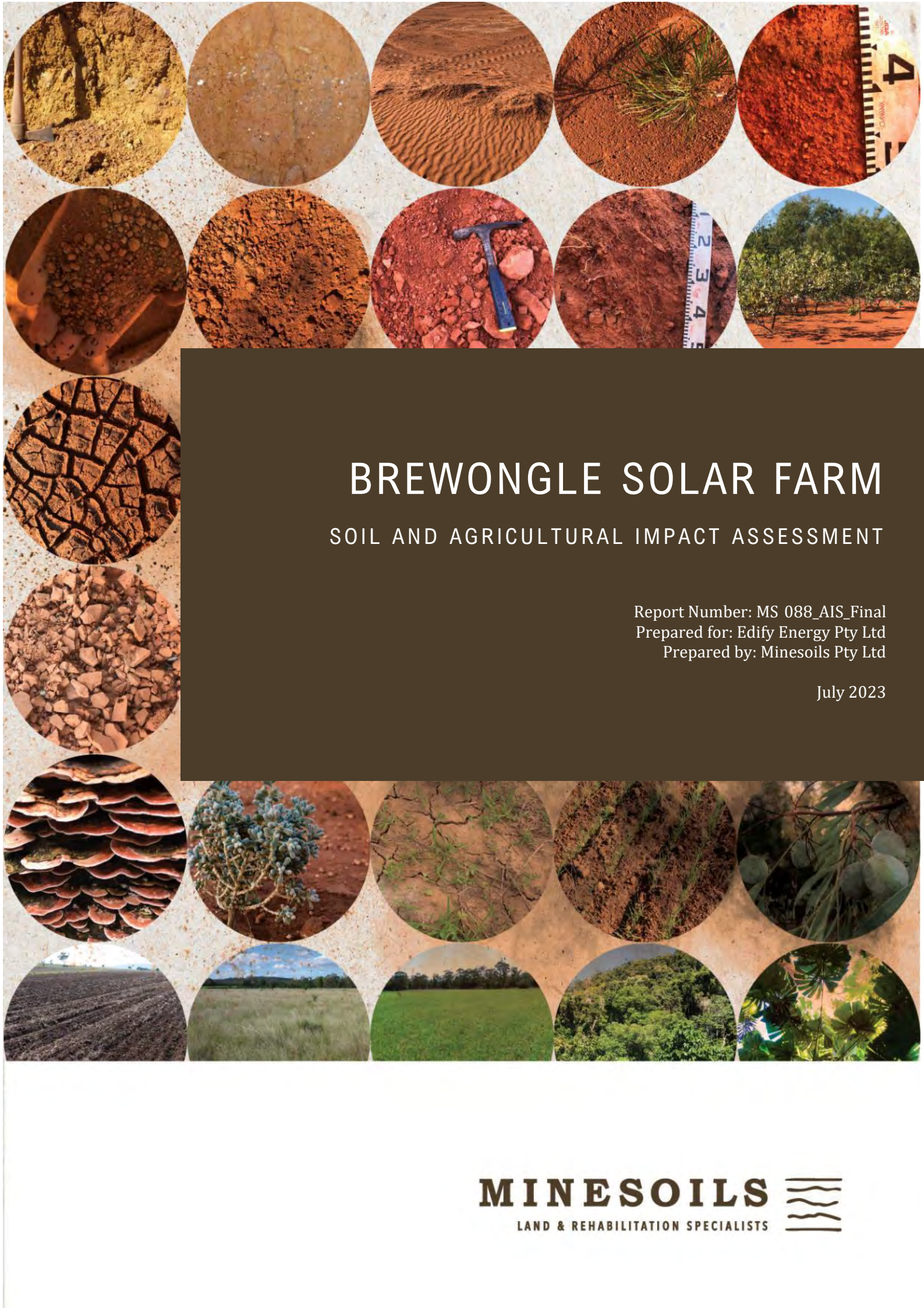


A circular collage of 20 images showing various soil textures, colors (yellow, orange, red, brown), and landscapes. Some images include a hammer for scale, a ruler, and a small plant.

# BREWONGLE SOLAR FARM

## SOIL AND AGRICULTURAL IMPACT ASSESSMENT

Report Number: MS 088\_AIS\_Final

Prepared for: Edify Energy Pty Ltd

Prepared by: Minesoils Pty Ltd

July 2023

**MINESOILS**

LAND & REHABILITATION SPECIALISTS



## PREPARED BY

**Minesoils Pty Ltd**  
ABN 84 627 497 509

-  0408 474 248
-  clayton@minesoils.com.au
-  www.minesoils.com.au
-  PO Box 11034 Tamworth NSW 2340

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## DOCUMENT CONTROL

| Reference       | Date | Prepared by | Approved |
|-----------------|------|-------------|----------|
| MS-088_ Draft 1 |      |             |          |
| MS-088_ Draft 2 |      |             |          |
| MS-088_ Final   |      |             |          |



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## EXECUTIVE SUMMARY

Minesoils Pty Ltd (Minesoils) was engaged by Edify Energy Pty Ltd (Edify) to conduct a Soil and Agricultural Impact Assessment of the Brewongle Solar Farm (the Project) located in the Central Tablelands region of New South Wales. The Project will involve the construction, operation and decommissioning of a photovoltaic (PV) solar, Battery Energy Storage System (BESS) and associated infrastructure, with a generation capacity of up to 100MWac PV and associated 90MW/360MWh BESS. The Project will comprise approximately 192,000 photovoltaic (PV) modules (solar panels) and is anticipated to have an operational life of 30 years or more.

The Study Area subject to the Project is located at Tarana Road, Bathurst, NSW, 2795, approximately 12 km from the Bathurst town centre in the Bathurst Regional Council Local Government Area (LGA) (refer Figure 1), and covers an area of 299 ha. A preliminary development footprint covers 170 ha. The Study Area has historically been utilised for agricultural practices with evidence of broad native vegetation modification resulting from extensive clearing and agricultural land use. Current land use comprises grazing land, and is consistent with the surrounding locality, which consists of a range of farming properties and rural living properties.

A soil survey undertaken by Minesoils found the Study Area to contain three dominant soil mapping units:

- Soil Unit 1: Chromosols – covering 210 ha.
- Soil Unit 2: Sodosols – covering 69 ha.
- Soil Unit 3: Dermosols – covering 20 ha.

Based on laboratory analysis results, there is a high potential risk for dispersion where the subsoils of Soil Unit 2 are disturbed within the Study Area. Higher impact activities such as where earthworks are necessary for construction of sub-station pads or site facilities are highly likely to result in increased dispersive behaviour when soil is remoulded, compacted or pulverised. In addition, caution must be taken over the entire Study Area including Soil Units 1 and 3, as these units display a moderate dispersion risk in subsurface soil horizons. Notwithstanding, there is a high level of confidence regarding the Project activities, surface disturbance requirements and erosion and sediment control management options available to mitigate this risk.

The Study Area was also subject to a site verification assessment of land and soil capability (LSC), in accordance with the LSC Guideline, and was found to contain four LSC classes:

- LSC class 2: very high capability land – covering 20 ha.
- LSC class 3: high capability land – covering 130 ha.
- LSC class 4: moderate capability land – covering 58 ha.
- LSC class 5: moderately-low capability land – covering 91 ha.

The Applicant has made key decisions regarding the Project in response to agricultural and land use considerations, including the design of the proposed infrastructure disturbance footprint to avoid, as much as practicable, LSC class 2 lands.

There is a high level of certainty about the status of agricultural resources and enterprises in the Study Area, locality and broader region, based on the site verification assessment undertaken, consultation and desktop studies carried out. Further, there is a high level of confidence regarding the Project activities and requirements and commitments to returning land to pre-disturbance agricultural status following the life of the Project. Based on these factors, the impacts on agriculture as a result of the Project are determined to be low, temporary, and limited to the development footprint. These impacts can be summarised as the following:

- Temporary removal of 170 ha from agricultural land use within the development footprint of the Study Area for the duration of the Project.



- Temporary removal of potential agricultural primary productivity to the estimated value of up to \$70,047 per year for the duration of the Project.
- Temporary removal of potential agricultural secondary productivity to the estimated value of up to \$152,618, per year for the duration of the Project.
- Temporary impacts on soil resources within the Study Area where surface disturbance occurs.

The temporary 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 Bathurst Regional Council LGA. Further, at the scale of the enterprises operating within the Study Area, impacts are considered offset as the involved landowners would be financially compensated and are expected to continue farming practices across the balance of the land unimpacted by the proposed infrastructure area.

Following construction and resting period of approximately one year, subject to the approval of Project stakeholders, Edify anticipates the implementation of agrisolar, the integration of solar panels and livestock grazing. This offers the potential to enable the continuation of agricultural land use within the Study Area and mitigates the above listed temporary impacts of the Project.

It is anticipated that by adopting the principles of impact minimisation 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 no permanent negative impacts on agricultural resources or enterprises.



# 1. INTRODUCTION

## 1.1 OVERVIEW

Minesoils Pty Ltd (Minesoils) was engaged by Edify Energy Pty Ltd (Edify) to conduct a Soil and Agricultural Impact Assessment of the Brewongle Solar Farm (the Project) located in the Central Tablelands region of New South Wales. The baseline soil and agriculture resources are detailed within this report. The impacts on these resources 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 (SSD) Development Consent approval under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979 (EP&A Act), as part of the Environmental Impact Statement (EIS) for the Project.

Secretary's Environmental Assessment Requirements (SEAR's) will be issued for the Applicant to address following submission of a Scoping Report to the Department of Planning and Environment. The objective of this report is address the following items likely to be included in the SEAR's for the Project and as detailed in the NSW Large-scale Solar Energy Guideline (NSW DPE, 2022):

- *a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and*
- *assessment of impact on agricultural resources and agricultural production on the site and region.*

## 1.2 PROJECT DESCRIPTION

The Project will involve the construction, operation and decommissioning of a photovoltaic (PV) solar, Battery Energy Storage System (BESS) and associated infrastructure, with a generation capacity of up to 1090 MWac PV and associated 90MW/360MWh BESS. The Project will comprise up to 192,000 photovoltaic (PV) modules (solar panels).

The Project is anticipated to connect into the existing TransGrid 132kV overhead transmission line, running from Wallerawang to Panorama (94X). This will require establishing a new substation to enable the project's connection into the overhead transmission line. The substation will include the establishment of a new step-down transformer from 132kV to 33kV. Edify anticipate the total switching station footprint will equate to approximately 150m x 100m.

The built form on the site will consist of the following:

- Solar power station consisting of 'array blocks' typically of 3MVA and 6MVA;
- Battery Energy Storage System(s);
- Site office and car park;
- Access easement (off Tarana road) and perimeter tracks;
- Security fence surrounding boundary of Development Area;
- Buildings including Operations and Maintenance; and
- High Voltage Substation.

The Project is anticipated to have an operational life of 30 years or more. Following construction and resting period of approximately one year, subject to the approval of Project stakeholders such as Rural Fire Service, Bathurst Regional Council and the Project's insurance providers, Edify anticipates that sheep can be introduced to graze within the Project boundary. This combined land use offers the potential to enable the continuation of agricultural land usage.



### 1.3 STUDY AREA

The Study Area is located at Tarana Road, Bathurst, NSW, 2795, approximately 12 km from the Bathurst town centre in the Bathurst Regional Council Local Government Area (LGA) (refer **Figure 1**), and covers an area of 299 ha (refer **Figure 2**).

The Study Area has historically been utilised for agricultural practices with evidence of broad native vegetation modification resulting from extensive clearing and agricultural land use. Current land use comprises grazing land, and is consistent with the surrounding locality, which consists of a range of farming properties and rural living properties. The majority of built structures in the immediate vicinity of the Study Area are rural-residences and agricultural buildings (e.g. hay / machinery shedding).

The indicative Development Area (Impact Area) will be a portion of the 299ha Study Area, being approximately 170 hectares. The final design will confirm the avoidance or removal of farm dams on site and will confirm total amount of avoidance of the mapped corridor of Biophysical Strategic Agricultural Land (refer **Figure 2**).

### 1.4 ASSESSMENT APPROACH

The assessment has 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 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 1**.

### 1.5 CONSULTATION

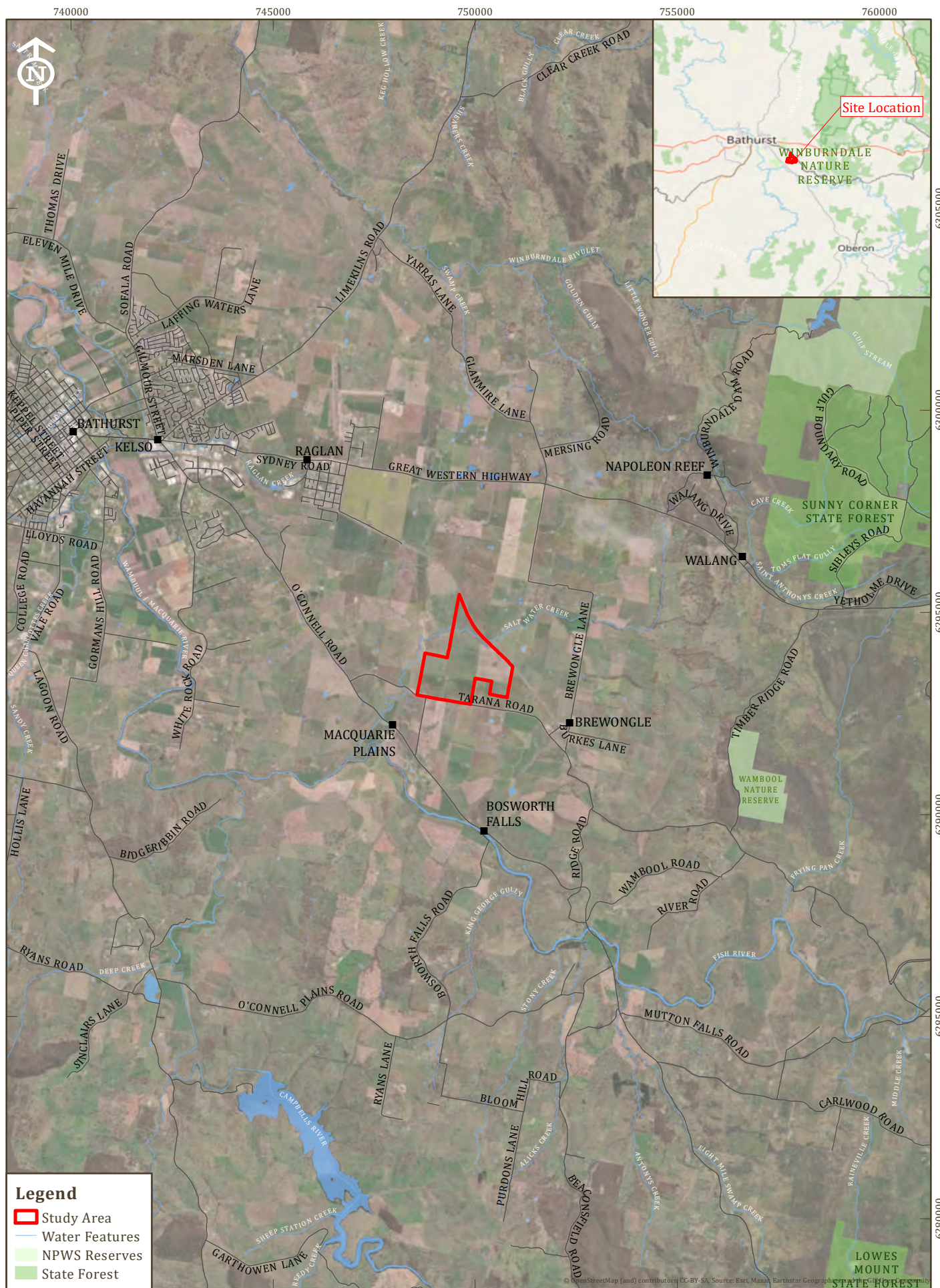
Extensive consultation is being carried out with a range of stakeholder groups and individual stakeholders during the current scoping phase of the Project. These include regulators who have a decision-making role in project approvals, and groups or individuals who may be directly or indirectly affected by the project.

Consultation has included formal and informal engagement with the following as indicated in the Scoping Report:

- NSW Department of Primary Industries;
- NSW Department of Planning and Environment;
- Bathurst Regional Council;
- Bathurst Business Chamber;
- Transgrid;
- Local aboriginal groups;
- Neighbouring landowners; and
- The local community.

Direct consultation to inform this assessment was undertaken with land managers regarding current and historical management of land and agricultural practices on the Study Area and its surrounds, and the potential effects on local industries, support services and agribusinesses as a result to changes to agricultural enterprises in the Study Area.





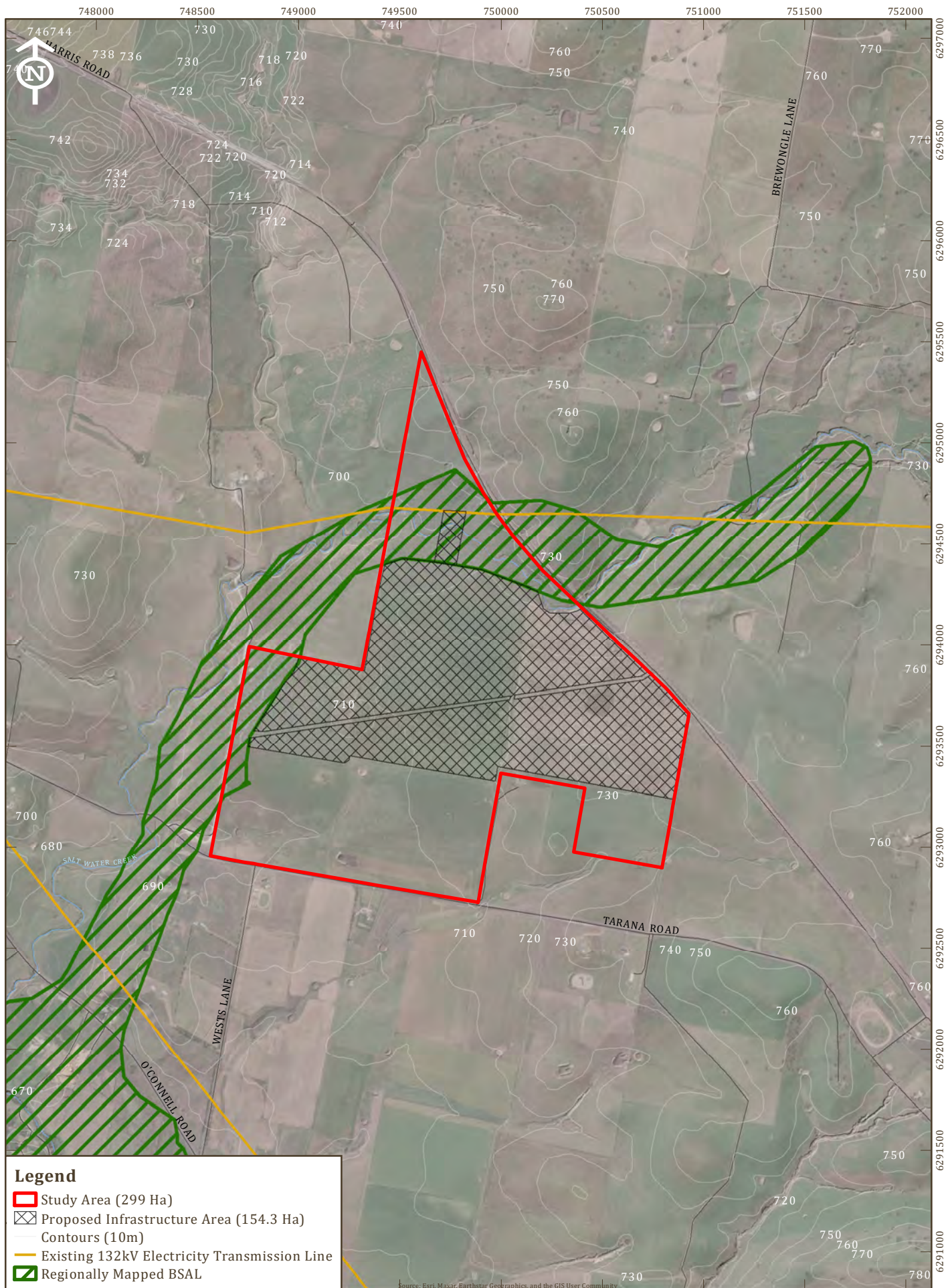
GDA2020 MGA Zone 55

Project Locality

**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS

0 0.5 1 2 Km  
Scale 1:125000 at A4

**FIGURE 1**



GDA2020 MGA Zone 55

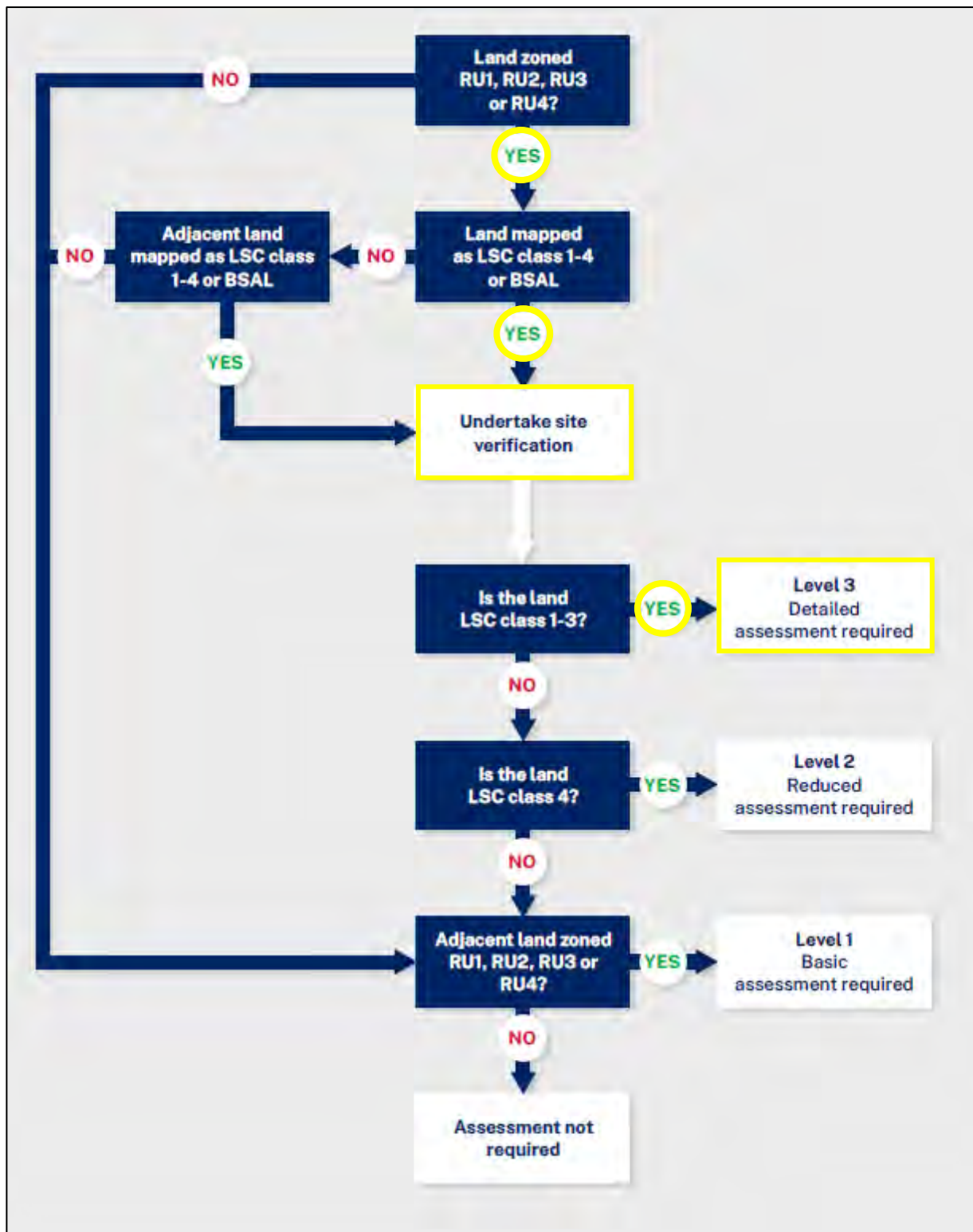
**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS

0 125 250 500 Meters  
Scale 1:25000 at A4

Brewongle Solar Farm  
Project Site

**FIGURE 2**

Figure 3. Agricultural Assessment Requirement Pathway



(NSW DPIE, 2022)

Table 1: Requirements of ‘Level 3 - Detailed’ Assessment and Section Addressed

| Assessment                                                                                                                                                                                                                                                                                                        | Content and form                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Section Addressed |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Project description</b><br>Describe the nature, location, intensity and duration of the project and include a map of the Study Area.                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• project description</li> <li>• areas of the site that would be disturbed or temporarily removed from agricultural use</li> <li>• location</li> <li>• duration</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                 |
| <b>Regional context</b><br>Describe the regional context.                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• property zoning</li> <li>• climate and rainfall</li> <li>• regional landform</li> <li>• regional land use including any significant agricultural industries and/or infrastructure</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2                 |
| <b>Site characteristics and land use description</b><br>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 LSC scheme. | <ul style="list-style-type: none"> <li>• describe the land subject to the Study Area</li> <li>• describe existing agricultural land uses</li> <li>• describe the history of agricultural practices on the Study Area</li> <li>• identify soil type, fertility, land and soil capability</li> <li>• provide a map showing the verified LSC class of the Study Area</li> <li>• provide a map showing topography of the site</li> <li>• describe the agricultural productivity of the site</li> </ul>                                                                                                                                                                                                 | 3                 |
| <b>LUCRA assessment</b><br>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                                                                                                  | <ul style="list-style-type: none"> <li>• land use compatibility and conflicts</li> <li>• 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</li> </ul>                                                                                                                                                                                                                                                                                                                       | 4<br>(Appendix 1) |
| <b>Impacts on agricultural land</b><br>Identify and describe the nature, duration and consequence of any potential impacts on agricultural land subject to the Study Area and in the wider region                                                                                                                 | <ul style="list-style-type: none"> <li>• describe project impacts on identified agricultural productivity and enterprises including but not limited to livestock, cropping activities, orchard production., etc</li> <li>• consider impacts to the agricultural land of the site</li> <li>• consider project potential to temporarily and/or permanently remove agricultural land and/or fragment or displace existing agricultural industries</li> <li>• consider cumulative impacts of multiple solar projects</li> <li>• a detailed assessment of whether the project would significantly impact the local or regional agricultural industry, including production and supply chains</li> </ul> | 5                 |
| <b>Mitigation strategies</b><br>Outline strategies which may be adopted to mitigate potential impacts on agricultural land and minimise land use conflict.                                                                                                                                                        | <ul style="list-style-type: none"> <li>• outline and consider strategies to mitigate project impacts on agricultural land</li> <li>• consider co-location with existing agricultural practices and investigate feasibility of agrisolar where it would result in a meaningful benefit</li> <li>• justification for the project considering other alternatives which would have lesser impacts on agricultural land. Applicants must demonstrate that other project sites and siting options have been considered and state the reasons why the site and layout was chosen over alternative options</li> <li>• an analysis of whether site design could be amended to reduce impacts</li> </ul>     | 6                 |



## 2 REGIONAL CONTEXT

### 2.1 ZONING

The Proposal would be contained within, Lot 1 DP 1206130, Lot 1 DP 1236901 and Lot 2 DP 1236901. (refer **Figure 4**). The Study Area is zoned as RU1 (Primary Production) under the *Bathurst Regional Local Environmental Plan 2014* (Bathurst Regional LEP) (refer **Figure 4**). The objectives of this zone are:

- 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 land
- To minimise conflict between land uses within this zone and land uses within adjoining zones
- To maintain the rural and scenic character of the land
- To provide for a range of compatible land uses that are in keeping with the rural character of the locality, do not unnecessarily convert rural land resources to non-agricultural land uses, minimise impacts on the environmental qualities of the land and avoid land use conflicts.

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 the LEP, therefore the development is 'Prohibited' according to item 4. However, the provisions of the State Environmental Planning Policy (Transport and Infrastructure) 2021 override the LEP, allowing the proposal to be undertaken with consent under clause 2.36 (1(b)).

