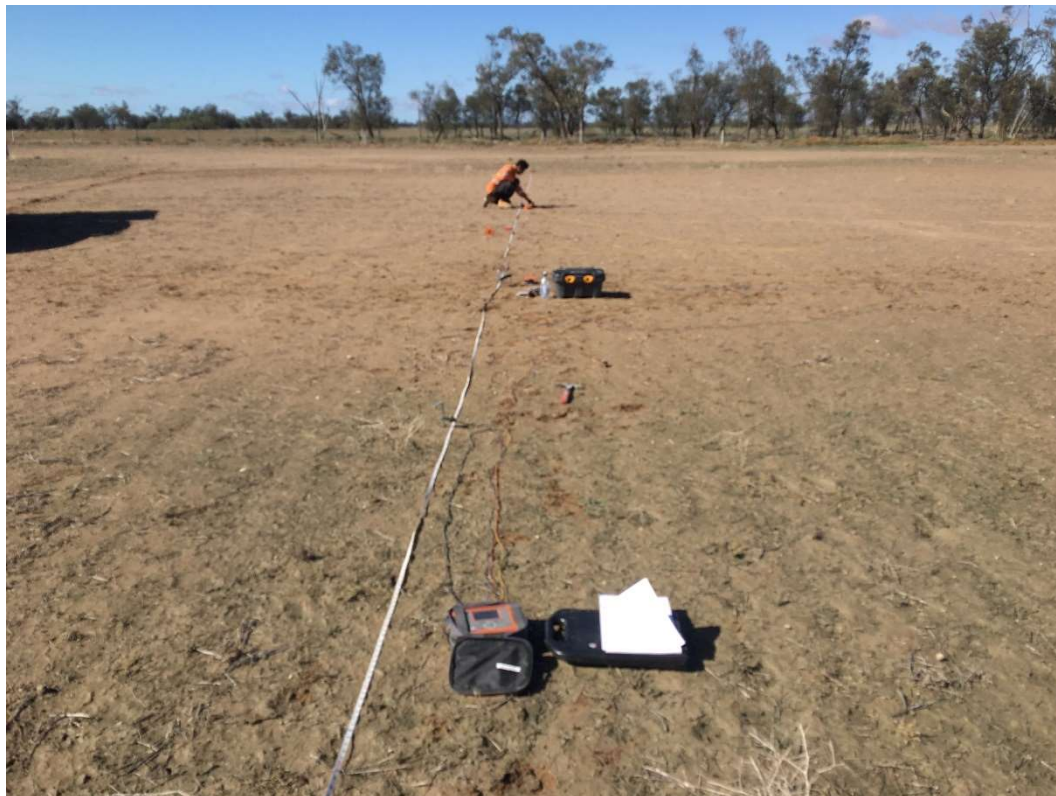


Figure 4: 4-point Wenner array setup at TP06 with 2.0m spaced electrodes

It should be noted that all the results reported are representative of the ground conditions at the time of the survey. The resistivity of the ground can vary due seasonal factors, including changes in moisture content.

The locations of each ERT are presented in Appendix A at the corresponding results for each location is summarised in Table 4 and ERT results are presented in Appendix E.

Table 4 - Summary of ERT testing				
Location	Test ID	Maximum Pin Spacing (m)	Direction	Apparent Resistivity (Ωm)
TP01	ERT01	16	N-S ; E-W	2.78 – 34.8
TP02	ERT02	16	N-S ; E-W	1.36 – 2.76
TP03	ERT03	16	N-S ; E-W	3.47 – 59.7
TP04	ERT04	16	N-S ; E-W	6.12 – 13
TP05	ERT05	16	N-S ; E-W	1.55 – 6.53
TP06	ERT06	16	N-S ; E-W	1.24 – 3.06
TP07	ERT07	16	N-S ; E-W	2.84 – 56.5
TP08	ERT08	16	N-S ; E-W	2.49 – 52.1
TP09	ERT09	16	N-S ; E-W	2.34 – 69.5
TP10	ERT10	16	N-S ; E-W	1.32 – 30.5
TP11	ERT11	16	N-S ; E-W	1.56 – 21.0
TP12	ERT12	16	N-S ; E-W	1.02 – 10.5
TP13	ERT13	16	N-S ; E-W	2.07 – 532
TP14	ERT14	16	N-S ; E-W	0.82 – 24.6
TP15	ERT15	16	N-S ; E-W	2.61 – 11.12

3.4 Subsurface Conditions

The ground conditions encountered from the investigation were considered to be generally consistent with the published geology for the area. Encountered conditions can be generalised as poorly consolidated medium dense to dense sand overlying poorly consolidated clay of stiff to hard in consistency. Isolated deposits of alluvial clays and fluvial gravels and sands were also encountered on the western side of the site.

Standard Penetrometer Test (SPT) was undertaken in the field at 1.5m intervals. A summary of the depth versus SPT N value for cohesive and granular materials encountered are presented below in Figure 5 and Figure 6.

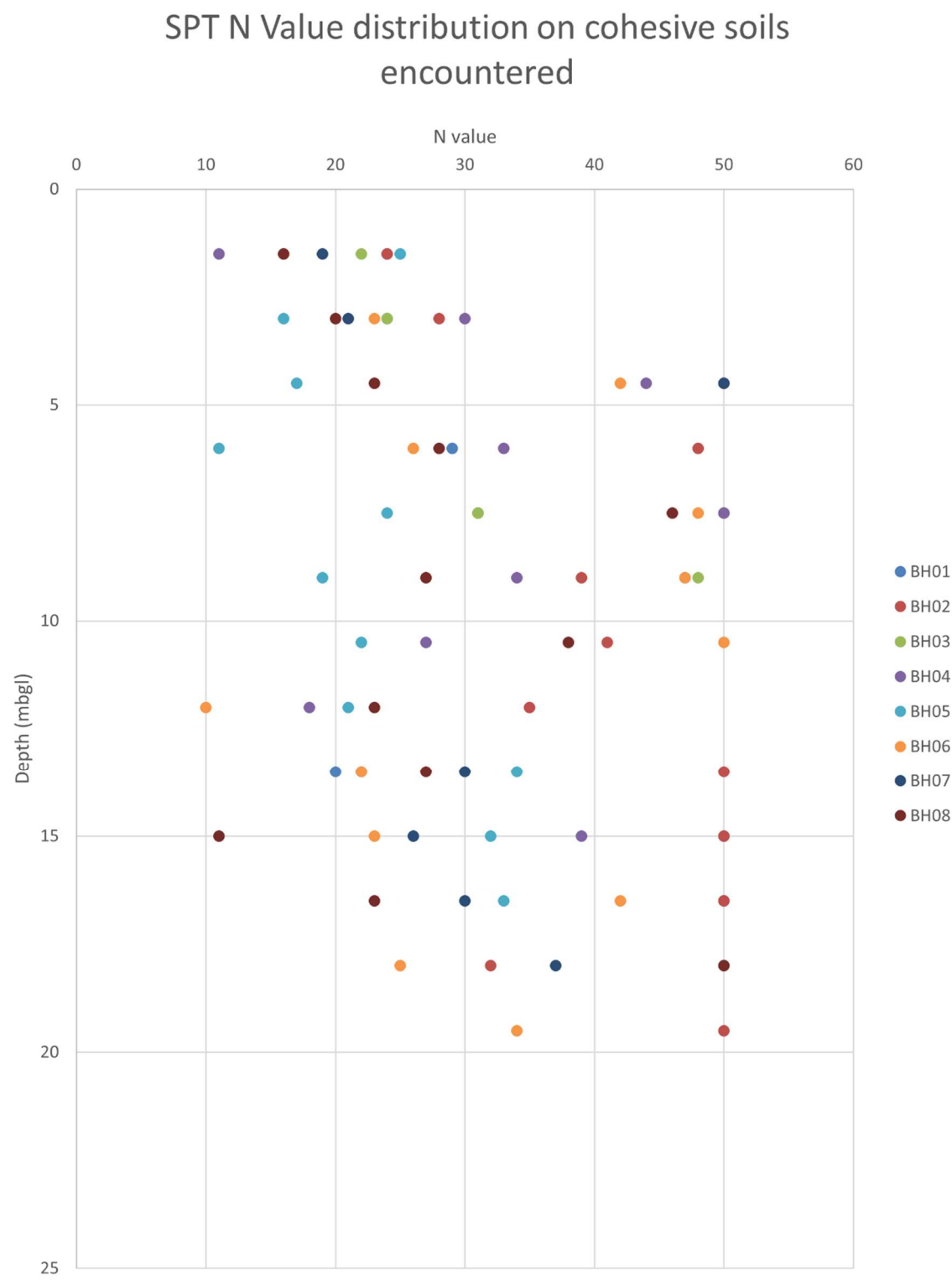


Figure 5: Distribution of SPT N Values for cohesive materials.

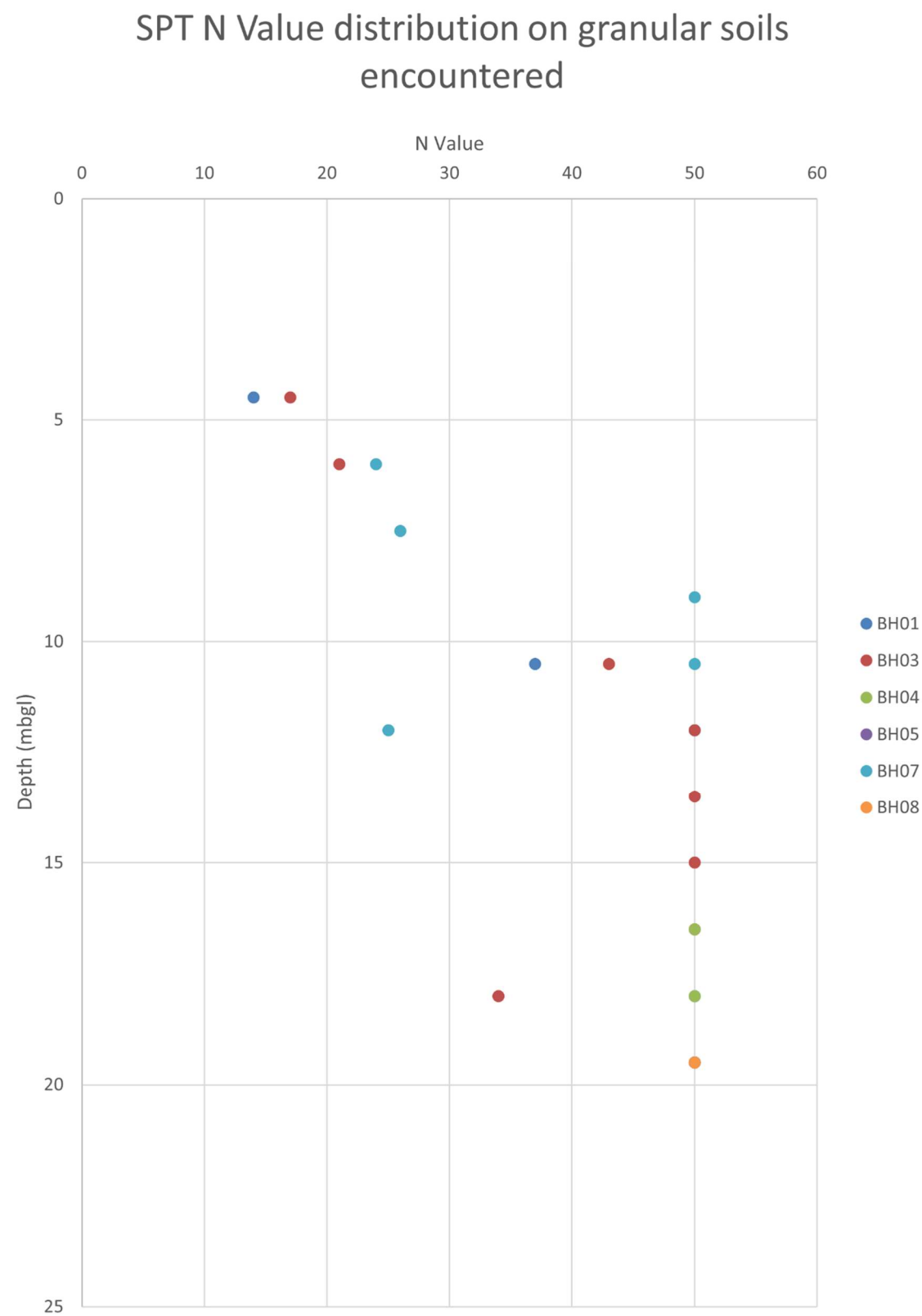


Figure 6: Distribution of SPT N Values for granular materials encountered.

3.5 Groundwater

Groundwater was not encountered over the depth of auger drilling within each borehole, or within test pit excavations from surface to termination depth. Groundwater depth was also not able to be inferred during washbore drilling, due to the method of drilling adopted requiring water re-circulation within the borehole.

It should be expected that groundwater levels will vary seasonally, following periods of heavy rainfall and influenced by overland flow paths. Perched groundwater tables can also exist at varying subsoil layer boundaries e.g., clay/sand/gravel.

Installation of groundwater monitoring wells and associated monitoring was not included within the scope of works for this project. If groundwater monitoring is required, groundwater well installation and subsequent monitoring could be adopted to assess water levels at the turbine sites. We would recommend that this be completed in a future stage of geotechnical investigation works for this project.

3.6 Laboratory Test Results

The following sections present summaries of the laboratory testing completed. The laboratory testing certificate which provides more information about individual tests are presented in Appendix D.

A summary of the laboratory testing results for Particle Size Distribution (PSD), Atterberg Limits, Moisture Content, Emerson Class Number and California Bearing Ratio (CBR) are shown in Table 5 and Table 6. All laboratory result certificates are provided in Appendix D.

Table 5 – Atterberg Limits, Linear Shrinkage, Moisture Content, PSD, Emerson Class Number Results											
Location ID	Depth (m)		Atterberg Limits (%)			Linear Shrinkage (%)	Moisture Content (%)	Emerson Class Number	PSD (%)		
	From	To	LL	PL	PI				Fines	Sand	Gravel
TP01	0.6	2.0	35	16	19	9.0	14.6	4	51	49	0
TP05	0.6	2.0	30	16	14	4.5	9.4	2	52	48	0
TP08	0.6	2.0	29	12	17	6.5	16.9	4	41	59	0
TP10	0.6	2.0	46	17	29	11.0	16.9	4	58	42	0
TP13	0.6	2.0	51	18	33	12.0	18.0	2	84	16	0
TP14	0.6	2.0	54	15	39	7.0	12.4	2	41	59	0
LL – Liquid Limit; PL – Plastic Limit; PI – Plasticity Index; PSD – Particle Size Distribution											

Table 6 - Summary of CBR test results							
Location ID	Depth (m)		Maximum Dry Density (t/m ³)	Optimum Moisture Content (%)	Swell (%)	CBR (%)	Specification
	From	To					
TP02	0.2	0.5	1.66	21.0	2.0	3.0	98% standard compaction, 4 day soaked, 4.5kg surcharge
TP09	0.2	0.5	1.60	23.0	0.5	7.0	
TP13	0.8	1.3	1.72	18.0	3.0	1.0	

A summary of the Thermal Resistivity test results is shown in Table 7. All laboratory test certificates are provided in Appendix D. The testing procedure adopted included 98% standard compaction, with thermal resistivity/dry back curves recorded at Optimum Moisture Content (OMC), 60% of OMC, 25% of OMC and dry.

Table 7 - Summary of Thermal Resistivity Test results									
Location ID	Depth (m)		Field Description	MDD (t/m ³)	OMC (%)	TR (mK/W) - OMC	TR (mK/W) - 60% OMC	TR (mK/W) - (25% OMC)	TR (mK/W) - (dry)
	From	To							
TP02	0.8	1.0	Sandy CLAY	1.66	20.9	0.59	0.76	1.31	2.12
TP04	0.8	1.3	Clayey SAND	1.89	13.0	0.44	0.50	0.70	1.28
TP10	0.8	1.3	CLAY	1.68	18.8	0.63	0.65	1.12	1.72
MDD – Maximum Dry Density; OMC – Optimum Moisture Content; TR – Thermal Resistivity									

Samples were taken during test pitting for Corrosion Assessment testing. A summary of the results of this testing is presented in Table 8. Laboratory test certificates are provided in Appendix D.

Table 8 - Corrosion Assessment Test Results							
Location ID	Sample Depth (m bgl)	Conductivity (uS/cm)	pH	SO4 (mg/kg)	Chloride (mg/kg)	Resistivity (ohm.m)	Moisture (%)
TP01	3.0 - 3.5	1420	7.2	800	1590	7.04	13.1
TP05	3.0 - 3.5	655	9.7	160	650	15.30	4.8
TP08	3.0 - 3.5	1240	8.2	1170	840	8.06	19.1
TP10	3.0 - 3.5	1390	8.1	820	1820	7.19	17.3
TP13	3.0 - 3.5	675	9.4	330	560	14.80	16.5
TP14	3.0 - 3.5	613	7.3	340	600	16.30	17.2
SO4 - Sulphate							

4 CLOSURE

The findings contained within this report are the result of limited discrete investigations conducted in accordance with normal practices and standards. This report has been prepared for use by Windlab Developments in relation to the Burrawong Wind Farm Project in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. Use of this report by parties other than Windlab Developments and their respective consultants and contractors is at their risk as it may not contain sufficient information for any other purposes.

For and on behalf of CMW Geosciences

Prepared by:



Matthew Linke

Project Geotechnical Engineer

Reviewed and authorised by:



Mark Argent

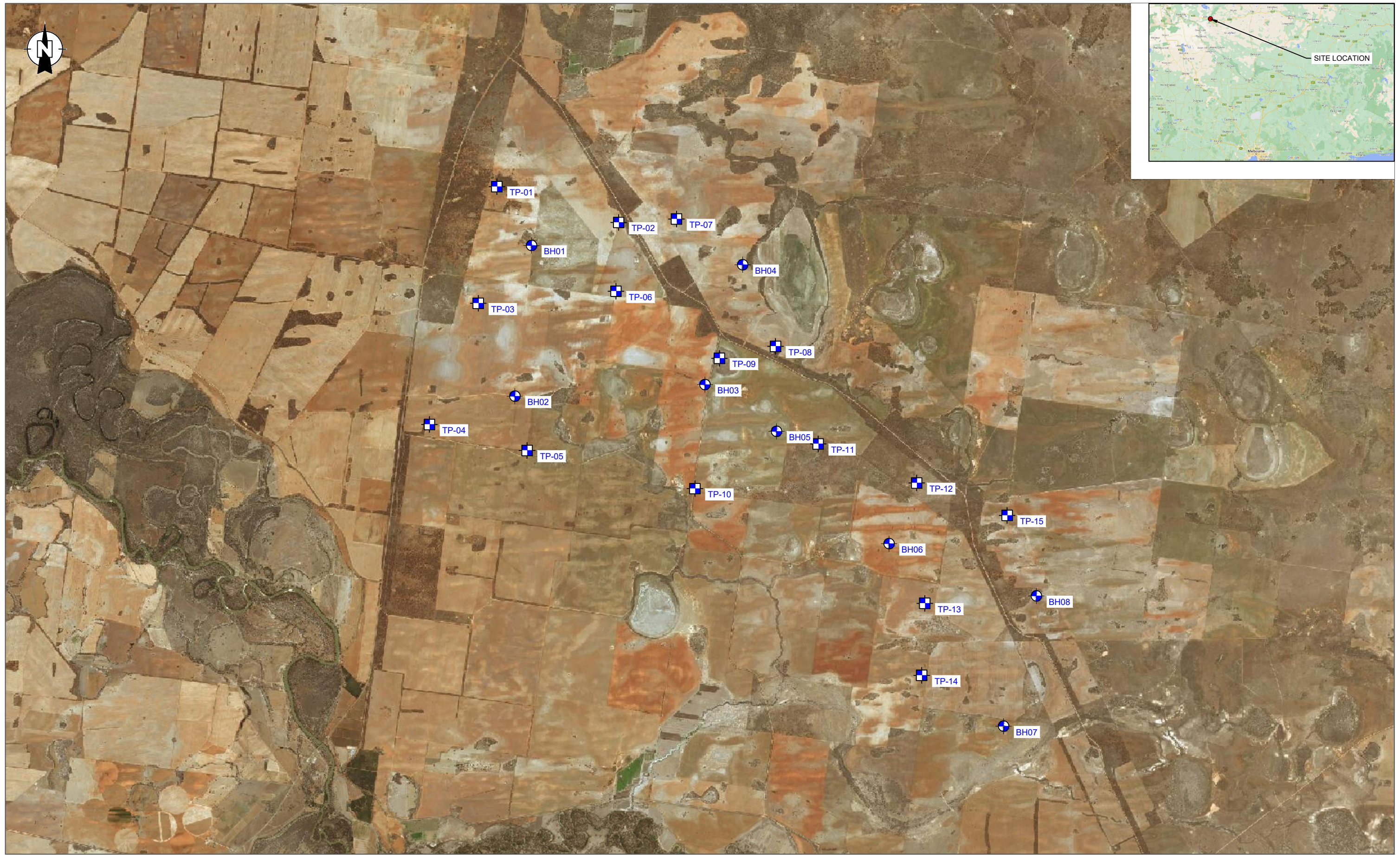
Principal Geotechnical Engineer

Distribution: 1 electronic copy to Windlab Developments via email
Original held at CMW Geosciences



Appendix A

Site Plan



LEGEND:

 BH01 BOREHOLE (BH) LOCATION

 TP01 TEST PIT (TP) LOCATION



CLIENT:	WINDLAB PTY LAB		DRAWN:	HN	PROJECT:	MEL2022-0026
PROJECT:	BURRAWONG WIND FARM BALRANALD		CHECKED:	ML	FIGURE:	01
TITLE:	SITE INVESTIGATION PLAN		REVISION:	0	SCALE:	1:100 000
			DATE:	28/04/2022	SHEET:	A3 L

Appendix B

Site Photographs

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



Taken by: NM

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Checked by: ML

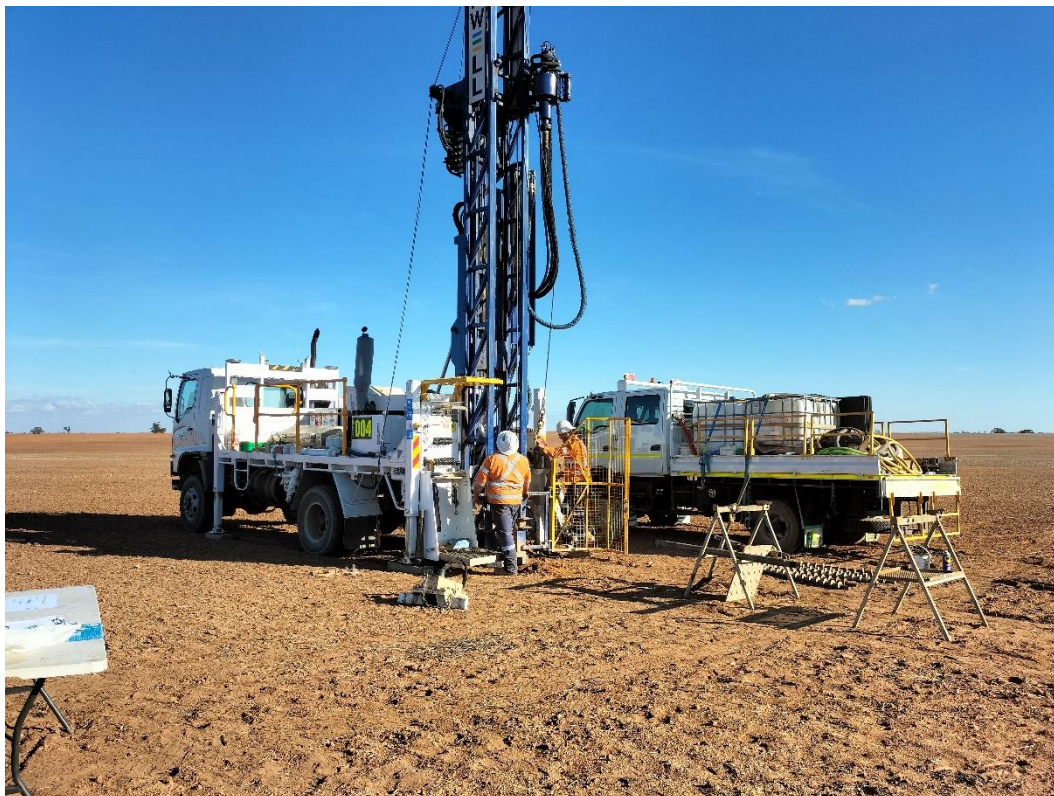


Photo 1: Rockwell drilling at BH-01.

