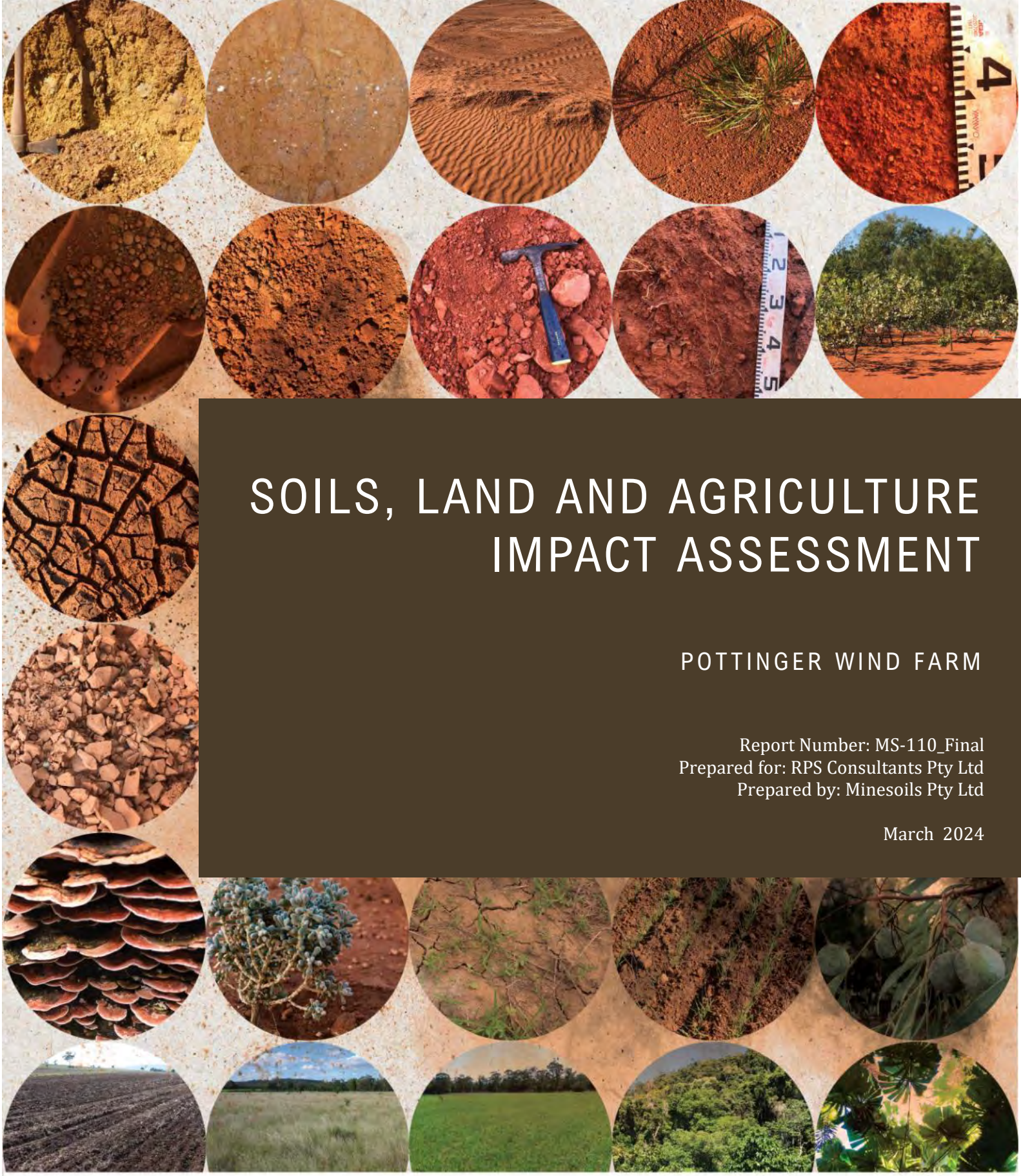

SOILS, LAND AND AGRICULTURE IMPACT ASSESSMENT

POTTINGER WIND FARM

Report Number: MS-110_Final
Prepared for: RPS Consultants Pty Ltd
Prepared by: Minesoils Pty Ltd

March 2024

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DOCUMENT CONTROL

Reference	Date	Prepared by	Approved
MS-110_ Draft 1	31 January 2024	Matt Hemingway	Clayton Richards
MS-110_ Draft 2	13 March 2024	Matt Hemingway	Clayton Richards
MS-110_ Final	19 March 2024	Matt Hemingway	Clayton Richards

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1. INTRODUCTION

1.1 OVERVIEW

Minesoils Pty Ltd (Minesoils) was engaged by RPS Consultants Pty Ltd (RPS) to conduct a Soil, Land and Agricultural Impact Assessment of the proposed Pottinger Wind Farm (the Project) located in the Riverina region of New South Wales. The baseline soil and agriculture resources are detailed within this report. The impacts on these resources and agricultural enterprises from the proposed construction, operation and decommissioning phases of the Project are addressed in this report in accordance with relevant regulatory requirements and guidelines.

This report supports a State Significant Development (SDD) Development Consent approval under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (SSD-59235464), as part of the Environmental Impact Statement (EIS) for the Project.

Secretary's Environmental Assessment Requirements (SEAR's) have been issued for the Applicant to address. The objective of this report is address the following items included in the SEAR's for the Project.

Table 1: SEARs addressed in this report

SEARs Item	Section Addressed
A soil survey to determine the soil characteristics and consider the potential for erosion to occur.	3
Assessment of impact on agricultural resources and agricultural production on the site and region	5
Completion of a Land Use Conflict Risk Assessment in accordance with the NSW Department of Industry's Land Use Conflict Risk Assessment Guide (NSW DPI, 2011).	4

1.2 PROJECT DESCRIPTION

The Project includes the construction, operation and decommissioning of a 1.3 GW wind farm, electrical infrastructure, other infrastructure and ancillary activities generally including the following components:

- Up to 247 Wind Turbine Generators (WTGs) of which each has a tip height of up to 280 m and capacity up to 8 MW;
- Electrical reticulation network:
  - Up to six substations and 13 transformers;
    - One BESS 33/330kV substation with three transformers;
    - Internal 33 kV, 66 kV, 132 kV, or 330 kV electrical reticulation network and infrastructure connecting to the 330 kV Project EnergyConnect line via a switchyard and collector station;
  - Approximately 500 MW / 2 gigawatt hours (GWh) Battery Energy Storage (BESS);
- Other temporary and permanent infrastructure including:
  - Operations and Maintenance (O&M) facility and infrastructure including site office, control room, storage facilities, car parking and fencing;
  - Accommodation facilities;
  - Construction and operational compounds;

- Hardstands for WTGs and other infrastructure;
- Internal access tracks and road turning head connecting Project infrastructure;
- Meteorological masts; and
- Concrete batching plants, crushing facilities, gravel / borrow pits, construction laydown areas;

- Ancillary activities including sourcing of materials and equipment for construction; sourcing of water for construction; subdivision and boundary adjustments, visual screening and associated ancillary works;
- Access road use via four locations and Project-required upgrades:

- Project Area access: via the Cobb Highway from Jerilderie Road in the north east, from Wagman Road in the west, from East West Road in the south and West Burrabogie Road in the west, as well as emergency access; and
- Wind farm major components transported via Port Adelaide;
    - Operational workforce of up to 50 Full Time Equivalent (FTE) and construction up to 900 FTE; and
    - Construction generally within standard construction hours and operations 24 hours per day 7 days per week.

If it is determined to decommission the wind farm, then the wind turbines would be dismantled, and their respective components removed from site. There are provisions in the land and lease agreements with the site landowners for rehabilitation of the site after decommissioning. All impacted land would then be returned to agricultural land use.

1.3 PROJECT AREA

The Project is located approximately 60 km south of Hay and 110 km north of Deniliquin, located within the Hay Local Government Area (LGA) and the Edward River LGA (refer **Figure 1**). The Project Area covers a total area of approximately 26,400 ha. The Project Disturbance Footprint covers approximately 1,066 ha, with a broader Survey Area subject to assessment of 8,703 ha, as shown on **Figure 2**.

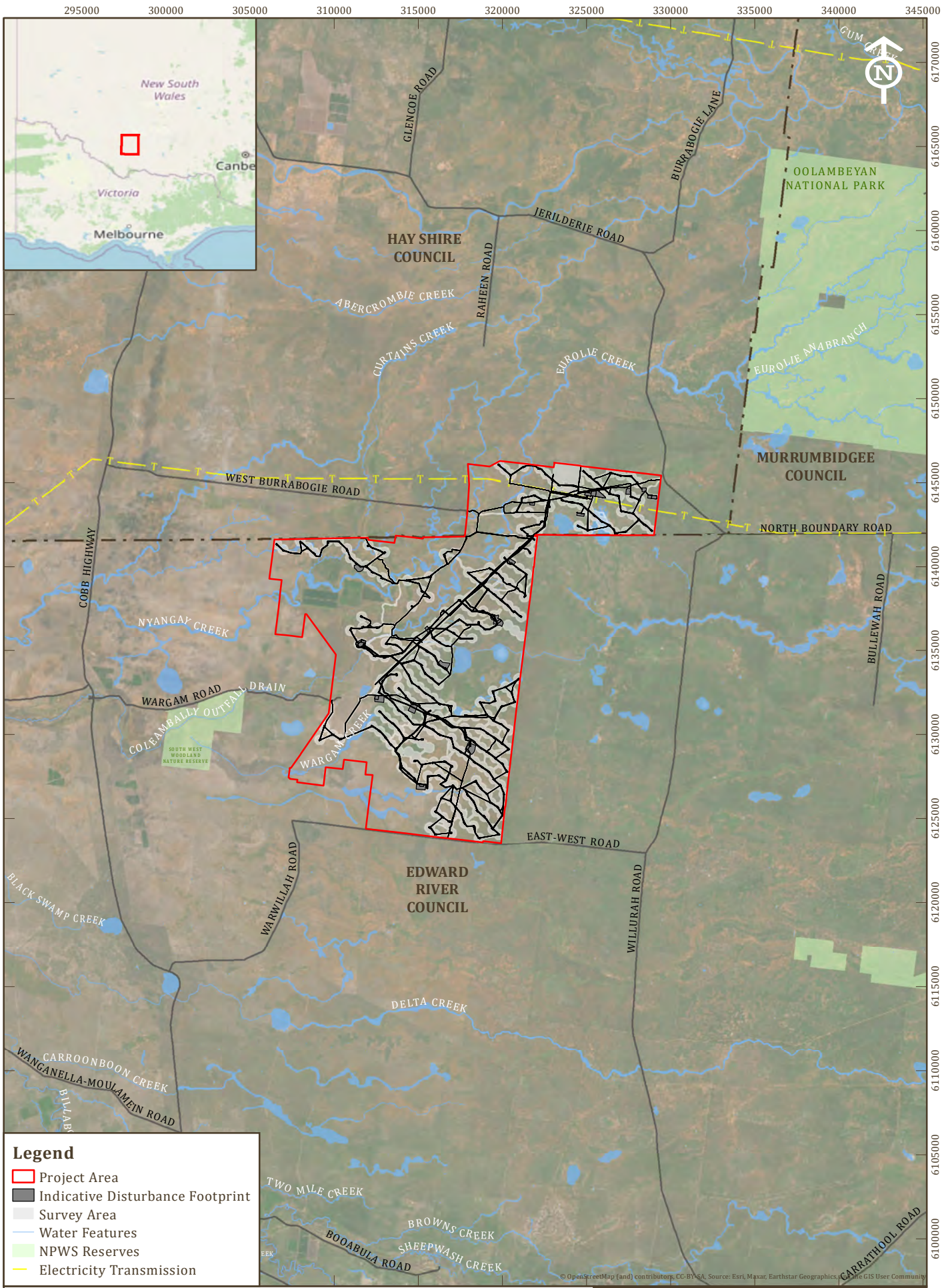
The Project Area is subject to agricultural use as a large-scale sheep breeding and cattle grazing property containing native grazing pastures, with some irrigated cropping areas.

The Project Area is within the plains country and sits between the Murray River to the south and Murrumbidgee River to the north. The surrounding locality is characterised by rural land uses. The Project Area and locality have historically been utilised for agricultural practices primarily consisting of livestock grazing, cropping, and some horticulture, with evidence of broad native vegetation modification resulting from extensive clearing and agricultural land use.

The Project is entirely within the NSW South-West Renewable Energy Zone (REZ).

1.4 ASSESSMENT APPROACH

In lieu of guidelines that relate to the assessment of soil, land and agriculture for wind farm projects, this assessment has generally been undertaken in accordance with the *Large-Scale Solar Energy Guidelines* (LSSE Guidelines) (NSW DPIE, 2022) which includes requirements to undertake a soil survey and verify land and soil capability (LSC) in accordance with *Land and Soil Capability Assessment Scheme* (LSC Scheme) (EOH 2012). The results of the site verification, as presented in Section 3.2, determined the level of agriculture impact assessment as Level 3 – Detailed, as per the LSSE Guidelines. The assessment requirement pathway adopted for this assessment from the LSSE Guidelines is presented in **Figure 3**. The requirements for this level of assessment, and where these items are addressed in this report, are presented in **Table 2**.



GDA2020 MGA Zone 55

MINESOILS
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0 1 2 4 Km

Scale 1:300000 at A4

Pottinger Solar Farm
Project Locality

FIGURE 1

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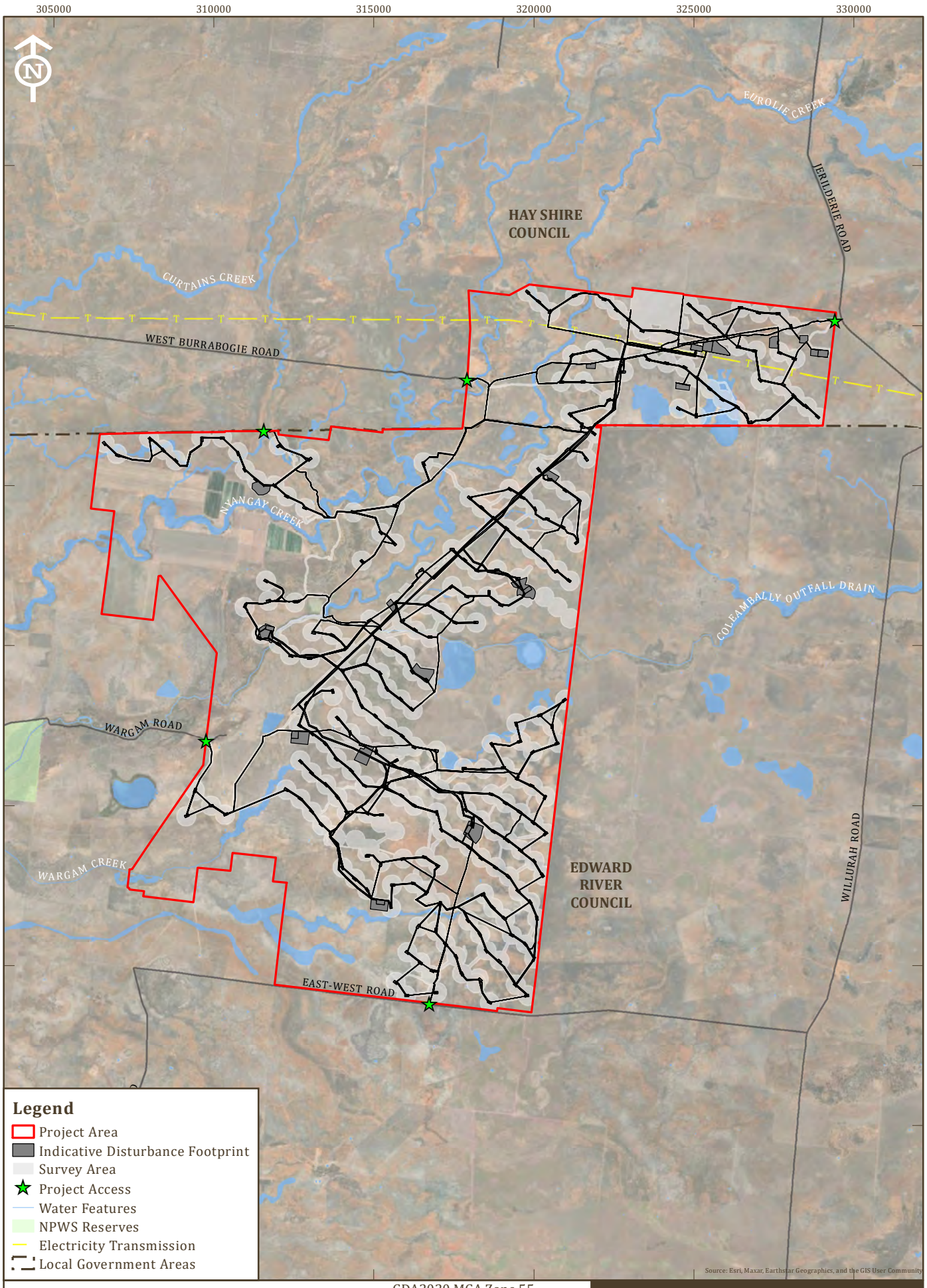

GDA2020 MGA Zone 55

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0 1 2 4 Kilometers

Scale 1:157015.344

Project Area and Indictive Disturbance Footprint

FIGURE 2

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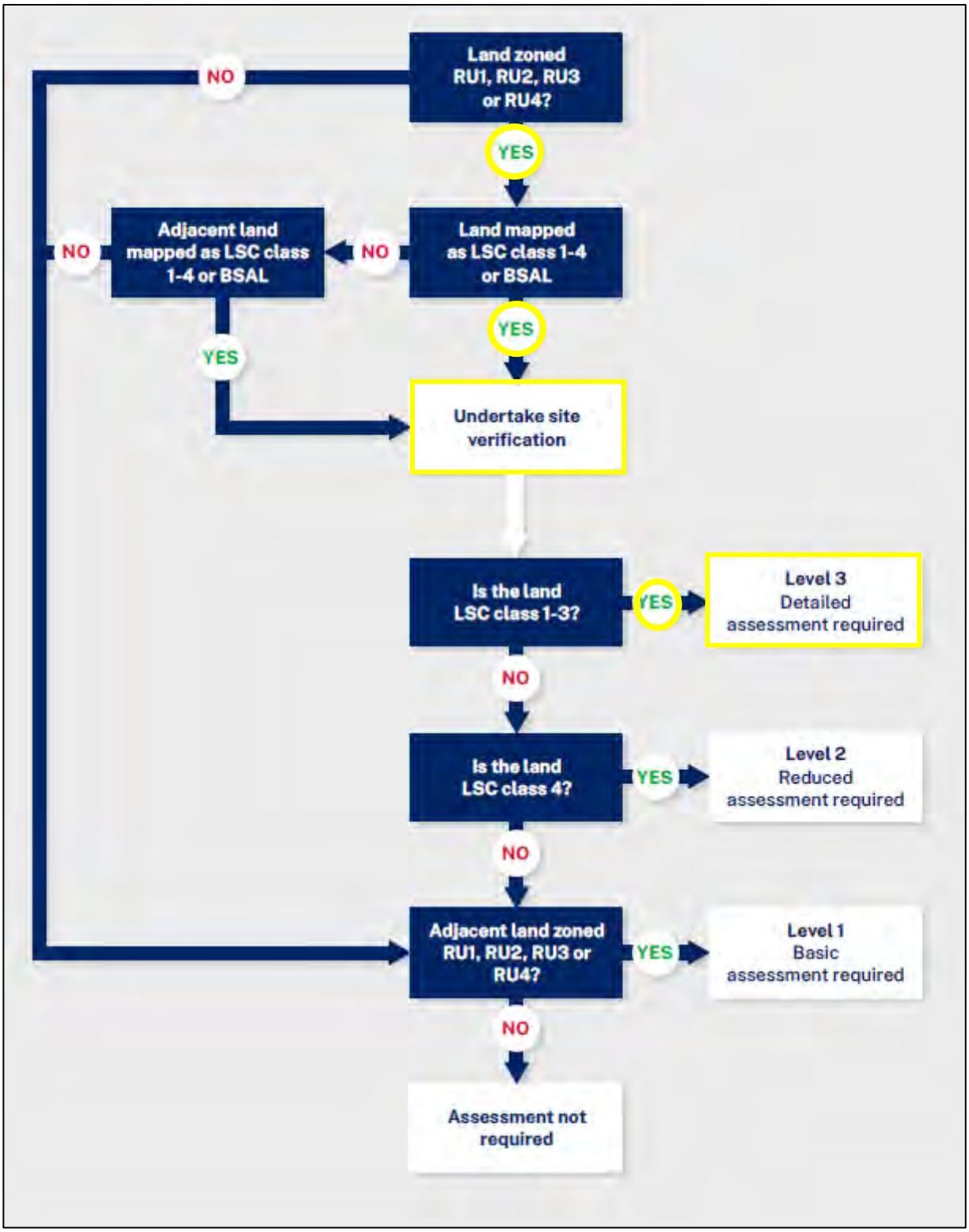
Figure 3. Adopted Agricultural Assessment Pathway



(NSW DPIE, 2022)

Table 2: Adopted Requirements of 'Level 3 - Detailed' Assessment and Section Addressed

Assessment	Content and form	Section Addressed
Project description Describe the nature, location, intensity and duration of the project and include a map of the Project Area.	• project description • areas of the site that would be disturbed or temporarily removed from agricultural use • location	**1**
Regional context Describe the regional context.	• zoning of the Project Area • climate and rainfall • regional landform • regional land use including any significant agricultural industries and/or infrastructure	**2**
Site characteristics and land use description Describe the nature and location of agricultural land with the potential to be impacted by the development. Describe the current agricultural status and productivity of the proposed development area and surrounding locality including the land capability as per Office of Environment and Heritage's (OEH) Land and Soil Capability Assessment Scheme.	• describe the land subject to the Project Area • describe existing agricultural land uses (i.e. orchards, vineyards, breeding paddocks, intensive livestock areas) • describe the history of agricultural practices on the Project Area • identify soil type, fertility, land and soil capability • provide a map showing the verified LSC class of the Project Area • provide a map showing topography of the site • describe the agricultural productivity of the site	**3**
LUCRA assessment Conduct an assessment of potential land use conflicts, including completion of an assessment in accordance with the Department of Industries' Land Use Conflict Risk Assessment Guide.	• land use compatibility and conflicts • discuss compatibility of the development with the existing land uses on the site and adjacent land (e.g. aerial spraying, dust generation and biosecurity risk) during operation and after decommissioning, with reference to the zoning provisions applying to the land	**4** **(Appendix 1)**
Impacts on agricultural land Identify and describe the nature, duration and consequence of any potential impacts on agricultural land subject to the Project Area and in the wider region.	• describe project impacts on identified agricultural lands, including but not limited to, potential weeds, pests, dust, bushfire, livestock, crop production • consider impacts to the agricultural land of the site • consider project potential to temporarily and/or permanently remove agricultural land and/or fragment or displace existing agricultural industries • consider cumulative impacts of multiple solar energy projects on agriculture in the region • a detailed assessment of whether the project would significantly impact the local or regional agricultural industry, including production and supply chains	**5**
Mitigation strategies Outline strategies which may be adopted to mitigate potential impacts on agricultural land and minimise land use conflict.	• outline and consider strategies to mitigate project impacts on agricultural land • consider co-location with existing agricultural practices and investigate feasibility of agrisolar where it would result in a meaningful benefit	**6**

2 REGIONAL CONTEXT

2.1 ZONING

The Project Area is zoned as Rural Use 1 (RU1) – Primary Production under the *Hay Local Environmental Plan 2011* (Hay Shire Council, 2011) and the *Conargo LEP 2013* (Edward River Council, 2013) (refer **Figure 4**).

The objectives of the RU1 zone for both LEPs are as follows:

- 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 zone.

Development for the purpose of electricity generation is not specified in item 2 or 3 of the RU1 Primary Production Land Use Table under Part 2 of both the LEPs, therefore the development is 'Prohibited' according to item 4. However, the provisions of the State Environmental Planning Policy (Transport and Infrastructure) 2021, override the LEPs, allowing the Project to be undertaken with consent under clause 2.36 (1(b)).

2.2 CLIMATE AND RAINFALL

The Bureau of Meteorology (BOM) (BOM, 2023) classify the Riverina in the Hot Dry Zone (with cooler winters) climatic zone. This zone can be very hot in the summer months while in the winter, nights can be considerably cold with cool to mild days.

Annual rainfall in the Riverina has remained relatively stable over the past 30 years, decreasing by around 20 mm(4%) from about 520 mm to about 500 mm when compared to the previous 30 years (Bureau of Meteorology and the CSIRO, 2019).

Rainfall reliability maps for Riverina over the past 30 years show winter rainfall has been moderately reliable across the region, usually changing by about 50 mm from year to year. This is in contrast to spring and summer rainfall, which have been less reliable. Autumn rainfall has been unreliable across the entire region.

The Riverina region experiences frost risks to agriculture, which tend to occur through dry winter and spring periods, when soil moisture is low, and cloud cover infrequent.

The closest BOM weather station to the Project Area at Hay Airport (Site No. 075019), approximately 60km north (BOM, 2023). The annual average rainfall is 354.2 mm, falling throughout the year over approximately 46 rain days, with the average highest rainfall in the month of October and the lowest in the month of July.

The annual average maximum temperature recorded at the site is 25.1°C and the annual average minimum temperature is 10.2°C. The highest average maximum temperature of 35.0°C is recorded in January, while the lowest average maximum temperature of 18.2°C is recorded in July and August.

2.3 REGIONAL LANDFORM

2.3.1 REGIONAL LANDFORM CHARACTERISTICS

The Project Area is located on the Riverine Plain, the eastern geomorphic subdivision of the Murray Basin that encompasses an area of 77,000 square kilometres. The Riverine Plain is characterised by almost flat topography with extremely low gradients dominated by the open plains of native grasslands and semi-arid shrublands, which is traversed by several major rivers and their tributaries that flow from the east and south. The Murray Basin is a large low lying intracratonic basin containing Cainozoic unconsolidated sediments and sedimentary rocks.

The three main rivers of the Riverina Murray region are the Murray, Murrumbidgee and Lachlan Rivers, all fed by numerous creeks and tributaries. The three river systems are part of the greater Murray-Darling Basin.

The underlying geology of the Project Area consists of Shepparton Formation which formed in a fluvio-lacustrine environment between the Pleistocene and Holocene with the dominant lithology consisting of alluvial floodplain deposits (refer **Figure 5**). The Shepparton Formation consists of unconsolidated to poorly consolidated variegated and mottled clay, silt, silty clay, with intercalated lenses of fine to coarse sand and gravel. The formation has been partially modified by pedogenesis and groundwater table fluctuation.

Soil features are of riverine and aeolian origin – that is, deposited by water and wind geomorphological processes. Riverine features of the plains are, especially in the great alluvial fans and fluvial complexes, but minutiae in a broad natural system of river courses changing with time, and are associated with complex of deposits which vary rapidly both laterally and in depth. The most common aeolian landforms are those which involve accumulation, especially of sandy material, occurring as dunes, lunettes or sand-ridges. In addition, deflationary landforms are present, represented by the occurrences of sheet erosion known as scalds, and the occurrence of dry lake basins (Butler, et al 1973).

2.4 REGIONAL LAND USE

2.4.1 AGRICULTURAL LAND USE

The Riverina Murray region covers approximately 115,000 square kilometres, or 14% of NSW (DPI 2018), including twenty local government areas. The variety of landscapes in the wider Riverina Murray Agricultural region supports a diverse range of agricultural industries that all place a high value on the region's reliable water supplies.