### 2.2 CLIMATE AND RAINFALL

The Study Area is located in the Central Tablelands. this region is often referred to as the High Rainfall Zone (HRZ), has a more-or-less uniform year-round rainfall distribution and an average annual rainfall of more than 600mm. In summer, evaporation exceeds rainfall, reducing pasture growth and this is magnified at lower altitude where rainfall is lower and temperatures higher. In winter rainfall exceeds evaporation, but cooler temperatures slow pasture growth and this impact is greater at the higher altitude (EverGraze, 2023).

The climate around the Central Tablelands is strongly influenced by topography and the movement of cold air. During the cooler months, cooler air drops into the valleys and the concentration of this colder air increases the number of frosts in some areas. The frost period ranges from five to eight months of the year, significantly impacting pasture growth. The Central Tablelands is renowned for their mild summers and cool winters with snow falling in most years, increasing in frequency as elevation increases. There is a strong association between altitude and temperature (EverGraze, 2023).

The closest Bureau of Meteorology (BOM) weather station to the Study Area is the Bathurst Airport Automatic Weather Station (AWS) (063291). This station is located approximately 6 km northwest of the Study Area and has a data range from 1988 to present (BOM, 2023). The average maximum temperature ranges from 28.9°C in January, down to 12.9°C in July, while average minimum temperatures range from 14.0°C in January, down to 0.8°C in July.

The annual average rainfall is 616.4 mm, with the highest average rainfall of 71.2 mm falling in November, and the lowest average rainfall of 33.1 mm falling in April. Rain generally falls over approximately 71 days.

### 2.3 REGIONAL LANDFORM

#### 2.3.1 REGIONAL LANDFORM CHARACTERISTICS

The Central West comprises an area of 6.3 million ha, stretching from the elevated Central Tablelands on the western side of the Blue Mountains, and extending almost 500km to the Central West Plains.



The region includes the LGAs of Bathurst, Blayney, Cabonne, Cowra, Forbes, Lachlan, Lithgow, Oberon, Orange, Parkes, and Weddin. The Study Area is also captured within the Central West Slopes and Plains Sub Region, an area of 94,215km<sup>2</sup> which incorporated land in both the Lachlan and Macquarie river valleys, including Parkes, Forbes, Weddin, Lachlan, Dubbo, Warrumbungle, Gilgandra, Coonamble, Narromine, Warren and Bogan.

The Central Tablelands sub-region is broadly located in the Upper Lachlan, Lachlan Slopes, Upper Macquarie and Mid Macquarie sub catchments. It covers the western fall of the Great Dividing Range and includes the towns of Lithgow in the east to Cowra in the west, and Gulgong in the north to Oberon in the south.

The Central Tablelands is distinguished from other Australian regions by its dissected ranges, granite basins and once extensive woodlands. The Lachlan and Macquarie Rivers are the major drainage systems. River She-oak (*Casuarina cunninghamiana*) dominates the riparian vegetation at lower elevations while Ribbon Gum (*Eucalyptus viminalis*) is more often encountered higher up. Much of the remaining vegetation occurs on the poorer granitic soils, composing dry sclerophyll forests dominated by eucalypts (NSW Biodiversity Conservation Trust, 2023).

At the scale of the Bathurst Regional Council LGA, the region consists of two physical components, the Bathurst Basin and the tablelands area, which are drained by the Fish, Campbells, Macquarie and Turon Rivers to the north and the Isabella and Abercrombie Rivers to the south. Fertile alluvial soils occur along valley floors and along the Macquarie River through the LGA.

Topography of the region ranges from slightly undulating to rough and very steep country. Approximately 20 km to the east of the Study Area is the folded and faulted sedimentary and metamorphosed formations of the Great Dividing Range which runs roughly north–south.

### 2.3.2 REGIONAL GEOLOGY

The region occurs in the Lachlan Fold Belt, composed of Cambrian to Early Carboniferous sedimentary and volcanic rocks. Valleys between ranges in this area are generally either granite or softer rocks like shale, phyllite or slate. Granites are common across the Lachlan Fold Belt area, occurring either as basins surrounded by steep hills, or as rock outcrops and plateaus (NSW NPWS, 2003).

The northern section of the Bathurst Regional Council LGA comprises sandstones, conglomerates, greywack, siltstones, limestones and minor volcanos whilst the central basin is comprised predominately of granite soils. The southern section is more complex with siltstones, sandstones, greywacks, shales and chert, basalt and granite intrusions, embedded volcanic and limestones (Watkins et al, 1997). The dominant underlying geology of the Study Area is the Early Carboniferous to Carboniferous Bathurst granite, which consists of coarse-grained, porphyritic biotite granite, porphyritic granite and granodiorite, aplite (refer **Figure 5**).

## 2.4 REGIONAL LAND USE

### 2.4.1 AGRICULTURAL LAND USE

The Central Tablelands region covers over 3 million hectares, with 78% of land under agricultural production (BOM and the CSIRO, 2019), containing 3.2% of NSW's agricultural land (NSW Local Land Services, 2023). European settlers first inhabited the region in the early 1820s and found the grassy woodlands and plains on basalt soils attractive for both grazing and cropping.

At the scale of the LGA, Bathurst Regional Council covers an area of 4,720 km<sup>2</sup> and supports a population of approximately 44,000 people, and includes the city of Bathurst and nine rural villages; Georges Plains, Hill End, Peel, Rockley, Sofala, Sunny Corner, Trunkey Creek, Wattle Flat and Yetholme.

Within the LGA, 152,636 ha of land is subject to agricultural activity (ABS, 2022a). The area of land use for of the agricultural types for the Bathurst Regional Council LGA is presented in **Table 2**, which shows grazing as the dominant land use, accounting for approximately 93% of this area (ABS, 2022a).



Table 2: Bathurst Regional Council LGA Agricultural Land Use by Type 2020 - 2021

| Agricultural Land Use | Area    |     |
|-----------------------|---------|-----|
|                       | ha      | %   |
| Grazing               | 142,198 | 93  |
| Cropping              | 8,705   | 6   |
| Forestry              | 1,001   | <1  |
| Other                 | 732     | <1  |
| Total                 | 152,636 | 100 |

#### 2.4.2 AGRICULTURAL ENTERPRISES

The Central Tablelands region supports a diverse mix of agricultural enterprises. Grazing, predominantly sheep and cattle, and broadacre cropping are the two largest industries, along with vegetables, pome and stone fruit, wine and table grapes and nursery (cut flowers) (BOM and the CSIRO, 2019). The area includes properties that make up 4.2% of NSW's annual value of agricultural production and includes almost 10% of NSW's agricultural business (NSW Local Land Services, 2023).

For the census year of 2020 – 2021, there were 266 livestock grazing businesses and 94 cropping enterprise businesses in the LGA (ABS 2022a). The gross value of agricultural enterprises within the Bathurst Regional Council LGA for 2020-2021 is \$72 million (ABS 2022b). As shown in **Table 3**, livestock for slaughter accounts for 52% of the total gross value of agriculture for the LGA. Other key enterprises are cropping and livestock products.

For livestock slaughtered, cattle and calves make up 55% of the gross value with sheep and lambs making up 44% (refer **Table 5**). Within the category of cropping, vegetables and hay are the dominant enterprises (refer **Table 4**), collectively contributing more than two thirds of crop value (ABS, 2022b). For livestock products wool contributes 90% of the gross value (refer **Table 6**) (ABS, 2022b).



Table 3: Bathurst Regional Council LGA Agricultural Commodity Gross Value by Type 2020 - 2021

| Agricultural Commodity  | Gross Value |     |
|-------------------------|-------------|-----|
|                         | \$          | %   |
| Livestock for slaughter | 36,957,911  | 52  |
| Crops                   | 22,789,385  | 32  |
| Livestock products      | 11,775,730  | 16  |
| Total                   | 71,523,026  | 100 |

Table 4: Bathurst Regional Council LGA Livestock Gross Value by Type 2020 - 2021

| Livestock         | Value      |     |
|-------------------|------------|-----|
|                   | \$         | %   |
| Cattle and calves | 20,420,052 | 55  |
| Sheep and lambs   | 16,159,584 | 44  |
| Pigs              | 195,918    | 1   |
| Other             | 176,569    | 0   |
| Poultry           | 5,788      | 0   |
| Total             | 36,957,911 | 100 |

Table 5: Bathurst Regional Council LGA Crop Gross Value by Type 2020 - 2021

| Crop                                      | Value      |     |
|-------------------------------------------|------------|-----|
|                                           | \$         | %   |
| Vegetables                                | 7,998,150  | 35  |
| Hay                                       | 7,969,989  | 35  |
| Nurseries, cut flowers or cultivated turf | 3,400,670  | 15  |
| Wheat for grain                           | 1,675,952  | 7   |
| Fruit and nuts                            | 599,057    | 3   |
| Canola                                    | 457,176    | 2   |
| Oats for grain                            | 402,255    | 2   |
| Total                                     | 22,789,385 | 100 |



Table 6: Bathurst Regional Council LGA Livestock Product Gross Value by Type 2020 - 2021

| Agricultural Commodity | Gross Value |     |
|------------------------|-------------|-----|
|                        | \$          | %   |
| Wool                   | 10,552,103  | 90  |
| Milk                   | 1,211,619   | 10  |
| Eggs                   | 12,007      | <1  |
| Total                  | 11,775,730  | 100 |

#### 2.4.3 REGIONAL AGRICULTURAL INFRASTRUCTURE

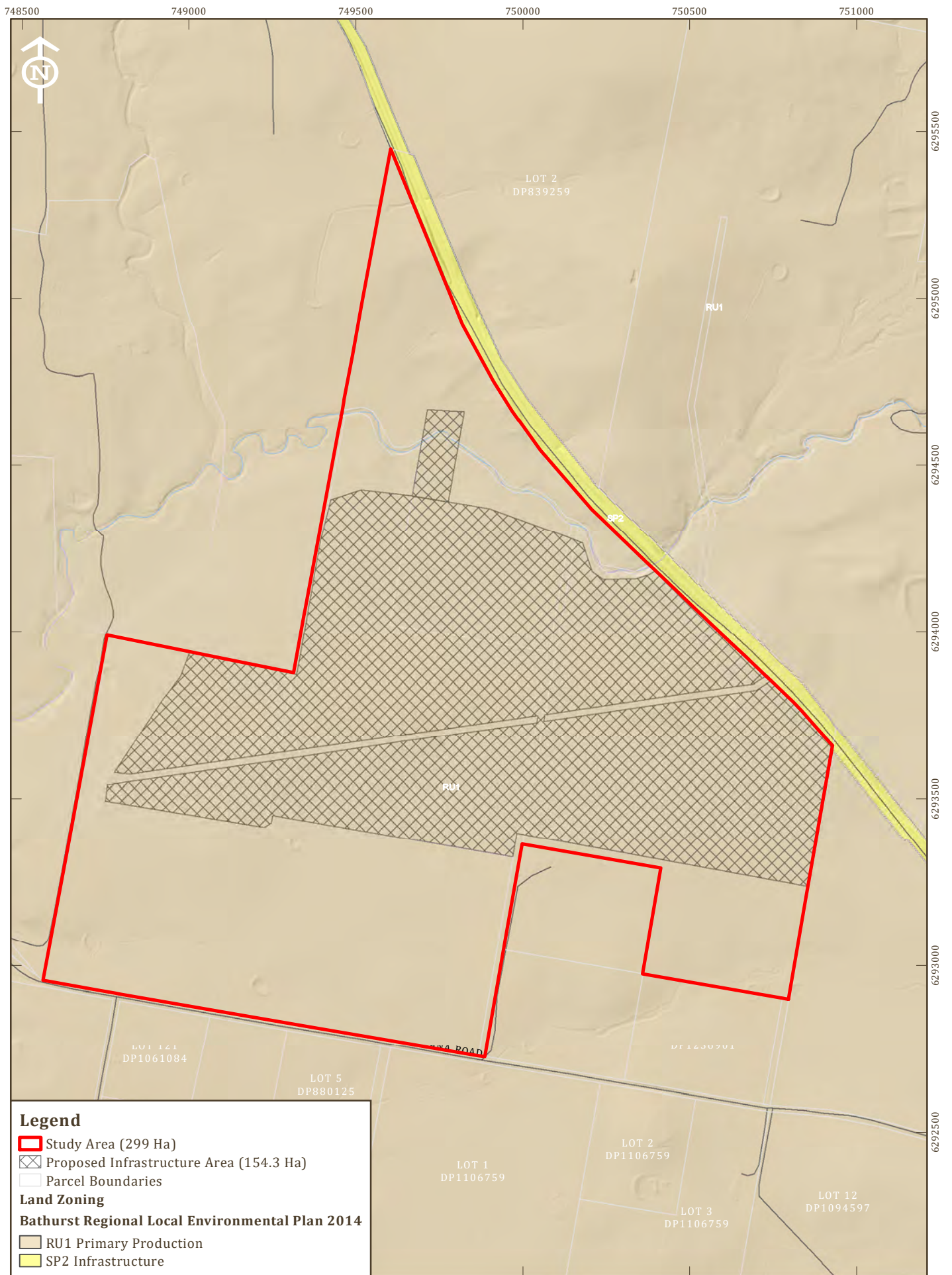
The key infrastructure item assisting agricultural market access and cost of production is the transport network servicing the central west region. Underlining the importance of this issue, total freight costs from farm to port can be as much as 30% of the value of the crop being marketed depending on Australian and world commodity prices in a given season. The Study Area is located approximately 4 km south of the Great Western Highway (A32). The region is traversed by this highway and the Mid Western Highway and Mitchell Highway, as well as the Main Western Railway Line, link agricultural enterprises to Sydney, Newcastle and Brisbane, as well as other regional centres.

In proximity to the Study Area, the large agricultural service centres of Bathurst (approximately 12km north west) and Lithgow (approximately 50km east) allow access to businesses providing agricultural equipment and supplies, including animal fencing, animal vaccinations, livestock ID, stock supplements, seed, fertiliser and crop protection.

The Central Tablelands Livestock Exchange (CTLX), located at Carcoar on the Mid Western Highway, provides the region with a state-of-the-art livestock auction facility. The CTLX opened in 2008 to replace outdated council saleyards at Orange, Bathurst and Blayney.

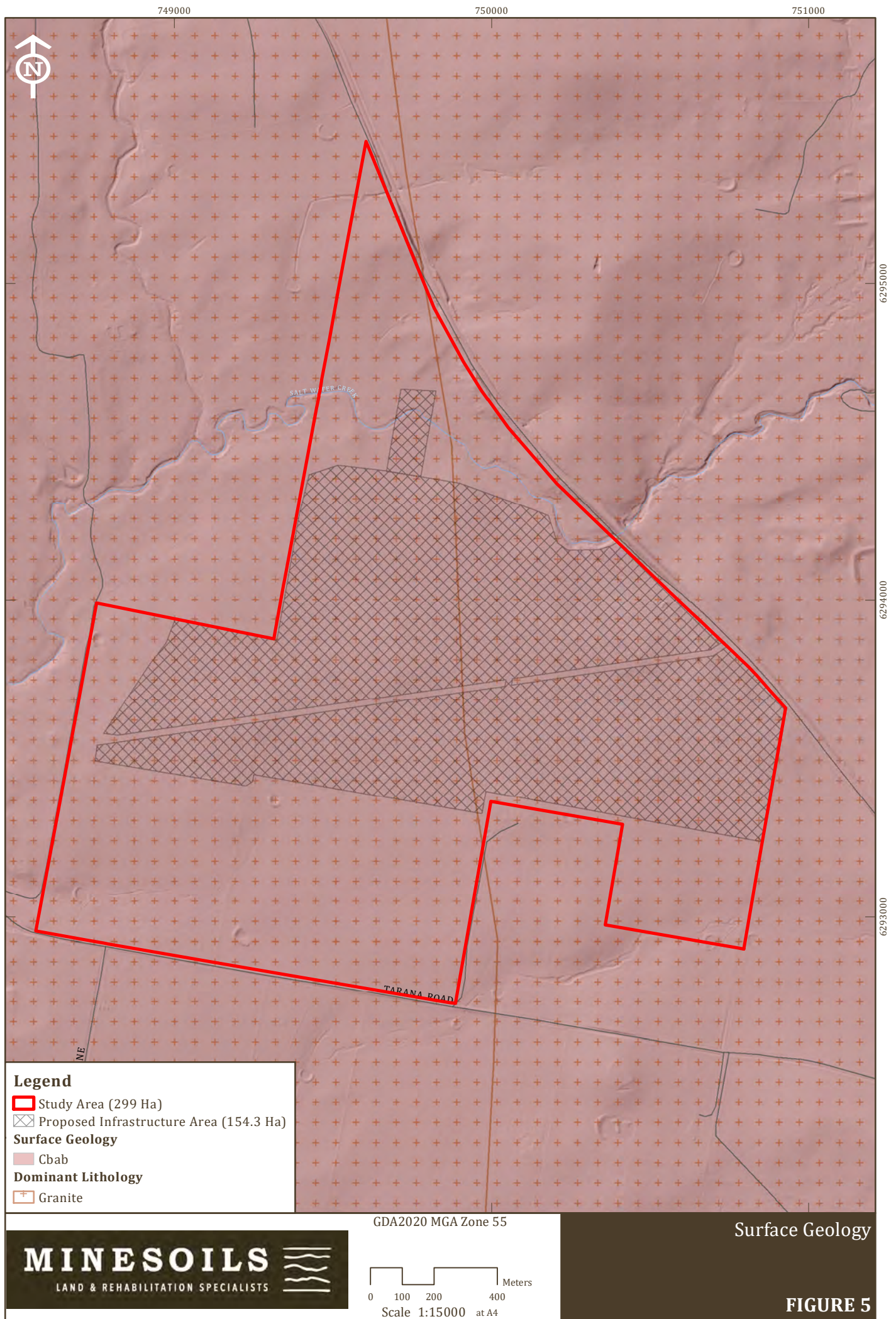
Other infrastructure critical to agricultural production include energy needs (gas and electricity), telecommunications services, urban water and wastewater services. General agricultural improvements such as stock fences, shedding, dams and access tracks are widespread throughout the locality which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





Land Zoning

**FIGURE 4**



## 3 SITE CHARACTERISTICS AND LAND USE

### 3.1 SITE CHARACTERISTICS

#### 3.1.1 LANDSCAPE

A site inspection was undertaken by Minesoils in May 2023. The Study Area was determined to be a stable, free draining landform with 80 - 100% surface cover in sustainable pasture that has been highly disturbed in the past by land clearing for agriculture (**Plate 1**). The Study Area landscape is characterised by gently undulating low rolling hills and crests, with narrow drainage flats associated with Saltwater Creek. The lowest elevation is approximately 700 m on drainage flats and rises to 750 m on crested areas (refer **Figure 6**).

Isolated exotic trees exist along Saltwater Creek, which runs east to west in the northern part of the Study Area is a tributary of Fish Creek which flows into the Macquarie River approximately 7.5 km south west of the Study Area.

There is an existing Transgrid 132 kV powerline that runs along the creek on the northern extent of the Study Area and also an underground gas line easement that runs through the middle of the site. A rail line that runs to the north of the Study Area, adjoins the northern boundary on the eastern side.

#### 3.1.2 AGRICULTURAL LAND USE

The Study Area is subject to livestock as the primary land-use, supporting sheep, cattle and calves, which are grazed on rotation for breeding and fattening, and are watered through two surface dams and pumped in water. Select paddocks are currently subject to mixed species fodder blend of brassica, oats and barley (**Plate 2**).

The Study Area is not fertilised, and there is no ongoing use of herbicides according to current landholder. General agricultural improvements are present, including troughs and lick feeders (**Plate 3**) a cattle yard (**Plate 4**), stock fences and gates (**Plate 5**), water pumps, tanks and dams, and unsealed access tracks.

Cattle and sheep were observed to be grazing within the Study Area at the time of the site investigation (**Plate 6**).

Based on satellite imagery, site observation, soil and land capability, and anecdotal evidence, it is determined that the Study Area has historically been used for cropping in addition to livestock grazing. Cropping included hay, wheat and canola. Anecdotal evidence provided by landholder indicates no cropping has been undertaken in the last seven years.

At the time of inspection, neighbouring properties in the immediate vicinity were observed to be used primarily for livestock grazing, with some cropping also being undertaken within the broader locality. Similar agricultural improvements (e.g. stock fences, dams and existing access tracks) are widespread throughout the locality which reflects the historical and current development of the local lands for these land uses.

No sensitive agricultural activities such as intensive plant or livestock agriculture are being undertaken within the Study Area or its immediate surrounds.

#### 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 Study Area. There is no set agricultural productivity value for land under agricultural use.

The NSW Department of Primary Industries (2019, 2022) Gross Margin Budgets for Livestock can be used to provide a broad estimation of the productivity of the land for grazing within the Study Area. Based on the DPI cattle and sheep enterprise options of 'Growing-out Steers (240 – 460 kgs)' and 'Merino Ewes (20 micron) – Merino Rams,' the estimated productivity ranges from \$119,525 to \$123,200 per annum for the Study Area, and \$67,958 to \$70,047 per annum for the development footprint, as summarised in **Table 7**.





**Plate 1:** Lands cleared for grazing on sustainable pastures with presence of exotic trees along Saltwater Creek



**Plate 2:** Lands cleared for grazing on mixed species fodder blend of brassica, oats and barley.



**Plate 3:** Agricultural infrastructure within the Study Area includes troughs and lick feeders.



**Plate 4:** Agricultural infrastructure within the Study Area includes cattle yards.



**Plate 5:** Agricultural infrastructure includes fencing and gates.



**Plate 6:** Cattle observed during the site investigation.

Table 7: Estimated Productivity of Grazing Land within the Study Area

| Enterprise                            | Estimated Gross Margin (\$/ha/year) | Study Area        |                                   | Development Footprint |                                              |
|---------------------------------------|-------------------------------------|-------------------|-----------------------------------|-----------------------|----------------------------------------------|
|                                       |                                     | Grazing Land (ha) | Study Area Gross Margin (\$/year) | Grazing Land (ha)     | Development Footprint Gross Margin (\$/year) |
| Growing-out Steers<br>240 – 460kg     | 412.04                              | 299               | 123,199.96                        | 170                   | 70,046.80                                    |
| Merino Ewes (20 micron) – Merino Rams | 399.75                              | 299               | 119,525.25                        | 170                   | 67,957.5                                     |

The related economic activity arising from the Study Area enterprises is referred to as the secondary productivity. The value of secondary productivity can be calculated using an economic multiplier. Agricultural economic multipliers provide annual estimates of employment and output effects of trade in agricultural products on the economy. When expressed as multipliers, these effects reflect the amount of economic activity and jobs generated by agricultural exports.

There are a range of upstream and downstream employment roles associated with agricultural production in the Project locality and wider region. These include:

- Agronomy services.
- Input providers (chemical, fertilisers, etc).
- Machinery sales and mechanical support.
- Grain and livestock transport.
- Production marketing.
- Fencing, harvest and other contractors.

Upstream activities for the current Study Area enterprises include contractors, farm input and service providers. Downstream activities for the current landowners' enterprises include distribution and processing (value adding). The related economic activity from the proposed solar farm area can be calculated using the economy multiplier of 2.1788, as used by ABS.

By applying the economic multiplier of 2.1788 to the estimated productivity, the value to the broader economy equates to an estimated \$260,421 to \$268,428 per year of the Project for the Study Area and \$148,066 to \$152,618 per year for the development footprint.

## 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 landscapes, soil types, inherent soil fertility and LSC as applied to the Study Area (NSW and Department of Planning, Industry and Environment, 2022).

#### **Soil Landscapes**

The Study Area lies within the *Soil Landscapes of the Bathurst 1:250 000 Sheet Report* (Kovac et al, 2010). Soil landscapes are an inventory of soil and landscape information with relatively uniform land management requirements, allowing major soil and landscape qualities and constraints to be identified.



The soil landscapes within the Study Area are shown on **Figure 7** and described below.

### Raglan

This landscape comprises the gently undulating to undulating rises on the Bathurst Plains. Red Solodic Soils are the dominant soils with Yellow Solodic Soils commonly found on lower slopes and in drainage depressions. Some Non-calci Brown Soils are associated with Bathurst soil landscape on upper slopes. Massive Red Earths and Yellow Earths are also present.

### Macquarie

This soil landscape includes the alluvial plains and terraces of the Macquarie, upper Belubula and Campbells Rivers, as well as Summer Hill, Flyers and Saltwater Creeks. Prairie Soils are the dominant soils on the floodplain. Other soils include earthy loams, Siliceous Sands and loams, Wiesenboden and Black Earths. Terraces have a variety of soils including Red Podzolic Soils and Red Earths on the upper levels, with Yellow Podzolic Soils and Yellow Solodic Soils on middle and lower levels.

### Bathurst

The Bathurst soil landscape is located on hills around Bathurst and has Non-calci Brown Soils with Yellow Solodic Soils on the lower slopes and in drainage lines. Sands and mottled Yellow Solodic Soils also occur.

### Soil Types

The NSW regional soil mapping indicates the dominant soil types within the Study Area are Chromosols, Sodosols and Dermosols, as per Australian Soil Classification (ASC) (Isbell, R. F., 2021) (refer **Figure 8**).

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 B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is not sodic and not strongly acid. Soils with strongly subplastic upper B2 horizons are also included even if they are sodic.

Sodosols are 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.

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

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

### 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 Study Area is dominated by soils with Moderately Low (2), Moderate (3) and Moderately High (4) fertility (refer **Figure 9**).

### 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 8** 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 8: Land and Soil Capability Classification

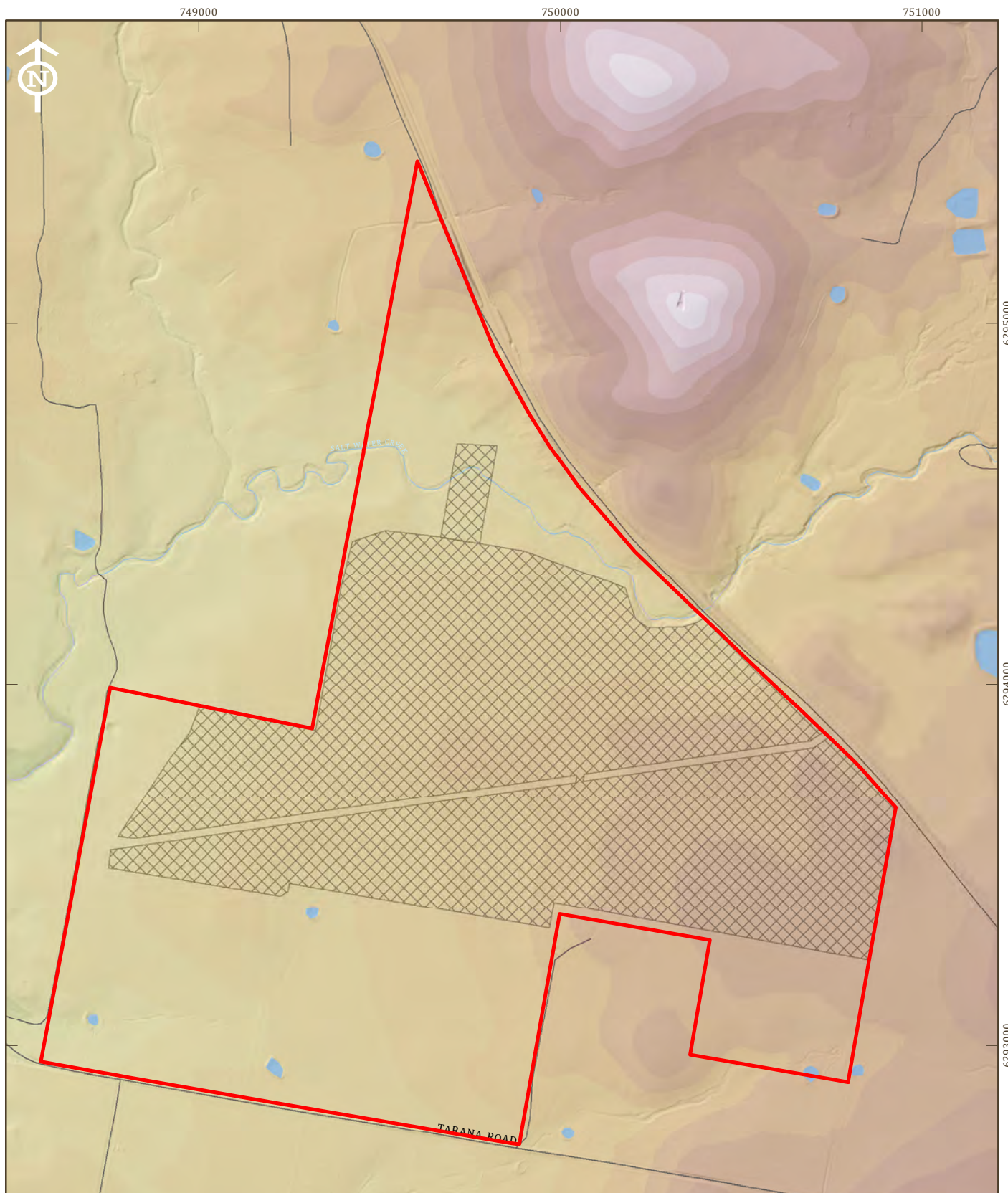
| Class                                                                                                                                                             | Land and Soil Capability                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)</b>                                               |                                                                                                                                                                                                                                                                                                                                                                                              |
| 1                                                                                                                                                                 | <b>Extremely high capability land:</b> Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.                                                                                                                                                                                                            |
| 2                                                                                                                                                                 | <b>Very high capability land:</b> 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                                                                                                                                                                 | <b>High capability land:</b> 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.                   |
| <b>Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)</b> |                                                                                                                                                                                                                                                                                                                                                                                              |
| 4                                                                                                                                                                 | <b>Moderate capability land:</b> 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                                                                                                                                                                 | <b>Moderate-low capability land:</b> 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.                                                                                                          |
| <b>Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                              |
| 6                                                                                                                                                                 | <b>Low capability land:</b> 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.                                                                                                     |
| <b>Land generally incapable of agricultural land use (selective forestry and nature conservation)</b>                                                             |                                                                                                                                                                                                                                                                                                                                                                                              |
| 7                                                                                                                                                                 | <b>Very low capability land:</b> 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                                                                                                                                                                 | <b>Extremely low capability land:</b> 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 Study Area consists of land capable of a variety of land uses and characterised by LSC class 2: Very high capability land, LSC class 3: High capability land and LSC class 4: Moderate capability land (refer **Figure 10**).