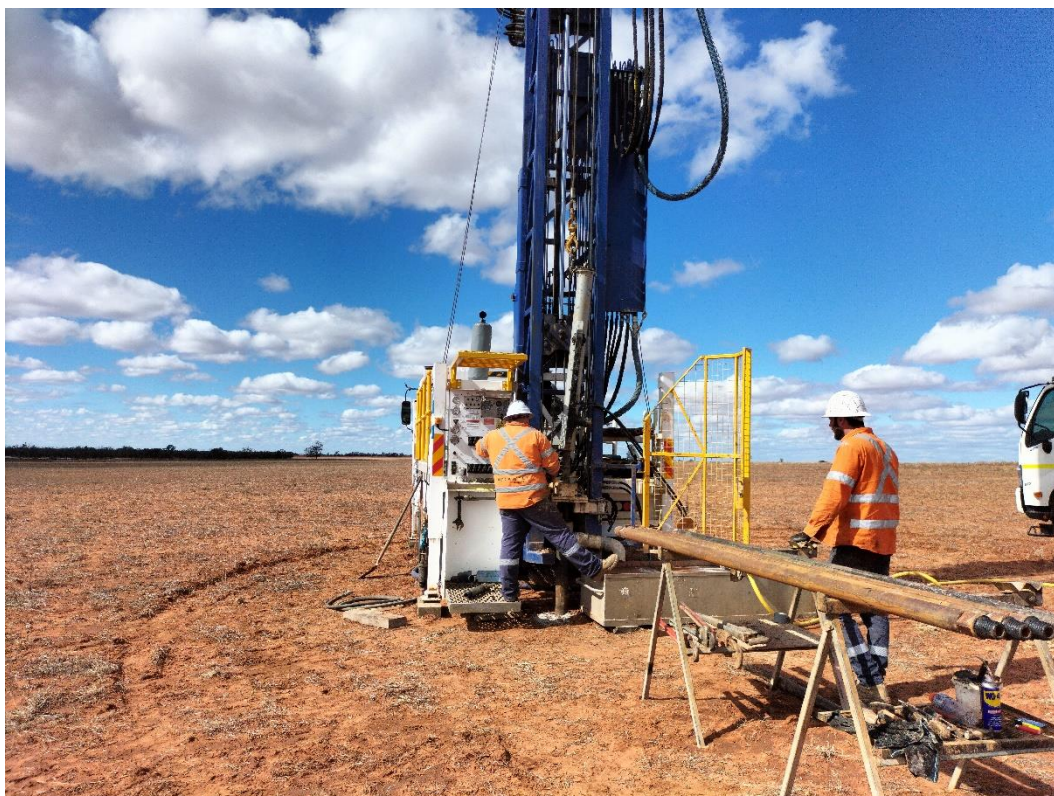


Photo 2: Rockwell drilling at BH-02.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



Taken by: NM

Page 2 of 3

Checked by: ML



Photo 3: Rockwell drilling at BH-03.



Photo 4: Rockwell drilling at BH-04

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML			



Photo 5: Rockwell drilling and site conditions at BH05.



Photo 6: Rockwell drilling at BH06.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



Taken by: NM

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Checked by: ML



Photo 7: Rockwell drilling and site condition at BH07.



Photo 8: Rockwell drilling at BH08.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML			



Photo 9: General site condition at TP01.



Photo 10: TP02 been backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



Taken by: HN			Page 3 of 3
Checked by: ML			



Photo 11: Test pit excavation TP03.



Photo 12: General site conditions at TP04.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML			



Photo 13: General site conditions and backfilled test pit at TP05.



Photo 14: Test pit excavation at TP06.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML			



Photo 15: Test pit excavation at TP07.



Photo 16: Test pit excavation at TP08.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML			



Photo 17: General site condition at TP09.



Photo 18: General site condition and backfilled test pit at TP13.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML			



Photo 19: General site condition at TP15.

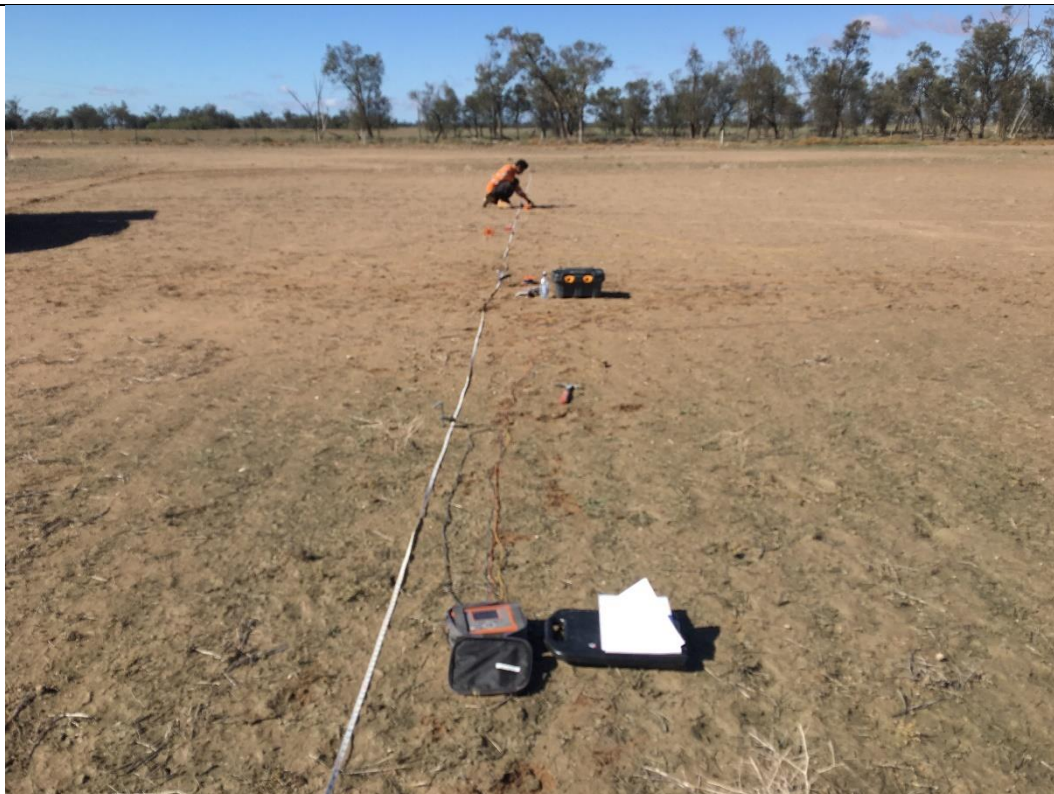


Photo 20: ERT testing at TP06.

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



Taken by: HN			Page 3 of 3
Checked by: ML			



Photo 21: Access track conditions at TP01.



Photo 22: Access track conditions and site access at gate #3

This report must be read in conjunction with accompanying notes and abbreviations.

SITE PHOTOGRAPHS

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm
Location: Balranald, NSW
Project ID: MEL2022-0026
Date: 28/04/2021



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Checked by: ML



Photo 23: Boggy conditions encountered at BH03.



Photo 24: Bugged incident encountered enroute to BH-01.

This report must be read in conjunction with accompanying notes and abbreviations.

Appendix C

Engineering Logs with Material Photographs

BOREHOLE LOG - BH01

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



1:50 Sheet 1 of 2

Logged by: NM Checked by: ML					Position: E.732512m N.6144355m Elevation: 67 m		Hole Diameter: 120mm Angle from horizontal: 90°				Plant: Truck Mounted Rig Contractor: Rockwell Drilling												
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength					Cementation/ Weathering	Defect Spacing (mm)					Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH		EH	<20	20-40	40-100	100-300	
AD/T						67.0			CL: SANDY CLAY: sand, fine to coarse grained, subrounded to rounded; dark brown orange grey, trace fine to coarse grained gravel; trace grass roots.	St to VSt	<PL											0.00-0.40m: Topsoil	
						66.6		CL: CLAY: low plasticity; trace sand, fine grained, subangular to subrounded; brown orange grey.														0.40-19.80m: Woorinen Formation	
						66.0	1	CI: GRAVELLY CLAY: medium plasticity; gravel, fine to medium grained, subangular to subrounded; brown orange.														1.5m:SPT: (10,10,14) N=24	
						65.2	2	CI: CLAY: medium plasticity; trace sand; dark red brown, trace fine grained gravel.													3.0m:SPT: (6,10,14) N=24		
						63.5	4	SC: CLAYEY SAND: fine to medium grained, subangular to subrounded; clay; red brown and pale grey.	MD	D to M												4.5m:SPT: (6,6,8) N=14	
							5	... from 4.70m to 4.90m, Becoming pale grey															6.0m:SPT: (6,13,16) N=29
						61.8	6	CI: CLAY: medium plasticity; trace sand, fine grained, subangular to subrounded; orange brown and pale grey.														7.5m:SPT: (8,13,18) N=31	
							7			Vst to H	<PL												9.0m:SPT: (13,25,22) N=47
							8																
						57.9	9	SM: SILTY SAND: fine to coarse grained, subangular to subrounded; silt; pale grey.	D to VD	D to M													
						10																	

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 6.5m

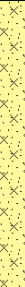
This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH01

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



1:50 Sheet 2 of 2

Logged by: NM			Position: E.732512m N.6144355m			Hole Diameter: 120mm			Plant: Truck Mounted Rig										
Checked by: ML			Elevation: 67 m			Angle from horizontal: 90°			Contractor: Rockwell Drilling										
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength					Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH			
W							11		SM: SILTY SAND: fine to coarse grained, subangular to subrounded; silt; pale grey.	D to VD	D to M	</							

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 6.5m

This report must be read in conjunction with accompanying notes and abbreviations.

1:50 Sheet 1 of 2

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 4.8m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH02

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



1:50 Sheet 2 of 2

Logged by: NM			Position: E.732040m N.6140057m			Hole Diameter: 120mm			Plant: Truck Mounted Rig																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Checked by: ML			Elevation: 71 m			Angle from horizontal: 90°			Contractor: Rockwell Drilling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength					Cementation/Weathering	Defect Spacing (mm)					Samples, test results and additional Data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
			TCR	SCR	RQD							VL	L	M	H	VH		EH	<20	20-40	40-100	100-300		300-1000	>1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
W						58.0	11		CH: CLAY: high plasticity; trace sand, fine grained, subangular to subrounded; pale grey mottled dark red.	H	<PL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 4.8m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH03

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 20/04/2022



1:50 Sheet 1 of 2

Logged by: NM		Position: E.737459m N.6140389m		Hole Diameter: 120mm		Plant: Truck Mounted Rig															
Checked by: ML		Elevation: 61 m		Angle from horizontal: 90°		Contractor: Rockwell Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data	
			TCR	SCR	RQD							VL	L	M	H	VH	EH				
AD/T						61.0			CL: SANDY CLAY: low plasticity; sand, fine to medium grained, subangular to subrounded; grey to dark grey, trace grass roots.	VSt	≈PL									0.00-0.50m: Topsoil	
						60.5		CI: CLAY: medium plasticity; trace sand, fine grained, subangular to subrounded; pale grey to grey.												0.50-19.63m: Woorinen Formation	
						1														1.50-1.95m: SPT 1.5m:SPT: (5,9,13) N=22	
						59.0	2		CL: SANDY CLAY: low plasticity; sand, fine grained, subangular to subrounded; brown orange to red orange.	<PL										3.0m:SPT: (7,10,14) N=24	
						3															
						57.5	4		SM: SILTY SAND: fine to medium grained, subangular to subrounded; silt; red orange to brown orange.											4.5m:SPT: (6,8,9) N=17	
							5		... at 5.30m, Becoming dark brown-purple	D	D to M										6.0m:SPT: (7,10,11) N=21
						6		... at 5.70m, Becoming pale grey													
						7															7.5m:SPT: (8,11,20) N=31
						53.7			CI: CLAY: medium plasticity; trace sand, fine grained, subangular to subrounded; dark brown and pale grey. ... at 7.50m, Becoming pale grey	H	≈PL										9.0m:SPT: (12,19,29) N=48
					8																
					9																
						10															

Termination reason: Target depth reached
Remarks: Groundwater and moisture content obscured by drilling method below 9.8m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH03

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 20/04/2022



1:50 Sheet 2 of 2

Logged by: NM Checked by: ML					Position: E.737459m N.6140389m Elevation: 61 m		Hole Diameter: 120mm Angle from horizontal: 90°		Plant: Truck Mounted Rig Contractor: Rockwell Drilling																	
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/ Weathering	Defect Spacing (mm)	Samples, test results and additional Data						
			TCR	SCR	RQD							VL	L	M	H	VH	EH									
W						50.5			CI: CLAY: medium plasticity; trace sand, fine grained, subangular to subrounded; dark brown and pale grey. SM: SILTY SAND: fine to coarse grained, subangular to subrounded; silt; pale grey and brown red, trace fine grained gravel. GC: GRAVELLY SAND: medium to coarse grained, subangular to subrounded; gravel, fine to medium grained, subangular to subrounded; pale grey; weakly cemented. ... at 13.20m, Becoming brown-orange	H	≈PL												10.5m:SPT: (13,19,24) N=43			
						11																				
						12																			12.0m:SPT: (13,26,30/110mm) N=R	
						48.8																				
						13																			13.5m:SPT: (8/50mm) N=R	
						14																				
						15																			15.0m:SPT: (16,30/100mm) N=R	
						16																				16.5m:SPT: (30/130mm) N=R
						17																				
						18																				18.0m:SPT: (4,10,24) N=34
						19																				
															Borehole terminated at 19.6 m											
						20																				

Termination reason: Target depth reached
Remarks: Groundwater and moisture content obscured by drilling method below 9.8m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH04

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



1:50 Sheet 1 of 2

Logged by: NM			Position: E.738532m N.6143806m			Hole Diameter: 120mm			Plant: Truck Mounted Rig																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Checked by: ML			Elevation: 69 m			Angle from horizontal: 90°			Contractor: Rockwell Drilling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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AD/T						69.0			CL: SANDY CLAY: sand, fine to coarse grained, subangular to subrounded; grey and brown, trace grass rootlets; trace fine to coarse grained gravel.	St										0.00-0.60m: Topsoil																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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						64.0			CL: SANDY CLAY: low plasticity; sand, fine to medium grained, subangular to subrounded; pale grey and brown orange.	H	<PL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 8.0m

This report must be read in conjunction with accompanying notes and abbreviations.

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



Sheet 2 of 2

Termination reason: Target depth reached
Remarks: Groundwater and moisture content obscured by drilling method below 8.0m
This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH05

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 26/04/2022



1:50 Sheet 1 of 2

Logged by: NM		Position: E.739499m N.6139055m		Hole Diameter: 120mm		Plant: Truck Mounted Rig																									
Checked by: ML		Elevation: 58 m		Angle from horizontal: 90°		Contractor: Rockwell Drilling																									
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data											
			TCR	SCR	RQD							VL	L	M	H	VH	EH														
AD/T						58.0			CL: SANDY CLAY: low plasticity; sand, fine to coarse grained, subangular to subrounded; grey to dark grey, trace fine to coarse grained gravel; trace grass rootlets and debris. CI: CLAY: medium plasticity; trace sand; dark grey to grey.	<PL											0.00-0.30m: Topsoil										
																															0.30-19.76m: Woorinen Formation
						56.5			CH: CLAY: high plasticity; green grey and brown orange.	VSt	≈PL										1.5m:SPT: (9,10,15) N=25										

Termination reason: Target depth reached
Remarks: Groundwater and moisture content obscured by drilling method below 5.0m

This report must be read in conjunction with accompanying notes and abbreviations.

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 26/04/2022



Sheet 2 of 2

[illegible]

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 5.0m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH06

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 26/04/2022



1:50 Sheet 1 of 2

Logged by: NM Checked by: ML					Position: E.742706m N.6135854m Elevation: 70 m		Hole Diameter: 120mm Angle from horizontal: 90°		Plant: Truck Mounted Rig Contractor: Rockwell Drilling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/ Weathering	Defect Spacing (mm)					Samples, test results and additional Data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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AD/T						70.0			CL: SANDY CLAY: sand, fine to coarse grained, subangular to subrounded; with gravel, fine to coarse grained, subangular to subrounded; brown orange and grey, trace fine to coarse grained gravel; trace grass roots and debris. CI: CLAY: medium plasticity; trace sand, fine to medium grained, subangular to subrounded; brown orange and grey. CH: CLAY: high plasticity; red orange.	St	<PL													0.00-1.00m: Topsoil																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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						66.0	4		CL: SANDY CLAY: low plasticity; sand, fine grained, subangular to subrounded; red orange and grey.	VSt	<PL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

Termination reason: Target depth reached
Remarks: Groundwater and moisture content obscured by drilling method below 6.5m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH06

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 26/04/2022



1:50 Sheet 2 of 2

Logged by: NM Checked by: ML					Position: E.742706m N.6135854m Elevation: 70 m					Hole Diameter: 120mm Angle from horizontal: 90°					Plant: Truck Mounted Rig Contractor: Rockwell Drilling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/ Weathering	Defect Spacing (mm)					Samples, test results and additional Data																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			TCR	SCR	RQD							VL	L	M	H	VH	EH		≤20	20-40	40-100	100-300	300-1000		>1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
W						59.7		CI: GRAVELLY CLAY: medium plasticity; gravel, fine to coarse grained, subangular to subrounded; dark red. CH: CLAY: high plasticity; trace sand, fine grained, subangular to subrounded; green grey to grey. ... at 11.50m, Becoming green-grey and brown-orange	H	<PL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 6.5m

This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH07

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 25/04/2022



1:50 Sheet 1 of 2

Logged by: NM			Position: E.745969m N.6130652m			Hole Diameter: 120mm			Plant: Truck Mounted Rig											
Checked by: ML			Elevation: 65 m			Angle from horizontal: 90°			Contractor: Rockwell Drilling											
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH	EH			
AD/T						65.0			CL: SANDY CLAY: low plasticity; sand, fine to coarse grained, subangular to subrounded; brown orange and grey, trace grass roots. Cl: CLAY: medium plasticity; trace sand, fine grained, subangular to subrounded; red orange and brown. ... at 1.00m, Becoming high plasticity	VSt	<PL	</								

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 5.0m

This report must be read in conjunction with accompanying notes and abbreviations.

CMW Geosciences

Sheet 2 of 2

Termination reason: Target depth reached
Remarks: Groundwater and moisture content obscured by drilling method below 5.0m
This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH08

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 24/04/2022



1:50 Sheet 1 of 2

Logged by: NM Checked by: ML					Position: E.746904m N.6134365m Elevation: 72 m		Hole Diameter: 120mm Angle from horizontal: 90°		Plant: Truck Mounted Rig Contractor: Rockwell Drilling															
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength					Cementation/ Weathering	Defect Spacing (mm)					Samples, test results and additional Data	
			TCR	SCR	RQD							VL	L	M	H	VH		EH	<20	20-40	40-100	100-300		300-1000
AD/T						72.0			SM: SILTY SAND: fine to coarse grained, subangular to subrounded; silt; brown and brown, trace grass roots; trace fine to coarse grained gravel.	MD	D to M												0.00-1.00m: Topsoil	
						71.0	1		CL: SANDY CLAY: low plasticity; sand, fine to coarse grained, subangular to subrounded; brown and orange.	St to VSt	<PL											1.00-19.95m: Woorinen Formation		
						70.2	2		CL: GRAVELLY CLAY: low plasticity; gravel, fine to medium grained, subangular to subrounded; brown orange and grey.													1.5m:SPT: (8,8,8) N=16		
						69.2	3		CI: CLAY: medium plasticity; trace sand, fine grained, subangular to subrounded; brown orange and grey.			VSt										3.0m:SPT: (6,8,12) N=20		
						68.0	4		SC: CLAYEY SAND: medium to coarse grained, subangular to subrounded; clay; red orange and grey.	MD	D to M											4.5m:SPT: (7,10,13) N=23		
						67.5	5		CH: CLAY: high plasticity; trace sand, fine grained, subangular to subrounded; green grey and brown.	VSt	<PL												4.5m:SPT: (7,10,13) N=23	
							6		... at 6.20m, Becoming dark red and green-grey														6.0m:SPT: (6,12,16) N=28	
						65.0	7		CI: GRAVELLY CLAY: medium plasticity; gravel, fine to coarse grained, subangular to subrounded; dark red and green grey.														7.5m:SPT: (16,20,26) N=46	
							8			H														
							9			VSt														9.0m:SPT: (7,12,15) N=27
						10																		

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 5.0m

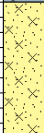
This report must be read in conjunction with accompanying notes and abbreviations.

BOREHOLE LOG - BH08

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 24/04/2022



1:50 Sheet 2 of 2

Logged by: NM					Position: E.746904m N.6134365m					Hole Diameter: 120mm					Plant: Truck Mounted Rig					
Checked by: ML					Elevation: 72 m					Angle from horizontal: 90°					Contractor: Rockwell Drilling					
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/ Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH	EH			
W						61.4			CI: GRAVELLY CLAY: medium plasticity; gravel, fine to coarse grained, subangular to subrounded; dark red and green grey.	VSt	<PL									10.5m:SPT: (13,18,20) N=38
						11			SM: SILTY SAND: fine to coarse grained, subangular to subrounded; silt; green grey to grey.	D	M									
						60.5			CH: CLAY: high plasticity; green grey and orange.	VSt										12.0m:SPT: (5,9,14) N=23
						12														
						13														13.5m:SPT: (7,11,16) N=27
						14														
						15														15.0m:SPT: (5,5,6) N=11
						16				St	≈PL									16.5m:SPT: (7,9,14) N=23
						55.3			CL: SANDY CLAY: low plasticity; sand, fine to medium grained, subangular to subrounded; green grey to grey.	VSt										
						54.5			CL: GRAVELLY CLAY: low plasticity; gravel, fine to medium grained, subangular to subrounded; trace sand, fine to coarse grained, subangular to subrounded; green grey and red orange.											18.0m:SPT: (24,35/140mm) N=R
					18															
					53.5				SC: CLAYEY SAND: fine to coarse grained, subangular to subrounded; clay; trace gravel, fine to medium grained, subangular to subrounded; red orange and grey, trace fine to medium grained gravel.	D	M									19.5m:SPT: (25,27,35) N=62
					20			Borehole terminated at 20.0 m												

Termination reason: Target depth reached

Remarks: Groundwater and moisture content obscured by drilling method below 5.0m

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP-01

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



1:20

Sheet 1 of 1

Logged by: HN Position: E.731526m N.6146032m Plant: Kobelco 14T
Checked By: ML Elevation: 75 m Contractor: Mallee Earthmoving & Excavation Dimensions : 0.60m x 1.50m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			74.8			SC: CLAYEY SAND: fine grained; clay; red brown, trace roots.	D to M	L to MD	1			
						SC: CLAYEY SAND: fine grained; clay, low plasticity; red orange and pale orange, trace roots; weakly cemented.			3			
	0.5	B							2			
	0.6	D							2			
									4			
									4			
	0.8 - 1.3	B							4			
									8			
	1.0	D		1					6			
									9			
									7			
									8			
							M	MD to D	8			
									8			
									8			
									9			
									10			
									15			
	2.0	D		2					18			
												2.00m: DCP Refusal
			72.5			Cl: CLAY: medium plasticity; red brown mottled grey, with fine grained sand.						
	3.00			3			<PL	H				
	3.00	PP=250.0kPa										
	3.5	D	71.5			Test pit terminated at 3.50 m						

DCP Equipment Ref.: 02 In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Target depth reached

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-01

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



TP-01 Side wall



TP-01 Spoil

TEST PIT LOG - TP-02										 CMW Geosciences	
Client: Windlab Pty Ltd Project: Burrawong Wind Farm, NSW Location: Burrawong Project ID: MEL2022-0026 Date: 21/04/2022										1:20 Sheet 1 of 1	
Logged by: HN Checked By: ML			Position: E.734998m N.6145011m Elevation: 70 m			Plant: Kobelco 14T Contractor: Malee Earthmoving & Excavation			Dimensions : 0.60m x 1.50m		
Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & other observations	
	Depth	Type & Results									
			69.8			SC: CLAYEY SAND: fine to medium grained; clay, medium plasticity; brown, with roots.	M	MD	3		
	0.5 0.50 0.50 0.6	B PP=250.0kPa D				CI: SANDY CLAY: medium plasticity; sand, fine grained; brown mottled yellow grey, trace silt.			6 10 7 8 7 6 6 6 7		
	0.8 - 1.0	B							5 5 6 5 5 6 7 4 8		
	1.0 1.00 1.00	D PP=175.0kPa		1							
	2.0 2.00 2.00	D PP=225.0kPa		2						2.00m: DCP Refusal	
						... at 2.50m, Becoming brown mottled grey in colour					
				3							
	3.5 3.50 3.50	D PP=150.0kPa	66.5			Test pit terminated at 3.50 m					

DCP Equipment Ref.: 02

In Situ Vane Equipment Ref.:

Pocket Penetrometer Equipment Ref.:

Termination Reason: Target depth reached

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-02

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



TP-02 Side wall



TP-02 Spoil

TEST PIT LOG - TP-03										 CMW Geosciences	
Client: Windlab Pty Ltd Project: Burrawong Wind Farm, NSW Location: Burrawong Project ID: MEL2022-0026 Date: 22/04/2022										1:20 Sheet 1 of 1	
Logged by: HN Checked By: ML			Position: E.730997m N.6142707m Elevation: 70 m			Plant: Kobelco 14T Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m					
Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & other observations	
	Depth	Type & Results									
			69.7			SC: CLAYEY SAND: fine to medium grained; clay, low plasticity; red brown, trace roots.	D to M	L to MD	3 4 3 3 1 2 2 3 4 6 9		
	0.5 0.6 0.8 - 1.3 1.0	B D B D		1		SC: CLAYEY SAND: fine to medium grained; clay, low plasticity; red brown			5 5 6 4 5 12 10 11		
	2.0	D		2		... at 2.00m, Becoming strongly cemented sand	D to M	D	5	2.00m: DCP Refusal	
	2.80 2.80	PP=185.0kPa	67.2	3		CI: SANDY CLAY: medium plasticity; sand; brown mottled yellow grey, trace silt.	=PL	Vst to H			
	3.5 3.50 3.50	D PP=225.0kPa	66.5			Test pit terminated at 3.50 m					

DCP Equipment Ref.: 02

In Situ Vane Equipment Ref.:

Pocket Penetrometer Equipment Ref.:

Termination Reason: Target depth reached

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-03

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



TP-03 Side wall



TP-03 Spoil

CMW Geosciences

Sheet 1 of 1

Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-04

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



TP-04 Side wall



TP-04 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-05

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



TP-05 Side wall



TP-05 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

DCP Equipment Ref.: 02	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Target depth reached Remarks: This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP-06

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



TP-06 Side wall



TP-06 Spoil

[illegible]

PHOTOGRAPH SHEET - TP-07

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



TP-07 Side wall



TP-07 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-08

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



TP-08 Side wall



TP-08 Spoil

TEST PIT LOG - TP-09										 CMW Geosciences			
Client: Windlab Pty Ltd Project: Burrawong Wind Farm, NSW Location: Burrawong Project ID: MEL2022-0026 Date: 21/04/2022										1:20 Sheet 1 of 1			
Logged by: HN Checked By: ML			Position: E.737871m N.6141139m Elevation: 65 m			Plant: Kobelco 14T Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m							
Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations	
	Depth	Type & Results							5	10	15		
			64.8			SC: CLAYEY SAND: clay, low plasticity; grey, with roots; trace fine grained sand.	D	MD	1				1.70m: DCP Refusal
						CI: CLAY: medium plasticity; grey, with silt.			6				
	0.5	B							10				
	0.6	D							9				
	0.8 - 1.0	B							10				
									10				
									9				
									9				
	1.0	D					<PL	St	10				
	1.00								9				
	1.00	PP=50.0kPa							15				
									11				
									11				
									11				
			63.4			S: SAND: fine grained; yellow grey, with clay; strongly cemented.			14				
									17				
									17				
	2.0	D		2									
	3.0	D		3									
			61.5			Test pit terminated at 3.50 m							

DCP Equipment Ref.: 02

In Situ Vane Equipment Ref.:

Pocket Penetrometer Equipment Ref.:

Termination Reason: Target depth reached
 Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-09

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 21/04/2022



TP-09 Side wall



TP-09 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-10

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



TP-10 Side wall



TP-10 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-11

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



TP-11 Side wall



TP-11 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-12

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



TP-12 Side wall



TP-12 Spoil

CMW Geosciences

Sheet 1 of 1

Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-13

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



TP-13 Side wall



TP-13 Spoil

TEST PIT LOG - TP-14

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



1:20

Sheet 1 of 1

Logged by: HN Position: E.743637m N.6132103m Plant: Kobelco 14T
Checked By: ML Elevation: 68 m Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			67.7			SC: CLAYEY SAND: fine to coarse grained, angular to rounded; clay, low plasticity; brown, trace roots.	D to M	L to MD	1			
	0.5	B							3			
	0.6	D							3			
	0.8 - 1.3	B				S: SAND: fine to coarse grained, angular to rounded; brown and white, trace clay; strongly cemented.		D to VD	2			
	1.0	D		1			D		6			
									16			
									20			
									25			
												0.80m: DCP Refusal
			66.4			CI: SANDY CLAY: medium plasticity; sand, fine to coarse grained, angular to rounded; brown mottled yellow grey, trace silt; Observed occasional bands of cemented sand.						
	2.0	D		2								
	2.00											
	2.00	PP=225.0kPa										
						... at 2.50m, Becoming grey in colour	≈PL	Vst to H				
				3								
	3.5	D	64.5									
	3.50					Test pit terminated at 3.50 m						
	3.50	PP=175.0kPa										

DCP Equipment Ref.: 02 In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Target depth reached

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-14

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 23/04/2022



TP-14 Side wall



TP-14 Spoil

TEST PIT LOG - TP-15

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



1:20

Sheet 1 of 1

Logged by: HN Position: E.746073m N.6136661m Plant: Kobelco 14T
Checked By: ML Elevation: 72 m Contractor: Mallee Earthmoving and Excavation Dimensions : 0.60m x 1.50m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			71.7			SC: CLAYEY SAND: fine to coarse grained, angular to rounded; clay, low plasticity; brown, trace roots.	M	L to MD	1	4	4	
	0.5	B							8	8		
	0.6	D							6			
	0.8 - 1.3	B							9			
	1.0	D		1		... at 1.00m, Becoing pale brown and strongly cemented			16	20	22	1.00m: DCP Refusal
	2.0	D		2			D to M	D				
	2.50		69.6									
	2.50	PP=110.0kPa				CI: SANDY CLAY: medium plasticity; sand, fine to coarse grained, angular to rounded; brown mottled grey, trace silt.						
	3.5	D		3			≈PL	VSt				
	3.50											
	3.50	PP=125.0kPa	68.5			Test pit terminated at 3.50 m						

DCP Equipment Ref.: 02 In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Target depth reached

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP-15

Client: Windlab Pty Ltd
Project: Burrawong Wind Farm, NSW
Location: Burrawong
Project ID: MEL2022-0026
Date: 22/04/2022



TP-15 Side wall



TP-15 Spoil

Appendix D

Geotechnical Laboratory Test Results

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129
Order No.:
TRN:

CG Request No.:
Lot No.:



Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-14, 2m
Field Sample ID 15
Date Sampled 2/05/2022
Source In-Situ
Material
Specification AS Grading
Sampling Method Submitted by client
Sample ID S22DS-03633

Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 12/05/2022

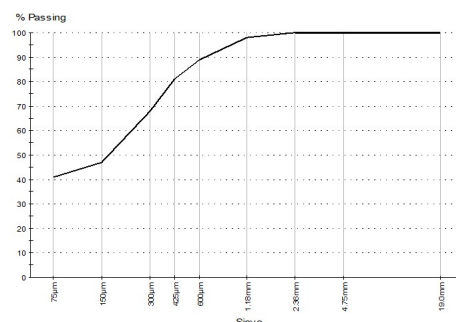
Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	98	
600µm	89	
425µm	81	
300µm	68	
150µm	47	
75µm	41	

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	12.4	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	7.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	54	
Plastic Limit (%)	AS 1289.3.2.1	15	
Plasticity Index (%)	AS 1289.3.3.1	39	
Date Tested		11/05/2022	

Chart



Comments

N/A



Dandenong South
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DANDENONG SOUTH, VIC 3175

Ph: + 61 3 8796 7900
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Report No: MAT:S22DS-03632/1

Issue No: 1

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**



Accredited for compliance with ISO/IEC 17025
– Testing

Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-14, 0.6m
Field Sample ID 14
Date Sampled 2/05/2022
Source In-Situ
Material
Specification
Sampling Method Submitted by client
Sample ID S22DS-03632

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1 - 2017	2	
Soil Description			
Type of Water		Distilled	
Date Tested		9/05/2022	

Comments

N/A

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129
Order No.:
TRN:

CG Request No.:
Lot No.:



Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-13, 2m
Field Sample ID 13
Date Sampled 2/05/2022
Source In-Situ
Material
Specification AS Grading
Sampling Method Submitted by client
Sample ID S22DS-03631

Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 11/05/2022

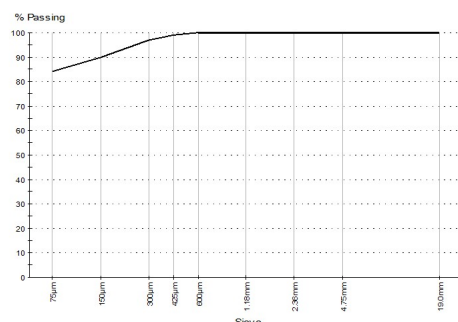
Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	100	
600µm	100	
425µm	99	
300µm	97	
150µm	90	
75µm	84	

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	18.0	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	12.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	51	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	33	
Date Tested		13/05/2022	

Chart



Comments

N/A



Dandenong South
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DANDENONG SOUTH, VIC 3175

Ph: + 61 3 8796 7900
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Report No: MAT:S22DS-03629/1

Issue No: 1

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**



Accredited for compliance with ISO/IEC 17025
– Testing

Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-13, 0.6m
Field Sample ID 11
Date Sampled 2/05/2022
Source In-Situ
Material
Specification
Sampling Method Submitted by client
Sample ID S22DS-03629

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1 - 2017	2	
Soil Description			
Type of Water		Distilled	
Date Tested		6/05/2022	

Comments

N/A

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129
Order No.:
TRN:

CG Request No.:
Lot No.:

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
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Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022

Sample Details

Location Burrawong Wind Farm
Sample Location TP-10, 2m
Field Sample ID 10
Date Sampled 2/05/2022
Source In-Situ
Material
Specification AS Grading
Sampling Method Submitted by client
Sample ID S22DS-03628

Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 12/05/2022

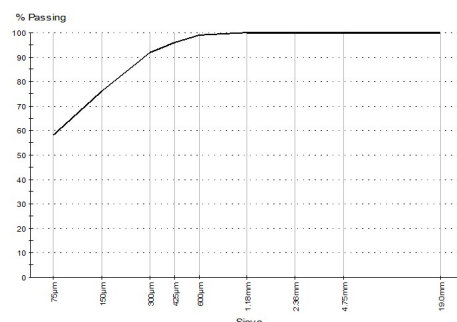
Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	96	
300µm	92	
150µm	76	
75µm	58	

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.9	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	11.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	46	
Plastic Limit (%)	AS 1289.3.2.1	17	
Plasticity Index (%)	AS 1289.3.3.1	29	
Date Tested		12/05/2022	

Chart



Comments

N/A



Dandenong South
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Report No: MAT:S22DS-03627/1

Issue No: 1

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**



Accredited for compliance with ISO/IEC 17025
– Testing

Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-10, 0.6m
Field Sample ID 9
Date Sampled 2/05/2022
Source In-Situ
Material
Specification
Sampling Method Submitted by client
Sample ID S22DS-03627

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1 - 2017	4	
Soil Description			
Type of Water		Distilled	
Date Tested		10/05/2022	

Comments

N/A

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Date of Issue: 25/05/2022
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Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)

Sample Details

Location Burrawong Wind Farm
Sample Location TP-08, 2m
Field Sample ID 7
Date Sampled 2/05/2022
Source In-Situ
Material
Specification AS Grading
Sampling Method Submitted by client
Sample ID S22DS-03625

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	16.9	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	6.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	29	
Plastic Limit (%)	AS 1289.3.2.1	12	
Plasticity Index (%)	AS 1289.3.3.1	17	
Date Tested		12/05/2022	

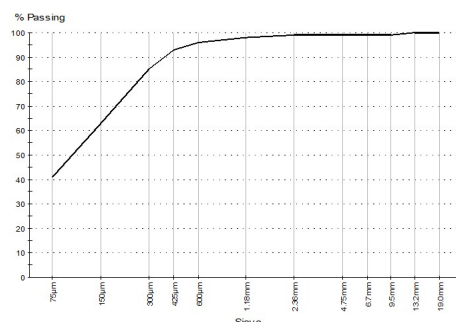
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 12/05/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	99	
6.7mm	99	
4.75mm	99	
2.36mm	99	
1.18mm	98	
600µm	96	
425µm	93	
300µm	85	
150µm	63	
75µm	41	

Chart



Comments

N/A



Dandenong South
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Report No: MAT:S22DS-03624/1

Issue No: 1

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**



Accredited for compliance with ISO/IEC 17025
– Testing

Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-08, 0.6m
Field Sample ID 6
Date Sampled 2/05/2022
Source In-Situ
Material
Specification
Sampling Method Submitted by client
Sample ID S22DS-03624

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1 - 2017	4	
Soil Description			
Type of Water		Distilled	
Date Tested		10/05/2022	

Comments

N/A

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Date of Issue: 25/05/2022
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Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)

Sample Details

Location Burrawong Wind Farm
Sample Location TP-05, 2m
Field Sample ID 5
Date Sampled 2/05/2022
Source In-Situ
Material
Specification AS Grading
Sampling Method Submitted by client
Sample ID S22DS-03623

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	9.4	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	4.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	30	
Plastic Limit (%)	AS 1289.3.2.1	16	
Plasticity Index (%)	AS 1289.3.3.1	14	
Date Tested		12/05/2022	

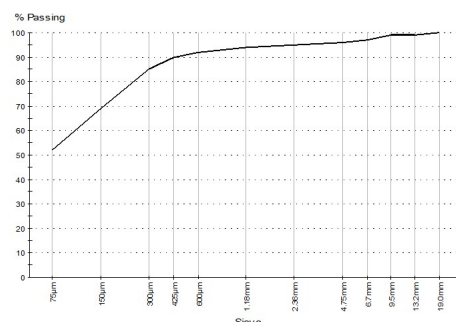
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 12/05/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	99	
9.5mm	99	
6.7mm	97	
4.75mm	96	
2.36mm	95	
1.18mm	94	
600µm	92	
425µm	90	
300µm	85	
150µm	69	
75µm	52	

Chart



Comments

N/A



Dandenong South
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Report No: MAT:S22DS-03622/1

Issue No: 1

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**



Accredited for compliance with ISO/IEC 17025
– Testing

Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-05, 0.6m
Field Sample ID 4
Date Sampled 2/05/2022
Source In-Situ
Material
Specification
Sampling Method Submitted by client
Sample ID S22DS-03622

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1 - 2017	2	
Soil Description			
Type of Water		Distilled	
Date Tested		6/05/2022	

Comments

N/A

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Date of Issue: 25/05/2022
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Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)

Sample Details

Location Burrawong Wind Farm
Sample Location TP-01, 2m
Field Sample ID 2
Date Sampled 2/05/2022
Source In-Situ
Material
Specification AS Grading
Sampling Method Submitted by client
Sample ID S22DS-03620

Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 10/05/2022

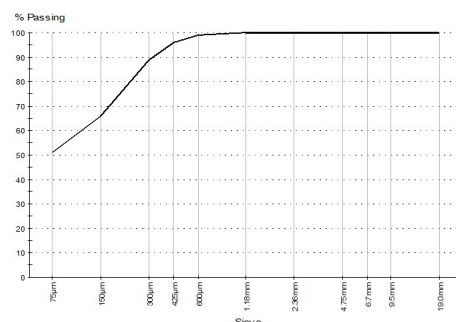
Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	100	
600µm	99	
425µm	96	
300µm	89	
150µm	66	
75µm	51	

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AS 1289.2.1.1	14.6	
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	9.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.2	35	
Plastic Limit (%)	AS 1289.3.2.1	16	
Plasticity Index (%)	AS 1289.3.3.1	19	
Date Tested		12/05/2022	

Chart



Comments

N/A



Dandenong South
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Report No: MAT:S22DS-03619/1

Issue No: 1

Material Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**



Accredited for compliance with ISO/IEC 17025
– Testing

Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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Sample Details

Location Burrawong Wind Farm
Sample Location TP-01, 0.6m
Field Sample ID 1
Date Sampled 2/05/2022
Source In-Situ
Material
Specification
Sampling Method Submitted by client
Sample ID S22DS-03619

Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1 - 2017	4	
Soil Description			
Type of Water		Distilled	
Date Tested		9/05/2022	

Comments

N/A

California Bearing Ratio Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129
Order No.:
TRN:

CG Request No.:
Lot No.:



Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022
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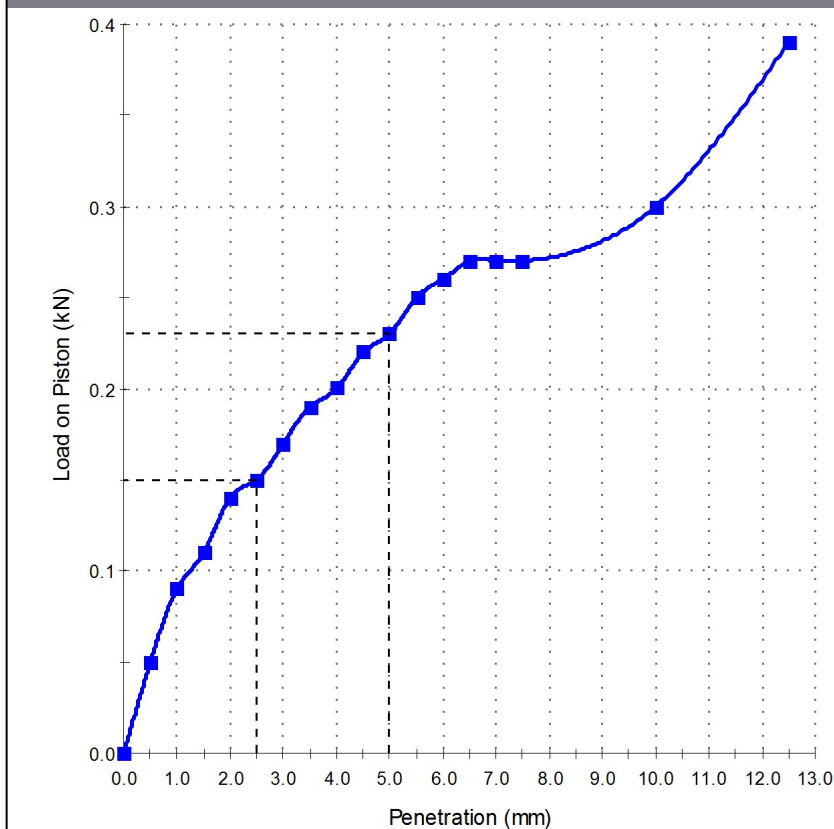
Sample Details

Sample ID: S22DS-03630
Sampled By: Client
Source: In-Situ
Location: Burrawong Wind Farm
Location: TP-13, 0.8 - 1.3m

Date Sampled: 2/05/2022
Sampling Method: Submitted by client
Material:

Date Tested: 20/05/2022

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2017

CBR at 5.0mm (%): 1.0
Dry Density before Soaking (t/m³): 1.69
Density Ratio before Soaking (%): 98.5
Moisture Content before Soaking (%): 17.8
Moisture Ratio before Soaking (%): 98.5
Dry Density after Soaking (t/m³): 1.64
Density Ratio after Soaking (%): 95.5
Swell (%): 3.0
Moisture Content of Top 30mm (%): 26.2
Compaction Hammer Used: Standard
AS 1289.5.1.1
Surcharge Mass (kg): 4.50
Period of Soaking (Days): 4
Retained on 19 mm Sieve (%): 0
CBR Moisture Content Method: AS 1289.2.1.1
Sample Curing Time (h): 92

Comments

California Bearing Ratio Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
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Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 26/05/2022

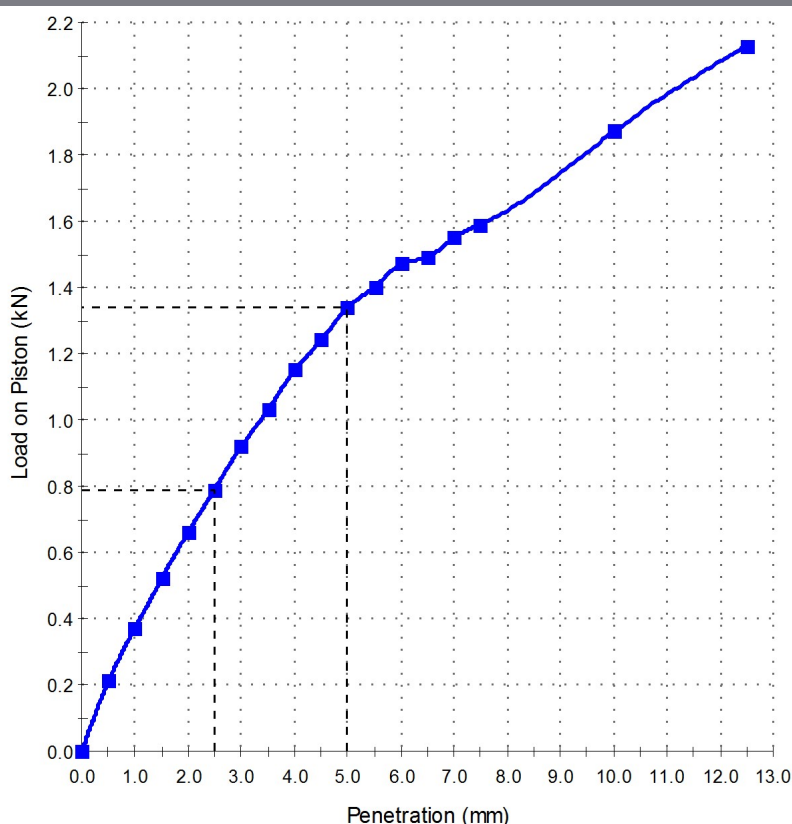
Sample Details

Sample ID: S22DS-03626
Sampled By: Client
Source: In-Situ
Location: Burrawong Wind Farm
Location: TP-09, 0.5m

Date Sampled: 2/05/2022
Sampling Method: Submitted by client
Material:

Date Tested: 16/05/2022

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2017

CBR at 5.0mm (%): 7

Dry Density before Soaking (t/m³): 1.56
Density Ratio before Soaking (%): 97.5
Moisture Content before Soaking (%): 22.9
Moisture Ratio before Soaking (%): 99.5
Dry Density after Soaking (t/m³): 1.56
Density Ratio after Soaking (%): 97.5
Swell (%): 0.5
Moisture Content of Top 30mm (%): 25.0
Compaction Hammer Used: Standard
AS 1289.5.1.1

Surcharge Mass (kg): 4.50
Period of Soaking (Days): 4
Retained on 19 mm Sieve (%): 0
CBR Moisture Content Method: AS 1289.2.1.1
Sample Curing Time (h): 45

Comments

California Bearing Ratio Test Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022

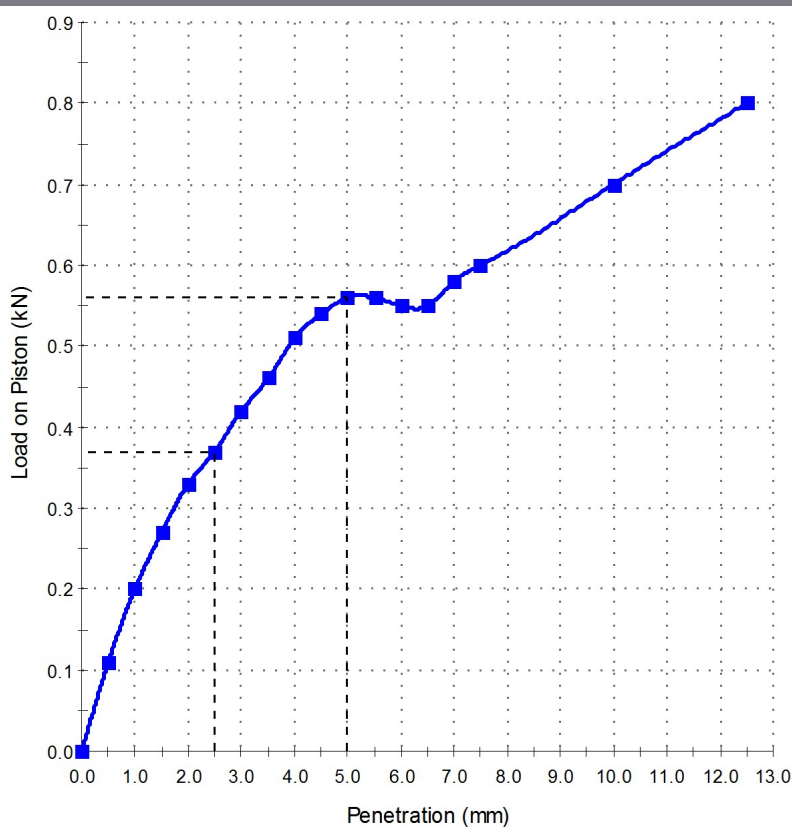
Sample Details

Sample ID: S22DS-03621
Sampled By: Client
Source: In-Situ
Location: Burrawong Wind Farm
Location: TP-02, 0.5m

Date Sampled: 2/05/2022
Sampling Method: Submitted by client
Material:

Date Tested: 16/05/2022

Load vs Penetration



Test Results

AS 1289.6.1.1 - 2017

CBR at 5.0mm (%): **3.0**

Dry Density before Soaking (t/m³): 1.63
Density Ratio before Soaking (%): 98.0
Moisture Content before Soaking (%): 19.8
Moisture Ratio before Soaking (%): 100.0
Dry Density after Soaking (t/m³): 1.59
Density Ratio after Soaking (%): 96.0
Swell (%): 2.0
Moisture Content of Top 30mm (%): 25.6
Compaction Hammer Used: Standard
AS 1289.5.1.1

Surcharge Mass (kg): 4.50
Period of Soaking (Days): 4
Retained on 19 mm Sieve (%): 0
CBR Moisture Content Method: AS 1289.2.1.1
Sample Curing Time (h): 49
Plasticity Determination Method: Visual/Tactile

Comments

Maximum Dry Density Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Date of Issue: 25/05/2022
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)

Sample Details

Location: Burrawong Wind Farm
Sample ID: S22DS-03630
Sampling Method: Submitted by client
Source: In-Situ