The region has a long and favourable pastoral history in spite of its low stocking rate and its susceptibility to drought and scald (Butler, et al, 1973).

Europeans arrived in the region as early as 1830, with Moulamein (approximately 60km west of the Project Area) being the oldest town in the Riverina (Sydney Morning Herald, 2008). Moulamein's early importance was as a crossroad where wool from western NSW was brought to the local port where the paddle-steamers plying the Edward River could take the cargo downstream.

Following settlement, wool growing quickly became the major local industry. Dominated for over 100 years by squatters and their flocks on immense holdings of land, the introduction of irrigation and the creation of soldier settlement blocks in the 1940s broadened the agricultural industry, increasing the population.

Today agriculture in the region includes beef grazing and temperate fruit (apples, pears, cherries) production in the east, through broad-acre cropping (cereal, oilseed and pulses), beef and sheep grazing, intensive poultry and pigs, irrigation cropping (cotton, rice, maize), to rangeland grazing in the west.

The properties in the south-west of the Riverina region (Murray River LGA, Edward River LGA) are partially influenced by irrigation, but generally contain rangeland. Here, farm sizes are in the 3,000ha to 4,000ha range. In the far north-west of the region, where the Project Area lies (Hay LGA) properties are largest for the Riverina region and typically greater than 7,00ha, reflecting use for large scale grazing enterprises (DPI, 2018).

At the scale of the Edward River and Hay Shire LGAs (within which the Project lies), as of the last agricultural census of 2020 - 2021 (ABS, 2022a) 826,618ha of land is subject to agricultural activity for the Edward River LGA and 1,021,167 ha of land is subject to agricultural activity for the Hay Shire LGA. The area of land used by agricultural type within the each is presented in **Table 3**, which shows grazing of livestock is the dominant land use for both LGAs, accounting for 74% to 98% of area subject to agricultural land use.

Table 3: Edward River and Hay Shire LGAs Agricultural Land Use by Type 2020 - 2021

Agricultural Land Use	Edward River LGA		Hay Shire LGA	
	ha	%	ha	%
Grazing	614,305	74	1,000,468	98
Cropping	207,145	25	20,242	2
Forestry	4,908	1	375	0
Other	261	0	82	0
Total	826,618	100	1,021,167	100

2.4.2 AGRICULTURAL ENTERPRISES

At a scale of the locality, agricultural enterprises and land use surrounding the Project Area largely consist of livestock grazing on native pastures. However, wheat, rice, barley, and canola broadacre cropping enterprises, as well as vegetable and citrus and orchard fruit occur over large areas subject to cropping throughout the wider Edward River LGA, and to a more limited extent, the Hay Shire LGA.

The gross value of agricultural enterprises within the Edward River LGA and Hay Shire LGA for 2020-2021 is $326 million and $75 million respectively, as shown in **Table 4**(ABS, 2022b). The Edward River LGA has a higher overall agricultural commodity value due to the strength of cropping activities undertaken, which make up 64% of the agricultural commodity value of the LGA. Cropping accounts for approximately 43 % of the total gross value of agriculture for the Hay Shire LGA. Livestock for slaughter are represented in the commodity value more so in the Hay Shire LGA (40%) than the Edward River LGA (23%).

Within the category of livestock slaughtered, sheep and lambs dominate in both LGAs followed by cattle and calves, as shown in **Table 5** (ABS, 2022b). Livestock grazing enterprises are represented by the following estimates from the latest agricultural census (2020 – 2021) (ABS, 2022a):

- 567,453 sheep and lambs and 43,843 head of cattle over 294 livestock grazing business enterprises in the Edward River LGA; and
- 383,620 sheep and lambs and 19,315 head of cattle over 73 livestock grazing business enterprises in the Hay Shire LGA.

For crops, broadacre crops consisting largely of wheat, rice and barley for grain, with broadacre cropping dominating the of the gross value for agriculture in both LGAs, as shown in **Table 6** (ABS, 2022b). Milk dominates livestock products with 56% of gross value for the Murray River LGA and wool dominates livestock products with 100% of gross value for the Hay Shire LGA, as shown in **Table 7** (ABS, 2022b).

Table 4: Edward River and Hay Shire LGAs Agricultural Commodity Gross Value by Type 2020 - 2021

Agricultural Commodity	Edward River LGA		Hay Shire LGA	
	$	%	$	%
Crops	208,862,940	64	29,630,322	40
Livestock slaughtered	73,501,523	23	32,029,787	43
Livestock products	43,930,968	13	13,067,769	17
Total	326,295,431	100	74,727,878	100

Table 5: Edward River and Hay Shire LGAs Livestock Slaughtered Gross Value by Type 2020 – 2021

Livestock Type	Edward River LGA		Hay Shire LGA	
	$	%	$	%
Sheep and lambs	29,330,830	40	20,019,266	63
Cattle and calves	27,152,271	37	11,960,258	37
Pigs	16,959,387	23	-	-
Poultry	34,690	<1	-	-
Other	24,346	<1	50,263	0
Total	73,501,523	100	29,630,322	100

Table 6: Edward River and Hay Shire LGAs Crop Gross Value by Type 2020 – 2021

Crop Type	Edward River LGA		Hay Shire LGA	
	$	%	$	%
Broadacre crops	132,763,664	64	27,839,079	94
Vegetables	35,965,216	17	1,079,480	4
Hay	17,900,691	9	671,957	2
Fruit and nuts	13,980,690	7	39,806	<1
Grapes	7,878,667	4	0	0
Total	208,862,940	0	29,630,322	100

Table 7: Edward River and Hay Shire LGAs Livestock Products Gross Value by Type 2020 – 2021

Livestock Product	Edward River LGA		Hay Shire LGA	
	$	%	$	%
Milk	24,494,827	56	0	0
Wool	19,329,906	44	13,067,769	100
Eggs	106,235	<1	0	0
Total	43,173,162	100	13,067,769	100

2.4.3 REGIONAL AGRICULTURAL INFRASTRUCTURE

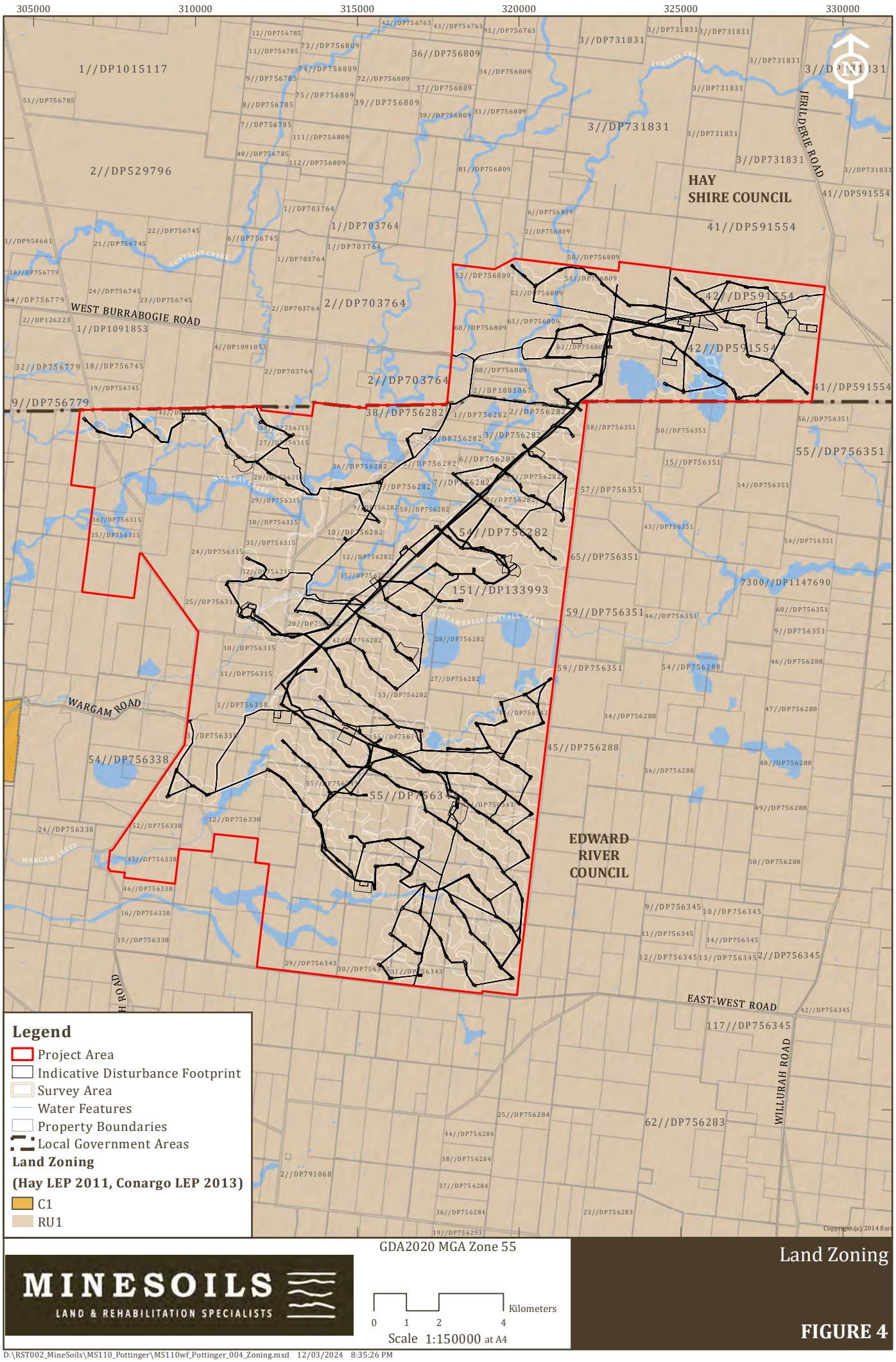
The key infrastructure item assisting agricultural market access and cost of production is the transport network servicing the Riverina region. Underlining the importance of this issue, total freight costs from farm to port can be as much as 30% of the value of the crop being marketed depending on Australian and world commodity prices in a given season. The Riverina Murray is a key transport hub for the distribution of goods across south-eastern Australia with rail freight, roads and airport links within reach of major markets. Situated to the south-west of the ACT and bordering Victoria, the region has extensive commercial links to the ACT and Victoria, as well as Sydney and Adelaide.

The main transport route for the Project locality is the Cobb Highway which connects to the Sturt Highway and Riverina Highway, with several minor roads transecting the locality (e.g., Jerilderie Road). The Sturt Highway is used for intra-regional transportation consisting of agricultural trucks, freight trucks and local farming traffic as well as low levels of tourist traffic, between the towns of Hay and Balranald. The highway links Adelaide with the Hume Highway 20km past Wagga Wagga.

In proximity to the Project Area, the agricultural service centres of Hay (60km north), Darlington Point (80 km north east) and Deniliquin (110 km south) allow access to businesses providing agricultural equipment and supplies, including animal fencing, animal vaccinations, livestock ID, stock supplements, seed, fertiliser and crop protection.

Wagga Wagga is the focal centre of the Riverina region's beef and sheep industry and is the location of the Wagga Wagga Livestock Marketing Centre (LMC), one of the key livestock exchange facilities in NSW with a reputation as the largest selling centre for sheep in Australia. In the financial year of 2020/2021, the LMC sold 2,005,091 sheep, representing 30% of the sheep sold in NSW, and 107,274 head of cattle, representing 11% of the cattle sold in NSW (MLA, 2022).

Other infrastructure critical to agricultural production includes energy needs (gas and electricity), telecommunications services, irrigation water infrastructure and urban water and wastewater services. General agricultural improvements such as stock fences, stock yards, shedding, dams and access tracks are widespread throughout the Project locality which reflects the historical and current development of the local lands for livestock grazing.



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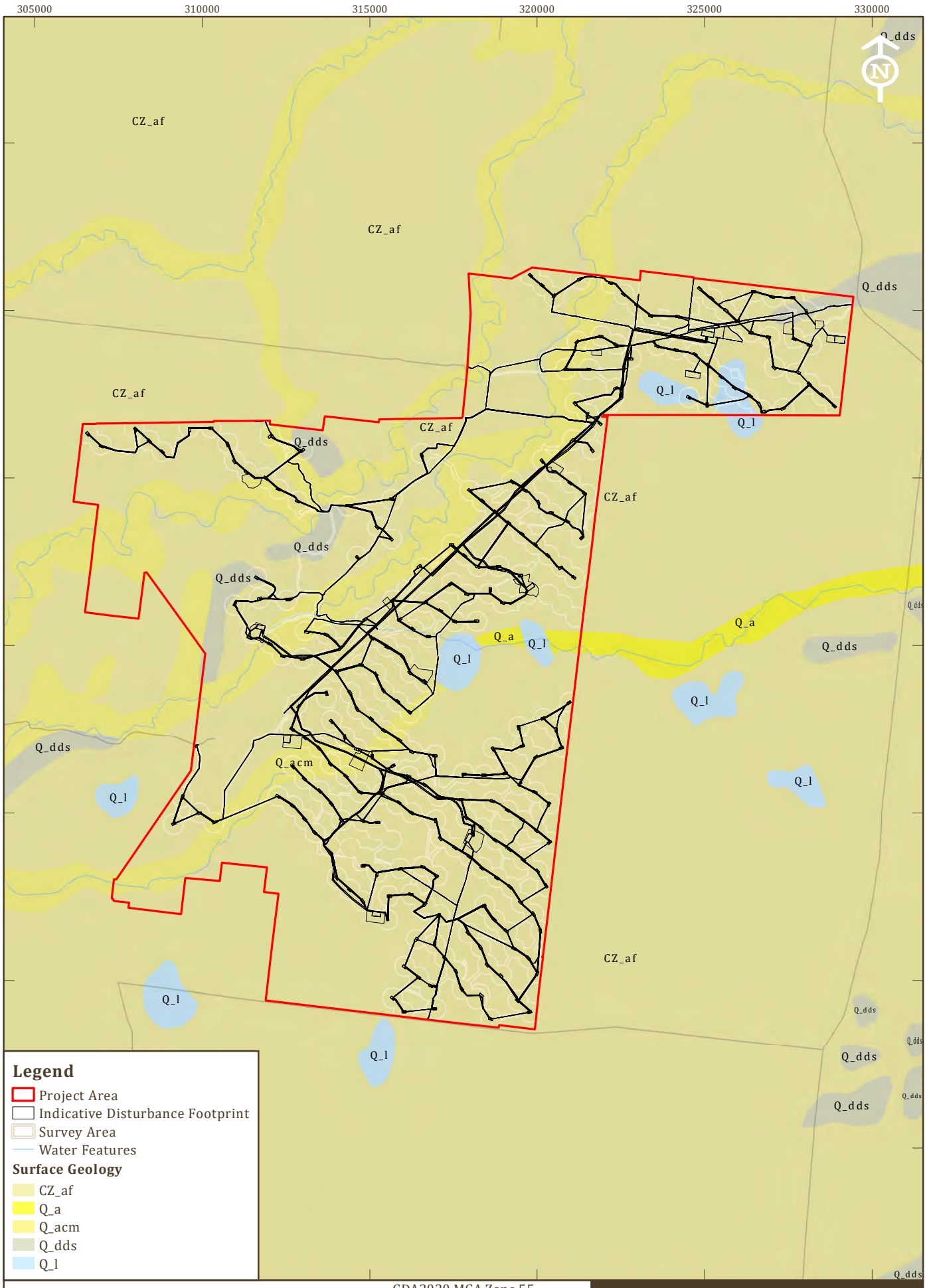

GDA2020 MGA Zone 55

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0 1 2 4 Kilometers

Scale 1:150000 at A4

Surface Geology

FIGURE 5

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3 SITE CHARACTERISTICS AND LAND USE

3.1 SITE CHARACTERISTICS

3.1.1 LANDSCAPE

A site inspection was undertaken by Minesoils in November 2023. The Project Area was determined to be a generally stable, largely treeless, open plain landform with 90 - 100% surface cover predominantly in the form of low shrubs and native pasture for grazing (**Plates 1**). Areas subject to cropping activity are also present, covering an area of approximately 1,000 ha (**Plate 2**), with these generally occurring outside the Disturbance Footprint.

The flat nature of the plains within which the Project Area lies is highlighted of **Figure 6**, which shows minimal elevation change (approximately 87 m Australian height Datum (AHD) at the south western border to 100 m AHD in the north, over a distance of approximately 25 km). The Project Area landscape is generally level, although contains a minor presence low rises and depressions, such as low sand dunes and drainage lines (refer **Figure 6**). Sand dunes are result of aeolian geomorphological processes known to be active within the locality (Butler et al 1973),

Several lakes and associated wetland ecosystems occur within the Project Area, with the largest up to 100 ha in size, as can be seen on **Figure 2** (**Plate 3**). There are several water courses within the Project Area. The main watercourses within the Project Area are:

- Nyangay Creek;
- Coleambally Outfall Drain; and
- Eurolie Creek (flows into Coleambally Outfall Drain).

The Project Area is located south of the Murrumbidgee River and north of an irrigation channel (Coleambally Outfall Drain). The watercourses within the Project Area are within the Murrumbidgee Catchment. Traces of irrigated cropping and pastures are also prevalent on the outer edges of the Project Area and are flat and open.

All water channels remain dry most of the time and exhibit vegetation characteristics that are unique to the Riverina region.

Minor areas of scald and bare earth were observed as a result of agriculture land use, saline soil conditions, and aeolian processes experienced on the plains. Several firebreaks, where groundcover had been removed to prevent the spread of grassfire, was also observed (**Plate 4**).

The landscape of the surrounding locality are generally consistent with the Project Area.

3.1.2 AGRICULTURAL LAND USE

The agricultural land within the Project Area is subject to livestock grazing as the primary land-use, supporting Merino sheep and Hereford cattle (**Plate 5**), which are grazed at a low stocking rate on mostly native pastures for breeding and fattening. Grazing of Merino sheep is the current and historically dominant livestock enterprise on the Disturbance Footprint, Project Area and broader locality.

Livestock are watered through a series of surface dams (**Plate 6**), which are filled with pumped irrigated water. In addition, concrete tanks, troughs and trough pipes were observed.

The Project Area is not subject to fertiliser application, and there is minimal ongoing use of herbicides. General agricultural improvements are present, including stock fences and gates, stock yards, livestock shedding (**Plate 7**) and unsealed access tracks.

Irrigation infrastructure including irrigation channels and pipework (**Plate 8**), irrigation booms (**Plate 9**) and a pump motor house with fuel stores (**Plate 10**) were observed within to the Project Area, servicing the more

intensive cropping and grazing activity on improved pastures and/or increased stocking rates being undertaken outside of the Disturbance Footprint.

At the time of inspection, neighbouring properties in the immediate vicinity were observed to be used for livestock both grazing and irrigation agriculture. Similar agricultural improvements (e.g. irrigation channels, travelling irrigators, cattle grids, stock yards, stock fences, dams and existing access tracks) are widespread throughout the locality which reflects the historical and current development of the local lands for grazing and cropping land uses. No sensitive agricultural activities such as intensive plant or livestock agriculture were observed to be being undertaken within the Project Area or its immediate surrounds.

Plate 1: The Project Area is dominated by open plain lands dominated by low shrubs and native pasture for grazing.

Plate 2: The Project Area contains areas of subject to cropping activity.

Plate 3: Several lakes and associated wetland ecosystems occur within the Project Area.

Plate 4: Fire breaks were observed during the site inspection.

Plate 5: Sheep are the dominant livestock within the Project Area but cattle are also present

Plate 6: Agricultural infrastructure within the Project Area includes load-out ramps.

Plate 7: Agricultural infrastructure within the Project Area includes shedding.

Plate 8: Agricultural infrastructure within the Project Area includes irrigation channels.

Plate 9: Agricultural infrastructure within the Project Area includes travelling irrigator.

Plate 10: Agricultural infrastructure within the Project Area pump motor house and fuel stores.

3.1.3 AGRICULTURAL PRODUCTIVITY

Agricultural productivity is subject to long term climate and rainfall variables, as well as changes in economic, social and policy frameworks, often at a scale well beyond the Project Area. There is no set agricultural productivity value for land under agricultural use.

The NSW Department of Primary Industries (DPI) (2023) *Gross Margin Budgets for Livestock* can be used to provide a broad estimation of the productivity of the land for grazing within the Disturbance Footprint. Based on modelling conservative enterprises of Merino ewes (20 micron) – Merino rams as a stocking rate of 1.5 DSE/ha, the estimated productivity of the Project Area is $75,105 per annum as summarised in **Table 8**.

An alternative way to estimate the productivity of the Disturbance Footprint is by analysing the information presented from the last agricultural census of 20220 – 2021 in Section 2.3 (ABS 2022a and 2022b). This information shows that within the Hay LGA 1,000,468 ha of land was used for grazing activities, of which 100% of the gross commodity value of livestock slaughtered and livestock products (totalling $45,097,556) can be attributed that area, resulting in a $/ha ratio of $45/ ha. For the Edward River LGA, 614,305 ha of land was used for grazing, of which the gross commodity value of 99% of livestock products and 77% of livestock for slaughter (totalling $99,769,335) can be attributed to that area, resulting in a $/ha ratio of $162/ ha. By applying these rates to the Project Area, the productivity is estimated to range between $47,970 and $155,636/ ha/ year, as shown in **Table 9**.

$146/ha/year is a conservative agricultural productivity value used for the purpose of this assessment. The actual agricultural productivity for the Project Area is expected to be closer to $45/ha/year.

Estimations of productivity are based on livestock grazing on pastures as irrigated cropping land covers a significantly smaller portion of land within the Project Area and falls outside of the Disturbance Footprint.

Table 8: Estimated Productivity of Agricultural Land within the Disturbance Footprint

Enterprise	Estimated Gross Margin ($/DSE/year)*	Stocking Rate (DSE)	Disturbance Footprint (ha)	Project Area Gross Margin ($/year)
Merino ewes (20 micron) – Merino rams	46.97	1.5	1,066	75,105

*Source: DPI, 2023

Table 9: Estimated Productivity of the Disturbance Footprint based on LGA Data

LGA	Estimated Gross Value in LGA ($/ha/year)	Disturbance Footprint (ha)	Estimated Productivity ($/year)
Hay Shire	45	1,066	47,970
Edwards River	146	1,066	155,636

3.2 SOIL SURVEY AND SITE VERIFICATION

3.2.1 EXISTING SOILS INFORMATION

The following section presents the NSW state government regional mapping data for soil types, inherent soil fertility and LSC as applied to the Project Area (NSW and Department of Planning, Industry and Environment, 2022).

Soil Types

The NSW regional soil mapping indicates the dominant soil types within the Project Area are Vertosols, Rudosols and Chromosols as per Australian Soil Classification (ASC) (Isbell, R. F.,2021) (refer **Figure 7**).

Vertosols are defined as soils with the following:

1. A clay field texture of 35% or more clay throughout the solum except for thin, surface crusty horizons 30 mm or less thick and
2. When dry, open cracks occur at some time in most years. These are at least 5 mm wide and extend upward to the surface or to the base of any plough layer, peaty horizon, self-mulching horizon, or thin, surface crusty horizon; and
3. Slickensides and/or lenticular peds occur at some depth in the solum.

Rudosols are defined as soils with little, if any, (rudimentary) pedologic organisation apart from (a) minimal development of an Al horizon or (b) the presence of less than 10% of B horizon material (including pedogenic carbonate) in fissures in the parent rock or saprolite. The soils are apedal or only weakly structured in the A1 horizon and show no pedological colour changes apart from the darkening of an A1 horizon. There is little or no texture or colour change with depth unless stratified or buried soils are present.

Chromosols are defined as soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2t horizon (or the major part of the entire B2t horizon if it is less than 0.2 m thick) is not sodic and not strongly acid. Soils with strongly subplastic upper B2t horizons are also included even if they are sodic.

Inherent Soil Fertility

NSW regional mapping provides an estimation of the inherent fertility of soils in NSW. It uses the best available soils and natural resource mapping developed for LSC dataset. The mapping describes soil fertility in NSW according to a five-class system: Low (1), Moderately Low (2), Moderate (3), Moderately High (4), High (5).

Soils with 'Low' fertility, due to their poor physical and/or chemical status, only support limited plant growth. Soils with 'Moderately Low' fertility can generally only support plants suited to grazing; large inputs of fertiliser are required to make the soil suitable for arable purposes. Soils with 'Moderate' fertility usually require fertilisers and/or have some physical restrictions for arable use. Soils with 'Moderately High' fertility have a high level of fertility in their virgin state which is significantly reduced after a few years of cultivation (Murphy *et al*., 2007).

The Project Area is dominated by soils with Moderate (3) fertility (refer **Figure 8**).

Land and Soil Capability

Land capability, as detailed in LSC Scheme, is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources. Failure to manage land in accordance with its capability risks degradation of resources both on- and off-site, leading to a decline in natural ecosystem values, agricultural productivity, and infrastructure functionality.

The scheme uses the biophysical features of the land and soil to derive detailed rating tables for a range of land and soil hazards. The scheme consists of eight classes, which classify the land based on the severity of long-term limitations. The LSC classes are described in **Table 10** and their definition has been based on two considerations:

- The biophysical features of the land to derive the LSC classes associated with various hazards.
- The management of the hazards including the level of inputs, expertise and investment required to manage the land sustainably.

The biophysical features of the land that are associated with various hazards are broadly soil, climate and landform, specifically noted as slope, landform position, acidity, salinity, drainage, rockiness; and climate. The eight hazards associated with these biophysical features that are assessed by the LSC scheme are:

1. Water erosion
2. Wind erosion
3. Soil structure decline
4. Soil acidification
5. Salinity
6. Water logging
7. Shallow soils and rockiness
8. Mass movement

Each hazard is assessed against set criteria tables, as described in the LSC Guideline, with each hazard ranked from 1 through to 8 with the overall ranking of the land determined by its most significant limitation.

Table 10: Land and Soil Capability Classification

Class	Land and Soil Capability
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	**Extremely high capability land**: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
2	**Very high capability land**: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	**High capability land**: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4	**Moderate capability land**: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5	**Moderate–low capability land**: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
6	**Low capability land**: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	**Very low capability land**: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8	**Extremely low capability land**: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

The NSW regional based maps of LSC indicate the Project Area consists of LSC class 4: moderate capability land, and LSC class 6: low capability land (refer **Figure 9**).