#### **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, particularly between mining, coal seam gas and agriculture. There is a stretch of BSAL in close association with Salt Water Creek within the northern extent of the Study Area (refer **Figure 2**).





### Legend

  Study Area (299 Ha)

Proposed Infrastructure Area (154.3 Ha)

#### Elevation (m)

685 - 690

690 - 695

695 - 700

700 - 705

705 - 710

710 - 715

715 - 720

720 - 725

725 - 730

730 - 735

735 - 740

740 - 745

745 - 750

750 - 755

755 - 760

760 - 765

765 - 770

770 - 780

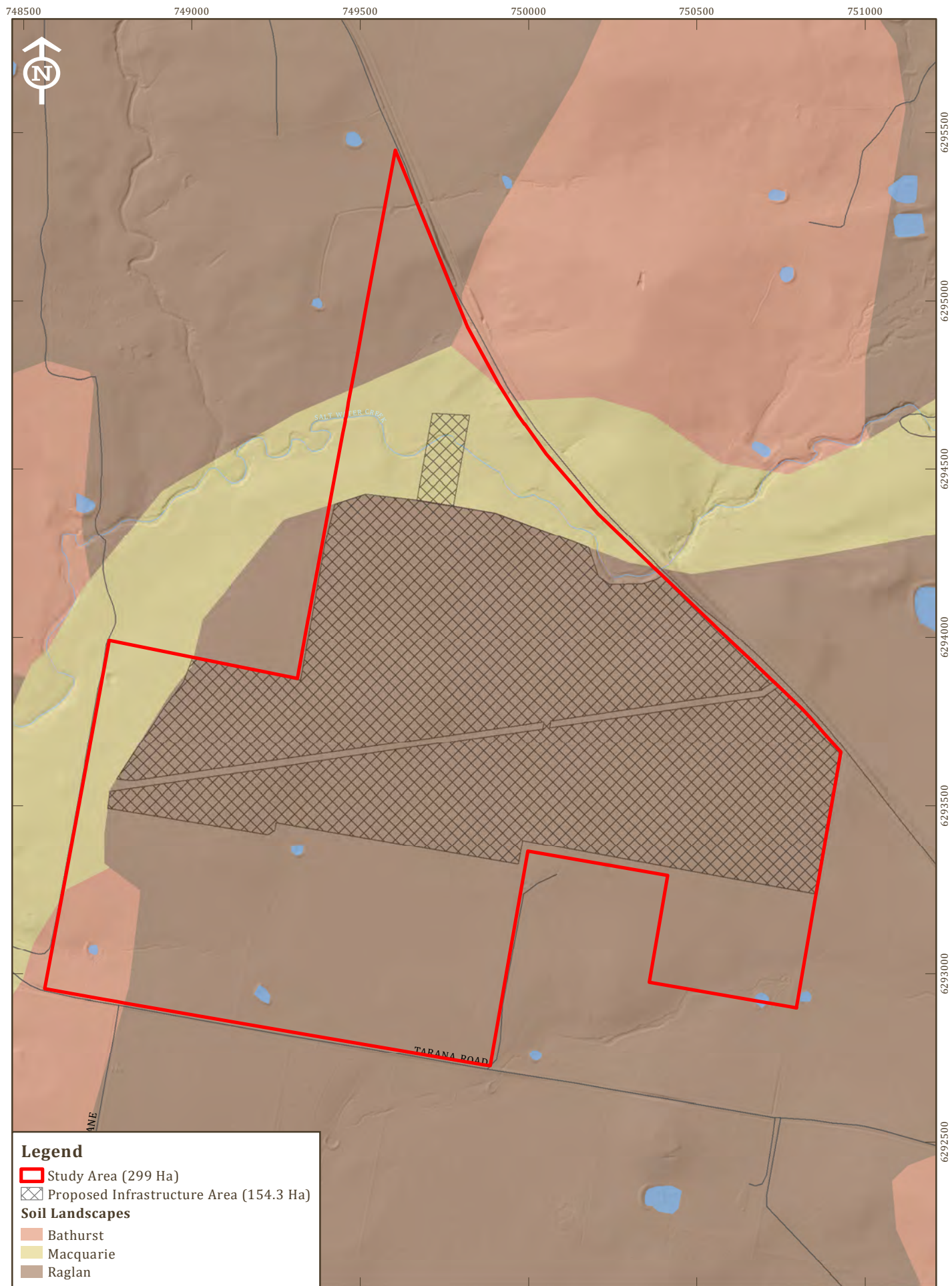
GDA2020 MGA Zone 55

**MINESOILS**  
LAND & REHABILITATION SPECIALISTS

0 100 200 400 Meters  
Scale 1:15000 at A4

Topography

**FIGURE 6**



### Legend

- Study Area (299 Ha)
- Proposed Infrastructure Area (154.3 Ha)

### Soil Landscapes

- Bathurst
- Macquarie
- Raglan

GDA2020 MGA Zone 55

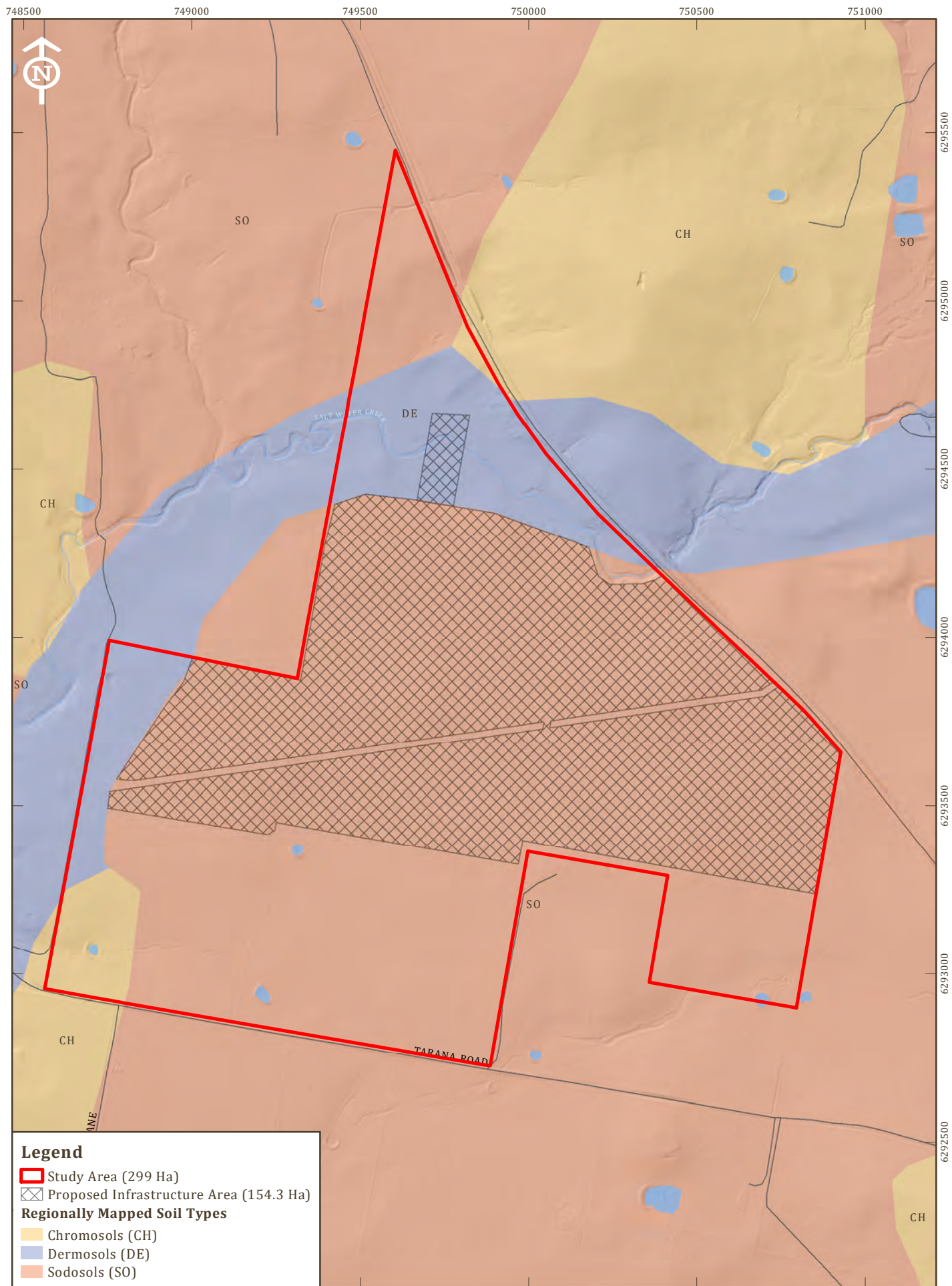
**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS



0 100 200 400 Meters  
Scale 1:15000 at A4

Regionally Mapped  
Soil Landscapes

**FIGURE 7**



### Legend

- Study Area (299 Ha)
- Proposed Infrastructure Area (154.3 Ha)
- Regionally Mapped Soil Types**
- Chromosols (CH)
- Dermosols (DE)
- Sodosols (SO)

**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS

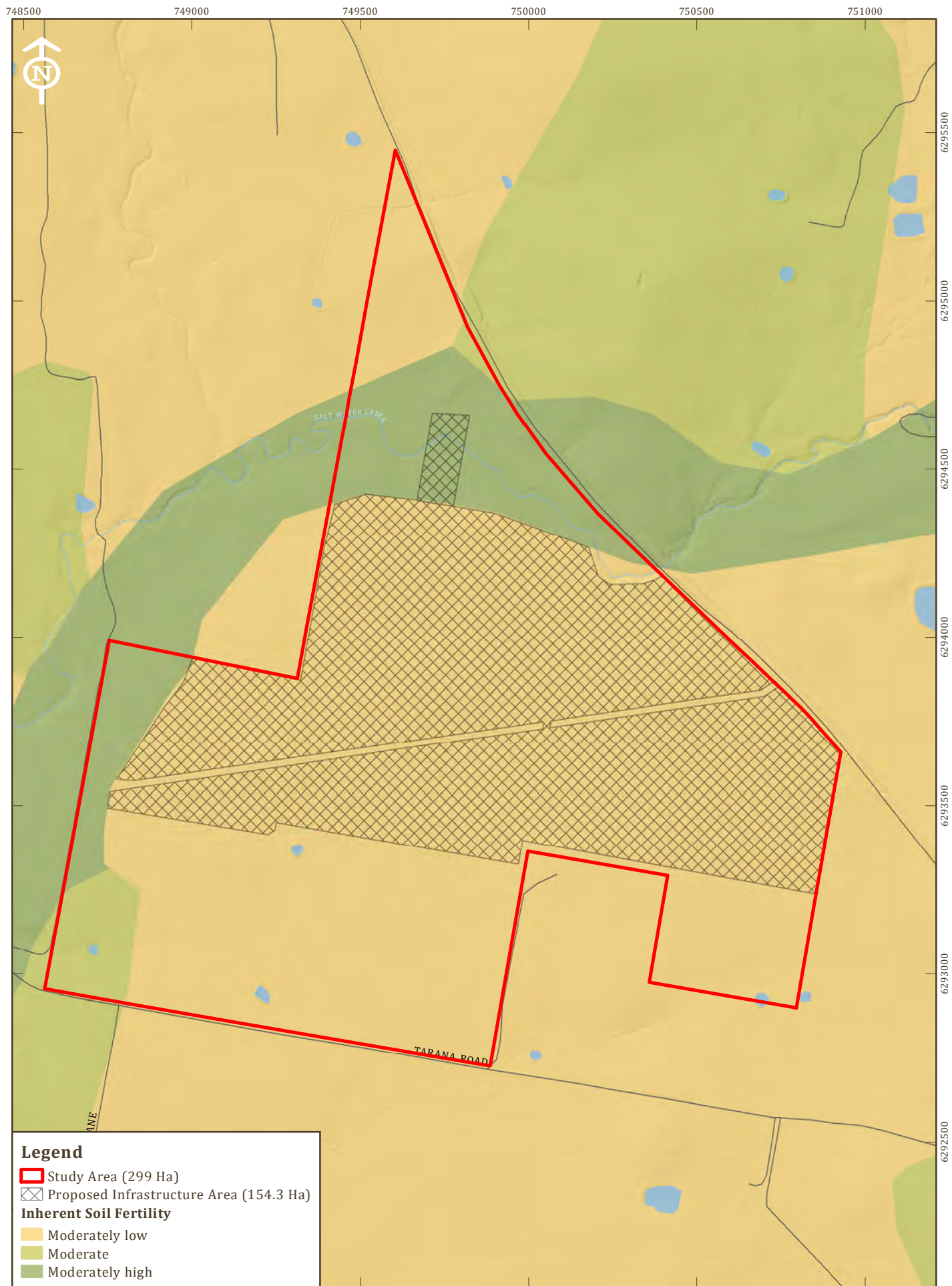


GDA2020 MGA Zone 55

0 100 200 400 Meters  
Scale 1:15000 at A4

Regionally Mapped  
Soil Types

**FIGURE 8**

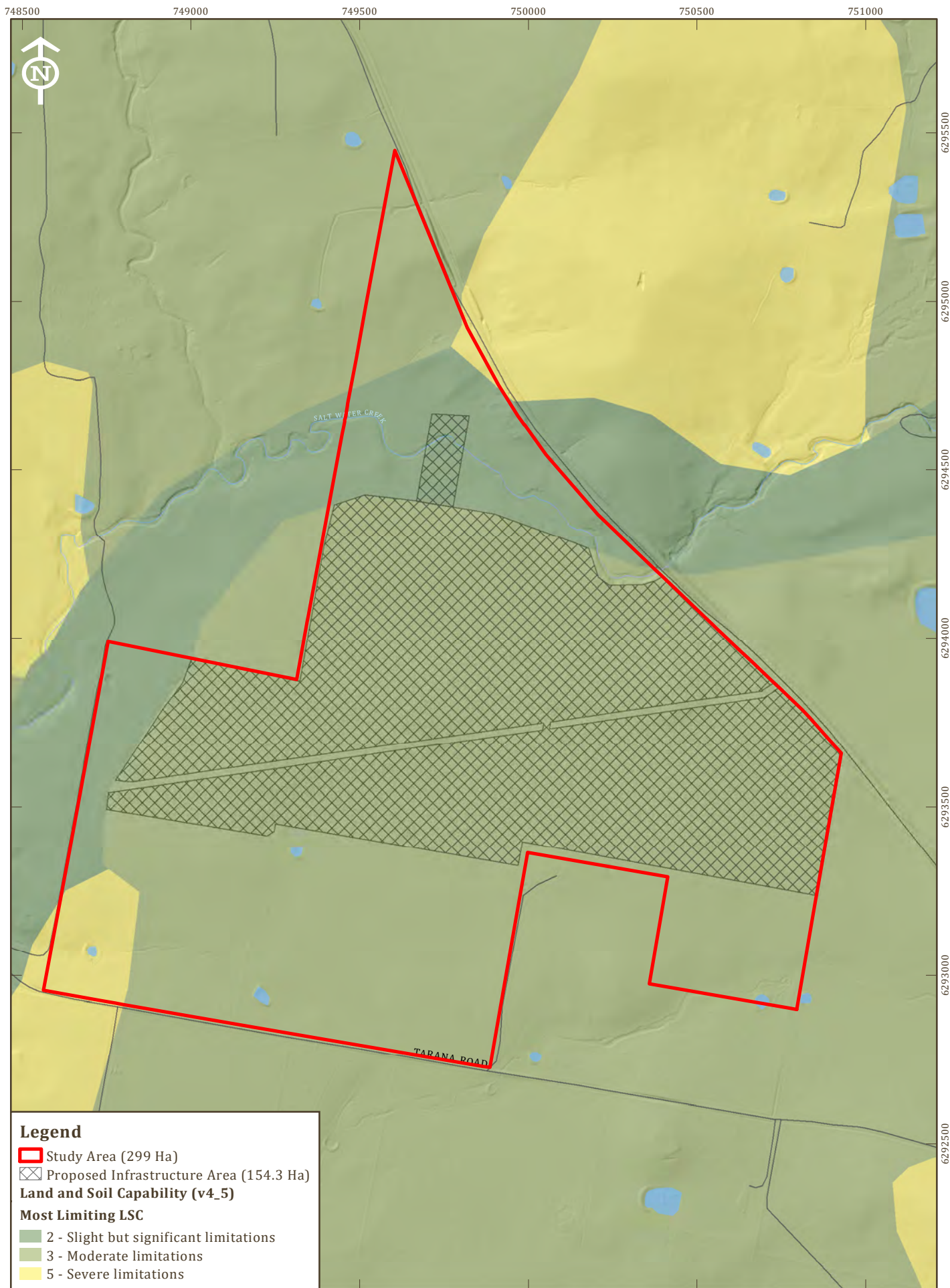


Regionally Mapped  
Inherent Soil Fertility

**FIGURE 9**

**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS





GDA2020 MGA Zone 55

**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS



0 125 250 500 Meters  
Scale 1:15000 at A4

Regionally Mapped  
Land and Soil Capability

**FIGURE 10**

### 3.2.2 SOIL SURVEY METHODOLOGY

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

- Soil assessment, identifying soil units, soil qualities and risks including erosion, acid sulfate soils 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. 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 Study 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 pits were excavated by a soil corer to a depth of 0.7 – 1.0m. 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 Study Area which were avoided during excavation activities.

The survey area was the full 299 ha of the Study Area. A total of 13 sites were assessed, resulting in a survey intensity of 1 site per <25 ha. Soil profiles within the Study Area (refer to **Figure 11**) 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 9**. 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 0.8m, with a total of 40 samples collected. Minesoils chose 22 of these samples that were considered representative in terms of soil type and spatial distribution onsite, to be subject to laboratory testing. The laboratory testing suite for these sites is detailed in the **Table 10**.

Duplicate samples at every site were collected during the fieldwork and stored until the EIS is finalised.



Table 9: 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 10: 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 Study Area to contain three dominant soil mapping units, as shown on **Figure 11**, and presented in **Table 11**:

- Soil Unit 1: Chromosols – covering 210 ha.
- Soil Unit 2: Sodosols – covering 69 ha.



- Soil Unit 3: Dermosols – 20 ha.

Soil Unit 1 is characterised by Chromosols, 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 not sodic and not strongly acid. Soils with strongly subplastic upper B2 horizons are also included even if they are sodic.

This unit is characterised by sandy loams and loams with moderate structure overlying medium to heavy clay mottled subsoils with moderate to strong structure. pH is slightly to moderately acidic in the topsoil and trends from neutral to mildly alkaline at depth. These soils are consistently non-saline and generally non-sodic. Soil profile drainage ranges from moderate to imperfect, and profiles are consistently deep. This soil unit is found on the undulating slopes that dominate the Study Area.

Representative sites for this unit, which include detailed laboratory data, consist of sites 1 and 5.

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. Soils with strongly subplastic upper B2 horizons are excluded.

This unit is characterised by sandy loams and loams with moderate structure overlying light-medium to heavy clay mottled subsoils with moderate to strong structure. A bleached A2 horizon is consistently present. pH is slightly acidic in the topsoil and trends from neutral to moderately alkaline at depth. These soils are generally non-saline and sodic in the subsoil. Soil profile drainage is imperfect, and profiles are consistently deep. This soil unit is found on a broad, very gently undulating upper slope and crest area in the south east of the Study Area.

Representative sites for this unit, which include detailed laboratory data, consist of sites 11 and 12.

Soil Unit 3 is characterised by Dermosols, which are defined as soils other than Vertosols, Hydrosols, Calcarosols and Ferrosols which:

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

This unit is characterised by dark friable loam topsoils overlying light medium clay subsoils with moderate structure. pH is slightly to moderately acidic in the topsoil and trends to neutral at depth. These soils are consistently non-saline and non-sodic. Soil profile drainage is moderately well drained, and profiles are consistently deep. This soil unit is found on drainage flats associated with waterways.

The representative site for this unit, which includes detailed laboratory data, is site 7.

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



Table 11: Soil Mapping Units and Soil Units Summary

| Site # | Soil Mapping Units |            | Soil Profile ASC                          | ASC Family Criteria |
|--------|--------------------|------------|-------------------------------------------|---------------------|
|        | #                  | Name       |                                           |                     |
| 1      | 1                  | Chromosols | Mottled Eutrophic Red Chromosol           | BELOWNR             |
| 2      | 1                  | Chromosols | Brown Chromosol                           | -                   |
| 3      | 1                  | Chromosols | Red Chromosol                             | -                   |
| 4      | 1                  | Chromosols | Red Chromosol                             | -                   |
| 5      | 1                  | Chromosols | Mottled-Sodic Eutrophic Red Chromosol     | BFLOWNR             |
| 6      | 1                  | Chromosols | Brown Chromosol                           | -                   |
| 7      | 3                  | Dermosols  | Haplic Mesotrophic Black Dermosol         | BELOW               |
| 8      | 3                  | Dermosols  | Black Dermosol                            | -                   |
| 9      | 1                  | Chromosols | Red Chromosol                             | -                   |
| 10     | 3                  | Dermosols  | Black Dermosol                            | -                   |
| 11     | 2                  | Sodosols   | Eutrophic Mottled-Subnatric Black Sodosol | BELOWNR             |
| 12     | 2                  | Sodosols   | Bleached Mottled-Subnatric Grey Sodosol   | CELOWNR             |
| 13     | 2                  | Sodosols   | Brown Sodosol                             | -                   |

### ***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 12** shows the EAT class and the dispersion degree during testing and resulting risk of dispersion for that soil.



Table 12: 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 13** highlights the lowest Emerson Class Number recorded for select laboratory data representative sites of the Study Area, as an indicator of highest potential risk during disturbance activities.



Table 13: Potential Dispersion Risk

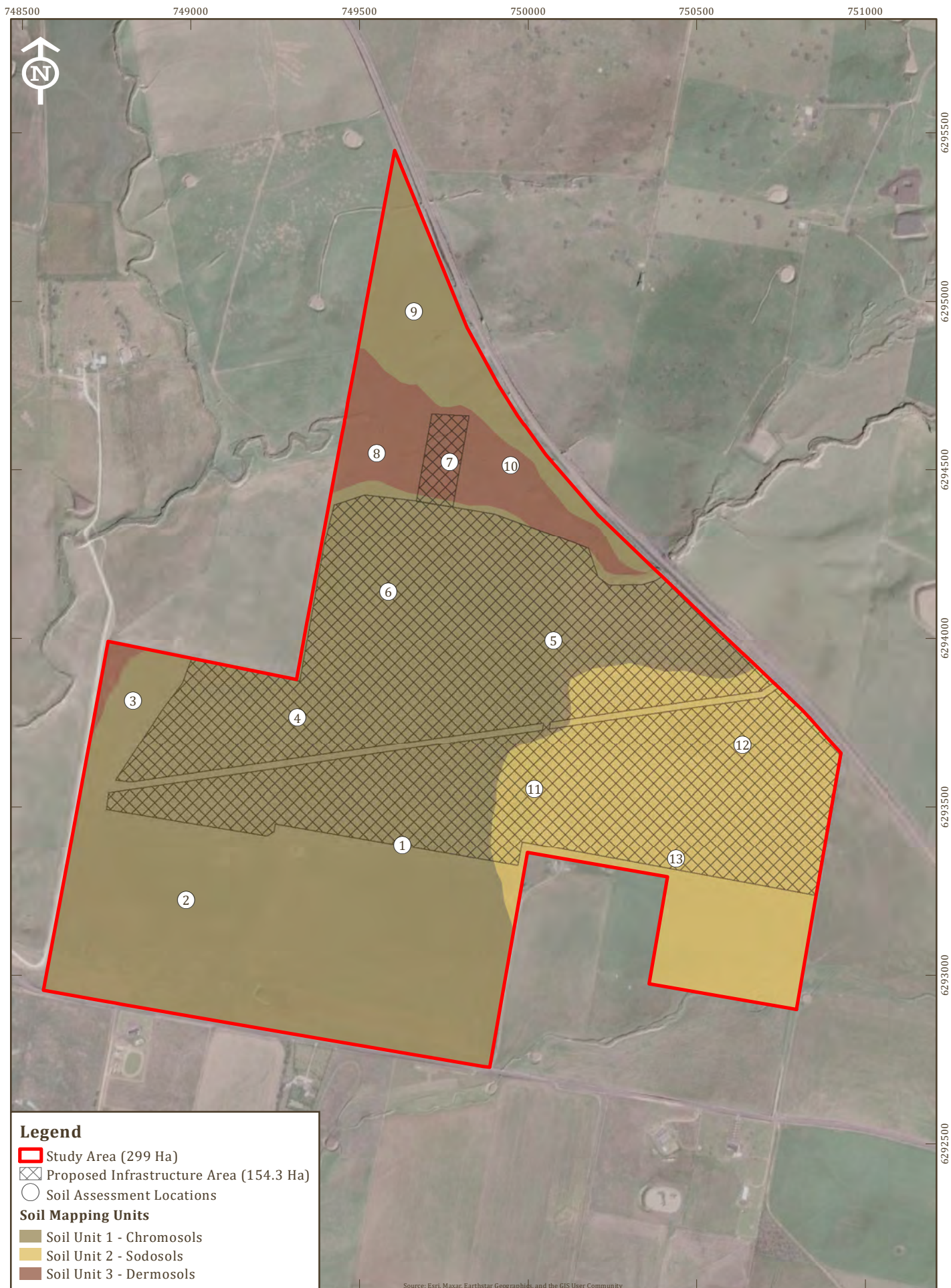
| Site No. | ASC                                       | Soil Depth (m) | EAT | Potential Risk |
|----------|-------------------------------------------|----------------|-----|----------------|
| 1        | Mottled Eutrophic Red Chromosol           | 0.30 – 0.40    | 3   | Moderate       |
|          |                                           | 0.60 – 0.70    | 4   | Negligible     |
| 5        | Mottled-Sodic Eutrophic Red Chromosol     | 0.30 – 0.40    | 3   | Moderate       |
|          |                                           | 0.60 – 0.70    | 3   | Moderate       |
| 7        | Haplic Mesotrophic Black Dermosol         | 0.20 – 0.30    | 3   | Moderate       |
|          |                                           | 0.50 – 0.60    | 3   | Moderate       |
| 11       | Eutrophic Mottled-Subnatric Black Sodosol | 0.20 – 0.30    | 2   | High           |
|          |                                           | 0.50 – 0.60    | 3   | Moderate       |
| 12       | Bleached Mottled-Subnatric Grey Sodosol   | 0.25 – 0.35    | 2   | High           |
|          |                                           | 0.65 – 0.75    | 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 minimal erosion and sedimentation risk associated with the topsoils currently present in the Study Area with evidence of minor sheet erosion. However, the dispersion risk status of the tested soils indicate there is high potential risk for dispersion of the A2 horizon and subsoils of Soil Unit 2: Sodosols. The representative laboratory tested soils also indicate high levels of sodicity primarily in the clay subsoils associated with this unit. 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 low levels of salinity of the soils tested, all sodic soils should be considered dispersive.