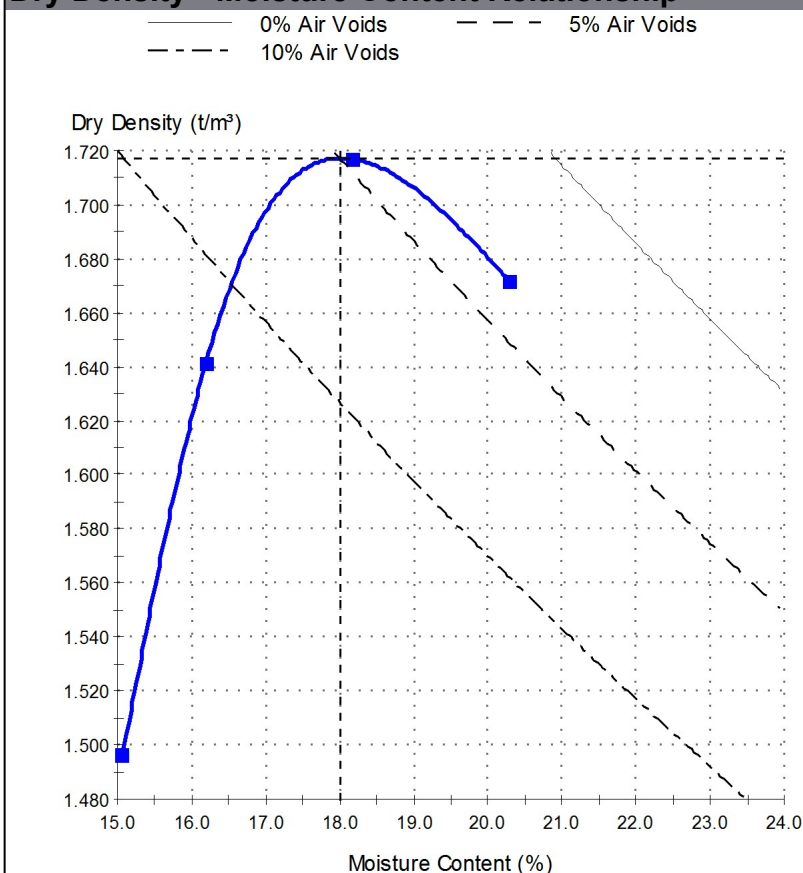
Date Sampled: 2/05/2022

Specification:

Location: TP-13, 0.8 - 1.3m
Date Tested: 10/05/2022

Material:

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1 - 2017

Standard MDD (t/m³): 1.72
Standard OMC (%): 18.0
Retained Sieve (mm): 19.0
Oversize Material (%): 0
Curing Time (h): 96
LL Method: Visual / Tactile

Comments

Maximum Dry Density Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 25/05/2022

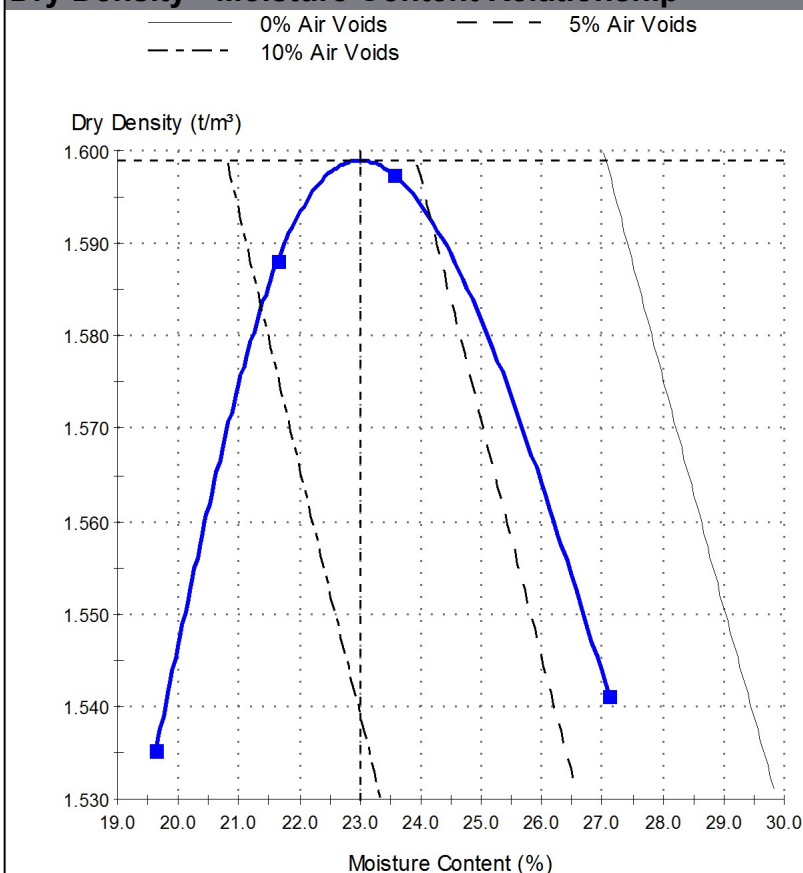
Sample Details

Location: Burrawong Wind Farm
Sample ID: S22DS-03626
Sampling Method: Submitted by client
Source: In-Situ
Specification:
Location: TP-09, 0.5m
Date Tested: 9/05/2022

Date Sampled: 2/05/2022

Material:

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1 - 2017

Standard MDD (t/m³): 1.60
Standard OMC (%): 23.0
Retained Sieve (mm): 19.0
Oversize Material (%): 0
Curing Time (h): 72
LL Method: Visual / Tactile

Comments

Maximum Dry Density Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
Date of Issue: 25/05/2022
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)

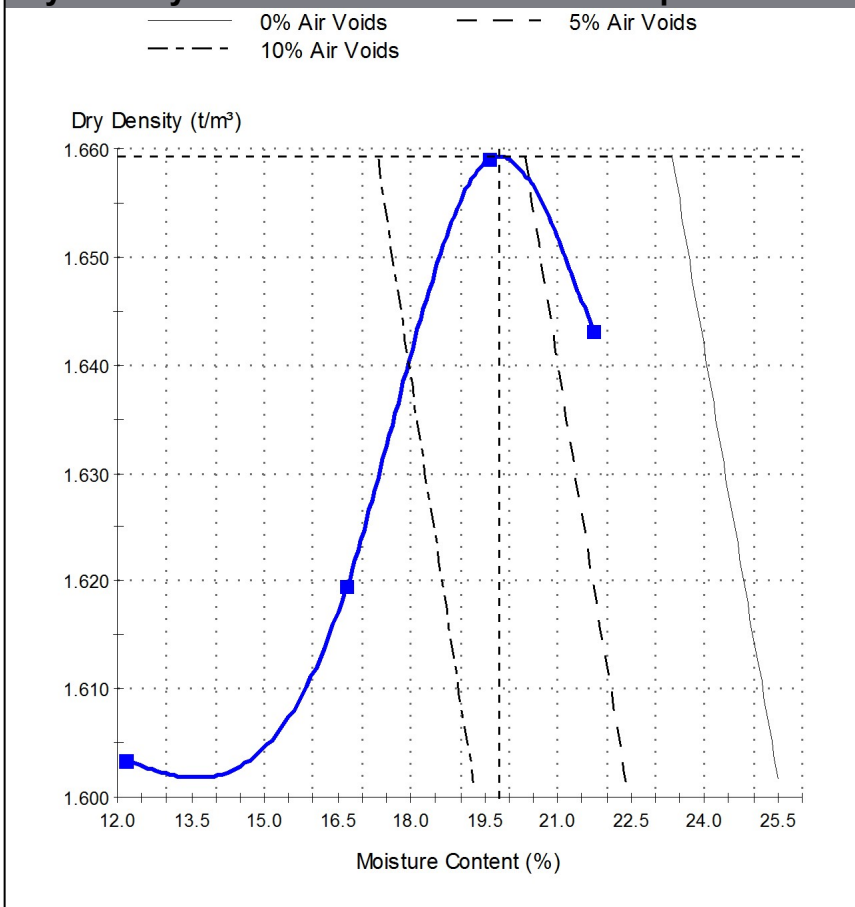
Sample Details

Location: Burrawong Wind Farm
Sample ID: S22DS-03621
Sampling Method: Submitted by client
Source: In-Situ
Specification:
Location: TP-02, 0.5m
Date Tested: 9/05/2022

Date Sampled: 2/05/2022

Material:

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1 - 2017
Standard MDD (t/m³): 1.66
Standard OMC (%): 20.0
Retained Sieve (mm): 19.0
Oversize Material (%): 0
Curing Time (h): 72
LL Method: Visual / Tactile

Comments

Maximum Dry Density Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 30/05/2022

Sample Details

Location: Burrawong Wind Farm, NSW

Sample ID: S22DS-03618

Date Sampled: 2/05/2022

Sampling Method: Submitted by client

Source: In-Situ

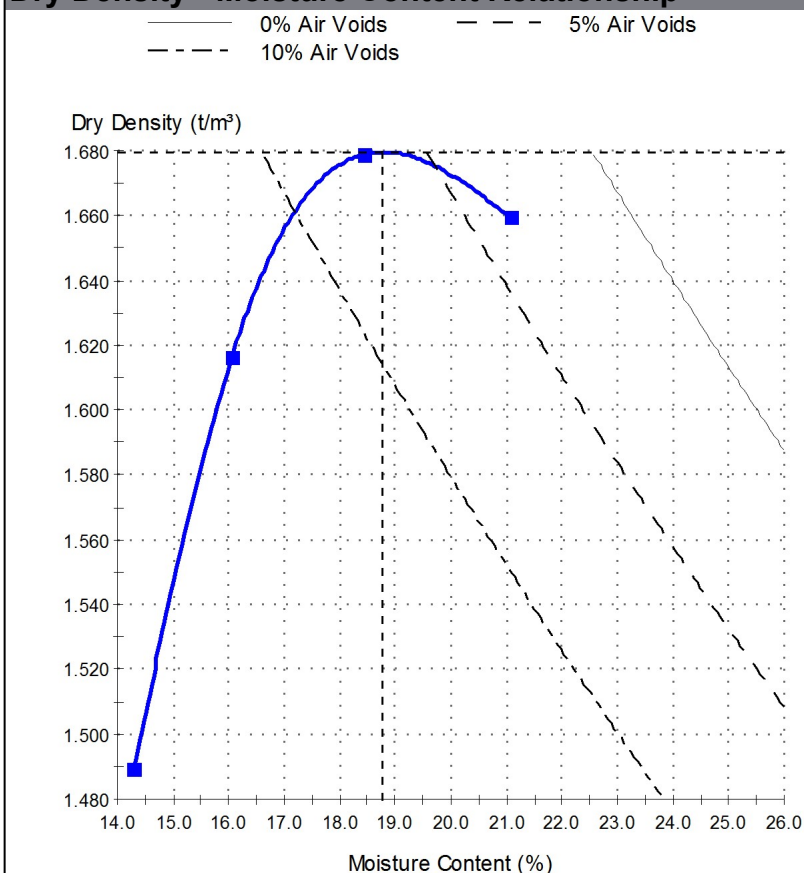
Material:

Specification:

Location: TP-10, 0.8 - 1.3m

Date Tested: 9/05/2022

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1 - 2017

Standard MDD (t/m³): 1.68
Standard OMC (%): 19.0
Retained Sieve (mm): 19.0
Oversize Material (%): 0
Curing Time (h): 72
LL Method: Visual / Tactile

Comments

Maximum Dry Density Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 30/05/2022

Sample Details

Location: Burrawong Wind Farm, NSW

Sample ID: S22DS-03617

Date Sampled: 2/05/2022

Sampling Method: Submitted by client

Source: In-Situ

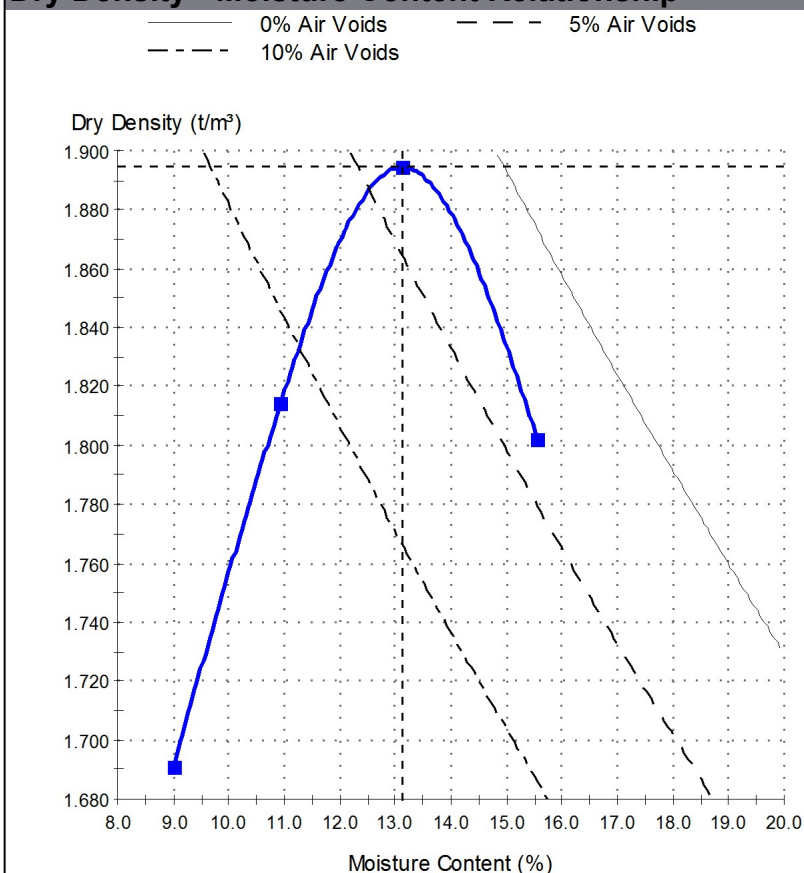
Material:

Specification:

Location: TP-04, 0.8 - 1.3m

Date Tested: 9/05/2022

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1 - 2017

Standard MDD (t/m³): 1.89
Standard OMC (%): 13.0
Retained Sieve (mm): 19.0
Oversize Material (%): 1
Curing Time (h): 72
LL Method: Visual / Tactile

Comments

Maximum Dry Density Report

Client: CMW Geosciences Pty Ltd
Address: Level 5, 3 Bowen Crescent
Melbourne VIC 3004
Project: CMW - MEL2022-0026
Project No.: 2021129

Order No.: **CG Request No.:**
TRN: **Lot No.:**

Accredited for compliance with ISO/IEC 17025
– Testing



Accreditation Number: 12719
Site Number: 12712
THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Approved Signatory: J. Lamont
(Dandenong Laboratory Manager)
Date of Issue: 30/05/2022

Sample Details

Location: Burrawong Wind Farm, NSW

Sample ID: S22DS-03616

Date Sampled: 2/05/2022

Sampling Method: Submitted by client

Source: In-Situ

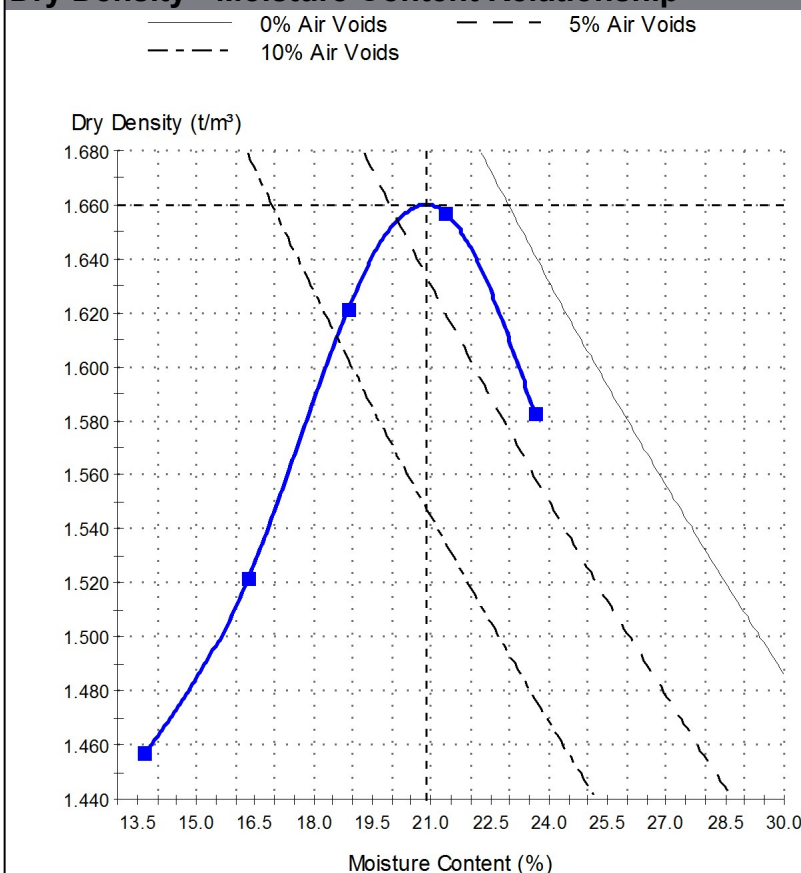
Material:

Specification:

Location: TP-02, 0.8 - 1m

Date Tested: 9/05/2022

Dry Density - Moisture Content Relationship



Test Results

AS 1289.5.1.1 - 2017

Standard MDD (t/m³): 1.66
Standard OMC (%): 21.0
Retained Sieve (mm): 19.0
Oversize Material (%): 0
Curing Time (h): 72
LL Method: Visual / Tactile

Comments

Head Office:
25 Metcalf Street
Dandenong South VIC 3175
Ph: +61 8796 7900



Thermal Resistivity Dryout Curve Report

Customer: CMW Geosciences Pty Ltd
Customer Address: Level 5, 3 Bowen Crescent, Melbourne
Project: CMW - MEL2022-0026
Project Location: Burrawong Wind Farm, NSW
Customer Request No.: MEL2022-0026

Report No: TR-S22DS-03618
CG Project No: 2021129
Report Date: 30/05/22
Test Method: TR LAB (In-House)
Page: 1 of 1

Testing performed and reported at the Dandenong South Laboratory (Site Number 12712)

Sample No: S22DS-03618

Date Moulded: 13/05/2022

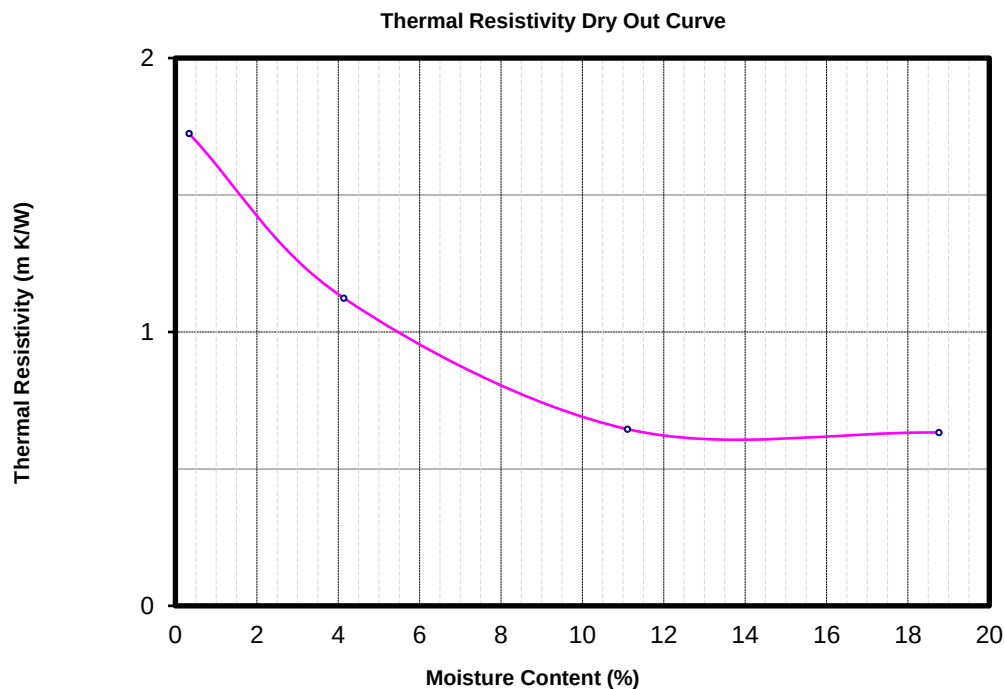
Client Sample ID: 3
Sample Location: TP-10 @ 0.8 - 1.3m
Date Sampled: 2/05/2022

Sampling Procedure: As Supplied
Sample Description: Clay with Silt
Sample History: Remoulded

Maximum Dry Density (t/m^3): 1.68
Optimum Moisture Content(%): 18.8
Moulded Moisture Content (%): 18.8

Achieved Density Ratio (%): 98.0
Achieved Moisture Ratio (%): 100.0

Moisture Content (%)	Compacted Dry Density t/m^3	Thermal Conductivity (W / m K)	Thermal Resistivity (m K / W)
0.3	---	0.58	1.72
4.1	---	0.89	1.12
11.1	---	1.55	0.65
18.8	1.65	1.58	0.63



Resistivity Meter: **TC1396**

Needle ID.: **0239**

Needle Resistance: **84.40 Ohm/m**

Remarks:



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17025 - Testing.

Corporate Accreditation No. 12719

APPROVED SIGNATORY

J Lamont

Form No.: CG 351.006

Issue Date: 16/06/2021

Head Office:
25 Metcalf Street
Dandenong South VIC 3175
Ph: +61 8796 7900



Thermal Resistivity Dryout Curve Report

Customer: CMW Geosciences Pty Ltd
Customer Address: Level 5, 3 Bowen Crescent, Melbourne
Project: CMW - MEL2022-0026
Project Location: Burrawong Wind Farm, NSW
Customer Request No.: MEL2022-0026

Report No: TR-S22DS-03617
CG Project No: 2021129
Report Date: 30/05/22
Test Method: TR LAB (In-House)
Page: 1 of 1

Testing performed and reported at the Dandenong South Laboratory (Site Number 12712)

Sample No: S22DS-03617

Date Moulded: 12/05/2022

Client Sample ID: 2
Sample Location: TP-04 @ 0.8 - 1.3m
Date Sampled: 2/05/2022

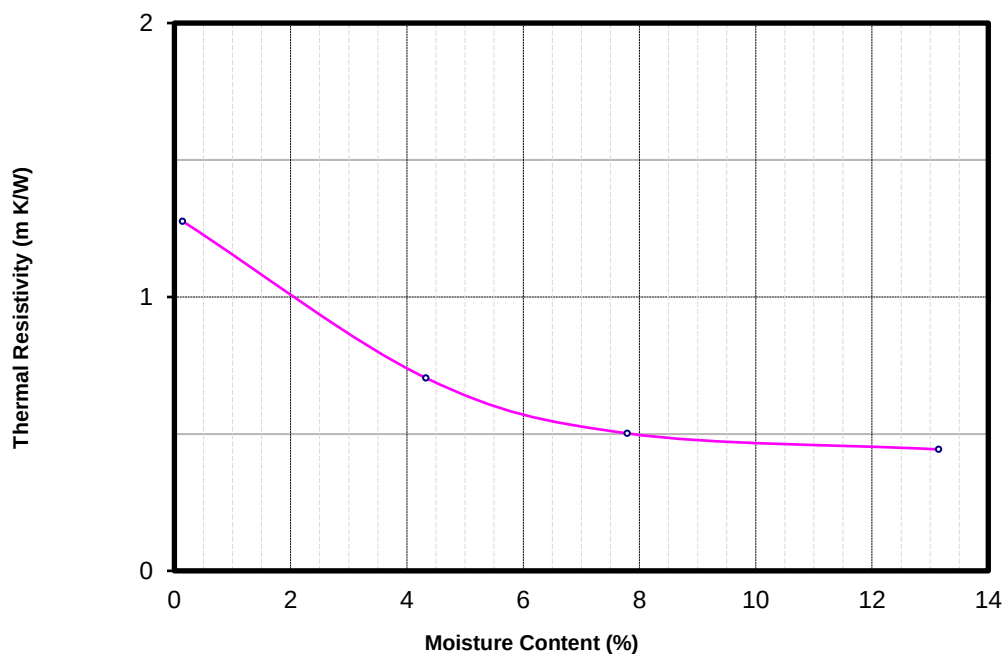
Sampling Procedure: As Supplied
Sample Description: Clayey Sand
Sample History: Remoulded

Maximum Dry Density (t/m^3): 1.89
Optimum Moisture Content(%): 13.1
Moulded Moisture Content (%): 13.1

Achieved Density Ratio (%): 98.0
Achieved Moisture Ratio (%): 100.5

Moisture Content (%)	Compacted Dry Density t/m^3	Thermal Conductivity (W / m K)	Thermal Resistivity (m K / W)
0.1	---	0.78	1.28
4.3	---	1.42	0.70
7.8	---	1.99	0.50
13.1	1.85	2.255	0.44

Thermal Resistivity Dry Out Curve



Resistivity Meter: **TC1396**

Needle ID.: **0239**

Needle Resistance: **84.40 Ohm/m**

Remarks:



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17025 - Testing.