Strategic Regional Land Use Policy Mapping

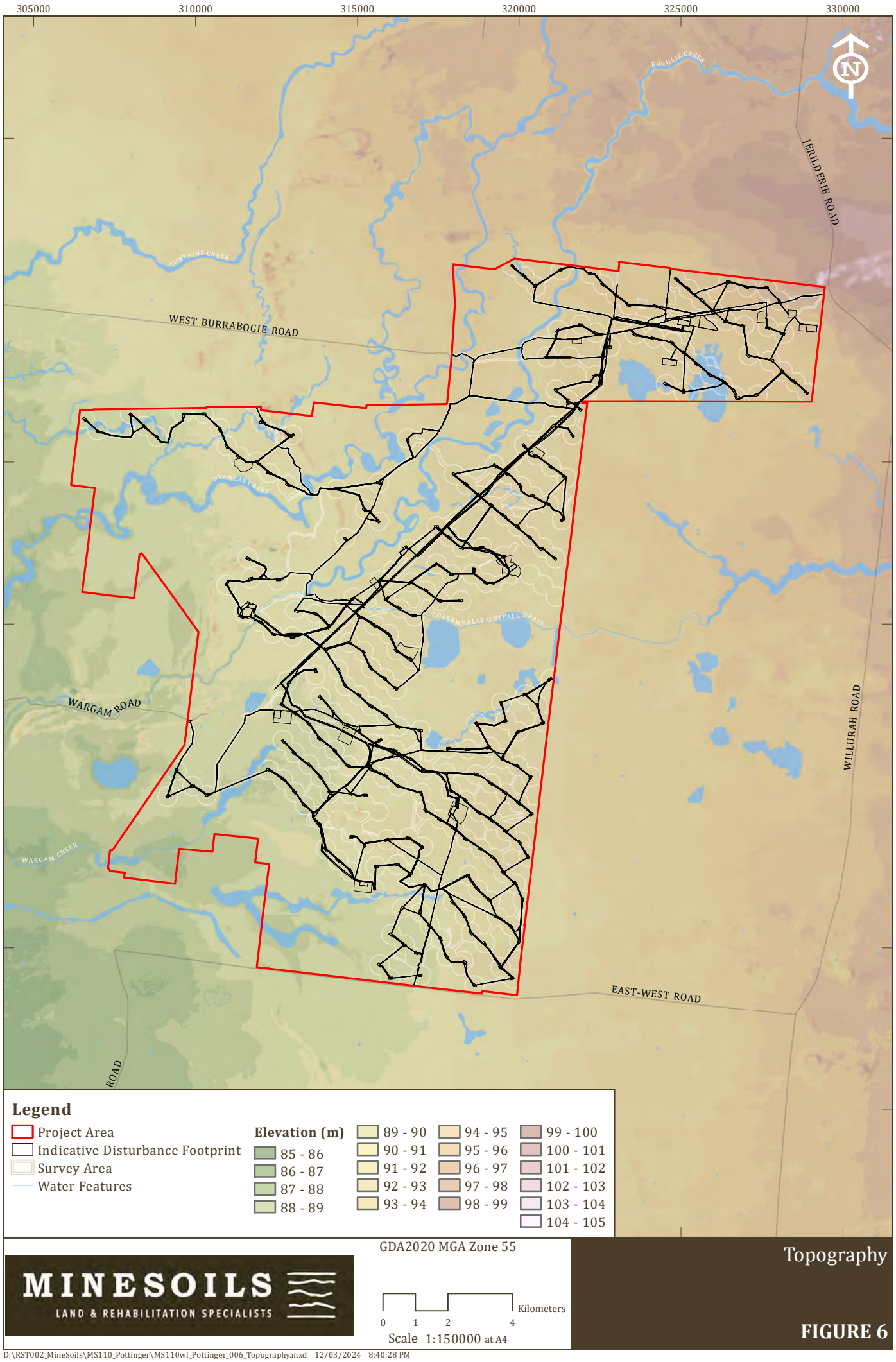
The 'NSW Government's Strategic Regional Land Use Policy' (the Policy) defines and identifies strategic agricultural land across NSW. Strategic agricultural land includes land with unique natural resource characteristics, known as biophysical strategic agricultural land (BSAL), and clusters of significant agricultural industries known as critical industry clusters (CICs). The Policy has been developed to achieve balanced land use outcomes, specifically between mining, coal seam gas and agriculture.

There is no BSAL or CICs mapped within the Project Area or the Project locality. The nearest BSAL is located approximately 200 km east of the site.

State Significant Agricultural Land

The NSW Department of Primary Industries is undertaking a mapping program to identify State Significant Agricultural Land (SSAL). A map of SSAL is an essential component of agricultural land use planning, enabling clearer local planning with informed prioritisation of future land uses.

SSAL is not mapped within the Project Area.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WILLURAH ROAD
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ROAD
Legend
Project Area
Indicative Disturbance Footprint
Survey Area
Water Features
Elevation (m)
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Topography
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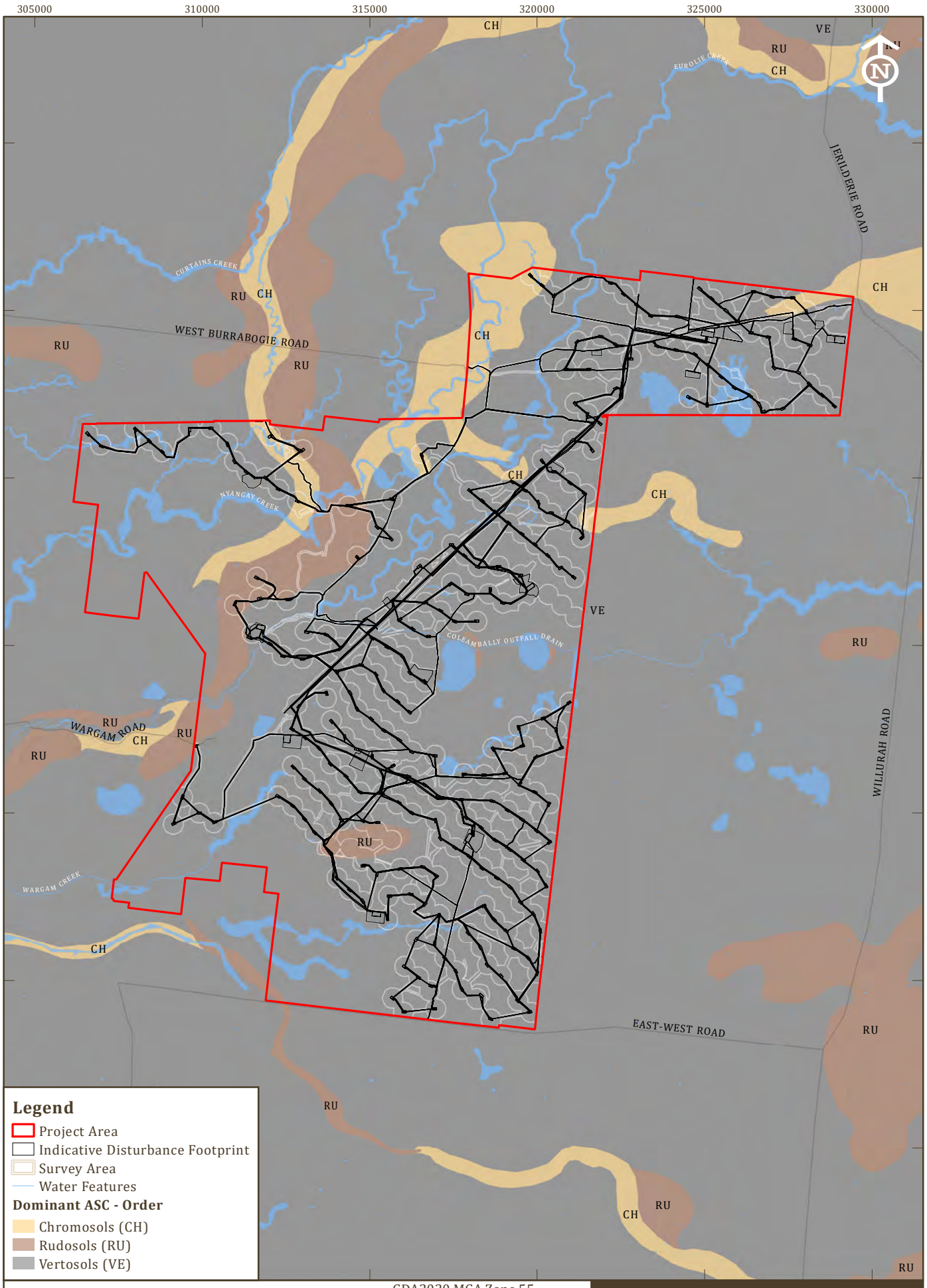
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Water Features
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Rudosols (RU)
Vertosols (VE)
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Regionally Mapped Soil Types
FIGURE 7
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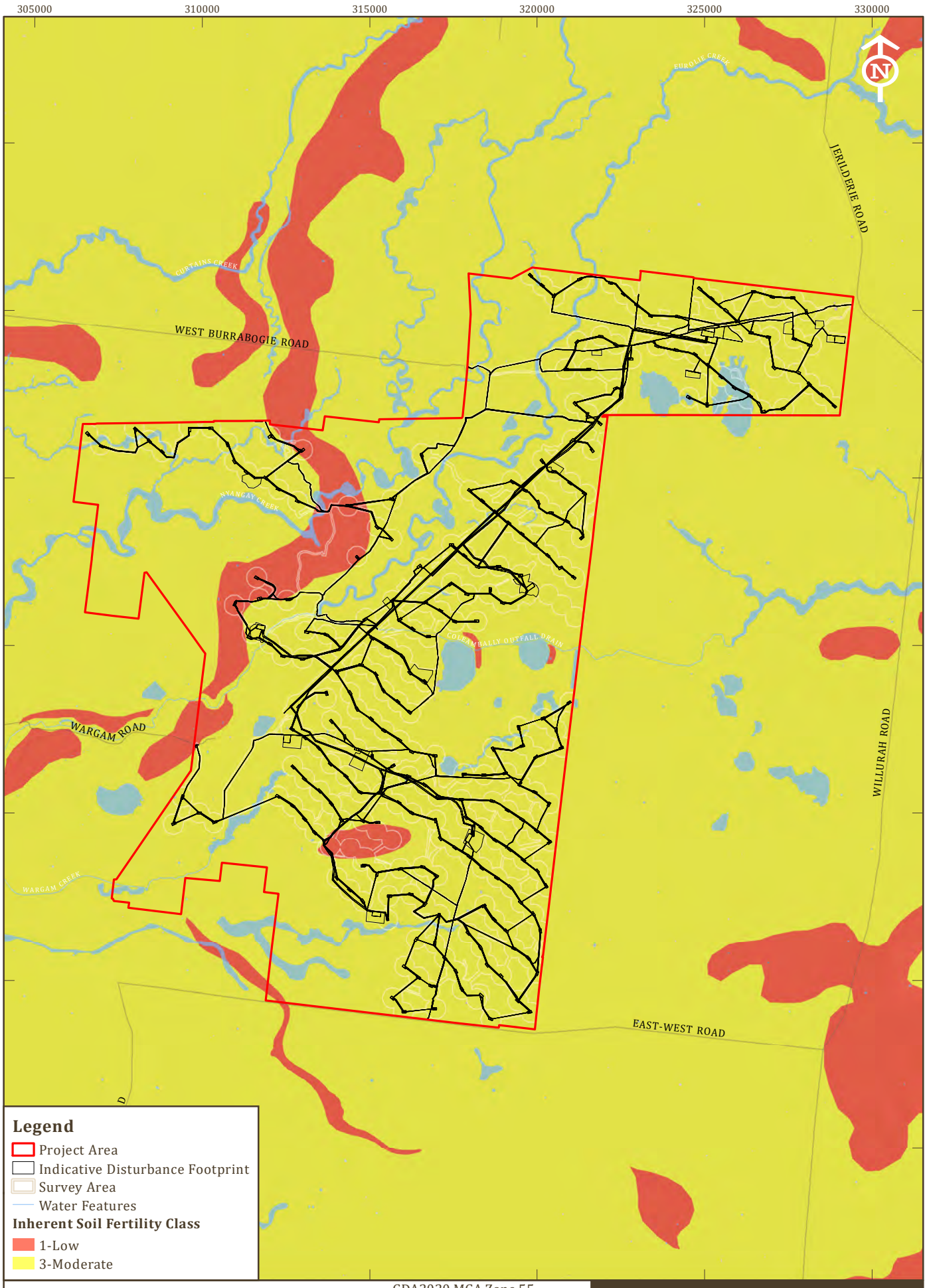

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Regionally Mapped Inherent Soil Fertility

FIGURE 8

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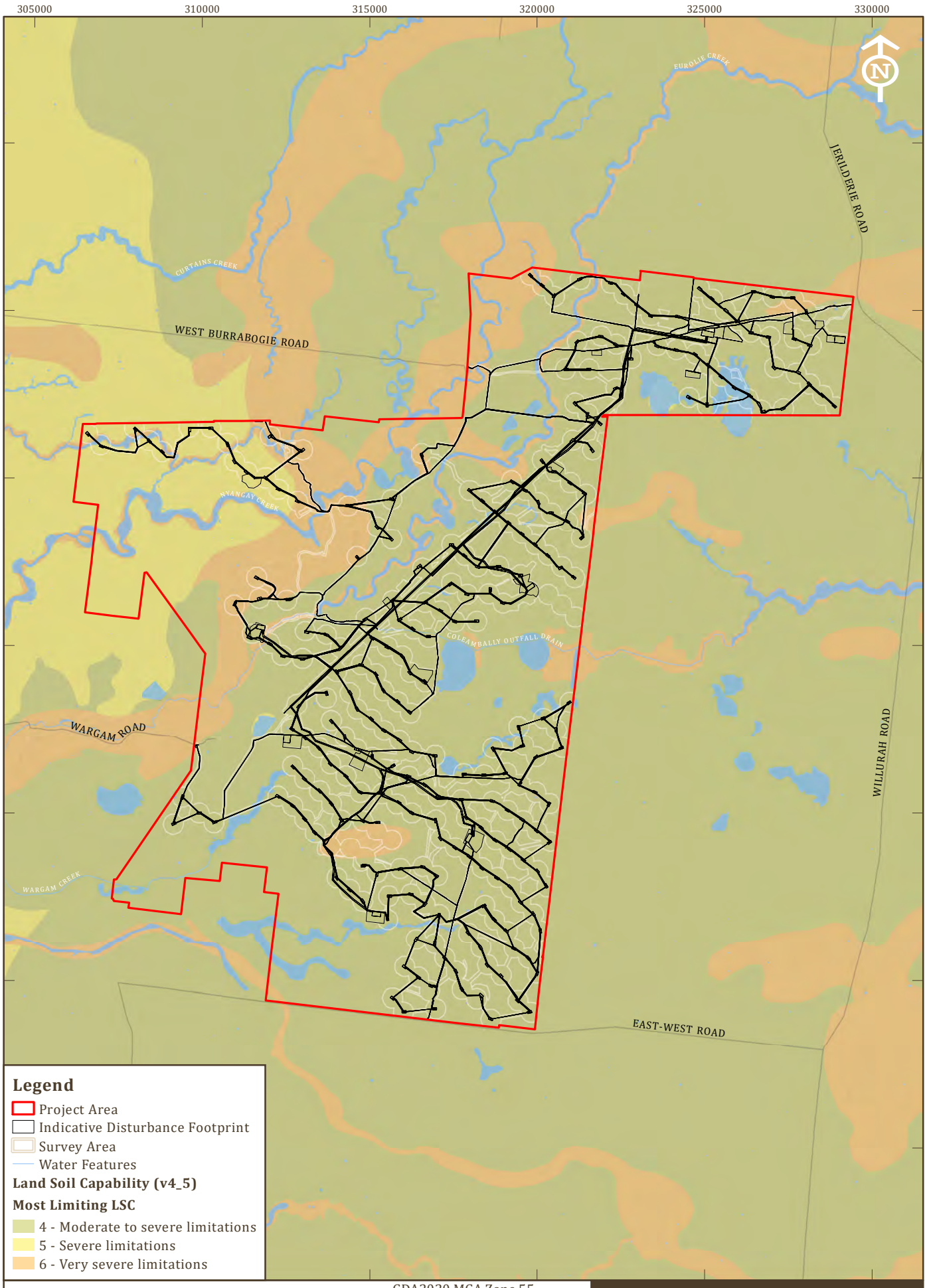

GDA2020 MGA Zone 55

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Regionally Mapped Land and Soil Capability

FIGURE 9

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3.2.2 SOIL SURVEY METHODOLOGY

Minesoils undertook a soil and land resource survey to inform the following tasks to be undertaken throughout the EIS process:

- Soil assessment, identifying soil units, soil qualities and risks including erosion, acid sulfate soils (ASS) risk and salinity.
- Land and soil capability (LSC) verification.
- Management and mitigation measures for mitigating soil erosion during construction, operations and decommissioning.

The objective of the Minesoils fieldwork program was to satisfy the field assessment, sampling and testing requirements related to soil and land resources of the *LSSE Guideline* (adopted for this assessment). The fieldwork plan outlined below was designed to satisfy the following requirements:

- Soil survey and mapping: This was undertaken at a 1:25,000 survey intensity (1 site every 25 ha), and requires collection of landform pattern and element information, soil profile data, and taxonomic parameters to distinguish soil units according to the Australian Soil Classification criteria, within the Project Area.
- LSC verification: The information required for the LSC assessment was collected during both the desktop assessment and verified on the ground during the field program. The LSC system requires data on biophysical features from in situ measurements regional mapping.
- Soil qualities and risks: Additional information was recorded in the field on erosion and evidence of potentially erosive soils including tunnelling, rill, gully and sheet erosion, which may require specific handling and management techniques during construction or operational activities, and the consequences of this on stripping and rehabilitation. Observations were made on risks of ASS and salinity.

The field program was designed as an integrated free survey. An integrated survey assumes that many land characteristics are interdependent and tend to occur in correlated sets (NSCT, 2008). Survey points are irregularly located according to the survey teams' judgement to enable the delineation of soil boundaries. Soil boundaries can be abrupt or gradual, and catena and toposequences are used to aid the description of gradual variation. Soil cores were excavated by a soil corer to a depth of approximately 0.8 – 1.0m or to a point of refusal. Site clearances and dial before you dig (DBYD) plans were undertaken as part of the safety planning requirements and found underground service running through the centre of the Project Area which were avoided during excavation activities.

The soil survey targeted the 1,066 ha Project Disturbance Footprint. A total of 52 sites were assessed, resulting in a survey intensity of 1 site per <25 ha of the Project Disturbance Footprint. Soil profiles within the Project Area (refer to **Figure 10** – noting sites annotated with an 'S' are used for the solar farm assessment also) were assessed in accordance with the 'Australian Soil and Land Survey Field Handbook soil classification procedures' (NCST, 2009). Detailed soil profile descriptions were recorded covering the major parameters specified in **Table 11**. Soil profile logging was undertaken in the field using Minesoils' soil data sheets, including GPS recordings and photographs of the landforms and soil profiles. Soils were keyed out in accordance with the Australian Soil Classification (ASC) Third Edition (2008) (Isbell, R. F., 2021).

Soil samples were collected at each of the assessment site's soil horizons to a depth of 1 m, with a total of 165 samples collected. Minesoils chose 56 of these samples that were considered representative to be subject to laboratory testing. The laboratory testing suite for these sites is detailed in the **Table 12**.

Table 11: Detailed soil profile description parameters

Detailed Field Assessment Parameters	
Horizon depth including distinctiveness and shape	Pan presence and form
Field texture grade	Permeability and drainage
Field colour (Munsell colour chart)	Field pH
Pedality structure, grade and consistence	Field moisture
Soil fabric and stickiness	Surface condition
Stones (abundance and size)	Landform pattern / element
Mottles (amount, size and distinctiveness)	Current land use and previous disturbance
Segregations (abundance, nature, form and size)	Vegetation

Table 12: Soil Sample Laboratory Analysis

Lab Analysis	
Analyte	**Methodology**
pH (1:5 water & CaCl)	Rayment & Lyons 2011-4A1
Electrical Conductivity (EC) and Chloride	Rayment & Lyons 2011-3A1
Cation Exchange Capacity (CEC) & ESP and Ca:Mg Ratio	Rayment & Lyons 2011-15J1
Particle Size Analysis (PSA)	ISSS Hydrometer plus 0.2 and 2.0 mm Sieving (CSIRO 'Yellow Book')
Emerson Aggregate Test (EAT)	AS1289.3.8.1-2017

3.2.3 SOIL SURVEY FINDINGS

Soil Mapping Units

The soil survey undertaken by Minesoils found the Disturbance Footprint to cover three dominant soil mapping units, as shown on **Figure 10**, and presented in **Table 13**:

- Soil Unit 1: Dermosol/ Vertosol Complex – covering 815 ha.
- Soil Unit 2: Sodosols – covering 234 ha.
- Soil Unit 3: Arenosols – covering 17 ha.

Soil Unit 1: Dermosol/ Vertosol Complex

A soil complex consists of areas of two or more soils, so intricately mixed or so with individual soil types small in size that they cannot be separately on a soil map. Each area of a complex contains some of each of the two or more dominant soils characteristics, and the pattern and relative proportions are about the same in all areas.

The soils within the Project Area as classified as Dermosols and Vertosols, which are intermixed, and very closely associated. These soils are generally very similar albeit for subtle variances in vertic properties and clay percentage.

Dermosols are soils other than Vertosols, Hydrosols, Calcarosols and Ferrosols which:

- Have B2 horizons that have grade of pedality greater than weak throughout the major part of the horizon, and
- Do not have clear or abrupt textural B horizon.

Meanwhile, Vertosols are soils with the following:

- A clay field texture or 35% or more clay throughout the solum except for thin, surface crusty horizons 30 mm or less thick and
- When dry, open cracks occur at some time in most years. These are at least 5 mm wide and extend upward to the surface or to the base of any plough layer, peaty horizon, self-mulching horizon, or thin, surface crusty horizon; and
- Slickensides and/or lenticular peds occur at some depth in the solum.

The complex containing these soil types is characterised by heavy clay and medium topsoils with consistently strong structure overlying medium clay, silty clay loam and clay loam subsoils with moderate to strong structure, often with vertic properties. pH ranges from mildly to very strongly alkaline, often increasing with depth, and salinity levels range from non-saline at the surface to extremely saline at depth. These soils are consistently saline (ranging to extremely saline), and consistently sodic (often strongly sodic). They regularly sporadically calcium carbonate nodules, are moderately well drained, highly permeable and are deep.

This soil mapping unit is the most dominant within the Project Area and generally define the open plains that characterise the Project Area. Representative sites for this unit, which include detailed laboratory data, consist of sites 1, 4, 8, 15, 20, 22, 25, 29 and 30.

Soil Unit 2: Sodosols

Soil Unit 2 is characterised by Sodosols, which are defined as soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is sodic and not strongly acid.

This unit is characterised by clay loam, loam and loamy sand topsoils with moderate to weak structure overlying clay subsoils with strong to weak structure. pH ranges from slightly acidic to moderately alkaline in the topsoil, to very strongly alkaline at depth. These soils range from non-saline to extremely saline, and are sodic (often strongly sodic). They are consistently deep, not mottled, and range from imperfectly drained to rapidly drained.

This soil mapping unit occurs in a loose association with Soil Unit 3: Arenosols. Representative sites for this unit, which include detailed laboratory data, consist of sites 13, 27 and 32.

A sodic Chromosol exists as a sub-dominant soil type within this unit, and is represented by detailed site 13. The majority of the duplex soils within the Project Area are anticipated to be sodic due to the consist and spatially widespread presence of strongly sodic subsoils in the tested soils.

Soil Unit 3: Arenosols

Soil Unit 3 is characterised by Arenosols, which are defined as soils with soils that have, within the upper 1.0 m of the soil profile:

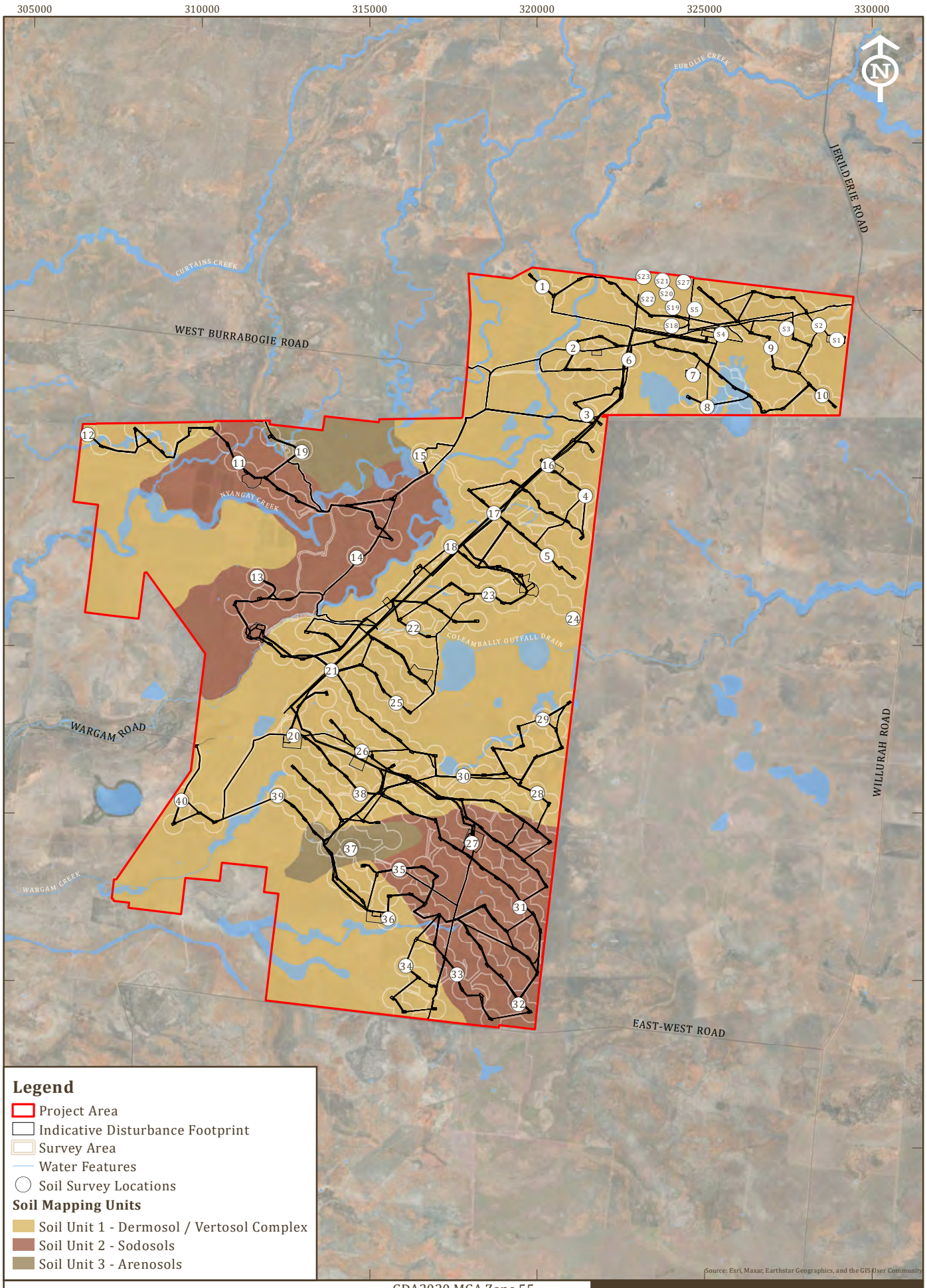
- A sandy field texture (i.e. a field texture of sand, loamy sand or clayey sand) in one or more layers or horizons with a combined thickness of at least 0.8 m; and
- No layer or horizon with a clay content that exceeds 15% (i.e. heavy sandy loam [SL+] or heavier) excluding argic horizon/s; and
- ≤10% (by visual abundance and weighted average) of coarse fragments and/or hard segregations >2 mm in size; and
- No hard layers (cemented pans, other cemented materials, rock, saprock or saprolite that do not soften when moist).

These are soils with consistently deep, structureless, highly permeable and rapidly drained, reddish coloured sandy profiles – the result of aeolian deposition. They are non-saline, with neutral to mildly alkaline pH, and are sodic.

This soil mapping unit occur on the slightly elevated low rises throughout the Project Area. The representative site for this unit, which includes detailed laboratory data, consists of site 19.

Soil Mapping Units 2 and 3 are thought to be largely (although not exclusively) comprised of buried Dermosols and Vertosols: that is, Dermosols and Vertosols that have, at some point in time, been covered by aeolian deposition which now comprises a thin topsoil. This covering topsoil horizon is consistently only approximately 10 cm in depth, and in some cases is marked by a dramatic contrast in colour and texture.

Full soil profile descriptions are included as **Appendix 2**. Laboratory certificates of analysis are included as **Appendix 3**.