Based on these results, there is a high potential risk for dispersion where the subsoils of Soil Unit 2 are disturbed within the Study Area. Higher impact activities such as where earthworks are necessary for construction of sub-station pads or site facilities are highly likely to result in increased dispersive behaviour when soil is remoulded, compacted or pulverised. Targeted controls should be applied to this soil unit.

In addition, caution must be taken over the entire Study Area including Soil Units 1 and 3 despite the most stabilise chemical and physical properties and landscape location of specific soil test sites, as these units displays a moderate dispersion risk in subsurface soil horizons. General controls should therefore be applied across the entire Study Area where any disturbance occurs (including changes to vegetation cover). Recommended control measures are presented in Section 6.2.1.





Soil Mapping Units

**MINE SOILS**  
LAND & REHABILITATION SPECIALISTS

**FIGURE 11**

### ***Acid Sulphate Soils***

Acid sulfate soils (ASS) have been classified into 5 different classes based on the likelihood of the acid sulfate soils 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 Study 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**

The 13 soil test sites within the Study Area have been subject to the site verification assessment of LSC, in accordance with the LSC Guideline and outlined in Section 3.2.1.

The Study Area contains four LSC classes:

- LSC class 2: very high capability land – covering 20 ha.
- LSC class 3: high capability – covering 130 ha.
- LSC class 4: moderate capability land – covering 58 ha.
- LSC class 5: moderately low capability land – covering 91 ha.

The spatial extent of each LSC class is shown in **Figure 12**. The LSC verification assessment outcomes for the eight hazards group for the soil profiles assessed is presented in **Table 14**. Full LSC working tables are included as **Appendix 4**.

Class 2 land is directly associated with drainage flats associated with Salt Water Creek and has slight limitations that 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. The minor limitations of this class within the Study Area include wind erosion, waterlogging and soil acidity.

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 Study Area include water erosion, wind erosion, soil acidity 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 limitations of this class within the Study Area include wind erosion, soil acidity and waterlogging.

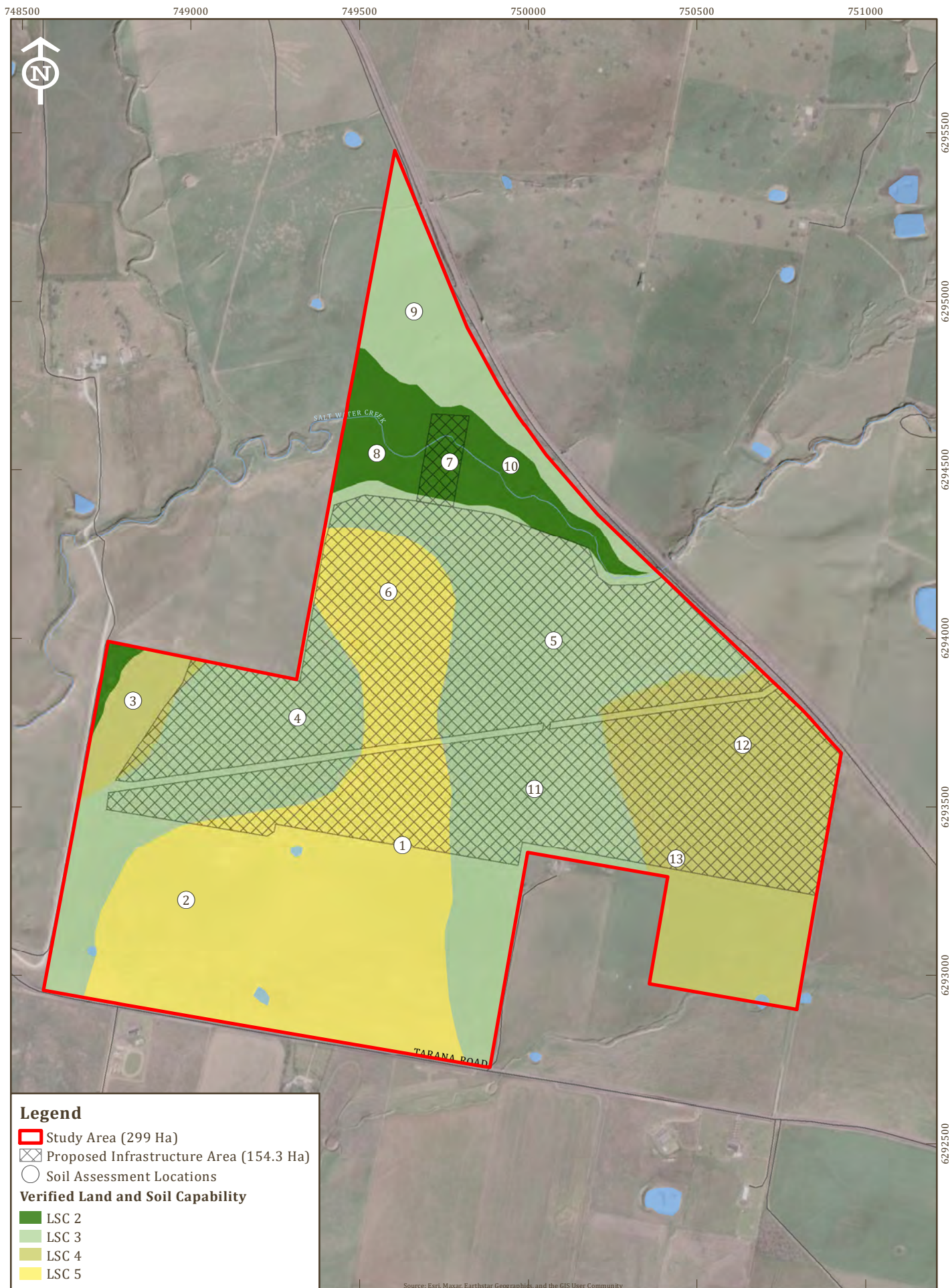


Class 5 land is associated with Soil Unit 1 and has high limitations for high-impact land uses that will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation. The key limitation of this class within the Study Area is soil acidity.

Table 14: LSC Parameters and Overall Class

|    |                                           | Hazard Criteria |              |           |         |          |               |            |          | Overall |
|----|-------------------------------------------|-----------------|--------------|-----------|---------|----------|---------------|------------|----------|---------|
|    |                                           | 1               | 2            | 3         | 4       | 5        | 6             | 7          | 8        |         |
|    |                                           | Water erosion   | Wind erosion | Structure | Acidity | Salinity | Water logging | Soil depth | Movement | Class   |
| 1  | Mottled Eutrophic Red Chromosol           | 3               | 4            | 3         | 5       | 1        | 2             | 1          | 1        | 5       |
| 2  | Brown Chromosol                           | 3               | 4            | 3         | 5       | 1        | 2             | 1          | 1        | 5       |
| 3  | Red Chromosol                             | 3               | 4            | 3         | 4       | 1        | 2             | 1          | 1        | 4       |
| 4  | Red Chromosol                             | 3               | 3            | 3         | 3       | 1        | 2             | 1          | 1        | 3       |
| 5  | Mottled-Sodic Eutrophic Red Chromosol     | 3               | 4            | 3         | 4       | 1        | 2             | 1          | 1        | 4       |
| 6  | Brown Chromosol                           | 3               | 4            | 3         | 5       | 1        | 3             | 1          | 1        | 5       |
| 7  | Haplic Mesotrophic Black Dermosol         | 1               | 2            | 1         | 2       | 2        | 2             | 1          | 1        | 2       |
| 8  | Black Dermosol                            | 3               | 2            | 1         | 2       | 2        | 2             | 1          | 1        | 2       |
| 9  | Red Chromosol                             | 3               | 3            | 3         | 3       | 1        | 2             | 1          | 1        | 3       |
| 10 | Black Dermosol                            | 1               | 2            | 1         | 2       | 2        | 2             | 1          | 1        | 2       |
| 11 | Eutrophic Mottled-Subnatric Black Sodosol | 3               | 3            | 3         | 3       | 1        | 3             | 1          | 1        | 3       |
| 12 | Bleached Mottled-Subnatric Grey Sodosol   | 2               | 4            | 3         | 4       | 1        | 4             | 1          | 1        | 4       |
| 13 | Brown Sodosol                             | 3               | 4            | 3         | 4       | 1        | 4             | 1          | 1        | 4       |





**Legend**

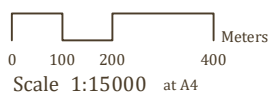
- Study Area (299 Ha)
- Proposed Infrastructure Area (154.3 Ha)
- Soil Assessment Locations

**Verified Land and Soil Capability**

- LSC 2
- LSC 3
- LSC 4
- LSC 5

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community  
GDA2020 MGA Zone 55

Verified Land and Soil Capability



**FIGURE 12**

## 4 LAND USE CONFLICT RISK ASSESSMENT

### 4.1 OVERVIEW

The Land Use Conflict Risk Assessment (LUCRA) (NSW Department of Primary Industries, 2011) is required as part of an Agricultural Impact Assessment as per the LSSE Guideline. The 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. 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 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 solar farm and adjacent land 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 significant overlap between the agricultural impact assessment and land use conflict considerations, many agriculture-related risk items listed in the LUCRA are detailed in Section 5.

### 4.3 FINDINGS

There are 39 risk items that were considered as part of the LUCRA. The mitigation measures and controls outlined in this assessment reduce the level of risk for the majority of considered potential risks with complaints or conflict being managed within normal operations. There are no high risk potential conflicts, however a number of items of potential conflict remain a moderate risk and may require further consultation and management in addition to standard operations. These are summarised in **Table 15**. The LUCRA methodology including risk ranking matrix and full LUCRA assessment are included as **Appendix 1**.



Table 15: LUCRA Moderate Risk Items and Risk Controls Summary

| Risk Item                                                                                                                                                                                                               | Risk Reduction Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Land users in the locality may be concerned about the possibility of increased vehicles during construction on the Tarana Road may result in an incident involving other vehicles, farm machinery or wildlife on roads. | <p>The assessment of potential traffic impacts will be undertaken via a Traffic Impact Assessment (TIA). Appropriate mitigation measures will be 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 local road users.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p>                                                                                                                                                                                                                                                                  |
| Stakeholders in the locality who wish to maintain views of the existing agricultural landscape may be concerned about the change in visual amenity resulting from the solar farm.                                       | <p>The assessment of visual impacts to surrounding amenity will be undertaken via a LVIA. Appropriate mitigation measures will be specified within the LVIA to minimise the risk of altered amenity for surrounding residents and public within the locality. Compliance with mitigation measures specified within the LVIA is anticipated to reduce the risk of conflict related to visual amenity.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p>                                                                                                                                                                                                                  |
| Land users in the locality may be concerned about weed, plant pest, plant disease or pest animal introduction and/or spread.                                                                                            | <p>The assessment of impacts to biodiversity will be undertaken via a BDAR. Consideration of the potential for pest species to impact agriculture has been included in this assessment. Appropriate mitigation measures will be specified within the BDAR and this assessment to minimise the risk for weeds and pests to spread throughout the site and onto neighbouring land.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p>                                                                                                                                                                                                                                      |
| Land users in the locality may be concerned about the risk of fires occurring at the site and their potential to spread to surrounding land, infrastructure or livestock.                                               | <p>Consideration of potential bushfire impacts will be undertaken as part of a Preliminary Hazard Analysis (PHA) informing the EIS. Appropriate mitigation measures will be specified within the bushfire assessment within the EIS to minimise the risk of bushfire incidents including their risk to people and potential to damage surrounding land.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p>                                                                                                                                                                                                                                                               |
| Landowners in the locality may be concerned about potential devaluation of properties due to proximity to solar farm infrastructure.                                                                                    | <p>After delivering eight projects throughout Australia, including the largest solar and battery project in New South Wales, Edify is not aware of, and has not been presented with, any reliable, impartial research or evidence which establishes a correlation between declining real estate values and proximity to renewable infrastructure.</p> <p>Given the size of the landholdings, it is likely that their agricultural production attributes provide a strong foundation for overall property value. The project will not impact the agricultural resources or production value of properties proximate to the Study Area. Further, the change in visual amenity is not anticipated to have any noticeable effect on property values.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> |



| Risk Item                                                                                                                                                  | Risk Reduction Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stakeholders may be concern about potential impacts to biodiversity within the site and locality                                                           | <p>The assessment of impacts to biodiversity will be undertaken via a BDAR. Appropriate mitigation measures will be specified within the BDAR and this assessment to minimise the risk for impacts on biodiversity within the site and locality.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> |
| Public Authorities may have concerns regarding the potential for cumulative impacts arising from the proximity of state significant developments.          | <p>An assessment of potential cumulative impacts will be undertaken as part of the EIS. Appropriate mitigation measures (where required) will be specified in the EIS to minimise the potential for cumulative impacts to occur at or near the site.</p>                                                                                                                                                                                                                        |
| Stakeholders may be concerned about the potential for poor rehabilitation outcomes and the resulting long term environmental and agricultural consequence. | <p>A Rehabilitation and Decommissioning Management Plan will ensure the land can be successfully returned to pre-disturbance land and soil capability and final land use commitments following decommissioning.</p>                                                                                                                                                                                                                                                             |



## 5 IMPACTS ON AGRICULTURAL LAND

The impacts solar farming 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 agricultural land from service over the life of the Project. Permanent impacts may include changes to land and soil capability and agricultural resources of the Study Area. Permanent impacts are irreversible and compromise the reinstatement of agricultural lands and land productivity. Evidence from Australian solar farming practices generally suggests permanent and irreversible impacts to agricultural land has a low degree of risk.

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 Study 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 solar farms within the region.

### 5.1 LAND USED FOR AGRICULTURE

The Project will be undertaken on an area of approximately 170 ha of land that is currently subject to agriculture land use. The Applicant intends to use as much of the Study Area as possible for agricultural purposes during the operational phase of the Project. Land being used simultaneously for agriculture and the solar farm is known as agrisolar and is further described in Section 6.4. However, for the purpose of this assessment, it is assumed that the agriculture will cease within the development footprint for the duration of the Project

Therefore, there will be a temporary decrease of approximately 170 ha of land used for agriculture for the duration of the Project. It is anticipated that agricultural land use will be re-established over the entire 170 ha Study Area at the time of decommissioning (unless otherwise agreed with the landowner and/or regulatory authorities). There will be no permanent decrease in land available for agriculture use.

Current agricultural land use in the remainder of the Study Area, immediate to the Study 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.

### 5.2 PRODUCTIVITY AND ENTERPRISES

#### 5.2.1 PRIMARY PRODUCTIVITY

The productivity of the Study Area is described in Section 3.1.3. For the purpose of this assessment, the impact of the Project on productivity of agricultural land based on the change in land use within the development footprint is up to \$70,047 per year.

This is considered negligible impact in the context of the agricultural industry gross value of the Bathurst Regional Council LGA as outlined in Section 2.4.2.

Due to the minimal disturbance to the landform, following the life of the Project, all 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.

#### 5.2.2 SECONDARY PRODUCTIVITY

The secondary productivity of the Study Area is outlined in Section 3.1.3. For the purpose of this assessment the impact of the Project on secondary agricultural productivity is estimated to be up to \$152,618. This is considered



negligible impact in the context of the agricultural industry gross value of the Bathurst Regional Council LGA as outlined in Section 2.4.2.

### 5.2.3 PRODUCTIVITY OF LAND WITHIN LOCALITY

Agricultural productivity of land outside of the development footprint 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 Study Area.

### 5.2.4 AGRICULTURE SUPPORT SERVICES

The Project will have a negligible impact on local and regional agricultural services. Changes to the supply and viability of agricultural support services in the main service centres are the towns of Bathurst and Lithgow are driven by social and market trends far exceeding the scale of the minor reduction in agricultural land use and productivity as a result of the Project.

The reduction in livestock being sold will be a negligible impact at the scale of the Central Tablelands Livestock Exchange, as this reduction is estimated to represents <0.001% of all livestock sold.

### 5.2.5 CRITICAL MASS THRESHOLDS

Due to the limited reduction in agricultural activity as a result of the Project, there will be no impact to critical mass thresholds of agricultural enterprises needed to attract and maintain investment in agricultural service industries and infrastructure.

## 5.3 AGRICULTURAL RESOURCES

### 5.3.1 SOILS

Over the majority of the Study Area, soils will be subject to minor disturbance as part of the construction or maintenance of solar arrays and electrical cabling trenches. In areas where earthworks are necessary for construction of the BESS, substation and switching station, site facilities or access tracks, soils will be subject to higher impact disturbance.

All soil that is proposed to be disturbed during the Project will be stripped and re-used during construction and/or rehabilitation in order to mitigate long term effects on soil resources during operation. Given the limited surface disturbance anticipated, any soil stripping and re-use will be localised; that is, soil may be stripped and stored adjacent to disturbance and respread from where it was stripped. This localised approach will promote reinstatement of the soil profile to its original condition.

Additionally, soils may be stripped only in areas where soil disturbance occurs. The depth of soil salvaged will be as deep as excavations or surface disturbance is required, or to a depth where parent material is encountered.

Impacts on soil biological balance and nutrient availability are linked to the status of vegetation beneath the panels. If grass cover is maintained across the site both between and under the panel rows to provide groundcover, there will be negligible soil composition and productivity impacts as a result of the panels.

However, if vegetation beneath the panels is significantly reduced or eliminated over long periods during operations, the soil may be temporarily sterilised and will require additional efforts and costs at the time of site decommissioning to restore the soil to a level of productivity equivalent to pre-disturbance conditions.

Overall, the impacts to the soils of the Study Area are expected to be minimal and temporary. There will be no direct or indirect impacts to the soil resources of the Project locality outside the Study Area.

Soil impact mitigation measures are outlined in Section 6.2.



### 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 and leveling), impacts on LSC are expected to be minor. The preliminary surface disturbance footprint for large site infrastructure is shown on **Figure 2**. The proposed infrastructure disturbance footprint has been designed to avoid, as much as practicable, LSC class 2 lands.

Following the end of life for the Project, disturbance footprints will be re-graded (where required) and any minor stockpiles of topsoil and subsoil be respread over disturbed areas and rehabilitated with either native vegetation or improved pastures 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.

Therefore, it is anticipated there will be no permanent impacts on LSC classes within the Study Area as a result of the Project.

### 5.3.3 WATER

The risk of groundwater impacts during solar farm construction activities is generally low as potential limited site levelling for the solar farm and substation foundations is expected to require excavation of no more than 0.40 – 0.60 m, and trenches for underground cables are expected to be no greater than 1.0 to 1.2 m deep. There are no impacts on groundwater anticipated and risks to water quality are expected to be readily manageable.

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

Erosion risks are primarily associated with Soil Unit 2: Sodosols in the south west upper slopes and broad crested portion of the Study Area. In addition, EAT classes throughout the entire Study Area indicate the widespread presence of potentially dispersive soils with a moderate potential for increased dispersion upon disturbance. Suitable erosion and sedimentation controls, as outlined in Section 6.2, can be implemented to target these specific erosion hazards to reduce impacts to surface soils and waterways.

### 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 and rail network that connects the agricultural industry to markets, services and suppliers (refer Section 5.4.4).

Stock fences, dams and access tracks will be retained to accommodate potential agrisolar. Upgrades to access tracks throughout the Project will benefit post-Project agricultural land uses and is considered a positive impact. Dams within the Study Area will not be disturbed by the Project.

## 5.4 OTHER POTENTIAL IMPACTS ON AGRICULTURE

### 5.4.1 PEST SPECIES

Pest species could be inadvertently brought into the Study 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 hindrance to rehabilitation, regeneration activities, and agricultural endeavours.

Weeds in general will be managed across the site through a series of control measures, including:

- Prior to re-spreading stockpiled topsoil onto the disturbance area, an assessment of weed infestation on stockpiles will be undertaken to determine if individual stockpiles require herbicide application and / or “scalping” of weed species prior to topsoil spreading.



- Rehabilitation monitoring programs and routine inspections will be undertaken to identify potential weed infestations; and
- There will be an ongoing effort to identify and eliminate (spray) existing weed populations on-site over the life of the Project.

The spread of declared noxious weeds will be prevented by using the measures above. The monitoring and control of weed populations using herbicides within the site will significantly reduce weed infestations. 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 goats, foxes, cats, rabbits, pigs, and dogs and will be controlled in accordance with Livestock Health and Pest Authority procedures.

#### 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. 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 has 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). 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 can be readily implemented 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 solar farm operations, leaving fewer transport options for agricultural enterprises.

Tarana Road in the vicinity of the Study Area is anticipated to experience an increase in traffic volumes during the peak construction period. However, the traffic impacts of the Project are not likely to have material consequences on agricultural enterprises within the Project locality. Further, no increases in levels of noise and dust that could impact agriculture will result from increased traffic.



#### 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 (e.g., harvesters, boom sprayers and tractors), wind through trees, 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 proponent 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 will be provided through a Noise Impact Assessment in the EIS.

Vibration issues are not expected to be significant during either construction or operation due to the distance between the site and the nearest sensitive receivers.

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. The predicted noise levels are anticipated to pose a negligible impact on agricultural activities.

### 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 will be further investigated in the EIS for the Project.

In the context of agriculture, the applicability of agrisolar to solar farm projects is especially relevant to the Project locality and wider region given the suitable conditions for sheep grazing and the established sheep and lambing industries and infrastructure (as outlined in Section 2.4.3). 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 minor for each respective Project.

Increased cumulative impacts including changes to land used for agricultural, localised productivity, secondary productivity and some agricultural support services are likely to be experienced where solar farm Projects in the region do not implement agrisolar. However, given the nature and scale of the established agricultural industries within the region, significant impacts to critical mass thresholds and regional agricultural infrastructure are unlikely to occur in the foreseeable future.

On a broader scale, the cumulative risk to agricultural land and productivity across NSW because of large-scale solar development is estimated to be very low (DPE 2022). The Australian Energy Market Operator estimates that NSW will need approximately 20,000 MW of large-scale solar generation by 2050. This would require approximately 40,000 ha of land or only 0.06% of rural land in NSW. Even in the highly unlikely scenario that all of NSW's solar generation were located on important agricultural land (this land covers around 13.8% of the state and is 6 to 7 times more agriculturally productive than the remaining 86.2% of the state) only 0.4% of this land would be required (DPE 2022).



## 6 MITIGATION MEASURES

The Program 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 enterprise.

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 ALTERNATIVES AND DESIGN

The Applicant undertakes a constraints and opportunities analysis process to identify potential development sites for its projects. For the Project, this process has included consideration of factors such as:

- Access to existing transmission assets to accept energy from the solar farm.
- Access to, and capacity of, existing energy grids.
- Proximity to coal generators that are planned for closure and need replacement.
- Generation/storage capacity.
- Potential for land acquisition.
- Land suitability (e.g. topography, existing land use, flood risk, zoning).
- Need to minimise environmental and social impacts (e.g. avoiding sensitive environments, areas of cultural heritage value, population centres).

The site selection process undertaken included consideration of factors such as the availability and extent of land for housing solar arrays, the consequent potential capacity for generation, the capacity of the grid to receive the generated electricity, the capital and operational costs of the project, and anticipated market conditions.

The Study Area was chosen because it provides the optimal combination of:

- Access to the 132 kV Transgrid Transmission Line
- High levels of available capacity on the grid transmission system
- High quality solar resource
- Low environmental sensitivity and absence of locational constraints due to:
  - the Study Area comprising predominantly cleared grazing land, with little remaining native vegetation
  - the very gently undulating terrain of the site, for cost effective construction
  - an acceptably low flood risk
  - the low density of the surrounding population and limited number of neighbouring properties
  - the suitable planning context of the site including an absence of zoning issues or restrictive planning overlays
  - the access of the site to a suitable road network.

The Applicant has made key decisions regarding the Project in response to agricultural and land use considerations. Namely, the proposed development has been designed to avoid, as much as practicable, LSC class 2 lands (refer **Figure 12**).

In addition, the Project will consist of a number of solar array areas or blocks comprised of PV modules arranged in a series of long rows. The modules are mounted on frames which are fixed to piles driven into the soil. This method of installation includes an ability to track the sun's path throughout the day, in order to maximise the electricity yield that is generated.



This Project design was chosen for its simplicity, maturity and cost-effectiveness, and because it allows retention of existing grassland vegetation in situ with minimal ground disturbance in order to facilitate agrisolar and minimise soil impacts. This design approach is a critical mitigation measure employed to potentially reduce the impacts to agriculture as a result of the Project, if agrisolar is implemented.

No further design amendments are recommended.

## 6.2 LAND AND SOIL DISTURBANCE MITIGATION

### 6.2.1 SOIL EROSION MANAGEMENT

Based on site observations, there are no significant erosion and sedimentation issues present at the Study Area. However, as the chemical analysis and dispersion risk status of the tested soils indicate, there is a potential moderate risk for dispersion for the soils within the Study Area, with one soil unit having a potentially high risk of dispersion, which would result in long term agricultural impacts.

Generally, channelised drainage patterns should be minimised and the Project should limit hard engineering solutions for erosion control and preference soft, vegetated structures.

The Project will prepare an erosion and sediment control plan (ESCP) that addressed 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 Study Area.
- Solar arrays are typically pole mounted, with the poles being supported on a driven or screw pile, so that there is no excavation required other than for electrical cabling.
- Construction areas should be progressively revegetated with grass and pasture species as installation of solar panels proceeds across the site.
- At locations where earthworks are necessary, such as for cable trenching, localised 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.
- Where the Soil Unit 2: Sodosols are subject to high impact disturbance activity, 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.
- All areas disturbed during construction that are not in active use for over 3 months should be sown with grass and pasture species with starter fertiliser to provide stabilising ground cover and a healthy topsoil to provide long term protection against erosion.

#### Operation Phase

- Soil disturbance during operation of the Project should be minimal and 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 sediment 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.



- During operation, mounted solar panels will change orientation during the day, with any rainfall runoff being distributed in the area around each panel, and not drained permanently to a single point on the ground.
- Measures to manage any bare areas and erosion that develop beneath the solar arrays over time should be included in an operational management plan for implementation during ongoing operation of the proposal.

### **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 unwanted 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 STRIPPING FOR REHABILITATION**

The very minor amount of soil that is proposed to be disturbed during the Project will be stripped and re-used in construction and/or rehabilitation efforts in order to mitigate long term effects on the land and soil capability of the Study Area.

The entirety of the Study Area has been assessed to determine suitability for stripping and re-use. This will allow site managers to make decisions on soil stripping for re-use when the locations of soil disturbance for surface infrastructure have been finalised. This localised, fluid approach is an integral process for successful rehabilitation of the Project. This section provides information on the following key areas related to the management of the topsoil resources for the area within the Study Area.

#### **Soil Stripping Strategy**

Laboratory soil analytical results (refer **Appendix 2**) were used in conjunction with the field assessment to determine the potential risk associated with soil material recovery and re-use. Structural and textural properties of soils, along with stones, dispersion potential, sodicity and high acidity are the most common and significant limiting factors in determining depth of soil suitability for re-use, however, given the limited surface disturbance and lack of a soil bank for the site, it is anticipated that all soil stripping and re-use will be localised; that is, soil will be respread from where it is stripped during construction, reinstating the soil profile to its original condition.

Additionally, soils will be stripped only in areas where soil disturbance occurs. The depth of soil salvaged should be as deep as excavations or surface disturbance is required, or to a depth where parent material is encountered.

Due to the sodic nature and dispersion risk of the soils in the south western portion of the Study Area in association with Soil unit 2: Sodosols, targeted controls must be implemented to manage the risk of surface water erosion with potential to occur once excavated. Upon respreading, clay subsoils that have been excavated for trenching will be used exclusively as a subsoil, and encapsulated by the loamy topsoils with which they are currently capped.

#### **Higher Impact Areas**

It is recommended that proposed long term small scale stockpiles in areas associated with the higher impact activities where larger amounts of soil will be displaced should be stripped of topsoil. Then the excavated subsoil (only if requiring disturbance) should be placed on the exposed subsoil of the stockpile area to create a low-profile landform of subsoil. A thin layer of topsoil material from the stripped areas should be placed as a 'cap' over the



subsoil stockpiles to promote vegetation growth. Topsoil materials should otherwise be stockpiled separately to subsoils. Subsoils associated with Soil Unit 2: Sodosol should be treated gypsum prior to stockpiling.