Corporate Accreditation No. 12719

APPROVED SIGNATORY

J Lamont

Form No.: CG 351.006

Issue Date: 16/06/2021

Head Office:
25 Metcalf Street
Dandenong South VIC 3175
Ph: +61 8796 7900



Thermal Resistivity Dryout Curve Report

Customer: CMW Geosciences Pty Ltd
Customer Address: Level 5, 3 Bowen Crescent, Melbourne
Project: CMW - MEL2022-0026
Project Location: Burrawong Wind Farm, NSW
Customer Request No.: MEL2022-0026

Report No: TR-S22DS-03616
CG Project No: 2021129
Report Date: 30/05/22
Test Method: TR LAB (In-House)
Page: 1 of 1

Testing performed and reported at the Dandenong South Laboratory (Site Number 12712)

Sample No: S22DS-03616

Date Moulded: 12/05/2022

Client Sample ID: 2
Sample Location: TP-02 @ 0.8 - 1m
Date Sampled: 2/05/2022

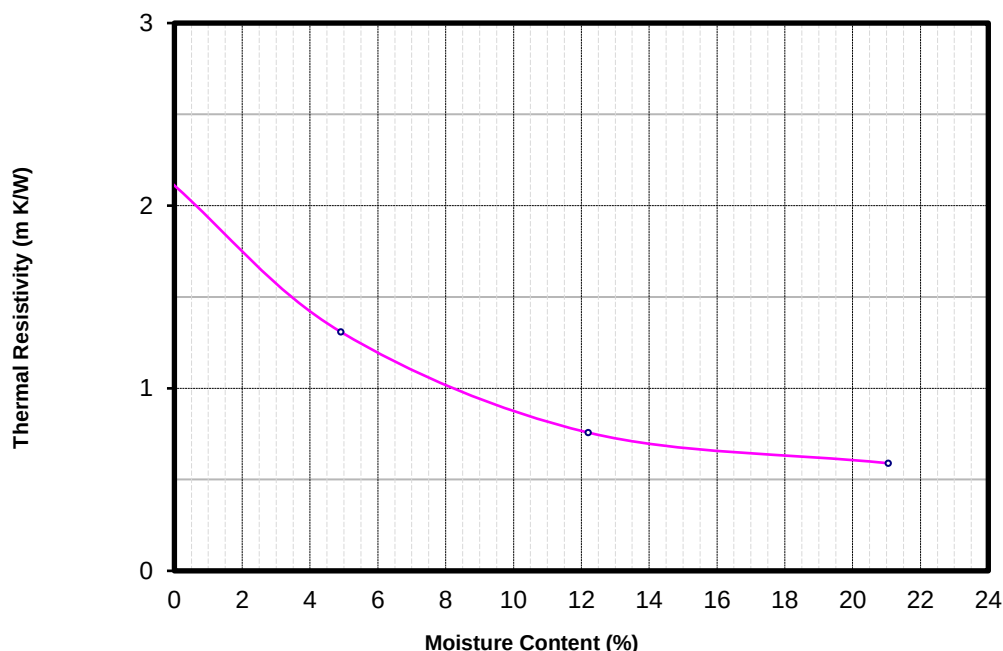
Sampling Procedure: As Supplied
Sample Description: Clay with Silt
Sample History: Remoulded

Maximum Dry Density (t/m^3): 1.66
Optimum Moisture Content(%): 20.9
Moulded Moisture Content (%): 21.1

Achieved Density Ratio (%): 98.0
Achieved Moisture Ratio (%): 100.5

Moisture Content (%)	Compacted Dry Density t/m^3	Thermal Conductivity (W / m K)	Thermal Resistivity (m K / W)
0.0	---	0.47	2.12
4.9	---	0.76	1.31
12.2	---	1.32	0.76
21.1	1.63	1.697	0.59

Thermal Resistivity Dry Out Curve



Resistivity Meter: **TC1396**

Needle ID.: **0239**

Needle Resistance: **84.40 Ohm/m**

Remarks:



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Corporate Accreditation No. 12719

APPROVED SIGNATORY

J Lamont

Form No.: CG 351.006

Issue Date: 16/06/2021

CERTIFICATE OF ANALYSIS

Work Order : **EM2207743**
Client : **CMW GEOSCIENCES (EAST COAST) PL**
Contact : **MATTHEW LINKE**
Address : **LEVEL 4, 3 BOWEN CRESCENT**
MELBOURNE VICTORIA 3004
Telephone : **----**
Project : **----**
Order number : **----**
C-O-C number : **----**
Sampler : **HN**
Site : **----**
Quote number : **EN/222**
No. of samples received : **6**
No. of samples analysed : **6**

Page : 1 of 4
Laboratory : Environmental Division Melbourne
Contact : Peter Ravlic
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +6138549 9645
Date Samples Received : 29-Apr-2022 11:53
Date Analysis Commenced : 02-May-2022
Issue Date : 04-May-2022 22:34



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dilani Fernando	Laboratory Coordinator	Melbourne Inorganics, Springvale, VIC



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- Corrosion assessment for Concrete and Steel piles in soil per Australian Standard AS2159-2009 uses a combination of soil and groundwater data (Tables 6.4.2 C & 6.5.2 C). In the absence of groundwater data, assessment has been made against soil criteria only. Refer to AS2159-2009 section 6.4 for further interpretation of corrosion assessment. ALS is not NATA accredited for Corrosion Assessment comments
- EA167: Soil Condition A – High permeability soils (e.g. sands and gravels) which are in groundwater
- EA167: Soil Condition B – Low permeability soils (e.g. silts and clays) or all soils above groundwater
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	TP-01	TP-05	TP-08	TP-10	TP-13
Sampling date / time					22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00	22-Apr-2022 00:00
Compound	CAS Number	LOR	Unit		EM2207743-001	EM2207743-002	EM2207743-003	EM2207743-004	EM2207743-005
				Result	Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		7.2	9.7	8.2	8.1	9.4
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		1420	655	1240	1390	675
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		13.1	4.8	19.1	17.3	16.5
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		704	1530	806	719	1480
EA167: Corrosion Classification (per AS2159-2009)									
Ø Exposure Classification - Concrete Piles Soil Condition A	----	-	-		Mild	Mild	Mild	Mild	Mild
Ø Exposure Classification - Concrete Piles Soil Condition B	----	-	-		Non Aggressive	Non Aggressive	Non Aggressive	Non Aggressive	Non Aggressive
Ø Exposure Classification - Steel Piles Soil Condition A	----	-	-		Severe	Moderate	Severe	Severe	Moderate
Ø Exposure Classification - Steel Piles Soil Condition B	----	-	-		Moderate	Mild	Moderate	Moderate	Mild
ED040S: Soluble Major Anions									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		800	160	1170	820	330
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		1590	650	840	1820	560



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP-14	----	----	----	----
			Sampling date / time	22-Apr-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EM2207743-006	-----	-----	-----	-----
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	7.3	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	613	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	17.2	----	----	----	----
EA080: Resistivity								
Resistivity at 25°C	----	1	ohm cm	1630	----	----	----	----
EA167: Corrosion Classification (per AS2159-2009)								
Ø Exposure Classification - Concrete Piles Soil Condition A	----	-	-	Mild	----	----	----	----
Ø Exposure Classification - Concrete Piles Soil Condition B	----	-	-	Non Aggressive	----	----	----	----
Ø Exposure Classification - Steel Piles Soil Condition A	----	-	-	Moderate	----	----	----	----
Ø Exposure Classification - Steel Piles Soil Condition B	----	-	-	Mild	----	----	----	----
ED040S: Soluble Major Anions								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	340	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	600	----	----	----	----

Appendix E

Electrical Resistivity Test Results

Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN/ML		
Date:	20/04/2022	Sheet:	1 of 2

Test Number:	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP01	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	30.5
1.0	0.5	0.02	30.4
1.0	0.5	0.02	30.4
2.0	1	0.02	16.8
2.0	1	0.02	16.8
2.0	1	0.02	16.8
4.0	2	0.02	5.36
4.0	2	0.02	5.36
4.0	2	0.02	5.36
8.0	4	0.02	4.35
8.0	4	0.02	4.3
8.0	4	0.02	4.38
16.0	8	0.02	2.86
16.0	8	0.02	2.86
16.0	8	0.02	2.78

Test Number:	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP01	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	34.8
1.0	0.5	0.02	34.8
1.0	0.5	0.02	34.8
2.0	1	0.02	18.5
2.0	1	0.02	18.7
2.0	1	0.02	18.5
4.0	2	0.02	5.34
4.0	2	0.02	5.37
4.0	2	0.02	5.36
8.0	4	0.02	4.29
8.0	4	0.02	4.36
8.0	4	0.02	4.48
16.0	8	0.02	3.22
16.0	8	0.02	3.27
16.0	8	0.02	3.27

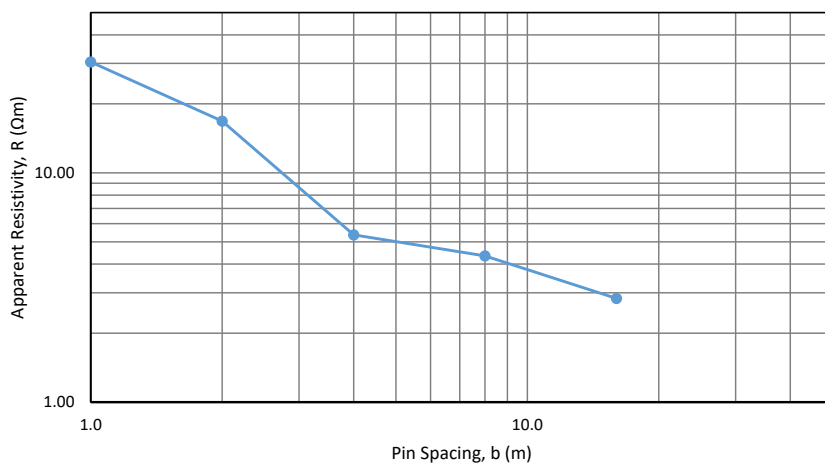
Earth Resistivity Test Results

Client:	Windlab Pty Ltd
Project Name:	Burrawong Wind Farm
Project Number:	MEL2022-0026
Logged By:	HN/ML
Date:	20/04/2022

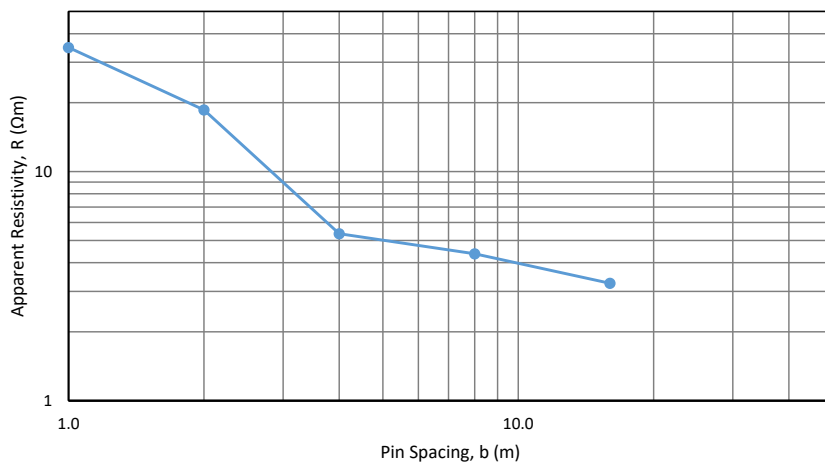


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN/ML		
Date:	20/04/2022	Sheet:	1 of 2

Test Number:	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP02	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	2.76
1.0	0.5	0.02	2.75
1.0	0.5	0.02	2.76
2.0	1	0.02	1.5
2.0	1	0.02	1.5
2.0	1	0.02	1.5
4.0	2	0.02	1.42
4.0	2	0.02	1.42
4.0	2	0.02	1.42
8.0	4	0.02	1.76
8.0	4	0.02	1.71
8.0	4	0.02	1.73
16.0	8	0.02	1.97
16.0	8	0.02	2.06
16.0	8	0.02	2.06

Test Number:	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP02	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	2.2
1.0	0.5	0.02	2.21
1.0	0.5	0.02	2.21
2.0	1	0.02	1.49
2.0	1	0.02	1.49
2.0	1	0.02	1.48
4.0	2	0.02	1.38
4.0	2	0.02	1.36
4.0	2	0.02	1.39
8.0	4	0.02	1.5
8.0	4	0.02	1.54
8.0	4	0.02	1.54
16.0	8	0.02	2.18
16.0	8	0.02	2.18
16.0	8	0.02	2.35

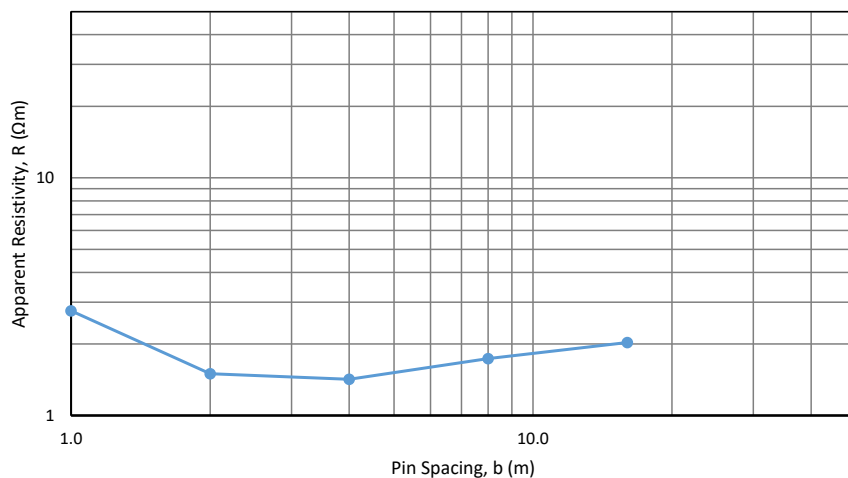
Earth Resistivity Test Results

Client:	Windlab Pty Ltd
Project Name:	Burrawong Wind Farm
Project Number:	MEL2022-0026
Logged By:	HN/ML
Date:	20/04/2022

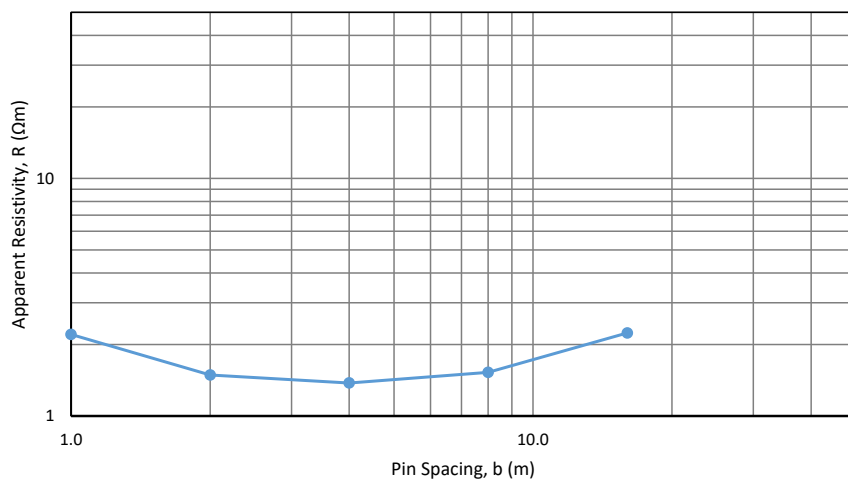


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	24/04/2022	Sheet:	1 of 2

Test Number:	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP03	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	59.7
1.0	0.5	0.02	59.7
1.0	0.5	0.02	59.7
2.0	1	0.02	37.2
2.0	1	0.02	37.2
2.0	1	0.02	37.2
4.0	2	0.02	11.8
4.0	2	0.02	11.8
4.0	2	0.02	11.8
8.0	4	0.02	3.47
8.0	4	0.02	3.47
8.0	4	0.02	3.5
16.0	8	0.02	3.29
16.0	8	0.02	3.29
16.0	8	0.02	3.29

Test Number:	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP03	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	54.6
1.0	0.5	0.02	54.6
1.0	0.5	0.02	54.5
2.0	1	0.02	37.2
2.0	1	0.02	37.2
2.0	1	0.02	37.2
4.0	2	0.02	11.8
4.0	2	0.02	11.8
4.0	2	0.02	11.8
8.0	4	0.02	3.47
8.0	4	0.02	3.47
8.0	4	0.02	3.5
16.0	8	0.02	3.29
16.0	8	0.02	3.29
16.0	8	0.02	3.29

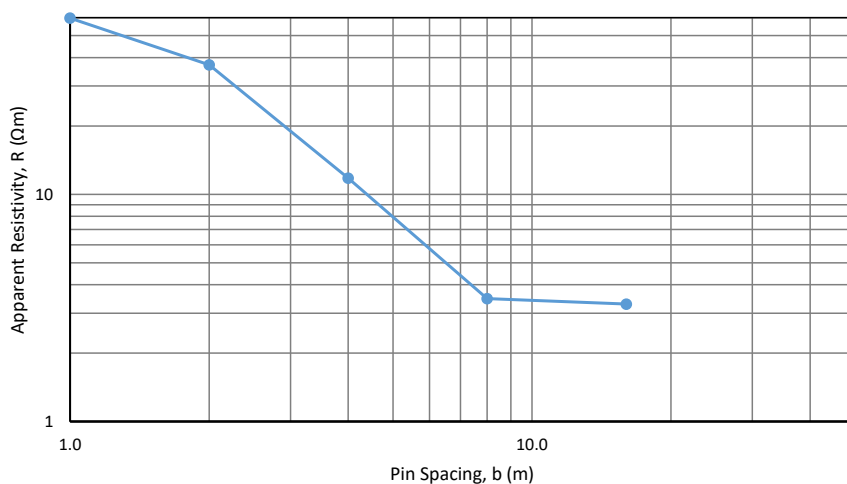
Earth Resistivity Test Results

Client:	Windlab Pty Ltd
Project Name:	Burrawong Wind Farm
Project Number:	MEL2022-0026
Logged By:	HN
Date:	24/04/2022

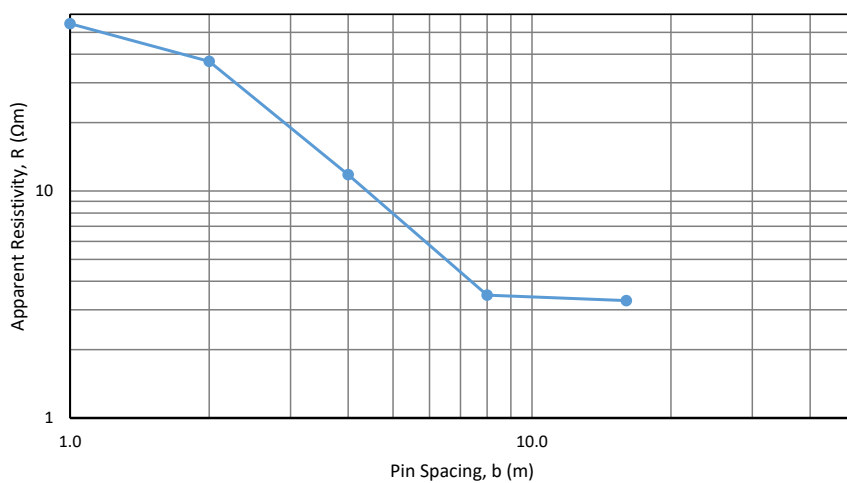


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



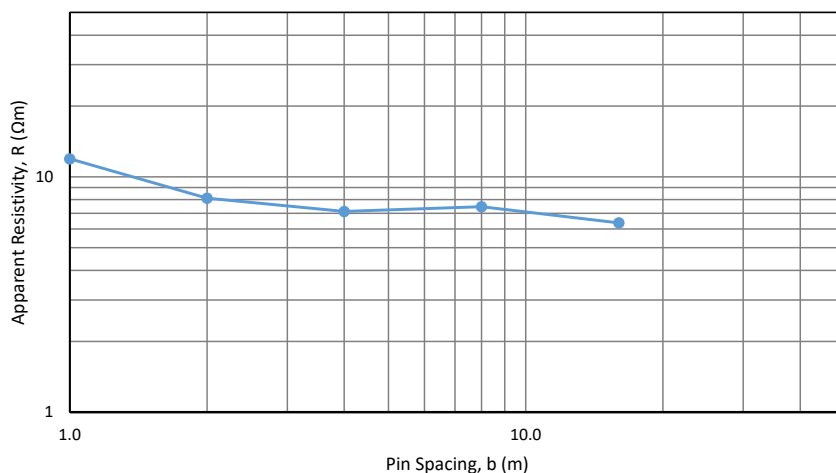
Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	20/04/2022	Sheet:	1 of 2

Test Number:	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP04	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	11.9
1.0	0.5	0.02	12
1.0	0.5	0.02	11.9
2.0	1	0.02	8.13
2.0	1	0.02	8.13
2.0	1	0.02	8.11
4.0	2	0.02	7.14
4.0	2	0.02	7.13
4.0	2	0.02	7.14
8.0	4	0.02	7.45
8.0	4	0.02	7.48
8.0	4	0.02	7.45
16.0	8	0.02	6.41
16.0	8	0.02	6.36
16.0	8	0.02	6.35

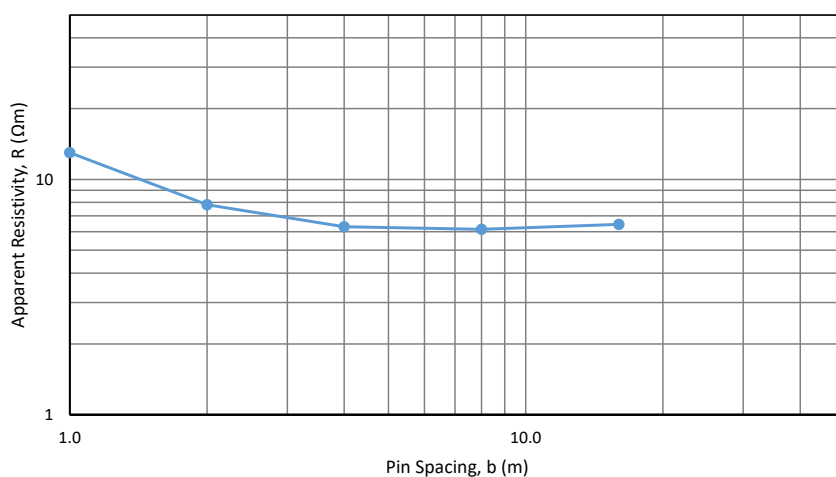
Test Number:	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP04	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	13
1.0	0.5	0.02	13
1.0	0.5	0.02	13
2.0	1	0.02	7.82
2.0	1	0.02	7.82
2.0	1	0.02	7.81
4.0	2	0.02	6.29
4.0	2	0.02	6.32
4.0	2	0.02	6.29
8.0	4	0.02	6.12
8.0	4	0.02	6.15
8.0	4	0.02	6.15
16.0	8	0.02	6.47
16.0	8	0.02	6.41
16.0	8	0.02	6.45

Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	20/04/2022	Sheet:	2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	24/04/2022	Sheet:	1 of 2

Test Number:	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP05	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	5.88
1.0	0.5	0.02	5.89
1.0	0.5	0.02	5.88
2.0	1	0.02	6.08
2.0	1	0.02	6.09
2.0	1	0.02	6.09
4.0	2	0.02	6.49
4.0	2	0.02	6.48
4.0	2	0.02	6.53
8.0	4	0.02	3.5
8.0	4	0.02	3.47
8.0	4	0.02	3.49
16.0	8	0.02	1.47
16.0	8	0.02	1.55
16.0	8	0.02	1.51

Test Number:	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP05	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing, a (m)	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	5.53
1.0	0.5	0.02	5.53
1.0	0.5	0.02	5.53
2.0	1	0.02	5.87
2.0	1	0.02	5.86
2.0	1	0.02	5.87
4.0	2	0.02	6
4.0	2	0.02	6.01
4.0	2	0.02	6.01
8.0	4	0.02	4.32
8.0	4	0.02	4.24
8.0	4	0.02	4.32
16.0	8	0.02	2.39
16.0	8	0.02	2.35
16.0	8	0.02	2.38

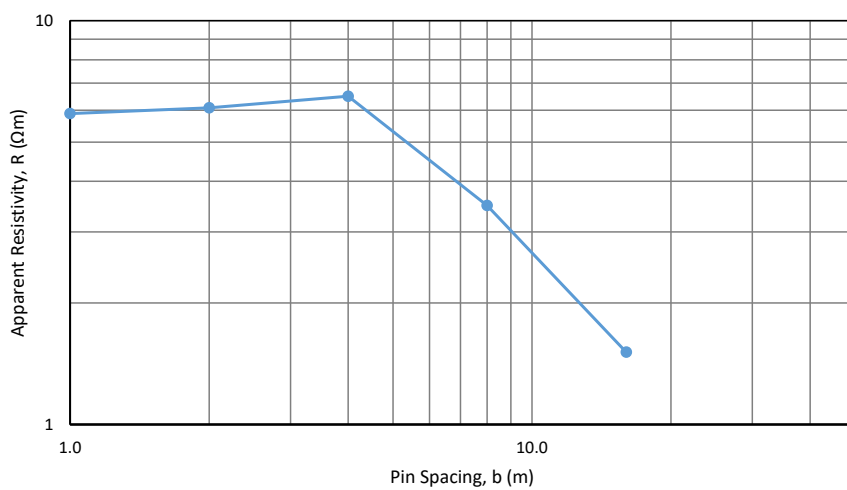
Earth Resistivity Test Results

Client:	Windlab Pty Ltd
Project Name:	Burrawong Wind Farm
Project Number:	MEL2022-0026
Logged By:	HN
Date:	24/04/2022

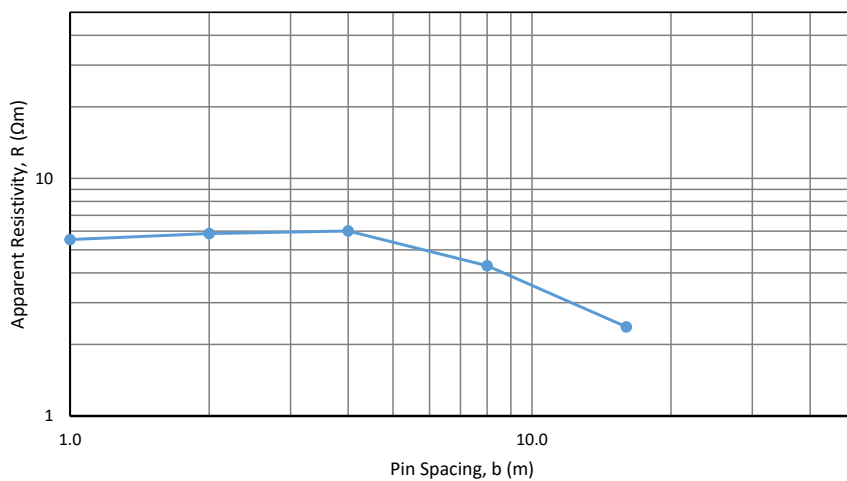


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Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN/ML		
Date:	20/04/2022	Sheet:	1 of 2