Legend

- Project Area
- Indicative Disturbance Footprint
- Survey Area
- Water Features
- Soil Survey Locations

Soil Mapping Units

- Soil Unit 1 - Dermosol / Vertosol Complex
- Soil Unit 2 - Sodosols
- Soil Unit 3 - Arenosols

GDA2020 MGA Zone 55

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Soil Survey Locations and Soil Mapping Units

FIGURE 10

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Table 13: Soil Mapping Units and Soil Units Summary

Site #	Soil Mapping Units		Soil Profile - Australian Soil Classification	ASC Family Criteria
	#	Name		
1	1	Dermosol/ Vertosol Complex	Episodic-Endocalcareous Epipedal Brown Vertosol	ERRW
2	1	Dermosol/ Vertosol Complex	Brown Dermosol	-
3	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
4	1	Dermosol/ Vertosol Complex	Sodic Hypocalcic Brown Dermosol	BEOOW
5	1	Dermosol/ Vertosol Complex	Red Dermosol	-
6	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
7	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
8	1	Dermosol/ Vertosol Complex	Sodic Eutrophic Grey Dermosol	CEOMW
9	1	Dermosol/ Vertosol Complex	Yellow Dermosol	-
10	1	Dermosol/ Vertosol Complex	Brown Vertosol	-
11	2	Sodosols	Red Sodosol	-
12	1	Dermosol/ Vertosol Complex	Brown Dermosol	-
13	2	Sodosols	Sodic Eutrophic Red Chromosol	BEKOWNR
14	2	Sodosols	Brown Sodosol	-
15	1	Dermosol/ Vertosol Complex	Episodic-Endocalcareous Epipedal Brown Vertosol	ERRW
16	1	Dermosol/ Vertosol Complex	Black Vertosol	-
17	1	Dermosol/ Vertosol Complex	Brown Dermosol	-
18	1	Dermosol/ Vertosol Complex	Red Dermosol	-
19	3	Arenosols	Stratic Arenosol	EKKWNR
20	1	Dermosol/ Vertosol Complex	Episodic Epipedal Black Vertosol	ERRW
21	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
22	1	Dermosol/ Vertosol Complex	Sodic Eutrophic Brown Dermosol	-
23	1	Dermosol/ Vertosol Complex	Red Dermosol	-

Site #	Soil Mapping Units		Soil Profile - Australian Soil Classification	ASC Family Criteria
	#	Name		
24	1	Dermosol/ Vertosol Complex	Brown Vertosol	-
25	1	Dermosol/ Vertosol Complex	Endocalcareous Epipedal Black Vertosol	ERRW
26	1	Dermosol/ Vertosol Complex	Black Vertosol	-
27	2	Sodosols	Eutrophic Hypernatric Brown Sodosol	BELOWNR
28	1	Dermosol/ Vertosol Complex	Red Dermosol	-
29	1	Dermosol/ Vertosol Complex	Sodic Eutrophic Grey Dermosol	BEOOW
30	1	Dermosol/ Vertosol Complex	Sodic Eutrophic Red Dermosol	BEOOW
31	2	Sodosols	Red Sodosol	-
32	2	Sodosols	Eutrophic Hypernatric Red Sodosol	BELOWNR
33	2	Sodosols	Red Sodosol	-
34	1	Dermosol/ Vertosol Complex	Brown Dermosol	-
35	2	Sodosols	Red Sodosol	-
36	1	Dermosol/ Vertosol Complex	Red Dermosol	-
37	3	Arenosols	Stratic Arenosol	EKKWNR
38	1	Dermosol/ Vertosol Complex	Brown Dermosol	-
39	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
40	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
S1	1	Dermosol/ Vertosol Complex	Episodic Epipedal Brown Vertosol	ERRW
S2	1	Dermosol/ Vertosol Complex	Red Dermosol	-
S3	1	Dermosol/ Vertosol Complex	Vertic Hypocalcic Brown Dermosol	BEMOW
S4	1	Dermosol/ Vertosol Complex	Sodic Hypocalcic Red Dermosol	BEOMW
S5	1	Dermosol/ Vertosol Complex	Sodic Hypocalcic Brown Dermosol	BEOOW
S18	1	Dermosol/ Vertosol Complex	Grey Vertosol	-
S19	1	Dermosol/ Vertosol Complex	Red Vertosol	-

Site #	Soil Mapping Units		Soil Profile - Australian Soil Classification	ASC Family Criteria
	#	Name		
S20	1	Dermosol/ Vertosol Complex	Grey Dermosol	-
S21	1	Dermosol/ Vertosol Complex	Grey Dermosol	-
S22	1	Dermosol/ Vertosol Complex	Episodic-Endocalcareous Epipedal Grey Vertosol	EQQW
S23	1	Dermosol/ Vertosol Complex	Brown Dermosol	-
S27	1	Dermosol/ Vertosol Complex	Grey Dermosol	-

Soil Erodibility

Soil aggregate stability refers to the stability of soil structural units (aggregates) when immersed in water. Instability may be indicated by slaking or clay dispersion. A soil with low aggregate stability is likely to be less resilient to mechanical impacts, more likely to be compacted and poorly structured, or be susceptible to tunnelling if used for earthworks. The Emerson Aggregate Test (EAT) classifies the behaviour of soil aggregates, when immersed, on their coherence in water. **Table 14** shows the EAT class and the dispersion degree during testing and resulting risk of dispersion for that soil.

Table 14: Dispersion Degree and Risk Correlation to EAT Class

EAT Class	Dispersion	
	Degree	Risk
1	Complete dispersion	Very High
2	Partial dispersion	High
3	Complete or partial dispersion after remoulding	Moderate
4 - 8	Well aggregated with no dispersion after remoulding	Negligible

Source: Adapted from Hazelton and Murphy (2011)

Emerson Class Numbers of 1 and 2 indicates a high to very high potential for the soil to disperse when inundated with water. These classes represent the greatest erosion and sediment control hazard to surface disturbance works.

Emerson Class Numbers of 3 indicate that while the soil is only slightly dispersive, the remoulding and breaking down of soil bonds can result in increased dispersive behaviour. Remoulding of the soil at a moisture content near the optimum for compaction (simulating the use of these soils in a filling and compaction operation) does not increase the potential for dispersive behaviour, however further breakdown of the soil may occur, by water turbulence or concentrated rapid water flow. Under these circumstances this class of soil may disperse.

Emerson Class Numbers greater than 4 have a low potential for dispersive behaviour. Some swelling or slaking may occur but generally such soils are not readily dispersive.

Table 15 highlights the lowest Emerson Class Number recorded for select laboratory data representative sites of the Project Area, as an indicator of highest potential risk during disturbance activities.

Table 15: Potential Dispersion Risk

Site No.	Soil Depth (m)	EAT	Potential Risk
1	1 0-10	2	High
1	1 30-40	3	Moderate
1	1 60-70	3	Moderate
19	19 0-10	3	Moderate
19	19 20-30	3	Moderate
19	19 50-60	3	Moderate
19	19 90-100	3	Moderate
22	22 0-10	2	High
22	22 30-40	2	High
22	22 60-70	4	Negligible
25	25 0-10	3	Moderate
25	25 30-40	3	Moderate
25	25 60-70	3	Moderate
27	27 0-10	3	Moderate
27	27 30-40	2	High
27	27 60-70	2	High

Based on site observation, which included assessment for indicators of erodibility, such as sheet or gully erosion, it can be concluded that there is a wind erosion and sedimentation risk associated with the topsoils currently present in the Project Area, due to the nature of the landscape and exposure characteristics. In addition, the dispersion risk status of representative tested soils indicate there is moderate to high potential risk for dispersion of all three Soil Units within the Project Area.

The representative laboratory tested soils indicate high levels of sodicity across all soils within the Project Area. While sodic soils are generally dispersive, it is important to acknowledge that not all sodic soils disperse, and that not all dispersive soils are sodic. However, given the ranges in salinity of the soils tested within the Project Area, all sodic soils should be considered dispersive.

Based on these results, there is a moderate to high potential risk for dispersion where soils are disturbed by Project construction efforts within the Project Area. Higher impact activities such as where earthworks are necessary for construction of sub-station pads or site facilities are very likely to result in increased dispersive behaviour when soil is remoulded, compacted or pulverised.

In addition, due to the flat nature of the landscape, the risk of soil erosion from surface water flows is very low. However, the aeolian processes observed to be operational within the Project Area, along with the chemical instability of the laboratory tested soils, indicate an erosion risk that must be considered and appropriately controlled by Project mitigation measures. Wind erosion has the potential to occur where soils are disturbed or

vegetation is removed as a result of the Project, especially in coarser textured topsoils, such as those in Soil Units 2 and 3. A summary of the erodibility of the Soil Units within the Project Area, which takes into account site observation, dispersion risk, the general physical and chemical characteristics of each unit, and landscape position, is presented in **Table 16**.

Nonetheless, the overall risk of erosion and sedimentation impacts on agriculture as a result of the Project should be considered low.

Table 16: Erosion Risk for Soil Units

Soil Unit #	Soil Unit Name	Water Erosion Risk	Wind Erosion Risk
1	Dermosol/ Vertosol Complex	Low	Low
2	Sodosols	Low	Low - Moderate
3	Arenosols	Low	Low - Moderate

Acid Sulphate Soils

Acid sulfate soils (ASS) have been classified into 5 different classes based on the likelihood of the ASS being present in particular areas and at certain depths (NSW Department of Planning and Environment, 2018):

- Class 1: ASS in a class 1 area are likely to be found on and below the natural ground surface.
- Class 2: ASS in a class 2 area are likely to be found below the natural ground surface.
- Class 3: ASS in a class 3 area are likely to be found beyond 1 metre below the natural ground surface.
- Class 4: ASS in a class 4 area are likely to be found beyond 2 metres below the natural ground surface.
- Class 5: ASS are not typically found in Class 5 areas. Areas classified as Class 5 are located within 500 metres on adjacent class 1,2,3 or 4 land.

The Project Area does not contain any of the above classes on the NSW Acid Sulfate Soil Planning Map.

Assessing land elevation and distance from the coast, in conjunction with existing ASS mapping for NSW, the potential for ASS is considered a very low risk.

Further, there was no evidence of ASS indicators such as soil gleying, odour, marine sediments and organic materials recorded as part of the soils survey.

3.2.4 SITE VERIFICATION OF LSC

All soil assessment sites within the Project Area have been subject to the site verification assessment of LSC, in accordance with the LSC Guideline and outlined in Section 3.2.1.

Based on the results of the LSC verification assessment, it is concluded that the Project Area contains two LSC classes:

- LSC class 3: high capability land – covering 26 ha.
- LSC class 4: moderate capability land – covering 31 ha.
- LSC class 5: moderate-low capability land – covering 610 ha.
- LSC class 6: low capability land – covering 198 ha.
- LSC class 7: very low capability land – covering 201 ha.

The spatial extent of each LSC class is shown in **Figure 11**. The LSC verification assessment outcomes for the eight hazards group for the soil profiles assessed is presented in **Table 17**.

Class 3 land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation. The key limitations of this class within the Project Area are wind erosion and soil structure decline.

Class 4 land has moderate to high limitations for high-impact land uses that will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology. The key limitation of this class within the Project Area is soil structure decline.

Class 5 land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation. The key limitation of this class within the Project Area is salinity.

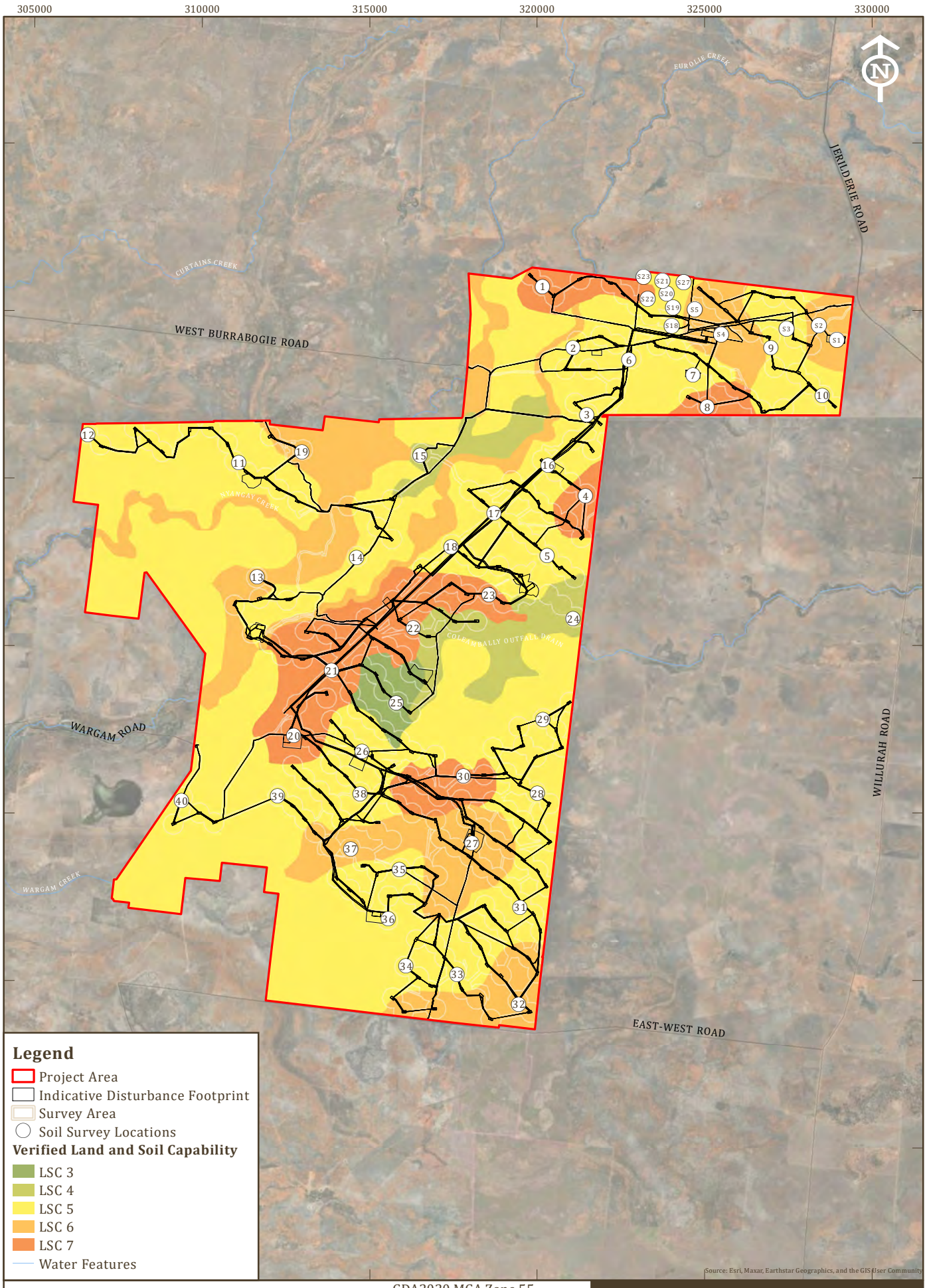
Class 6 land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation. The key limitations of this class within the Project Area are wind erosion and salinity.

Class 7 land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation. The key limitations of this class within the Project Area are soil structure decline associated with strongly sodic clay topsoils.

Table 17: LSC Parameters and Overall Class

		Hazard Criteria								
		1	2	3	4	5	6	7	8	Overall
		Water erosion	Wind erosion	Structure	Acidity	Salinity	Water-logging	Soil depth	Movement	Class
1	Episodic-Endocalcareous Epipedal Brown Vertosol	1	3	7	1	6	2	1	1	7
2	Brown Dermosol	1	3	4	-	5	2	1	1	5
3	Grey Vertosol	1	3	4	-	5	2	1	1	5
4	Sodic Hypocalcic Brown Dermosol	1	3	7	1	6	2	1	1	7
5	Red Dermosol	1	3	4	-	5	2	1	1	5
6	Grey Vertosol	1	3	4	-	5	2	1	1	5
7	Grey Vertosol	1	3	4	-	5	2	1	1	5
8	Sodic Eutrophic Grey Dermosol	1	3	7	1	6	2	1	1	7
9	Yellow Dermosol	1	3	4	-	5	2	1	1	5
10	Brown Vertosol	1	3	4	-	5	2	1	1	5
11	Red Sodosol	1	5	3	-	2	2	1	1	5
12	Brown Dermosol	1	3	4	-	5	2	1	1	5
13	Sodic Eutrophic Red Chromosol	1	6	1	3	2	2	1	1	6
14	Brown Sodosol	1	5	3	-	2	2	1	1	5
15	Episodic-Endocalcareous Epipedal Brown Vertosol	1	3	4	1	2	2	1	1	4
16	Black Vertosol	1	3	4	-	5	2	1	1	5
17	Brown Dermosol	1	3	4	-	5	2	1	1	5
18	Red Dermosol	1	3	4	-	5	2	1	1	5
19	Stratic Arenosol	1	6	1	3	2	1	1	1	6
20	Episodic Epipedal Black Vertosol	1	3	7	1	6	2	1	1	7
21	Grey Vertosol	1	3	7	-	5	2	1	1	7
22	Sodic Eutrophic Brown Dermosol	1	3	7	1	5	2	1	1	7
23	Red Dermosol	1	3	7	-	2	2	1	1	7
24	Brown Vertosol	1	3	4	-	2	2	1	1	4
25	Endocalcareous Epipedal Black Vertosol	1	3	3	1	2	2	1	1	3
26	Black Vertosol	1	3	4	-	5	2	1	1	5
27	Eutrophic Hypernatric Brown Sodosol	1	3	7	3	6	2	1	1	6
28	Red Dermosol	1	3	4	-	5	2	1	1	5

		Hazard Criteria								
		1	2	3	4	5	6	7	8	Overall
		Water erosion	Wind erosion	Structure	Acidity	Salinity	Water-logging	Soil depth	Movement	Class
29	Sodic Eutrophic Grey Dermosol	1	3	4	1	6	2	1	1	6
30	Sodic Eutrophic Red Dermosol	1	3	7	1	6	2	1	1	7
31	Red Sodosol	1	3	4	-	5	2	1	1	5
32	Eutrophic Hypernatric Red Sodosol	1	3	6	2	6	2	1	1	6
33	Red Sodosol	1	5	3	-	5	2	1	1	5
34	Brown Dermosol	1	3	4	-	5	2	1	1	5
35	Red Sodosol	1	3	4	-	5	2	1	1	5
36	Red Dermosol	1	3	4	-	5	2	1	1	5
37	Stratic Arenosol	1	6	1	-	2	1	1	1	6
38	Brown Dermosol	1	3	4	-	5	2	1	1	5
39	Grey Vertosol	1	3	4	-	5	2	1	1	5
40	Grey Vertosol	1	3	4	-	5	2	1	1	5
S1	Episodic Epipedal Brown Vertosol	1	3	6	1	5	2	1	1	6
S2	Red Dermosol	1	3	6	2	5	2	1	1	6
S3	Vertic Hypocalcic Brown Dermosol	1	3	4	1	5	2	1	1	5
S4	Sodic Hypocalcic Red Dermosol	1	3	6	2	5	2	1	1	6
S5	Sodic Hypocalcic Brown Dermosol	1	3	6	2	5	2	1	1	6
S18	Grey Vertosol	1	3	4	1	5	2	1	1	5
S19	Red Vertosol	1	3	4	1	5	2	1	1	5
S20	Grey Dermosol	1	3	4	2	5	2	1	1	5
S21	Grey Dermosol	1	3	4	2	5	2	1	1	5
S22	Episodic-Endocalcareous Epipedal Grey Vertosol	1	3	7	1	5	2	1	1	7
S23	Brown Dermosol	1	3	4	1	5	1	1	1	5
S27	Grey Dermosol	1	3	4	2	5	1	1	1	5



GDA2020 MGA Zone 55

MINESOILS
LAND & REHABILITATION SPECIALISTS

0 1 2 4 Kilometers

Scale 1:150000 at A4

Verified Land and Soil Capability

FIGURE 11

D:\RST002_MineSoils\MS110_Pottinger\MS110wf_Pottinger_011_VerifLSC.mxd 12/03/2024 8:49:55 PM

4 LAND USE CONFLICT RISK ASSESSMENT

4.1 OVERVIEW

The Land Use Conflict Risk Assessment (LUCRA) (NSW Department of Primary Industries, 2011) is a system to identify and assess the potential for land use conflict to occur between neighbouring land uses. It helps land managers and consent authorities assess the possibility for and potential level of future land use conflict. LUCRA aims 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.
- 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.

Land use conflicts occur when one land user is perceived to infringe upon the rights or impact the values or amenity of another. In rural areas land use conflicts commonly occur between agricultural and residential uses. However, land use conflicts can also occur between different agricultural enterprises and other primary industries.

Rural amenity issues are the most common land use conflict issues, followed by environmental protection issues. Rural amenity issues include impacts to air quality due to agricultural and rural industry (odour, pesticides, dust, smoke and particulates); use and enjoyment of neighbouring land e.g., noise from machinery; and visual amenity associated with rural industry e.g., the use of netting, planting of monocultures and impacts on views.

Environmental protection issues include soil erosion leading to land and water pollution, clearing of native vegetation, and stock access to waterways.

Direct impacts from neighbouring land uses on farming operations can also cause conflict, such as: harassment of livestock from straying domestic animals; trespass; changes to storm water flows or water availability; and poor management of pest animals and weeds.

4.2 APPROACH

The LUCRA as presented in **Appendix 1** compares and contrasts the Project against adjoining/surrounding land uses and activities for real or perceived incompatibility and conflict issues based on the risks and impacts identified in Section 5, and the mitigation measures and controls presented in Section 6. Each potential conflict between the operation of the wind farm and adjacent land or wider locality has been assessed and given a risk ranking based on probability and consequence as outlined in **Appendix 1**. Performance targets will be determined via management plans specified by the EIS (and specialist impact assessments) and development consent conditions (if approved). Monitoring will be undertaken in accordance with those management plans. Indicative performance targets are presents in **Appendix 1**.

Given the overlap between the agricultural impact assessment and land use conflict considerations, many agriculture-related risk items listed in the LUCRA are further detailed in Section 5.

4.3 FINDINGS

The following land use conflict risk items were identified for the Project:

- Construction ground disturbance;
- Construction noise;
- Construction dust;

- Construction traffic;
- Construction workforce;
- Construction work;
- Project infrastructure;
- Land removed from agriculture;
- Operational traffic;
- Operational noise;
- Visual amenity;
- Property devaluation;
- Biosecurity;
- Erosion and sedimentation;
- Livestock;
- Decommissioning and rehabilitation; and
- Cumulative impacts.

Within these risk item categories, 27 potential conflicts were considered as part of the LUCRA. The mitigation measures and controls outlined in this assessment and the wider EIS reduce the level of risk for the majority of considered potential risks with complaints or conflict being managed within normal operations. However, a number of items of potential conflict remain a moderate or high risk for land use conflict. Note, these potential conflicts largely pertain to the wider locality and community, as opposed to immediate neighbours. The high and moderate potential conflicts are summarised in **Table 18**. The LUCRA methodology including risk ranking matrix and full LUCRA assessment are included as **Appendix 1**.

Table 18: LUCRA Moderate Risk Items and Risk Controls Summary

Potential Conflict	Conflict Risk
Aerial farm service providers in the locality may be concerned that wind turbine structures and associated turbulence in the Project Area may pose safety risk.	High
Public Authorities and the local community may have concerns regarding the potential for cumulative impacts arising from the proximity of several nearby renewable developments.	High
Land users and residents in the locality who wish to maintain views of the existing landscape may be concerned about the change in visual amenity resulting from the wind farm	Medium
Landowners in the locality may be concerned about potential devaluation of properties due to proximity to wind farm infrastructure.	Medium
Stakeholders may be concern about potential impacts to biodiversity within the site and locality from construction activities	Medium
Land users in the locality may be concerned about the possibility of increased vehicles during construction or operation may result in an accident with livestock, farm machinery or wildlife on roads.	Medium
Neighbouring landholders may be concerned that aerial spraying undertaken on properties within the locality may be limited by wind turbine structures and associated turbulence in the Project Area.	Medium
Stakeholders may be concern about potential impacts to biodiversity including migratory wetland bird species from the presence wind turbines in proximity the lakes.	Medium
Land users in the locality may be concerned about biosecurity breaches including weed, plant pest, plant disease or pest animal introduction and/or spread, as a result of the Project.	Medium

5 IMPACTS ON AGRICULTURAL LAND

The impacts wind farm activities can have on land resources and agricultural productivity range from short term temporary impacts to long term and permanent impacts. Temporary impacts can include the removal of agriculture from disturbance areas over full the life of the Project, including during the construction, operation and decommissioning phases. Permanent impacts may include changes to land and soil capability and agricultural resources of the Project Area. Permanent impacts are irreversible and can be mitigated by the reinstatement of agricultural lands and land productivity to a pre-disturbance condition and productivity. Australian wind farming practices are generally presented as low risk of permanent and irreversible impacts to agricultural land.

This section identifies and describes the nature, duration and consequence of the potential impacts on agricultural land as a result of the Project, for the Project Area and in the wider region, across five risk areas:

- Changes in the amount of land used for agriculture.
- Changes to agricultural productivity and agricultural enterprises.
- Changes to agricultural resources.
- Other potential impacts to agriculture considered for the Project.
- Cumulative impacts of the potential for multiple large scale renewable projects within the region.

5.1 LAND USED FOR AGRICULTURE

The Project will disturb an area of approximately 1,066 ha of land that is currently subject to agriculture land use. While a portion of this area may be subject to disturbance during the construction phase only, for the purpose of this assessment and to apply a conservative approach, it is assumed that the agriculture will cease within this area for the duration of the Project.

It is anticipated that agricultural land use will be re-established over 1,059 ha of disturbed agricultural land at the time of decommissioning, unless otherwise agreed with the landowner and/or regulatory authorities (such as if farmers request access track to be retained, etc).

The only permanent decrease in land available for agriculture use will be associated with a 330 kV switching station, which, for the purpose of this assessment, is assumed will remain post-Project, and has a footprint of approximately 7 ha (this would be up to the discretion of the asset's owner, Transgrid).

Therefore, within the Project Area there will be a temporary reduction in land used for agricultural over an area of approximately 1,059 ha, and a permanent reduction of land used for agriculture over an area of approximately 7 ha.

Current agricultural land use immediate to the Project Area, and in the broader Project locality will not change as a result of the Project, and there will be no fragmentation or displacement of existing agricultural industries.

The temporary reduction of 1,059 ha and permanent reduction of 7 ha are considered negligible impacts in the context of the scale of land area subject to agriculture use in the Hay Shire and Edwards River LGAs as outlined in Section 2.4.1.

5.2 PRODUCTIVITY AND ENTERPRISES

5.2.1 PRIMARY PRODUCTIVITY

The productivity of the Disturbance Footprint is described in Section 3.1.3. For the purpose of this assessment, the temporary impact of the Project on productivity of agricultural land based on the change in land use for the duration of the Project is up to $155,636 per year. Due to the minimal disturbance to the landform, following the life of the Project, 1,059 ha of land removed from agriculture will be returned to agricultural use, with no reductions in land and soil capability. Agricultural enterprises can then re-commence at an equivalent agricultural productivity.

The permanent impact of the Project on productivity of agricultural land based on the removal of the remaining 7 ha following the Project is estimated up to $1,022 per year.

The permanent reduction of $1,022 per year is considered negligible impact in the context of the agricultural industry gross value of the Hay Shire and Edwards River LGAs as outlined in Section 2.4.2.