Topsoil and subsoil depths for these areas should be recorded in GIS and rehabilitated with target species to build up the seedbank over the years of stockpiling.

### **Stripped Soil Management**

The following soil handling techniques are recommended to prevent excessive soil deterioration and dispersion. It is not anticipated the Project will involve major amounts of soil excavation requiring long-term stockpile solutions, however small scale potential soil stockpiling from trenched areas and hardstand locations should abide by the following measures where practicable:

- Strip soil material to maximum excavation depths only.
- Soil should ideally be stripped in a slightly moist condition, where practicable. Material should not be stripped in either an excessively dry or wet condition.
- Push soil into windrows or small stockpiles with graders. This technique is an example of preferential less aggressive soil handling. This minimises compression effects of the heavy equipment that is often necessary for economical transport of soil material.
- The surface of soil stockpiles should be left in as coarsely structured a condition as possible in order to promote infiltration and minimise erosion until vegetation is established, and to prevent anaerobic zones forming.
- Where necessary, a flow diversion bank or catch drain should be placed up-slope of a stockpile to direct surface water flows away. All stockpiles shall remain in a free-draining location to avoid long term soil saturation.
- Where necessary, silt fences or cleared vegetation should be installed around topsoil stockpiles or stripped areas as a form of erosion and sediment control. Mulch or wood chip from cleared vegetation can also be applied as a veneer over topsoil stockpiles to slow erosion, weed establishment and to maintain moisture content.
- As a general rule, maintain a maximum stockpile height of 3 m. Clayey soils should be stored in lower stockpiles for shorter periods of time compared to coarser textured sandy soils.
- Seed and fertilise stockpiles as soon as possible. An annual cover crop species that produce sterile florets or seeds may be sown. A rapid growing and healthy annual pasture sward will provide sufficient competition to minimise the emergence of undesirable weed species. The annual pasture species will not persist in the rehabilitation areas but will provide sufficient competition for emerging weed species and enhance the desirable micro-organism activity in the soil. Final rehabilitation target species should be established on stockpiles to build up a desirable species seed bank in the topsoil.
- An inventory of available soil should be maintained to ensure adequate materials are available for planned rehabilitation activities when the time comes.
- Prior to re-spreading stockpiled topsoil onto the disturbance area, an assessment of weed infestation on stockpiles should be undertaken to determine if individual stockpiles require herbicide application and / or “scalping” of weed species prior to topsoil spreading.

### **Soil Re-spreading and Seedbed Preparation**

The Project does not anticipate large volumes of topsoil to require significant stockpile and resspreading management measures, however the following re-spreading and seedbank preparation techniques are recommended to prevent excessive soil deterioration and dispersion for any minor areas of topsoil removal.

- Topsoil should be spread to a depth that reflects pre-disturbance soil horizons.



- Topsoil 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.
- All topsoiled areas should be lightly contour ripped (after topsoil spreading or following removal of hardstand from topsoil areas) to create a “key” between the soil and material below. Ripping should be undertaken on the contour. Best results will be obtained by ripping when soil is moist and when undertaken immediately prior to sowing.
- 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.

### 6.2.3 SOIL BIOLOGY MANAGEMENT

During the approximately 30 year life of the Project soil hydrological and ecological processes may be impacted. In addition to reducing the landscape’s ability to support ecosystem services during the solar facility’s lifespan, these changes may leave legacy effects that persist long after the installation is removed, if effective rehabilitation is not undertaken post decommissioning.

Based on the intensity of the panel array layout and potential for stock to graze under the panels, the soil will be able to retain and store nutrients. Upon decommissioning the areas under the panels may be seen to have a short term decrease in productivity compared to adjacent areas, however commitments to achieve a groundcover level during the post operative period will be sufficient to increase soil productivity to match adjacent analogue areas.

Several mitigation measures are available for the operational phase to mitigate the long term impacts of the Projects on soil biological balance and nutrient availability. These include:

- Routine vegetation monitoring and maintenance.
- Erosion and sediment controls to preserve topsoil material.
- Routine monitoring and management of visible surface erosion, such as rilling caused by concentrated flows from infrastructure.
- Promotion of grass cover in spacing between each of the solar panel array rows.
- Weed management strategies to promote continued presence of pasture species and seedbank within topsoil.

These should be incorporated into the Operational Environmental Management Plan, which will guide operational environmental management following the final design of the Project and would be approved by the relevant statutory authority.

A small soil sampling program is a means to demonstrate the ongoing protection of soil health during operation of the Projects. This may be required where existing grass cover is considered marginal.

Soil sterilisation, localised or widespread, remains a minor risk throughout the Project. However, soil rehabilitation measures at the decommissioning stage can be employed to restore soil biological balance and nutrient availability. Measures include the application of mulch and organic materials, fertilisers, soil ameliorants and regenerative farming practices. Further, the spacing between each of the solar panel rows are anticipated to remain biologically active and act as an established source of bioactivity for spreading into potentially sterilised islands following the removal of panels.

## 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 Operation



Environmental Management Plan, that will assist in managing impacts on agricultural land will be stipulated in conditions of development consent.

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 AGRISOLAR

Agrisolar refers to co-developing the same area of land for both use as a solar farm as well as for agriculture activities (Clean Energy Council, 2021). By implementing complementary solar energy and agricultural production, impacts to existing agricultural land use and enterprises, including primary and secondary productivity, can be reduced.

Solar Farms typically require access to relatively flat or gently sloping land in sunny areas within proximity to electricity transmission networks, where biodiversity impacts can be avoided or minimised. This often means that land which has been previously cleared or zoned for agricultural use is well-situated to host solar farm developments.

Where solar farms are proposed and developed, there is increasing interest in exploring the opportunities for complementary agricultural activities which can benefit from a number of the valuable characteristics of solar arrays, including:

- the provision of partial shading and weather protection (including sun, rain, hail and wind).
- improved soil moisture retention, which can lead to improved vegetation growth beneath the panels.
- protection from predators for sheep.

Sheep grazing delivers benefits for the operation of solar farms, as the vegetation is maintained in a cost-effective and safe manner by reducing the need for mowing or spraying. This maintenance reduces the risk of fire hazard, protecting the solar assets and neighbouring properties. Further, agrisolar can strengthen relationships, communication and interaction with local landholders and farming communities and mitigate land use conflicts.

During the detailed design phase prior to construction commencing, the Project will consider design measures to enable the efficient movement of sheep between the solar farm areas and other paddocks. With the development of solar farms commencing in Australia from around 2015 onwards, the local experience of agrisolar practices is still developing and currently dominated by the practice of sheep grazing on solar farms (Clean Energy Council, 2021). By 2020, there were at least 13 large-scale solar farms grazing sheep in Australia. At the Gannawarra Solar and Battery project in Victoria, now in its operational phase, the Applicant has successfully integrated 500 merino sheep onto project site.



Plate 6: Edify Energy's Gannawarra Solar Farm (2020)

The Applicant is committed to exploring the integration of solar panel installation with the existing agricultural use at the Study Area as a means of mitigating the impacts to agriculture and anticipates that approximately 1,000 merino sheep can be introduced to graze within the Study Area during the operation phase of the Project, subject to necessary approvals and climate conditions permitting.

## 6.5 MITIGATION SUMMARY

The mitigation measures pertaining to soils and agriculture that have been referenced in this assessment will form part of the Project approval commitments. A summary of these is presented in **Table 16**.

Table 16: Summary of Mitigation Measures

| Risk Category             | Mitigation Measure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agricultural Land Use     | Consider implementing Agrisolar to reduce area of land removed from agricultural service.<br>Agriculture land use will be re-established over the entire Study Area at the time of decommissioning (unless otherwise agreed with the landowner and/or regulatory authorities).                                                                                                                                                                                                                                     |
| Agricultural Productivity | Consider implement Agrisolar at a suitable stocking rate.<br>Study Area will be returned to an equivalent agricultural productivity following the Project.                                                                                                                                                                                                                                                                                                                                                         |
| Soils                     | All soil that is proposed to be disturbed during the Project will be stripped and re-used in construction and/or stockpiled for use in rehabilitation.<br>Channelised drainage patterns should be minimised and the Project should limit hard engineering solutions for erosion control and preference soft, vegetated structures.<br>All soil resources are to be managed throughout construction, operation and decommissioning phases of the Project in accordance with recommendations outlined in Section 6.2 |
| LSC                       | Return disturbed land 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, will facilitate the rehabilitation in.                                                                                                                                                                                                                                                                                      |
| Erosion and Sedimentation | Suitable erosion and sedimentation controls, as outlined in Section 6.2, will be implemented.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Infrastructure            | Stock fences, farm dams, and access tracks to be retained and maintained to accommodate Agrisolar.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Pest Species              | Pest species will be managed in accordance with measures outlined in Section 5.4.1                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Biosecurity               | Biosecurity will be managed in accordance with measures outlined in Section 5.4.2                                                                                                                                                                                                                                                                                                                                                                                                                                  |



## 7 SUMMARY

There is a high level of certainty about the status of agricultural resources and enterprises in the Study Area, locality and broader region, based on the 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 status following the life of the Project.

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

- Temporary removal of 170 ha from agricultural land use within the Study Area for the duration of the Project.
- Temporary removal of potential agricultural primary productivity to the estimated value of up to \$70,047 per year for the duration of the Project.
- Temporary removal of potential agricultural secondary productivity to the estimated value of up to \$152,618, per year for the duration of the Project.
- Temporary impacts on soil resources within the Study Area where surface disturbance occurs.

The temporary 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 Bathurst Regional Council LGA. Further, at the scale of the enterprises operating within the Study Area, impacts are considered offset as the involved landowners would be financially compensated.

Following construction and resting period of approximately one year, subject to the approval of Project stakeholders such as Rural Fire Service, Bathurst Regional Council and the Project's insurance providers, Edify anticipates that merino sheep can be introduced to graze within the Project boundary. This integrated land use of solar panels and livestock grazing offers the potential to enable the continuation of agricultural land usage and mitigate the above listed temporary impacts of the Project.

Further, it is anticipated that by adopting the principles of impact minimisation 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 no permanent negative impacts on agricultural resources or enterprises.

A summary of mitigation measures and management recommendations have been provided at Section 6.5 to eliminate the permanent risks and control the temporary risks of the Project on land and soil resources. The salvage of topsoil material for re-use purposes combined with sound erosion and sedimentation management practices during construction, operational and decommissioning phases of the Project, will ensure rehabilitation requirements are met and land is returned to a pre-disturbance agricultural status.



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## 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 solar 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 Study 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

| Consequence | Probability |    |    |    |    |
|-------------|-------------|----|----|----|----|
|             | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Level 1</b>    |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Severe</b>     | <ul style="list-style-type: none"> <li>Severe and/or permanent damage to the environment</li> <li>Irreversible</li> <li>Severe impact on the community</li> <li>Neighbours are in prolonged dispute and legal action involved</li> </ul> | <ul style="list-style-type: none"> <li>Harm or death to animals, fish, birds or plants</li> <li>Long term damage to soil or water</li> <li>Odours so offensive some people are evacuated or leave voluntarily</li> <li>Many public complaints and serious damage to Council's reputation</li> <li>Contravenes Protection of the Environment &amp; Operations Act and the conditions of Council's licences and permits. Almost certain prosecution under the POEO Act</li> </ul> |
| <b>Level 2</b>    |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Major</b>      | <ul style="list-style-type: none"> <li>Serious and/or long-term impact to the environment</li> <li>Long-term management implications</li> <li>Serious impact on the community</li> <li>Neighbours are in serious dispute</li> </ul>      | <ul style="list-style-type: none"> <li>Water, soil or air impacted, possibly in the long term</li> <li>Harm to animals, fish or birds or plants</li> <li>Public complaints. Neighbour disputes occur. Impacts pass quickly</li> <li>Contravenes the conditions of Council's licences, permits and the POEO Act</li> <li>Likely prosecution</li> </ul>                                                                                                                           |
| <b>Level 3</b>    |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Moderate</b>   | <ul style="list-style-type: none"> <li>Moderate and/or medium-term impact to the environment and community</li> <li>Some ongoing management implications</li> <li>Neighbour disputes occur</li> </ul>                                    | <ul style="list-style-type: none"> <li>Water or soil known to be affected, probably in the short to medium-term (e.g. 1-5 years)</li> <li>Management could include significant change of management needed for agricultural enterprises to continue</li> </ul>                                                                                                                                                                                                                  |
| <b>Level 4</b>    |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Minor</b>      | <ul style="list-style-type: none"> <li>Minor and/or short-term impact to the environment and community</li> <li>Can be effectively managed as part of normal operations</li> <li>Infrequent disputes between neighbours</li> </ul>       | <ul style="list-style-type: none"> <li>Theoretically could affect the environment or people but no impacts noticed</li> <li>No complaints to Council</li> <li>Does not affect the legal compliance status of Council</li> </ul>                                                                                                                                                                                                                                                 |
| <b>Level 5</b>    |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Negligible</b> | <ul style="list-style-type: none"> <li>Very minor impact to the environment and community</li> <li>Can be effectively managed as part of normal operations</li> <li>Neighbour disputes unlikely</li> </ul>                               | <ul style="list-style-type: none"> <li>No measurable or identifiable impact on the environment</li> <li>No measurable impact on the community or impact is generally acceptable</li> </ul>                                                                                                                                                                                                                                                                                      |

(Source: DPI, 2011)



| Activity     | Potential Conflict                                                                                                                                                              | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Final Risk Rating |             |        | Performance Target                                                                                                                                           |
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|              |                                                                                                                                                                                 | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Probability       | Consequence | Rating |                                                                                                                                                              |
| Construction | Land users in the locality may be concerned construction activity disturbances may affect livestock behaviour and/or breeding.                                                  | D                   | 3           | 9      | <p>The assessment of potential noise and vibration impacts will be undertaken via a Noise and Vibration Impact Assessment (NVIA). Appropriate mitigation measures will be specified within the NVIA to minimise noise and vibration impacts.</p> <p>Based on the preliminary separation distances and the mitigation proposed, adverse impacts from noise and vibration during construction and operation are not predicted.</p> <p>Compliance with mitigation measures is anticipated to reduce the risk of conflict related to noise and vibration impacts on agricultural land users.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p>                                  | D                 | 4           | 5      | <p>Any complaints from neighbours regarding effects to livestock can be managed within normal operations.</p> <p>No exceedances of adopted noise policy.</p> |
| Construction | Land users in the locality may be concerned that dust generated by construction activities may have adverse health implications for residential land users within the locality. | D                   | 3           | 9      | <p>The assessment of potential dust impacts will be undertaken as part of the EIS. Appropriate mitigation measures will be specified within the EIS to minimise the risk for dust to spread throughout the site and onto neighbouring land. Compliance with mitigation measures is anticipated to reduce the risk of conflict related to air quality impacts.</p> <p>Separation distances for dust originating from the development (if applicable) will be included as a management strategy.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p> | E                 | 4           | 3      | <p>Any complaints from neighbours can be managed within normal operations. No exceedances of adopted dust criteria.</p>                                      |



| Activity     | Potential Conflict                                                                                                                                                                                                                                | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Final Risk Rating |             |        | Performance Target                                                                                                            |
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|              |                                                                                                                                                                                                                                                   | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Probability       | Consequence | Rating |                                                                                                                               |
| Construction | Increased noise generated by construction activities and heavy vehicle movements may be perceived as nuisance to surrounding residential properties.                                                                                              | C                   | 4           | 8      | <p>The assessment of potential noise and vibration impacts will be undertaken via a Noise and Vibration Impact Assessment (NVIA). Appropriate mitigation measures will be specified within the NVIA to minimise noise and vibration impacts.</p> <p>Based on the preliminary separation distances and the mitigation proposed, adverse impacts from noise and vibration during construction and operation are not predicted.</p> <p>Compliance with mitigation measures is anticipated to reduce the risk of conflict related to noise and vibration impacts on agricultural land users.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p>                                                              | D                 | 4           | 5      | <p>Any complaints from neighbours can be managed within normal operations.</p> <p>No exceedances of adopted noise policy.</p> |
| Construction | 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, resulting from surface disturbances during construction activities | C                   | 3           | 13     | <p>Consideration of impacts to surrounding water courses and water quality will be undertaken within the for the EIS. Appropriate mitigation measures will be 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.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>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.</p> | D                 | 4           | 5      | <p>No reportable erosion or sedimentation of waterways.</p>                                                                   |



| Activity     | Potential Conflict                                                                                                                                                                                                                                                                                          | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Final Risk Rating |             |        | Performance Target                                                                                      |
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|              |                                                                                                                                                                                                                                                                                                             | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Probability       | Consequence | Rating |                                                                                                         |
| Construction | Use of surrounding roadways during construction of the solar 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      | <p>The assessment of potential traffic impacts will be undertaken via a Traffic Impact Assessment (TIA). Appropriate mitigation measures will be 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 local road users.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved)</p> | D                 | 2           | 4      | No complaints from local agricultural enterprises during the construction phase.                        |
| Construction | Land users in the locality may be concerned about the possibility of increased vehicles during construction on the Tarana Road may result in an incident involving other vehicles, farm machinery or wildlife on roads.                                                                                     | D                   | 1           | 19     | <p>The assessment of potential traffic impacts will be undertaken via a Traffic Impact Assessment (TIA). Appropriate mitigation measures will be 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 local road users.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved)</p> | E                 | 2           | 10     | No traffic incidents during construction that are directly related to the solar farm.                   |
| Construction | Public authorities may be concern 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      | <p>The assessment of impacts related to the increased demand for surrounding services and infrastructure will be undertaken as part of the EIS. Levels of anticipated increased demand and appropriate mitigation measures will be specified within the EIS to minimise the risk for logistical issues associated with the increased demand for existing infrastructure and services.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p>                                                                                          | D                 | 5           | 2      | No unreasonable additional pressure on local services and infrastructure during the construction phase. |



| Activity     | Potential Conflict                                                                                                                                                                                               | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Final Risk Rating |             |        | Performance Target                                                                                                                                                                |
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|              |                                                                                                                                                                                                                  | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Probability       | Consequence | Rating |                                                                                                                                                                                   |
| Construction | Stakeholders may have concerns that construction activities associated with the solar farm may damage existing public services infrastructure including 132 kV TransGrid Transmission Line.                      | C                   | 4           | 8      | <p>Consideration of potential impacts to surrounding service provider infrastructure will be undertaken as part of the EIS. Appropriate mitigation measures will be specified within the EIS and will be detailed in a Construction Management Plan 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.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).</p> | D                 | 4           | 5      | No damage to existing infrastructure including transmission line during the construction phase.                                                                                   |
|              | Stakeholders may have concerns that the construction and operation of the solar farm may alter and disturb existing soil properties, undermining the suitability of the land for future agricultural production. |                     |             |        | <p>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.</p> <p>Implement all measures specified in this report and associated management plans identified in the EIS and/or consent conditions (if approved).</p>                                                                                                                                                               |                   |             |        | Stakeholders are informed of assessment findings and have no concern regarding impacts to soil and LSC. No observed erosion or degradation of soils or sedimentation of waterways |



| Activity              | Potential Conflict                                                                                                                                                                                                                                                           | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Final Risk Rating |             |        | Performance Target                                                                                                            |
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|                       |                                                                                                                                                                                                                                                                              | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Probability       | Consequence | Rating |                                                                                                                               |
| Agriculture Cessation | Stakeholders in the locality may be concerned about the reduction of land used for agricultural purposes or the reduction of productivity of the land                                                                                                                        | A                   | 4           | 16     | The assessment of the reduction of land used for agriculture and the productivity of land will be undertaken within this agricultural assessment. Anticipated impacts and appropriate mitigation measures (ie consideration of agrisolar) will be provided within this report for stakeholder consideration.<br>A Rehabilitation and Decommissioning Management Plan will ensure the land can be successfully returned to agricultural production following decommissioning. | D                 | 4           | 5      | Stakeholders are informed of assessment findings and have no concern regarding change in land use                             |
| Agriculture Cessation | 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 have been undertaken within this agricultural assessment. Anticipated impacts are determined to be negligible and presented in this report for land user consideration.<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                            | D                 | 5           | 2      | Stakeholders are informed of assessment findings and have no concern regarding impacts to agricultural support infrastructure |
| Operation Traffic     | Land users in the locality may be concerned about an increase in traffic volume on Tarana Road throughout the operational phase of the Project, which may cause conflict by interacting with agriculture 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 will be undertaken via a Traffic Impact Assessment (TIA). Anticipated impacts are anticipated to be negligible and presented in the EIS for land user consideration.<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                     | D                 | 5           | 2      | No complaints from agriculture enterprises regarding increased traffic                                                        |



| Activity                 | Potential Conflict                                                                                                                                                                                                                                                                             | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Final Risk Rating |             |        | Performance Target                                                                                         |
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|                          |                                                                                                                                                                                                                                                                                                | 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 will be undertaken as part of the EIS. Anticipated impacts are anticipated to be negligible and presented in the EIS for land user consideration.<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.<br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).                                                                                                                                                            | E                 | 3           | 6      | No complaints from neighbours due to the solar farm activities.<br>No exceedances of adopted dust criteria |
| Operation Noise          | Land users in the locality may be concerned about an increase in noise levels generated from power inverters, transformer system, tracker motors and maintenance activities throughout the operational phase of the Project.                                                                   | C                   | 3           | 13     | The assessment of potential noise and vibration impacts will be undertaken via a Noise and Vibration Impact Assessment (NVIA). Anticipated impacts are determined to be negligible and presented in the EIS for land user consideration.<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                                 | D                 | 5           | 2      | No complaints from neighbours due to the solar farm activities.<br>No exceedances of adopted noise policy. |
| Operation Visual Amenity | Stakeholders in the locality who wish to maintain views of the existing agricultural landscape may be concerned about the change in visual amenity resulting from the solar farm.                                                                                                              | B                   | 3           | 17     | The assessment of visual impacts to surrounding amenity will be undertaken via a LVIA. Appropriate mitigation measures will be specified within the LVIA to minimise the risk of altered amenity for surrounding residents and public within the locality. Compliance with mitigation measures specified within the LVIA is anticipated to reduce the risk of conflict related to visual amenity.<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.<br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). | C                 | 4           | 8      | No complaints from stakeholders regarding visual amenity                                                   |



| Activity                 | Potential Conflict                                                                                                                             | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Final Risk Rating |             |        | Performance Target                                                                                                                                         |
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|                          |                                                                                                                                                | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Probability       | Consequence | Rating |                                                                                                                                                            |
| Operation Visual Amenity | The solar farm location and potential for glare and reflectivity has the potential to impact the amenity of surrounding residential properties | C                   | 3           | 13     | The assessment of glare and reflectivity impacts to surrounding residential properties will be undertaken via a LVIA. Anticipated impacts are anticipated to be negligible and presented in the EIS for stakeholder consideration.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                      | E                 | 3           | 6      | No complaints from neighbouring properties regarding glare and reflectivity of panels                                                                      |
| Operation Visual Amenity | Stakeholders in the locality may be concerned about impacts on agriculture-based tourism                                                       | C                   | 3           | 13     | Consideration of potential impacts to agriculture-based tourism will be undertaken as part of the EIS. Anticipated impacts are anticipated to be negligible and presented in the EIS for stakeholder consideration.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                                     | E                 | 4           | 3      | No complaints from agriculture-based tourism enterprise operating in the Project locality                                                                  |
| Operation Pest Control   | Land users in the locality may be concerned about weed, plant pest, plant disease or pest animal introduction and/or spread                    | B                   | 2           | 21     | The assessment of impacts to biodiversity will be undertaken via a BDAR. Consideration of the potential for pest species to impact agriculture will be included in this assessment. Appropriate mitigation measures will be specified within the BDAR and this assessment to minimise the risk for weeds and pests to spread throughout the site and onto neighbouring land.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise.<br><br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). | D                 | 3           | 9      | No introduction of weed, plant pest, plant disease or pest animals onto the Study Area as a result of the Project, and no spread to surrounding properties |
| Operation Pest Control   | Neighbouring property owners may be concerned about sprays from weed control adversely affecting adjacent land                                 | D                   | 4           | 5      | Weed mitigation measures will be undertaken as per methodology specified in management plans identified in the EIS and/or consent conditions (if approved), including spraying in a manner to prevent spray drift.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                                      | E                 | 4           | 3      | No complaints from neighbouring properties regarding overspray of herbicides                                                                               |



| Activity               | Potential Conflict                                                                                                                                                                        | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Final Risk Rating |             |        | Performance Target                                                                                                                                         |
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|                        |                                                                                                                                                                                           | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Probability       | Consequence | Rating |                                                                                                                                                            |
| Operation Pest Control | Land users in the locality may be concerned that waste generated by the development may increase the presence of pest animals and/or vermin which could impact agricultural productivity. | D                   | 4           | 5      | <p>Consideration of waste related impacts will be undertaken as part of the EIS. Appropriate mitigation measures will be specified within the EIS to minimise the risk of attracting pest animals and/or vermin.</p> <p>Compliance with mitigation measures specified in the EIS is anticipated to reduce the risk of conflict related to pest animals and/or vermin.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p>                                                                                                                                                                                                                                                                             | E                 | 4           | 3      | No introduction of weed, plant pest, plant disease or pest animals onto the Study Area as a result of the Project, and no spread to surrounding properties |
| General Operation      | 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     | <p>Consideration of impacts to surrounding water courses and water quality will be undertaken within the water impact assessment of the EIS. Appropriate mitigation measures will be 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.</p> <p>Ongoing consultation with stakeholders will identify and address concerns if they arise.</p> <p>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.</p> | D                 | 4           | 5      | No observed erosion of soils or sedimentation of waterways                                                                                                 |



| Activity          | Potential Conflict                                                                                                                                                       | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Final Risk Rating |             |        | Performance Target                                                                   |
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|                   |                                                                                                                                                                          | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Probability       | Consequence | Rating |                                                                                      |
| General Operation | Land users in the locality may be concerned about the risk of fires occurring at the site and their potential to spread to surrounding land, infrastructure or livestock | C                   | 2           | 18     | Consideration of potential bushfire impacts will be undertaken as part of a Preliminary Hazard Analysis (PHA) informing the EIS. Appropriate mitigation measures will be specified within the bushfire assessment within the EIS to minimise the risk of bushfire incidents including their risk to people and potential to damage surrounding land.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise.<br><br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). | E                 | 2           | 10     | No occurrence of fires beginning on the Study Area and spreading to surrounding land |
| General Operation | Stakeholders in the locality may be concerned about the effects on local and regional employment                                                                         | C                   | 1           | 4      | Consideration of employment impacts will be undertaken as part of the EIS. Anticipated impacts are determined to be negligible and outweighed by the employment opportunities of the Project. This finding is presented in the EIS for stakeholder consideration.                                                                                                                                                                                                                                                                                                               | E                 | 1           | 1      | No unreasonable additional pressure to local employment                              |
| General Operation | Neighbouring landowners may be concerned about livestock used for vegetation control on Study 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.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                      | E                 | 4           | 3      | No breach of boundary fence.                                                         |



| Activity          | Potential Conflict                                                                                                                                                                     | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Final Risk Rating |             |        | Performance Target                                                                 |
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|                   |                                                                                                                                                                                        | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Probability       | Consequence | Rating |                                                                                    |
| General Operation | Neighbouring landowners may be concerned about their livestock entering the Study Area and becoming injured or causing damage                                                          | 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. 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.<br><br>Ongoing consultation with stakeholders will identify and address concerns if they arise. | E                 | 4           | 3      | No breach of boundary fence.                                                       |
| General Operation | Land users in the locality may be concerned about electro-magnetic fields (EMF) resulting from electrical infrastructure associated with the Project.                                  | D                   | 2           | 14     | Consideration of EMF impacts resulting from the development will be undertaken as part of the PHA and summarised in the EIS. The report is expected to conclude that EMF exposure levels will not exceed the International Commission on Non-Ionizing Radiation Protection reference level for the general public. No adverse impacts to human health at the site or in the locality are therefore anticipated. This finding is presented in the EIS for stakeholder consideration.                                                  | E                 | 5           | 1      | Stakeholders are informed of assessment findings and have no concern regarding EMF |
| General Operation | The placement of the solar farm on agriculturally viable land may cause conflict with surrounding agricultural operators interested in expanding their operations onto the Study Area. | C                   | 3           | 13     | Existing consultation and engagement for the project has not identified any intent for surrounding agricultural industries to expand operations onto the site in the short term.<br><br>The reversibility of the Project would allow the site to be returned to its existing agricultural land use, therefore minimising potential for long term conflict.                                                                                                                                                                           | E                 | 3           | 6      | Successful consultation addresses stakeholder concerns                             |
| General Operation | The placement of the solar farm on land that may be viable for sub-division may cause conflict with surrounding business operators interested in expanding production onto the site.   | D                   | 3           | 9      | Existing consultation and engagement for the project has not identified any intent for nearby enterprises to expand operations onto the site in the short term.<br><br>The reversibility of the project would allow the site to be returned to its existing land use, therefore minimising potential for long term conflict.                                                                                                                                                                                                         | E                 | 3           | 6      | Successful consultation addresses stakeholder concerns                             |