Test Number	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP06	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	1.57
1.0	0.5	0.02	1.57
1.0	0.5	0.02	1.57
2.0	1	0.02	1.28
2.0	1	0.02	1.27
2.0	1	0.02	1.27
4.0	2	0.02	1.27
4.0	2	0.02	1.27
4.0	2	0.02	1.27
8.0	4	0.02	1.37
8.0	4	0.02	1.4
8.0	4	0.02	1.37
16.0	8	0.02	3.06
16.0	8	0.02	3.07
16.0	8	0.02	3.14

Test Number	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP06	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Conditions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	2.22
1.0	0.5	0.02	2.22
1.0	0.5	0.02	2.22
2.0	1	0.02	1.34
2.0	1	0.02	1.35
2.0	1	0.02	1.34
4.0	2	0.02	1.26
4.0	2	0.02	1.24
4.0	2	0.02	1.24
8.0	4	0.02	1.61
8.0	4	0.02	1.63
8.0	4	0.02	1.62
16.0	8	0.02	2.28
16.0	8	0.02	2.37
16.0	8	0.02	2.27

Earth Resistivity Test Results

Client: Windlab Pty Ltd

Project Name: Burrawong Wind Farm

Project Number: MEL2022-0026

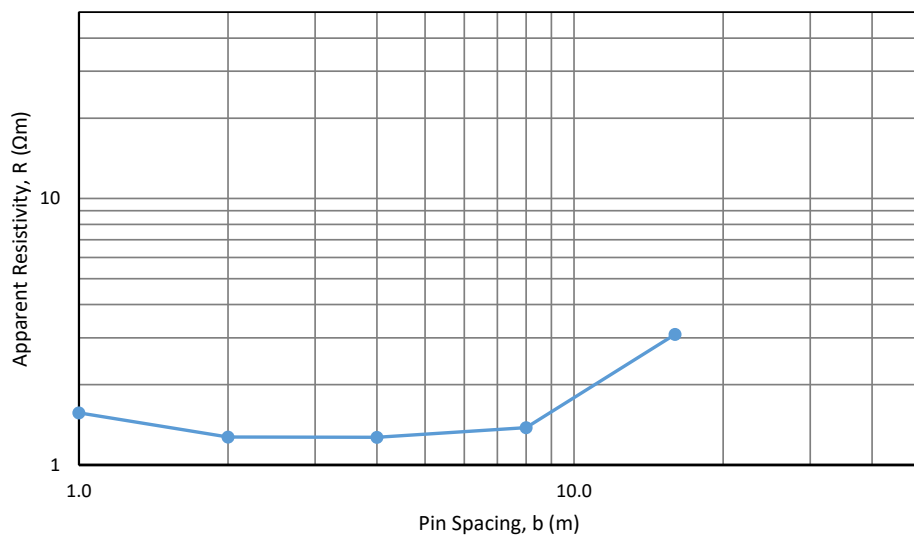
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Date: 20/04/2022

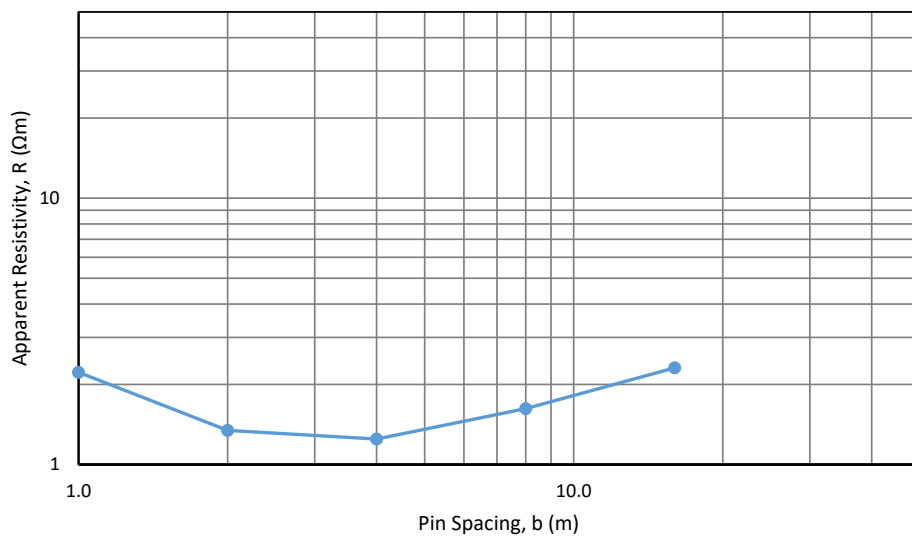


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Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	24/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP07	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	56.5
1.0	0.5	0.02	56.6
1.0	0.5	0.02	56.5
2.0	1	0.02	27.5
2.0	1	0.02	27.5
2.0	1	0.02	27.4
4.0	2	0.02	6.84
4.0	2	0.02	6.86
4.0	2	0.02	6.84
8.0	4	0.02	3.45
8.0	4	0.02	3.39
8.0	4	0.02	3.33
16.0	8	0.02	3.29
16.0	8	0.02	3.29
16.0	8	0.02	3.29

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP07	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	47.2
1.0	0.5	0.02	47.1
1.0	0.5	0.02	47.1
2.0	1	0.02	31.3
2.0	1	0.02	31.2
2.0	1	0.02	31.3
4.0	2	0.02	6.7
4.0	2	0.02	6.71
4.0	2	0.02	6.69
8.0	4	0.02	2.87
8.0	4	0.02	2.84
8.0	4	0.02	2.84
16.0	8	0.02	3.18
16.0	8	0.02	3.18
16.0	8	0.02	3.18

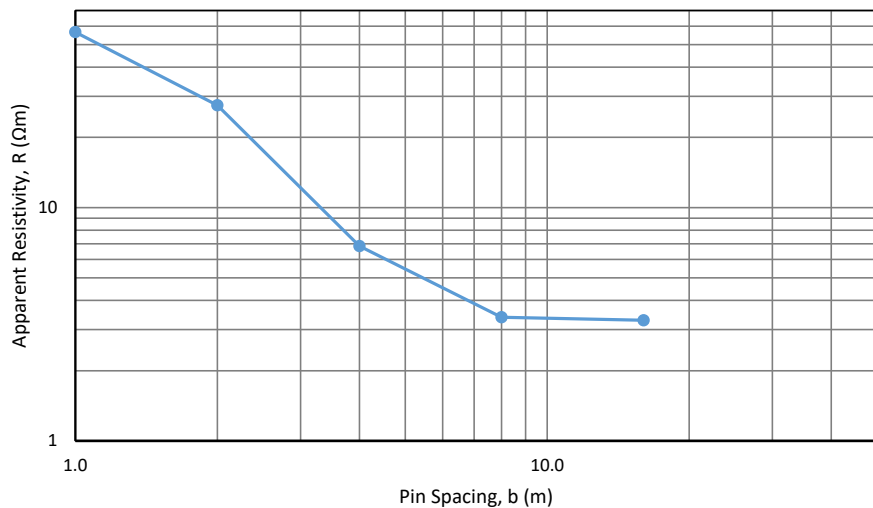
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 24/04/2022

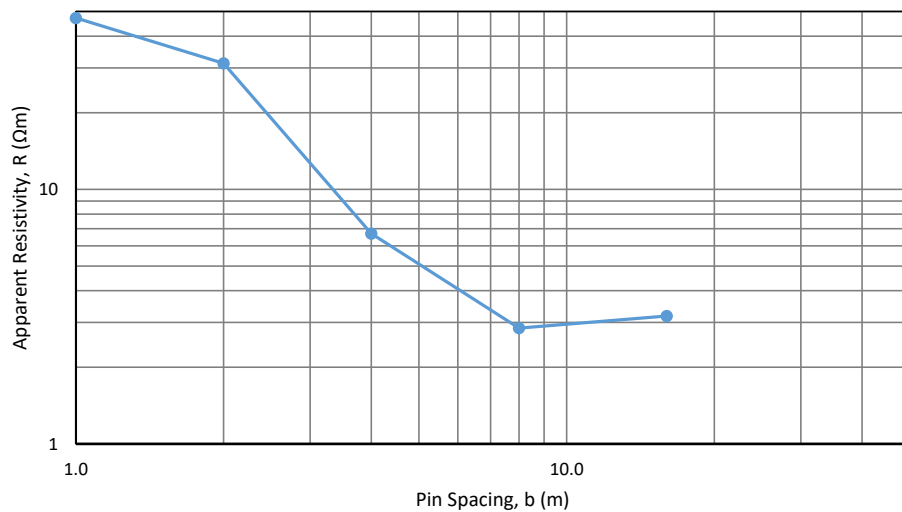


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	24/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP08	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	52.1
1.0	0.5	0.02	52.1
1.0	0.5	0.02	52.1
2.0	1	0.02	31
2.0	1	0.02	31
2.0	1	0.02	31.1
4.0	2	0.02	8.08
4.0	2	0.02	8.09
4.0	2	0.02	8.11
8.0	4	0.02	5.61
8.0	4	0.02	5.61
8.0	4	0.02	5.61
16.0	8	0.02	3.49
16.0	8	0.02	3.49
16.0	8	0.02	3.49

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP08	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	44.1
1.0	0.5	0.02	44.1
1.0	0.5	0.02	44.2
2.0	1	0.02	30.8
2.0	1	0.02	30.8
2.0	1	0.02	30.8
4.0	2	0.02	7.29
4.0	2	0.02	7.3
4.0	2	0.02	7.26
8.0	4	0.02	3.21
8.0	4	0.02	3.17
8.0	4	0.02	3.24
16.0	8	0.02	2.49
16.0	8	0.02	2.49
16.0	8	0.02	2.49

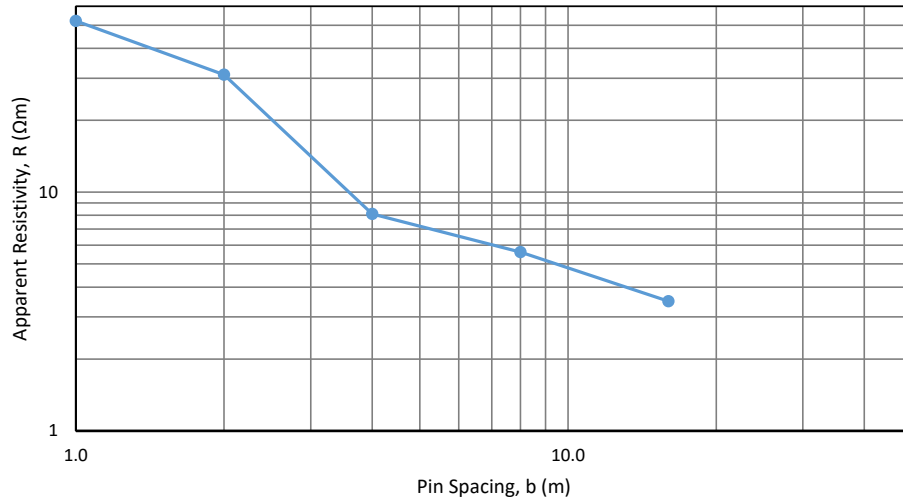
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 24/04/2022

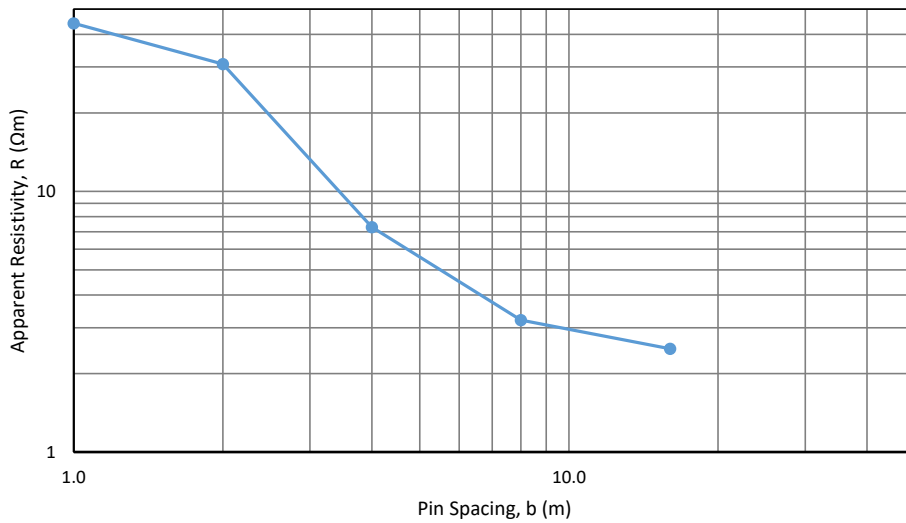


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN/ML		
Date:	20/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP09	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	69.4
1.0	0.5	0.02	69.5
1.0	0.5	0.02	69.5
2.0	1	0.02	25.4
2.0	1	0.02	25
2.0	1	0.02	25
4.0	2	0.02	11.2
4.0	2	0.02	11.2
4.0	2	0.02	11.2
8.0	4	0.02	3.19
8.0	4	0.02	2.87
8.0	4	0.02	2.88
16.0	8	0.02	2.41
16.0	8	0.02	2.34
16.0	8	0.02	2.36

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP09	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	60
1.0	0.5	0.02	60
1.0	0.5	0.02	60.1
2.0	1	0.02	23.9
2.0	1	0.02	23.9
2.0	1	0.02	23.9
4.0	2	0.02	8.89
4.0	2	0.02	8.88
4.0	2	0.02	8.86
8.0	4	0.02	2.94
8.0	4	0.02	2.94
8.0	4	0.02	2.96
16.0	8	0.02	2.64
16.0	8	0.02	2.67
16.0	8	0.02	2.64

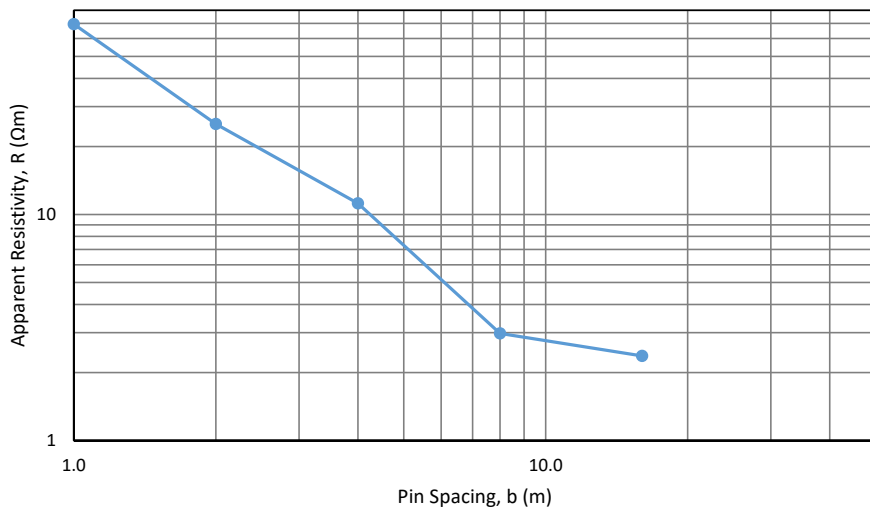
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN/ML
Date: 20/04/2022

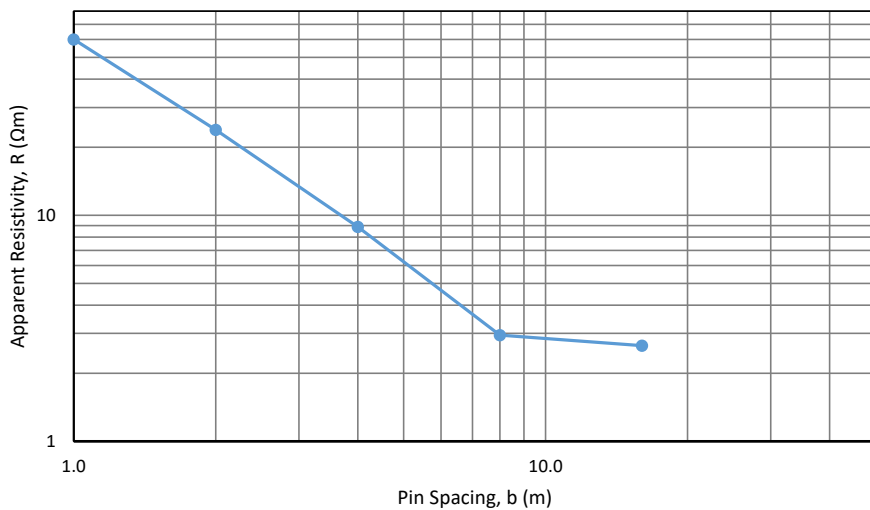


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	25/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP10	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	23.7
1.0	0.5	0.02	23.7
1.0	0.5	0.02	23.8
2.0	1	0.02	10.9
2.0	1	0.02	10.9
2.0	1	0.02	10.9
4.0	2	0.02	2.49
4.0	2	0.02	2.49
4.0	2	0.02	2.48
8.0	4	0.02	2.33
8.0	4	0.02	2.34
8.0	4	0.02	2.33
16.0	8	0.02	2.03
16.0	8	0.02	2.03
16.0	8	0.02	2.03

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP10	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	30.5
1.0	0.5	0.02	30.5
1.0	0.5	0.02	30.5
2.0	1	0.02	12.3
2.0	1	0.02	12.3
2.0	1	0.02	12.3
4.0	2	0.02	2.81
4.0	2	0.02	2.85
4.0	2	0.02	2.85
8.0	4	0.02	2.98
8.0	4	0.02	3.03
8.0	4	0.02	3
16.0	8	0.02	1.32
16.0	8	0.02	1.32
16.0	8	0.02	1.32

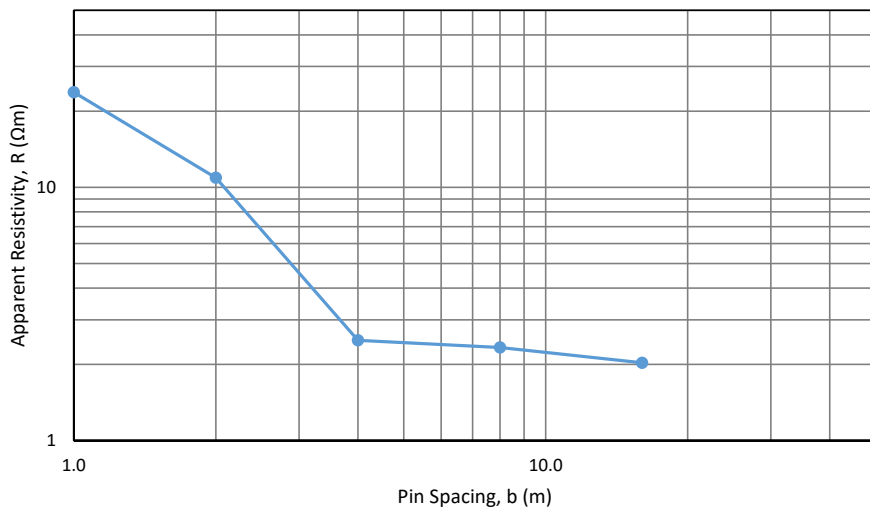
Earth Resistivity Test Results

Client: Windlab Pty Ltd
 Project Name: Burrawong Wind Farm
 Project Number: MEL2022-0026
 Logged By: HN
 Date: 25/04/2022

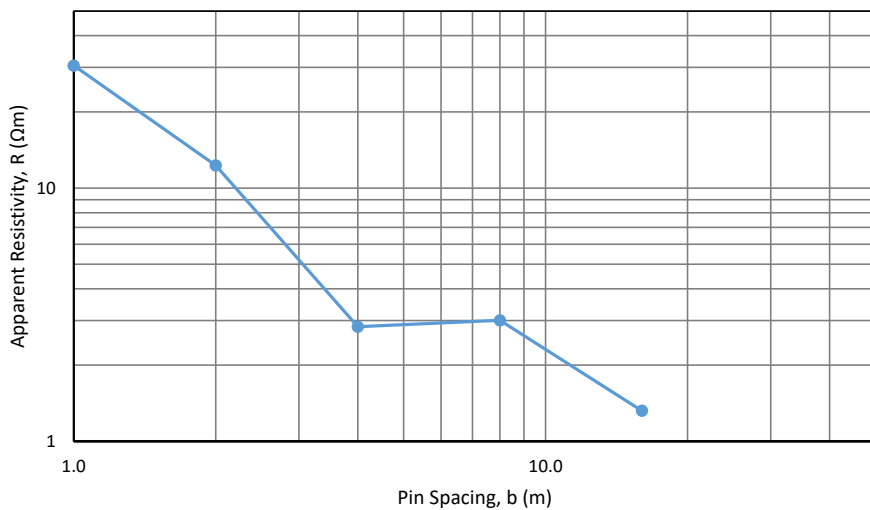


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	25/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP11	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	21
1.0	0.5	0.02	21
1.0	0.5	0.02	21
2.0	1	0.02	12.5
2.0	1	0.02	12.5
2.0	1	0.02	12.5
4.0	2	0.02	4.77
4.0	2	0.02	4.77
4.0	2	0.02	4.76
8.0	4	0.02	2.04
8.0	4	0.02	2.08
8.0	4	0.02	2.03
16.0	8	0.02	1.85
16.0	8	0.02	1.85
16.0	8	0.02	1.85

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP11	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	23.2
1.0	0.5	0.02	23.2
1.0	0.5	0.02	23.2
2.0	1	0.02	14.5
2.0	1	0.02	14.5
2.0	1	0.02	14.5
4.0	2	0.02	4.94
4.0	2	0.02	4.93
4.0	2	0.02	4.94
8.0	4	0.02	1.6
8.0	4	0.02	1.56
8.0	4	0.02	1.57
16.0	8	0.02	2.22
16.0	8	0.02	2.22
16.0	8	0.02	2.22

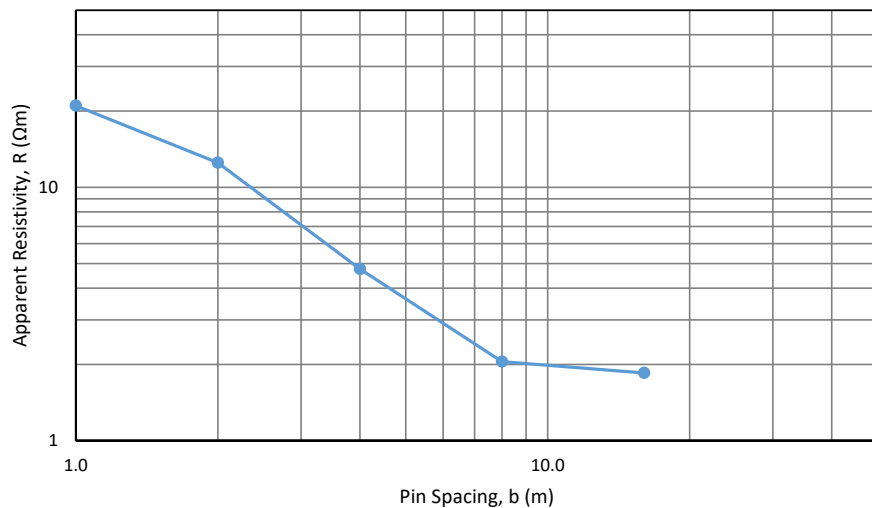
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 25/04/2022

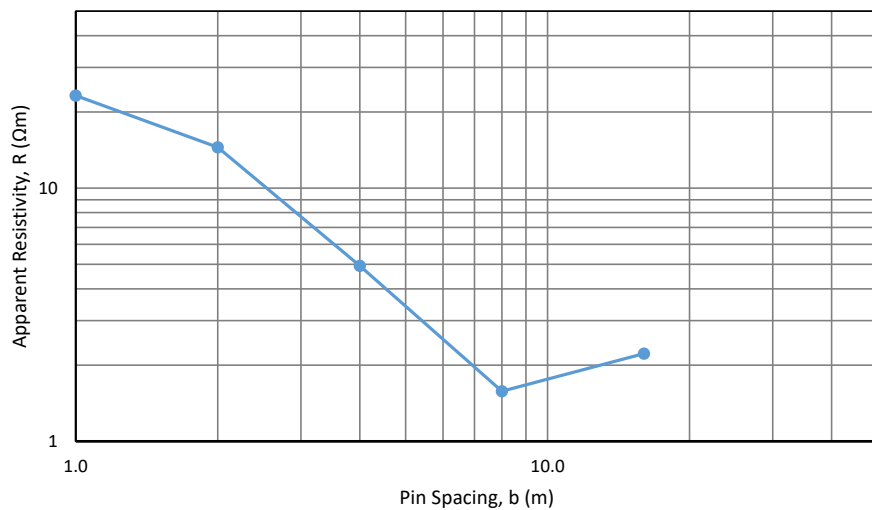


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	25/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP12	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	10.5
1.0	0.5	0.02	10.5
1.0	0.5	0.02	10.6
2.0	1	0.02	4.68
2.0	1	0.02	4.66
2.0	1	0.02	4.68
4.0	2	0.02	3.07
4.0	2	0.02	3.07
4.0	2	0.02	3.07
8.0	4	0.02	2.5
8.0	4	0.02	2.51
8.0	4	0.02	2.5
16.0	8	0.02	1.07
16.0	8	0.02	1.07
16.0	8	0.02	1.07

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP12	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	9.01
1.0	0.5	0.02	9.02
1.0	0.5	0.02	9.02
2.0	1	0.02	4.44
2.0	1	0.02	4.44
2.0	1	0.02	4.45
4.0	2	0.02	3.4
4.0	2	0.02	3.41
4.0	2	0.02	3.41
8.0	4	0.02	2.31
8.0	4	0.02	2.31
8.0	4	0.02	2.33
16.0	8	0.02	1.02
16.0	8	0.02	1.02
16.0	8	0.02	1.02

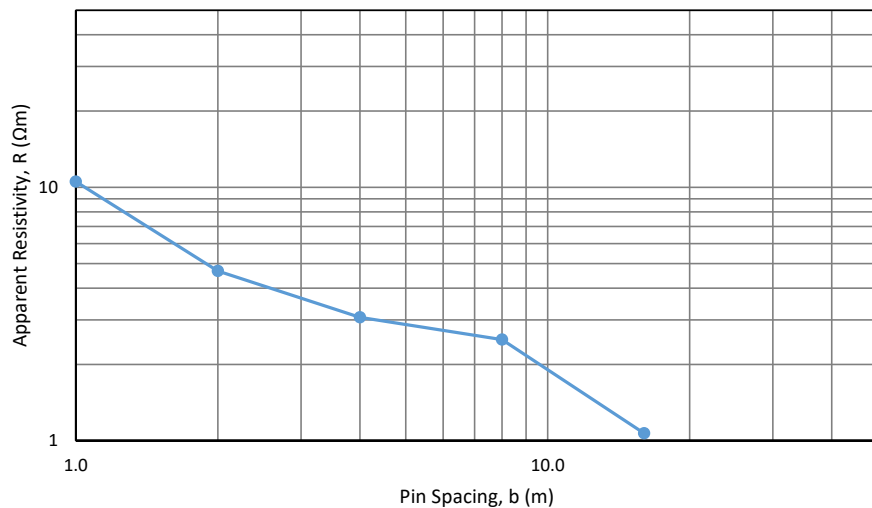
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 25/04/2022

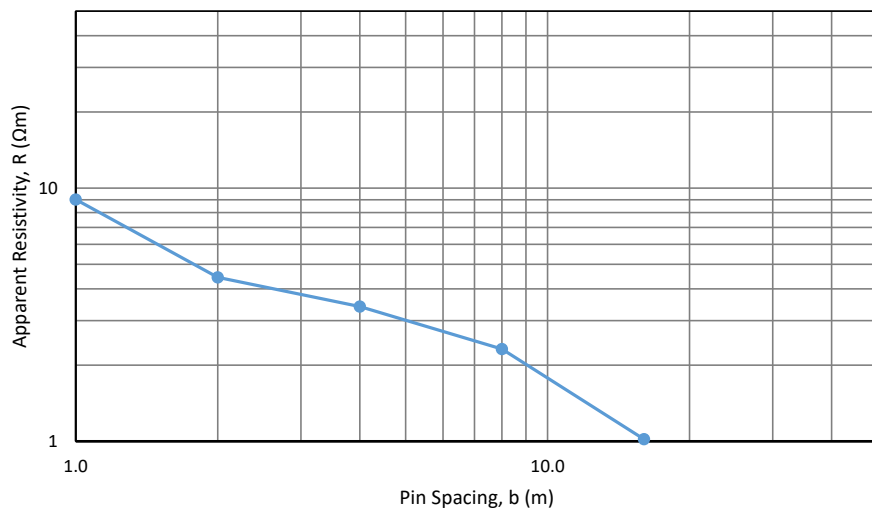


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Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	25/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP13	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	101
1.0	0.5	0.02	101
1.0	0.5	0.02	101
2.0	1	0.02	45.4
2.0	1	0.02	45.3
2.0	1	0.02	45.3
4.0	2	0.02	7.79
4.0	2	0.02	7.79
4.0	2	0.02	7.78
8.0	4	0.02	4.74
8.0	4	0.02	4.9
8.0	4	0.02	4.94
16.0	8	0.02	4.57
16.0	8	0.02	4.57
16.0	8	0.02	4.57

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP13	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	47.2
1.0	0.5	0.02	47.3
1.0	0.5	0.02	47.3
2.0	1	0.02	241
2.0	1	0.02	241
2.0	1	0.02	241
4.0	2	0.02	522
4.0	2	0.02	522
4.0	2	0.02	532
8.0	4	0.02	414
8.0	4	0.02	414
8.0	4	0.02	416
16.0	8	0.02	2.07
16.0	8	0.02	2.07
16.0	8	0.02	2.07

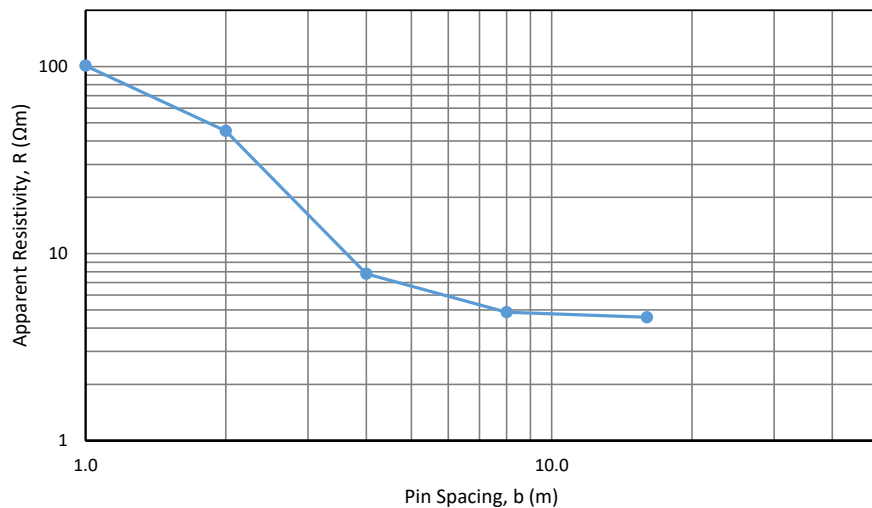
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 25/04/2022

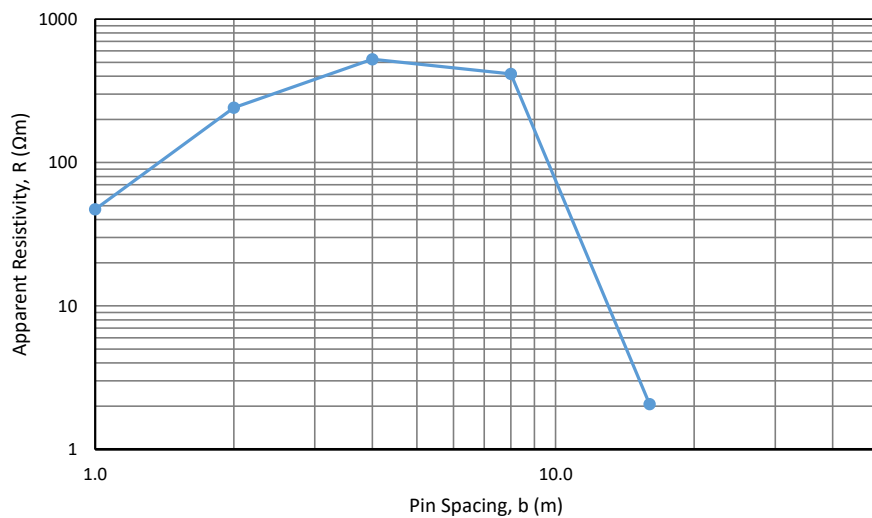


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	25/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP14	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	24.6
1.0	0.5	0.02	24.6
1.0	0.5	0.02	24.6
2.0	1	0.02	11.5
2.0	1	0.02	11.5
2.0	1	0.02	11.5
4.0	2	0.02	4.43
4.0	2	0.02	4.42
4.0	2	0.02	4.43
8.0	4	0.02	2.49
8.0	4	0.02	2.5
8.0	4	0.02	2.51
16.0	8	0.02	0.82
16.0	8	0.02	0.82
16.0	8	0.02	0.82

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP14	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	14.8
1.0	0.5	0.02	14.8
1.0	0.5	0.02	14.8
2.0	1	0.02	9.19
2.0	1	0.02	9.18
2.0	1	0.02	9.17
4.0	2	0.02	4.2
4.0	2	0.02	4.19
4.0	2	0.02	4.2
8.0	4	0.02	2.44
8.0	4	0.02	2.44
8.0	4	0.02	2.43
16.0	8	0.02	2.69
16.0	8	0.02	2.69
16.0	8	0.02	2.69

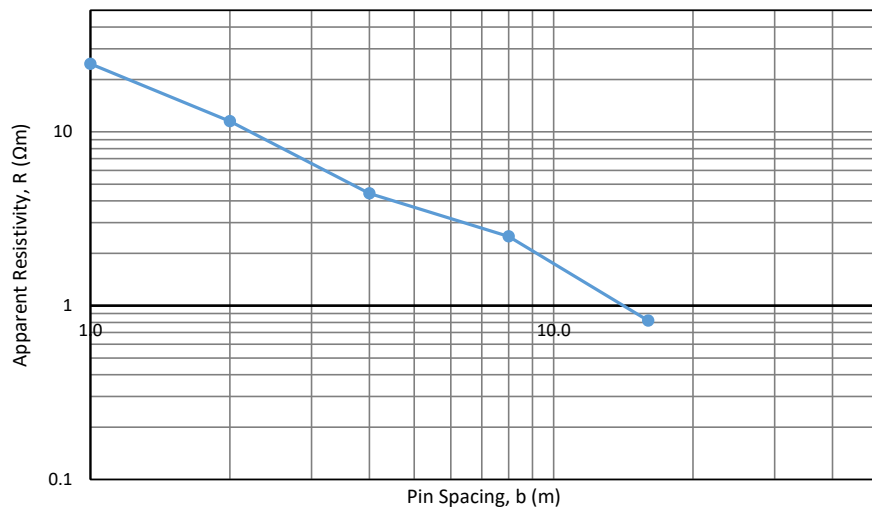
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 25/04/2022

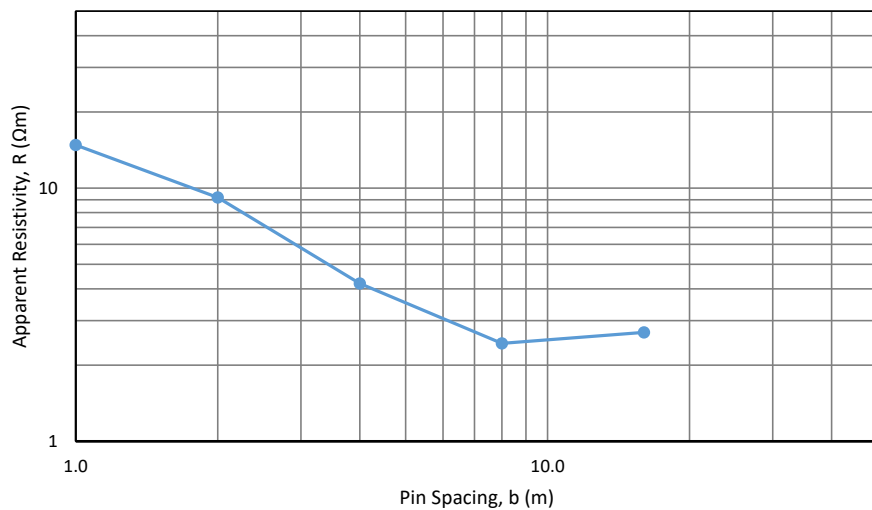


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



Earth Resistivity Test Results			
Client:	Windlab Pty Ltd		
Project Name:	Burrawong Wind Farm		
Project Number:	MEL2022-0026		
Logged By:	HN		
Date:	23/04/2022	Sheet:	1 of 2

Test Numb	1	Locality Reference:	Appendix D
Bearing:	E-W	Equipment:	Sonel MRU30
Location:	TP15	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	11.12
1.0	0.5	0.02	11.2
1.0	0.5	0.02	11.2
2.0	1	0.02	9.28
2.0	1	0.02	9.29
2.0	1	0.02	9.29
4.0	2	0.02	5.9
4.0	2	0.02	5.9
4.0	2	0.02	5.83
8.0	4	0.02	3.05
8.0	4	0.02	3.05
8.0	4	0.02	3.04
16.0	8	0.02	2.66
16.0	8	0.02	2.61
16.0	8	0.02	2.62

Test Numb	2	Locality Reference:	Appendix D
Bearing:	N-S	Equipment:	Sonel MRU30
Location:	TP15	Array Type:	Wenner Four Pin Method - AS1768
Ground Conditions:	Dry	Weather Condions:	Clear
Pin Spacing,	Distance From Midpoint, a/2 (m)	Pin Depth, b (m)	Apparent Resistivity, R (Ω m)
1.0	0.5	0.02	9.98
1.0	0.5	0.02	9.97
1.0	0.5	0.02	9.99
2.0	1	0.02	7.67
2.0	1	0.02	7.66
2.0	1	0.02	7.67
4.0	2	0.02	6.04
4.0	2	0.02	6.05
4.0	2	0.02	6.04
8.0	4	0.02	3.67
8.0	4	0.02	3.67
8.0	4	0.02	3.69
16.0	8	0.02	8.14
16.0	8	0.02	8.2
16.0	8	0.02	8.17

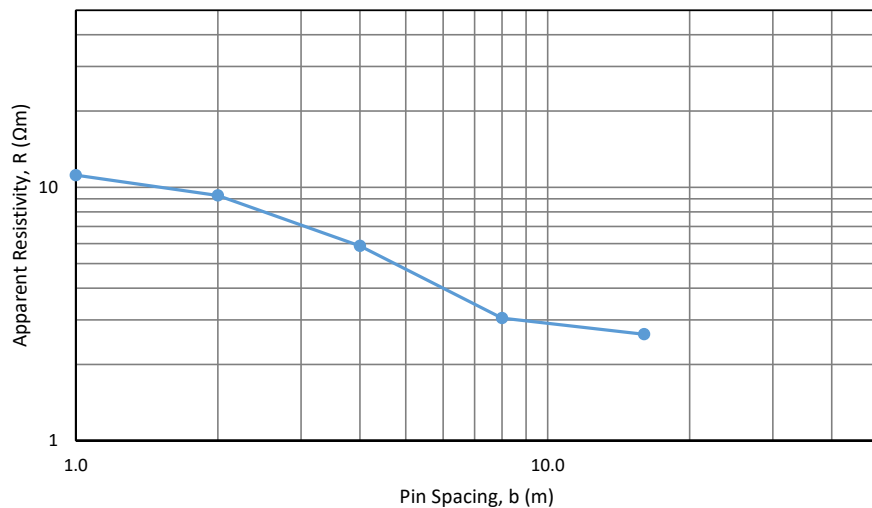
Earth Resistivity Test Results

Client: Windlab Pty Ltd
Project Name: Burrawong Wind Farm
Project Number: MEL2022-0026
Logged By: HN
Date: 23/04/2022

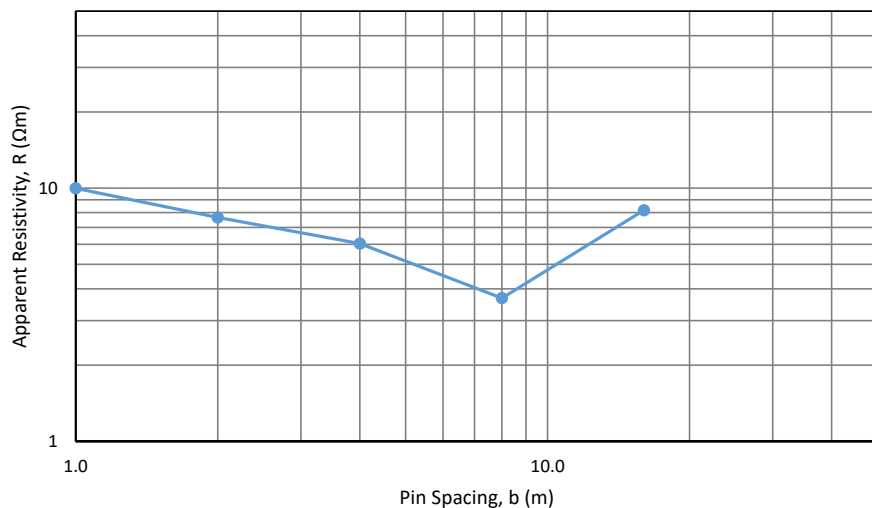


Sheet: 2 of 2

Earth Resistivity Test 1 Graph



Earth Resistivity Test 2 Graph



6 June 2022

**BURRAWONG WIND FARM
BALRANALD, NEW SOUTH WALES**

GEOTECHNICAL INTERPRETIVE REPORT

Windlab Developments Pty Ltd
MEL2022-0026AC Rev0

MEL2022-0026AC		
Date	Revision	Comments
6 June 2022	0	Initial Submission

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1 INTRODUCTION

CMW Geosciences (CMW) has been engaged by Windlab Developments Pty Ltd (Windlab) to undertake a geotechnical investigation for the proposed Burrawong Wind Farm (BWF) located near Balranald, New South Wales 2715.

This report presents the interpretation and recommendations from our geotechnical investigation reported in MEL2022-0026AB. The geotechnical works were undertaken in accordance with our proposal MEL2022-0026AA Rev1 dated 16 March 2022. The works were commissioned by Windlab Developments Pty Ltd via a signed Investigative Works Services Agreement dated 29 March 2022.

1.1 Proposed Development

Windlab is currently in the process of defining the required civil scope of works for the proposed BWF, which comprises up to 107 turbines with associated civil and electrical works. The project size comprises approximately 15,000ha of land located about 15km south of Balranald. Figure 1 below provides a general site location.

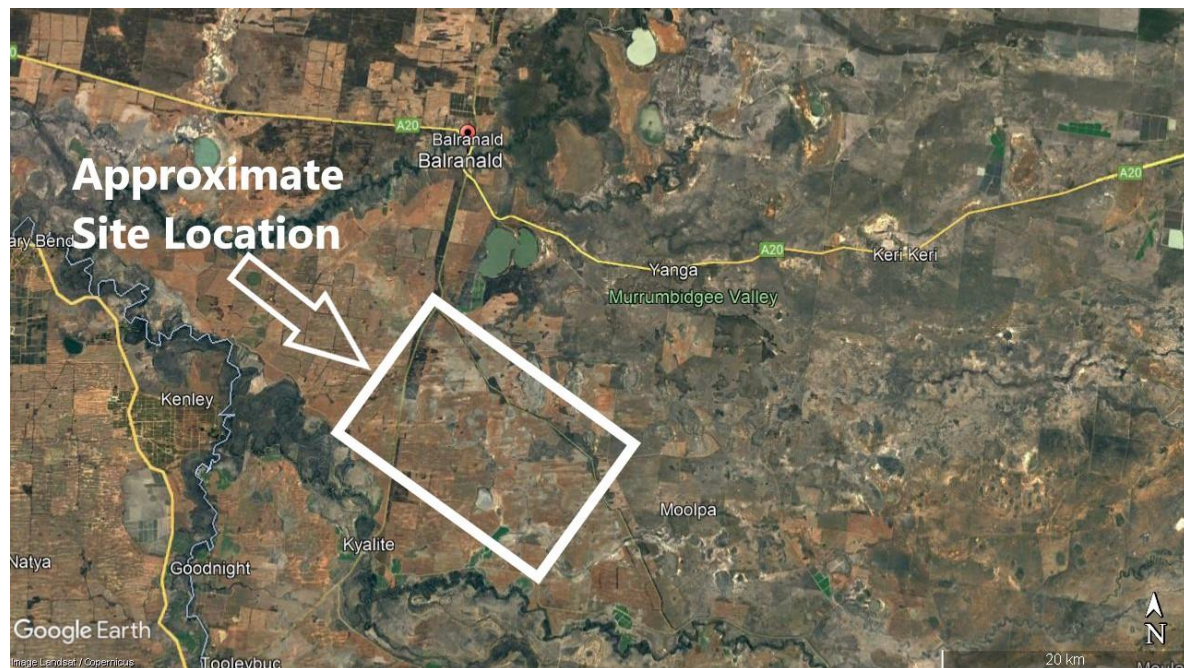


Figure 1: Approximate Site Location

The site has been divided into three sections, north, south, and west, separated by Balranald Road which generally runs centrally through the site.

Turbine and test locations, and existing access tracks at the time of the field investigation were provided to CMW by Windlab through a series of KMZ files. The turbine test locations were named in accordance with the provided numbering system.

1.2 Purpose of the investigation

The scope and aims of the geotechnical study are as follows:

- Assess general subsurface conditions and characterise the subsurface units at the site relevant to the proposed development.
- Provide shallow and deep foundation design parameters for wind turbine and substation foundations including:
 - Dynamic and static elastic moduli;
 - Poisson's Ratio;
 - Ultimate and serviceability bearing capacity;
 - Backfill bulk density;
 - Site reactivity.
- Assess the suitability of the site materials for re-use in civil works including hard stands, cable trenches and access road construction and recommend design parameters for such earthworks;
- Assessment of subgrade strength for pavement design;
- Comment on the excavation characteristics of the materials likely to be encountered during footing, cable trench and other excavations. Provide field data to allow contractors to make their own assessment of the likely conditions;
- Undertake laboratory testing of recovered soil samples for material classification, strength, pavement subgrade parameters, durability assessment and thermal resistivity to inform design.

2 PREVIOUS INVESTIGATION BY CMW

The factual data from the BWF geotechnical investigation carried out by CMW are presented in the geotechnical factual report MEL2022-0026AB which summarises the regional setting, field investigation and laboratory test results. This report shall be read in conjunction with this geotechnical interpretive report.

3 GROUND MODEL

3.1 Description of Geological Units

The ground conditions encountered and inferred from the investigation of the wind farm were generally consistent with the published geology for the area, and can be generalised according to the following units:

- Unit 1 – TOPSOIL – Surface topsoil material typically encountered comprises of loose to medium dense clayey sand or silty sand. Topsoil was also described as stiff to very stiff sandy clay.
- Unit 2A – 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.
- Unit 2B –SAND – Weakly to strongly cemented clayey sands, medium dense to very dense. Generally red brown and grey in colour.

Although the encountered geological unit at each borehole location was reasonably consistent (i.e., Woorinen Formation), the nature of this geological unit has significant inherent variability. Therefore the ground conditions encountered are only applicable to the investigation locations and may vary substantially across the turbine locations.

Boreholes at each turbine location will be required to confirm ground conditions at that particular location as there is likely a significant variability between each wind turbine foundation condition.

Table 1 and Table 2 display the subsurface units encountered at each test pit and borehole location.