5.2.1 PRODUCTIVITY OF LAND WITHIN LOCALITY

Agricultural productivity of land outside of the Project Area will not be affected by the Project as the associated agricultural resources will not be affected. Therefore, the Project will not negatively impact any existing agricultural enterprise outside of the Project Area.

5.2.2 AGRICULTURE SUPPORT SERVICES

The Project will have a negligible impact on the viability of local and regional agricultural services and employment. There will be no impacts experienced by employees or contracting services currently engaged (i.e., stock mustering services). Changes to the supply and viability of agricultural support services in the main service centres of Hay and Deniliquin are driven by social and market trends far exceeding the scale of the negligible reduction in agricultural land use and productivity as a result of the Project.

5.2.3 CRITICAL MASS THRESHOLDS

Due to the limited reduction in agricultural activity as a result of the Project, and given the nature and scale of the established agricultural industries within the region and wider state, there will be no impact to critical mass thresholds of agricultural enterprises needed to attract and maintain investment in agricultural industries and infrastructure.

5.3 AGRICULTURAL RESOURCES

5.3.1 SOILS

Over the majority of the Project Area, soils will not be impacted. Soils within the Disturbance Footprint will be subject to impacts as part of the construction or maintenance of wind turbines, construction compounds, site infrastructure, cable trenching and access tracks. In areas where earthworks and excavations are necessary for construction, soils will be subject to higher impact disturbance.

Based on available soil management options that include soil stripping and reuse during construction and decommissioning, and the use of stockpiled or otherwise sourced suitable capping material for excavated areas or remaining infrastructure, the impacts to the soils of the Project Area are expected to be minimal and for the duration of the Project only. The exception is the 330 kV switching station footprint of 7 ha, which will be permanently disturbed as a result of the Project.

Soil impact mitigation strategy and measures are outlined in Section 6.2.1.

There will be no direct or indirect impacts to the soil resources of the Project locality outside the Project Area.

5.3.2 LAND AND SOIL CAPABILITY

Due to the nature of the Project which will require only localised and sporadic landform modification including minor soil stripping (for excavation works) impacts on LSC are expected to be minor.

Following the end of life for the Project, wind turbine footings and infrastructure Disturbance Footprints will be re-graded (where required) or capped with soil. Soil will be respread over disturbed areas and rehabilitated with either native vegetation or pasture for grazing depending on the intended final land use. This strategy, along with good soil management practices as outlined in Section 6.2 will facilitate the rehabilitation in returning the land to an equivalent LSC class, with the exception of 330 kV switching station footprint of 7 ha, which will be permanently removed from LSC classification.

Therefore, it is anticipated there will be no permanent impacts on LSC classes as a result of the Project over the 1,059 ha being returned to agriculture.

5.3.3 WATER

The Project is unlikely to impact groundwater due to not requiring extraction of groundwater, and having anticipated depth of construction that does not intersect the water table. A hydraulic analysis completed as part of the EIS determined impacts to exiting watercourses are manageable and confirmed low potential for flood inundation over the land. Water use during project construction and operation will be minimal and water will be brought to site by tanker as required.

No impacts are anticipated on the availability of current surface or groundwater resources used by local landholders.

5.3.4 EROSION AND SEDIMENTATION

There is a moderate to high potential risk for dispersion where soils are disturbed by Project construction efforts within the Project Area. Higher impact activities such as where earthworks are necessary for construction of sub-station pads or site facilities are very likely to result in increased dispersive behaviour when soil is remoulded, compacted or pulverised. Wind erosion must also be considered and soils exposed as a result of construction should be sown with grass and pasture species with starter fertiliser to provide stabilising ground cover.

However, due to the flat nature of the landform and existing aeolian processes, the risk of erosion and sedimentation impacts on agriculture as a result of the Project is low.

With the implementation of mitigation measures detailed in Section 6.2, it is expected that direct and indirect erosion and sedimentation risks would be limited and manageable.

5.3.5 AGRICULTURAL INFRASTRUCTURE

The Project will have a negligible impact on local and regional agricultural infrastructure. There will be negligible impacts on the road network that connects the agricultural industry to markets, services and suppliers (refer Section 5.4.4).

Within the Project Area, stock fences, dams and access tracks will be retained for continued grazing operations outside of the Disturbance Footprint.

5.4 OTHER POTENTIAL IMPACTS ON AGRICULTURE

5.4.1 WEEDS AND PEST SPECIES

Weeds and pest species could be inadvertently brought into the Project Area with imported materials, machinery, or allowed to invade naturally through removal or damage of current vegetation. The presence of weed species has the potential to be a major long term hindrance to agricultural endeavours within the locality and region, as well as rehabilitation efforts within the Project Area.

Weeds in general will be managed across the site through a weed management plan. This will include an ongoing effort to identify and eliminate existing weed populations on-site over the life of the Project. The spread of declared noxious weeds will be prevented by using site specific measures such as direct spraying.

Weed control, if required, will be undertaken in a manner that will minimise soil disturbance. Any use of herbicides will be carried out in accordance with the regulatory requirements. Records will be maintained of weed infestations and control programs will be implemented according to best management practice for the weed species concerned.

Feral animal control may potentially be undertaken in consultation with neighbouring landholders, as required. Programs to control feral animals will include the determination of appropriate control practices, consultation with

appropriate authorities, obtaining appropriate approvals, implementing control practices, and undertaking follow-up monitoring and control as required. If a substantial increase in the numbers of any known feral fauna species, or the occurrence of a previously unrecorded feral fauna species, is discovered, advice will be sought from a suitably qualified and experienced person on the management and control options for that species and appropriate measures for mitigating any impacts caused by its management on native species.

Feral animals may include cats, rabbits, pigs, and dogs and will be controlled in accordance with Livestock Health and Pest Authority procedures.

With the effective implementation of measures to manage and control the spread of weeds and pest species within and around the Project Area, weeds and pests will not have an impact on agriculture within the Project locality.

5.4.2 BIOSECURITY

Biosecurity is defined in the 'Draft NSW Biosecurity Strategy' (DPI, 2021) as 'the protection of the economy, environment and community from pests, diseases and weeds'. It includes measures to prevent new pests, diseases and weeds from entering our country and becoming established. At the local level, as per Section 5.4.1 above, appropriate weed management will reduce biosecurity risks. On a regional level, any import of equipment or machinery from overseas will follow the standard procurement safeguards and quarantine procedures as per Australian requirements.

Further, an agricultural biosecurity management plan detailing construction and operational risks and controls in relation to pests, weeds, and diseases will be prepared for the Project.

As DPI has noted for other similar large scale renewables projects, the agricultural biosecurity management plan should include controls to address the current elevated threat of foot-and-mouth disease (FMD), a serious and highly contagious animal disease that affects all cloven-hoofed animals including cattle and sheep. An incursion of the virus would have severe consequences for Australia's animal health and trade. Key controls should include adherence to government FMD awareness, prevention and preparedness programs and guidance.

Given the processes above, it is considered that the Project will not have any potential impact on the biosecurity of agricultural resources and enterprises within the region.

5.4.3 AIR QUALITY AND DUST

Construction and decommissioning activities have the potential to increase dust through movement of traffic on unsealed roads on dry days, vegetation removal, and localised dust emissions generated by land disturbance (such as excavation activities required for infrastructure). Dust control measures will be detailed in a Construction Environmental Management Plan (CEMP). With the implementation of the CEMP, it is expected that the construction and decommissioning activities would have a negligible impact on local air quality.

During operations, ongoing maintenance of infrastructure and land will result in very minor, localised vehicle emissions and generation of dust from vehicles travelling along unsealed internal access tracks. These impacts are unlikely to affect agriculture and standard dust suppression measures will be outlined in an Operational Environmental Management Plan (OEMP) to manage and control dust where required.

5.4.4 TRAFFIC

Agricultural enterprises can be impacted by increased traffic movements through an increase in noise and dust, and also through the cumulative impact of road transport being utilised by wind farm operations, leaving fewer transport options for agricultural enterprises.

The roads in proximity to the Project Area are anticipated to experience an increase in traffic volumes during the peak construction period. However, the Traffic Impact Assessment for the Project determined that the current road

network has adequate capacity for construction traffic and free flow conditions would continue. Further, no increases in levels of noise and dust that could impact agriculture will result from increased traffic.

Therefore, the traffic impacts of the Project are not likely to have consequences on agricultural enterprises within the Project locality.

5.4.5 NOISE AND VIBRATION

Background noise levels are expected to reflect the site's location in a rural setting away from population centres. Background noise sources would include traffic, farm equipment, wind through trees, birds and insects.

Noise levels during construction and operation are predicted to comply with noise criteria. It is expected that noise will be effectively managed and minimised through the adoption of standard management practices. The Applicant will implement practicable measures to reduce noise impacts including for example, the careful location of noise generating components within the site to increase the distance to sensitive receivers. Supportive evidence is provided through a Noise Impact Assessment in the EIS.

Generally, agriculture is only impacted by noise when constantly high noise levels or sudden loud noise leads to a decrease in animal production through increased livestock stress. Cattle may tolerate moderate levels of noise and may easily adapt to an intensity level of 60-90 dB. Continuous exposure to noise above 90dB has been known to severely affect animals (Dairy Global, 2017).

The assessment of potential noise impacts has been undertaken via a Noise and Vibration Impact Assessment (NVIA). Appropriate mitigation measures are specified within the NIA to minimise noise impacts. As a result, the NIA predicts noise levels will be far below 90dBA as a result of the Project where livestock will be located on a non-associated property adjacent to the Project Area. As such, livestock and other agricultural resources are unlikely to be impacted by construction and operational noise due to the Project.

5.5 CUMULATIVE IMPACTS

The Project has the potential to generate cumulative impacts with numerous other existing, approved or proposed developments in the region, which are numerous and detailed in the EIS for the Project. These generally consist of solar farm and a wind farm projects, with few mining and infrastructure projects.

In the context of agriculture, increased cumulative impacts including changes to land used for agriculture, localised productivity, secondary productivity and some agricultural support services are likely to be experienced. This will be a result of agriculture land use being inhibited by landform modification and infrastructure, such as the development footprints for wind and solar farms. However, given the nature and scale of the established agricultural industries within the region that interfaces with renewable energy projects (that is, predominantly livestock grazing, with some broadacre cropping), as well as the generally low quality agricultural resources and low stocking rates for the region, significant impacts to regional agricultural businesses, industry critical mass thresholds and regional agricultural infrastructure are unlikely to occur in the foreseeable future.

In addition, the applicability of dual land use opportunities for solar and wind farm projects is especially relevant to the South West REZ given the suitable conditions for sheep grazing and the established sheep and lambing industries and infrastructure (as outlined in Section 2.4.3).

Therefore, given the majority of proposed development in the local and regional context of the Project are renewables developments, the cumulative impact on agriculture for the region is considered to be low given changes to agricultural land use and agricultural productivity are anticipated to be negligible to minor for each respective wind and solar Project.

6 MITIGATION MEASURES

The Project will include a number of measures to prevent, minimise and manage adverse impacts on agricultural resources. This incorporates procedural mitigation measures along with a land management process that ensures the Project has negligible impact on agricultural resources and enterprises.

In addition to the specific measures described in this assessment, all activities associated with the Project will be conducted in consideration of approval obligations and environmental management measures in development consent stipulated environmental management plans.

6.1 PROJECT DESIGN

The design of the Project is the result of an iterative process and has been adapted progressively as information regarding site constraints, and the potential impacts and risks associated with the development of the Project have become available. Constraints related to cultural heritage, electricity network easements, visual impact, heritage sensitivities and biodiversity values in particular have been considered in developing the proposed layout.

Given the negligible effect the Project will have on agricultural resources and enterprises, (as outlined in Section 5), no further design amendments are recommended to address agricultural impacts.

Further Project design considerations, as well as an analysis of Project alternatives, are presented in the EIS.

6.2 LAND AND SOIL DISTURBANCE MITIGATION

6.2.1 SOIL EROSION MANAGEMENT

Based on site observations and an analysis of laboratory data, there is a moderate to high potential risk for dispersion where soils are disturbed by Project construction efforts within the Project Area. Higher impact activities such as where earthworks are necessary for construction of sub-station pads or site facilities are very likely to result in increased dispersive behaviour when soil is remoulded, compacted or pulverised. However, due to the nature of the landform, the risk of erosion and sedimentation impacts as a result of the Project remains a low.

Nonetheless, erosion and sedimentation risks present could result in long term, irreversible agricultural impacts if suitable controls are not implemented. As part of a Construction Environmental Management Plan (CEMP), and Operational Environmental Management Plan (OEMP), the Project will prepare an Erosion and Sediment Control plan (ESCP) that addresses specific soil dispersion risks based on disturbance activity and phase of the Project. The ESCP should include the following:

Construction Phase

- The Project should utilise the existing landform and not endeavour to undertake broad-scale re-contouring of the existing ground levels without referring to this soil and land resource assessments and implementing erosion and sediment control accordingly. As a result, the existing vegetative cover and soil structure will be maintained intact across much of the Project Area.
- Generally, channelised drainage patterns should be minimised and the Project should limit hard engineering solutions for erosion control and preference soft, vegetated structures.
- Construction areas should be progressively revegetated with grass and pasture species as installation of wind farm turbines and site infrastructure is completed.
- At all locations where earthworks are necessary, erosion and sediment controls will be placed in accordance with the Landcom (2004) guidelines.
- Preservation and stabilisation of drainageways and minimisation of the extent and duration of any surface disturbance will be prioritised during construction.

- Due to the consistency sodic nature of the soils within the Disturbance Footprint, where soils are subject to high impact disturbance activity such as extensive excavation and surface modification, it is recommended to apply gypsum as an ameliorant to displace the sodium and provide the soil with a stronger aggregate and hold structure when wet. This is especially relevant to stockpiled sodic soils.
- All areas disturbed during construction that are complete and have no further use during construction should be sown with grass.

Operation Phase

- Soil disturbance during operation of the Project should be limited to maintenance activities, involving very small, localised disturbance areas on an infrequent basis.
- Standard erosion and sediment control measures should be implemented to minimise the potential for aeolian export within areas to be disturbed during operations. These measures would be developed on a case-by-case basis referring to this soil assessment and are likely to include measures such as sediment fencing, localised sediment traps, and progressive stabilisation with vegetation.
- Groundcover within the Project Area should be maintained at a minimum of 70% where practical (subject to long terms seasonal variations, such as drought).

Decommissioning and Rehabilitation Phase

- A detailed Decommissioning and Rehabilitation Plan should be prepared within 18 months of the planned closure of the Project. This plan will detail all aspects of decommissioning and removal of all infrastructure for post Project land use (some infrastructure may remain for post Project land use purposes i.e., constructed internal roads may be kept as part of the agricultural infrastructure), which may require temporary erosion and sediment control measures.
- During decommissioning, where potential erosive impacts have been identified due to the disturbance of sodic subsoils in locations of significant disturbance, soil amelioration should be undertaken as part of remediation earthworks. Standard temporary erosion and sediment control measures are to be put in place for high disturbance areas.

6.2.2 SOIL DISTURBANCE MANAGEMENT

Land that is proposed to be disturbed during the Project over the 1,059 ha portion of the Disturbance Footprint being returned to agriculture land use must have a soil growth medium reinstated at a safe and stable depth in order to mitigate long term effects on the land and soil capability of the Project Area.

Minesoils recommends all Project infrastructure be removed, consistent with DPI's preference for large scale Projects being undertaken on land that will be returned to agriculture. This is especially relevant for ground cabling in coarser textured soils that may be exposed over time by the aeolian processes observed to be active within the Project Area.

Areas subject to excavation and subsoil exposure should be capped with suitable topsoil material as soon as practical – i.e. immediately following trenching during the construction phase, or following removal of site facilities at the time of decommissioning.

Where infrastructure is unable to be removed, soil capping material should be reinstated to a depth of 0.5m, with material of suitable texture and preparation to mitigate long term wind erosion.

Soil capping material will either be obtained from stripped and stockpiled soil from the construction phase of the Project, or soil otherwise sourced during decommissioning. Soil capping material should be chemically and physically stabile. The subsoils observed throughout the Project Area are generally unsuitable as capping material due to risk of highly saline and sodic soils. Sandy textured soils are unsuitable as capping material due to high risk of wind erosion.

A site soil management plan that includes soil management measures relating to stripping, stockpiling, reuse, determining soil capping suitability, and soil material sourcing as required, should be prepared for the Project to inform the CEMP, OEMP and a Decommissioning and Rehabilitation Plan.

The following re-spreading and seedbank preparation techniques are recommended to prevent excessive soil deterioration and dispersion for areas where soil will be re-spread over disturbed land or used to cap remaining infrastructure.

- Soil should be spread to a depth that best reflects pre-disturbance soil horizons and surrounding landform – ie. level plains.
- Soil should be spread, treated with fertiliser and seeded in one consecutive operation, to reduce the potential for topsoil loss to wind and water erosion. Thorough seedbed preparation should be undertaken to ensure optimum establishment and growth of vegetation.
- The respread soil surface should be scarified prior to, or during seeding, to reduce run-off and increase infiltration. This can be undertaken by contour tilling with a fine-tyned plough or disc harrow.

6.3 MONITORING PROGRAMS

Monitoring programs are instituted to assess predicted versus actual impacts as the Project progresses in order to implement controls where required. All operations associated with the Project undertaken in accordance with approved environmental management plans and strategies. The management plans will include environmental monitoring programs, where required. Key management plans, or chapters housed within a larger OEMP, that will assist in managing impacts on agricultural land will be stipulated in conditions of development consent. These should include soil management, erosion and sediment control, weed management and biosecurity related plans (or OEMP chapters).

These management plans, which will include mitigation measures to control impacts to soils and agriculture, will be reviewed and revised where necessary to incorporate the requirements associated with the Project prior to commencement.

6.4 MITIGATION SUMMARY

The mitigation measures pertaining to soils and agriculture that have been referenced in this assessment will form part of the development consent commitments. A summary of these is presented in **Table 19**.

Table 19: Summary of Mitigation Measures

Risk Category	Mitigation Measure
Agricultural Land Use	During the life of the Project, agriculture land use will continue within the Project Area outside of the Disturbance Footprint. At the time of decommissioning, agriculture land use will be re-established over 1,059 ha of agricultural land removed from agriculture (unless otherwise agreed with the landowner and/or regulatory authorities).
Agricultural Productivity	During the life of the Project, agriculture land use will continue within the Project Area outside of the Disturbance Footprint at historical stocking rates. At the time of decommissioning, the Project Area will be returned to an agricultural productivity that is approximately equivalent of pre-Project status.
Soil Disturbance	All soil that is proposed to be disturbed during the Project will be handled in accordance with the strategy outlines in Section 6.2.1 and a site soil management plan prepared for the Project that includes soil management measures relating to stripping, stockpiling, reuse, and sourcing, as required. This will inform the CEMP, OEMP and a Decommissioning and Rehabilitation Plan. All soil resources are to be managed throughout construction, operation and decommissioning phases of the Project in accordance with an ESCP which should include recommendations outlined in Section 6.2.1. All remaining infrastructure to be capped with 0.5m of soil at the time of decommissioning with material of suitable texture and preparation to mitigate long term wind erosion in order to restore pre-disturbance LSC classes.
LSC	At the time of decommissioning, 1,059 ha of disturbed land will be returned to an equivalent LSC class following the end of life for the Project, through site rehabilitation and good soil management practices as outlined in Section 6.2.
Erosion and Sedimentation	All soil resources are to be managed throughout construction, operation and decommissioning phases of the Project in accordance with an ESCP which should include recommendations outlined in Section 6.2.1.
Agricultural Infrastructure	Stock fences, farm dams, and access tracks to be retained and maintained to accommodate continued grazing operations within the Project Area
Pest Species	Pest species will be managed in accordance with measures outlined in Section 5.4.1, and a Weed Management Plan prepared for the Project.
Biosecurity	Biosecurity will be managed in accordance with measures outlined in Section 5.4.2 and an Agricultural Biosecurity Management Plan prepared for the Project.

7 SUMMARY

There is a high level of certainty about the status of agricultural resources and enterprises in the Project Area, locality and broader region, based on the soil survey and site verification assessment undertaken, consultation and desktop studies carried out. Further, there is a high level of confidence regarding the Project activities, surface disturbance requirements and commitments to returning land to pre-disturbance agricultural land use following the life of the Project.

Based on these factors, the impacts on agriculture as a result of the Project are determined to be generally minor, temporary, and limited to the development footprint. These impacts can be summarised as the following:

- Temporary removal of 1,066 ha of land within the Project Area from agricultural land use for the duration of the Project.
- Temporary removal of potential agricultural primary productivity to the estimated value of up to $155,636 per year for the duration of the Project.
- Temporary impacts on soil resources and LSC within the Project Area where surface disturbance occurs.

Due to the 330 kV switching station infrastructure assumed to be remaining as a permanent feature of the Project Area following the Project, the minor permanent impacts as a result of the Project consist of the following:

- Permanent removal of 7 ha from agricultural land use.
- Permanent removal of potential agricultural primary productivity to the estimated value of up to $1,022 per year.
- Permanent impacts on soil resources and LSC over 7 ha.

The temporary and permanent impacts on agriculture listed above are considered a negligible impact in the context of the gross commodity values and land use coverage of the agricultural industries operating within the Hay Shire and Edwards River LGAs. Given the nature and scale of the established agricultural industries within the region and wider state, there will be no impact to critical mass thresholds of agricultural enterprises needed to attract and maintain investment in agricultural industries and infrastructure. At the scale of the enterprises operating within the Project Area, the minor anticipated impacts are considered offset as the involved landowner would be financially compensated.

A summary of mitigation measures and management recommendations have been provided at Section 6.5 as key controls to the temporary risks of the Project on land and soil resources. The reinstatement of a physically and chemically stabile soil growth medium over disturbed areas is critical to ensure rehabilitation commitments are able to be met and 1,059 ha of the 1,066 ha of agricultural land being disturbed is able to be returned to a pre-disturbance agricultural status.

It is anticipated that by adopting a soil management strategy and targeted soil and erosion management during Project construction and operation, and implementing effective decommissioning and rehabilitation at the end of Project life, the Project will have minor impact on the soils and agricultural productivity of the Project Area, and negligible impact on agriculture industries operation within the region.

8 REFERENCES

Australian Bureau of Statistics (2022a), Agricultural Commodities, Australia. Year 2020-2021. https://www.abs.gov.au/statistics/industry/agriculture/agricultural-commodities-australia

Australian Bureau of Statistics (2022b), Value of Agricultural Commodities Produced, Australia. Year 2020–2021 https://www.abs.gov.au/statistics/industry/agriculture/value-agricultural-commodities-produced-australia

Bureau of Meteorology (2024). Climate statistics for Australian locations, Hay Airport (Site No. 075019), Australian Government. Accessed 25 January 2023: Climate statistics for Australian locations (bom.gov.au)

Bureau of Meteorology and the CSIRO (2019) *Riverina Regional Weather and Climate Guides*

B. E. Butler, G. Blackburn, J. M. Bowler, C. R. Lawrence, J. W. Newell, S. Pels (1973) *A Geomorphic Map of the Riverine Plain of South-eastern Australia.* Australian National University Press Canberra

Edward River Council (2013) *Conargo Local Environmental Plan 2013*

Elliot, G.L. and Reynolds, K.C. *in* Charman, P.E.V. and Murphy, B.W. (2007) *Soils their Properties and Management* (Oxford University Press, Australia).

Geoscience Australia (2016) *GA Surface Geology of Australia* MapServer, Canberra.

Hay Shire Council (2011) *Hay Local Environmental Plan 2011*

Isbell, R. F. (2021) *The Australian Soil Classification Third Edition* (CSIRO Publication, Australia).

McKenzie, N.J, Grundy, M.J., Webster, R. and Ringrose-Voase, A.J. (2008) *Guidelines for Surveying Soil and Land Resources (2nd Ed)*. CSIRO Publishing, Melbourne.

Meat and Livestock Australia (MLA) (2022) National Livestock Reporting Service – Saleyard Survey 2021-2022.

NSW Department of Planning, Industry and Environment (2022) Retrieved of following layers: soil landscapes, soil types, inherent soil fertility, land and soil capability. espade.environment.nsw.gov.au

NSW Department of Planning and Environment (2022) *Large-Scale Solar Energy Guideline*

NSW Department of Primary Industries (2011) *Land and Use Conflict Risk Assessment Guide.*

NSW Department of Primary Industries (2018) *Riverina Murray Region Agricultural Profile*

NSW Department of Industry & Investment (2021) *Biosecurity Strategy*

NSW Department of Primary Industries (2023) *Farm Enterprise Budget Series - Summary of gross margins for NSW beef enterprises*

NSW Office of Environment and Heritage and DPI-OAS&FS (2013). *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land.*

NSW Office of Environment and Heritage (2012). *The land and soil capability assessment scheme: second approximation – A general rural land evaluation system for NSW.*

Appendix 1

Land Use Conflict Risk Assessment

Overview

LUCRA is a system to identify and assess the potential for land use conflict to occur between neighbouring land uses. It helps land managers and consent authorities assess the possibility for and potential level of future land use conflict.

The LUCRA compares and contrasts the Project against adjoining/surrounding land uses and activities for incompatibility and conflict issues based on the risks and impacts identified in Section 5, and the mitigation measures and controls presented in Section 6. Each potential conflict between the operation of the wind farm and adjacent land has been assessed and given a risk ranking based on probability and consequence as outlined in the following section.

Assumption

The current status of rural land use in the area is not considered likely to change significantly during the life of the Project. For example, due to the location of the Project Area relative to major regional towns, it is considered unlikely that surrounding properties will undergo subdivision to accommodate residential or small-block rural developments. Accordingly, it is not expected that future changes to land use will occur that will generate new land use conflicts in addition to those identified.

Methodology

A risk ranking matrix (**Table A1**) provided by the DPI (2011) is used to rank the identified potential land use conflicts. The risk ranking matrix assesses the economic, social and environmental impacts according to the probability of occurrence and consequence of the impact.

Table A1: Risk Ranking Matrix

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

(Source: DPI, 2011)

The risk ranking 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 A2**) and 5 levels of 'consequence', (a number 1 to 5 as defined in **Table A3**) 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. A rank of 25 is the highest magnitude of risk; a highly likely, very serious event. A rank of 1 represents the lowest magnitude of risk; an almost impossible, very low consequence event. Low risk is a ranking score of 10 or below.

Table A2: Probability Definitions

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 or 'I've never heard of it happening.'