| Activity          | Potential Conflict                                                                                                                                                                                         | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Final Risk Rating |             |        | Performance Target                                     |
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|                   |                                                                                                                                                                                                            | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Probability       | Consequence | Rating |                                                        |
| General Operation | The placement of the solar farm in proximity to agricultural business operators may affect insurance premiums for surrounding private property owners, especially in the context of potential fire damage. | C                   | 3           | 13     | Edify has its own insurance and would seek to make claim on that first in the event of fire damage to the solar power station. Notwithstanding, Edify recommends that farmers on nearby properties take all necessary precautions to prevent the ignition and spreading of fires, and seek advice from their insurance providers on individual insurance policy matters. Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                                                                                                               | E                 | 3           | 6      | Successful consultation addresses stakeholder concerns |
| General Operation | Landowners in the locality may be concerned about potential devaluation of properties due to proximity to solar farm infrastructure.                                                                       | B                   | 3           | 17     | After delivering eight projects throughout Australia, including the largest solar and battery project in New South Wales, Edify is not aware of, and has not been presented with, any reliable, impartial research or evidence which establishes a correlation between declining real estate values and proximity to renewable infrastructure. Given the size of the landholdings, it is likely that their agricultural production attributes provide a strong foundation for overall property value. The project will not impact the agricultural resources or production value of properties proximate to the Study Area. Further, the change in visual amenity is not anticipated to have any noticeable effect on property values. Ongoing consultation with stakeholders will identify and address concerns if they arise. | E                 | 2           | 10     | Successful consultation addresses stakeholder concerns |
| General Operation | Landowners in the locality may be concerned about potential increase in council rates as a result of the change in land use of the Study Area.                                                             | C                   | 3           | 13     | The applicant has determined that council rates will not be expected to change in the locality as a result of the Project. Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | E                 | 3           | 6      | Successful consultation addresses stakeholder concerns |



| Activity          | Potential Conflict                                                                                                                                                                                                               | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Final Risk Rating |             |        | Performance Target                                                                                                                     |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|--------|----------------------------------------------------------------------------------------------------------------------------------------|
|                   |                                                                                                                                                                                                                                  | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Probability       | Consequence | Rating |                                                                                                                                        |
| General Operation | Land users in the locality may be concerned that waste generated by the development has the potential to enter surrounding residential land.                                                                                     | D                   | 4           | 5      | Consideration of waste related impacts will be undertaken as part of the EIS. Risk will be mitigated by implementing standard operation measures specified in management plans identified in the EIS and/or consent conditions (if approved).<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                                                                                                                                                                  | E                 | 5           | 1      | No complaints from land users in the locality regarding waste.                                                                         |
| General Operation | Land users in the locality may be concerned that the change in land use may attract people to the area who may not otherwise visit the area, including workers. This may be perceived to adversely affect a resident's security. | D                   | 3           | 9      | Consideration of potential crime related impacts will be undertaken as part of the EIS. Appropriate mitigation measures will be specified in the EIS to minimise the potential for crime to occur at or near the site. Compliance with crime management measures specified within the EIS is anticipated to reduce the risk of conflict related to the increased risk of vandalism and theft for surrounding residents.<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.<br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). | E                 | 3           | 6      | Successful consultation assures residents of security mitigation measures alleviating concerns of perceived additional security risks. |
| General Operation | Stakeholders may have concerns regarding the ownership of the site i.e., whether it is a foreign-owned company                                                                                                                   | D                   | 4           | 5      | Engagement for the project has introduced the Project and the applicant (Edify) to surrounding stakeholders. Notification to stakeholders outlined the applicant's ownership and consultation has provided an opportunity for stakeholders to provide feedback. No feedback will be provided regarding the ownership of the site.                                                                                                                                                                                                                                                                                                          | E                 | 4           | 3      | Successful consultation addresses stakeholder concerns                                                                                 |



| Activity          | Potential Conflict                                                                                                                                                                                                                                                  | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Final Risk Rating |             |        | Performance Target                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|--------|--------------------------------------------------------------------------------------------------|
|                   |                                                                                                                                                                                                                                                                     | Probability         | Consequence | Rating |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Probability       | Consequence | Rating |                                                                                                  |
| General Operation | 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 will be undertaken with the preparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR) and Statement of Heritage Impact (SOHI). Appropriate mitigation measures will be specified within the ACHAR and SOHI to minimise impacts to heritage. Compliance with mitigation measures specified within the ACHAR and SOHI is anticipated to reduce the risk of conflict related to environmental features, culturally sensitive land, and heritage.<br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved). | D                 | 4           | 5      | No complaints from stakeholders regarding impacts to heritage items or values at the Study Area. |
| General Operation | Stakeholders may be concern about potential impacts to biodiversity within the site and locality                                                                                                                                                                    | B                   | 3           | 17     | The assessment of impacts to biodiversity will be undertaken via a BDAR. Appropriate mitigation measures will be specified within the BDAR and this assessment to minimise the risk for impacts on biodiversity within the site and locality.<br>Implement all measures specified in management plans identified in the EIS and/or consent conditions (if approved).<br>Ongoing consultation with stakeholders will identify and address concerns if they arise.                                                                                                                                                         | D                 | 3           | 9      | No complaints from stakeholders regarding impacts to biodiversity at the Study Area.             |
| General Operation | Public Authorities may have concerns regarding the potential for cumulative impacts arising from the proximity of state significant developments.                                                                                                                   | B                   | 3           | 17     | An assessment of potential cumulative impacts will be undertaken as part of the EIS. Appropriate mitigation measures (where required) will be specified in the EIS to minimise the potential for cumulative impacts to occur at or near the site. Anticipated impacts are determined to be minor and presented in the EIS for Public Authority consideration.                                                                                                                                                                                                                                                            | D                 | 3           | 9      | Successful consultation addresses stakeholder concerns                                           |
| General Operation | Dispersion of dust and/or agricultural/ rural products from surrounding land uses, including adjacent Monaro Highway may impact the productivity of the solar farm panels, potentially causing conflict between agricultural land users and the solar farmland use. | C                   | 4           | 8      | Compliance with mitigation measures specified within the EIS together within the routine and event triggered cleaning of solar panels and site infrastructure, is anticipated to reduce the risk of conflict related to the functioning of the solar farm panels.                                                                                                                                                                                                                                                                                                                                                        | D                 | 5           | 2      | No impact to solar farm operations or infrastructure.                                            |



| Activity        | Potential Conflict                                                                                                                                         | Initial Risk Rating |             |        | Risk Reduction Control                                                                                                                                                                                       | Final Risk Rating |             |        | Performance Target                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|--------|-----------------------------------------|
|                 |                                                                                                                                                            | Probability         | Consequence | Rating |                                                                                                                                                                                                              | Probability       | Consequence | Rating |                                         |
| Decommissioning | Stakeholders may be concerned about the potential for poor rehabilitation outcomes and the resulting long term environmental and agricultural consequence. | C                   | 1           | 22     | A Rehabilitation and Decommissioning Management Plan will ensure the land can be successfully returned to pre-disturbance land and soil capability and final land use commitments following decommissioning. | E                 | 2           | 10     | Fulfilment of rehabilitation objectives |



## Appendix 2

### Soil Profile Descriptions



| Site Description Site 1 |           |                |                                           |             |
|-------------------------|-----------|----------------|-------------------------------------------|-------------|
|                         |           |                | Mottled Eutrophic Red Chromosol (BELOWNR) |             |
| Average Slope           | 3%        | Land Use       |                                           | Coordinates |
| Landform Pattern        | Hillslope | Soil Fertility | Moderately High                           | MGA 55      |
| Landform Element        | Midslope  | Drainage       | Moderate                                  | X: 749627   |
| Surface Condition       | Soft      | Permeability   | High                                      | Y: 6293384  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description                                                                                                                                                                                                                     |                          |                 |       |           |
|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------|-------|-----------|
| A1           | 0.00 – 0.20 | Very dark greyish brown (Munsell 10YR 3/2) Sandy Loam with weak pedality. Slightly acidic pH, non-saline and non-sodic. No coarse fragments. Many roots and well drained. Gradual boundary.                                     |                          |                 |       |           |
| A2           | 0.20 – 0.60 | Dark greyish brown (Munsell 10YR 4/2) Loamy Sand with weak pedality. Neutral pH, non-saline and non-sodic. No coarse fragments. Few roots and well drained. Clear boundary.                                                     |                          |                 |       |           |
| B2           | 0.60 +      | Light red (Munsell 2.5YR 6/6) Medium Clay with moderate pedality. Neutral pH, non-saline and non-sodic. No coarse fragments. Very few fine roots and moderately drained. 30% distinct grey mottling. 30% distinct red mottling. |                          |                 |       |           |
| Sample Depth | ECe         |                                                                                                                                                                                                                                 | pH <sub>(1 5water)</sub> |                 | ESP   |           |
|              | dS/m        | Rating                                                                                                                                                                                                                          | Value                    | Rating          | Value | Rating    |
| 0.00 – 0.10  | 0.8         | Non-saline                                                                                                                                                                                                                      | 6.2                      | Slightly Acidic | 0.8   | Non sodic |
| 0.30 – 0.40  | 0.5         | Non-saline                                                                                                                                                                                                                      | 6.7                      | Neutral         | 1.9   | Non sodic |
| 0.60 – 0.70  | 0.3         | Non-saline                                                                                                                                                                                                                      | 7.0                      | Neutral         | 4.5   | Non sodic |



| Site Description Site 2 |           |                |                 |             |
|-------------------------|-----------|----------------|-----------------|-------------|
|                         |           |                | Brown Chromosol |             |
| Average Slope           | 6%        | Land Use       |                 | Coordinates |
| Landform Pattern        | Hillslope | Soil Fertility | Moderately High | MGA 55      |
| Landform Element        | Midslope  | Drainage       | Moderate        | X: 748985   |
| Surface Condition       | Soft      | Permeability   | Moderate        | Y: 6293223  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description                                                                                                                                                                                            |            |                          |                   |       |           |
|--------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------|-------------------|-------|-----------|
| A1           | 0.00 – 0.20 | Dark grey (Munsell 7.5YR 4/1) Sandy Loam field texture with moderate pedality. Moderately acidic pH, non-saline and non-sodic. No coarse fragments. Many roots and well drained. Clear boundary.       |            |                          |                   |       |           |
| A2           | 0.20 – 0.45 | Very dark grey (Munsell 7.5YR 3/1) Loam field texture with moderate pedality. No coarse fragments. Few roots and moderately drained. Clear boundary.                                                   |            |                          |                   |       |           |
| B21          | 0.45 – 0.65 | Reddish brown (Munsell 7.5YR 4/4) Light Medium Clay field texture with moderate pedality. No coarse fragments. Very few fine roots and moderately drained. 30% distinct grey mottling. Clear boundary. |            |                          |                   |       |           |
| B22          | 0.65+       | Dark greyish brown (Munsell 10YR 4/2) Medium Clay field texture with moderate pedality. No coarse fragments. Very few fine roots and moderately drained. 20% distinct orange mottling.                 |            |                          |                   |       |           |
| Sample Depth |             | ECe                                                                                                                                                                                                    |            | pH <sub>(1 5water)</sub> |                   | ESP   |           |
|              |             | dS/m                                                                                                                                                                                                   | Rating     | Value                    | Rating            | Value | Rating    |
| 0.00 – 0.10  |             | 0.5                                                                                                                                                                                                    | Non-saline | 5.8                      | Moderately Acidic | 2.4   | Non sodic |



| Site Description Site 3 |                 |                |                 |             |
|-------------------------|-----------------|----------------|-----------------|-------------|
|                         |                 |                | Red Chromosol   |             |
| Average Slope           | 4%              | Land Use       |                 | Coordinates |
| Landform Pattern        | Hillslope       | Soil Fertility | Moderately High | MGA 55      |
| Landform Element        | Mid/lower slope | Drainage       | Moderate        | X: 748828   |
| Surface Condition       | Soft            | Permeability   | Moderate        | Y: 6293814  |



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) Sandy Loam field texture with moderate pedality. Moderately acidic pH, non-saline and non-sodic. No coarse fragments. Many roots and well drained. Gradual boundary. |              |                   |       |           |
| A2           | 0.20 – 0.50 | Dark grey (Munsell 7.5YR 4/1) Sandy Loam field texture with moderate pedality. No coarse fragments. Few roots and moderately drained. Clear boundary.                                               |              |                   |       |           |
| B21          | 0.50 – 0.65 | Light red (Munsell 2.5YR 6/6) Medium Clay field texture with moderate pedality. No coarse fragments. Very few fine roots and moderately drained. 10% faint grey mottling. Clear boundary.           |              |                   |       |           |
| B22          | 0.65+       | Light Grey (Munsell 5YR 7/1) Medium Clay field texture with strong pedality. 20% coarse fragments 2 – 10mm. Very few fine roots and moderately drained. 40% orange mottling.                        |              |                   |       |           |
| Sample Depth | ECe         |                                                                                                                                                                                                     | pH(1 5water) |                   | ESP   |           |
|              | dS/m        | Rating                                                                                                                                                                                              | Value        | Rating            | Value | Rating    |
| 0.00 – 0.10  | 0.6         | Non-saline                                                                                                                                                                                          | 5.7          | Moderately Acidic | 1.3   | Non-sodic |



| Site Description Site 4 |           |                |                 |             |
|-------------------------|-----------|----------------|-----------------|-------------|
|                         |           |                | Red Chromosol   |             |
| Average Slope           | 3%        | Land Use       |                 | Coordinates |
| Landform Pattern        | Hillslope | Soil Fertility | Moderately High | MGA 55      |
| Landform Element        | Midslope  | Drainage       | Moderate        | X: 749316   |
| Surface Condition       | Firm      | Permeability   | Moderate        | Y: 6293763  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description                                                                                                                                                                                 |            |                          |                 |       |           |
|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------|-----------------|-------|-----------|
| A11          | 0.00 – 0.30 | Dark brown (Munsell 7.5YR 3/3) Loam field texture with moderate pedality. Slightly acidic pH, non-saline and non-sodic. No coarse fragments. Many roots and well drained. Gradual boundary. |            |                          |                 |       |           |
| A12          | 0.30 – 0.55 | Very dark grey (Munsell 7.5YR3/1) Loam field texture with moderate pedality. No coarse fragments. Few roots and moderately drained. Clear boundary.                                         |            |                          |                 |       |           |
| A22          | 0.55 – 0.70 | Bleached Light Brown (Munsell 7.5YR 6/3) Loam field texture with weak pedality. 30% coarse fragments 10mm. No roots and moderately drained.                                                 |            |                          |                 |       |           |
| B2           | 0.70+       | Yellowish red (Munsell 5YR 4/6) Medium Clay field texture with strong pedality. No coarse fragments. No roots and moderately drained. 30% distinct grey mottling.                           |            |                          |                 |       |           |
| Sample Depth |             | ECe                                                                                                                                                                                         |            | pH <sub>(1 5water)</sub> |                 | ESP   |           |
|              |             | dS/m                                                                                                                                                                                        | Rating     | Value                    | Rating          | Value | Rating    |
| 0.00 – 0.10  |             | 0.8                                                                                                                                                                                         | Non-saline | 6.2                      | Slightly Acidic | 1.0   | Non sodic |



| Site Description Site 5 |             |                |                                                 |             |
|-------------------------|-------------|----------------|-------------------------------------------------|-------------|
|                         |             |                | Mottled-Sodic Eutrophic Red Chromosol (BFLOWNR) |             |
| Average Slope           | 5%          | Land Use       |                                                 | Coordinates |
| Landform Pattern        | Hillslope   | Soil Fertility | Moderately High                                 | MGA 55      |
| Landform Element        | Upper slope | Drainage       | Moderate                                        | X: 750075   |
| Surface Condition       | Soft        | Permeability   | High                                            | Y: 6293992  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |            |                          |                 |       |           |
|--------------|-------------|-------------|------------|--------------------------|-----------------|-------|-----------|
| A1           | 0.00 – 0.30 |             |            |                          |                 |       |           |
| B21          | 0.30 – 0.55 |             |            |                          |                 |       |           |
| B22          | 0.55 +      |             |            |                          |                 |       |           |
| Sample Depth |             | ECe         |            | pH <sub>(1 5water)</sub> |                 | ESP   |           |
|              |             | dS/m        | Rating     | Value                    | Rating          | Value | Rating    |
| 0.00 – 0.10  |             | 1.1         | Non-saline | 6.1                      | Slightly Acidic | 1.1   | Non sodic |
| 0.30 – 0.40  |             | 0.3         | Non-saline | 6.4                      | Slightly Acidic | 5.4   | Non sodic |
| 0.60 – 0.70  |             | 0.5         | Non-saline | 7.7                      | Mildly Alkaline | 12.1  | Sodic     |



| Site Description Site 6 |           |                |                 |             |
|-------------------------|-----------|----------------|-----------------|-------------|
|                         |           |                | Brown Chromosol |             |
| Average Slope           | 5%        | Land Use       | Grazing         | Coordinates |
| Landform Pattern        | Hillslope | Soil Fertility | Moderately High | MGA 55      |
| Landform Element        | Midslope  | Drainage       | Imperfect       | X: 749585   |
| Surface Condition       | Soft      | Permeability   | Moderate        | Y: 6294138  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |            |                          |                 |       |           |
|--------------|-------------|-------------|------------|--------------------------|-----------------|-------|-----------|
| A1           | 0.00 – 0.35 |             |            |                          |                 |       |           |
| A2           | 0.35 – 0.70 |             |            |                          |                 |       |           |
| B            | 0.70 +      |             |            |                          |                 |       |           |
| Sample Depth |             | ECe         |            | pH <sub>(1 5water)</sub> |                 | ESP   |           |
|              |             | dS/m        | Rating     | Value                    | Rating          | Value | Rating    |
| 0.00 – 0.10  |             | 0.7         | Non-saline | 6.0                      | Slightly Acidic | 3.2   | Non sodic |



| Site Description Site 7 |               |                |                                           |             |
|-------------------------|---------------|----------------|-------------------------------------------|-------------|
|                         |               |                | Haplic Mesotrophic Black Dermosol (BELOW) |             |
| Average Slope           | 0%            | Land Use       | Grazing                                   | Coordinates |
| Landform Pattern        | Drainage Flat | Soil Fertility | High                                      | MGA 55      |
| Landform Element        | Flat          | Drainage       | Moderately Well                           | X: 749766   |
| Surface Condition       | Soft          | Permeability   | High                                      | Y: 6294523  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |              |                   |       |           |
|--------------|-------------|-------------|--------------|-------------------|-------|-----------|
| A1           | 0.00 – 0.15 |             |              |                   |       |           |
| B21          | 0.15 – 0.40 |             |              |                   |       |           |
| B22          | 0.40 +      |             |              |                   |       |           |
| Sample Depth | ECe         |             | pH(1 5water) |                   | ESP   |           |
|              | dS/m        | Rating      | Value        | Rating            | Value | Rating    |
| 0.00 – 0.10  | 0.5         | Non-saline  | 6.1          | Slightly Acidic   | 0.7   | Non sodic |
| 0.20 – 0.30  | 0.2         | Non-saline  | 6.0          | Moderately Acidic | 0.9   | Non sodic |
| 0.50 – 0.60  | 0.2         | Non-saline  | 6.9          | Neutral           | 0.8   | Non sodic |



| Site Description Site 8 |               |                |                |             |
|-------------------------|---------------|----------------|----------------|-------------|
|                         |               |                | Black Dermosol |             |
| Average Slope           | 5%            | Land Use       | Grazing        | Coordinates |
| Landform Pattern        | Drainage Flat | Soil Fertility | High           | MGA 55      |
| Landform Element        | Bench         | Drainage       | Moderate       | X: 749551   |
| Surface Condition       | Soft          | Permeability   | Moderate       | Y: 6294548  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |            |                          |                   |       |           |
|--------------|-------------|-------------|------------|--------------------------|-------------------|-------|-----------|
| A1           | 0.00 - 0.25 |             |            |                          |                   |       |           |
| B21          | 0.25 - 0.60 |             |            |                          |                   |       |           |
| B22          | 0.60 +      |             |            |                          |                   |       |           |
| Sample Depth |             | ECe         |            | pH <sub>(1 5water)</sub> |                   | ESP   |           |
|              |             | dS/m        | Rating     | Value                    | Rating            | Value | Rating    |
| 0.00 - 0.10  |             | 0.5         | Non-saline | 5.9                      | Moderately Acidic | 0.7   | Non sodic |



| Site Description Site 9 |           |                |                 |             |
|-------------------------|-----------|----------------|-----------------|-------------|
|                         |           |                | Red Chromosol   |             |
| Average Slope           | 9%        | Land Use       | Grazing         | Coordinates |
| Landform Pattern        | Hillslope | Soil Fertility | Moderately High | MGA 55      |
| Landform Element        | Midslope  | Drainage       | Moderate        | X: 749661   |
| Surface Condition       | Soft      | Permeability   | Moderate        | Y: 6294968  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |            |                          |                   |       |           |
|--------------|-------------|-------------|------------|--------------------------|-------------------|-------|-----------|
| A            | 0.00 - 0.30 |             |            |                          |                   |       |           |
| B2           | 0.30 +      |             |            |                          |                   |       |           |
| Sample Depth |             | ECe         |            | pH <sub>(1 5water)</sub> |                   | ESP   |           |
|              |             | dS/m        | Rating     | Value                    | Rating            | Value | Rating    |
| 0.00 - 0.10  |             | 0.4         | Non-saline | 5.6                      | Moderately Acidic | 1.8   | Non sodic |



| Site Description Site 10 |               |                |                 |             |
|--------------------------|---------------|----------------|-----------------|-------------|
|                          |               |                | Black Dermosol  |             |
| Average Slope            | 0%            | Land Use       | Grazing         | Coordinates |
| Landform Pattern         | Drainage Flat | Soil Fertility | Moderately High | MGA 55      |
| Landform Element         | Flat          | Drainage       | Moderately Well | X: 749948   |
| Surface Condition        | Soft          | Permeability   | High            | Y: 6294511  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |            |                          |                   |       |           |
|--------------|-------------|-------------|------------|--------------------------|-------------------|-------|-----------|
| A1           | 0.00 – 0.15 |             |            |                          |                   |       |           |
| B21          | 0.15 – 0.40 |             |            |                          |                   |       |           |
| B22          | 0.40 +      |             |            |                          |                   |       |           |
| Sample Depth |             | ECe         |            | pH <sub>(1 5water)</sub> |                   | ESP   |           |
|              |             | dS/m        | Rating     | Value                    | Rating            | Value | Rating    |
| 0.00 – 0.10  |             | 0.4         | Non-saline | 5.9                      | Moderately Acidic | 0.6   | Non sodic |



| Site Description Site 11 |             |                |                                                     |             |
|--------------------------|-------------|----------------|-----------------------------------------------------|-------------|
|                          |             |                | Eutrophic Mottled-Subnatric Black Sodosol (BELOWNR) |             |
| Average Slope            | 4%          | Land Use       | Grazing                                             | Coordinates |
| Landform Pattern         | Hillslope   | Soil Fertility | Moderate                                            | MGA 55      |
| Landform Element         | Upper slope | Drainage       | Imperfect                                           | X: 750018   |
| Surface Condition        | Soft        | Permeability   | High                                                | Y: 6293553  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description |                 |                          |                     |       |           |
|--------------|-------------|-------------|-----------------|--------------------------|---------------------|-------|-----------|
| A1           | 0.00 - 0.20 |             |                 |                          |                     |       |           |
| B22          | 0.20 - 0.35 |             |                 |                          |                     |       |           |
| B23          | 0.35 +      |             |                 |                          |                     |       |           |
| Sample Depth |             | ECe         |                 | pH <sub>(1:5water)</sub> |                     | ESP   |           |
|              |             | dS/m        | Rating          | Value                    | Rating              | Value | Rating    |
| 0.00 - 0.10  |             | 1.1         | Non-saline      | 6.1                      | Slightly Acidic     | 3.0   | Non sodic |
| 0.20 - 0.30  |             | 1.1         | Non-saline      | 7.1                      | Neutral             | 14.3  | Sodic     |
| 0.50 - 0.60  |             | 2.8         | Slightly saline | 8.4                      | Moderately Alkaline | 21.8  | Sodic     |



| Site Description Site 12 |           |                |                                                   |             |
|--------------------------|-----------|----------------|---------------------------------------------------|-------------|
| Site Reference           | 12        | ASC Name       | Bleached Mottled-Subnatric Grey Sodosol (CELOWNR) |             |
| Average Slope            | 2%        | Land Use       | Grazing                                           | Coordinates |
| Landform Pattern         | Hillslope | Soil Fertility | Moderate                                          | MGA 55      |
| Landform Element         | Crest     | Drainage       | Imperfect                                         | X: 750636   |
| Surface Condition        | Firm      | Permeability   | Moderate                                          | Y: 6293682  |



Plate 1 – Soil Profile



Plate 2– Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description                                                                                                                                                                                                           |              |                 |       |           |
|--------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------|-------|-----------|
| A11          | 0.00 – 0.25 | Brown (Munsell 7.5YR 4/2) Sandy Loam with moderate pedality. Slightly acidic pH, non-saline and sodic. No coarse fragments. Many roots and well drained. Clear boundary.                                              |              |                 |       |           |
| A12          | 0.25 – 0.45 | Brown (Munsell 7.5YR 4/3) Sandy Clay Loam with weak pedality. Neutral pH, non-saline and non-sodic. No coarse fragments. Few roots and moderately drained. 40% distinct red mottling. Abrupt boundary.                |              |                 |       |           |
| A2           | 0.45 – 0.55 | Bleached Pale Brown (Munsell 10YR6/3) apedal Loamy Sand field texture. Neutral pH, non-saline and sodic. 10% coarse fragments 10mm. No roots and imperfectly drained. Abrupt boundary.                                |              |                 |       |           |
| B2           | 0.55+       | Greyish brown (Munsell 10YR 5/2) Light Medium Clay with strong pedality. Neutral pH, non-saline and sodic. No coarse fragments. No roots and poorly drained. 10% distinct yellow mottling. 10% distinct red mottling. |              |                 |       |           |
| Sample Depth | ECe         |                                                                                                                                                                                                                       | pH(1 5water) |                 | ESP   |           |
|              | dS/m        | Rating                                                                                                                                                                                                                | Value        | Rating          | Value | Rating    |
| 0.00 – 0.10  | 0.6         | Non-saline                                                                                                                                                                                                            | 6.1          | Slightly Acidic | 7.2   | Sodic     |
| 0.25 – 0.35  | 0.3         | Non-saline                                                                                                                                                                                                            | 6.5          | Neutral         | 3.1   | Non sodic |
| 0.45 – 0.55  | -           | -                                                                                                                                                                                                                     | 7.0          | Neutral         | 8.4   | Sodic     |
| 0.65 – 0.75  | 0.5         | Non-saline                                                                                                                                                                                                            | 7.3          | Neutral         | 11.9  | Sodic     |

| Site Description Site 13 |             |                |               |             |
|--------------------------|-------------|----------------|---------------|-------------|
|                          |             |                | Brown Sodosol |             |
| Average Slope            | 3%          | Land Use       |               | Coordinates |
| Landform Pattern         | Hillslope   | Soil Fertility | Moderate      | MGA 55      |
| Landform Element         | Upper Slope | Drainage       | Imperfect     | X: 750438   |
| Surface Condition        | Firm        | Permeability   | Moderate      | Y: 6293346  |