Table 01 - Summary of depth of subsurface unit (m bgl) – TEST PITS			
Location ID	Unit 1	Unit 2A	Unit 2B
TP01	0.0-0.2	2.5-3.5	0.2-2.5
TP02	0.0-0.2	2.0-3.5	0.2-2.0
TP03	0.0-0.3	2.8-3.5	0.3-2.8
TP04	0.0-0.2	-	0.2-3.5
TP05	0.0-0.2	-	0.2-3.5
TP06	0.0-0.3	0.3-2.0	2.0-3.5
TP07	0.0-0.2	2.3-3.5	0.2-2.3
TP08	0.0-0.3	1.8-3.5	0.3-1.8
TP09	0.0-0.2	0.2-1.6	1.6-3.5
TP10	0.0-0.3	0.3-3.5	-
TP11	0.0-0.3	1.5-3.5	0.3-1.5
TP12	0.0-0.3	0.3-3.5	-
TP13	0.0-0.4	0.8-3.5	0.4-0.8
TP14	0.0-0.3	1.6-3.0	0.3-1.6
TP15	0.0-0.3	2.4-3.5	0.3-2.4

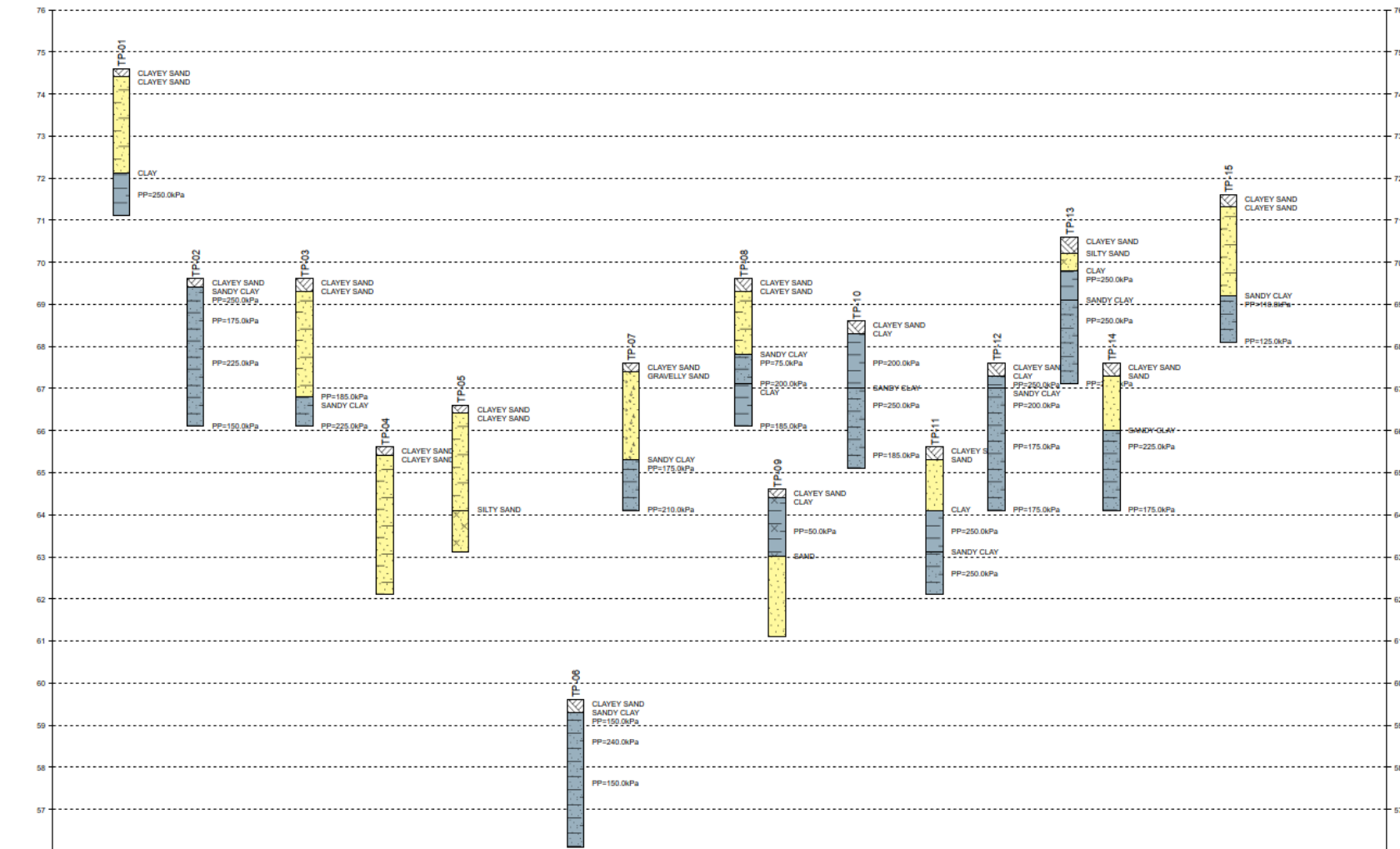


Figure 2: Sections of geological units encountered at test pit locations

Table 2 - Summary of depth of subsurface unit (m bgl) – BOREHOLES			
Location ID	Unit 1	Unit 2A	Unit 2B
BH01	0.0 - 0.4	0.4 -3.5 5.2-9.1 13.0-15.1 16.5- 18.1	3.5 - 5.2 9.1- 13.0 15.1-16.5 18.1- 19.8
BH02	0.0-0.6	0.6-4.7 5.4-19.8	4.7-5.4
BH03	0.0-0.5	0.5-3.5 7.3-10.5	3.5-7.3 10.5-19.6
BH04	0.0-0.6	0.6-16.5	16.5-19.8
BH05	0.0-0.3	0.3-19.5	19.5-19.8
BH06	0.0-1.0	1.0-4.6 5.5-13.25 14.5-16.55 18.0-20.0	4.6-5.5 13.25-14.5 16.55-18.0
BH07	0.0-0.3	0.3-6.0 6.8-7.15 13.0-19.0	6.0-6.8 7.15-13.0 19.0-20.0
BH08	0.0-1.0	1.0-4.0 4.5-10.6 11.5-18.5	4.0-4.5 10.6-11.5 18.5-20.0

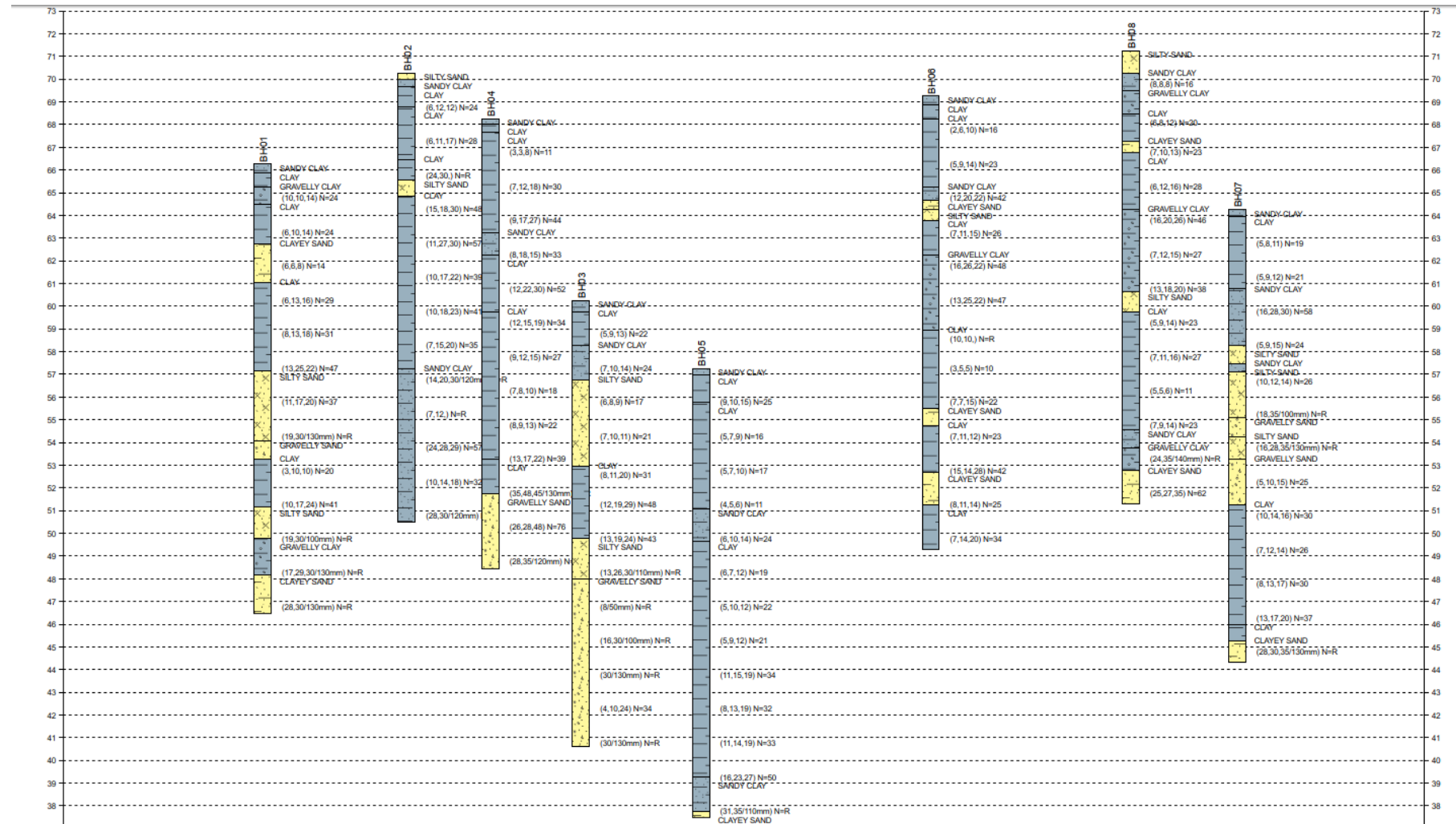


Figure 3: Sections of geological units encountered at borehole locations

4 GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

4.1 WTG Footings

4.1.1 General

Wind turbines are 'light' structures that experience very high overturning loads due to their height and applied lateral loads. Resistance against these overturning loads typically governs the size (width/diameter/thickness) and mass of footing required. Based on the provided brief from the client, it is understood that WTG footing depths in the order of 3.0-3.5m depth are expected.

Options for the WTG footings typically involve large square, circular or octagonal shaped concrete pad footings that resist overturning through the mass of the concrete and backfill material above the footing. Alternative footings can involve the use of anchors or piles to increase the turning resistance. Where suitable ground exists, the use of anchors or piles can reduce the required excavation and concrete volume.

At the time of preparing this report, the foundation type envisaged for WTG for the BWF project were unknown to CMW. It is anticipated that the probable design solution is expected to comprise a gravity pad foundation. Based on an anticipated footing depth of 3.0-3.5m depth, it is expected that the WTGs will be founded on either stiff to hard clay (Unit 2A) or medium dense to dense granular soils (Unit 2B).

The primary geotechnical parameters relevant to the design of gravity footings are the static and dynamic stiffness (elastic modulus) and the bearing capacity of the upper founding materials. Recommendations are provided in the following sections for the geotechnical design of gravity footings founded on either Unit 2A or Unit 2B.

4.1.2 WTG Foundation Design Parameters

The suitability of the foundation materials will need to be verified by an experienced geotechnical professional for each WTG footing during construction. Should weaker materials be encountered locally at the design founding depth, such weaker materials would need to be excavated and replaced with mass concrete or engineered fill to create suitable and generally uniform materials across the excavation base.

Removal of weak materials from the founding surface is necessary to achieve the required performance of the footing. Care must be taken during excavation to avoid loosening or disturbing the founding materials. Disturbed material below the base of the excavation will require removal and the excavation base reinstated with mass concrete or engineered fill.

A blinding layer of concrete should be placed over the prepared foundation as soon as practicable to reduce the potential for loosening of the surface and potential damage from inclement weather events.

Gravity footings relying on the weight of the backfill above the concrete pad base may be assessed based on a unit weight of 18 kN/m³ for compacted site won soils. No allowance should be made for any friction around the perimeter of the footing.

In preparing the footing base, it is anticipated that a progressively smaller excavation plant will be required to clean out the excavation base until all loose material has been removed.

When deriving the preliminary design parameters, each borehole location was individually assessed using an equivalent ground model based on the layered ground model at each location. Table 3 and Table 4 present recommended preliminary design parameters for the WTG footings founded at 3.0 to 3.5m depth at relevant borehole locations.

Table 3 – Summary of preliminary geotechnical parameters											
Material			Y (kN/ m³)	Φ' (°)	c' (kPa)	Cu (kPa)	SPT N Value	E' (MPa)	G ₀ (MPa)	f _s (kPa)	f _b (kPa)
1	TOPSOIL	-	18	-	-	-	-	-	-	-	-
2A	Cohesive Woorinen Formation	St	18	26	5	50-100	8-12	15-30	100	40	450
		VSt	19	28	10	100-200	13-25	30-70	150	50	900
		H	20	28	15	>200	>25	>70	215	60	1800
2B	Granular Woorinen Formation	MD	18	32	-	-	10-30	20-60	100	30	2,000
		D	19	36	-	-	30-50	60-100	170	55	4,000
		VD	21	39	-	-	>50	>100	250	90	6,000
Notes: γ = Unit weight, Φ = friction angle, c' = drained cohesion, cu = undrained shear strength, E' = static drained elastic modulus, G0 = Ismall strain shear modulus, fb = ultimate end bearing capacity, fs = ultimate shaft friction in compression											

Table 04 – Summary of geotechnical design parameters for predominant unit at each borehole location.								
Geotechnical Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08
Ultimate Bearing Capacity (kPa) *	2,200	1,100	2,700	1,500	910	950	1,300	960
Allowable Net Bearing Capacity (kPa)**	100	50	125	70	40	45	60	45
Average Elastic Modulus (E_s) (MPa)	70	35	85	45	30	30	40	30
Average Dynamic Elastic Modulus (E_0) (MPa) [^]	210	105	255	135	90	90	120	90
Average Shear Modulus, G (MPa)	25	15	30	17	12	12	15	12
Poisson's Ratio (ν)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
* Ultimate bearing capacity must be multiplied by a geotechnical reduction factor ϕ_g when calculating the limit state geotechnical bearing capacity. Ultimate bearing capacity assessed based on a 22m diameter circular footing founded 3m below ground level and does not consider settlement and will not govern the design. ** A simplified allowable net bearing capacity has been assessed based on a maximum 30mm settlement due to sustained loading based on a 22m diameter circular footing founded 3m below ground level. [^] Dynamic Elastic Modulus was preliminarily assessed via correlation of 3 x Elastic Modulus, which is considered applicable for a strain of 10^{-3}								

The wind turbine structures are dynamic systems that generate and experience cyclic loading. The detailed design of the wind tower foundation relies on the knowledge of the soil stiffness degradation at typical strain ranges expected from cycling loadings generated by the structure. The accurate estimation of the soil response to the tower vibration is paramount for the tower foundation design as the value of the foundation rocking stiffness will likely govern. In addition, an appropriate soil stiffness degradation assessment can assist in reducing the future structural maintenance due to fatigue.

Due to the highly variable nature of the site, we recommend during the detailed site investigation phase assessing the small strain moduli of the soils (G₀) using geophysics. In addition, we suggest this be complemented by targeted laboratory cyclic testing (such as the resonant column tests - please refer to DNV/Risø : 2002 Chapter 8.1) to establish the soil damping ratio applicable to the location.

4.1.3 Uplift Pressures

As noted in Section 4.4 of this report, groundwater was not observed at the time of the investigation, due to the drilling method adopted. A nearby domestic stock well from MinView (MinView, 2022) located NW of the site within the Dalton property had recorded groundwater measured at 9.0 mbgl on 01 January 1960. Groundwater was not encountered in any of the test pits.

It is recommended that groundwater level monitoring be carried out following any installation of groundwater monitoring wells in subsequent investigation stages for this site. Wind turbine foundations exposed to water levels close to ground level can be subject to buoyancy effects which may have a significant impact on their design. The preliminary information presented in this report suggests that this is unlikely to be the case for the investigated turbines.

4.2 Substation

4.2.1 General

The substation location for the BWF project was not known at the time of the investigation or preparation of this report. As such the reactivity, shallow footing and pile recommendations are based generally on the dominant subsoil materials (units) encountered across the site. Additional investigation will need to be undertaken at the substation location.

4.2.2 Site Classification – AS2870

Australian Standard AS2870-2011 'Residential Slabs and Footings' provides guidance on classifying each site by estimating the characteristic surface movement (y_s). Based on the guidance of the AS2870-2011.

Based on the reactivity of the soils encountered during the geotechnical investigation, the site is likely to be classified as up to 'Class H2' being highly reactive, which may experience high ground movements from moisture change. The reactivity of the existing site profile has been estimated to be up to 70mm for the profiles observed at investigation locations, on the basis of the following assessment parameters:

- Depth of Suction Change H_s = 4.0m for the Swan Hill region (Australian Standard 2870, 2011)
- Design suction change of Δu = 1.2pF (Australian Standard 2870, 2011)
- Cracked depth of 3.0m (Australian Standard 2870, 2011)
- Shrink swell index of up to I_{ss} = 2.5%/pF for the clay soils.

This site classification provides a guide to the level of surface movement due to seasonal moisture changes that could be expected on the site. Additional boreholes are required at the substation location to confirm the preliminary site classification presented here. The thickness and extent of sandier lenses within the Woorinen Formation will impact on the preliminary site classification presented here.

Larger y_s values may occur when the future moisture content change in the soil exceeds design moisture content change as determined from AS2870. Such changes may occur, for example, adjacent to leaking water services or where the soils are desiccated by the roots of trees.

We caution that AS2870-2011 is intended for the consideration of residential structures and associated moisture variability. The proposed structures to be located on this site may require consideration of the site conditions based on more rigorous engineering principles.

4.2.3 Shallow Footings

Shallow footing systems for the proposed concrete buildings and substation at this site could consist of shallow strip or pad footings founded below the ground surface.

The shear strength and stiffness of the near surface material, within 1.5 times the width below the base of the footings, governs the allowable bearing capacity.

Footings founded in the following soils may be proportioned based on the following preliminary allowable bearing capacities.

Due to the variability of the shallow strata encountered, an additional site investigation at the proposed foundation locations would be required to confirm these preliminary assessments.

Table 5: Summary of Allowable Bearing Capacity				
Embedment Depth (m)	Footing Width (m)	Footing Length (m)	Allowable Bearing Capacity (kPa)	Estimated Total Settlement (mm)
0.5 (Unit 2A – Stiff CLAY)	0.5 strip		100	10
	1.0 strip		100	20
	1.0	1.0	130	15
	2.0	2.0	125	25
1.0 (Unit 2A – Stiff CLAY)	0.5 strip		100	10
	1.0 strip		100	20
	1.0	1.0	130	15
	2.0	2.0	130	25
0.5 (Unit 2B- Medium dense SAND)	0.5 strip		130	10
	1.0 strip		170	20
	1.0	1.0	150	10
	2.0	2.0	210	25
1.0 (Unit 2B- Medium dense SAND)	0.5 strip		210	10
	1.0 strip		220	25

	1.0	1.0	240	15
	2.0	2.0	215	25

The assessed bearing capacity outlined above assumes that the bearing surfaces are adequately prepared, are clean and free from spoil and other soft and loose material and free of water at the time of placement of concrete. Adequate surface drainage must be provided to prevent saturation associated loss of soil strength.

4.3 Durability Assessment

A total of six (6) samples were tested for chemical properties and aggressivity to steel and concrete as presented in the geotechnical factual report.

4.3.1 Exposure Classification for Concrete

Results for the chemical testing of the subsurface material indicated that the soil tested has:

- pH between 7.2 and 9.7; and
- Sulphate content <1170 mg/kg; and
- Chlorides <1,820 mg/kg

Based on the above test results, in accordance with AS2159 - 2009 Table 6.4.2(C), concrete footings in such soil environments are considered to have an exposure classification of “non-aggressive”.

4.3.2 Exposure Classification for Steel

Results for the chemical testing on the subsurface material indicated that the soil tested has;

- pH between 7.2 and 9.7;
- Chlorides < 1,820 ppm; and
- Soil Resistivity < 10 ohm.m (based on insitu ERT data)

Based on the above test results and test pit observations and logs, in accordance with AS2159 – 2009 Table 6.5.2(C), steel piles in such soil environments are considered to have an exposure classification of “Moderate” above the groundwater level and severe below ground water level due to the low resistivity for the soils.

Table 06: Comparison of In-Situ ERT and Chemical Resistivity		
Location ID	In-situ ERT (Ω m)	Chemical resistivity (Ω m)
TP01	2.8 - 34.8	7.04
TP05	1.5 - 6.5	15.3
TP08	2.5 - 52.1	8.06
TP10	1.3 - 30.5	7.19
TP13	2.1 - 532	14.80
TP14	0.8 - 24.6	16.30

5 EARTHQUAKE SITE FACTOR

Using AS1170.4 – 2007 “Structural Design Actions Part 4: Earthquake Actions, Section 3 – Site Hazard”, and based upon the ground conditions encountered, it is recommended that the project adopts an earthquake site hazard factor of 0.04.

The subsurface conditions for structures founded on all units will be classified as Class C_e.

We caution that AS1170.4 – 2007 is not intended for the consideration of structures with more than 5s first mode period and transmission line towers (e.g., structures similar to wind turbine structures),

6 CONSTRUCTION CONSIDERATIONS

6.1 Excavatability

The assessment of likely excavation characteristics has been based mainly on the observation of test pit excavation with a 14-tonne excavator and auger drilling resistance with a truck mounted drill rig as well as in situ tests conducted during drilling. Soil strength materials were generally encountered across the site to the extents of the drilling depths as noted on the engineering logs. The soils at the tested locations are assessed to be excavatable using conventional earthmoving equipment such as backhoes and excavators up to approximately 3.5m.

Below this level, excavatability is expected to be slower with larger equipment required to achieve suitable excavation productivity.

6.2 Site preparation and earthworks

Earthworks construction should be undertaken in general accordance with AS3798-2007 ‘*Guidelines on Earthworks for Commercial and Residential Developments*’. Earthworks operations are likely to be limited to the construction of access tracks, wind turbine generator foundations, ground slabs, and trenching for cabling operations.

Vehicle/plant movement across ‘wet’ subgrades during and following inclement weather would be expected to result in significant damage to the exposed subgrade. Due to the potential for poor trafficability across the site during wet weather, the placement of a nominal 300 – 500mm thick granular layer should be allowed for, to enable the movement of construction machinery.

General guidelines relating to earthworks for access roads and foundations include:

- Remove any loose surface soils and vegetation;
- Moisture condition the exposed subgrade as necessary;
- Proof roll the exposed surface using a minimum 12-tonne pad foot roller. The surface should be rolled a minimum of 6 times, with the last two passes carefully observed by a Geotechnical Engineer (**HOLD POINT**);
- Any wet, soft, loose or heaving materials identified during proof rolling should be removed as directed by the geotechnical engineer;
- Fill, where required, should be placed in layers not exceeding 250mm loose thickness and be compacted to the required standard and level before placing the next layer. Thinner layers may be required for smaller compaction equipment. The recommended compaction levels would be:
 - Pavement Subgrades – 95% standard minimum dry density ratio at $\pm 3\%$ optimum moisture content;
 - Pavement Materials – 98% standard minimum dry density ratio; and

- Beneath Structures – 100% standard minimum dry density ratio at $\pm 2\%$ optimum moisture content.

Filling for future structures should be undertaken under Level 1 Geotechnical Inspection and Testing Authority (GITA) regime in accordance with AS3798-2007.

6.3 Batter slopes

Temporary batter slopes or benching will be required during excavation of footings and trenches generally for safety reasons. Permanent batter slopes may be required elsewhere on site for access track construction, hardstand or substation platforms. The recommendation for batter slopes will be dependent on numerous factors such as construction methodology and level of construction supervision and monitoring. The recommendations provided below are of a general nature.

Temporary excavations within soil strength materials should be battered or benched at an angle of not greater than 1V:1H. The proximity of stockpiles, cranes and delivery vehicles to the footing excavation would also need to be considered in the design of temporary batter slopes.

Batters constructed from engineered fill should have a maximum batter angle of 1V:2H.

Batter slopes for large cuts and/or fills will require careful consideration, given the nature of the area.

Due to variability of materials observed across the site, it is recommended that inspection by geotechnical engineer during construction is undertaken. The above advice is limited to cut and fills with a total height of around 3m.

6.4 Re-use of site won material

In general, material reused as engineered fill should be free of topsoil, organics or other deleterious material and should have a maximum particle size of less than 75mm. Granular materials should be well graded.

Topsoil, silt and material which breaks down to silt during compaction are unsuitable for reuse as engineered fill but may be suitable for landscaping purposes.

The following pavement and fill materials are expected to be required for construction:

- Wearing Course for unbound pavements – Austroads Guide to Pavement Technology Part 6: Unsealed Roads;
- Base and Subbase - Austroads Guide to Pavement Technology Part 4a: Granular Base and Subbase Materials;
- General fill.

Based on our site investigation, only general fill is likely to be won from project excavations and granular pavement materials will likely require importing to site.

6.5 Hardstands and access tracks

It is anticipated that filling will be required to form site access roads. The selection of access roads should take into consideration the extent of cut and fill required and, where possible, minimise the volume of earthworks.

Based on our site investigation and site observations, suitable structural fill or pavement materials are unlikely to be won from site excavations. It is likely that suitable pavement base course materials will require importing. Materials required for pavements would require a reasonably well-graded material with a maximum particle size of around 75mm and a soaked CBR exceeding about 25%. A product with a maximum particle size of 40mm or less should be considered for the final running surface.

DCP testing conducted at the test pit locations indicated a wide variety of *in situ* CBR values within 0.5m of the existing surface levels (ranging from 1% to more than 10%), confirming the variability of the ground conditions across the site. Laboratory testing of soaked CBR also suggests a wide range of subgrade strength is likely.

A preliminary subgrade design CBR of 3% is recommended, acknowledging that some removal and replacement may be required in places where the soaked CBR does not meet the assumed 3% design value.

Regular maintenance and repairs will likely be required along unsealed access roads during the project construction phase when heavy construction traffic is expected to degrade the pavement surface. Following construction, the access roads are likely only to be trafficked by light vehicles and the occasional heavy vehicle/plant for maintenance.

For preliminary costing purposes, a 300mm to 400mm thick access track pavement is likely to be suitable for typical rubber tyred wind farm traffic loads and crane tracking routes. Careful consideration of the drainage and track gradients as well as the size of the plant using the access tracks should be undertaken as part of the final access track design thickness.

We recommend that the procedure for preparing the subgrade beneath access tracks and hardstands comprise the following:

- Strip existing surface of topsoil and soil containing organic matter (typically less than 400mm in thickness);
- Moisture condition the stripped surface as required and compact using a roller to achieve a dry density ratio exceeding 95% relative to standard compaction to a depth of 300 mm. Any soft, wet or weak areas exposed during this process that do not respond to additional compaction should be excavated and replaced with engineered fill;
- Where required, place general fill to the underside of the access track/hardstand pavement in loose 200mm thick layers and compact to a minimum dry density ratio of 95% relative to standard compaction; and
- A pavement profile should then be constructed above the prepared subgrade.

Close attention should be paid to the drainage design of the access tracks and areas adjacent to the wind turbine foundation. The access tracks should be constructed to shed water at regular intervals and all low points, as well as to limit the potential for run-off to form in concentrated flows. Erosion protection such as vegetation or silt fences may be required to limit erosion and disturbance of near surface soils.

The size of cranes proposed, and the magnitude of the likely loads may change but are likely to require a hardstand bearing capacity in the order of 200 – 250 kPa. For preliminary planning purposes and typical cranes for WTG structures, we would expect the pad to consist of a 500mm to 750mm thick 20mm nominal size gravel layer (such as DGB20 to RMS specification 3051). The pad thickness will depend upon lifting loads and the size of bog mats used on site.

7 CLOSURE

All information given in this report is based on the ground conditions encountered during the limited discrete investigations and on results of field and laboratory tests as part of the commissioned ground investigation.

To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, can it be considered that these findings represent the actual state of the ground conditions away from our investigation locations. Conditions may exist on site, however, which have not been considered; these could include unpredictable soil strata and water conditions between or below the boreholes. It should also be noted that groundwater levels will vary due to seasonal or other effects and may at times differ from those recorded within the ground investigation.

This report has been prepared for use by Windlab Developments in relation to the Burrawong Wind Farm Project in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. Use of this report by parties other than Windlab Developments and their respective consultants and contractors is at their risk as it may not contain sufficient information for any other purposes.

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