(Source: DPI, 2011)

Table A3: Consequence Definitions

	Description	Example of Implications
Level 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	• Harm or death to animals, fish, birds or plants • Long term damage to soil or water • Odours so offensive some people are evacuated or leave voluntarily • Many public complaints and serious damage to Council's reputation • Contravenes Protection of the Environment & Operations Act and the conditions of Council's licences and permits. Almost certain prosecution under the POEO Act
Level 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	• Water, soil or air impacted, possibly in the long term • Harm to animals, fish or birds or plants • Public complaints. Neighbour disputes occur. Impacts pass quickly • Contravenes the conditions of Council's licences, permits and the POEO Act • Likely prosecution
Level 3		
Moderate	• Moderate and/or medium-term impact to the environment and community • Some ongoing management implications • Neighbour disputes occur	• Water or soil known to be affected, probably in the short to medium-term (e.g. 1-5 years) • Management could include significant change of management needed for agricultural enterprises to continue
Level 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	• Theoretically could affect the environment or people but no impacts noticed • No complaints to Council • Does not affect the legal compliance status of Council
Level 5		
Negligible	• Very minor impact to the environment and community • Can be effectively managed as part of normal operations • Neighbour disputes unlikely	• No measurable or identifiable impact on the environment • No measurable impact on the community or impact is generally acceptable

(Source: DPI, 2011)

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Construction Ground Disturbance	Land users in the locality may be concerned about changes to water quality, quantity and surface water flows that may affect the site and locality, including local waterways, from surface disturbances during construction activities	C	4	8	Consideration of impacts to surrounding water courses and water quality has been undertaken within the water impact assessment for the EIS. The nature of the landform indicates a low erosion and sedimentation risk. Appropriate mitigation measures are specified within the EIS, including soil erosion and sedimentation controls within this report, to minimise impacts to watercourse health and quality. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to watercourse health and quality. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved), such as a soil management plan and an erosion and sediment control plan.	D	4	5	Effectiveness of mitigation measures will be measured as part of the EMS, specifically the Erosion and Sediment Control Plan (ESCP).
Construction Ground Disturbance	Stakeholders may be concerned about impacts to heritage items or values at the site and locality.	B	4	12	An assessment of impacts to heritage has been undertaken with the preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR) and a historic heritage assessment. Appropriate mitigation measures are specified within the ACHAR and the historic heritage assessment to minimise impacts to heritage. Compliance with mitigation measures specified within the ACHAR and the historic heritage assessment is anticipated to reduce the risk of conflict related to environmental features, culturally sensitive land and heritage. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).	D	4	5	Effectiveness of mitigation measures will be measured as part of the EMS, specifically through an Aboriginal Cultural Heritage Management Plan (ACHMP).

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Construction Ground Disturbance	Stakeholders may have concerns that the construction of the wind farm may alter and disturb existing soil properties, undermining the suitability of the land for future agricultural production.	C	2	18	The assessment of soil characteristics, erodibility and land and soil capability has been undertaken within this agricultural assessment. Anticipated impacts and appropriate mitigation measures are provided within this report. Compliance with mitigation measures is anticipated to reduce the risk of potential conflicts related to future land capability for agriculture. Implement all measures specified in this report and associated management plans identified in the EIS and/or consent conditions (if approved).	E	3	6	Effectiveness of mitigation measures will be measured as part of the EMS, specifically the Soil and Water Management Plan (SWMP).
Construction Disturbance	Stakeholders may be concern about potential impacts to biodiversity within the site and locality from construction activities	B	3	17	The assessment of impacts to biodiversity has been undertaken via a BDAR. Appropriate mitigation measures are specified within the BDAR and this assessment to minimise the risk for impacts on biodiversity within the site and locality. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	3	9	Effectiveness of engagement will be measured as part of the EMS.
Construction Noise	Land users in the locality may be concerned construction activity noise disturbances may affect livestock behaviour and/or breeding.	D	3	9	The assessment of potential noise impacts has been undertaken via a Noise Impact Assessment (NIA). Low stocking rates and distance between neighbouring farms in the locality suggest a low risk. Appropriate mitigation measures are specified within the NIA to minimise noise impacts. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to noise impacts on agricultural land users. Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	4	5	Any complaints from neighbours regarding effects to livestock can be managed within normal operations.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Construction Dust	Land users in the locality may be concerned that dust generated by construction activities may affect livestock or impact agriculture land uses such as cropping.	D	3	9	The assessment of potential dust impacts has been undertaken as part of the EIS. With the implementation of mitigation measures, the Project can be constructed without any significant impact to local and regional air quality. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to air quality impacts. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).	E	4	3	Effectiveness of mitigation measures will be measured as part of the Environmental Management System (EMS), which will include a Construction Environmental Management Plan (CEMP) that outlines dust suppression strategies.
Construction Traffic	Use of Sturt Highway and local roads during construction of the wind farm may cause conflict by interacting with agricultural and/or local transport activities, and/or resulting in additional travel time for road users	C	4	8	The assessment of potential traffic impacts has been undertaken via a Traffic Impact Assessment (TIA), which found the road network can accommodate the traffic generated by the Project during the construction, operation and decommissioning stages. Appropriate mitigation measures are specified within the TIA to minimise impacts to the traffic environment. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to traffic for surrounding land users. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved)	D	4	5	The EMS, specifically the Traffic Management Plan (TMP), will include a complaint resolution as a mechanism to address any issues identified by neighbouring land users.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Construction Traffic	Land users in the locality may be concerned about the possibility of increased vehicles during construction or operation may result in an accident with livestock, farm machinery or wildlife on roads.	D	1	19	The assessment of potential traffic impacts has been undertaken via a Traffic Impact Assessment (TIA). The low volume of traffic on local roads suggest a low risk. Appropriate mitigation measures are specified within the TIA to minimise impacts to the traffic environment. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to traffic for surrounding land users. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).	E	2	10	The EMS, specifically TMP, will include a complaint resolution as a mechanism to address any issues identified by neighbouring land users
Construction Workforce	Public authorities may be concerned about the increased demand for services and infrastructure that may result from the development, especially during the construction stage, including increased accommodation for workers, availability of medical facilities and capacity of surrounding waste facilities	C	5	4	The assessment of impacts related to the increased demand for surrounding services and infrastructure has been undertaken via a Social Impact Assessment (SIA) and as part of the EIS. Levels of anticipated increased demand and appropriate mitigation measures are specified within the SIA to minimise the risk for logistical issues associated with the increased demand for existing infrastructure and services. Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	5	2	Effectiveness of mitigation measures will be measured as part of the EMS.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Construction Workforce	Neighbouring landholders may be concerned about the presence of an accommodation camp within the Project Area, if to be constructed and utilised for the project. This may be perceived to adversely affect neighbouring agricultural operations or local residents security.	C	5	4	The assessment of impacts related to the presence of an accommodation camp has been undertaken via a Social Impact Assessment (SIA) and as part of the EIS. Grazing at low stocking rates and the distance between the Project Area and the nearest sensitive agricultural operation, as well as the distance to the nearest residences, suggest a low risk. All site personnel will be required to follow struct site policies while lodging at accommodation camp. Impacts to agricultural enterprises on neighbouring properties are unlikely to be experienced. Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	5	2	Effectiveness of mitigation measures will be measured as part of the EMS.
Construction Work	Stakeholders may have concerns that construction activities associated with the wind farm may damage existing infrastructure including transmission lines and public infrastructure.	C	4	8	Consideration of potential impacts to surrounding service provider infrastructure has been undertaken as part of the EIS. Appropriate mitigation measures are specified within the EIS and will be detailed in a Construction Environmental Management Plan (CEMP) to minimise the risk of construction activities damaging existing infrastructure. Compliance with construction management measures anticipated to reduce the risk of conflict related to damaging existing infrastructure. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).	D	4	5	No damage to existing infrastructure including transmission lines during the construction phase due to project activities. Any impacts to public infrastructure will be remedied.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Project Infrastructure	Neighbouring landholders may be concerned that aerial spraying undertaken on properties within the locality may be limited by wind turbine structures and associated turbulence in the Project Area.	D	2	13	Aerial protocols will provide safe boundaries and clear rules for aerial farm services to operate in the vicinity of the windfarm. This will minimise the inconvenience to farmers and maximise efficiency of spraying activity. The Project will develop an agreed set of protocols with the local aerial applicators for all relevant operational issues, including action by the wind farm operator to stop blades in a safe position during application operations as required.	E	2	10	No complaints from agriculture enterprises regarding limitations on aerial farm applications.
Project Infrastructure	Aerial farm service providers in the locality may be concerned that wind turbine structures and associated turbulence in the Project Area may pose safety risk.	D	1	19	In accordance with the Aerial Agricultural Association of Australia (AAAA) policy document on windfarms, the assessment recommends that in areas where there is irrigated cropping: • All power lines to be underground, where possible • All MET towers are marked in accordance with NASAG Guidelines and notified to the local aerial applicators • Local aerial applicators are notified about the WTG locations, including permanent MET towers. The Project will develop an agreed set of protocols with the local aerial applicators for all relevant operational issues, including action by the wind farm operator to stop blades in a safe position during application operations as required.	E	1	13	No incidents.
Project Infrastructure	Stakeholders may be concern about potential impacts to biodiversity including migratory wetland birds from placing wind turbines in proximity of seasonal lakes.	B	3	17	The assessment of impacts to biodiversity has been undertaken via a BDAR. Appropriate mitigation measures are specified within the BDAR and this assessment to minimise the risk for impacts on biodiversity within the site and locality. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	3	9	Effectiveness of engagement will be measured as part of the EMS.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Land Removed from Agriculture	Stakeholders in the locality may be concerned about the reduction of land used for agricultural purposes or the reduction of productivity of the land	D	2	13	The assessment of the reduction of land used for agriculture and the productivity of land has been undertaken within this agricultural assessment, which determined impacts to be negligible. Appropriate mitigation measures are provided within the agricultural impact assessment report for stakeholder consideration. A Decommissioning and Rehabilitation Management Plan will ensure the land can be successfully returned to agricultural production following decommissioning.	D	4	5	Rehabilitation objectives and strategies (including performance measures) will be established in the Decommissioning and Rehabilitation Management Plan.
Land Removed from Agriculture	Land users in the locality may be concerned about impacts to agricultural support infrastructure in the Project locality and wider region	D	4	5	The assessment of the impacts to agricultural support infrastructure in the Project locality and wider region has been undertaken within this agricultural assessment, which determined impacts to be negligible. Anticipated impacts are determined to be negligible and presented in this report for land user consideration. Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	5	2	No complaints from agriculture enterprises regarding impact to agricultural support infrastructure due to project activities.
Operation Traffic	Land users in the locality may be concerned about an increase in traffic volume on local roads throughout the operational phase of the Project, which may cause conflict by interacting with agriculture transport activities or increasing travel times over the life of the Project.	D	4	5	The assessment of potential traffic impacts during the operational phase of the Project has been undertaken via a Traffic Impact Assessment (TIA). Anticipated impacts are determined to be negligible and presented in the EIS for land user consideration. Ongoing consultation with stakeholders will identify and address concerns if they arise.	E	5	1	Effectiveness of mitigation measures will be measured as part of the EMS which will include a complaint handling system.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Operation Traffic	Land users in the locality may be concerned that dust generated by increased vehicle movements along access roads during the operational phase of the Project has the potential to impact air quality and may have adverse health implications for residential land users within the locality.	D	3	9	The assessment of potential dust impacts during the operational phase of the Project has been undertaken as part of the EIS. Anticipated impacts are determined to be negligible and presented in the EIS for land user consideration. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).	E	5	1	Effectiveness of mitigation measures will be measured as part of the EMS which will include a complaint handling system.
Operation Noise	Land users in the locality may be concerned about an increase in noise levels generated from wind turbines, power inverters, transformer system and maintenance activities throughout the operational phase of the Project.	C	3	13	The assessment of potential noise impacts has been undertaken via a Noise Impact Assessment (NIA). Anticipated impacts are determined presented in the EIS for land user consideration. Ongoing consultation with stakeholders will identify and address concerns if they arise.	D	4	5	Effectiveness of mitigation measures will be measured as part of the EMS.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Visual Amenity	Stakeholders in the locality who wish to maintain views of the existing landscape may be concerned about the change in visual amenity resulting from the wind farm	B	3	17	The assessment of potential noise impacts has been undertaken as part of a Landscape and Visual Impact Assessment (LVIA). Anticipated impacts are determined presented in the EIS for land user consideration. Risk reductions controls consist of the following: • Uniformity in the colour, design, rotational speed, height, and rotor diameter. • The use of simple muted colours and non-reflective materials to reduce distant visibility and avoid drawing the eye. • Blades, nacelle, and tower to appear as the same colour. • Avoidance of unnecessary lighting, signage, logos etc • The Landscape and Visual Impact Assessment (LVIA) has recommended one non-associated dwelling be considered for screen planting. Should this dwelling become habitable, in consultation with the landowner post construction, screen planting will be considered. • Neighbour Agreements have been reached to demonstrate acceptance of the project and its associated impacts to neighbours with dwellings located within 10 km of a WTG.	D	3	9	Effectiveness of mitigation measures will be measured as part of the EMS which will include a complaint handling system.
Property Devaluation	Landowners in the locality may be concerned about potential devaluation of properties due to proximity to wind farm infrastructure.	B	3	17	Neighbour Agreements have been reached to demonstrate acceptance of the Project and its associated impacts to neighbours with dwellings located within 10 km of a WTG. Benefits sharing funding programs have been agreed with Hay Shire Council and Edward River Council following consultation, as further discussed in the EIS.	D	3	9	Effectiveness of mitigation measures will be measured as part of the EMS which will include a complaint handling system.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Biosecurity	Land users in the locality may be concerned about biosecurity breaches including weed, plant pest, plant disease or pest animal introduction and/or spread, as a result of the Project.	B	2	21	The assessment of impacts to biodiversity has been undertaken via a BDAR. Consideration of the potential for pest species to impact agriculture has been included in this assessment. Appropriate mitigation measures are specified within the BDAR and this assessment to minimise the risk for weeds and pests to spread throughout the site and onto neighbouring land. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).	D	3	9	Effectiveness of mitigation measures will be measured as part of the EMS, specifically Biodiversity Management Plan.
Operation Erosion Management	Land users in the locality may be concerned about changes to site run-off water quality during operational phases of the Project	C	3	13	Consideration of impacts to surrounding water courses and water quality has been undertaken within the water impact assessment of the EIS. Appropriate mitigation measures are specified within the EIS, including soil erosion and sedimentation controls within this report, to minimise impacts to watercourse health and quality. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to watercourse health and quality. Ongoing consultation with stakeholders will identify and address concerns if they arise. Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved), such as an erosion and sediment control plan.	D	4	5	Effectiveness of mitigation measures will be measured as part of the EMS.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Livestock Management	Neighbouring landowners may be concerned about livestock on Project Area entering adjacent properties	D	4	5	Operational management plans will include a provision to ensure boundary fence is 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. Ongoing consultation with stakeholders will identify and address concerns if they arise.	E	4	3	Effectiveness of mitigation measures will be measured as part of the EMS.
Livestock Management	Neighbouring landowners may be concerned about their livestock entering the Project Area and becoming injured or causing damage	D	4	5	Operational management plans will include a provision to ensure boundary fence around site infrastructure that can be damaged by livestock is 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. If livestock enter the site, the surrounding landowners should be contacted. Efforts will be made to ensure the animal is not distressed and kept away from public roads. Ongoing consultation with stakeholders will identify and address concerns if they arise.	E	4	3	Effectiveness of mitigation measures will be measured as part of the EMS.
Decommissioning and Rehabilitation	Stakeholders may be concerned about the potential for poor decommissioning and rehabilitation outcomes and the resulting long term environmental and agricultural consequence.	C	3	13	A Decommissioning and Rehabilitation Plan will ensure the land can be successfully returned to pre-disturbance land and soil capability and final land use commitments following decommissioning.	E	3	6	Rehabilitation objectives and strategies (including performance measures) will be established in the Decommissioning and Rehabilitation Management Plan.

Risk	Potential Conflict	Initial Risk Rating			Risk Reduction Control	Final Risk Rating			Performance Target
		Probability	Consequence	Rating		Probability	Consequence	Rating	
Cumulative Impacts	Public Authorities and the local community may have concerns regarding the potential for cumulative impacts arising from the proximity of nearby renewable developments.	B	3	17	An assessment of potential cumulative impacts has been undertaken as part of the EIS. Appropriate mitigation measures (where required) are specified in the EIS to minimise the potential for cumulative impacts to occur at or near the Project Area. Anticipated impacts are presented in the EIS for Public Authority consideration. It should be noted, only a small percentage of the 26+ gigawatts of projects proposed in SW-REZ will proceed to construction and operation stages, noting that Project Energy Connect has less than 2GW of total capacity. On 21 February 2024, Hay Shire Council hosted a roundtable discussion with several Applicants who were preparing their EIS at the time. The group discussed developing responses to cumulative impacts through consultation and collaboration between Applicants along the SW-REZ. All Applicants attending the discussion made an in-principle commitment to consult and collaborate to manage, mitigate and/or enhance several potential cumulative project impacts.	C	3	13	-

Appendix 2

Soil Profile Descriptions

Site Description – Site 1				
Site Reference	1	**ASC Name**	Episodic-Endocalcareous Epipedal Brown Vertosol (ERRW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 320159
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145703

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.30**	Dark greyish brown (Munsell 10YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. Mildly alkaline pH, slightly saline and strongly sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.30 – 0.50**	Brown (Munsell 10YR 4/3) Heavy Clay with strong pedality, rough fabric and moderate consistence. Mildly alkaline pH, slightly saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. 10% faint grey mottling. Gradual boundary.
B22	**0.50 +**	Grey (Munsell 7.5YR 5/1) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Mildly alkaline pH, slightly saline and strongly sodic. No coarse fragments. No roots and moderately well drained. 10% faint grey mottling. 5% calcium carbonate nodules.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	2.0	Slightly saline	7.4	Mildly Alkaline	16	Sodic
0.30-0.40	14.1	Highly saline	7.8	Mildly Alkaline	34	Sodic
0.60-0.70	22.7	Extremely saline	7.8	Moderately Alkaline	35	Sodic

Site Description – Site 2				
Site Reference	2	**ASC Name**	Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 321073
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6143881

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.25**	Brown (Munsell 10YR 4/3) Heavy Clay with strong pedality, rough fabric and strong consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.25 – 0.40**	Yellowish brown (Munsell 10YR 5/4) Light Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.40 +**	Pale brown (Munsell 10YR 6/3) Silty Clay Loam with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 2% calcium carbonate nodules.

Site Description – Site 3				
Site Reference	3	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 321478
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6141883

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.25**	Dark grey (Munsell 10YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B2	**0.25 +**	Greyish brown (Munsell 10YR 5/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Very few roots and moderately well drained. 10% faint brown mottling.

Site Description – Site 4				
Site Reference	4	**ASC Name**	Sodic Hypocalcic Brown Dermosol (BEOOW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 321439
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6139467

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.30**	Dark reddish brown (Munsell 5YR 3/3) Medium Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, non-saline and strongly sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B2	**0.30+**	Brown (Munsell 7.5YR 4/4) Medium Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, highly to extremely saline and strongly sodic. No coarse fragments. Trace roots and moderately well drained. 10% faint grey mottling. Gradual boundary.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.7	Non-saline	8.0	Moderately Alkaline	16	Sodic
0.30 – 0.40	13.6	Highly saline	8.2	Moderately Alkaline	40	Sodic
0.60 – 0.70	18.4	Extremely saline	8.3	Moderately Alkaline	39	Sodic

Site Description – Site 5				
Site Reference	5	**ASC Name**	Red Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 320293
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6137674

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark reddish brown (Munsell 5YR 3/4) Heavy Clay with strong pedality, rough fabric and moderate consistence. coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.45**	Reddish brown (Munsell 5YR 4/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45 +**	Light brownish yellow (Munsell 10YR 6/4) Clay Loam with moderate pedality, rough fabric and moderate consistence. coarse fragments. No roots and moderately well drained. 2% calcium carbonate nodules.

Site Description – Site 6				
Site Reference	6	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 322740
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6143529

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Very dark grey (Munsell 10YR 3/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.45**	Dark grey (Munsell 10YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Light brownish grey (Munsell 10YR 6/2) Medium Clay with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 7				
Site Reference	7	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 324660
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6143063

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Black (Munsell 10YR 2/1) Heavy Clay with strong pedality, rough fabric and strong consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.45**	Very dark grey (Munsell 10YR 3/1) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Grey (Munsell 10YR 5/1) Light Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 8				
Site Reference	8	**ASC Name**	Sodic Eutrophic Grey Dermosol (CEOMW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Well	X: 325068
Surface Condition	Firm	**Permeability**	Moderate	Y: 6142102

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.50**	Reddish brown (Munsell 2.5YR 4/4) Medium Clay with moderate pedality, rough fabric and moderate consistence. Mildly to moderately alkaline pH, non-saline to highly saline and strongly sodic. No coarse fragments. Many roots and well drained. Clear boundary.
B2	**0.50+**	Pale brown (Munsell 10YR 6/3) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, extremely saline and strongly sodic. No coarse fragments. Few roots and well drained. 10% faint brown mottles.

Sample Depth	ECe		$pH_{(1-5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	1.4	Non-saline	7.4	Mildly Alkaline	18	Sodic
0.30 – 0.40	13.9	Highly saline	8.4	Moderately Alkaline	37	Sodic
0.60 – 0.70	32.5	Extremely saline	8.4	Moderately Alkaline	41	Sodic

Site Description – Site 9				
Site Reference	9	**ASC Name**	Yellow Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 326982
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6143880

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.30**	Very dark grey (Munsell 10YR 3/1) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B2	**0.30 +**	Very pale brown (Munsell 10YR 7/4) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. No coarse fragments. Trace roots and moderately well drained. 2% calcium carbonate nodules.

Site Description – Site 10				
Site Reference	10	**ASC Name**	Brown Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 328517
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6142458

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Black (Munsell 10YR 2/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.55**	Brown (Munsell 10YR 4/6) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Very few roots and moderately well drained. 5% faint grey mottling. Gradual boundary.
B22	**0.55+**	Pale brown (Munsell 10YR 6/3) Light Clay with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 11				
Site Reference	11	**ASC Name**	Red Sodosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 311092
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6140451

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Brown (Munsell 7.5YR 5/3) Sandy Loam with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.30**	Reddish brown (Munsell 10YR 4/4) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.30+**	Reddish brown (Munsell 10YR 5/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 12				
Site Reference	12	**ASC Name**	Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 306586
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6141278

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Dark reddish grey (Munsell 5YR4/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.45**	Dark reddish grey (Munsell 5YR4/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Very pale brown (Munsell 10YR 7/4) Clay Loam with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Site Description – Site 13				
Site Reference	13	**ASC Name**	Sodic Eutrophic Red Chromosol (BEKOWNR)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 311644
Surface Condition	Loose	**Permeability**	Moderate	Y: 6137039

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Yellowish red (Munsell 5YR 5/6) apedal Sand. Neutral pH, non-saline and non-sodic. No coarse fragments. Many roots and rapidly drained. Clear boundary.
B21	**0.10 – 0.30**	Dark reddish brown (Munsell 5YR 3/4) Medium Clay with strong pedality, rough fabric and strong consistence. Mildly alkaline pH, non-saline and non-sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.30+**	Brownish yellow (Munsell 10YR 6/6) Light Clay with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, non-saline and non-sodic. No coarse fragments. No roots and moderately well drained. 10% faint grey mottling.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	1.5	Non-saline	6.7	Neutral	5.9	Non sodic
0.20 – 0.30	0.2	Non-saline	7.7	Mildly Alkaline	4.3	Non sodic
0.45 – 0.55	1.1	Non-saline	8.9	Strongly Alkaline	4.7	Non sodic
0.80 – 0.90	1.9	Non-saline	8.8	Strongly Alkaline	7.8	Sodic

Site Description – Site 14				
Site Reference	14	**ASC Name**	Brown Sodosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 314608
Surface Condition	Loose	**Permeability**	Moderate	Y: 6137620

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Light reddish brown (Munsell 5YR6/3) Sandy Loam with weak consistence, sandy fabric and weak consistence. No coarse fragments. Many roots and rapidly drained. Clear boundary.
B21	**0.10 – 0.45**	Reddish brown (Munsell 10YR 4/3) Heavy Clay with strong pedality, rough fabric and strong consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Pale brown (Munsell 10YR 6/3) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 10% faint grey mottling.

Site Description – Site 15				
Site Reference	15	**ASC Name**	Episodic-Endocalcareous Epipedal Brown Vertosol (ERRW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 316497
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6140655

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Dark brown (Munsell 7.5YR 3/2) Medium Clay with strong pedality, rough fabric and moderate consistence. Neutral pH, non-saline and marginally sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.55**	Brown (Munsell 7.5YR 4/3) Medium Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, moderately saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.55+**	Reddish grey (Munsell 5YR 5/2) Medium Clay with moderate pedality, rough fabric and moderate consistence. Mildly alkaline pH, extremely saline and strongly sodic. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.5	Non-saline	6.9	Neutral	7.7	Sodic
0.30 – 0.40	4.2	Moderately saline	8.3	Moderately Alkaline	20	Sodic
0.60 – 0.70	17.4	Extremely saline	7.8	Mildly Alkaline	24	Sodic

Site Description – Site 16				
Site Reference	16	**ASC Name**	Black Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 320322
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6140375

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.25**	Very dark grey (Munsell 7.5YR 3/1) Heavy Clay with strong pedality, rough fabric and strong consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.25 – 0.55**	Dark brown (Munsell 7.5YR 3/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Brown (Munsell 7.5YR5/2) Medium Clay with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. Faint grey mottling 20%.

Site Description – Site 17				
Site Reference	17	**ASC Name**	Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 318718
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6138943

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Dark reddish grey (Munsell 5YR4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.55**	Brown (Munsell 10YR 4/6) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.55+**	Pale brown (Munsell 10YR 6/3) Clay Loam with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Site Description – Site 18				
Site Reference	18	**ASC Name**	Red Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 317425
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6137932

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Reddish brown (Munsell 5YR 4/3) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.45**	Reddish brown (Munsell 5YR 4/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Light brownish yellow (Munsell 10YR 6/4) Silty Clay Loam with moderate pedality, rough fabric and moderate consistence. No coarse fragments. Trace roots and moderately well drained. 10% calcium carbonate nodules.

Site Description – Site 19				
Site Reference	19	**ASC Name**	Stratic Arenosol (EKKWNR)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderately Low	MGA 55
Landform Element	Flat	**Drainage**	Rapid	X: 312974
Surface Condition	Loose	**Permeability**	High	Y: 6140778

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.15**	Strong brown (Munsell 7.5YR 5/8) Sand with weak pedality, sandy fabric and weak consistence. Neutral pH, non-saline and marginally sodic. No coarse fragments. Many roots and rapidly drained. Gradual boundary.
B21	**0.15 – 0.80**	Red (Munsell 2.5YR 5/8) Sand with weak pedality, sandy fabric and weak consistence. Neutral pH, non-saline and marginally sodic. No coarse fragments. Few roots and rapidly drained. Gradual boundary.
B22	**0.80 +**	Red (Munsell 2.5YR 5/8) Sand with weak pedality, sandy fabric and weak consistence. Mildly alkaline pH, non-saline and non-sodic. No coarse fragments. No roots and rapidly drained.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	1.2	Non-saline	7.0	Neutral	6.5	Sodic
0.20 – 0.30	0.3	Non-saline	7.1	Neutral	1.4	Non sodic
0.50 – 0.60	0.2	Non-saline	7.2	Neutral	6.6	Sodic
0.90 – 1.00	0.2	Non-saline	7.6	Mildly Alkaline	3.3	Non sodic

Site Description – Site 20				
Site Reference	20	**ASC Name**	Episodic Epipedal Black Vertosol (ERRW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 312735
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6132299

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Grey (Munsell 2.5Y 5/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, non-saline and strongly sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.60**	Dark grey (Munsell 2.5Y 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, moderately saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Grey (Munsell 5Y 5/1) Medium Clay with moderate pedality, rough fabric and moderate consistence. Moderately alkaline pH, extremely saline and strongly sodic. No coarse fragments. No roots and moderately well drained.

Sample Depth	ECe		$pH_{(1-5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.9	Non-saline	7.9	Moderately Alkaline	14	Sodic
0.30 – 0.40	5.9	Moderately saline	8.8	Strongly Alkaline	34	Sodic
0.60 – 0.70	25.6	Extremely saline	8.1	Moderately Alkaline	38	Sodic

Site Description – Site 21				
Site Reference	21	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 313857
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6134242

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark grey (Munsell 2.5Y 4/1) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.40**	Greyish brown (Munsell 2.5Y 5/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.40+**	Brown (Munsell 10YR 5/3) Light Clay with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Site Description – Site 22				
Site Reference	22	**ASC Name**	Sodic Eutrophic Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 316298
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6135517

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Brown (Munsell 7.5YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, slightly saline and strongly sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.45**	Greyish brown (Munsell 10YR 5/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, highly saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Light yellowish brown (Munsell 10YR 6/4) Clay Loam with moderate pedality, rough fabric and weak consistence. Moderately alkaline pH, extremely saline and strongly sodic. No coarse fragments. No roots and moderately well drained.