Plate 1 – Soil Profile



Plate 2 – Landscape



Plate 3 – Surface

| Horizon      | Depth (m)   | Description                                                                                                                                                                                       |            |                          |                 |       |           |
|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------|-----------------|-------|-----------|
| A11          | 0.00 – 0.20 | Dark grey (Munsell 7.5YR 4/1) Sandy Loam field texture with moderate pedality. Slightly acidic pH, non-saline and non-sodic. No coarse fragments. Many roots and well drained. Clear boundary.    |            |                          |                 |       |           |
| A12          | 0.20 – 0.55 | Yellowish brown (Munsell 10YR 5/4) Sandy Clay Loam field texture with weak pedality. No coarse fragments. Few roots and moderately drained. Abrupt boundary.                                      |            |                          |                 |       |           |
| A2           | 0.55 – 0.65 | Bleached pale brown (Munsell 10YR 6/3) apedal Loamy Sand field texture. 20% coarse fragments 2 - 5mm. No roots and imperfectly drained. Abrupt boundary.                                          |            |                          |                 |       |           |
| B2           | 0.65+       | Strong brown (Munsell 7.5YR 4/6) Light Medium Clay field texture with strong pedality. No coarse fragments. No roots and poorly drained. 30% distinct red mottling. 10% distinct orange mottling. |            |                          |                 |       |           |
| Sample Depth |             | ECe                                                                                                                                                                                               |            | pH <sub>(1 5water)</sub> |                 | ESP   |           |
|              |             | dS/m                                                                                                                                                                                              | Rating     | Value                    | Rating          | Value | Rating    |
| 0.00 – 0.10  |             | 0.5                                                                                                                                                                                               | Non-saline | 6.1                      | Slightly Acidic | 5.7   | Non sodic |



## Appendix 3

### Laboratory Certificates of Analysis



## GRAIN SIZE ANALYSIS (hydrometer and sieving techniques)

16 of 24 soil samples supplied by Minesoils Pty Ltd on 22nd May, 2023 - Lab Job No. P0986

Analysis requested by Matt Hemingway. Job Ref: MS-088 Brewongle

Address Not Given

| SAMPLE ID         | Lab Code | MOISTURE<br>CONTENT<br><br>(% of water in<br>sample) | TOTAL<br>GRAVEL<br>> 2 mm<br><br>(% of total oven-<br>dry equivalent) | GRAVEL<br>> 4.75 mm<br><br>(% of total oven-<br>dry equivalent) | GRAVEL<br>2.00-4.75 mm<br><br>(% of total oven-<br>dry equivalent) | COARSE SAND<br>200-2000 µm<br>(0.2-2.0 mm)<br><br>(% of total oven-<br>dry equivalent) | FINE SAND<br>20-200 µm<br>(0.02-0.2 mm)<br><br>(% of total oven-<br>dry equivalent) | SILT<br>2-20 µm<br><br>(% of total oven-<br>dry equivalent) | CLAY<br>< 2 µm<br><br>(% of total oven-<br>dry equivalent) |
|-------------------|----------|------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------|
| <b>1 0 - 10</b>   | P0986/1  | 13.0%                                                | 1.3%                                                                  | 0.0%                                                            | 1.3%                                                               | 42.5%                                                                                  | 36.7%                                                                               | 8.1%                                                        | 11.4%                                                      |
| <b>1 30 - 40</b>  | P0986/2  | 8.9%                                                 | 1.8%                                                                  | 0.0%                                                            | 1.8%                                                               | 41.0%                                                                                  | 37.8%                                                                               | 12.1%                                                       | 7.3%                                                       |
| <b>1 60 - 70</b>  | P0986/3  | 13.5%                                                | 1.3%                                                                  | 0.0%                                                            | 1.3%                                                               | 21.0%                                                                                  | 28.3%                                                                               | 4.2%                                                        | 45.3%                                                      |
| <b>5 0 - 10</b>   | P0986/7  | 12.4%                                                | 6.6%                                                                  | 1.0%                                                            | 5.6%                                                               | 30.0%                                                                                  | 36.8%                                                                               | 8.8%                                                        | 17.7%                                                      |
| <b>5 30 - 40</b>  | P0986/8  | 23.3%                                                | 3.1%                                                                  | 0.9%                                                            | 2.1%                                                               | 8.4%                                                                                   | 10.9%                                                                               | 2.0%                                                        | 75.6%                                                      |
| <b>5 60 - 70</b>  | P0986/9  | 23.7%                                                | 4.0%                                                                  | 0.7%                                                            | 3.3%                                                               | 6.4%                                                                                   | 6.1%                                                                                | 4.1%                                                        | 79.4%                                                      |
| <b>7 0 - 10</b>   | P0986/11 | 18.3%                                                | 4.2%                                                                  | 0.0%                                                            | 4.2%                                                               | 38.1%                                                                                  | 31.6%                                                                               | 10.2%                                                       | 16.0%                                                      |
| <b>7 20 - 30</b>  | P0986/12 | 11.9%                                                | 2.9%                                                                  | 0.0%                                                            | 2.9%                                                               | 39.4%                                                                                  | 32.5%                                                                               | 5.4%                                                        | 19.9%                                                      |
| <b>7 50 - 60</b>  | P0986/13 | 15.9%                                                | 5.6%                                                                  | 1.7%                                                            | 3.9%                                                               | 36.2%                                                                                  | 16.9%                                                                               | 2.8%                                                        | 38.6%                                                      |
| <b>11 0 - 10</b>  | P0986/17 | 15.0%                                                | 11.2%                                                                 | 0.0%                                                            | 11.2%                                                              | 22.1%                                                                                  | 36.3%                                                                               | 12.3%                                                       | 18.1%                                                      |
| <b>11 20 - 30</b> | P0986/18 | 24.3%                                                | 5.5%                                                                  | 0.0%                                                            | 5.5%                                                               | 4.9%                                                                                   | 11.6%                                                                               | 4.2%                                                        | 73.8%                                                      |
| <b>11 50 - 60</b> | P0986/19 | 27.0%                                                | 4.1%                                                                  | 0.0%                                                            | 4.1%                                                               | 8.2%                                                                                   | 10.6%                                                                               | 4.3%                                                        | 72.7%                                                      |
| <b>12 0 - 10</b>  | P0986/20 | 13.4%                                                | 1.3%                                                                  | 0.0%                                                            | 1.3%                                                               | 39.9%                                                                                  | 40.4%                                                                               | 7.8%                                                        | 10.6%                                                      |
| <b>12 25 - 35</b> | P0986/21 | 10.0%                                                | 0.9%                                                                  | 0.0%                                                            | 0.9%                                                               | 36.9%                                                                                  | 35.1%                                                                               | 7.2%                                                        | 19.9%                                                      |
| <b>12 45 - 55</b> | P0986/22 | 5.0%                                                 |                                                                       |                                                                 |                                                                    | Insufficient sample                                                                    |                                                                                     |                                                             |                                                            |
| <b>12 65 - 75</b> | P0986/23 | 12.9%                                                | 1.4%                                                                  | 0.0%                                                            | 1.4%                                                               | 16.4%                                                                                  | 28.8%                                                                               | 9.8%                                                        | 43.7%                                                      |

### 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 06/06/2023.

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|                                                         |                                                                  |                                                   |                                |                           |           |          |
|---------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------|--------------------------------|---------------------------|-----------|----------|
| Not Given                                               |                                                                  | Sample ID:                                        | Sample 1                       | Sample 2                  | Sample 3  | Sample 4 |
|                                                         |                                                                  | Crop:                                             | 1 0 - 10                       | 1 30 - 40                 | 1 60 - 70 | 2 0 - 10 |
|                                                         |                                                                  | Client:                                           | Soil                           | Soil                      | Soil      | Soil     |
|                                                         |                                                                  |                                                   | EDIFY                          | EDIFY                     | EDIFY     | EDIFY    |
|                                                         | Parameter                                                        | Method reference                                  | P0986/1                        | P0986/2                   | P0986/3   | P0986/4  |
|                                                         | pH                                                               | Rayment & Lyons 2011 - 4A1 (1:5 Water)            | 6.17                           | 6.68                      | 6.98      | 5.75     |
|                                                         | Electrical Conductivity (dS/m)                                   | Rayment & Lyons 2011 - 3A1 (1:5 Water)            | 0.056                          | 0.021                     | 0.039     | 0.039    |
|                                                         | Exchangeable Calcium (cmol./kg)<br>(kg/ha)<br>(mg/kg)            | Rayment & Lyons 2011 - 15D3<br>(Ammonium Acetate) | 4.2                            | 2.6                       | 4.4       | 3.1      |
|                                                         |                                                                  |                                                   | 1,880                          | 1,164                     | 1,984     | 1,393    |
|                                                         |                                                                  |                                                   | 839                            | 519                       | 886       | 622      |
|                                                         | Exchangeable Magnesium (cmol./kg)<br>(kg/ha)<br>(mg/kg)          |                                                   | 0.85                           | 0.73                      | 4.3       | 0.98     |
|                                                         |                                                                  |                                                   | 230                            | 197                       | 1,158     | 266      |
|                                                         |                                                                  |                                                   | 103                            | 88                        | 517       | 119      |
|                                                         | Exchangeable Potassium (cmol./kg)<br>(kg/ha)<br>(mg/kg)          |                                                   | 0.33                           | 0.15                      | 0.30      | 0.38     |
|                                                         |                                                                  |                                                   | 290                            | 128                       | 261       | 333      |
|                                                         |                                                                  |                                                   | 129                            | 57                        | 117       | 149      |
|                                                         | Exchangeable Sodium (cmol./kg)<br>(kg/ha)<br>(mg/kg)             |                                                   | <0.065                         | 0.07                      | 0.42      | 0.12     |
|                                                         |                                                                  |                                                   | <33                            | 34                        | 216       | 60       |
|                                                         |                                                                  |                                                   | <15                            | 15                        | 96        | 27       |
| Exchangeable Aluminium (cmol./kg)<br>(kg/ha)<br>(mg/kg) | **Inhouse S37 (KCl)                                              | <0.01                                             | <0.01                          | <0.01                     | 0.17      |          |
|                                                         |                                                                  | 1.6                                               | <1                             | 1.2                       | 35        |          |
|                                                         |                                                                  | <1                                                | <1                             | <1                        | 16        |          |
| Exchangeable Hydrogen (cmol./kg)<br>(kg/ha)<br>(mg/kg)  | **Rayment & Lyons 2011 - 15G1<br>(Acidity Titration)             | 0.10                                              | <0.01                          | <0.01                     | 0.11      |          |
|                                                         |                                                                  | 2.2                                               | <1                             | <1                        | 2.4       |          |
|                                                         |                                                                  | <1                                                | <1                             | <1                        | 1.1       |          |
| Effective Cation Exchange Capacity (ECEC) (cmol./kg)    | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol./kg)              | 5.5                                               | 3.5                            | 9.4                       | 4.9       |          |
| Calcium (%)                                             | **Base Saturation Calculations -<br>Cation cmol./kg / ECEC x 100 | 76                                                | 73                             | 47                        | 64        |          |
| Magnesium (%)                                           |                                                                  | 15                                                | 21                             | 45                        | 20        |          |
| Potassium (%)                                           |                                                                  | 6.0                                               | 4.1                            | 3.2                       | 7.8       |          |
| Sodium - ESP (%)                                        |                                                                  | 0.82                                              | 1.9                            | 4.5                       | 2.4       |          |
| Aluminium (%)                                           |                                                                  | 0.14                                              | 0.11                           | 0.06                      | 3.6       |          |
| Hydrogen (%)                                            |                                                                  | 1.8                                               | 0.00                           | 0.00                      | 2.2       |          |
| Calcium/Magnesium Ratio                                 | **Calculation: Calcium / Magnesium (cmol./kg)                    | 4.9                                               | 3.6                            | 1.0                       | 3.2       |          |
| Emerson Aggregate Test (EAT)                            | **AS1289.3.8.1-2017                                              | ..                                                | 3                              | 4                         | ..        |          |
| Moist Munsell Colour                                    | **Inhouse Munsell Soil Colour Classification                     | 10YR 3/2<br>Very Dark Grayish Brown               | 10YR 4/2<br>Dark Grayish Brown | 2.5YR 6/6<br>Olive Yellow | ..        |          |
| Mottles Munsell Colour                                  |                                                                  | ..                                                | ..                             | 2.5YR 4/8, 2.5YR 3/1      | ..        |          |
| Degree of Mottling (%)                                  |                                                                  | ..                                                | ..                             | ..                        | ..        |          |
|                                                         |                                                                  | ..                                                | ..                             | 50                        | ..        |          |

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|           |           |                  |          |           |           |          |
|-----------|-----------|------------------|----------|-----------|-----------|----------|
| Not Given |           | Sample ID:       | Sample 1 | Sample 2  | Sample 3  | Sample 4 |
|           |           |                  | 1 0 - 10 | 1 30 - 40 | 1 60 - 70 | 2 0 - 10 |
|           |           | Crop:            | Soil     | Soil      | Soil      | Soil     |
|           |           | Client:          | EDIFY    | EDIFY     | EDIFY     | EDIFY    |
|           | Parameter | Method reference | P0986/1  | P0986/2   | P0986/3   | P0986/4  |

### Notes:

- All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
- Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.
- Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
- 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
- Guidelines for phosphorus have been reduced for Australian soils.
- Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
- Total Acid Extractable Nutrients indicate a store of nutrients.
- 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.
- Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil results'.
- Conversions for 1 cmol<sub>e</sub>/kg = 230 mg/kg Sodium, 390 mg/kg Potassium, 122 mg/kg Magnesium, 200 mg/kg Calcium
- Conversions to kg/ha = mg/kg x 2.24
- The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
- \*\* NATA accreditation does not cover the performance of this service.
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full. Results only relate to the item tested.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer [scu.edu.au/eal/t&cs](http://scu.edu.au/eal/t&cs)).
- This report was issued on 6/06/2023.

Quality Checked: Kris Saville  
Agricultural Co-Ordinator

KS



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Accreditation No. 149  
Accredited for compliance  
with ISO/IEC 17025 - Te

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|                                                      |                                                                  | Sample ID:                                           | Sample 5 | Sample 6 | Sample 7                         | Sample 8                   | Sample 9                 |
|------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------|----------|----------|----------------------------------|----------------------------|--------------------------|
|                                                      |                                                                  | Crop:                                                | 3 0 - 10 | 4 0 - 10 | 5 0 - 10                         | 5 30 - 40                  | 5 60 - 70                |
|                                                      |                                                                  | Client:                                              | Soil     | Soil     | Soil                             | Soil                       | Soil                     |
|                                                      |                                                                  |                                                      | EDIFY    | EDIFY    | EDIFY                            | EDIFY                      | EDIFY                    |
| Parameter                                            | Method reference                                                 |                                                      | P0986/5  | P0986/6  | P0986/7                          | P0986/8                    | P0986/9                  |
| pH                                                   | Rayment & Lyons 2011 - 4A1 (1:5 Water)                           |                                                      | 5.71     | 6.15     | 6.13                             | 6.41                       | 7.66                     |
| Electrical Conductivity (dS/m)                       | Rayment & Lyons 2011 - 3A1 (1:5 Water)                           |                                                      | 0.040    | 0.054    | 0.075                            | 0.047                      | 0.085                    |
| Exchangeable Calcium                                 | (cmol./kg)                                                       | Rayment & Lyons 2011 - 15D3<br>(Ammonium Acetate)    | 2.9      | 4.8      | 5.2                              | 9.8                        | 9.0                      |
|                                                      | (kg/ha)                                                          |                                                      | 1,302    | 2,139    | 2,341                            | 4,383                      | 4,033                    |
|                                                      | (mg/kg)                                                          |                                                      | 581      | 955      | 1,045                            | 1,957                      | 1,800                    |
| Exchangeable Magnesium                               | (cmol./kg)                                                       |                                                      | 0.84     | 0.90     | 1.1                              | 7.3                        | 11                       |
|                                                      | (kg/ha)                                                          |                                                      | 230      | 244      | 302                              | 1,985                      | 2,865                    |
|                                                      | (mg/kg)                                                          |                                                      | 103      | 109      | 135                              | 886                        | 1,279                    |
| Exchangeable Potassium                               | (cmol./kg)                                                       |                                                      | 0.33     | 0.58     | 1.2                              | 0.79                       | 0.48                     |
|                                                      | (kg/ha)                                                          |                                                      | 285      | 507      | 1,052                            | 692                        | 424                      |
|                                                      | (mg/kg)                                                          |                                                      | 127      | 226      | 470                              | 309                        | 189                      |
| Exchangeable Sodium                                  | (cmol./kg)                                                       |                                                      | <0.065   | <0.065   | 0.08                             | 1.0                        | 2.7                      |
|                                                      | (kg/ha)                                                          |                                                      | <33      | <33      | 42                               | 533                        | 1,415                    |
|                                                      | (mg/kg)                                                          |                                                      | <15      | <15      | 19                               | 238                        | 632                      |
| Exchangeable Aluminium                               | (cmol./kg)                                                       | **Inhouse S37 (KCl)                                  | 0.14     | 0.01     | 0.02                             | 0.18                       | <0.01                    |
|                                                      | (kg/ha)                                                          |                                                      | 29       | 2.6      | 4.9                              | 36                         | 1.8                      |
|                                                      | (mg/kg)                                                          |                                                      | 13       | 1.2      | 2.2                              | 16                         | <1                       |
| Exchangeable Hydrogen                                | (cmol./kg)                                                       | **Rayment & Lyons 2011 - 15G1<br>(Acidity Titration) | 0.15     | 0.08     | 0.12                             | 0.16                       | <0.01                    |
|                                                      | (kg/ha)                                                          |                                                      | 3.4      | 1.7      | 2.7                              | 3.6                        | <1                       |
|                                                      | (mg/kg)                                                          |                                                      | 1.5      | <1       | 1.2                              | 1.6                        | <1                       |
| Effective Cation Exchange Capacity (ECEC) (cmol./kg) | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol./kg)              |                                                      | 4.4      | 6.4      | 7.8                              | 19                         | 23                       |
| Calcium (%)                                          | **Base Saturation Calculations -<br>Cation cmol./kg / ECEC x 100 |                                                      | 66       | 75       | 67                               | 51                         | 39                       |
| Magnesium (%)                                        |                                                                  |                                                      | 19       | 14       | 14                               | 38                         | 46                       |
| Potassium (%)                                        |                                                                  |                                                      | 7.4      | 9.1      | 15                               | 4.1                        | 2.1                      |
| Sodium - ESP (%)                                     |                                                                  |                                                      | 1.3      | 0.97     | 1.1                              | 5.4                        | 12                       |
| Aluminium (%)                                        |                                                                  |                                                      | 3.2      | 0.20     | 0.31                             | 0.92                       | 0.04                     |
| Hydrogen (%)                                         |                                                                  |                                                      | 3.4      | 1.2      | 1.6                              | 0.83                       | 0.00                     |
| Calcium/Magnesium Ratio                              | **Calculation: Calcium / Magnesium (cmol./kg)                    |                                                      | 3.4      | 5.3      | 4.7                              | 1.3                        | 0.85                     |
| Emerson Aggregate Test (EAT)                         | **AS1289.3.8.1-2017                                              |                                                      | ..       | ..       | ..                               | 3                          | 3                        |
| Moist Munsell Colour                                 | **Inhouse Munsell Soil Colour Classification                     |                                                      | ..       | ..       | 5YR 3/3<br>Dark Reddish<br>Brown | 5YR 4/6<br>Yellowish Brown | 2.5YR 4/3<br>Olive Brown |
| Mottles Munsell Colour                               |                                                                  |                                                      | ..       | ..       | ..                               | 5YR 3/2                    | 2.5 4/6, 2.5YR 3/2       |
|                                                      |                                                                  |                                                      | ..       | ..       | ..                               | ..                         | ..                       |
| Degree of Mottling (%)                               |                                                                  |                                                      | ..       | ..       | ..                               | 30                         | 50                       |

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

Sample ID:

3 0 - 10

4 0 - 10

5 0 - 10

5 30 - 40

5 60 - 70

Soil

Soil

Soil

Soil

Soil

EDIFY

EDIFY

EDIFY

EDIFY

EDIFY

| Parameter | Method reference | P0986/5 | P0986/6 | P0986/7 | P0986/8 | P0986/9 |
|-----------|------------------|---------|---------|---------|---------|---------|
|-----------|------------------|---------|---------|---------|---------|---------|

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Quality Checked: Kris Saville  
Agricultural Co-Ordinator

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## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|                                                         |                                                                  |                                                   |           |             |           |           |           |
|---------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------|-----------|-------------|-----------|-----------|-----------|
| Not Given                                               |                                                                  | Sample ID:                                        | Sample 10 | Sample 11   | Sample 12 | Sample 13 | Sample 14 |
|                                                         |                                                                  | Crop:                                             | 6 0 - 10  | 7 0 - 10    | 7 20 - 30 | 7 50 - 60 | 8 0 - 10  |
|                                                         |                                                                  | Client:                                           | Soil      | Soil        | Soil      | Soil      | Soil      |
|                                                         |                                                                  |                                                   | EDIFY     | EDIFY       | EDIFY     | EDIFY     | EDIFY     |
|                                                         | Parameter                                                        | Method reference                                  | P0986/10  | P0986/11    | P0986/12  | P0986/13  | P0986/14  |
|                                                         | pH                                                               | Rayment & Lyons 2011 - 4A1 (1:5 Water)            | 6.01      | 6.07        | 6.00      | 6.90      | 5.92      |
|                                                         | Electrical Conductivity (dS/m)                                   | Rayment & Lyons 2011 - 3A1 (1:5 Water)            | 0.049     | 0.050       | 0.025     | 0.023     | 0.048     |
|                                                         | Exchangeable Calcium (cmol./kg)<br>(kg/ha)<br>(mg/kg)            | Rayment & Lyons 2011 - 15D3<br>(Ammonium Acetate) | 3.0       | 5.7         | 6.7       | 11        | 3.0       |
|                                                         |                                                                  |                                                   | 1,336     | 2,570       | 3,029     | 4,847     | 1,363     |
|                                                         |                                                                  |                                                   | 597       | 1,147       | 1,352     | 2,164     | 608       |
|                                                         | Exchangeable Magnesium (cmol./kg)<br>(kg/ha)<br>(mg/kg)          |                                                   | 1.1       | 1.2         | 1.3       | 4.4       | 0.86      |
|                                                         |                                                                  |                                                   | 286       | 340         | 358       | 1,200     | 235       |
|                                                         |                                                                  |                                                   | 128       | 152         | 160       | 536       | 105       |
|                                                         | Exchangeable Potassium (cmol./kg)<br>(kg/ha)<br>(mg/kg)          |                                                   | 0.32      | 0.69        | 0.47      | 0.44      | 0.53      |
|                                                         |                                                                  |                                                   | 277       | 604         | 408       | 382       | 463       |
|                                                         |                                                                  |                                                   | 124       | 269         | 182       | 171       | 207       |
|                                                         | Exchangeable Sodium (cmol./kg)<br>(kg/ha)<br>(mg/kg)             |                                                   | 0.15      | <0.065      | 0.08      | 0.12      | <0.065    |
|                                                         |                                                                  |                                                   | 78        | <33         | 40        | 64        | <33       |
|                                                         |                                                                  |                                                   | 35        | <15         | 18        | 29        | <15       |
| Exchangeable Aluminium (cmol./kg)<br>(kg/ha)<br>(mg/kg) | **Inhouse S37 (KCl)                                              | 0.02                                              | 0.01      | 0.02        | 0.01      | 0.07      |           |
|                                                         |                                                                  | 4.7                                               | 2.0       | 3.3         | 2.4       | 14        |           |
|                                                         |                                                                  | 2.1                                               | <1        | 1.5         | 1.1       | 6.2       |           |
| Exchangeable Hydrogen (cmol./kg)<br>(kg/ha)<br>(mg/kg)  | **Rayment & Lyons 2011 - 15G1<br>(Acidity Titration)             | 0.19                                              | 0.07      | 0.05        | <0.01     | 0.08      |           |
|                                                         |                                                                  | 4.2                                               | 1.5       | 1.2         | <1        | 1.7       |           |
|                                                         |                                                                  | 1.9                                               | <1        | <1          | <1        | <1        |           |
| Effective Cation Exchange Capacity (ECEC) (cmol./kg)    | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol./kg)              | 4.7                                               | 7.8       | 8.7         | 16        | 4.6       |           |
| Calcium (%)                                             | **Base Saturation Calculations -<br>Cation cmol./kg / ECEC x 100 | 63                                                | 73        | 78          | 68        | 66        |           |
| Magnesium (%)                                           |                                                                  | 22                                                | 16        | 15          | 28        | 19        |           |
| Potassium (%)                                           |                                                                  | 6.7                                               | 8.8       | 5.4         | 2.8       | 11        |           |
| Sodium - ESP (%)                                        |                                                                  | 3.2                                               | 0.74      | 0.90        | 0.79      | 0.66      |           |
| Aluminium (%)                                           |                                                                  | 0.50                                              | 0.13      | 0.19        | 0.08      | 1.5       |           |
| Hydrogen (%)                                            |                                                                  | 4.0                                               | 0.85      | 0.60        | 0.00      | 1.7       |           |
| Calcium/Magnesium Ratio                                 | **Calculation: Calcium / Magnesium (cmol./kg)                    | 2.8                                               | 4.6       | 5.1         | 2.4       | 3.5       |           |
| Emerson Aggregate Test (EAT)                            | **AS1289.3.8.1-2017                                              | ..                                                | ..        | 3           | 3         | ..        |           |
| Moist Munsell Colour                                    | **Inhouse Munsell Soil Colour Classification                     | ..                                                | 5YR 2.5/1 | 7.5YR 2.5/1 | 7.5YR 4/2 | ..        |           |
|                                                         |                                                                  | ..                                                | Black     | Black       | Brown     | ..        |           |
|                                                         |                                                                  | ..                                                | ..        | ..          | ..        | ..        |           |
|                                                         |                                                                  | ..                                                | ..        | ..          | ..        | ..        |           |
|                                                         |                                                                  | ..                                                | ..        | ..          | ..        | ..        |           |

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

Sample ID:

6 0 - 10

7 0 - 10

7 20 - 30

7 50 - 60

8 0 - 10

Soil

Soil

Soil

Soil

Soil

EDIFY

EDIFY

EDIFY

EDIFY

EDIFY

| Parameter | Method reference | P0986/10 | P0986/11 | P0986/12 | P0986/13 | P0986/14 |
|-----------|------------------|----------|----------|----------|----------|----------|
|-----------|------------------|----------|----------|----------|----------|----------|

### Notes:

- All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
- Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.
- Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
- 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
- Guidelines for phosphorus have been reduced for Australian soils.
- Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
- Total Acid Extractable Nutrients indicate a store of nutrients.
- 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.
- Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil results'.
- Conversions for 1 cmol<sub>e</sub>/kg = 230 mg/kg Sodium, 390 mg/kg Potassium, 122 mg/kg Magnesium, 200 mg/kg Calcium
- Conversions to kg/ha = mg/kg x 2.24
- The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
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Agricultural Co-Ordinator

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Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|                                                      |                                |                                                                  |                                                   |           |           |            |                      |
|------------------------------------------------------|--------------------------------|------------------------------------------------------------------|---------------------------------------------------|-----------|-----------|------------|----------------------|
| Not Given                                            |                                |                                                                  | Sample ID:                                        | Sample 15 | Sample 16 | Sample 17  | Sample 18            |
|                                                      |                                |                                                                  | Crop:                                             | 9 0 - 10  | 10 0 - 10 | 11 0 - 10  | 11 20 - 30           |
|                                                      |                                |                                                                  | Client:                                           | Soil      | Soil      | Soil       | Soil                 |
|                                                      |                                |                                                                  |                                                   | EDIFY     | EDIFY     | EDIFY      | EDIFY                |
|                                                      | Parameter                      | Method reference                                                 |                                                   | P0986/15  | P0986/16  | P0986/17   | P0986/18             |
|                                                      | pH                             | Rayment & Lyons 2011 - 4A1 (1:5 Water)                           |                                                   | 5.63      | 5.85      | 6.13       | 7.09                 |
|                                                      | Electrical Conductivity (dS/m) | Rayment & Lyons 2011 - 3A1 (1:5 Water)                           |                                                   | 0.034     | 0.040     | 0.112      | 0.186                |
|                                                      | Exchangeable Calcium           | (cmol./kg)                                                       | Rayment & Lyons 2011 - 15D3<br>(Ammonium Acetate) | 2.9       | 4.6       | 6.7        | 12                   |
|                                                      |                                | (kg/ha)                                                          |                                                   | 1,317     | 2,053     | 3,013      | 5,313                |
|                                                      |                                | (mg/kg)                                                          |                                                   | 588       | 917       | 1,345      | 2,372                |
|                                                      | Exchangeable Magnesium         | (cmol./kg)                                                       |                                                   | 0.93      | 1.1       | 1.6        | 6.9                  |
|                                                      |                                | (kg/ha)                                                          |                                                   | 252       | 309       | 442        | 1,882                |
|                                                      |                                | (mg/kg)                                                          |                                                   | 113       | 138       | 197        | 840                  |
|                                                      | Exchangeable Potassium         | (cmol./kg)                                                       |                                                   | 0.27      | 0.59      | 1.1        | 0.87                 |
|                                                      |                                | (kg/ha)                                                          |                                                   | 236       | 517       | 959        | 763                  |
|                                                      |                                | (mg/kg)                                                          |                                                   | 105       | 231       | 428        | 340                  |
|                                                      | Exchangeable Sodium            | (cmol./kg)                                                       |                                                   | 0.08      | <0.065    | 0.29       | 3.3                  |
|                                                      |                                | (kg/ha)                                                          |                                                   | 41        | <33       | 151        | 1,682                |
|                                                      |                                | (mg/kg)                                                          |                                                   | 18        | <15       | 67         | 751                  |
| Exchangeable Aluminium                               | (cmol./kg)                     | **Inhouse S37 (KCl)                                              | 0.19                                              | 0.05      | 0.02      | 0.02       |                      |
|                                                      | (kg/ha)                        |                                                                  | 39                                                | 9.3       | 3.7       | 3.2        |                      |
|                                                      | (mg/kg)                        |                                                                  | 17                                                | 4.2       | 1.7       | 1.4        |                      |
| Exchangeable Hydrogen                                | (cmol./kg)                     | **Rayment & Lyons 2011 - 15G1<br>(Acidity Titration)             | 0.14                                              | 0.16      | 0.06      | <0.01      |                      |
|                                                      | (kg/ha)                        |                                                                  | 3.2                                               | 3.6       | 1.4       | <1         |                      |
|                                                      | (mg/kg)                        |                                                                  | 1.4                                               | 1.6       | <1        | <1         |                      |
| Effective Cation Exchange Capacity (ECEC) (cmol./kg) |                                | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol./kg)              |                                                   | 4.5       | 6.5       | 9.8        | 23                   |
| Calcium (%)                                          |                                | **Base Saturation Calculations -<br>Cation cmol./kg / ECEC x 100 |                                                   | 65        | 70        | 68         | 52                   |
| Magnesium (%)                                        |                                |                                                                  |                                                   | 20        | 17        | 17         | 30                   |
| Potassium (%)                                        |                                |                                                                  |                                                   | 5.9       | 9.0       | 11         | 3.8                  |
| Sodium - ESP (%)                                     |                                |                                                                  |                                                   | 1.8       | 0.59      | 3.0        | 14                   |
| Aluminium (%)                                        |                                |                                                                  |                                                   | 4.3       | 0.70      | 0.19       | 0.07                 |
| Hydrogen (%)                                         |                                |                                                                  |                                                   | 3.1       | 2.5       | 0.63       | 0.00                 |
| Calcium/Magnesium Ratio                              |                                | **Calculation: Calcium / Magnesium (cmol./kg)                    |                                                   | 3.2       | 4.0       | 4.1        | 1.7                  |
| Emerson Aggregate Test (EAT)                         |                                | **AS1289.3.8.1-2017                                              |                                                   | ..        | ..        | ..         | 2                    |
| Moist Munsell Colour                                 |                                | **Inhouse Munsell Soil Colour Classification                     |                                                   | ..        | ..        | 7.5YR 3/2  | 7.5YR 3/2            |
|                                                      |                                |                                                                  |                                                   | ..        | ..        | Dark Brown | Dark Brown           |
| Mottles Munsell Colour                               |                                |                                                                  |                                                   | ..        | ..        | ..         | 5YR 2.5/1, 2.5YR 3/4 |
| Degree of Mottling (%)                               |                                |                                                                  |                                                   | ..        | ..        | ..         | ..                   |
|                                                      |                                |                                                                  |                                                   | ..        | ..        | ..         | 50, 20               |

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Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|           |           |                  |           |           |           |            |
|-----------|-----------|------------------|-----------|-----------|-----------|------------|
| Not Given |           | Sample ID:       | Sample 15 | Sample 16 | Sample 17 | Sample 18  |
|           |           |                  | 9 0 - 10  | 10 0 - 10 | 11 0 - 10 | 11 20 - 30 |
|           |           | Crop:            | Soil      | Soil      | Soil      | Soil       |
|           |           | Client:          | EDIFY     | EDIFY     | EDIFY     | EDIFY      |
|           | Parameter | Method reference | P0986/15  | P0986/16  | P0986/17  | P0986/18   |

### Notes:

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- Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.
- Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
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- Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil results'.
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- Conversions to kg/ha = mg/kg x 2.24
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Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|                                                      |                                                                  |                                        |            |            |            |            |            |
|------------------------------------------------------|------------------------------------------------------------------|----------------------------------------|------------|------------|------------|------------|------------|
| Not Given                                            |                                                                  |                                        | Sample ID: | Sample 19  | Sample 20  | Sample 21  | Sample 22  |
|                                                      |                                                                  |                                        | Crop:      | 11 50 - 60 | 12 0 - 10  | 12 25 - 35 | 12 45 - 55 |
|                                                      |                                                                  |                                        | Client:    | Soil       | Soil       | Soil       | Soil       |
|                                                      |                                                                  |                                        |            | EDIFY      | EDIFY      | EDIFY      | EDIFY      |
|                                                      | Parameter                                                        | Method reference                       | P0986/19   | P0986/20   | P0986/21   | P0986/22   |            |
|                                                      | pH                                                               | Rayment & Lyons 2011 - 4A1 (1:5 Water) | 8.37       | 6.14       | 6.52       | 7.04       |            |
|                                                      | Electrical Conductivity (dS/m)                                   | Rayment & Lyons 2011 - 3A1 (1:5 Water) | 0.482      | 0.040      | 0.029      | 0.028      |            |
|                                                      | Exchangeable Calcium                                             | (cmol./kg)                             | 14         | 3.7        | 4.6        | 2.3        |            |
|                                                      |                                                                  | (kg/ha)                                | 6,068      | 1,678      | 2,056      | 1,034      |            |
|                                                      |                                                                  | (mg/kg)                                | 2,709      | 749        | 918        | 462        |            |
|                                                      | Exchangeable Magnesium                                           | (cmol./kg)                             | 11         | 1.0        | 1.5        | 1.4        |            |
|                                                      |                                                                  | (kg/ha)                                | 2,934      | 282        | 415        | 387        |            |
|                                                      |                                                                  | (mg/kg)                                | 1,310      | 126        | 185        | 173        |            |
|                                                      | Exchangeable Potassium                                           | (cmol./kg)                             | 0.55       | 0.21       | 0.17       | 0.15       |            |
|                                                      |                                                                  | (kg/ha)                                | 480        | 184        | 146        | 129        |            |
|                                                      |                                                                  | (mg/kg)                                | 214        | 82         | 65         | 58         |            |
|                                                      | Exchangeable Sodium                                              | (cmol./kg)                             | 6.9        | 0.40       | 0.20       | 0.36       |            |
|                                                      |                                                                  | (kg/ha)                                | 3,579      | 204        | 103        | 184        |            |
|                                                      |                                                                  | (mg/kg)                                | 1,598      | 91         | 46         | 82         |            |
| Exchangeable Aluminium                               | (cmol./kg)                                                       | 0.01                                   | 0.03       | 0.02       | <0.01      |            |            |
|                                                      | (kg/ha)                                                          | 2.6                                    | 5.2        | 4.8        | 2.0        |            |            |
|                                                      | (mg/kg)                                                          | 1.2                                    | 2.3        | 2.1        | <1         |            |            |
| Exchangeable Hydrogen                                | (cmol./kg)                                                       | <0.01                                  | 0.12       | <0.01      | <0.01      |            |            |
|                                                      | (kg/ha)                                                          | <1                                     | 2.7        | <1         | <1         |            |            |
|                                                      | (mg/kg)                                                          | <1                                     | 1.2        | <1         | <1         |            |            |
| Effective Cation Exchange Capacity (ECEC) (cmol./kg) | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol./kg)              | 32                                     | 5.5        | 6.5        | 4.2        |            |            |
| Calcium (%)                                          | **Base Saturation Calculations -<br>Cation cmol./kg / ECEC x 100 | 42                                     | 68         | 71         | 54         |            |            |
| Magnesium (%)                                        |                                                                  | 34                                     | 19         | 23         | 34         |            |            |
| Potassium (%)                                        |                                                                  | 1.7                                    | 3.8        | 2.6        | 3.5        |            |            |
| Sodium - ESP (%)                                     |                                                                  | 22                                     | 7.2        | 3.1        | 8.4        |            |            |
| Aluminium (%)                                        |                                                                  | 0.04                                   | 0.47       | 0.36       | 0.23       |            |            |
| Hydrogen (%)                                         |                                                                  | 0.00                                   | 2.1        | 0.00       | 0.00       |            |            |
| Calcium/Magnesium Ratio                              | **Calculation: Calcium / Magnesium (cmol./kg)                    | 1.3                                    | 3.6        | 3.0        | 1.6        |            |            |
| Emerson Aggregate Test (EAT)                         | **AS1289.3.8.1-2017                                              | 3                                      | ..         | 2          | ..         |            |            |
| Moist Munsell Colour                                 | **Inhouse Munsell Soil Colour Classification                     | 10YR 4/3                               | 7.5YR 4/2  | 7.5YR 4/3  | 10YR6/3    |            |            |
|                                                      |                                                                  | Brown                                  | Brown      | Brown      | Pale Brown |            |            |
|                                                      |                                                                  | 10YR 3/2                               | ..         | 2.5YR 4/6  | ..         |            |            |
|                                                      |                                                                  | ..                                     | ..         | ..         | ..         |            |            |
| Mottles Munsell Colour                               |                                                                  | 50                                     | ..         | 2          | ..         |            |            |
| Degree of Mottling (%)                               |                                                                  | ..                                     | ..         | 2          | ..         |            |            |

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Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|           | Sample ID:       | Sample 19  | Sample 20 | Sample 21  | Sample 22  |
|-----------|------------------|------------|-----------|------------|------------|
|           | Crop:            | 11 50 - 60 | 12 0 - 10 | 12 25 - 35 | 12 45 - 55 |
|           | Client:          | Soil       | Soil      | Soil       | Soil       |
|           |                  | EDIFY      | EDIFY     | EDIFY      | EDIFY      |
| Parameter | Method reference | P0986/19   | P0986/20  | P0986/21   | P0986/22   |

### Notes:

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Not Given

| Not Given |                                                      | Sample ID:                                                       | Sample 23            | Sample 24 |
|-----------|------------------------------------------------------|------------------------------------------------------------------|----------------------|-----------|
|           |                                                      | Crop:                                                            | 12 65 - 75           | 13 0 - 10 |
|           |                                                      | Client:                                                          | Soil                 | Soil      |
|           |                                                      |                                                                  | EDIFY                | EDIFY     |
|           | Parameter                                            | Method reference                                                 | P0986/23             | P0986/24  |
|           | pH                                                   | Rayment & Lyons 2011 - 4A1 (1:5 Water)                           | 7.30                 | 6.11      |
|           | Electrical Conductivity (dS/m)                       | Rayment & Lyons 2011 - 3A1 (1:5 Water)                           | 0.058                | 0.047     |
|           | Exchangeable Calcium                                 | (cmol./kg)                                                       | 6.2                  | 2.7       |
|           |                                                      | (kg/ha)                                                          | 2,805                | 1,221     |
|           |                                                      | (mg/kg)                                                          | 1,252                | 545       |
|           | Exchangeable Magnesium                               | (cmol./kg)                                                       | 5.5                  | 0.52      |
|           |                                                      | (kg/ha)                                                          | 1,493                | 143       |
|           |                                                      | (mg/kg)                                                          | 667                  | 64        |
|           | Exchangeable Potassium                               | (cmol./kg)                                                       | 0.31                 | 0.24      |
|           |                                                      | (kg/ha)                                                          | 271                  | 213       |
|           |                                                      | (mg/kg)                                                          | 121                  | 95        |
|           | Exchangeable Sodium                                  | (cmol./kg)                                                       | 1.6                  | 0.22      |
|           |                                                      | (kg/ha)                                                          | 840                  | 112       |
|           |                                                      | (mg/kg)                                                          | 375                  | 50        |
|           | Exchangeable Aluminium                               | (cmol./kg)                                                       | 0.02                 | 0.05      |
|           |                                                      | (kg/ha)                                                          | 3.3                  | 10        |
|           |                                                      | (mg/kg)                                                          | 1.5                  | 4.5       |
|           | Exchangeable Hydrogen                                | (cmol./kg)                                                       | <0.01                | 0.10      |
|           |                                                      | (kg/ha)                                                          | <1                   | 2.3       |
|           |                                                      | (mg/kg)                                                          | <1                   | 1.0       |
|           | Effective Cation Exchange Capacity (ECEC) (cmol./kg) | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol./kg)              | 14                   | 3.9       |
|           | Calcium (%)                                          | **Base Saturation Calculations -<br>Cation cmol./kg / ECEC x 100 | 46                   | 70        |
|           | Magnesium (%)                                        |                                                                  | 40                   | 14        |
|           | Potassium (%)                                        |                                                                  | 2.3                  | 6.3       |
|           | Sodium - ESP (%)                                     |                                                                  | 12                   | 5.7       |
|           | Aluminium (%)                                        |                                                                  | 0.12                 | 1.3       |
|           | Hydrogen (%)                                         |                                                                  | 0.00                 | 2.7       |
|           | Calcium/Magnesium Ratio                              | **Calculation: Calcium / Magnesium (cmol./kg)                    | 1.1                  | 5.2       |
|           | Emerson Aggregate Test (EAT)                         | **AS1289.3.8.1-2017                                              | 2                    | ..        |
|           | Moist Munsell Colour                                 | **Inhouse Munsell Soil Colour Classification                     | 10YR 5/2             | ..        |
|           |                                                      |                                                                  | Grayish Brown        | ..        |
|           | Mottles Munsell Colour                               |                                                                  | 5YR 2.5/1, 2.5YR 4/4 | ..        |
|           |                                                      |                                                                  | ..                   | ..        |
|           | Degree of Mottling (%)                               |                                                                  | 30, 15               | ..        |

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|  | Sample ID: | Sample 23  | Sample 24 |
|--|------------|------------|-----------|
|  |            | 12 65 - 75 | 13 0 - 10 |
|  | Crop:      | Soil       | Soil      |
|  |            | EDIFY      | EDIFY     |
|  | Client:    | P0986/23   | P0986/24  |
|  |            |            |           |

### 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
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 Conditions
17. This report was issued on 6/06/2023.

Quality Checked: Kris Saville  
 Agricultural Co-Ordinator

KS

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

| Not Given                                                         |                                |                                                                               | Heavy Soil                                     | Medium Soil | Light Soil | Sandy Soil |
|-------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|-------------|------------|------------|
| Sample ID:                                                        |                                |                                                                               |                                                |             |            |            |
| Crop:                                                             |                                |                                                                               |                                                |             |            |            |
| Client:                                                           |                                |                                                                               | Clay                                           | Clay Loam   | Loam       | Loamy Sand |
|                                                                   | Parameter                      | Method reference                                                              | Indicative guidelines - refer to Notes 6 and 8 |             |            |            |
|                                                                   | pH                             | Rayment & Lyons 2011 - 4A1 (1:5 Water)                                        | 6.5                                            | 6.5         | 6.3        | 6.3        |
|                                                                   | Electrical Conductivity (dS/m) | Rayment & Lyons 2011 - 3A1 (1:5 Water)                                        | 0.200                                          | 0.150       | 0.120      | 0.100      |
|                                                                   | Exchangeable Calcium           | (cmol <sub>e</sub> /kg)                                                       | 15.6                                           | 10.8        | 5.0        | 1.9        |
|                                                                   |                                | (kg/ha)                                                                       | 7000                                           | 4816        | 2240       | 840        |
|                                                                   |                                | (mg/kg)                                                                       | 3125                                           | 2150        | 1000       | 375        |
|                                                                   | Exchangeable Magnesium         | (cmol <sub>e</sub> /kg)                                                       | 2.4                                            | 1.7         | 1.2        | 0.60       |
|                                                                   |                                | (kg/ha)                                                                       | 650                                            | 448         | 325        | 168        |
|                                                                   |                                | (mg/kg)                                                                       | 290                                            | 200         | 145        | 75         |
|                                                                   | Exchangeable Potassium         | (cmol <sub>e</sub> /kg)                                                       | 0.60                                           | 0.50        | 0.40       | 0.30       |
|                                                                   |                                | (kg/ha)                                                                       | 526                                            | 426         | 336        | 224        |
|                                                                   |                                | (mg/kg)                                                                       | 235                                            | 190         | 150        | 100        |
|                                                                   | Exchangeable Sodium            | (cmol <sub>e</sub> /kg)                                                       | 0.3                                            | 0.26        | 0.22       | 0.11       |
|                                                                   |                                | (kg/ha)                                                                       | 155                                            | 134         | 113        | 57         |
|                                                                   |                                | (mg/kg)                                                                       | 69                                             | 60          | 51         | 25         |
| Exchangeable Aluminium                                            | (cmol <sub>e</sub> /kg)        | 0.6                                                                           | 0.5                                            | 0.4         | 0.2        |            |
|                                                                   | (kg/ha)                        | 121                                                                           | 101                                            | 73          | 30         |            |
|                                                                   | (mg/kg)                        | 54                                                                            | 45                                             | 32          | 14         |            |
| Exchangeable Hydrogen                                             | (cmol <sub>e</sub> /kg)        | 0.6                                                                           | 0.5                                            | 0.4         | 0.2        |            |
|                                                                   | (kg/ha)                        | 13                                                                            | 11                                             | 8           | 3          |            |
|                                                                   | (mg/kg)                        | 6                                                                             | 5                                              | 4           | 2          |            |
| Effective Cation Exchange Capacity (ECEC) (cmol <sub>e</sub> /kg) |                                | **Calculation:<br>Sum of Ca,Mg,K,Na,Al,H (cmol <sub>e</sub> /kg)              | 20.1                                           | 14.3        | 7.8        | 3.3        |
| Calcium (%)                                                       |                                | **Base Saturation Calculations -<br>Cation cmol <sub>e</sub> /kg / ECEC x 100 | 77.6                                           | 75.7        | 65.6       | 57.4       |
| Magnesium (%)                                                     |                                |                                                                               | 11.9                                           | 11.9        | 15.7       | 18.1       |
| Potassium (%)                                                     |                                |                                                                               | 3.0                                            | 3.5         | 5.2        | 9.1        |
| Sodium - ESP (%)                                                  |                                |                                                                               | 1.5                                            | 1.8         | 2.9        | 3.3        |
| Aluminium (%)                                                     |                                |                                                                               | 6.0                                            | 7.1         | 10.5       | 12.1       |
| Hydrogen (%)                                                      |                                |                                                                               |                                                |             |            |            |
| Calcium/Magnesium Ratio                                           |                                | **Calculation: Calcium / Magnesium (cmol <sub>e</sub> /kg)                    | 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                                  | ..                                             |             |            |            |
| Mottles Munsell Colour                                            |                                |                                                                               | ..                                             |             |            |            |
| Degree of Mottling (%)                                            |                                |                                                                               | ..                                             |             |            |            |
|                                                                   |                                |                                                                               | ..                                             |             |            |            |

## AGRICULTURAL SOIL ANALYSIS REPORT

24 samples supplied by Minesoils Pty. Ltd. on 22/05/2023. Lab Job No.P0986

Analysis requested by Matt Hemingway. Your Job: MS-088 Brewongle

Not Given

|            |            |             |            |            |
|------------|------------|-------------|------------|------------|
| Sample ID: | Heavy Soil | Medium Soil | Light Soil | Sandy Soil |
| Crop:      |            |             |            |            |
| Client:    | Clay       | Clay Loam   | Loam       | Loamy Sand |

| Parameter | Method reference | Indicative guidelines - refer to Notes 6 and 8 |
|-----------|------------------|------------------------------------------------|
|-----------|------------------|------------------------------------------------|

### Notes:

- All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
- Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.
- Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
- 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
- Guidelines for phosphorus have been reduced for Australian soils.
- Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
- Total Acid Extractable Nutrients indicate a store of nutrients.
- 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.
- Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil results'.
- Conversions for 1 cmol./kg = 230 mg/kg Sodium, 390 mg/kg Potassium, 122 mg/kg Magnesium, 200 mg/kg Calcium
- Conversions to kg/ha = mg/kg x 2.24
- The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
- \*\* NATA accreditation does not cover the performance of this service.
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full. Results only relate to the item tested.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions
- This report was issued on 6/06/2023.

Quality Checked: Kris Saville  
 Agricultural Co-Ordinator

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## Appendix 4

### Land and Soil Capability Working Tables



Table A4.1: Water Erosion Limitation

| Site | Slope (%) | Slope Class (%) | Sodicity (for 10 to <20ha slope class) | LSC Class |
|------|-----------|-----------------|----------------------------------------|-----------|
| 1    | 3         | 3 to <10        | N/A                                    | 3         |
| 2    | 6         | 3 to <10        | N/A                                    | 3         |
| 3    | 4         | 3 to <10        | N/A                                    | 3         |
| 4    | 3         | 3 to <10        | N/A                                    | 3         |
| 5    | 5         | 3 to <10        | N/A                                    | 3         |
| 6    | 5         | 3 to <10        | N/A                                    | 3         |
| 7    | 0         | <1              | N/A                                    | 1         |
| 8    | 5         | 3 to <10        | N/A                                    | 3         |
| 9    | 9         | 3 to <10        | N/A                                    | 3         |
| 10   | 0         | <1              | N/A                                    | 1         |
| 11   | 4         | 3 to <10        | N/A                                    | 3         |
| 12   | 2         | 1 to <3         | N/A                                    | 2         |
| 13   | 3         | 3 to <10        | N/A                                    | 3         |

Table A4.2: Wind Erosion Limitation

| Site | Surface Soil Texture | Wind Erodibility Class of Soil Texture | Wind Erosive Power | Exposure to Wind | Average Annual Rainfall | LSC Class |
|------|----------------------|----------------------------------------|--------------------|------------------|-------------------------|-----------|
| 1    | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |
| 2    | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |
| 3    | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |
| 4    | Loam                 | Low                                    | High               | Moderate         | >500mm                  | 3         |
| 5    | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |
| 6    | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |
| 7    | Loam                 | Low                                    | High               | Low              | >500mm                  | 2         |
| 8    | Loam                 | Low                                    | High               | Low              | >500mm                  | 2         |
| 9    | Loam                 | Low                                    | High               | High             | >500mm                  | 3         |
| 10   | Loam                 | Low                                    | High               | Low              | >500mm                  | 2         |
| 11   | Loam                 | Low                                    | High               | Moderate         | >500mm                  | 3         |
| 12   | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |
| 13   | Sandy Loam           | Moderate                               | High               | Moderate         | >500mm                  | 4         |

Table A4.3: Soil Structure Limitation

| Site | Surface Soil Texture | Modifier | LSC Class |
|------|----------------------|----------|-----------|
| 1    | Sandy Loam           | Nil      | 3         |
| 2    | Sandy Loam           | Nil      | 3         |
| 3    | Sandy Loam           | Nil      | 3         |
| 4    | Loam                 | Normal   | 3         |
| 5    | Sandy Loam           | Nil      | 3         |
| 6    | Sandy Loam           | Nil      | 3         |
| 7    | Loam                 | Friable  | 1         |
| 8    | Loam                 | Friable  | 1         |
| 9    | Loam                 | Normal   | 3         |
| 10   | Loam                 | Friable  | 1         |
| 11   | Loam                 | Normal   | 3         |
| 12   | Sandy Loam           | Nil      | 3         |
| 13   | Sandy Loam           | Nil      | 3         |

Table A4.4: Soil Acidification Limitation

| Site | Surface Soil Texture | Buffering Capacity | Mean Annual Rainfall (MM) | Surface Soil pH | LSC Class |
|------|----------------------|--------------------|---------------------------|-----------------|-----------|
| 1    | Sandy Loam           | Very Low           | 550 - 700                 | 6.2             | 5         |
| 2    | Sandy Loam           | Very Low           | 550 - 700                 | 5.8             | 5         |
| 3    | Sandy Loam           | Very Low           | 550 - 700                 | 5.7             | 4         |
| 4    | Loam                 | Moderate           | 550 - 700                 | 6.2             | 3         |
| 5    | Sandy Loam           | Very Low           | 550 - 700                 | 6.1             | 4         |
| 6    | Sandy Loam           | Very Low           | 550 - 700                 | 6.0             | 5         |
| 7    | Loam                 | Moderate           | 550 - 700                 | 6.1             | 2         |
| 8    | Loam                 | Moderate           | 550 - 700                 | 5.9             | 2         |
| 9    | Loam                 | Moderate           | 550 - 700                 | 5.6             | 3         |
| 10   | Loam                 | Moderate           | 550 - 700                 | 5.9             | 2         |
| 11   | Loam                 | Moderate           | 550 - 700                 | 6.1             | 3         |
| 12   | Sandy Loam           | Very Low           | 550 - 700                 | 6.1             | 4         |
| 13   | Sandy Loam           | Very Low           | 550 - 700                 | 6.1             | 4         |

Table A4.5: Soil Salinity Limitation

| Site | Recharge Potential | Discharge Potential | Salt Store | LSC Class |
|------|--------------------|---------------------|------------|-----------|
| 1    | Moderate           | Low                 | Low        | 1         |
| 2    | Moderate           | Low                 | Low        | 1         |
| 3    | Moderate           | Low                 | Low        | 1         |
| 4    | Moderate           | Low                 | Low        | 1         |
| 5    | Moderate           | Low                 | Low        | 1         |
| 6    | Moderate           | Low                 | Low        | 1         |
| 7    | Moderate           | Moderate            | Low        | 2         |
| 8    | Moderate           | Moderate            | Low        | 2         |
| 9    | Moderate           | Low                 | Low        | 1         |
| 10   | Moderate           | Moderate            | Low        | 2         |
| 11   | Moderate           | Low                 | Low        | 1         |
| 12   | Moderate           | Low                 | Low        | 1         |
| 13   | Moderate           | Low                 | Low        | 1         |

Table A4.6: Waterlogging Limitation

| Site | Typical Waterlogging Duration (Months) | Return Period      | Soil Drainage   | LSC Class |
|------|----------------------------------------|--------------------|-----------------|-----------|
| 1    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 2    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 3    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 4    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 5    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 6    | 0 to 0.25                              | Every year         | Imperfect       | 3         |
| 7    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 8    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 9    | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 10   | 0 to 0.25                              | Every year         | Moderately Well | 2         |
| 11   | 0.25 to 2                              | Every year         | Imperfect       | 3         |
| 12   | 2 to 3                                 | Every 2 to 3 years | Imperfect       | 4         |
| 13   | 2 to 3                                 | Every 2 to 3 years | Imperfect       | 4         |

Table A4.7: Rockiness and Depth Limitation

| Site | Rocky Outcrop Coverage (%) | Soil Depth (cm) | LSC Class |
|------|----------------------------|-----------------|-----------|
| 1    | Nil                        | >100            | 1         |
| 2    | Nil                        | >100            | 1         |
| 3    | Nil                        | >100            | 1         |
| 4    | Nil                        | >100            | 1         |
| 5    | Nil                        | >100            | 1         |
| 6    | Nil                        | >100            | 1         |
| 7    | Nil                        | >100            | 1         |
| 8    | Nil                        | >100            | 1         |
| 9    | Nil                        | >100            | 1         |
| 10   | Nil                        | >100            | 1         |
| 11   | Nil                        | >100            | 1         |
| 12   | Nil                        | >100            | 1         |
| 13   | Nil                        | >100            | 1         |

Table A4.8: Mass Movement Limitation

| Site | Mean Annual Rainfall (mm) | Mass Movement Present | LSC Class |
|------|---------------------------|-----------------------|-----------|
| 1    | >500                      | No                    | 1         |
| 2    | >500                      | No                    | 1         |
| 3    | >500                      | No                    | 1         |
| 4    | >500                      | No                    | 1         |
| 5    | >500                      | No                    | 1         |
| 6    | >500                      | No                    | 1         |
| 7    | >500                      | No                    | 1         |
| 8    | >500                      | No                    | 1         |
| 9    | >500                      | No                    | 1         |
| 10   | >500                      | No                    | 1         |
| 11   | >500                      | No                    | 1         |
| 12   | >500                      | No                    | 1         |
| 13   | >500                      | No                    | 1         |