Sample Depth	ECe		pH(1-5water)		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	2.5	Slightly saline	7.9	Moderately Alkaline	24	Sodic
0.30 – 0.40	10.4	Highly saline	8.4	Moderately Alkaline	41	Sodic
0.60 – 0.70	38.3	Extremely saline	8.2	Moderately Alkaline	33	Sodic

Site Description – Site 23				
Site Reference	23	**ASC Name**	Red Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 318554
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6136509

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.15**	Dark reddish grey (Munsell 5YR4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.15 – 0.65**	Reddish brown (Munsell 5YR 4/4) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.65+**	Pale brown (Munsell 10YR 6/3) Clay Loam with moderate pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 24				
Site Reference	24	**ASC Name**	Brown Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 321070
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6135793

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Brown (Munsell 7.5YR 2.5/3) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.60**	Brown (Munsell 7.5YR 4/4) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Brown (Munsell 7.5YR 4/2) Light Clay with strong pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 25				
Site Reference	25	**ASC Name**	Endocalcareous Epipedal Black Vertosol (ERRW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 315798
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6133278

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.15**	Dark grey (Munsell 10YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Neutral pH, non-saline and non-sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.15 – 0.50**	Dark grey (Munsell 5YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Mildly alkaline pH, non-saline and non-sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Grey (Munsell 5YR 5/1) Heavy Clay with moderate pedality, rough fabric and moderate consistence. Strongly alkaline pH, non-saline and non-sodic. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Sample Depth	ECe		$pH_{(1-5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.3	Non-saline	6.9	Neutral	2.2	Non sodic
0.30 – 0.40	0.3	Non-saline	7.7	Mildly Alkaline	3.8	Non sodic
0.60 – 0.70	1.0	Non-saline	8.5	Strongly Alkaline	5.4	Non sodic

Site Description – Site 26				
Site Reference	26	**ASC Name**	Black Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 314774
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6131836

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Very dark grey (Munsell 7.5YR 3/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.50**	Very dark grey (Munsell 7.5YR 3/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Brown (Munsell 7.5YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Site Description – Site 27				
Site Reference	27	**ASC Name**	Eutrophic Hypernatric Brown Sodosol (BELOWNR)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 318054
Surface Condition	Hardset	**Permeability**	Moderate	Y: 6129085

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.12**	Strong brown (Munsell 7.5YR 4/6) Loam with moderate pedality, rough fabric and moderate consistence. Slightly acidic pH, non-saline and strongly sodic. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.12 – 0.60**	Brown (Munsell 7.5YR 4/2) Medium Clay with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, non-saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Brownish yellow (Munsell 10YR 6/6) Clay Loam with weak pedality, rough fabric and moderate consistence. Very strongly alkaline pH, highly saline and strongly sodic. No coarse fragments. No roots and moderately well drained

Sample Depth	ECe		pH(1-5water)		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.5	Non-saline	6.4	Slightly Acidic	18	Sodic
0.30 – 0.40	1.6	Non-saline	8.7	Strongly Alkaline	31	Sodic
0.60 – 0.70	15.4	Highly saline	9.1	Very Strongly Alkaline	37	Sodic

Site Description – Site 28				
Site Reference	28	**ASC Name**	Red Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 320010
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6130576

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	0.00 – 0.15	Dark reddish grey (Munsell 5YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	0.15 – 0.55	Reddish brown (Munsell 10YR 4/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	0.55+	Yellowish red (Munsell 5YR 5/6) Clay Loam with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 29				
Site Reference	29	**ASC Name**	Sodic Eutrophic Grey Dermosol (BEOOW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 320167
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6132788

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.20**	Grey (Munsell 10YR 5/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, non-saline and marginally sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.20 – 0.50**	Grey (Munsell 5YR 5/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, non-saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Greyish brown (Munsell 10YR 5/2) Clay Loam with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, highly saline and strongly sodic. No coarse fragments. No roots and moderately well drained.

Sample Depth	ECe		$pH_{(1-5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.9	Non-saline	7.8	Moderately Alkaline	8.0	Sodic
0.30 – 0.40	1.6	Non-saline	8.8	Strongly Alkaline	15	Sodic
0.60 – 0.70	11.9	Highly saline	8.7	Strongly Alkaline	26	Sodic

Site Description – Site 30				
Site Reference	30	**ASC Name**	Sodic Eutrophic Red Dermosol (BEOOW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 317802
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6131089

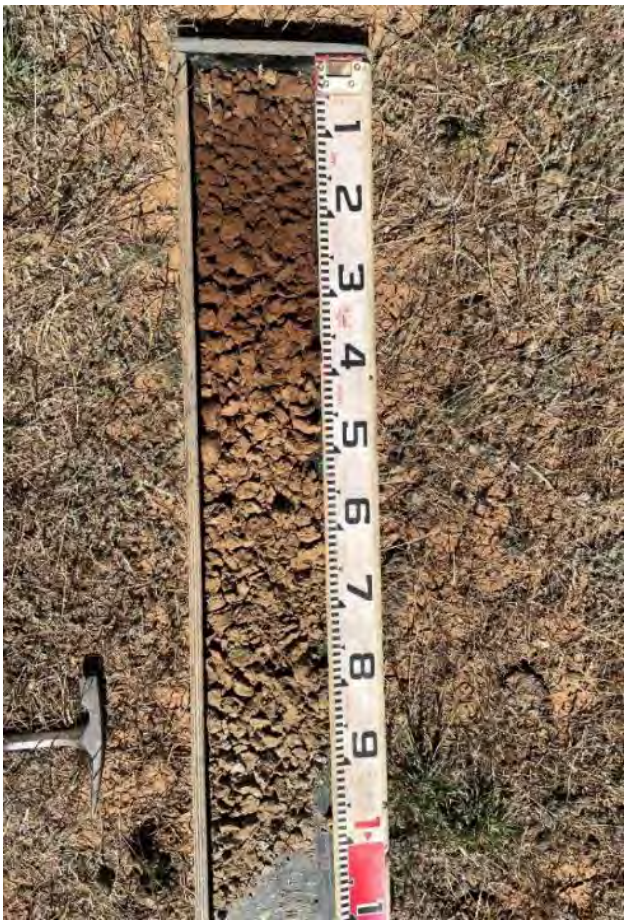


Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark reddish brown (Munsell 2.5YR 3/4) Heavy Clay with strong pedality, rough fabric and moderate consistence. Mildly alkaline pH, slightly saline and strongly sodic. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.40**	Yellowish red (Munsell 5YR 4/6) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, extremely saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.40+**	Very pale brown (Munsell 10YR 7/4) Silty Clay Loam with moderate pedality, rough fabric and weak consistence. Mildly alkaline pH, extremely saline and strongly sodic. No coarse fragments. Trace roots and moderately well drained.

Sample Depth	ECe		$pH_{(1-5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	3.8	Slightly saline	7.7	Mildly Alkaline	29	Sodic
0.30 – 0.40	20.9	Extremely saline	7.9	Moderately Alkaline	49	Sodic
0.60 – 0.70	36.4	Extremely saline	7.7	Mildly Alkaline	50	Sodic

Site Description – Site 31				
Site Reference	31	**ASC Name**	Red Sodosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 319490
Surface Condition	Loose	**Permeability**	Moderate	Y: 6127177

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Brown (Munsell 7.5YR 5/3) Loam with weak pedality, earthy fabric and weak consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.60**	Reddish brown (Munsell 5YR 4/3) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Dark yellowish brown (Munsell 10YR 4/4) Medium Clay with weak pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained

Site Description – Site 32				
Site Reference	32	**ASC Name**	Eutrophic Hypernatric Red Sodosol (BELOWNR)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 319451
Surface Condition	Loose	**Permeability**	Moderate	Y: 6124271

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark yellowish brown (Munsell 10YR 4/4) Loam with weak pedality, earthy fabric and weak consistence. Neutral pH, non-saline and strongly sodic. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.40**	Yellowish red (Munsell 5YR 4/6) Medium Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, Highly saline and strongly sodic. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.40+**	Strong brown (Munsell 7.5YR 5/6) Clay Loam with weak pedality, rough fabric and moderate consistence. Neutral pH, extremely saline and strongly sodic. No coarse fragments. No roots and moderately well drained

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	1.0	Non-saline	6.8	Neutral	15	Sodic
0.30 – 0.40	9.0	Highly saline	8.1	Moderately Alkaline	43	Sodic
0.60 – 0.70	25.7	Extremely saline	6.8	Neutral	53	Sodic

Site Description – Site 33				
Site Reference	33	**ASC Name**	Red Sodosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 317607
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6125175

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark yellowish brown (Munsell 10YR 4/4) Sandy Loam with weak pedality, earthy fabric and weak consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.40**	Yellowish red (Munsell 5YR 4/6) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.40+**	Strong brown (Munsell 7.5YR 5/8) Clay Loam with weak pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained

Site Description – Site 34				
Site Reference	34	**ASC Name**	Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 316080
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6125422

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Brown (Munsell 7.5YR 4/3) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.45**	Brown (Munsell 10YR 4/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.45+**	Pale brown (Munsell 10YR 6/3) Silty Clay Loam with weak pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Site Description – Site 35				
Site Reference	35	**ASC Name**	Red Sodosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 315887
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6128302

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Reddish grey (Munsell 5YR 5/2) Loam with weak pedality, earthy fabric and weak consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.50**	Yellowish red (Munsell 5YR 4/6) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Strong brown (Munsell 7.5YR 5/6) Clay Loam with moderate pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained

Site Description – Site 36				
Site Reference	36	**ASC Name**	Red Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 315551
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6126819

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Brown (Munsell 7.5YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Gradual boundary.
B21	**0.10 – 0.60**	Reddish brown (Munsell 5YR 4/3) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Pale brown (Munsell 10YR 6/3) Silty Clay Loam with weak pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site 37				
Site Reference	37	**ASC Name**	Stratic Arenosol (EKKWNR)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderately Low	MGA 55
Landform Element	Flat	**Drainage**	Rapid	X: 314435
Surface Condition	Loose	**Permeability**	High	Y: 6128919

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.15**	Dark reddish brown (Munsell 5YR 3/4) Loamy Sand with weak pedality, sandy fabric and weak consistence. No coarse fragments. Many roots and rapidly drained. Gradual boundary.
B21	**0.15 – 0.80**	Dark reddish brown (Munsell 5YR 3/4) Sand with weak pedality, sandy fabric and weak consistence. No coarse fragments. Few roots and rapidly drained. Gradual boundary.
B22	**0.80 +**	Reddish yellow (Munsell 5YR 5/6) Sand with weak pedality, sandy fabric and weak consistence. No coarse fragments. No roots and rapidly drained.

Site Description – Site 38				
Site Reference	38	**ASC Name**	Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 314710
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6130566

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.30**	Dark greyish brown (Munsell 10YR 4/2) Light Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.30 – 0.55**	Yellowish brown (Munsell 10YR 5/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.55+**	Yellowish brown (Munsell 10YR 5/4) Clay Loam with moderate pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Site Description – Site 39				
Site Reference	39	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 312250
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6130492

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Very dark grey (Munsell 10YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.50**	Dark greyish brown (Munsell 10YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Brown (Munsell 4/3) Light Medium Clay with moderate pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Site Description – Site 40				
Site Reference	40	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 309384
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6130358

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Greyish brown (Munsell 10YR 5/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and well drained. Clear boundary.
B21	**0.10 – 0.60**	Dark greyish brown (Munsell 10YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Dark yellowish brown (Munsell 10YR 4/6) Light Clay with moderate pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Site Description – Site S1				
Site Reference	S1	**ASC Name**	Episodic Epipedal Brown Vertosol (ERRW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 328944
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6144126

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.35**	Brown (Munsell 7.5YR 4/2) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, non-saline and sodic. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.35 – 0.90**	Brown (Munsell 7.5YR 5/3) Medium Clay with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, slightly saline and sodic. No coarse fragments. Very few roots and moderately well drained. Gradual boundary.
B22	**0.90 +**	Light grey (Munsell 10YR 7/1) Medium Clay with strong pedality, rough fabric and moderate consistence. Strongly to moderately alkaline pH, extremely saline and sodic. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Sample Depth	ECe		pH(1-5water)		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	0.5	Non-saline	7.9	Moderately Alkaline	11.4	Sodic
0.20 – 0.30	2.6	Slightly saline	8.5	Strongly Alkaline	20.2	Sodic
0.50 – 0.60	16.4	Extremely saline	8.6	Strongly Alkaline	33.2	Sodic
0.90 – 1.00	42.4	Extremely saline	8.1	Moderately Alkaline	23.8	Sodic

Site Description – Site S2				
Site Reference	S2	**ASC Name**	Red Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 328409
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6144551

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark reddish brown (Munsell 5YR 3/4) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.50**	Reddish brown (Munsell 2.5YR 5/3) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Common roots and moderately well drained. Gradual boundary.
B22	**0.50 +**	Dark reddish grey (Munsell 5YR 4/2) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained.

Site Description – Site S3				
Site Reference	S3	**ASC Name**	Vertic Hypocalcic Brown Dermosol (BEMOW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 327452
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6144457

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Reddish grey (Munsell 5YR 5/2) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, non-saline and sodic. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.40**	Brown (Munsell 7.5YR 5/3) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Very strongly alkaline pH, slightly saline and sodic. No coarse fragments. Common roots and moderately well drained. Gradual boundary.
B22	**0.40 +**	Brown (Munsell 7.5YR 5/2) Silty Clay with strong pedality, rough fabric and moderate consistence. Very strongly alkaline pH, moderately saline and sodic. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	1.3	Non-saline	8.9	Strongly Alkaline	3.4	Non sodic
0.30 – 0.40	3.0	Slightly saline	9.3	Very Strongly Alkaline	10.0	Sodic
0.60 – 0.70	6.5	Moderately saline	9.2	Very Strongly Alkaline	16.1	Sodic

Site Description – Site S4				
Site Reference	S4	**ASC Name**	Sodic Hypocalcic Red Dermosol (BEOMW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 325493
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6144285

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.35**	Dark reddish brown (Munsell 5YR 3/4) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, slightly saline and sodic. No coarse fragments. Very few roots and moderately well drained. Gradual boundary.
B2	**0.35+**	Reddish brown (Munsell 2.5YR 5/3) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, extremely saline and sodic. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules. Gradual boundary.

Sample Depth	ECe		$pH_{(1\text{-}5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	3.7	Slightly saline	8.0	Moderately Alkaline	22.6	Sodic
0.20 – 0.30	19.0	Extremely saline	8.9	Strongly Alkaline	35.1	Sodic
0.50 – 0.60	27.2	Extremely saline	8.8	Strongly Alkaline	30.6	Sodic
0.90 – 1.00	29.8	Extremely saline	8.5	Strongly Alkaline	29.2	Sodic

Site Description – Site S5				
Site Reference	S5	**ASC Name**	Sodic Hypocalcic Brown Dermosol (BEOOW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 324700
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145035

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark reddish grey (Munsell 5YR 4/2) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, moderately saline and sodic. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.45**	Brown (Munsell 7.5YR 4/3) Silty Clay with strong pedality, rough fabric and moderate consistence. Strongly alkaline pH, extremely saline and sodic. No coarse fragments. Very few roots and moderately well drained. Gradual boundary.
B22	**0.45 +**	Light olive brown (Munsell 2.5Y 5/4) Silty Clay Loam with moderate pedality, rough fabric and weak consistence. Moderately alkaline pH, extremely saline and sodic. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules.

Sample Depth	ECe		$pH_{(1-5water)}$		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	6.1	Moderately saline	7.9	Moderately Alkaline	27.3	Sodic
0.20 – 0.30	25.9	Extremely saline	8.4	Strongly Alkaline	47.5	Sodic
0.50 – 0.60	37.8	Extremely saline	8.5	Strongly Alkaline	34.1	Sodic
0.90 – 1.00	51.8	Extremely saline	8.2	Moderately Alkaline	11.3	Sodic

Site Description – Site S18				
Site Reference	S18	**ASC Name**	Grey Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 324014
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6144539

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	0.00 – 0.10	Very dark brown (Munsell 7.5YR 2.5/3) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	0.10 – 0.60	Dark grey (Munsell 7.5YR 4/1) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Common roots and moderately well drained. Gradual boundary.
B22	0.60+	Light olive brown (Munsell 2.5Y 5/4) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Site Description – Site S19				
Site Reference	S19	**ASC Name**	Red Vertosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 324062
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145085

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark grey (Munsell 7.5YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.60**	Reddish brown (Munsell 2.5YR 5/3) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Common roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Light yellowish brown (Munsell 10YR 6/4) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Site Description – Site S20				
Site Reference	S20	**ASC Name**	Grey Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 323864
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145505

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark greyish brown (Munsell 10YR 4/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.35**	Greyish brown (Munsell 10YR 5/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Common roots and moderately well drained. Gradual boundary.
B22	**0.35+**	Light yellowish brown (Munsell 10YR 6/4) Silty Clay Loam with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules at 0.8m.

Site Description – Site S21				
Site Reference	S21	**ASC Name**	Grey Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 323745
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145891

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Very grey (Munsell 10YR 4/1) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.40**	Greyish brown (Munsell 10YR 5/2)Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Common roots and moderately well drained. Gradual boundary.
B22	**0.40+**	Greyish brown (Munsell 10YR 5/2) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. No roots and moderately well drained. 5% calcium carbonate nodules at 0.7m.

Site Description – Site S22				
Site Reference	S22	**ASC Name**	Episodic-Endocalcareous Epipedal Grey Vertosol (EQQW)	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 323295
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145344

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark grey (Munsell 10YR 4/1) Heavy Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, moderately saline and sodic. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.50**	Dark greyish brown (Munsell 10YR 4/2) Medium Clay with strong pedality, rough fabric and moderate consistence. Moderately alkaline pH, extremely saline and sodic. No coarse fragments. Very few roots and moderately well drained. Gradual boundary.
B22	**0.50+**	Yellowish brown (Munsell 10YR 5/4) Medium Clay with moderate pedality, rough fabric and weak consistence. Moderately alkaline pH, extremely saline and sodic. No coarse fragments. No roots and moderately well drained. 10% calcium carbonate nodules.

Sample Depth	ECe		pH(1-5water)		ESP	
	dS/m	Rating	Value	Rating	Value	Rating
0.00 – 0.10	4.8	Moderately saline	7.9	Moderately Alkaline	23.8	Sodic
0.30 – 0.40	27.4	Extremely saline	7.9	Moderately Alkaline	40.6	Sodic
0.60 – 0.70	47.3	Extremely saline	8.0	Moderately Alkaline	13.4	Sodic

Site Description – Site S23				
Site Reference	S23	**ASC Name**	Brown Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 323177
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6146021

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark greyish brown (Munsell 10YR 5/2) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.60**	Strong brown (Munsell 7.5YR 5/6) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Very few roots and moderately well drained. Gradual boundary.
B22	**0.60+**	Light brown (Munsell 7.5YR 6/4) Silty Clay Loam with moderate pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained. 10% faint grey mottling. 10% calcium carbonate nodules.

Site Description – Site S27				
Site Reference	S27	**ASC Name**	Grey Dermosol	
Average Slope	0%	**Land Use**	Grazing	**Coordinates**
Landform Pattern	Open Plain	**Soil Fertility**	Moderate	MGA 55
Landform Element	Flat	**Drainage**	Moderately Well	X: 324379
Surface Condition	Cracked	**Permeability**	Moderate	Y: 6145837

Plate 1 – Soil Profile

Plate 2 – Landscape

Plate 3 – Surface

Horizon	Depth (m)	Description
A1	**0.00 – 0.10**	Dark grey (Munsell 10YR 4/1) Medium Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Many roots and moderately well drained. Gradual boundary.
B21	**0.10 – 0.40**	Dark greyish brown (Munsell 10YR 4/2) Silty Clay with strong pedality, rough fabric and moderate consistence. No coarse fragments. Very few roots and moderately well drained. Gradual boundary.
B22	**0.40+**	Light yellowish brown (Munsell 10YR 6/4) Silty Clay Loam with moderate pedality, rough fabric and weak consistence. No coarse fragments. No roots and moderately well drained. 15% calcium carbonate nodules from 0.7m.

Appendix 3

Laboratory Certificates of Analysis

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AGRICULTURAL SOIL ANALYSIS REPORT

41 samples supplied by Minesoils Pty. Ltd. on 28/11/2023. Lab Job No.P8093
Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

			Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
		Sample ID:	1 0-10	1 30-40	1 60-70	4 0-10	4 30-40
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/1	P8093/2	P8093/3	P8093/4	P8093/5
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	7.42	7.80	7.81	7.99	8.23
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.351	2.426	2.643	0.123	2.346
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	15	12	13	13	12
	Exchangeable Calcium (kg/ha)		6,605	5,405	5,685	5,989	5,234
	Exchangeable Calcium (mg/kg)		2,949	2,413	2,538	2,674	2,337
	Exchangeable Magnesium (cmol+/kg)		12	12	15	10.0	12
	Exchangeable Magnesium (kg/ha)		3,155	3,394	4,024	2,711	3,289
	Exchangeable Magnesium (mg/kg)		1,408	1,515	1,796	1,210	1,468
	Exchangeable Potassium (cmol+/kg)		0.62	0.41	0.57	1.1	0.75
	Exchangeable Potassium (kg/ha)		541	359	500	921	661
	Exchangeable Potassium (mg/kg)		241	160	223	411	295
	Exchangeable Sodium (cmol+/kg)		5.2	13	15	4.8	16
	Exchangeable Sodium (kg/ha)		2,692	6,753	7,688	2,457	8,248
	Exchangeable Sodium (mg/kg)		1,202	3,015	3,432	1,097	3,682
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.01	0.01	0.01	0.01	0.01
	Exchangeable Aluminium (kg/ha)		2.7	2.4	2.1	3.0	2.9
	Exchangeable Aluminium (mg/kg)		1.2	1.1	<1	1.3	1.3
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	<1
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	32	38	43	29	41
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	46	32	29	46	29
	Magnesium (%)		36	33	34	34	30
	Potassium (%)		1.9	1.1	1.3	3.6	1.9
	Sodium - ESP (%)		16	34	35	16	40
	Aluminium (%)		0.0	0.0	0.0	0.1	0.0
	Hydrogen (%)		0.0	0.0	0.0	0.0	0.0
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	1.3	0.97	0.86	1.3	0.97
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	2	3	3	..	..
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	10YR 4/2 Dark greyish brown	10YR 4/3 Brown	7.5YR 5/1 Grey	5YR 3/3 Dark reddish brown	7.5YR 4/4 Brown
	Mottles Munsell Colour		..	..	..	..	..
	Degree of Mottling (%)		..	..	..	..	..

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AGRICULTURAL SOIL ANALYSIS REPORT

41 samples supplied by Minesoils Pty. Ltd. on 28/11/2023. Lab Job No.P8093
Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
	Sample ID:	1 0-10	1 30-40	1 60-70	4 0-10	4 30-40
	Crop:	N/G	N/G	N/G	N/G	N/G
	Client:	RPS	RPS	RPS	RPS	RPS
Parameter	Method reference	P8093/1	P8093/2	P8093/3	P8093/4	P8093/5

Notes:

1. All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia.* CSIRO Publishing: Collingwood.
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils.
6. Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
7. Total Acid Extractable Nutrients indicate a store of nutrients.
8. National Environmental Protection (Assessment of Site Contamination) Measure 2013,
   Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
9. Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil results'.
10. Conversions for 1 $cmol_+/kg$ = 230 mg/kg Sodium, 390 mg/kg Potassium,
    122 mg/kg Magnesium, 200 mg/kg Calcium
11. Conversions to kg/ha = mg/kg x 2.24
12. The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
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17. This report was issued on 15/12/2023.

NATA
WORLD RECOGNISED ACCREDITATION
Accreditation No. 14960
Accredited for compliance with ISO/IEC 17025 - Testing

Quality Checked: Kris Saville
Agricultural Co-Ordinator

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			Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
		Sample ID:	4 60-70	8 0-10	8 30-40	8 60-70	13 0-10
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/6	P8093/7	P8093/8	P8093/9	P8093/10
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	8.31	7.42	8.39	8.37	6.66
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	3.167	0.192	1.848	3.775	0.065
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	13	12	9.0	9.1	5.1
	Exchangeable Calcium (kg/ha)		5,624	5,178	4,052	4,090	2,293
	Exchangeable Calcium (mg/kg)		2,511	2,312	1,809	1,826	1,024
	Exchangeable Magnesium (cmol+/kg)		12	16	17	19	1.6
	Exchangeable Magnesium (kg/ha)		3,217	4,445	4,689	5,240	425
	Exchangeable Magnesium (mg/kg)		1,436	1,984	2,093	2,339	190
	Exchangeable Potassium (cmol+/kg)		0.66	1.8	0.96	0.97	0.72
	Exchangeable Potassium (kg/ha)		575	1,543	844	851	635
	Exchangeable Potassium (mg/kg)		257	689	377	380	283
	Exchangeable Sodium (cmol+/kg)		16	6.3	16	20	0.46
	Exchangeable Sodium (kg/ha)		8,265	3,246	8,362	10,488	238
	Exchangeable Sodium (mg/kg)		3,690	1,449	3,733	4,682	106
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.02	0.02	0.02	0.02	0.02
	Exchangeable Aluminium (kg/ha)		3.1	3.0	3.4	3.7	3.1
	Exchangeable Aluminium (mg/kg)		1.4	1.4	1.5	1.7	1.4
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	<1
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	41	36	43	50	7.9
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	31	32	21	18	65
	Magnesium (%)		29	45	40	39	20
	Potassium (%)		1.6	4.9	2.2	2.0	9.2
	Sodium - ESP (%)		39	18	37	41	5.9
	Aluminium (%)		0.0	0.0	0.0	0.0	0.2
	Hydrogen (%)		0.0	0.0	0.0	0.0	0.0
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	1.1	0.71	0.52	0.47	3.3
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	..	..	..	..	..
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	10YR 6/2 Light brownish grey	2.5YR 4/4 Reddish brown	7.5YR 4/4 Brown	10YR 6/3 Pale Brown	5YR 5/6 Yellowish red
	Mottles Munsell Colour		2.5YR 6/6 Light red	.. ..	.. ..	5YR 5/6 Yellowish red	.. ..
	Degree of Mottling (%)		2	..	..	1	..

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Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

		Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
	Sample ID:	4 60-70	8 0-10	8 30-40	8 60-70	13 0-10
	Crop:	N/G	N/G	N/G	N/G	N/G
	Client:	RPS	RPS	RPS	RPS	RPS
Parameter	Method reference	P8093/6	P8093/7	P8093/8	P8093/9	P8093/10

Notes:

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2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia.* CSIRO Publishing: Collingwoo
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils.
6. Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
7. Total Acid Extractable Nutrients indicate a store of nutrients.
8. National Environmental Protection (Assessment of Site Contamination) Measure 2013,
   Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
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    122 mg/kg Magnesium, 200 mg/kg Calcium
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			Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
		Sample ID:	13 20-30	13 45-55	13 80-90	15 0-10	15 30-40
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/11	P8093/12	P8093/13	P8093/14	P8093/15
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	7.74	8.94	8.77	6.86	8.26
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.029	0.141	0.251	0.068	0.564
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	12	14	11	9.2	14
	Exchangeable Calcium (kg/ha)		5,335	6,289	4,921	4,150	6,383
	Exchangeable Calcium (mg/kg)		2,382	2,808	2,197	1,853	2,850
	Exchangeable Magnesium (cmol+/kg)		5.9	5.3	5.4	6.7	11
	Exchangeable Magnesium (kg/ha)		1,616	1,444	1,476	1,832	2,886
	Exchangeable Magnesium (mg/kg)		722	644	659	818	1,288
	Exchangeable Potassium (cmol+/kg)		0.34	0.27	0.27	1.1	0.57
	Exchangeable Potassium (kg/ha)		297	239	239	962	501
	Exchangeable Potassium (mg/kg)		133	107	106	430	224
	Exchangeable Sodium (cmol+/kg)		0.81	0.97	1.4	1.4	6.5
	Exchangeable Sodium (kg/ha)		417	498	725	733	3,335
	Exchangeable Sodium (mg/kg)		186	223	324	327	1,489
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.02	0.01	0.01	0.01	0.01
	Exchangeable Aluminium (kg/ha)		3.2	2.3	2.8	2.2	2.6
	Exchangeable Aluminium (mg/kg)		1.4	1.0	1.2	1.0	1.2
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	<1
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	19	21	18	19	32
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	63	68	61	50	45
	Magnesium (%)		31	26	30	36	33
	Potassium (%)		1.8	1.3	1.5	5.9	1.8
	Sodium - ESP (%)		4.3	4.7	7.8	7.7	20
	Aluminium (%)		0.1	0.1	0.1	0.1	0.0
	Hydrogen (%)		0.0	0.0	0.0	0.0	0.0
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	2.0	2.6	2.0	1.4	1.3
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	..	..	..	..	..
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	5YR 3/4 Dark reddish brown	10YR 6/6 Brownish yellow	10YR 6/2 Light brownish grey	7.5YR 3/2 Dark brown	7.5YR 4/3 Brown
	Mottles Munsell Colour		.. ..	.. ..	2.5YR 6/8 Light red	.. ..	.. ..
	Degree of Mottling (%)		..	..	2	..	..

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		Sample 11	Sample 12	Sample 13	Sample 14	Sample 15
	Sample ID:	13 20-30	13 45-55	13 80-90	15 0-10	15 30-40
	Crop:	N/G	N/G	N/G	N/G	N/G
	Client:	RPS	RPS	RPS	RPS	RPS
Parameter	Method reference	P8093/11	P8093/12	P8093/13	P8093/14	P8093/15

Notes:

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			Sample 16	Sample 17	Sample 18	Sample 19	Sample 20
		Sample ID:	15 60-70	19 0-10	19 20-30	19 50-60	19 90-100
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/16	P8093/17	P8093/18	P8093/19	P8093/20
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	7.75	6.96	7.11	7.24	7.55
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	2.316	0.050	0.014	0.008	0.008
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	19	2.4	2.4	2.1	2.2
	Exchangeable Calcium (kg/ha)		8,511	1,093	1,064	932	983
	Exchangeable Calcium (mg/kg)		3,800	488	475	416	439
	Exchangeable Magnesium (cmol+/kg)		12	0.62	0.38	0.47	0.40
	Exchangeable Magnesium (kg/ha)		3,237	170	105	128	110
	Exchangeable Magnesium (mg/kg)		1,445	76	47	57	49
	Exchangeable Potassium (cmol+/kg)		0.60	0.32	0.32	0.12	<0.12
	Exchangeable Potassium (kg/ha)		527	283	281	<112	<112
	Exchangeable Potassium (mg/kg)		235	126	125	<50	<50
	Exchangeable Sodium (cmol+/kg)		9.8	0.24	<0.065	0.19	0.09
	Exchangeable Sodium (kg/ha)		5,029	121	<33	97	47
	Exchangeable Sodium (mg/kg)		2,245	54	<15	43	21
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.01	0.01	0.01	0.01	0.02
	Exchangeable Aluminium (kg/ha)		2.6	2.2	2.9	2.2	3.1
	Exchangeable Aluminium (mg/kg)		1.2	<1	1.3	<1	1.4
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	<1
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	41	3.6	3.1	2.9	2.8
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	46	67	76	72	79
	Magnesium (%)		29	17	12	16	15
	Potassium (%)		1.5	8.9	10	4.3	2.7
	Sodium - ESP (%)		24	6.5	1.4	6.6	3.3
	Aluminium (%)		0.0	0.3	0.5	0.4	0.5
	Hydrogen (%)		0.0	0.0	0.0	0.0	0.0
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	1.6	3.9	6.2	4.4	5.4
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	..	3	3	3	3
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	5YR 5/2 Reddish grey	7.5YR 5/8 Strong brown	7.5YR 5/6 Strong brown	2.5YR 5/8 Red	2.5YR 5/8 Red
	Mottles Munsell Colour		..	..	..	..	..
	Degree of Mottling (%)		..	..	..	..	..

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		Sample 16	Sample 17	Sample 18	Sample 19	Sample 20
	Sample ID:	15 60-70	19 0-10	19 20-30	19 50-60	19 90-100
	Crop:	N/G	N/G	N/G	N/G	N/G
	Client:	RPS	RPS	RPS	RPS	RPS
Parameter	Method reference	P8093/16	P8093/17	P8093/18	P8093/19	P8093/20

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Parameter		Method reference	Sample 21	Sample 22	Sample 23	Sample 24	Sample 25
Sample ID:			20 0-10	20 30-40	20 60-70	22 0-10	22 30-40
Crop:			N/G	N/G	N/G	N/G	N/G
Client:			RPS	RPS	RPS	RPS	RPS
			P8093/21	P8093/22	P8093/23	P8093/24	P8093/25
pH		Rayment & Lyons 2011 - 4A1 (1:5 Water)	7.92	8.82	8.12	7.91	8.37
Electrical Conductivity (dS/m)		Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.120	0.785	3.411	0.434	1.800
Exchangeable Calcium	(cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	10	9.6	15	9.0	7.9
	(kg/ha)		4,703	4,318	6,836	4,056	3,532
	(mg/kg)		2,100	1,928	3,052	1,811	1,577
Exchangeable Magnesium	(cmol+/kg)		12	14	13	16	17
	(kg/ha)		3,208	3,679	3,513	4,425	4,602
	(mg/kg)		1,432	1,642	1,568	1,975	2,054
Exchangeable Potassium	(cmol+/kg)		1.2	1.2	1.1	1.1	0.95
	(kg/ha)		1,025	1,027	928	937	829
	(mg/kg)		458	459	414	418	370
Exchangeable Sodium	(cmol+/kg)		3.9	13	18	8.2	18
	(kg/ha)		1,993	6,494	9,188	4,202	9,202
	(mg/kg)		890	2,899	4,102	1,876	4,108
Exchangeable Aluminium	(cmol+/kg)	**Inhouse S37 (KCl)	0.01	0.02	0.02	0.01	0.01
	(kg/ha)		2.7	3.1	3.2	2.8	2.4
	(mg/kg)		1.2	1.4	1.4	1.2	1.1
Exchangeable Hydrogen	(cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	(kg/ha)		<1	<1	<1	<1	<1
	(mg/kg)		<1	<1	<1	<1	<1
Effective Cation Exchange Capacity (ECEC) (cmol+/kg)		**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	27	37	47	35	44
Calcium (%)		**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	38	26	32	26	18
Magnesium (%)			43	37	27	47	39
Potassium (%)			4.3	3.2	2.3	3.1	2.2
Sodium - ESP (%)			14	34	38	24	41
Aluminium (%)			0.0	0.0	0.0	0.0	0.0
Hydrogen (%)			0.0	0.0	0.0	0.0	0.0
Calcium/Magnesium Ratio		**Calculation: Calcium / Magnesium (cmol+/kg)	0.89	0.71	1.2	0.56	0.47
Emerson Aggregate Test (EAT)		**AS1289.3.8.1-2017	..	..	..	2	2
Moist Munsell Colour		**Inhouse Munsell Soil Colour Classification	2.5Y 5/1 Grey	2.5Y 4/1 Dark grey	5Y 5/1 Grey	7.5YR 4/2 Brown	10YR 5/2 Greyish brown
Mottles Munsell Colour			..	..	..	..	..
			..	..	..	..	..
Degree of Mottling (%)			..	..	..	..	..

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AGRICULTURAL SOIL ANALYSIS REPORT

41 samples supplied by Minesoils Pty. Ltd. on 28/11/2023. Lab Job No.P8093
Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

	Sample 21	Sample 22	Sample 23	Sample 24	Sample 25
Sample ID:	20 0-10	20 30-40	20 60-70	22 0-10	22 30-40
Crop:	N/G	N/G	N/G	N/G	N/G
Client:	RPS	RPS	RPS	RPS	RPS
Parameter / Method reference	P8093/21	P8093/22	P8093/23	P8093/24	P8093/25

Notes:

1. All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia.* CSIRO Publishing: Collingwoo
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils.
6. Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
7. Total Acid Extractable Nutrients indicate a store of nutrients.
8. National Environmental Protection (Assessment of Site Contamination) Measure 2013,
   Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
9. Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil result
10. Conversions for 1 cmol$_+$/kg = 230 mg/kg Sodium, 390 mg/kg Potassium,
    122 mg/kg Magnesium, 200 mg/kg Calcium
11. Conversions to kg/ha = mg/kg x 2.24
12. The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
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Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
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			Sample 26	Sample 27	Sample 28	Sample 29	Sample 30
		Sample ID:	22 60-70	25 0-10	25 30-40	25 60-70	27 0-10
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/26	P8093/27	P8093/28	P8093/29	P8093/30
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	8.20	6.91	7.72	8.53	6.42
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	4.456	0.053	0.051	0.169	0.052
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	19	11	15	15	1.5
	Exchangeable Calcium (kg/ha)		8,397	4,786	6,796	6,834	692
	Exchangeable Calcium (mg/kg)		3,749	2,137	3,034	3,051	309
	Exchangeable Magnesium (cmol+/kg)		17	7.7	12	12	1.3
	Exchangeable Magnesium (kg/ha)		4,566	2,098	3,202	3,300	351
	Exchangeable Magnesium (mg/kg)		2,038	936	1,429	1,473	157
	Exchangeable Potassium (cmol+/kg)		0.96	2.0	0.80	0.95	0.59
	Exchangeable Potassium (kg/ha)		840	1,753	698	833	513
	Exchangeable Potassium (mg/kg)		375	783	312	372	229
	Exchangeable Sodium (cmol+/kg)		18	0.46	1.1	1.6	0.78
	Exchangeable Sodium (kg/ha)		9,370	238	562	825	403
	Exchangeable Sodium (mg/kg)		4,183	106	251	368	180
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.02	<0.01	<0.01	<0.01	0.06
	Exchangeable Aluminium (kg/ha)		3.7	1.7	1.6	1.7	13
	Exchangeable Aluminium (mg/kg)		1.6	<1	<1	<1	5.7
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	0.08
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	1.8
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	55	21	29	30	4.3
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	34	51	53	51	35
	Magnesium (%)		31	37	41	41	30
	Potassium (%)		1.8	9.6	2.8	3.2	13
	Sodium - ESP (%)		33	2.2	3.8	5.4	18
	Aluminium (%)		0.0	0.0	0.0	0.0	1.4
	Hydrogen (%)		0.0	0.0	0.0	0.0	1.9
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	1.1	1.4	1.3	1.3	1.2
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	4	3	3	3	3
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	10YR 6/4 Light yellowish brown	10YR 4/1 Dark grey	5YR 4/1 Dark grey	5YR 5/1 Grey	7.5YR 4/6 Strong brown
	Mottles Munsell Colour		..	..	..	..	..
	Degree of Mottling (%)		..	..	..	..	..

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Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

		Sample 26	Sample 27	Sample 28	Sample 29	Sample 30
	Sample ID:	22 60-70	25 0-10	25 30-40	25 60-70	27 0-10
	Crop:	N/G	N/G	N/G	N/G	N/G
	Client:	RPS	RPS	RPS	RPS	RPS
Parameter	Method reference	P8093/26	P8093/27	P8093/28	P8093/29	P8093/30

Notes:

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2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia.* CSIRO Publishing: Collingwoo
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils.
6. Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
7. Total Acid Extractable Nutrients indicate a store of nutrients.
8. National Environmental Protection (Assessment of Site Contamination) Measure 2013,
   Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
9. Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil result
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    122 mg/kg Magnesium, 200 mg/kg Calcium
11. Conversions to kg/ha = mg/kg x 2.24
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PO BOX 11034 TAMWORTH NSW 2340

			Sample 31	Sample 32	Sample 33	Sample 34	Sample 35
		Sample ID:	27 30-40	27 60-70	29 0-10	29 30-40	29 60-70
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/31	P8093/32	P8093/33	P8093/34	P8093/35
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	8.66	9.08	7.81	8.80	8.66
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.210	1.793	0.118	0.208	1.389
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	7.2	15	16	17	21
	Exchangeable Calcium (kg/ha)		3,232	6,551	7,286	7,837	9,638
	Exchangeable Calcium (mg/kg)		1,443	2,925	3,253	3,499	4,303
	Exchangeable Magnesium (cmol+/kg)		7.9	8.2	13	12	12
	Exchangeable Magnesium (kg/ha)		2,156	2,243	3,405	3,316	3,343
	Exchangeable Magnesium (mg/kg)		962	1,001	1,520	1,480	1,492
	Exchangeable Potassium (cmol+/kg)		0.91	0.71	1.3	0.92	1.1
	Exchangeable Potassium (kg/ha)		799	623	1,131	804	924
	Exchangeable Potassium (mg/kg)		357	278	505	359	413
	Exchangeable Sodium (cmol+/kg)		7.1	14	2.6	5.5	12
	Exchangeable Sodium (kg/ha)		3,633	7,139	1,343	2,809	6,238
	Exchangeable Sodium (mg/kg)		1,622	3,187	600	1,254	2,785
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Aluminium (kg/ha)		2.3	1.4	<1	1.6	1.5
	Exchangeable Aluminium (mg/kg)		1.0	<1	<1	<1	<1
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	<1
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	23	37	33	36	47
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	31	39	50	48	46
	Magnesium (%)		34	22	38	34	26
	Potassium (%)		4.0	1.9	4.0	2.5	2.2
	Sodium - ESP (%)		31	37	8.0	15	26
	Aluminium (%)		0.0	0.0	0.0	0.0	0.0
	Hydrogen (%)		0.0	0.0	0.0	0.0	0.0
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	0.91	1.8	1.3	1.4	1.7
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	2	2	..	..	..
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	2.5YR 4/8 Red	10YR 6/6 Brownish yellow	10YR 5/1 Grey	5YR 5/1 Grey	10YR 5/2 Greyish brown
	Mottles Munsell Colour		..	..	..	..	2.5YR 6/6 Light red
	Degree of Mottling (%)		..	..	..	..	1

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Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

		Sample 31	Sample 32	Sample 33	Sample 34	Sample 35
	Sample ID:	27 30-40	27 60-70	29 0-10	29 30-40	29 60-70
	Crop:	N/G	N/G	N/G	N/G	N/G
	Client:	RPS	RPS	RPS	RPS	RPS
Parameter	Method reference	P8093/31	P8093/32	P8093/33	P8093/34	P8093/35

Notes:

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2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia.* CSIRO Publishing: Collingwoo
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7. Total Acid Extractable Nutrients indicate a store of nutrients.
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11. Conversions to kg/ha = mg/kg x 2.24
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			Sample 36	Sample 37	Sample 38	Sample 39	Sample 40
		Sample ID:	30 0-10	30 30-40	30 60-70	32 0-10	30 30-40
		Crop:	N/G	N/G	N/G	N/G	N/G
		Client:	RPS	RPS	RPS	RPS	RPS
	Parameter	Method reference	P8093/36	P8093/37	P8093/38	P8093/39	P8093/40
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	7.74	7.86	7.70	6.75	8.14
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.650	3.599	4.234	0.132	1.197
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	11	9.0	8.3	4.2	5.9
	Exchangeable Calcium (kg/ha)		4,724	4,061	3,725	1,865	2,669
	Exchangeable Calcium (mg/kg)		2,109	1,813	1,663	833	1,192
	Exchangeable Magnesium (cmol+/kg)		14	15	16	7.5	12
	Exchangeable Magnesium (kg/ha)		3,903	4,133	4,259	2,037	3,293
	Exchangeable Magnesium (mg/kg)		1,742	1,845	1,901	909	1,470
	Exchangeable Potassium (cmol+/kg)		1.2	1.0	1.0	1.8	0.75
	Exchangeable Potassium (kg/ha)		1,093	881	878	1,614	656
	Exchangeable Potassium (mg/kg)		488	393	392	721	293
	Exchangeable Sodium (cmol+/kg)		10	24	25	2.4	14
	Exchangeable Sodium (kg/ha)		5,387	12,367	12,853	1,260	7,327
	Exchangeable Sodium (mg/kg)		2,405	5,521	5,738	562	3,271
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Aluminium (kg/ha)		2.8	1.1	1.5	<1	1.6
	Exchangeable Aluminium (mg/kg)		1.3	<1	<1	<1	<1
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	<0.01	<0.01	<0.01	<0.01
	Exchangeable Hydrogen (kg/ha)		<1	<1	<1	<1	<1
	Exchangeable Hydrogen (mg/kg)		<1	<1	<1	<1	<1
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	37	49	50	16	33
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	29	18	17	26	18
	Magnesium (%)		39	31	31	47	37
	Potassium (%)		3.4	2.0	2.0	12	2.3
	Sodium - ESP (%)		29	49	50	15	43
	Aluminium (%)		0.0	0.0	0.0	0.0	0.0
	Hydrogen (%)		0.0	0.0	0.0	0.0	0.0
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	0.73	0.60	0.53	0.56	0.49
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	2	3	3	..	..
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	2.5YR 3/4 Dark reddish brown	5YR 4/6 Yellowish red	10YR 7/4 Very pale brown	10YR 4/4 Dark yellowish brown	5YR 4/6 Yellowish red
	Mottles Munsell Colour		..	..	..	..	..
	Degree of Mottling (%)		..	..	..	..	..

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Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

	Sample 36	Sample 37	Sample 38	Sample 39	Sample 40
Sample ID:	30 0-10	30 30-40	30 60-70	32 0-10	30 30-40
Crop:	N/G	N/G	N/G	N/G	N/G
Client:	RPS	RPS	RPS	RPS	RPS
Parameter / Method reference	P8093/36	P8093/37	P8093/38	P8093/39	P8093/40

Notes:

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			Sample 41	*Heavy Soil*	*Medium Soil*	*Light Soil*	*Sandy Soil*
		Sample ID:	30 60-70				
		Crop:	N/G				
		Client:	RPS	*Clay*	*Clay Loam*	*Loam*	*Loamy Sand*
	Parameter	**Method reference**	**P8093/41**	**Indicative guidelines - refer to Notes 6 and 8**			
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	6.76	*6.5*	*6.5*	*6.3*	*6.3*
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	2.984	*0.200*	*0.150*	*0.120*	*0.100*
	Exchangeable Calcium (cmol+/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	5.2	*15.6*	*10.8*	*5.0*	*1.9*
	Exchangeable Calcium (kg/ha)		2,354	*7000*	*4816*	*2240*	*840*
	Exchangeable Calcium (mg/kg)		1,051	*3125*	*2150*	*1000*	*375*
	Exchangeable Magnesium (cmol+/kg)		11	*2.4*	*1.7*	*1.2*	*0.60*
	Exchangeable Magnesium (kg/ha)		3,058	*650*	*448*	*325*	*168*
	Exchangeable Magnesium (mg/kg)		1,365	*290*	*200*	*145*	*75*
	Exchangeable Potassium (cmol+/kg)		0.64	*0.60*	*0.50*	*0.40*	*0.30*
	Exchangeable Potassium (kg/ha)		561	*526*	*426*	*336*	*224*
	Exchangeable Potassium (mg/kg)		250	*235*	*190*	*150*	*100*
	Exchangeable Sodium (cmol+/kg)		19	*0.3*	*0.26*	*0.22*	*0.11*
	Exchangeable Sodium (kg/ha)		9,912	*155*	*134*	*113*	*57*
	Exchangeable Sodium (mg/kg)		4,425	*69*	*60*	*51*	*25*
	Exchangeable Aluminium (cmol+/kg)	**Inhouse S37 (KCl)	0.01	*0.6*	*0.5*	*0.4*	*0.2*
	Exchangeable Aluminium (kg/ha)		2.2	*121*	*101*	*73*	*30*
	Exchangeable Aluminium (mg/kg)		<1	*54*	*45*	*32*	*14*
	Exchangeable Hydrogen (cmol+/kg)	**Rayment & Lyons 2011 - 15G1 (Acidity Titration)	<0.01	*0.6*	*0.5*	*0.4*	*0.2*
	Exchangeable Hydrogen (kg/ha)		<1	*13*	*11*	*8*	*3*
	Exchangeable Hydrogen (mg/kg)		<1	*6*	*5*	*4*	*2*
	Effective Cation Exchange Capacity (ECEC) (cmol+/kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol+/kg)	36	*20.1*	*14.3*	*7.8*	*3.3*
	Calcium (%)	**Base Saturation Calculations - Cation cmol+/kg / ECEC x 100	14	*77.6*	*75.7*	*65.6*	*57.4*
	Magnesium (%)		31	*11.9*	*11.9*	*15.7*	*18.1*
	Potassium (%)		1.8	*3.0*	*3.5*	*5.2*	*9.1*
	Sodium - ESP (%)		53	*1.5*	*1.8*	*2.9*	*3.3*
	Aluminium (%)		0.0	*6.0*	*7.1*	*10.5*	*12.1*
	Hydrogen (%)		0.0				
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol+/kg)	0.47	*6.5*	*6.4*	*4.2*	*3.2*
	Emerson Aggregate Test (EAT)	**AS1289.3.8.1-2017	..	*Class 3–8*			
	Moist Munsell Colour	**Inhouse Munsell Soil Colour Classification	7.5YR 5/6	..			
			Strong brown	..			
	Mottles Munsell Colour		..	..			
			..	..			
	Degree of Mottling (%)		..	..			

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AGRICULTURAL SOIL ANALYSIS REPORT

41 samples supplied by Minesoils Pty. Ltd. on 28/11/2023. Lab Job No.P8093
Analysis requested by Clayton Richards. Your Job: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

			Sample 41	*Heavy Soil*	*Medium Soil*	*Light Soil*	*Sandy Soil*
		Sample ID:	30 60-70				
		Crop:	N/G				
		Client:	RPS	*Clay*	*Clay Loam*	*Loam*	*Loamy Sand*
	Parameter	Method reference	P8093/41	Indicative guidelines - refer to Notes 6 and 8			

Notes:

1. All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
2. Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwoo
3. Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
4. 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
5. Guidelines for phosphorus have been reduced for Australian soils.
6. Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
7. Total Acid Extractable Nutrients indicate a store of nutrients.
8. National Environmental Protection (Assessment of Site Contamination) Measure 2013,
   Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
9. Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil result
10. Conversions for 1 cmol$_+$/kg = 230 mg/kg Sodium, 390 mg/kg Potassium,
    122 mg/kg Magnesium, 200 mg/kg Calcium
11. Conversions to kg/ha = mg/kg x 2.24
12. The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
13. ** NATA accreditation does not cover the performance of this service.
14. Analysis conducted between sample arrival date and reporting date.
15. This report is not to be reproduced except in full. Results only relate to the item tested.
16. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Condition
17. This report was issued on 15/12/2023.

Quality Checked: Kris Saville
Agricultural Co-Ordinator KS

GRAIN SIZE ANALYSIS (hydrometer and sieving techniques)

19 of 41 soil samples supplied by Minesoils Pty. Ltd. on 28th November, 2023 - Lab Job No. P8093
Analysis requested by Clayton Richards. Job Ref: MS110 Pottinger Wind Farm
PO BOX 11034 TAMWORTH NSW 2340

SAMPLE ID	Lab Code	MOISTURE CONTENT (% of water in sample)	TOTAL GRAVEL > 2 mm (% of total oven-dry equivalent)	GRAVEL > 4.75 mm (% of total oven-dry equivalent)	GRAVEL 2.00-4.75 mm (% of total oven-dry equivalent)	COARSE SAND 200-2000 µm (0.2-2.0 mm) (% of total oven-dry equivalent)	FINE SAND 20-200 µm (0.02-0.2 mm) (% of total oven-dry equivalent)	SILT 2-20 µm (% of total oven-dry equivalent)	CLAY < 2 µm (% of total oven-dry equivalent)
1 0-10	P8093/1	10.9%	0.0%	0.0%	0.0%	13.8%	17.8%	11.8%	56.7%
1 30-40	P8093/2	12.5%	0.0%	0.0%	0.0%	12.6%	20.4%	15.8%	51.1%
1 60-70	P8093/3	12.9%	0.0%	0.0%	0.0%	12.9%	24.7%	34.0%	28.5%
19 0-10	P8093/17	2.2%	0.0%	0.0%	0.0%	71.8%	22.6%	0.4%	5.3%
19 20-30	P8093/18	1.7%	0.0%	0.0%	0.0%	72.3%	22.1%	0.3%	5.3%
19 50-60	P8093/19	1.8%	0.0%	0.0%	0.0%	72.9%	20.3%	1.5%	5.3%
19 90-100	P8093/20	1.7%	0.0%	0.0%	0.0%	74.0%	19.3%	1.7%	5.0%
22 0-10	P8093/24	15.9%	0.1%	0.0%	0.1%	9.6%	15.0%	9.7%	65.6%
22 30-40	P8093/25	11.9%	0.1%	0.0%	0.1%	6.7%	22.8%	15.6%	54.8%
22 60-70	P8093/26	14.1%	0.0%	0.0%	0.0%	11.6%	37.8%	20.1%	30.5%
25 0-10	P8093/27	14.0%	0.1%	0.0%	0.1%	11.8%	19.7%	11.8%	56.5%
25 30-40	P8093/28	12.8%	0.0%	0.0%	0.0%	11.9%	22.4%	8.7%	57.0%
25 60-70	P8093/29	14.6%	0.0%	0.0%	0.0%	9.5%	19.8%	12.4%	58.2%
27 0-10	P8093/30	13.8%	0.2%	0.0%	0.2%	39.3%	32.9%	11.0%	16.6%
27 30-40	P8093/31	1.9%	0.0%	0.0%	0.0%	14.1%	29.9%	9.2%	46.8%
27 60-70	P8093/32	11.2%	3.3%	0.0%	3.3%	19.0%	31.6%	19.2%	26.8%
30 0-10	P8093/36	14.9%	0.0%	0.0%	0.0%	5.8%	21.5%	8.0%	64.6%
30 30-40	P8093/37	18.5%	0.0%	0.0%	0.0%	5.0%	23.8%	16.9%	54.3%
30 60-70	P8093/38	16.2%	0.2%	0.0%	0.2%	5.9%	32.3%	30.3%	31.4%

Note:

1: The Hydrometer Analysis method was used to determine the percentage sand, silt and clay,
modified from SOP meth004 (California Dept of Pesticide Regulation), using method of Gee & Bauder (1986),
in *Methods of Soil Analysis. Part 1* Agron. Monogr. 9 (2nd Ed). Klute, A., American Soc. of Agronomy Inc., Soil Sci. Soc. America Inc., Madison WI: 383-411.

2: Australian Standard 1289.3.8.1-1997 (see attached)

3. Analysis conducted between sample arrival date and reporting date.

4. This report is not to be reproduced except in full. Results only relate to the item tested.

5. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal).

6. This report was issued on 19/12/2023 and replaces the report issued on 13/12/2023. The correct sand and gravel fractions are now included for samples 32, 36-38.

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager