Tremain Ivey Advisory

Tchelery Wind Farm

Technical paper 4 – Agricultural Impact Assessment

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Neoen proposes to construct and operate the Tchelery Wind Farm (the project), a utility scale renewable energy development near Keri Keri in the Riverina Murray region of New South Wales (NSW). The project site is located at 46 Kerri East Road, Moulamein, within Edward River Council Local Government Area (LGA), as shown in Figure 3.1 of the Environmental Impact Statement (EIS). Approval is sought under Division 4.7 of Part 4 State Significant Development of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Part 9, Division 1 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Fully constructed, the project would include up to 74 wind turbine generators (WTGs) providing a total generation capacity of up to 577 megawatts (MW) and up to 350 MW Battery Energy Storage System (BESS) with a maximum energy storage capacity of 1,450 megawatt-hours (MWh). The project would be connected into the National Electricity Market (NEM) through Project EnergyConnect (NSW – Eastern Section) or the existing 220 kilovolt (kV) transmission line (both of which run through the project site) or similar electricity network infrastructure. The project supports the NSW Government's objectives to increase renewable energy generation, storage and investment in the South West REZ under the Electricity Infrastructure Roadmap (Department of Planning, Industry and Environment (DPIE), 2020).

Existing environment

General

The project site is in the Edward River Council LGA on the Riverina Plains that has very low relief.

Rainfall at the project site averages about 317 millimetres (mm) per year with moderate variability. Summers are relatively hot with an average of about 80 to 90 days per year over 30 degrees Celsius (°C).

Most soils in the project site are moderate fertility vertosols, with some bands of low fertility soils along The Forest Creek and in sandy areas. Land and soil capability (LSC) class 5 (moderate-low capability) is the dominant land types with a small area of lower capability land class 6 land.

Land use and agricultural productivity

Historically, the project site has mainly run Merino sheep for meat and wool production with two areas of irrigated cropping totalling about 500 hectares. The irrigation area has been reduced with only around 220 hectares remaining and has been used for pastures in recent years.

The host property runs about 6,500 to 7,000 Merino ewes that are mostly joined Merino rams. Up to 1,500 older ewes are joined to terminal rams producing 500 to 1,000 crossbred lambs for sale each year.

Impact assessment

Construction and operation of the project would have similar types of agricultural impacts. However, in most cases the extent and intensity of potential and expected impacts are greater during construction due to higher activity and a larger impact footprint.

Loss of agricultural land use

There would be a moderate loss of agricultural land use during construction. The potential loss of grazing income is estimated at $67,002 over three year construction period. As it is likely that some grazing would continue, this amount may overestimate the eventual loss of income.

The loss of grazing income during operation is much lower due to the expected continuation of grazing across most of the project site. The loss of income is estimated at $17,350 per year.

The area of agricultural production lost during construction and operation is a small fraction of the total agricultural land in the Edward River Council LGA. Therefore, the impacts of the project at a regional scale would be minimal.

Biosecurity

The potential spread of weeds by vehicles, machinery and personnel, and movement of soil and water is the highest biosecurity risk. The introduction of plant disease or pest species is also a relevant biosecurity risk. The risks would be managed by implementing mitigation measures and conformation to the biosecurity protocols of the host landholder.

Other potential impacts

Other potential impacts include disturbance of livestock by noise and fire risks. However, these impacts are expected to be relatively small and would have a minor effect on productivity.

There may be some benefits arising to agricultural activities from the project. The higher and more reliable income arising from rental receipts may enable the host landholder to further develop the property, resulting in an increase in long term agricultural production. Internal access tracks developed for the project may improve movement and access across the property for agricultural purposes (including bushfire response).

Mitigation measures

The proposed mitigation measures during construction and operation of the project are provided in Chapter 8.

Glossary, acronyms and abbreviations

°C	degrees Celsius
ABARES	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AIA	Agricultural Impact Assessment for the project – this report
ALC	Agricultural Land Classification system (see Hulme et al, 2002)
Applicant (the)	The applicant for this SSD project seeking development consent is Neoen Australia Pty Limited (Neoen)
Application (the)	Application for development consent under Part 4, Division 4.7 of EP&A Act and Sections 18 and 18A of EPBC Act.
BESS	Battery Energy Storage System
BJD	Bovine Johne's disease
BoM	Bureau of Meteorology
BSAL	Biophysical strategic agricultural land
Commonwealth	Reference to the Commonwealth of Australia such as Commonwealth land or Commonwealth legislation
construction footprint	The area that would be directly impacted by construction of the project, including (but not limited to) wind turbine generators, roads, access tracks, switching stations, communications infrastructure, workforce accommodation camp, construction compounds and laydown and staging areas.
DPE	Former Department of Planning and Environment (now known as DPHI)
DPHI	Department of Planning, Housing and Infrastructure (previously DPE)
DPI	former Department of Primary Industries (now known as DPIRD)
DPIE	former Department of Planning, Industry and Environment (now renamed DPE)
DPIRD	Department of Primary Industries and Regional Development
DSE	Dry sheep equivalent. A rating system used to quantify the different feed requirements of various types of livestock, and the capacity of pastures or fodder crops to carry livestock. It uses the feed requirements of an adult dry sheep (that is a non-pregnant, non-lactating adult sheep) as the unit of measurement.
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)

EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ha	hectare(s)
host landholder	Landholder of land where physical project elements are to be located.
km	kilometre(s)
kV	kilovolt
LGA	Local government area
LLS	Local Land Services
LSC	Land and soil capability assessment scheme (see OEH, 2012)
m	metre(s)
mAHD	metres above the Australian Height Datum
mm	millimetres
MW	megawatt
NEM	National Electricity Market
Neoen	Neoen Australia Pty Ltd (the Applicant)
NSW	New South Wales
O&M facility	Operations and maintenance facility
OEH	Former (NSW) Office of Environment and Heritage
OEM	Original equipment manufacturer
OJD	Ovine Johne's disease
operational footprint	The area that would be directly impacted by operation of the project, including (but not limited to) wind turbine generators, roads, access tracks, switching stations and communications infrastructure.
Primary Production SEPP	State Environmental Planning Policy (Primary Production) 2021
project (the)	The proposed Tchelery Wind Farm and associated infrastructure that would allow energy generation and storage and connection into EnergyConnect (NSW – Eastern Section) or the existing 220 kV transmission line. Fully constructed, the project would include up to 74 wind turbine generators (WTGs) providing a total generation capacity of up to 577 megawatts and up to 350 megawatts Battery Energy Storage System (BESS) with a maximum energy storage capacity of 1,450 megawatt-hours.
project site	The area to which the development application applies. Located at 46 Kerri East Road, Moulamein.
REZ	Renewable Energy Zone

SEARs	Planning Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSAL	State significant agricultural land
SSD	State significant development
stock units	In this assessment, one sheep or goat is equated to one stock unit and cattle are equated to ten stock units each.
TIA	Tremain Ivey Advisory
TSR	Travelling stock reserve
WTG	Wind turbine generator

1 Introduction

This Agricultural Impact Assessment (AIA) has been prepared for the proposed Tchelery Wind Farm (the project) for Neoen Pty Ltd (the Applicant). The Applicant is seeking state significant development (SSD) consent for the project under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This AIA supplements the Environmental Impact Statement (EIS) prepared by WSP Australia for the project and is required to be prepared as part of the SSD consent process.

1.1 Project overview

Neoen proposes to construct and operate the project, a utility scale renewable energy development in the Riverina Murray region of New South Wales (NSW). The project is located at 46 Kerri East Road, Moulamein, within the Edward River Council Local Government Area (LGA) as shown in Figure 3.1 of the EIS. Approval is sought under Division 4.7 of Part 4 State Significant Development of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Part 9, Division 1 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Fully constructed, the project would include up to 74 wind turbine generators (WTGs) providing a total generation capacity of up to 577 megawatts (MV) and up to 350 MV Battery Energy Storage System (BESS) with a maximum energy storage capacity of 1,450 megawatt-hours (MWh). The project would be connected into the National Electricity Market (NEM) through Project EnergyConnect (NSW – Eastern Section) or the existing 220 kilovolt (kV) transmission line (both of which run through the project site) or similar electricity network infrastructure. The project supports the NSW Government's objectives to increase renewable energy generation, storage and investment in the South West REZ under the Electricity Infrastructure Roadmap (Department of Planning, Industry and Environment (DPIE), 2020).

Key features of the project include:

- up to 74 WTGs with a hub height of 170 metres to a maximum tip height of 270 metres (subject to available technology at construction)
- generating capacity of around 577 MW, the final capacity would be determined through the Original Equipment Manufacturer (OEM) selection process
- a BESS with a maximum energy storage capacity of 1,450 MWh
- temporary ancillary infrastructure, including construction compounds, laydown areas and stockpiles, concrete batching plants, and workforce accommodation camp
- permanent ancillary infrastructure, including operation and maintenance (O&M) facility, internal access tracks and hardstands, transmission lines, a 330kV switchyard, three collector substations and up to six meteorological masts.

The project is being assessed as a State Significant Development (SSD) under Part 4 of the *Environmental Planning & Assessment Act 1979* (Application Number: 59701722). Planning Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 25 July 2023 identified key issues that must be addressed in the Environmental Impact Statement (EIS). Revised SEARs based on the current project description including the BESS and port to site transport routes were issued by NSW Department of Planning, Housing and Infrastructure (DPHI) on 14 February 2025.

Additional project details are provided in Chapter 3 (Project description) of the EIS. An indicative project layout is shown in Figure 1.1.

Major project elements are summarised below:

Project element	Description
Project site address	46 Kerri East Road, Moulamein
Project site area	About 288 square kilometres
Construction footprint	About 650.2 hectares
Operational footprint	About 505 hectares
Project site access	— Maude Road (north of Dry Lake Road) — Booroorban-Tchelery Road (west of the project site) — Maude Road (south of the project site).
Wind turbine generators (WTG)	— up to 74 WTGs with a generating capacity of up to 577 megawatts (MW) — maximum hub height of 170 metres — maximum tip height of 270 metres.
Battery energy storage system (BESS)	— up to 395 containers with a total storage capacity of up to 350MW/1,450 megawatt hours (MWh) — located within the eastern construction facilities area (described below).
Permanent electrical infrastructure	Connection directly into Project EnergyConnect or the existing 220 kilovolt (kV) transmission line via the following infrastructure: — one switchyard located within the eastern construction facilities area (described below) — up to three collector substations — underground 33 kV transmission lines connecting the WTGs to the collector substations — overhead 33 kV transmission lines connecting the WTGs to the collector substations — overhead and underground 330 kV transmission lines connecting the collector substations to the switchyard.
Operational ancillary facilities	— O&M facility — fibre-optic communications lines between each WTG and the O&M facility — internal access tracks from the site entrances to each WTG — up to six meteorological masts.

Construction ancillary facilities	— western construction facilities area, including:
	  — construction workforce amenities
	  — concrete batching plant
	  — laydown area for temporary storage of plant, equipment and materials

Project element	Description

	— eastern construction facilities area, including:
	  — construction workforce amenities
	  — concrete batching plant
	  — laydown area for temporary storage of plant, equipment and materials
	— construction compound on Maude Road
	— workforce accommodation camp on Maude Road, south of the site access location near the intersection with Dry Lake Road
	— internal access tracks from the site entrances to each WTG.

Timing	— construction: 2027-2029 — operation: 2030-2060.
Hours of operation	— construction: Seven days per week during both standard and non-standard construction hours (refer to Chapter 3 (Project description) of the EIS) — operation: 24 hours per day, seven days per week.

Workforce	— construction:
	  — estimated daily average: 300 full-time equivalent (FTE) workers.
	  — project peak: 530 FTE workers.
	— operation: up to 20 FTE workers.

Public infrastructure work	modifications and/or upgrades to the road network to facilitate oversize overmass (OSOM) transport to the project site (refer to Chapter 3 (Project description) of the EIS).

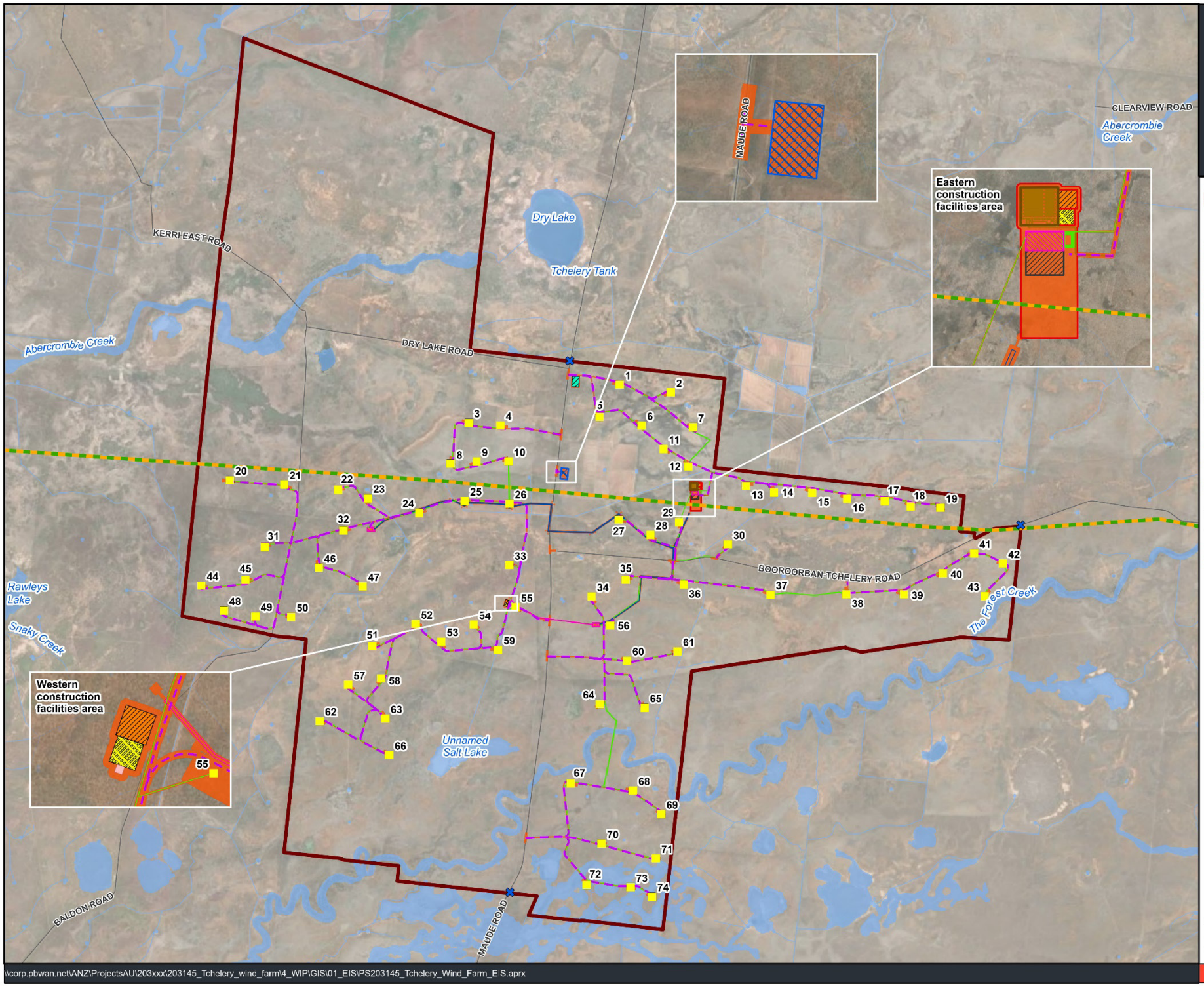
1.2 Purpose of this technical paper

This technical paper is one of several technical papers that form part of the EIS for the project.

The purpose of this technical paper is to identify and assess the potential impacts of the project in relation to agriculture. It responds directly to the Secretary's Environmental Assessment Requirements (SEARs) (refer to Section 1.3).

This report has the following objectives:

- describe the current socio-economic and environmental situation relevant to agricultural enterprises in the project site
- assess the impacts of the project on agriculture in the project site and in the surrounding region
- formulate mitigation measures to minimise the impacts on agriculture in the project site and in the surrounding region.



Tchelery Wind Farm

Figure 1.1
Indicative project layout

Legend

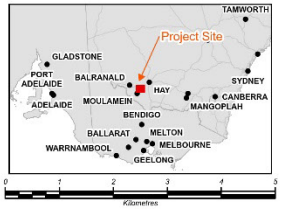
- Project site
- Site access points
- Wind turbine generator
- Internal access track
- Construction footprint
- Battery energy storage system
- Construction compound
- Collector substation
- Switchyard
- Workforce accommodation camp
- Workforce amenities
- Concrete batching plant
- Operations and maintenance facility
- Laydown areas

Transmission

- Overhead 330 kV lines
- Overhead 33 kV lines
- Underground 33 kV lines
- Existing 220 kV transmission line and proposed Project EnergyConnect - eastern section

Context

- Existing road
- Watercourse
- Waterbody



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:140,000 Date: 3/04/2025

1.3 Secretary's Environmental Assessment Requirements

The most recent SEARs were issued by DPHI for the EIS on 14 February 2025. The requirements specific to this assessment and where these aspects are addressed in this technical paper are outlined in Table 1.1.

Table 1.1
Secretary's Environmental Assessment Requirements

Reference	Requirement	Where addressed in this document
Tchelery Wind Farm		
Key Issue - Land:	An assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: ○ (amongst others) …agricultural land, irrigated lands,…travelling stock routes…; ○ a cumulative impact assessment of nearby developments.	Chapter 7
	An assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including: ○ (amongst others) assessment of impact on agricultural resources and agricultural production on the site and region.	Chapters 5 and 6

The AIA addresses assessment requirements from the 'land' key issue in relation to agricultural impacts.

The AIA assesses the impacts of the project on access; agricultural operations; livestock and machinery movements; crop production activities; irrigation and biosecurity risks. The impact on agricultural productivity is quantified and mitigation strategies to minimise resource loss, biosecurity risks and other impacts are addressed.

1.4 Structure of this report

The structure and content of this report is as follows:

- Chapter 1 – Introduction: Outlines the background and need for the project, and the purpose of this report
- Chapter 2 – Legislation and policy context: Provides an outline of the key legislative requirements and policy guidelines relating to the project
- Chapter 3 – Methodology: Provides an outline of the methodology used for the preparation of this AIA
- Chapter 4 – Existing environment: Describes the existing agricultural environment
- Chapter 5 – Construction impacts: Describes the potential construction impacts associated with the project
- Chapter 6 – Operational impacts: Describes the potential operational impacts associated with the project
- Chapter 7 – Cumulative impacts: Outlines the potential cumulative impacts with respect to other known developments within the vicinity of the project
- Chapter 8 – Management of impacts: Outlines the proposed mitigation measures for the project
- Chapter 9 – Conclusion: Provides a conclusion on the potential impacts of the project on agriculture
- Chapter 10 – References: Identifies the reports and documents used to generate this report.

Attachments to this report are:

- *Attachment 1 NSW DPI sheep budgets*
- *Attachment 2 Other regional weeds list – Murray LLS*

1.5 Limitations

The assessment has been based on information on the current design supplied by Neoen.

Inspections were limited to the project site and interviews were limited to the host landholder.

2 Legislation and policy context

2.1 Legislation

The project is subject to environmental assessment under Division 5.2 of the EP&A Act. Other legislation specific to the AIA includes the *Biosecurity Act 2015* and State Environmental Planning Policy (Primary Production) 2021 (Primary Production SEPP*)*. A summary of the relevance of each legislation is provided in the following sections.

2.1.1 Biosecurity Act 2015

The NSW *Biosecurity Act 2015* (the Act) came into effect on 1 July 2017[1] and complements the Commonwealth *Biosecurity Act 2015*[2]. The primary objective of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks. The Act is tenure neutral, that is, it applies to all lands in NSW, both public and private tenure.

The Act defines key concepts such as biosecurity matter, carrier, biosecurity impact, biosecurity risks and pests, and specifies a wide range of prohibited matter including pests and diseases of plants and animals.

Under the Act, the responsibility for biosecurity risk is shared between the NSW Government, industry and the community. Specifically, the Act establishes a general biosecurity duty, as follows:

> 'Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.'

The NSW Department of Primary Industries and Regional Development (DPIRD) holds the primary responsibility for management of biosecurity under the Act, ensuring the legislative and policy settings support best practice management of biosecurity risks. In addition, DPIRD works with other jurisdictions to prevent, prepare for, respond to and recover from biosecurity incursions and incidents. DPIRD works with a range of partners in the management of biosecurity. Significant partners include Local Land Services (LLS), local government and industry groups (DPI, 2013a).

The project is located in the Murray LLS region. Regional biosecurity strategies developed by DPIRD and LLS covering the project footprint include:

- NSW Invasive Species Plan 2018-2021 (DPI, 2018)
- Regional Strategic Weed Management Plan 2017-2022 for the Murray LLS (Murray LLS, 2017)
- Regional Strategic Pest Animal Management Plan 2018-2023 for the Murray LLS (Murray LLS, 2018).

The above listed strategies are considered in Sections 5.2 and 6.2 of this report.

[1] legislation.nsw.gov.au/#/view/act/2015/24

[2] legislation.gov.au/Series/C2015A00061

2.1.2 Primary Production SEPP

The relevant part of the Primary Production SEPP is 'Chapter 2 – Primary production and rural development'. This chapter includes the following relevant aims:

(a) to facilitate the orderly economic use and development of lands for primary production,

(b) to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources,

(c) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations, …

(e) to encourage sustainable agriculture, including sustainable aquaculture.

Part 2.2 deals with State significant agricultural land within which clause 10 states that 'the objects of this Part are as follows—

(a) to identify State significant agricultural land and to provide for the carrying out of development on that land,

(b) to provide for the protection of agricultural land—

(i) that is of State or regional agricultural significance, and

(ii) that may be subject to demand for uses that are not compatible with agriculture, and

(iii) if the protection will result in a public benefit.'

Clause 1 of section 2.8 states that land is State significant agricultural land if it is listed in Schedule 1 of the Primary Production SEPP. Schedule 1 does not list any State significant agricultural land at present. However, a draft map of State significant agricultural land (SSAL) has been released (DPI, 2021a).

2.2 Guidelines

Policies and guidelines relevant to the AIA include:

- Cumulative Impact Assessment Guidelines for State Significant projects (DPIE, 2021)
- Riverina Murray Regional Plan 2041 (Department of Planning and Environment (DPE), 2023)
- Murray Regional Strategic Weed Management Plan 2017-2022 (Murray LLS, 2017)
- Murray Regional Strategic Pest Animal Plan 2018-2023 (Murray LLS, 2018).
- The Land and Soil Capability Assessment Scheme (OEH, 2012)
- Agricultural Land Use Mapping Resources in NSW (Squires, 2017)
- Infrastructure Proposals on Rural Land (DPI, 2013b)
- Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land (OEH, 2013).

Some guidelines provide specific guidance in relation to the assessment of agricultural impacts (for example, use of the weed and pest animal management plans in the biosecurity assessment). Where appropriate, these guidelines have been referenced in the relevant sections of this technical paper.

3 Methodology

The methodology for this AIA has been designed to meet the requirements of the SEARs (refer to Section 1.3).

3.1 Overview of approach

The key aspects of the methodology were as follows:

- consultations with the host landholder and an inspection of the project site occurred on 26 March 2024 to obtain information on the agricultural enterprises conducted on the project footprint and the landholder's perceived impacts of the project on these enterprises.
- community consultation results that formed part of the Social Impact Assessment were reviewed.
- other consultation to identify the main biosecurity risks associated with the project and recommended mitigation measures was carried out by telephone with various biosecurity officers from the Edward River Council and Murray LLS.
- the existing environment was described primarily using a desktop study based on data from various sources referenced in Chapter 4.
- the assessment of the impacts on agriculture was based on the desktop study, consultations with landholders and other stakeholders, property inspections and professional knowledge.
- the identification of mitigation measures was based on information from the existing environment and impact assessments, consultations with landholders and other stakeholders, property inspections, professional knowledge, and various information sources as referenced in Chapter 4.

3.2 Relevant areas

The project site would generally cover the area of direct construction impacts on agriculture. However, some impacts, such as noise disturbance of livestock and restrictions on aerial agriculture, may occur beyond the project site.

The operational footprint includes project infrastructure elements that would have an ongoing impact on agricultural activities after the construction period has ended. However, agricultural production would not be directly impacted in all areas of the operational footprint. For example, grazing enterprises would be largely unaffected by transmission line easements.

3.3 Agricultural impact assessment

3.3.1 Landholder consultation and property inspection

An inspection of the project site and consultations with the host landholder occurred on 26 March 2024. The inspection and consultations were carried out by Peter Tremain of Tremain Ivey Advisory.

Consultations with the host landholder obtained information on the size and land types of the project site, the size and nature of agricultural enterprises conducted, and the landholder's perceived impacts of the project on the agricultural property and enterprises.

Other neighbouring properties were viewed to some extent from public roadways and adjacent private property. Community consultation with neighbouring landholders that formed part of the Social Impact Assessment were reviewed.

Further information on the project site and other properties (such as information on vegetation cover, soil type, land capability, land use, type and locations of horticultural crops, extent of cleared areas and type of cropping) was gained through examination of satellite imagery, reference material and public GIS datasets.

3.3.2 Stakeholder consultation

Discussions to identify the main biosecurity risks associated with the project and recommended mitigation measures were carried out by telephone with biosecurity officers from Murray LLS, and Edward River Council.

3.3.3 Agricultural impact assessment

The description of the existing environment was obtained primarily through a desktop study based on data from various sources referenced in Chapter 4. However, this information was also evaluated with reference to the information gathered during the property inspections and landholder consultations described above. The assessment of the existing environment concentrated on:

- geographical factors (such as climate, topography and soils) that have the greatest influence on agriculture at the project site
- measures that best appraise the nature and productivity of agricultural enterprises at the project site (such as land and soil capability (LSC), land use and value of production).

The assessment of the impacts on agriculture was based on information from the existing environment assessment, consultations with landholders and other stakeholders, property inspections and professional knowledge.

Mitigation measures are defined as actions, processes or structures that minimise or eliminate the impacts of the project. The identification of mitigation measures was based on information from the existing environment and impact assessments, consultations with landholders and other stakeholders, property inspections, professional knowledge, and various information sources as referenced in Chapter 4.

3.4 Consideration of biosecurity issues

Relevant information on biosecurity issues for the project were identified from the following sources:

1. landholder consultation (refer to Section 3.3.1)
2. observations during the property inspections (refer to Section 3.3.1)
3. consultation with various LLS and local government biosecurity officers (refer to Section 3.3.2)
4. reference to the *NSW Biosecurity Act 2015*
5. reference to the relevant regional strategic weed management plans
6. review of other documents set out in Chapter 10.

The methodology for the biosecurity assessment was similar to the AIA set out in Section 3.3.3. Existing biosecurity issues and potential biosecurity risks were primarily based on a desktop study including pest, disease and weed distribution data, and various legislation, regional plans and surveys referenced in Section 4.2. However, information gathered from property inspections and landholder consultation was also considered. The biosecurity assessment concentrated on the main risks associated with the project.

The identification of mitigation measures was based on information from the existing environment and impact assessments of this report, consultations with landholders and other stakeholders and property inspections.

4 Existing environment

4.1 General description

4.1.1 Location

The project site is located in the Edward River Council LGA and the Murray LLS region about 19 kilometres northeast of Moulamein and 33 kilometres south of Maude at the respective closest points. It is located on both sides of the Maude Road.

4.1.2 Topography

The project site has a landscape of relatively flat alluvial riverine plains crossed by two significant intermittent watercourses, Abercrombie Creek near the northern boundary of the project site and The Forest Creek in the southeast of the project site. The construction and operation footprints are located on the southern portion of the project site about four to five kilometres from Abercrombie Creek and on both sides of The Forest Creek.

The elevation is about 75 metres above Australian Height Datum (mAHD) and varies by only a few metres across the site, generally with a slight fall from east to west.

4.1.3 Climate

Climate, especially rainfall and temperature, has a large impact on the productivity of dryland agricultural properties such as those found on the project site. The Balranald RSL, Hay (Miller Street) and Hay Airport are the closest Bureau of Meteorology (BoM) recording stations to the project site with an extensive temperature and rainfall dataset. A BoM recording station is also located on the project site (at the Tchelery homestead – 34.81°S 144.17°E), recording rainfall. The climate records for these stations are summarised in Table 4.1.

Table 4.1
Summary of climate records

Balranald													
Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Annual**
Maximum temperature (°C)													
Mean	33.1	32.6	29.2	24.1	19.4	16.1	15.7	17.6	20.9	24.6	28.2	31.0	**24.4**
Mean number of days >= 30°C	18.2	16.3	11.3	2.9	0.0	0.0	0.0	0.0	1.1	4.4	8.7	13.5	**76.4**
Mean number of days >= 40°C	3.1	1.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.3	**7.1**
Minimum temperature (°C)													
Mean	16.6	16.4	13.7	9.7	6.8	4.4	3.5	4.8	7.1	9.9	12.7	14.9	**10.0**
Mean number of days <= 2°C	0.0	0.0	0.0	0.1	2.0	6.1	7.8	5.6	2.1	0.1	0.0	0.0	**23.8**
Rainfall (mm)													
Mean	22.6	24.6	21.9	24.1	31.3	29.3	26.1	29.4	29.3	31.4	28.8	25.9	**323.0**
10th percentile	0.0	0.0	0.4	1.3	4.1	7.6	6.5	7.8	6.5	3.7	2.0	1.5	**201.1**
Median	11.6	12.0	14.0	15.5	25.1	24.8	23.0	25.8	23.5	22.4	20.3	17.3	**312.3**
90th percentile	58.8	68.5	57.0	60.5	67.9	55.6	50.3	53.1	59.3	75.3	68.6	57.9	**465.9**
Other Rainfall Records													
Variability (%)	507%	571%	404%	382%	254%	194%	190%	176%	225%	320%	328%	326%	**85%**
Mean number of days of rain	3.1	2.9	3.5	4.1	6.3	7.5	8.2	8.0	6.7	6.0	4.7	3.9	**64.9**

Hay (combined)													
Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Annual**
Maximum temperature (°C)													
Mean	33.2	32.6	29.3	24.1	19.3	15.8	15.2	17.3	20.8	24.6	28.5	31.3	**24.3**
Number of days >= 30°C	22.6	19.9	13.7	3.3	0.0	0.0	0.0	0.0	1.0	5.3	11.4	17.6	**94.9**
Number of days >= 40°C	3.8	1.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.4	**8.2**
Minimum temperature (°C)													
Mean	16.7	16.5	13.8	9.9	6.7	4.5	3.5	4.5	6.6	9.5	12.6	15.0	**10.0**
Number of days <= 2°C	0.0	0.0	0.0	0.1	2.4	6.8	9.3	6.6	2.3	0.3	0.0	0.0	**27.8**
Rainfall (mm)													
Mean	27.4	28.3	29.3	28.1	34.4	34.9	30.3	31.8	31.2	35.1	27.3	26.8	**365.9**
10th percentile	0.9	0.5	0.5	2.0	6.3	8.1	7.1	7.8	6.2	5.9	4.6	3.3	**216.5**
Median	15.1	16.1	18.7	21.1	27.7	29.7	27.9	27.4	26.6	24.6	20.2	16.1	**358.1**
90th percentile	67.8	74.9	73.0	61.1	67.5	66.0	56.1	59.5	61.6	80.5	60.0	69.1	**532.8**
Other Rainfall Records													
Variability (%)	444%	462%	388%	279%	221%	195%	176%	188%	208%	303%	275%	408%	**88%**
Number of days of rain	3.8	3.4	4.0	4.5	6.4	8.3	8.9	8.6	6.7	6.3	4.9	4.3	**70.3**

Moulamein (Tchelery)													
Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Annual**
Rainfall (mm)													
Mean	21.8	23.8	21.9	24.0	30.4	30.0	25.9	29.9	27.4	31.1	24.7	25.8	**316.5**
10th percentile	0.0	0.0	0.0	0.8	3.8	8.7	6.2	6.2	5.9	2.3	0.2	0.0	**185.6**
Median	10.9	11.6	14.1	17.5	26.2	25.6	24.6	28.3	23.2	22.4	17.3	18.2	**298.5**
90th percentile	60.8	61.2	56.0	58.3	68.4	57.9	45.7	55.7	52.9	76.6	54.0	66.1	**460.4**
Other Rainfall Records													
Variability (%)	558%	528%	397%	329%	247%	192%	161%	175%	203%	332%	311%	363%	**92%**

The Balranald RSL station is about 67 kilometres west northwest of the project site and at an elevation of 61 metres. It has about 145 years of rainfall records and up to 107 years of temperature records.

The Hay stations at Miller Street and the Airport are about 66 and 67 kilometres northwest of the project site respectively and at an elevation of 92 to 93 mAHD. Miller Street (station 075031) has about 135 years of rainfall records and up to 134 years of temperature records until 2015, when it closed. Hay Airport station (075019) opened in 2007 and remains operational. The combined climate records of both stations are summarised in Table 4.1.

The Tchelery rainfall station is at an elevation of 70 mAHD, according to the BoM, and has 138 years of rainfall records from 1886 to 2024.

The mean maximum monthly temperatures reach a peak of about 33 degrees Celsius (°C) in January and February. The mean maximum monthly temperature varies from 15°C to 18°C in the winter months.

The average number of maximum temperatures per year over 30°C is 76.4 days at Balranald, but is much higher at 94.9 days in Hay. The average number of maximum temperatures over 40°C is seven to eight days per year.

The mean minimum temperatures fall to a low of 3.5°C in July and between 4°C and 5°C in the other winter months. A minimum temperature under 2°C is generally regarded as the approximate temperature at which frost will occur. An average of 23.8 such days per year have been recorded in Balranald and 27.8 days per year in Hay. The highest mean minimum temperatures occur in January and February at 16°C to 17°C.

The average rainfall at Balranald has been 323 millimetres (mm) over 65 rain days per year, while at Hay it has been 366 mm over 70 days. Rainfall at the project site averages 316.5 mm per year. In the driest 10 per cent of years, the average falls to 185.6 mm per year. The average in the wettest 10 per cent of years is 460.5 mm per year.

The rainfall has moderate variability according to rainfall records (BoM, 2021). Variability is generally much greater in late summer and early autumn than at other times of the year.

Rainfall is relatively evenly spread throughout the year with a slight dominance in winter and spring.

4.1.4 Soils

Most soils in the project site are moderate fertility vertosols (CSIRO, 2016; OEH, 2017). Vertosols have clay texture throughout the profile, display strong cracking when dry, and shrink and swell considerably during wetting and drying phases (Agriculture Victoria, 2021). The area of vertosols coincide with most of the moderately fertile soils mapped in Figure 4.1.

A band of moderate fertility chromosols follows The Forest Creek in the southeast part of the project site. Chromosols have a distinct texture contrast between the loamy A horizons and the clayey B horizons, but the latter is neither strongly acidic nor sodic (Agriculture Victoria, 2021).

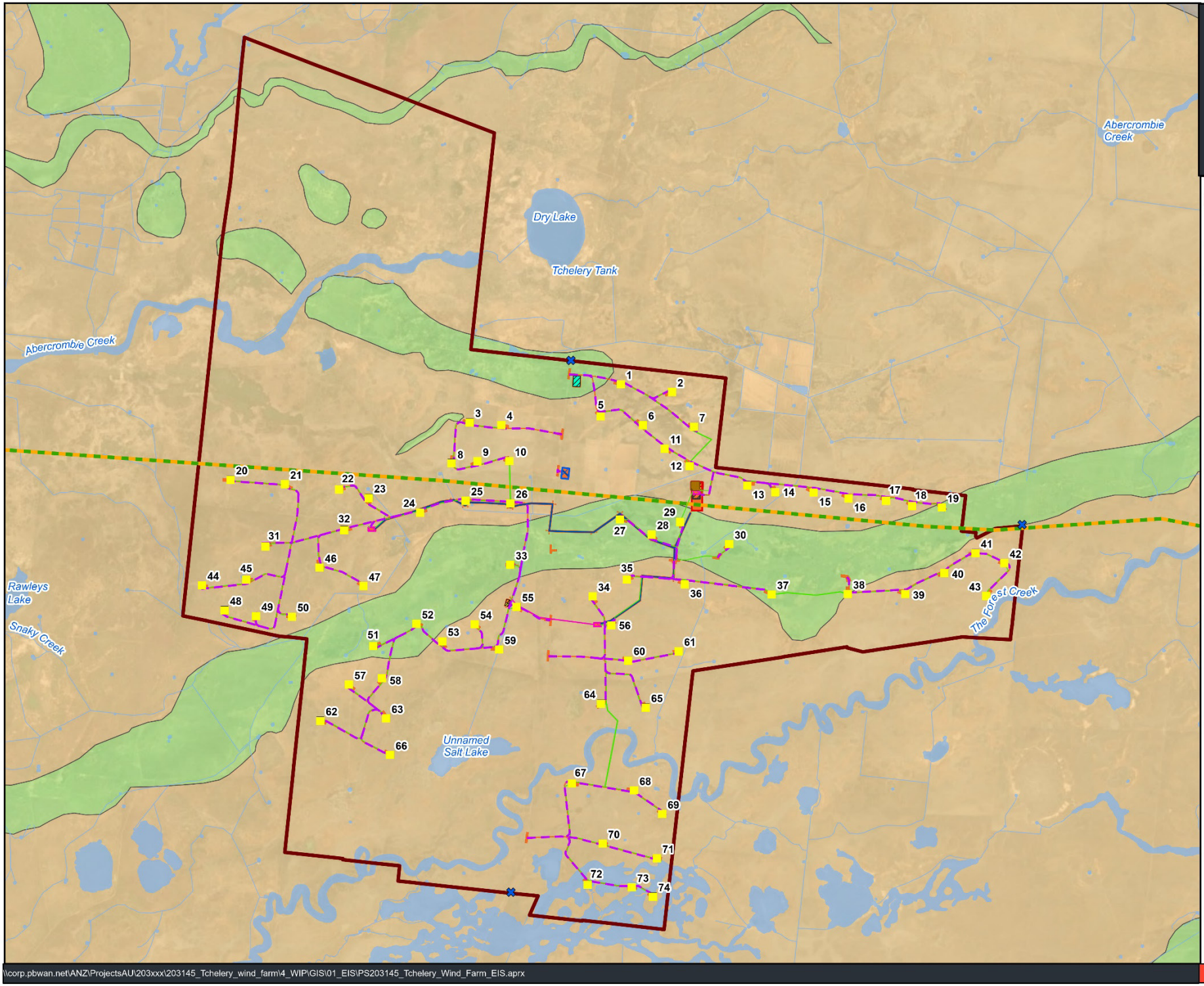
There are two approximately east-west bands of lighter textured (sandy), low fertility rudosols across the project site (OEH, 2017). One band is located near Dry Lake Road in the north of the project site, while the other band extends across the middle of the project site (CSIRO, 2016).

Rudosols have a sandy, weakly developed profile. They are typically acid throughout the profile and plant nutrient availability is quite variable. They may have good infiltration but usually low water holding capacity. The bands of rudosols can be seen in the areas of low inherent fertility mapped in Figure 4.1.

The low fertility rudosols comprise 18 per cent of the project area, with the remainder being moderate fertility vertosols and chromosols.

4.1.5 Livestock water

Water for livestock is mainly supplied by a water scheme via channels to earthen dams, and by rainfed dams. In a minority of instances, the water is pumped into troughs from the dams.



Tchelery Wind Farm

Figure 4.1
Inherent soil fertility

Legend

- Project site
- Site access points
- Wind turbine generator
- Internal access track
- Construction footprint
- Battery energy storage system
- Construction compound
- Collector substation
- Switchyard
- Workforce accommodation camp
- Workforce amenities
- Concrete batching plant
- Operations and maintenance facility
- Laydown areas

Transmission

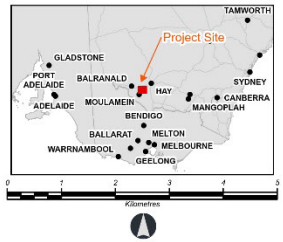
- Overhead 330 kV lines
- Overhead 33 kV lines
- Underground 33 kV lines
- Existing 220 kV transmission line and proposed Project EnergyConnect - eastern section

Inherent Soil Fertility

- 1 - Low
- 3 - Moderate

Context

- Existing road
- Watercourse
- Waterbody



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:140,000 Date: 7/04/2025

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4.1.6 Land use

A map of land use across the project site as derived from DPIE (2023) has been included as Figure 4.2. Relevant areas of land use are summarised in Table 4.2.

Most of the land use of the project site is classified as 'grazing of native pastures' with relatively small areas of 'grazing modified pastures', 'irrigated cropping' and 'residential and farm infrastructure'. In total, 96 per cent of the project comprises agricultural land.

The remainder of the project site is roads, farms and 'marsh and wetlands' along Abercrombie Creek, The Forest Creek and other areas in the southeast of the project site. The 'marsh and wetlands' areas are not fenced off and are utilised by livestock for grazing. Therefore, essentially, the entire project site apart from the roads and 'residential and farm infrastructure' is used for grazing or cropping.

About 89 per cent of the construction and operation footprints are mapped as 'grazing of native pastures'. These footprints also cover a very small area mapped as 'residential and farm infrastructure' and relatively little 'modified pastures', 'irrigated cropping' and 'marsh and wetland'.

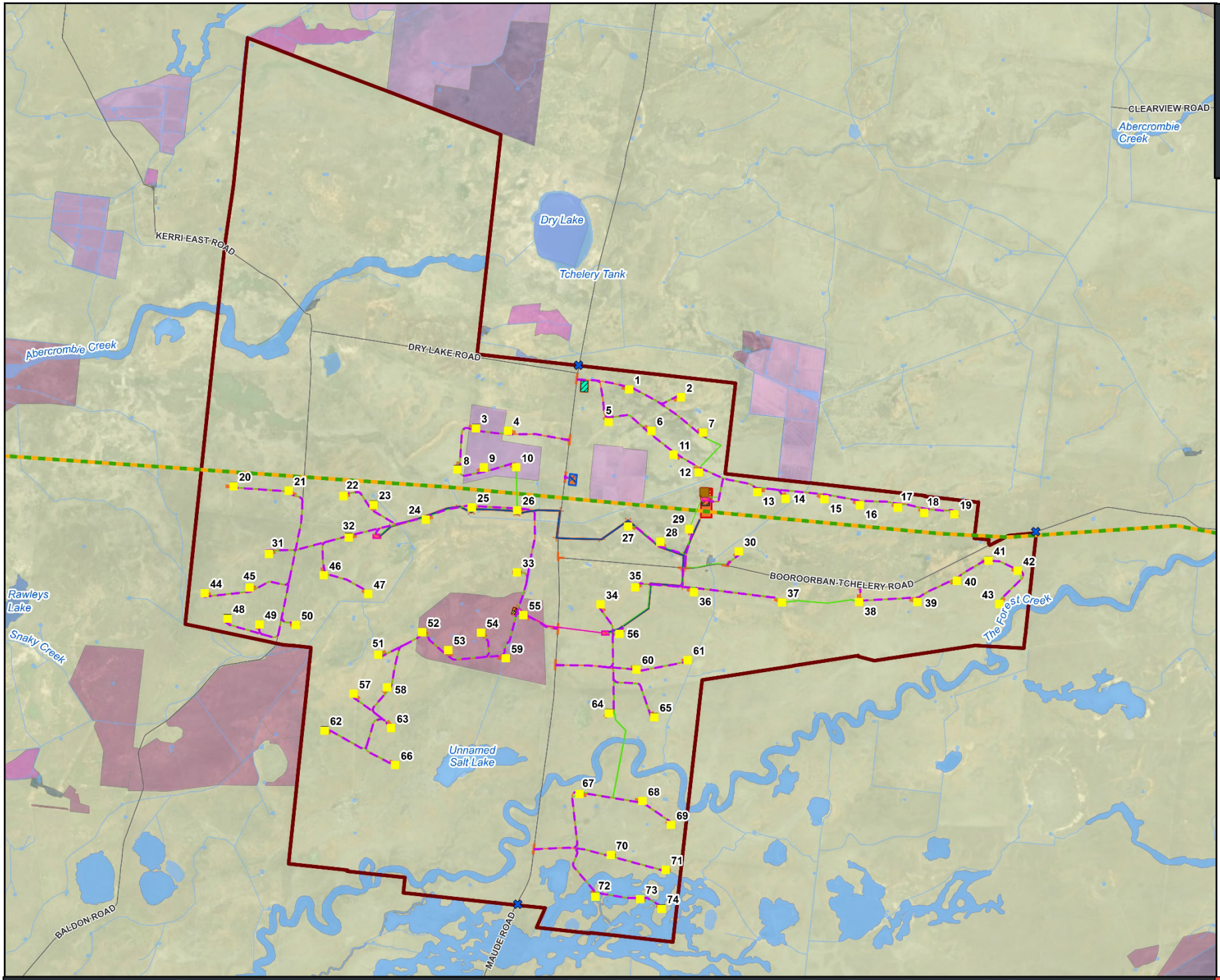
The classification is consistent with actual historical land use (Section 4.6).

Table 4.2
Summary of land use

Land use (DPIE, 2023)	Project site (ha)	Proportion	Construction footprint (ha)	Operation footprint (ha)
Agricultural land uses				
2.1.0 Grazing native vegetation	26,312	91.4%	576.4	451.5
3.2.0 Grazing modified pastures	707	2.5%	36.3	24.9
4.3.0 Irrigated cropping	534	1.9%	15.4	12.0
5.4.0 Residential and farm infrastructure	11	0.0%	0.1	0.1
Sub-total - Agriculture	27,564	95.7%	628.2	488.5
5.7.0 Transport and communication	93	0.3%	13.8	10.6
6.2.0 Reservoir and dam	0.3	0.0%	n/a	n/a
6.5.0 Marsh and wetland	1,136	3.9%	8.2	5.9
Total	**28,793**	**100.0%**	**650.2**	**505.0**

Note on Table 4.2:

Individual amounts are approximate and may not sum to the amount of the totals due to rounding.



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Tchelery Wind Farm

Figure 4.2
Land use

Legend

- Project site
- Site access points
- Wind turbine generator
- Internal access track
- Construction footprint
- Battery energy storage system
- Construction compound
- Collector substation
- Switchyard
- Workforce accommodation camp
- Workforce amenities
- Concrete batching plant
- Operations and maintenance facility
- Laydown areas

Transmission

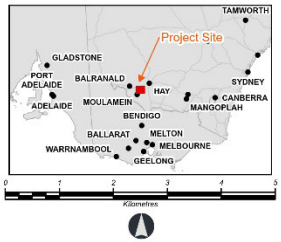
- Overhead 330 kv lines
- Overhead 33 kV lines
- Underground 33 kV lines
- Existing 220 kV transmission line and proposed Project EnergyConnect - eastern section

Land Use

- 2.1.0 Grazing native vegetation
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 4.2.0 Grazing irrigated modified pastures
- 4.3.0 Irrigated cropping
- 5.2.0 Intensive animal production
- 5.4.0 Residential and farm infrastructure
- 5.7.0 Transport and communication
- 6.1.0 Lake
- 6.2.0 Reservoir/dam
- 6.5.0 Marsh/wetland

Context

- Existing road
- Watercourse
- Waterbody



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:140,000 Date: 9/04/2025

4.2 Biosecurity issues

In contrast to much of NSW, the project site is less susceptible to biosecurity risks due to its separation from major populations and intensive agricultural industries, and the semi-arid climate that is challenging for exotic animals and plants to survive (DPE, 2017). However, the presence of irrigation areas on the project site would enable some weeds that may not thrive in dryland grazing situations to establish under irrigation.

4.2.1 Weeds

The most common weed recorded near the project site by authorised officers during property inspections under the *Biosecurity Act 2015* (DPI, 2021b) was African boxthorn (*Lycium ferocissimum*), that comprised over 45 per cent of reported weeds. Khaki weed (*Alternanthera pungens*) and horehound (Marrubium vulgare) were also common at 28 per cent and 12 per cent, respectively. Other less common weeds reported are set out in Table 4.3.

Table 4.3
Weeds reported near the project site

Galvanised burr (*Sclerolaena birchii)*	Bathurst burr (*Xanthium spinosum*)
Common thornapple (*Datura stramonium*)	Prickly pears (*Opuntia* species)
Silverleaf nightshade (*Solanum elaeagnifolium*)	Spiny burrgrass (*Cenchrus longispinus)*
Spiny burrgrass (*Cenchrus spinifex)*	

The Murray Regional Strategic Weed Management Plan (Murray LLS, 2017) identifies State and regional priority weeds, some of which may be present in the vicinity of the project site. Other important weeds are listed the Murray Regional Strategic Weed Management Plan and described as "species that are widespread in parts of the region and are of high community concern and priority to manage because of their extent and impact. These weeds are a direct threat to agricultural production and the environment and control should be undertaken to contain locally". These weeds are listed in Attachment 2, and include blue heliotrope *(Heliotropium amplexicaule),* Scotch and Illyrian thistles *(Onopordum* spp.), spiny emex (*Emex australis), and* St Barnaby's thistle (*Centaurea solstitialis*).

Problematic weeds present in the district with the potential to become more widespread that were mentioned by the host landholder included Bathurst burr, galvanised burr and African boxthorn.

4.2.2 Pest animals

Foxes, feral cats, wild rabbits, feral pigs and kangaroos have a widespread distribution in the proximity of the project site (Murray LLS, 2018). Feral goats have a limited distribution with a low presence to the west of the project site. Wild deer are present in the Balranald area and south of Moulamein (Murray LLS, 2018; DPI, 2021c). Some of these species (such as goats and pigs) pose important biosecurity, economic and social threats as they can harbour and transmit both endemic and exotic diseases.

Plague locusts occur in the vicinity of the project site, and have been recorded in very high numbers in the past. Under these circumstances can cause extensive damage to crops and pastures. The Department of Agriculture, Forestry and Fisheries (2025) indicates that the project area is a potential habitat for the Australian Plague Locust and that the Riverina Plains (including the project area) has a high frequency of infestations.

Mice plagues are less common and less severe than in grain growing areas, but localised high numbers can occur.

4.2.3 Animal and plant diseases

Footrot

Footrot is a contagious bacterial disease of sheep and goats, caused by the organism *Dichelobacter nodosus (D. nodosus)* in association with several other bacteria. The bacterium *D. nodosus* may persist for many years in the feet of infected sheep and may pass from infected sheep into the soil. Footrot is introduced into a clean flock by the inclusion of infected sheep, or by exposure to contaminated land under favourable conditions.

The occurrence of sheep footrot in the vicinity of the project site has been low in recent years. DPI reported a total of 14 flocks infected with virulent footrot as of December 2022 across the Murray LLS region. The total number of all flocks across the Murray LLS region was 1,263. Therefore, the infection rate was around 1.1 per cent. However, the infection rate at the western end of the Murray LLS region where the project site is located is likely to be much lower. As an indicator of this, the Western LLS region that has similar climate and rangelands to the project site, recorded no infected flocks in December 2021.

Across NSW there was 59 new cases of virulent footrot in 2021, a decrease on the previous year, but higher than the long term average between 2012 and 2021 of 35 cases per year. The increase was attributed to wetter, more favourable conditions for spread in 2022 (DPI, 2023).

The host landholder did not view footrot as a major problem, despite the high economic cost if it was introduced to the property, due to its relative rarity and the low likelihood of it being introduced by project activities.

Ovine Johne's disease

Ovine Johne's disease (OJD) is an incurable infectious disease caused by the bacterium *Mycobacterium paratuberculosis*.

Little recent data is available on the prevalence of OJD in NSW. However, the project site was in a low prevalence area in 2010 that had less than 0.8 per cent of flocks estimated to be infected (DPI, 2011).

The host landholder confirmed that OJD is not a major concern as it is currently well managed and presents little risk to their commercial sheep flocks.

4.3 Land and soil capability

There are several measures of land capability relevant to agriculture. This report describes the LSC based on the OEH's Land and Soil Capability Assessment Scheme (OEH, 2012). However, other measures are also examined in the following sections.

4.3.1 Background

The LSC assessment scheme was published in 2012 by the former Office of Environment and Heritage (OEH, 2012), representing a revision of an earlier scheme that was first published by the former Soil Conservation Service of NSW in 1986 (Emery, 1986). The LSC system builds on the earlier scheme, but with more emphasis on a broader range of soil and landscape properties.

LSC is based on an assessment of the biophysical characteristics of the land, the extent to which this would limit a particular type of land use, and the current technology that is available for the management of the land. It indicates the broad agricultural land uses most physically suited to an area. That is, it determines the best match between the physical requirements of the use and the physical qualities of the land, and the potential hazards and limitations associated with specific uses over a site. The LSC system can provide guidance on the inputs and management requirements associated with different intensities of agricultural land use (Woodward, 1988).

The LSC assessment is based on the premise that using land beyond its capability may have serious consequences for the land and soil resources of the State as well as broader environmental impacts on water, air and biodiversity (Woodward, 1988).

The LSC assessment scheme comprises eight land capability classes (1 to 8) with values representing a decreasing capability of the land to sustain intensive agricultural land use. Class 1 represents land capable of sustaining most intensive land uses including those that are often associated with regular soil cultivation, whereas class 8 represents land that can only sustain very low intensity land uses.

The current LSC scheme was initially developed for the NSW property vegetation planning program under the former *Native Vegetation Act 2003* and further updated for the NSW Natural Resources Monitoring, Evaluation and Reporting program.

The LSC assessment scheme uses the biophysical features of the land and soil including landform position, slope gradient, drainage, climate, soil type and soil characteristics to derive detailed rating tables for a range of land and soil hazards. These hazards include water erosion, wind erosion, soil structure decline, soil acidification, salinity, waterlogging, shallow soils and mass movement. Each hazard is given a rating between 1 (best, highest capability land) and 8 (worst, lowest capability land). The final LSC class of the land is based on the most limiting hazard.

The LSC class gives an indication of the land management practices that can be applied to a parcel of land without causing degradation to the land and soil at the site and to the off-site environment. As land capability decreases, the management of hazards requires an increase in knowledge, expertise and investment. In lands with lower capability, the hazards cannot be managed effectively for some land uses.

The LSC assessment scheme is most suitable for broad-scale assessment of land capability, particularly for assessment of lower intensity, dryland agricultural land use. It is less applicable for high intensity land use, or for irrigation (Woodward, 1988).

4.3.2 LSC classes

Class 1 land is described as *“extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices".*

Class 2 land is described as “very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation".

Class 3 land is described as “high capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation".

Class 4 land is described as “moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology”.

Class 5 land is described as “moderate–low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation".

Class 6 land is described as “low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation”.

Class 7 land is described as “very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation”.

Class 8 land is described as “extremely low capability land: Limitations are so severe that the land is incapable of sustaining land use apart from nature conservation. There should be no disturbance of native vegetation”.

4.3.3 LSC in the project site

A map of LSC across the project site is included as Figure 4.3. The area of each LSC class is summarised in Table 4.4. Published LSC mapping (NSW Government, 2023) indicates that there are no class 1 to 4 lands within the project site.

The project site consists mainly of moderate–low capability class 5 land with small areas of low capability class 6 land in the northeast and northwest parts of the site, and in an east-west band across the central part of the site.

Table 4.4
Summary of land and soil capability

LSC class	Project site		Construction footprint		Operation footprint	
	Area (ha)	Proportion	Area (ha)	Proportion	Area (ha)	Proportion
5 - Moderate–low capability	22,754	79.0%	540.3	83.1%	415.5	82.3%
6 - Low capability	6,038	21.0%	109.9	16.9%	89.5	17.7%
Total	28,793	100.0%	650.2	100.0%	505.0	100.0%

The construction footprint and operational footprint consist mainly of moderate–low capability land class 5 land, largely avoiding the lower capability class 6 land.

4.4 Other measures of land capability

4.4.1 Agricultural land classification

The Agricultural Land Classification (ALC) system is similar to the LSC assessment scheme. The current ALC system (Hulme, et al, 2002) was developed by the former NSW Agriculture (now DPIRD). Under the ALC system, land is classified by evaluating biophysical, social and economic factors that may constrain the use of land for agriculture. In general terms, the fewer the constraints on the land, the greater its value for agriculture. Each type of agricultural enterprise has a particular set of constraints affecting production.

The ALC system is not considered in this assessment due to its similarity to the LSC assessment scheme, and its limitations. Squires (2017) states that the ALC system has limitations with “poor quality control of product, limited availability and suitability for digital conversion (available as paper maps only in some areas), does not identify specific industry needs and excludes non-soil based agricultural needs”.

4.4.2 Biophysical strategic agricultural land

Biophysical strategic agricultural land (BSAL) is land with high quality soil and water resources capable of sustaining high levels of productivity. The protocol for determining BSAL is set out in OEH (OEH, 2013). BSAL has the best quality intrinsic landforms, soil and water resources that are naturally capable of sustaining high levels of productivity and require minimal management to maintain the high quality (DPE, 2013).

Mapping of BSAL was carried out by the then NSW DPE. This mapping indicates that there is no BSAL in the project site.

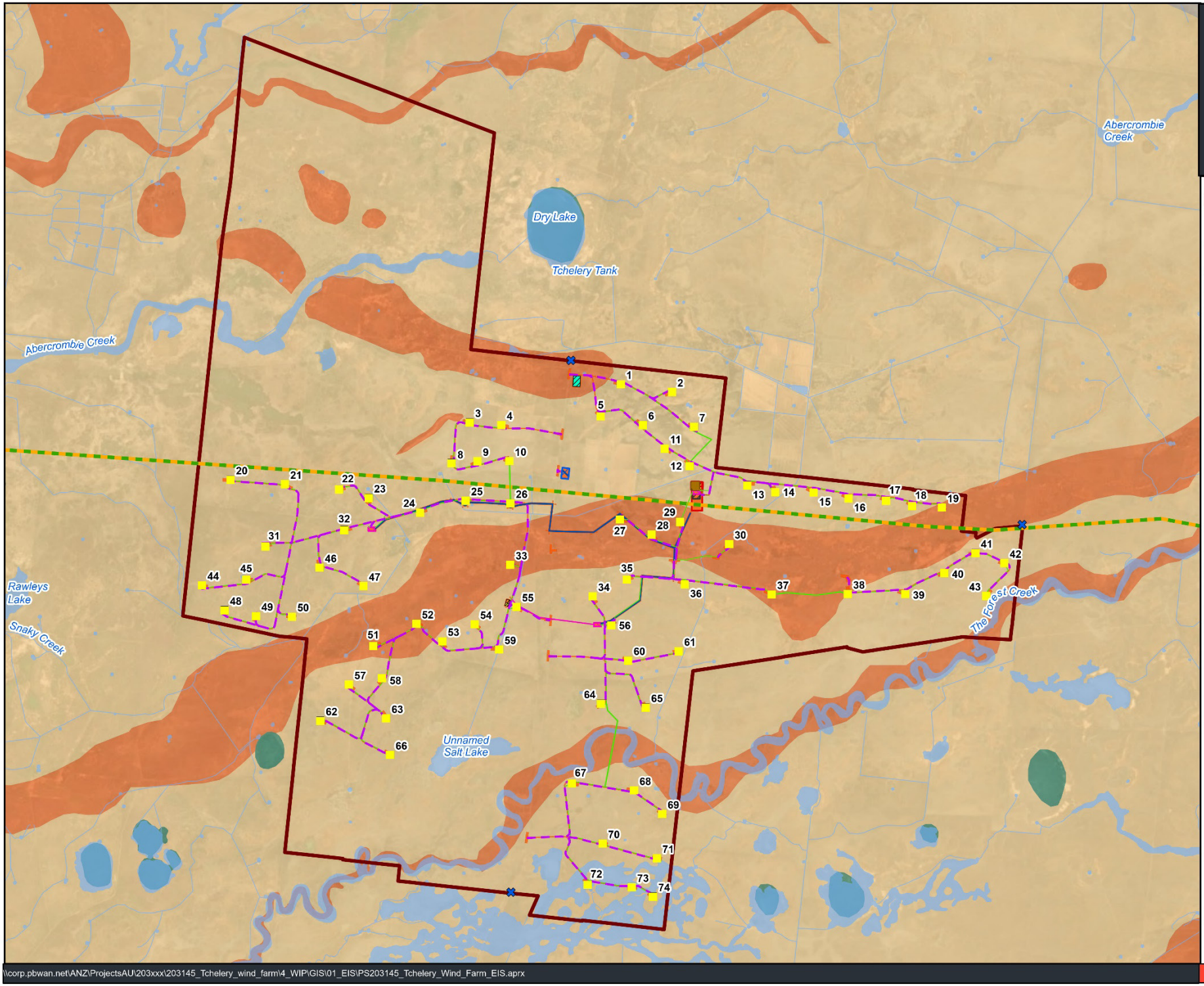
4.4.3 State significant agricultural land

A draft map of SSAL has been recently released (DPI, 2021a). The distribution of SSAL across the project site is similar to BSAL, as the assessment of both is based on similar parameters.

The draft mapping indicates that there is some SSAL on the project site associated with the irrigated areas (Figure 4.4). The area of SSAL is about 538 hectares, that is similar to the area of irrigated cropping land use set out in Table 4.2.

The SSAL on the project site is comprised of two separate blocks. The western SSAL block of about 303 hectares has five WTGs located on or adjacent to the SSAL. However, this block is not currently used for irrigation, and has not been cropped for many years. There are approximately 15 hectares of SSAL on the construction footprint in this area and 12 hectares of SSAL on the operational footprint.

The eastern SSAL block of about 235 hectares has grown irrigated crops such as barley in the past, but has only been used for growing irrigated pastures in recent years. No WTGs or other infrastructure are proposed to be located on this block. There are three WTGs and associated internal access tracks located within one kilometre of the eastern SSAL block. In addition, a proposed internal access track and a construction compound are located within about 250 metres of the eastern SSAL block.



Tchelery Wind Farm

Figure 4.3
Land and soil capability

Legend

- Project site
- Site access points
- Wind turbine generator
- Internal access track
- Construction footprint
- Battery energy storage system
- Construction compound
- Collector substation
- Switchyard
- Workforce accommodation camp
- Workforce amenities
- Concrete batching plants
- Operations and maintenance facility
- Laydown areas

Transmission

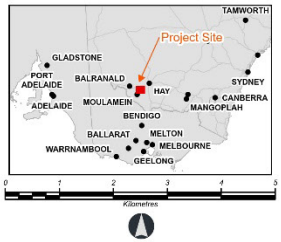
- Overhead 330 kV lines
- Overhead 33 kv lines
- Underground 33 kV lines
- Existing 220 kV transmission line and proposed Project EnergyConnect - eastern section

Land And Soil Capability

- 4 - Moderate to severe limitations
- 5 - Severe limitations
- 6 - Very severe limitations

Context

- Existing road
- Watercourse
- Waterbody



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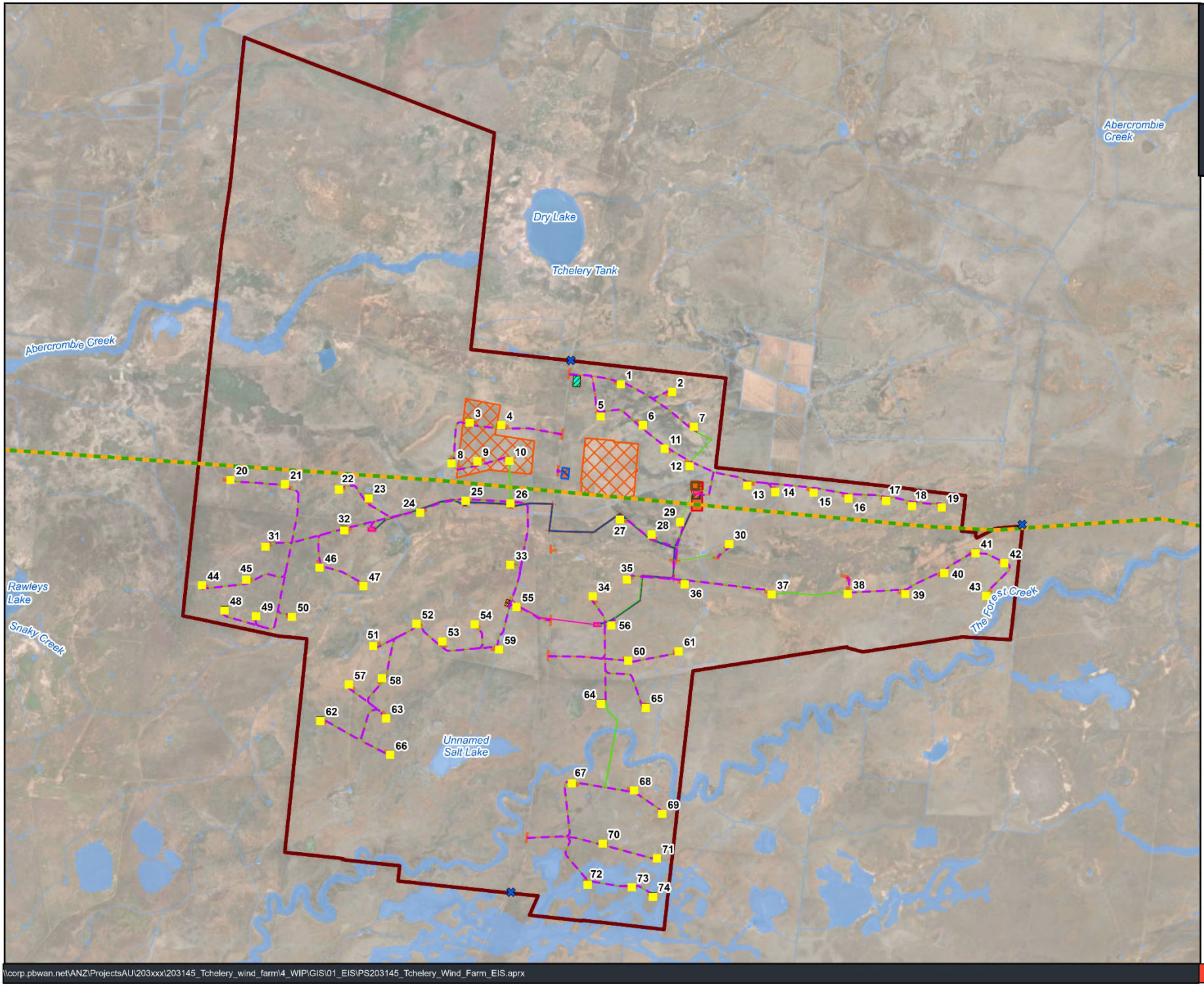


Tchelery Wind Farm

Figure 4.4
State significant agricultural land

Legend

- Project site
- Site access points
- Wind turbine generator
- Internal access track
- State significant agricultural land
- Construction footprint
- Battery energy storage system
- Construction compound
- Collector substation
- Switchyard
- Workforce accommodation camp
- Workforce amenities
- Concrete batching plant
- Operations and maintenance facility
- Laydown areas

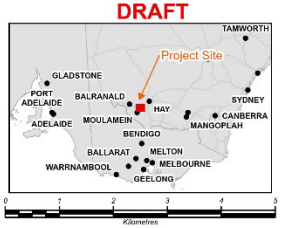
Transmission

- Overhead 330 kV lines
- Overhead 33 kV lines
- Underground 33 kV lines
- Existing 220 kV transmission line and proposed Project EnergyConnect - eastern section

Context

- Existing road
- Watercourse
- Waterbody

DRAFT



Coordinate system: GDA 1994 MGA Zone 55

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4.5 Regional agricultural productivity

4.5.1 Employment and businesses

Agriculture forestry and fishing is the largest industry (by number of persons employed) in the Edward River Council LGA. In 2021, employment in 'agriculture, forestry and fishing' made up 17.5 per cent of employed persons. Total employment in 'agriculture, forestry and fishing' is estimated at 660 persons across the LGA (ABS (Australian Bureau of Statistics), 2024).

In 2022, there were 361 'agriculture, forestry and fishing' businesses in the Edward River Council LGA (ABS, 2024). This is about 36 per cent of all businesses in the LGA.

4.5.2 Agricultural land use

The total area of agricultural holdings across the Edward River Council LGA in 2020-21 (ABS, 2022a)[1] was 859,344 hectares. The number of businesses was 364, that gives an average size of 2,361 hectares per business.

The same ABS statistics show the following broad land uses on agricultural holdings in the Edward River Council LGA. Nearly 74 per cent of the agricultural area is used for grazing. Most of the remainder is used for broadacre cropping, with relatively small areas of horticulture.

Table 4.5
Land use on farms 2020-21

Edward River Council LGA

Land use	Area (ha)	Proportion
Wheat for grain	60,160	7.0%
Other broadacre crops	80,262	9.3%
Unused cropping land (for example fallow)	48,739	5.7%
Hay and Silage	17,185	2.0%
Grapes	33	0.0%
Fruit and nuts	361	0.0%
Other horticulture	404	0.0%
Grazing improved pastures	154,201	17.9%
Grazing other land	460,104	53.5%
Other agriculture	261	0.0%
Total agricultural area	821,710	95.6%
Forestry	4,908	0.6%
Other	32,726	3.8%
Total area of holdings	859,344	100.0%

[1] Detailed agricultural statistics are only produced by the ABS to an LGA level every five years. The most recent LGA data are from 2020-21.

4.5.3 Livestock carried

Table 4.6 sets out livestock numbers and total 'stock units' across the Edward River Council LGA in 2020-21.

The number of grazing 'stock units' is calculated as one unit for sheep, lambs, goats and 'other', and 10 units each for meat cattle and dairy cattle. Pigs and poultry are disregarded for this calculation as they are generally intensively raised rather than grazed on pasture.

The 'stock units per hectare' amount is calculated as the total grazing 'stock units' divided by the pasture area (Table 4.5) and indicates the average stocking rate of pastures in the Edward River Council LGA.

The average stocking rate of 1.43 units per hectare in 2020-21 is relatively low. The average stocking rate across all of NSW in 2016 was 1.53 stock units per grazing hectare (ABS, 2022a). This includes large areas of semi-arid rangeland in the west of the State.

Table 4.6
Total livestock numbers across the Edward River Council LGA in 2020-21

Livestock type	Number
Grazing livestock	
Sheep and lambs	567,453
Meat cattle	33,838
Dairy cattle	10,005
Goats and other livestock	1,732
Total - grazing stock units	1,007,610
per hectare	1.52
Other livestock	
Pigs	36,598
Poultry	18

Source: ABS, 2022a

4.5.4 Value of agricultural production - ABS

The total gross value of agricultural production across the Edward River Council LGA in 2020-21 (ABS, 2022b) is shown in Table 4.7 at $326 million.

Wheat was the most valuable agricultural product at $50 million, but barley and rice were also substantial products, each valued at over $20 million. The production of hay, canola and 'other broadacre crops in 2020-21 was lower at $15 million to $18 million.

Vegetable production in irrigated areas is also provides considerable value in the region, contributing a gross production value of $36 million.

The disposal of 'sheep and lambs' and 'cattle and calves' (mostly for meat) each exceeded $27 million in 2020-21. Milk, wool and pigs were also substantial products.

The total gross value of agricultural production in 2020-21 was equivalent to $397 per hectare over the total agricultural area of holdings (885,903 hectares, refer to Table 4.5). However, there were large differences between the average gross value of broadacre cropping production ($956 per hectare), horticulture production ($72,960 per hectare) and broadacre grazing production[1] ($115 per hectare). The latter value is likely to be substantially higher than for grazing production on the project site, as it includes grazing on more productive sown pastures and irrigated pastures, and more intensive grazing in the higher rainfall areas around Deniliquin in the south eastern part of Edward River Council LGA. Overall broadacre grazing production per hectare is inflated by these higher value grazing activities.

The average gross value of sheep and wool products is equivalent to $86 per head across the Edward River Council LGA.

The value of agricultural production is greatly influenced by seasonal and market conditions and can fluctuate widely from year to year.

Table 4.7
Total gross value of agricultural production

Edward River Council LGA

Broadacre crops	
Wheat	$50,854,598
Barley	$27,123,440
Rice	$23,233,513
Canola	$16,606,994
Other	$14,945,118
Hay	$17,900,691
Total - Broadacre crops	$150,664,354
Horticulture	
Grapes	$374,012
Fruit and nuts	$7,878,667
Vegetables	$35,965,216
Nurseries, cut flowers and cultivated turf	$13,980,690
Total - Horticultural crops	$58,198,585
Livestock products	
Wool	$19,329,906
Sheep and lambs	$29,330,830
Cattle and calves	$27,152,271
Milk	$24,494,827
Pigs	$16,959,387
Poultry and eggs	$140,925
Goats and other livestock	$24,346
Total - Livestock products	$117,432,492
Total – Agriculture	**$326,295,431**

[1] Excluding the gross value of milk and pigs.

4.5.5 Value of agricultural production – Other Measures

Farm surveys data from the Australian Bureau of Agricultural and Resource Economics (ABARES) indicates that the average sheep and wool income of NSW Pastoral Zone (Far West) properties between 2012 and 2021 was $142 per ewe and $96 per sheep. These amounts are higher than the average gross value of sheep and wool product in the Edward River LGA during 2020-21 (Section 4.5.4).

NSW DPI farm enterprise budgets in October 2024 (Attachment 1) include a gross income for a 20 micron Merino ewe flock joined to terminal rams (which is comparable to the host landholder's flock) of $195 per ewe and $85 per sheep[1]. For a 20 micron Merino ewe breeding flock (that are common in the Edward River Council LGA) the gross income was budgeted at $137 per ewe and $75 per sheep. These amounts broadly consistent with those set out in the ABS and ABARES data. The variation may largely reflect different prices prevailing in October 2024.

The enterprise budget for 20 micron Merino wethers reveals a gross income of $67 per head that is also relatively consistent with the ABS and ABARES data.

The gross incomes per dry sheep equivalent (DSE) are $59 for Merino ewes joined to Merino rams, $85 for Merino ewes joined to terminal rams, and $56 for Merino wethers (Attachment 1).

4.6 Agricultural productivity of the project site

Historically, the project site has mainly run Merino sheep for meat and wool production, with two areas of irrigated cropping totalling about 500 hectares.

The irrigation area has been reduced in recent years with only around 220 hectares remaining. Historically, irrigated wheat, barley and rice were the main crops, but the remaining irrigation area has only been used for pastures in recent years. Some past crops have been grown under sharefarming agreements with the sharefarmer providing labour and machinery to carry out the irrigated cropping.

No dryland cropping has been carried out in recent years.

The host property runs about 6,500 to 7,000 Merino ewes that are mostly joined Merino rams. Up to 1,500 older ewes are joined to terminal rams, producing 500 to 1,000 crossbred lambs for sale each year. Merino wethers are sold at about six months of age. Lambing occurs between May and June.

4.6.1 Average stocking rate

The average stocking rate of the project site is estimated in Table 4.8, as follows:

- the usual stocking rate of the project site is 6,500 to 7,000 ewes.
- the dry DSE rating of the enterprises are derived from the NSW DPI budgets in Attachment 1.
- the average stocking rate estimated at 0.66 DSE per hectare.

[1] Average number of sheep on hand including ewes, rams and lambs.

Table 4.8
Average stocking rate

		Tchelery	
	DSE rating	Number	DSE
Merino ewe flock	2.3	6,750	15,525
Divided by			
Grazing area (ha)			28,793
Average stocking rate			**0.54**

4.6.2 Average gross grazing income

The average gross grazing income is estimated at $65 per DSE, based on the sheep enterprises and the income data in Sections 4.5.4 and 4.5.5, particularly the NSW DPI farm enterprise budgets for a 20 micron Merino ewe flock joined to Merino rams and for Merino ewes joined to terminal rams.

The average grazing gross income is estimated at $35.10 per hectare per year, based on the amounts in Table 4.9.

Table 4.9
Average gross income per hectare

Average stocking rate (DSE per ha)	0.54
Estimated annual gross income ($ per DSE)	$65.00
Estimated gross income ($ per ha per year)	**$35.10**

5 Construction impacts

5.1 Loss of land use

5.1.1 General comments

The main impact of the project on agriculture would be the temporary or permanent removal of production areas to accommodate the construction of the project. This impact would not occur over the entire project footprint, as grazing could continue to some degree during construction.

The current land use on the construction footprint is the grazing of native pastures. None of the WTGs or other parts of the construction footprint are located on land that is currently used for irrigation.

The impact on agricultural land use would be limited by the relatively small area directly affected, the continuation of some agricultural enterprises over most of the project site, and the proposed mitigation measures (refer to Chapter 8).

5.1.2 Area affected

The construction footprint would include areas required for permanent works such as an O&M facility, internal access tracks, hardstands, transmission lines, centralised 330 kV substation, three collector substations and several meteorological masts. as well as temporary areas required for construction (such as construction compounds, laydown areas and stockpiles, concrete batching plants and a potential workforce accommodation camp).

The construction footprint covers an area of 650.2 hectares. However, this includes 13.9 hectares of roads and farm infrastructure (Table 4.2), therefore the grazing land on the construction footprint is estimated at 636.3 hectares.

Little or no grazing would be possible on most the construction footprint , however this area would be relatively small in the context of the project site (28,793 hectares - Table 4.2) and the regional agricultural industry in the Edward River Council LGA (821,710 hectares - Table 4.5).

On some of the construction footprint, such as parts of the transmission line easement where construction activities would be of a relatively low intensity, pasture would not be greatly affected by construction and grazing could potentially continue on these areas. However, the landholder may choose to move livestock away from construction activities.

In this case, discussions with the host landholder indicated that it is planned to generally continue grazing in paddocks where construction is taking place. However, lambing ewes would need to be moved away from construction activity and other temporary destocking may be carried out if required.

5.1.3 Impact on income

The degree to which grazing income would be affected by construction activities would be influenced by many factors including:

1. the period of construction,
2. the average duration of construction within each paddock,
3. the degree to which construction activity would affect normal grazing patterns of the livestock,

4. the degree to which pasture can be carried over from a period of disturbance to a later period of undisturbed grazing, and
5. the attitude of the host landholder to continued grazing in the project site during construction activities, as noted above.

Construction is estimated to take about 36 months to complete. However, construction activities would not occur for the full duration at any one location.

The potential loss of gross income during construction is assessed in Table 5.1.

Table 5.1
Potential loss of gross grazing income during construction

Project area productivity	
Construction footprint (hectares)	636.3
Gross income ($ per ha per year)	$35.10
Period (months)	36
Annual loss of income	$22,334
Total loss of income (36 months)	**$67,002**

The calculations in Table 5.1 consider:

1. the likely sheep stocking rate (productivity) of the subject properties during construction as indicated by past stocking rates (Section 4.6).
2. available information (including discussions with the host landholder) indicates that the part of the project site encompassed by the construction footprint is of similar productivity to the whole project site. Therefore, the likely stocking rate per hectare of the area encompassed by the construction footprint is assessed at the same stocking rate per hectare of the whole project site.
3. gross income is assessed at $35.10 per hectare as calculated in Table 4.9.

The estimated annual loss of income during construction ($22,334) comprises a small proportion (0.0007 per cent) of the total gross value of agricultural production across the Edward River Council LGA in 2020-21 ($326 million – Section 4.5.4). This loss is only a short term, temporary loss and the loss of agricultural income during operation is expected to be much smaller (Section 6.1.3).

It is assumed in these calculations that grazing would be disrupted across the entire construction footprint for the whole construction period (36 months). As it is likely that some grazing would continue, then the calculated amount may overestimate the eventual loss of income.

The loss of net income (after production expenses are deducted) would also be lower than the gross amount assessed in Table 5.1.

The project would have little impact on agricultural support services due to the relatively low loss of production on a regional scale, and the short term, temporary of losses during construction.

The project would have little impact on processing and value adding industries as these are generally carried out on state-wide or international scale in the sheep and wool industries. For example, there are only three large scale sheep processing plants in NSW, plus several smaller facilities, the closest being at Wagga Wagga about 350 kilometres away by road. Few processing or value-adding activities

of wool are carried out in Australia. Any processing is done on a state-wide or national level, with no large-scale processing in the Edward River Council LGA.

The impact of the project on the sheep and wool industries on a state-wide level is negligible and therefore the impact on sheep and wool processing is also negligible.

5.2 Biosecurity

The following sections address the potential biosecurity impacts during construction of the project.

5.2.1 General biosecurity risks

There is a risk that animal diseases, plant diseases, feral pests and weeds could be introduced or spread during construction of the project. A biosecurity breach of this nature is likely to increase costs and decrease income of the host property, and could impact other properties in the vicinity of the project. Depending on the biosecurity matter, impacts on both costs and income could be short to long term (more than five years).

Increased costs could include expenses associated with monitoring pests, weeds or diseases and implementing control measures; while reduced income could include reduced livestock, crop or pasture production, plus lower quality of produce.

Potential carriers of weed seeds, plant material and diseases include vehicles (especially tyres), machinery and personnel (especially clothing and footwear). These can transport biosecurity matter over relatively long distances (Animal Health Australia, 2018).

Biosecurity matter also has the potential to be spread by soil and water movements associated with construction works. These movements would generally occur over relatively short distances given the nature of the works and the characteristics of the project site.

Compared to much of NSW, the project site is less susceptible to biosecurity risks due to its separation from major populations and intensive agricultural industries, and the semi-arid climate that is challenging for exotic animals, diseases and plants to survive (DPE, 2017).

5.2.2 Weed biosecurity risks

Weeds that present a high biosecurity risk from project activities are those:

- that may be spread readily by activities associated with the project
- that are adapted to the environmental conditions of the region
- that would have a substantial economic impact if they were to spread.

Weeds that are present in the region and present a potential biosecurity threat are discussed in Section 4.2.1.

Weeds such as some cactuses, spiny burrgrass, caltrops (*Tribulus terrestris*), khaki weed, Noogoora burr (*Xanthium occidentiale*) and Bathurst burr are readily spread by vehicle, machinery and human activity. Some also have a potential high impact on the income and costs of agricultural enterprises. For example, weeds such as blue heliotrope and silver-leaf nightshade are difficult to control, while spiny burrgrass containment presents a challenge in pastures and crops. Noogoora burr and Bathurst burr are important contaminants that decrease wool quality and prices.

There are numerous other weeds that could potentially have a large impact on agricultural enterprises, however the risk is moderated by:

- most weeds not being readily spread by activities associated with the project
- limited adaptability of some weeds to the environmental conditions of the region.

The maximum risk of weed spread associated with the project would occur during construction due to earthworks, the frequency of vehicle and personnel movements, and increased weed growth due to disturbance of ground cover and soil.

Mitigation measures to limit and manage the weed biosecurity risk are provided Chapter 8.

5.2.3 Livestock pests and diseases biosecurity risks

Sheep lice, OJD and ovine footrot are the most important livestock pest and disease risks. These sheep diseases are present in the region and can have large productivity impacts on sheep enterprises.

Footrot is the greatest risk despite its low current prevalence (refer to Section 4.2.3), due to the relative ease of its spread and its high potential economic impact. Virulent footrot is a severe, debilitating disease that causes considerable economic loss from reduced wool growth, lower wool quality, poor ewe fertility, slow growth rates, losses from blowfly strike, and reduced value of sale sheep. In infected flocks, there are also substantial costs associated with the control of the disease.

OJD is a wasting disease of sheep that can result in sizeable economic losses on infected farms due to sheep deaths, lost meat production, fewer lambs and less wool. Under the *Biosecurity Act 2015*, sheep footrot and OJD are notifiable diseases.

Sheep lice cause considerable losses in sheep enterprises due to treatment costs, reduced wool growth and lower meat production.

The risks associated with these diseases are low due to the low probability of spread being caused by project activities and the low prevalence of disease in the area (refer to Section 4.2.3).

There are many other important diseases of domestic livestock. Some diseases, such as bovine Johne's disease (BJD), leptospirosis, pestivirus and those caused by internal parasites, have the potential to be spread by uncontrolled livestock movements or carried by humans. However, the chance of this arising from activities associated with the project would be low.

Other diseases, such as anthrax, bovine respiratory disease, cheesy gland, clostridial diseases, ovine brucellosis, pinkeye, three-day sickness, trichomoniasis and vibriosis, are very unlikely to be spread by proposed construction activities.

Outbreaks of foot and mouth disease and lumpy skin disease were recently reported in Indonesia, and appropriate measures would be implemented if there is any risk of introduction via the project.

5.2.4 Vertebrate pest biosecurity risks

The most important vertebrate pests in the vicinity of the project site are pigs, foxes, rabbits and kangaroos. Other pest species such as deer, goats, horses and wild dogs have a more restricted distribution and lower overall economic impact. All these pests have economic impacts on agricultural enterprises arising from lamb predation, fence damage or consumption of pasture and crops. The project is unlikely to substantially change the number or movement patterns of vertebrate pests and therefore the impacts are expected to be very low.

5.2.5 Plant disease and pest biosecurity risks

Biosecurity risks associated with plant diseases and pests would be low due to the limited cropping, horticultural and irrigation industries near the project site. Rangeland pastures are not particularly susceptible to exotic plant diseases and pests, and the semi-arid climate is not conducive to their establishment or spread.

There is a ban on taking grapevines, cuttings, budwood, or soil that has been in contact with grapevine material from a Phylloxera Infested Zone into a Phylloxera Exclusion Zone. The Phylloxera Exclusion Zone covers most of NSW including the project site. The project site is also in the Potato Biosecurity Zone that covers all of NSW. The movement of plants belonging to the family Solanaceae and associated matter is banned from entering the zone. However, the risk associated with Phylloxera and potato diseases is very low due to the lack of horticultural crops in the vicinity of the project.

There are several important crop diseases in the region and pathogens such as rusts can be spread on vehicles, footwear and clothing (Plant Health Australia, 2017). Activity associated with the project has the potential to result in the spread of crop or pasture diseases or pests, but the risk is low due to the limited cropping activities on or adjacent to the project site.

5.3 Restricted movement

It is unlikely that construction activities would substantially restrict movements of landholders, agricultural workers, their livestock or equipment within the project site. It is possible that some movement would be affected temporarily due to restricted access to the construction footprint. However, these restrictions would be generally short in duration and in a limited location, and therefore unlikely to markedly affect movements for agricultural purposes.

5.4 On-ground agricultural operations

Construction activities have the potential to disrupt on-ground husbandry operations such as spraying, cultivation, sowing, slashing and harvesting. However, the presence of low input native pastures and the limited irrigation area on the project footprint means that such operations would be rare. Therefore, the impact would be very low.

Airborne dust from vehicle movements and construction activities can reduce the yield and quality of pastures. Dust can block stomata, hinder transpiration, reduce photosynthesis, foster pathogens and make pasture less palatable to livestock. Large amounts of dust can affect wool quality and make sheep more prone to diseases such as pleurisy and pneumonia.

The impact of dust generated by construction activities is likely to be minor due to the limited earthworks required, the impact being restricted to pasture and livestock close to internal access tracks, the low pasture productivity and the extensive nature of the grazing on the project site resulting in a very high proportion of the pastures and livestock being unaffected by dust. Dust impacts are further discussed in Chapter 15 (Air quality and greenhouse gas) of the EIS.

5.5 Impacts on aerial agriculture operations

Wind farms have the potential to have substantial impacts on aerial agriculture operations (such as aerial spreading of fertilisers, monitoring and aerial spraying) by aircraft and drones. In this case, aerial agriculture operations are only to be carried out on the irrigation area. There is an existing high voltage transmission line near the irrigation area, and approval for the construction of a second parallel transmission line. These transmission lines may cause some impacts on aerial agriculture operations on the irrigation area.

However, the irrigation area is relatively distant from the nearest WTG, with the closest four WTGs about 600 to 700 metres from the nearest part of the irrigation area. The WTGs near the irrigation area are also relatively widely spaced from 900 to 1,200 metres apart. This should not result in substantial additional impact, and would still enable any aerial agriculture operations on the irrigation area to be effectively carried out.

Aerial spraying has been utilised on crops in the irrigation area in the past. However, the current use of irrigated pasture usually requires less spraying than crops, and no aerial agriculture has been carried out in recent years.

The use of aerial agriculture in the project site in the dryland pastures is very limited and therefore impacts would be minimal.

The host landholder uses drones to check irrigation operations and search for sheep. However, the host landholder believes that the use of drones would not be affected by the project. Neoen will work with the landholder to establish an operations protocol for continued drone use.

5.6 Impacts on livestock enterprises

The main potential impact on livestock enterprises would be disturbance of sheep and cattle caused by noise and vehicle movements. Although livestock habituate to disturbances, the noise and movement of construction vehicles and other construction activities may have an impact on livestock in specific circumstances, especially during sensitive periods such as calving and lambing.

Livestock can be panicked, particularly if they are new to the area near the project (such as newly relocated, agisted or purchased animals) or if they are not accustomed to human contact. In semi-arid areas such as the project site, paddocks are large and stocking rates are low so livestock can move a considerable distance away from any source of disturbance. Conversely, livestock in semi-arid areas are often unaccustomed to human contact and therefore more susceptible to noise and vehicle disturbance.

Considerable disruption to livestock enterprises (such livestock deaths, illness and stress; disease spread; mixing of animals and uncontrolled breeding) is possible if stock water pipelines or fences are damaged and not promptly repaired during construction, or if gates are left open.

Grazing management would also be disrupted if construction activities result in paddocks being temporarily unavailable for grazing, or cause a disruption to the grazing pattern of livestock.

While the construction of infrastructure such as internal access tracks, WTGs, substations and overhead transmission lines would result in localised impacts on rangeland pasture, no broad-scale modification of pastures (such as cultivation, slashing or herbicide treatment) is proposed.

Although there is potential for some disturbance, the effect on productivity is expected to be relatively minor.

5.7 Strategic agricultural land

No BSAL is located within the construction footprint.

The western SSAL block has five WTGs located on or adjacent to it. There are 15.4 hectares of SSAL on the operational footprint within this block, but it is no longer used for irrigated cropping. The previous use of this block for irrigation was the basis by which it was identified as SSAL. However, this is not currently applicable, and it is unlikely that the block would qualify as SSAL at present.

The western SSAL block is now used for grazing. Construction activities would have some temporary impact on this area, consistent with the impact of construction on other grazing land.

There is no SSAL on the operational footprint within the eastern SSAL block. The irrigation carried out on it should not be affected by nearby WTGs and other project infrastructure.

5.8 Fire risk

Fires have the potential to be started by human activities, equipment and vehicles during construction. Particular fire risks may involve hot work or the storage and use of dangerous materials.

Fires can cause great damage to livestock, agricultural infrastructure (such as dwellings, stock yards, sheds and fences), pasture, shade and shelter trees, and agricultural equipment.

A bushfire plan would be prepared for the project and would include mitigation measures applicable to construction activities carried out during the bushfire danger period. The implementation of this plan is expected to adequately manage the bushfire risk during construction.

Fire risk is discussed in greater detail within Technical paper 12 (Bushfire risk assessment) of the EIS.

5.9 Travelling stock reserves and livestock routes

Maude Road, which dissects the project site, is a designated livestock highway (LLS, 2021). The NSW Department of Industry (2017) defined livestock highways as a key network of livestock routes connecting key agricultural regions within NSW, and with Queensland and Victoria. The roadside of the highway is generally about 800 metres wide and consists of numerous interconnected travelling stock reserves (TSRs).

There would be six access points to the project site and most WTGs off Maude Road, in addition to an intersection with the Booroorban-Tchelery Road that provides access to the remaining 13 WTGs. Therefore, Maude Road would be used frequently during construction.

Despite the importance of the Maude Road as a livestock route, the impact on travelling stock would be minimal due to the relatively short time that it would be affected by construction of the internal access tracks and the transmission line, and the relatively low usage of roadsides for moving livestock.

There are no other TSRs within the project area, the closest (to the nearest WTG) being:

- Keri Keri Lake TSR (85 hectares) about 16 kilometres west
- 10 Mile Hay Road TSR (52 hectares) about 10 kilometres southwest
- 4 Mile Hay Road TSR (about 238 hectares) about 17 kilometres southwest
- Bundyulumblah Reserve TSR (121 hectares) about 15 kilometres southeast
- Red Hill TSR (20 hectares) about 14 kilometres northeast.

6 Operational impacts

6.1 Loss of land use

Operation of the project would result in permanent change in some land use where permanent infrastructure would be established (for example WTGs, transmission line structures, internal access tracks O&M facility, hardstands, transmission lines, centralised 330 kV substation, three collector substations and several meteorological masts), from the existing agricultural land use to electrical generation infrastructure. The agricultural production in these areas would be lost during the operational life of the project.

Grazing operations would be able to continue on other areas of the project site.

6.1.1 Impacts

Most of the area defined as the operation footprint would be removed from agricultural production. However, grazing could continue on other parts of the operation footprint, such as in the transmission line easements and under the bases of transmission line structures.

Permanent access tracks and WTG hardstands are likely to affect soil characteristics to the extent that these locations would no longer be productive pasture areas. However, these areas would comprise only a small percentage of the project site.

6.1.2 Area affected

The impact of the project on grazing production would be minimal during operation due to the small area of pasture directly affected relative to total size of agricultural enterprises within the Edward River Council LGA.

The operation footprint is 505 hectares. However, this includes 10.7 hectares of roads and farm infrastructure (Table 4.2), therefore the grazing land on the construction footprint is estimated at 494.3 hectares.

The estimated area of grazing land permanently taken out of production (about 494.3 hectares) is equivalent to 1.7 per cent of the project site (28,793 hectares), and 0.06 per cent of the total agricultural land in the Edward River Council LGA (821,710 hectares – refer Table 4.5). This area is entirely grazing land, and no cropping land would be affected by the operation of the project.

6.1.3 Impact on income

The loss of gross income during operation, based on the operation footprint of 505 hectares is assessed in Table 6.1.

The loss of gross income during operation is assessed using a likely long term stocking rate based on past stocking rates. The long term stocking rates used in these calculations do not account for adverse seasonal conditions and other circumstances that may result in either full or partial future temporary destocking. Therefore, the calculations may somewhat overestimate the average annual loss.

The estimated loss of income during operation is relatively small at $17,350 per year. This is small proportion (0.005 per cent) of the total gross value of agricultural production across the Edward River Council LGA in 2020-21 ($326 million – Section 4.5.4).

This loss would also have a negligible impact on agricultural support services, processing and value adding industries.

The loss to the host landholder would be small compared to the extra revenue generated from hosting the project.

Table 6.1
Annual loss of gross grazing income during operation

Area (hectares)	494.3
Gross income ($ per ha per year)	$35.10
Annual loss of income	**$17,350**

From the host landholder's perspective, the long term rental income from hosting the wind farm would greatly exceed the loss of gross agricultural income assessed above. In addition, the rental income stream would be more reliable than agricultural incomes that are subject to seasonal and market fluctuations. Therefore, the landholder would have a higher overall income despite the expected reduction in their agricultural income.

The higher and more reliable net income may enable the landholder to further develop their properties, resulting in an increase in long term agricultural production.

6.2 Biosecurity

Any activity during operation (such as inspections, maintenance and repairs) that requires access of personnel, vehicles or machinery to the project area poses a potential biosecurity risk to agricultural operations in the vicinity of the project.

The biosecurity risks and potential impacts outlined in Section 5.2 in relation to construction are also applicable to the operational phase. The major difference is that vehicle, machinery and personnel activity would be less intense and frequent during operation, and therefore the risk of weed, pest or disease spread would be much lower.

6.3 Restricted movement

It is unlikely that the operation of the project would substantially restrict the movements of landholders, workers, livestock or equipment.

Conversely, internal access tracks developed for the project may improve movement and access across the property for agricultural purposes.

6.4 On-ground agricultural operations

The presence of structures on crop and pasture land could disrupt, to some extent, normal on-ground husbandry operations around the structure. However, the prevalence of low input native pastures and the lack of any cropping area in the operation footprint means that impacts would be very low.

6.5 Impacts on aerial agriculture operations

As discussed in Section 5.5, wind farms have the potential to have substantial impacts on aerial agriculture operations. However, the past and likely future use of aerial agriculture around the operation footprint is very limited, apart from on the irrigation area, and therefore impacts would generally be minimal.

Impacts on the aerial agricultural operations on the irrigation area would be mitigated by the substantial distance (600 to 700 metres) from the nearest WTGs, and the relatively widely spacing of the WTGs. This should not cause any substantial impact on aerial agriculture operations on the irrigation area in addition to the impacts potential impacts arising from nearby existing and proposed high voltage transmission lines.

Drone flight would be restricted around transmission line structures constructed for the project. Drones are subject to electric and magnetic interference from transmission lines, and it is recommended that they are not flown within 30 to 45 metres of transmission lines, electrical substations and other electrical equipment (Indiana Electric Cooperatives, 2020). Transgrid guidelines indicate that unmanned aerial vehicles (such as drones) cannot be flown within 60 metres of any transmission line structure, guy wire or conductor (Transgrid, 2022a).

However, as discussed in Section 5.5, the host landholder does not consider that the project would have a substantial impact on the use of drones. Neoen will work with the landholder to establish an operations protocol for continued drone use.

6.6 Impacts on livestock enterprises

The main potential impact on livestock enterprises would be noise and movement disturbance of sheep and cattle as discussed in Section 5.6. These impacts would be lower during operation due to a lower intensity of personnel and vehicle movements required for operation activities. The potential for damage to fences and other livestock infrastructure and gates being left open are therefore lower.

6.7 Strategic agricultural land

No BSAL is located within the operation footprint.

There are 12 hectares of SSAL on the operational footprint within the western SSAL block. However this block is no longer used for irrigated cropping. Therefore, the basis on which it was identified as SSAL is not currently applicable. Operation activities would have a small permanent impact on this area, consistent with the impact of operation by permanent infrastructure on other grazing land.

There is no SSAL on the operational footprint within the western SSAL block. The eastern SSAL block and the irrigated cropping carried out on it should not be affected by WTGs and other permanent project infrastructure on nearby land.

6.8 Fire risk

Fires have the potential to be started by human activities, equipment and vehicles during operation. This risk would be lower than during construction but are dependent on seasonal and weather conditions.

Fires have the potential to also arise from the operation of transmission lines and substations. Mechanical failure of a transmission line (for example, a dropped conductor), or failure of a transmission line to operate correctly under fault conditions (for example, faulty earthing at times of lightning strike), can initiate fire under specific conditions (Transgrid, 2013). Other fire risks may involve hot work, storage and use of dangerous materials, high heat, wind impacts and contact with vegetation.

The project's WTGs, transmission conductors and transmission line structures may result in safety issues during firefighting operations. There is a risk of contact with this infrastructure by firefighting aircraft. The combination of dense smoke and hot gases generated by a large fire directly under or near a high voltage transmission line can create a conductive path that increases the potential for a 'flashover'. Wires on transmission lines also sag lower in times of high temperature and fires, reducing the ground clearance (Powerlink Queensland 2015). Spraying water at fires near transmission lines is also a safety issue.

This may lead to inefficient firefighting activities due to restriction of activities in the vicinity of WTGs and transmission lines, and the creation of a barrier to movement across a fire ground by transmission lines.

Concerns have also been raised about the increased cost of public liability insurance premiums for neighbouring properties (Australian Energy Infrastructure Commissioner, 2023) to cover potential damage to a nearby wind farm, with fire spread being the most likely cause of substantial damage.

Fire risk is discussed in greater detail within Technical paper 12 (Bushfire risk assessment) of the EIS.

6.9 Frost

There is some evidence that WTGs reduce the occurrence of frost on surrounding land (Henschen, et al, 2011). However, this is unlikely to be substantial on the project site due to the relatively low frost incidence (Section 4.1.3), a lack of cropping and the low intensity of pasture production. Crops are generally more susceptible to frosts than pastures.

7 Cumulative impacts

The cumulative impact assessment considers other nearby developments along with the project and assesses the scale and nature of the cumulative impacts the developments on key matters.

7.1 Developments

Proposed developments that may be relevant to cumulative impacts have been identified as follows.

- Project EnergyConnect
- Victoria to NSW Interconnector – West
- Abercrombie Wind Farm
- Baldon Wind Farm
- Booroorban (Saltbush) Wind Farm
- Bullawah Wind Farm
- Dinawan Wind Farm
- Junction River Wind Farm
- Keri Keri Wind Farm
- Mallee Wind Farm
- Pottinger Wind Farm
- The Plains Wind Farm
- Wanganella Wind Farm
- Wilan Wind Farm
- Yanco Delta Wind Farm
- Currawarra Solar Farm
- Hay Solar Farm
- Keri Keri Solar Farm
- Limondale Solar Farm
- Lang's Crossing Solar Farm
- Pottinger Solar Farm
- Romani Solar Farm
- Southdown Solar Farm
- Sunraysia Solar Farm
- Tarleigh Park Solar Farm
- The Plains Solar Farm
- West Nyangay Solar Farm
- Conargo Wind Farm
- Balranald Mineral Sands Mine

Brief details and impacts of each of these projects are set out in Table 7.1 on page 53. This information was obtained from the websites of various proponents, the Australia and New Zealand Infrastructure Pipeline website (infrastructurepipeline.org) and the NSW DPHI's major projects website (planningportal.nsw.gov.au/major projects).

7.2 Summary

Cumulative impacts on agriculture in the region arising from the project being constructed and operated close to other major projects would be small.

All the wind and transmission projects have relatively little impact on agricultural production, generally allowing agricultural activities to continue across most of the respective project sites. The amount of agricultural land taken out of production is generally small in relation to the total project site, and very small relative to the total regional agricultural area. Consequently, the effect on regional agricultural production would be minimal and the cumulative impacts would be small.

The solar farm projects in the region are likely to have a larger impact on agricultural production than transmission lines or wind farms, as solar farms could remove current arable land from future crop production, although continued grazing is proposed or considered on the majority of solar farms in Australia. The Tchelery Wind Farm project would have no impact on cropping (Sections 5.4 and 6.4), and there would be no cumulative impact on crop production.

The BESS projects reviewed and the Balranald Mineral Sands Mine have relatively small project footprints, little impact on agricultural production and a distant from the Tchelery Wind farm. Therefore, minimal cumulative impacts are expected.

Further details on the cumulative impacts with specific projects are set out below in Table 7.1.

Table 7.1
Summary of cumulative impacts identified

Project	Details	Location	Cumulative Impacts
EnergyConnect (NSW – Eastern Section)	EnergyConnect (NSW – Eastern Section) would include 375 kilometres of new 330 kV double circuit transmission line and associated infrastructure between the Buronga substation and the proposed Dinawan 330 kV substation, a new 330 kV Dinawan substation around 30 kilometres south of Coleambally and about 162 kilometres of new 500 kV double circuit transmission line and associated infrastructure between the proposed Dinawan substation and the existing Wagga 330 kV substation. Construction of the project commenced in late 2022. —Planned operation by August 2024.	This project's easement passes across the northern part of the Tchelery project site. However other parts of this project are distant from the Tchelery project.	The magnitude of the impacts of this project on agriculture is limited by: • the relatively low productivity of agriculture in the area • the minor amount of land removed from agriculture • the continuation of agriculture activity despite the construction and operation of the project • the low biosecurity risks. The impacts of both EnergyConnect and this project are minor compared to the large scale of regional agricultural activity and the cumulative impact would also be minor. Much of EnergyConnect is distant from the project and would impact different parts of NSW. Transmission towers can cause cumulative impacts on aerial agriculture operations in association with WTGs. This is relevant to the Tchelery irrigation area that is adjacent to the EnergyConnect transmission line. However, the impact of the Tchelery project would be minimal and cumulative impacts would be small.

Project	Details	Location	Cumulative Impacts
Victoria to New South Wales Interconnector West (VNI West)	VNI West proposes a high voltage, 500 kV double-circuit overhead transmission line that would connect the high voltage electricity grids in NSW and Victoria. Specifically, VNI West would connect the Western Renewables Link proposal (at Bulgana in Victoria) with Project EnergyConnect (NSW Eastern Section) at the future Dinawan substation in NSW (currently in construction) via a new substation near Kerang (in Victoria) Construction of the project is expected to commence in late 2026. Once construction has commenced, the project is estimated to take around two years to complete.	VNI West's easement passes about three kilometres south of this project at its closest point. However other parts of this project are distant from the Tchelery project.	The construction periods of the VNI West and this project are likely to overlap. However, the magnitude of the cumulative impacts of this project on agriculture is limited by: • the small proportion of VNI West that is near Tchelery Wind Farm • the relatively low productivity of agriculture in the area • the minor amount of land removed from agriculture • the continuation of agriculture activity despite the construction and operation of the project • the low biosecurity risks. The impacts of both projects are minor compared to the large scale of regional agricultural activity. The cumulative impact would also be minor. Transmission towers can cause cumulative impacts on aerial agriculture operations in association with WTGs. However, VNI West is about 14 kilometres from the Tchelery irrigation area and there would be no cumulative impact in this regard.
Abercrombie Wind Farm	Abercrombie Wind Farm is a proposed wind development located 40 kilometres west of Hay. The project consists of up to 348 turbines generating up to 2.5 GW. Scoping report completed in October 2024.	About 25 kilometres north of the Tchelery project	The land is currently used for agricultural purposes including cropping (both irrigated and non-irrigated), grazing and horticulture. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.

Project	Details	Location	Cumulative Impacts
Baldon Wind Farm	Baldon Wind Farm would be located about 15 kilometres north of Moulamein and 55 kilometres east of Balranald. The project is at an early stage of development and the proponent is currently preparing the EIS. Construction is expected to occur between fourth quarter 2025 and second quarter 2029.	Borders the Tchelery project to the west.	The land is currently used for sheep grazing. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small. The use of aerial agriculture on this project area and the Tchelery project site is limited and therefore cumulative impacts of an additional wind farm would be minimal.
Booroorban (Saltbush) Wind Farm	Saltbush Wind Farm is a proposed 400 MW wind farm development comprising up to 68 wind turbines, with a 600 MW/1200 MWh BESS. The project is about 49 kilometres south of Hay, and 80 kilometres east of Moulamein. Construction planned to commence in 2028 and commissioning for 2030.	About 50 kilometres east of the Tchelery project	The land is currently used for low intensity grazing. It is expected that there would be minimal impact to grazing activities once the proposal is in operation. The impacts of this project on agriculture would be low and the cumulative impact on regional agricultural production would also be small.
Bullawah Wind Farm	The proposed Bullawah wind farm would have an installed capacity of up to 1,000 MW and a battery facility on site. The project includes 170 WTGs, with a maximum blade-tip height of 300 metres above the ground. It is located about is 30 kilometres southeast of Hay. A scoping report has been prepared and SEARs have been issued. Construction is expected to occur between 2025 and 2027.	About 80 kilometres east of the Tchelery project	The land is currently used for low intensity grazing. The impacts of this project on agriculture would be low and the cumulative impact on regional agricultural production would also be small.

Project	Details	Location	Cumulative Impacts
Dinawan Energy Hub	Dinawan Energy Hub is mainly located west of the road between Coleambally and Jerilderie, around the localities of Gala Vale and Mabins Well. Up to 200 WTGs and 1.7 million solar modules are proposed with a generation capacity of about 1.2 and 0.8 gigawatts, respectively. Construction is expected to occur in 2025 and 2026.	About 100 kilometres east of the Tchelery project	The land is distant from the Tchelery project and is currently used mainly for sheep and cattle grazing plus with some areas of irrigated canola, cotton and cereal crops. It is expected that there would be minimal impact to these activities once the proposal is in operation. Grazing would continue on the solar farm area during the operation phase. It is unlikely that construction would have a cumulative impact on agricultural activities on the host properties due to the large distance between the projects. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Junction River (formerly Burrawong) Wind Farm	The project is located about 15 kilometres south of Balranald could host up to 107 WTGs. A scoping report has been prepared and the proponent is currently preparing the EIS. Construction is planned for 2025, with operation by 2029.	About 50 kilometres west of the Tchelery project	The land is currently utilised for broad scale cropping activities and grazing. It is expected that there would be minimal impact to these activities once the proposal is in operation. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Keri Keri Wind Farm	The project features up to 158 WTGs. A scoping report has been prepared and SEARs have been issued. Construction is expected to begin in late 2027. Commissioning and operation in 2029.	About 20 kilometres northwest of the Tchelery project.	The project area is currently used for low intensity grazing. Grazing would continue on most of the site during the operation phase. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small. As for Baldon Wind Farm, there would be no cumulative impact on aerial agriculture.

Project	Details	Location	Cumulative Impacts
Mallee Wind Farm	The Mallee Wind Farm is part of the Mallee Energy Hub, located 16 kilometres north-east of Buronga, that includes wind, solar, and battery storage energy aspects. The wind farm would generate up to up to 400 MW from up to 76 WTGs Construction is planned to commence in 2026, with operation by 2027.	About 190 kilometres northwest of the Tchelery project	The project area is currently used for sheep grazing and of dryland crops. It is unlikely that constructions would have a cumulative impact on agricultural activities on the host properties due to the large distance between the projects. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Pottinger Wind Farm	Pottinger Wind Farm would consist of around 108 WTGs with a generation capacity of about 750 MW. It is located about 60 kilometres south of Hay and 15 kilometres northeast of the locality of Booroorban. Construction is expected to occur between 2026 and 2027.	About 60 kilometres east of the Tchelery project.	The project area is currently used mainly for grazing plus with some areas of dryland and irrigated crops. However, no WTGs are planned for the cropping areas. A small area of land is expected to be removed from agricultural production resulting in a relatively small loss of agricultural production. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
The Plains Wind Farm	The Plains Wind Farm proposes up to 240 WTGs up to 280 metres tall. It is located both east and west of the Cobb Highway, about 20 kilometres south of Hay. Construction is expected to occur between 2027 and 2030.	About 25 kilometres east of the Tchelery project	The land is currently used mainly for grazing plus with some areas of dryland and irrigated crops. It is expected that there would be minimal impact to these activities once the project is in operation. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.

Project	Details	Location	Cumulative Impacts
Wanganella Wind Farm	The Project includes 105 WTGs with a capacity of 840MW, a BESS, on-site substation and other associated works and infrastructure. Construction is expected to occur between 2027 and 2029.	About 60 kilometres southeast of the Tchelery project.	The land is currently used mainly for stud sheep, merino wool production and other animal grazing, and some broadacre crop production using irrigation provided by Billabong Creek. It is expected that there would be minimal impact to these activities once the project is in operation. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Wilan Wind Farm	Wilan Wind Farm would consist of around 138 WTGs with a generation capacity of about 800 MW. It is located about 25 kilometres east of Balranald., north of the Sturt Highway. Construction is expected to occur between 2026 and 2029.	About 30 kilometres northwest of the Tchelery project.	The land is currently used mainly for grazing plus with some areas of dryland and irrigated crops. It is expected that there would be minimal impact to these activities once the project is in operation. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Yanco Delta Wind Farm	The approved Yanco Delta Farm project would consist of up to 225 WTGs with a generation capacity of about 1,500 MW. It is located about 10 to 40 kilometres northwest of Jerilderie.	About 115 kilometres southeast of the project	The land is distant from the Tchelery project and the majority of the project area is currently used for low intensity dryland sheep grazing with some mixed dryland grazing and cropping activities. A small area of land is expected to be removed from agricultural production resulting in a relatively small loss of agricultural production. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Currawarra Solar Farm	Currawarra Solar Farm is located around 25 kilometres northeast of Deniliquin at Mayrung. The proposal is for a solar farm of around 195 MW capacity with about 654,200 solar panels. The project was approved in May 2018. Construction is expected to take 18 months, but it has not commenced.	About 100 kilometres southeast of the project	The land is distant from the Tchelery project and is currently utilised for broad scale cropping activities. Grazing would continue during the operation phase. This project would reduce regional crop production. However, as the Tchelery project would have no impact on crop production, there would be no cumulative impact in this regard. The overall cumulative impact on regional agricultural production would also be small.

Project	Details	Location	Cumulative Impacts
Hay Solar Farm	The project features a 110 MW solar farm with 300,000 panels across about 660 hectares. It was approved in 2017 and has a proposed 12-month construction period.	About 70 kilometres northeast of the Tchelery project	The land is currently used for grazing. Grazing would possibly continue during the operation phase. The Hay Solar Farm is relatively small in the context of the total regional grazing area. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Keri Keri Solar Farm	The project features a 400 MW solar farm across about 1,322 hectares. A scoping report has been prepared and SEARs have been issued. Construction is expected to take 18 to 24 months	About 30 kilometres west of the Tchelery project.	The land is currently used for low intensity grazing. Grazing would continue during the operation phase. The Keri Keri Solar Farm is relatively small in the context of the total regional grazing area. The impacts of this project on agriculture would be very low and therefore the cumulative impact on regional agricultural production would also be very small.
Limondale Solar Farm	The project features a 349 MW solar farm with 872,000 panels across about 900 hectares. The project has operational since late 2021.	About 55 kilometres west of the Tchelery project	The land was used for broadacre cropping, including hay. Grazing would possibly continue during the operation phase. This project would reduce regional crop production. However, as the Tchelery project would have no impact on crop production, there would be no cumulative impact in this regard. Limondale Solar Farm is relatively small in the context of the total regional agricultural area. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.
Lang's Crossing Solar Farm	The project is located about 1.6 kilometres north-east of the town centre of Hay and on an area of about 21 hectares. The project has been approved.	About 70 kilometres northeast of the Tchelery project	The project is very small in the context of the total regional agricultural area. The impacts of this project on agriculture would be very low and therefore the cumulative impact on regional agricultural production would also be very small.

Project	Details	Location	Cumulative Impacts
Pottinger Solar Farm	Pottinger Solar Farm would consist of up to 500 hectares of solar panels with a generation capacity of about 300 MW. It is located about 60 kilometres south of Hay and 15 kilometres northeast of the locality of Booroorban. Construction is expected to commence in 2026, with operation expected in 2028.	About 70 kilometres east of the Tchelery project.	The project area is currently used for grazing. The Pottinger Solar Farm is relatively small in the context of the total regional grazing area. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be very small.
Romani Solar Farm	The construction, operation and decommissioning of a solar photovoltaic energy generating facility (250 MW) with an associated battery energy storage system (150MW/300MWh), on a disturbance footprint of 870 hectares. The proponent is currently preparing the EIS. Construction is anticipated to start in 2025, and operation is planned for 2026.	About 20 kilometres east of the Tchelery project.	The project area is currently used for cropping and grazing. The Romani Solar Farm is relatively small in the context of the total regional grazing area. The construction periods are likely to overlap for a short period. There would not be a significant cumulative impact on agricultural activities on the host properties due this short overlap. The solar farm will enable grazing to continue on the project area. Therefore, the impacts of this project on agriculture would be low and the cumulative impact on regional agricultural production would also be small.
Southdown Solar Farm	The proposed Southdown Solar Farm is a utility-scale renewable energy project of up to 130 MW output on 390 hectares, to be located about 10 kilometres south of Deniliquin. A scoping report has been prepared and SEARs have been issued. Construction of the project is expected to take about 15 months	About 105 kilometres southeast of the Tchelery project	The land is currently used for grazing and cropping. Grazing would be considered during the operation phase. The Southdown Solar Farm is small in the context of the total regional grazing area. This project would reduce regional crop production by a small amount. However, as the Tchelery project would have no impact on crop production, there would be no cumulative impact in this regard. The overall cumulative impact on regional agricultural production would be small.

Project	Details	Location	Cumulative Impacts
Sunraysia Solar Farm	Sunraysia Solar Farm is an operational solar farm located 17 kilometres south of Balranald covering 1,000 hectares.	About 70 kilometres northwest of the Tchelery project	The land has largely been used for grazing interspersed with opportunistic cereal cropping. The Sunraysia Solar Farm is small in the context of the total regional grazing area. As grazing would continue during operation, the cumulative impact on regional agricultural production would be minor.
Tarleigh Park Solar Farm	Tarleigh Park Solar Farm is located 23 kilometres southeast of Deniliquin at Blighty and would generate up to 90 MW from 290,000 solar panels on 250 hectares. The project was approved in May 2018. Construction is expected to take 12 months, but it has not commenced.	About 125 kilometres southeast of the Tchelery project	The land is distant from the Tchelery project and is currently utilised for irrigated and dryland cropping. Grazing would likely be adopted as an alternative agricultural land use during the operation phase. This project would reduce regional crop production by a small amount. However, as the Tchelery project would have no impact on crop production, there would be no cumulative impact in this regard. The overall cumulative impact on regional agricultural production would also be small.
The Plains Solar Farm	The Plains Solar Farm aims to have a generating capacity of 400 MW with about 600,000 to 800,000 solar panels. It is located east of the Cobb Highway, about 30 kilometres south of Hay. Construction is expected to occur between 2026 and 2028.	About 65 kilometres east of the Tchelery project	The land is currently used for low intensity grazing. The project would allow existing grazing activities to continue. The impacts of this project on agriculture would be low and the cumulative impacts would also be small.

Project	Details	Location	Cumulative Impacts
West Nyangay Solar Farm	Development of an 800 MW solar farm with energy storage and associated infrastructure. The proponent is currently preparing the EIS. The project would be constructed over a period of around 12 to 18 months, but the construction commencement timeframe is currently unknown.	About 40 kilometres east of the Tchelery project	The project area is currently used for grazing. The West Nyangay Solar Farm is relatively small in the context of the total regional grazing area. The likely construction period is not known at present. However, it is unlikely that constructions would have a cumulative impact on agricultural activities on the host properties due to the distance between the projects. There is potential for sheep grazing under the solar arrays to continue. This would reduce the impact on agriculture. The overall impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be low.
Conargo Wind Farm	Proposed wind farm with 53 WTGs, a BESS, ancillary infrastructure and temporary facilities.	About 90 kilometres east of the Tchelery project	This project is distant from the Tchelery project and is currently utilised for grazing with some irrigation and cropping. It is expected that there would be minimal impact to these activities once the proposal is in operation. A small area of land is expected to be removed from agricultural production resulting in a relatively small loss of agricultural production. It is unlikely that constructions would have a cumulative impact on agricultural activities on the host properties due to the large distance between the projects. The impacts of this project on agriculture would be low and therefore the cumulative impact on regional agricultural production would also be small.

Project	Details	Location	Cumulative Impacts
Balranald Mineral Sands Mine	Mineral sands mine for processing ore extracted from the Balranald Project. Approved. Construction and operation commencement is unknown. Planned to be operational for 9 years followed by 5 years of rehabilitation, closure and decommissioning.	About 75 kilometres west of the Tchelery project	The impacts of this project on agriculture would be low due to the relatively small are impacted (about 2,700 to 3,800 hectares) the short expected mine life (10 years) and post mining rehabilitation. The project is also distant from Tchelery Wind Farm. Therefore the cumulative impact on regional agricultural production would be small.
Deniliquin East Battery Energy Storage System	Proposed 100 MW BESS.	About 95 kilometres southeast of the Tchelery project	The site is currently used for cropping and grazing. The project has a very small footprint with a site area of about 46 hectares and a development area of about 3.5 hectares. Therefore, the impact on agriculture and the cumulative impact on regional agricultural production would be minor.
Deniliquin Battery Energy Storage System	Proposed 120 MW and 480 MW-hour BESS.	About 95 kilometres southeast of the Tchelery project	The site currently consists mostly of a remnant gravel borrow pit. The project has a very small footprint with a site area of about 7.77 hectares and a development area of about 4.75 hectares. Therefore, the impact on agriculture would be minimal and the cumulative impact on regional agricultural production would be minor.

8 Management of impacts

The mitigation measures that would be implemented to avoid or minimise potential agricultural impacts are listed in Table 8.1.

Table 8.1
Mitigation measures – agriculture

Impact	Mitigation measure	Timing
Impact of structures	Permanent structures and temporary construction compounds will be located where possible to avoid or minimise impacts, or as agreed with the host landholder.	Detailed design and construction
Disruption Impacts	To minimise disruption to agricultural activities: • the host landholder will be consulted regarding any required adjustments to property infrastructure (fences, access tracks, etc) and the proposed timing and location of construction works, especially where some restriction on vehicular or stock movements will be necessary. These mitigation measures will be incorporated, as appropriate, in the Construction Environmental Management Plan and will be provided to the construction contractor. • property infrastructure (such as gates) will be managed in accordance with host landholder requirements (provided access is not limited or restricted). • any damage to property infrastructure caused by construction will be repaired in a timely manner in consultation with the host landholder. • use of existing roads, access tracks and other existing disturbed areas will be prioritised, where possible. • where access is required across open spaces, care will be exercised to ensure that minimum damage is caused to the surface by confining vehicular or plant movement, as far as possible, to one route.	Detailed design and construction
Fire	A bushfire plan will be prepared for the project and will include mitigation measures applicable to construction and operation activities carried out during the bushfire danger period.	Construction and operation
Rehabilitation	Disturbed areas will be stabilised and appropriately rehabilitated (that is, back to pre-impacted conditions) as soon as feasible and reasonable following the completion of construction work at each location. This will be carried out in consultation with the host landholder.	Construction

Impact	Mitigation measure	Timing
Livestock disturbance	Procedures will be implemented so that potential impacts or conflicts between livestock and construction activities are appropriately managed. Procedures will be developed in consultation with the host landholder and will include management of: • noise intensive activities during sensitive periods within the livestock production cycle (such as lambing and calving) • vehicle movements and other activities within the vicinity of livestock • movement of stock away from potential stressors created by construction activities.	Construction and operation
Biosecurity - construction	Construction activities will conform to the biosecurity protocols of the host landholder including recording of the name, location, date and time of visit for all persons entering the properties, all project vehicles to be washed down prior to entering any agricultural areas, and all vehicles to be washed down when moving between paddocks with known weed infestations. Temporary fencing will be installed around facilities (such as the construction compound, concrete batching plants, materials storage and laydown areas). New or existing infestations of any priority weed or unidentified weed will be reported to the appropriate weeds authority.	Construction
Weed control	Where present, weeds will be managed in consultation with the host landholder.	Construction
Access impacts - operation	Fencing and access arrangements, such as locked gates and requirements for opening and closing of gates, will be determined in consultation with host landholder. Any damage caused by maintenance activities will be repaired promptly.	Operation
Biosecurity - operation	Project activities will conform to the biosecurity protocols of the host landholder including recording of the name, location, date and time of visit for all persons entering the properties, all project vehicles to be washed down prior to entering any agricultural areas, all vehicles to be washed down when moving between paddocks with known weed infestations. Permanent security fencing will be installed around operational facilities including the O&M facility and substations. New infestations of any priority weed or unidentified weed will be reported to the appropriate weeds authority.	Operation
Weed management	Where present within the operation footprint, weeds will be managed in accordance with the *Biosecurity Act 2015* and the Murray Regional Strategic Weed Management Plan 2017-2022.	Operation

Impact	Mitigation measure	Timing
Decommissioning	The project site will be returned to agricultural use at the end of the project's operational life. All above-ground infrastructure will be removed. Hardstand surfaces, internal access tracks and other bare areas surplus to the host landholder's requirements will be rehabilitated to native pasture that may include addition of topsoil, restored drainage, and restoration of vegetation. Underground infrastructure (such as cables and footings) will be removed to a depth of 500 mm below ground surface, but may otherwise remain. Any contamination or waste will be removed or managed in consultation with the host landholder and according to regulations. Weed infestations will be controlled during the decommissioning process, if possible.	Decommission

9 Conclusion

The impact of the project on agricultural activities would be small. The magnitude of these impacts would be constrained by the following factors:

- the relatively small amount of agricultural land permanently removed from production compared to the total project site and the total regional agricultural land
- the continued grazing on most of the project site during operation
- the lack of any impact on cropping land
- the relatively low agricultural productivity of the project site
- low cumulative impacts
- the relatively low biosecurity risk in the project site, further reduced after mitigation measures are implemented
- effective mitigation measures would be implemented to reduce the impacts of the project on the agricultural industry.

The impact of the project on agricultural productivity at a regional scale would be minimal due to the above factors. This loss would also have a negligible impact on agricultural support services, processing and value adding industries.

10 References

ABS (2024), *Data by Region*. dbr.abs.gov.au/region.html?lyr=lga&rgn= 12730. Accessed 14 March 2024.

ABS (2022a), *Agricultural Commodities, Australia, 2020-21*. AGCDCLGA202021. Agricultural commodity estimates by 2021 Local Government Areas (LGA).

ABS (2022b), *Value of agricultural commodities produced, Australia, 2020-21.* VACPDCLGA202021 Gross and local value estimates by 2021 Local Government Areas (LGA).

Agriculture Victoria (2021), *Victorian Resources Online – Soil*. Available at http://vro.agriculture.vic.gov.au /dpi/vro/vrosite.nsf/pages/soil-home. Accessed 14 March 2024.

Animal Health Australia (2018), *National Farm Biosecurity Manual - Grazing Livestock Production.* April 2018

Australian Energy Infrastructure Commissioner (2023), *Commissioner's Observations and Recommendations (updated) - Neighbour Matters.* Available at https://www.aeic.gov.au/observations-and-recommendations/chapter-2-neighbour-consultation-agreements. Accessed 18 March 2024.

BoM (2021), *Rainfall Variability*. Available at bom.gov.au/jsp/ncc/climate_averages/rainfall-variability/index.jsp. Accessed 13 March 2024.

CSIRO (2016), *The Australian Soil Classification, Second Edition*. Available at clw.csiro.au/aclep /asc_re_on_line_V2 soilhome.htm. Accessed 13 March 2024.

Department of Industry (2017), *Travelling stock reserves - Interim update*. Published November 2017.

Department of Agriculture, Forestry and Fisheries (2025), *Australian plague locust.* Available at: agriculture.gov.au/biosecurity-trade/pests-diseases-weeds/locusts/about/australia#description-of-australian-plague-locust. Accessed 18 March 2025.

DPE (2013), *Strategic Regional Land Use Policy (SRLUP) - Strategic agricultural land - biophysical*. Available at datasets.seed.nsw.gov.au/dataset/srlup-salbiophysical. Accessed 15 March 2024.

DPE (2017), *Western Regional Plan 2036*.

DPI (2011), *OJD Prevalence Areas 2011-30 Dec 2012*. dpi.nsw.gov.au/animals-and-livestock/sheep/health/other/ojd/about/historical/ojd-prevalence-areas-jan2011. Accessed 16 March 2024.

DPI (2013a), *New South Wales Biosecurity Strategy 2013 – 2021.*

DPI (2013b), *Infrastructure Proposals on Rural Land*. June 2013, Primefact 1063, second edition. Mary Kovac and Glenda Briggs. Resource Planning and Development Unit

DPI (2018), *NSW Invasive Species Plan 2018-2021*.

DPI (2021a), *Draft state significant agricultural land map - exhibition.* Available at nswdpi.mysocialpinpoint.com/ssal. Accessed 14 March 2024

DPI (2021b), *Biosecurity Information System - Weeds, 2017-2020*. Available at trade.maps.arcgis. com/apps/webappviewer/index.html?id=a62b0f927ca441f1ba60b2dbfde5e9be. Accessed 14 March 2024

DPI (2021c), *Distribution Maps for Vertebrate Pests*. Available at dpi.nsw.gov.au/biosecurity/vertebrate-pests/publications/distribution-maps-for-vertebrate-pests. Accessed 18 March 2024.

DPI (2023), *NSW Footrot Program 2022 Report*. NSW Department of Primary Industries, May 2023.

DPIE (2020) *Electricity Infrastructure Roadmap - Building an Energy Superpower.* Published: November 2020.

DPIE (2023), *NSW Landuse 2017 v1.5*. Available at data.nsw.gov.au/data/dataset/nsw-landuse-2017 -v1p5-f0ed-clone-a95d. Updated December 2023.

DPIE (2021), *Cumulative Impact Assessment Guidelines for State Significant projects,* November 2021.

Emery K. A. (1986), *Rural Land Capability Mapping*. Soil Conservation Service of NSW, Sydney.

Henschen, M., Demchak, K., Herrholtz, B., Rudkin, M., Rhudy, L., Larson, E., Doogs, B., Holland, J., and J. Martin (2011), Do wind turbines affect weather conditions? A case study in Indiana. *Journal of Purdue Undergraduate Research*, 1, 22 – 29.

Hulme T., Grosskopf T. and Hindle J. (2002), *Agricultural Land Classification*. AgFact AC.25. NSW Agriculture, Orange NSW.

Indiana Electric Cooperatives (2020), *Drones Pose Electrical Safety Issues.* Available at indianaec.org/2020/05/27/drones-pose-electrical-safety-issues/. Accessed 17 March 2024.

LLS (2021), *Travelling Stock Reserves - State Classification Map*. Available at arcgis.com/apps/webappviewer/index.html?id=dd585551cd5c4320bfcd2d671d8f2364. Accessed 19 March 2024.

Murray LLS (2017), *Murray Regional Strategic Weed Management Plan 2017-2022.*

Murray LLS (2018), *Murray Regional Strategic Pest Animal Plan 2018-2023.*

NSW Government (2023), *Land and Soil Capability Mapping for NSW*. Available at: datasets.seed.nsw.gov.au/dataset/land-and-soil-capability-mapping-for-nsw4bc12. Accessed 15 March 2024.

OEH (2012), *The Land and Soil Capability Assessment Scheme (second approximation) – a General Land Evaluation System for New South Wales*. Office of Environment and Heritage, Sydney.

OEH (2013), *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land.* NSW Office of Environment and Heritage, Sydney.

OEH (2017), *Estimated Inherent Soil Fertility of NSW.* NSW Office of Environment and Heritage, Sydney.

Plant Health Australia (2017), *Biosecurity Manual for Grain Producers.* Version 4.1 January 2017.

Powerlink Queensland (2015), *Fire and high voltage transmission line safety*.

Squires H. (2017), *Agricultural Land Use Mapping Resources in NSW - User's guide*. Primefact 1538 first edition February 2017.

Woodward R. (1988), *Rural Land Evaluation: a Manual for Conducting a Rural Land Evaluation* Exercise at the local planning level, revised edition. Department of Planning, Sydney NSW.

Attachment 1
NSW DPI sheep budgets

NSW Department of Primary Industries

MERINO EWES (20 micron) - Merino Rams
Farm Enterprise Budget Series - Oct 2024 (ave. wool and sheep price Apr to Sep)

Flock size: 1000 ewes
Ewe body weight: 59 kgs
DSE rating: 2.32 DSEs/ewe

INCOME						Standard Budget ($)	Your Budget ($)
Wool	**number**	**class**	**kg /hd**	**$/kg**			
Shear	960	ewes	5.64	$8.10		$43,859	
	404	ewe hoggets	5.64	$8.25		$18,799	
	20	rams	7.50	$8.12		$1,218	
	413	ewe lambs	1.18	$3.26		$1,583	
Crutch	1020	adults	0.40	$5.30		$2,161	
	413	lambs	0.30	$5.30		$656	
Sheep Sales	**number**	**class**	**$ /hd**				
	177	CFA ewes	$91.38	(26.0 kg cwt)		$16,174	
	4	CFA rams	$57.02			$228	
	430	weth weaners	$63.00	(4 months)		$27,090	
	187	ewe hoggets	$136.00	(16 months)		$25,432	
Fodder	**tonnes**	**type**	**value per tonne**				
Graz/fodder crop	0 t	0	$0 /t			$0	
			A. Total Income:			**$137,202**	
VARIABLE COSTS							
Replacements	**number**	**class**	**cost ($)/hd**	**reps**			
	5	rams	$2,000.00			$10,000	
cartage	5	rams	$55.00			$275	
Wool Harvesting & Selling Costs							
Shearing	1777	ewes/hogg/lmb	$9.81	1		$17,429	
	20	rams	$13.62	1		$272	
Crutching	1413	ewes/lamb	$1.92	1		$2,718	
	20	rams	$3.31	1		$66	
Wool tax			1.50%			$1,024	
Commission, warehouse, testing charges			$45.62/ bale			$2,235	
Wool - cartage	49	bales	$16.00			$784	
- packs	49	packs	$14.00			$686	
Sheep Health	**number**	**class**					
Broadspectrum	1020	adults/hoggets	$1.59	2		$3,244	
	421	ewe lambs	$0.74	3		$935	
	430	wether lambs	$0.74	1		$318	
Narrowspectrum	1020	adults/hoggets	$0.47	1		$479	
	421	ewe lambs	$0.24	1		$101	
Lice control	1797	adults/Hog/wean	$1.62	1		$2,911	
Fly control (long acting)	1020	Adults	$2.39	1		$2,438	
Fly control (short acting)	413	ewe weaners	$0.46	1		$190	
Vaccination- 6 in 1	1020	Adults	$0.43	1		$439	
	890	lambs	$0.43	2		$765	
Mark (includes OJD)	890	lambs	$6.30	1		$5,605	
Scanning	1000	ewes	$1.05	1		$1,050	
Livestock Selling Costs							
Livestock cartage	798	sale sheep	$1.66			$1,325	
Commission on sheep sales			4.50%			$3,102	
Levies (Yard dues, MLA Transaction levy and LLS rates)						$2,238	
Pasture maintenance	232 ha	@	$52 /ha			$12,064	
Fodder							
Ewes/hoggets	1020	3.5 kg/hd/week	$0.28 /kg	10 weeks		$9,882	
Ewe lambs	413	2.8 kg/hd/week	$0.28 /kg	12 weeks		$3,886	
Wether lambs	430	2.8 kg/hd/week	$0.28 /kg	0 weeks		$0	
	Total feed	49,169 kg	@	$280		**$13,767**	
Graz/fodder crop	0 ha	@	$0 /ha			$0	
			B. Total Variable Costs:			**$86,460**	
					excl. fodder		incl. fodder
		GROSS MARGIN (A-B)			**$64,508.52**		**$50,741.26**
		GROSS MARGIN /EWE			**$64.51**		**$50.74**
		GROSS MARGIN /DSE			**$27.81**		**$21.87**
		GROSS MARGIN /HA			**$278.05**		**$218.71**

ASSUMPTIONS MERINO EWES (20 micron) - Merino Rams

1. Flock Parameters

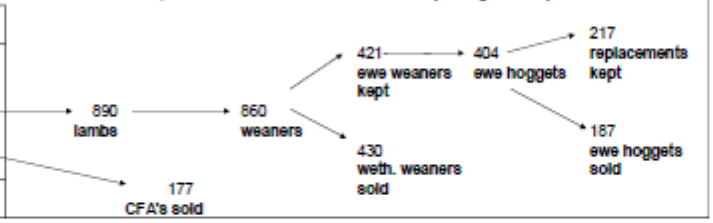
Flock mortality	4%	Ram %	2%
Productive life	5 years	Marking %	89%
Ewe body weight	59 kg	Weaning %	86%
DSE rating /ewe	2.32	Weaning age	3 months
Stocking rate/ha	10 dse's		

Pasture maintenance = 90kg/ha single super @ $500t + $7.00/ha application

2. Flock Structure

Sheep numbers are modified to reflect mortality throughout the year.

Age	Number of ewes
1.5	217
2.5	208
3.5	200
4.5	192
5.5	184
6.5	0
Total	1000



3. Wool Prices

Merino Ewe	Micron	AWEX Type	Clean price	Yield	Greasy price	Specifications (all 35n/ktex)	Proportion of Clip
- Fleece GTM	20	MF5B.	$13.30	65%	$8.67	1%VMB, 90mm	75%
- Skirtings/bellies	19	MP5B.	$12.86	56%	$7.18	4.8%VMB, 80mm	20%
- Cardings	20	MZ2B.	$6.05	52%	$3.14	2.9%VMB.	5%
					$8.10	→	used in budget

4. Sensitivity Tables - Changes in Gross Margin $/DSE (Includes fodder)

Wool Cut kg/hd	Adult Greasy Wool Price $/Kg greasy				
	$4.05	$6.08	$8.10	$10.13	$12.15
2.82 kg	$8.39	$10.72	$13.05	$15.38	$17.70
4.23 kg	$10.46	$13.95	$17.44	$20.94	$24.43
5.64 kg	$12.56	$17.22	**$21.87**	$26.53	$31.18
7.05 kg	$14.63	$20.45	$26.27	$32.08	$37.90
8.46 kg	$16.73	$23.71	$30.69	$37.68	$44.66

Hog. Wool Cut kg/hd	Hogget Greasy Wool Price $/Kg greasy				
	$4.13	$6.19	$8.25	$10.31	$12.38
2.82 kg	$16.08	$17.08	$18.08	$19.07	$20.07
4.23 kg	$16.98	$18.48	$19.97	$21.47	$22.97
5.64 kg	$17.88	$19.88	**$21.87**	$23.87	$25.86
7.05 kg	$18.78	$21.27	$23.77	$26.26	$28.76
8.46 kg	$19.65	$22.64	$25.63	$28.63	$31.62

Ewe hoggets $/Hd	Value of wether weaners $/Hd				
	$31.50	$47.25	$63.00	$78.75	$94.50
$68.00	$11.06	$13.85	$16.64	$19.42	$22.21
$102.00	$13.68	$16.47	$19.25	$22.04	$24.83
$136.00	$16.30	$19.08	**$21.87**	$24.66	$27.45
$170.00	$18.91	$21.70	$24.49	$27.28	$30.06
$204.00	$21.53	$24.32	$27.11	$29.89	$32.68

CFA ewes $/Hd	Weaning %				
	43%	65%	86%	108%	129%
$45.69	$2.84	$10.66	$18.54	$26.50	$34.38
$68.53	$4.50	$12.32	$20.21	$28.16	$36.05
$91.38	$6.17	$13.99	**$21.87**	$29.83	$37.71
$114.22	$7.83	$15.65	$23.54	$31.49	$39.38
$137.07	$9.50	$17.31	$25.20	$33.15	$41.04

Note: The above sensitivity tables vary price and quantities by +/- 25% and +/- 50%.

Crutching $/hd	Total shearing cost $/hd				
	$4.90	$7.36	**$9.81**	$12.26	$14.71
$0.96	$26.21	$24.34	$22.46	$20.58	$18.70
$1.44	$25.92	$24.04	$22.16	$20.29	$18.41
$1.92	$25.63	$23.75	**$21.87**	$19.99	$18.12
$2.40	$25.33	$23.46	$21.58	$19.70	$17.82
$2.89	$25.04	$23.16	$21.29	$19.41	$17.53

Ewes/hoggets kg/hd/wk	Grain price $/Tonne				
	$140.00	$210.00	**$280.00**	$350.00	$420.00
1.7 kg	$25.90	$24.95	$24.00	$23.05	$22.10
2.6 kg	$25.37	$24.15	$22.94	$21.72	$20.50
3.5 kg	$24.84	$23.35	**$21.87**	$20.39	$18.90
4.3 kg	$24.31	$22.56	$20.81	$19.06	$17.31
5.2 kg	$23.77	$21.76	$19.74	$17.73	$15.71

Note: The feeding sensitivity tables vary quantities/cost by +/- 25% and +/- 50%.

Sheep and wool prices thanks to MLA market reporting, AuctionsPlus and AWEX. Wool cuts based on wether trial data

This budget should be used as a GUIDE ONLY and should be changed by the grower to take account of movements in commodity and input prices, changes in seasonal conditions and individual farm characteristics. Estimated prices are GST exclusive.

MERINO EWES (20 micron) - Terminal Rams

Farm Enterprise Budget Series - Oct 2024 (ave. wool and sheep price Apr to Sep)

Flock size: 1000 ewes
Ewe body weight: 59 kgs
DSE rating: 2.30 DSEs/ewe

INCOME

					Standard Budget ($)	Your Budget ($)
Wool	**number**	**class**	**kg /hd**	**$/kg**		
Shear	940	ewes	5.16	$8.10	$39,251	
	20	rams	3.50	$2.13	$149	
Crutch	1000	mixed ages	0.40	$5.30	$2,119	
	893	xb lambs/rams	0.25	$2.03	$454	
Sheep Sales	**number**	**class**	**$ /hd**			
	165	CFA ewes	$91.38	(26.0 kg cwt)	$15,078	
	4	CFA rams	$57.02		$228	
8 months	437	mixed sex lambs	$150.40	(20.0 kg cwt)	$65,650	
10 months	437	mixed sex lambs	$165.22	(22.0 kg cwt)	$72,119	
Fodder	**tonnes**	**type**	**value per tonne**			
Graz/fodder crop	0 t	0	$0 /t		$0	
			A. Total Income:		**$195,047**	

VARIABLE COSTS

Replacements	**number**	**class**	**cost ($)/hd**	**reps**		
	5	rams	$2,000.00		$10,000	
	225	ewes	$136.00		$30,600	
Cartage	225	ewes	$1.66		$374	
Cartage	5	rams	$55.00		$275	
Wool Harvesting & Selling Costs						
Shearing	940	ewes	$9.81	1	$9,219	
	20	rams	$13.62	1	$272	
Crutching	1000	ewes	$1.92	1	$1,924	
	20	rams	$3.31	1	$66	
	873	weaners	$1.92	1	$1,679	
Wool tax			1.50%		$630	
Commission, warehouse, testing charges			$45.62/ bale		$1,506	
Wool - cartage	33	bales	$16.00		$528	
- packs	33	packs	$14.00		$462	
Sheep Health	**number**	**class**				
Broadspectrum	1020	adults/hoggets	$1.59	2	$3,244	
	900	lambs	$0.74	3	$1,998	
Narrowspectrum	1020	adults/hoggets	$0.47	1	$479	
	900	lambs	$0.24	1	$216	
Lice control	960	adults	$1.62	1	$1,555	
Fly control (long acting)	1020	adults	$2.39	1	$2,438	
Fly control (short acting)	900	weaners	$0.46	1	$414	
Vaccination- 6 in 1	1020	adults	$0.43	1	$439	
	930	lambs	$0.43	2	$800	
Mark	930	lambs	$3.03	1	$2,818	
Scanning	1000	ewes	$1.05	1	$1,050	
Livestock Selling Costs						
Livestock cartage	1,042	sale sheep	$1.66		$1,730	
Commission on sheep sales			4.50%		$6,888	
Levies (Yard dues, MLA Transaction levy and LLS rates)					$3,707	
Pasture maintenance	230 ha	@	$52 /ha		$11,960	
Fodder						
		Supplementary feed @ $280 /t				
Ewes/rams	960	3.5 kg/hd/week	$0.28 /kg	10 weeks	$9,300	
Mixed sex lambs	873	5.0 kg/hd/week	$0.28 /kg	12 weeks	$14,666	
	Total feed	85,596 kg	@	$280.00	**$23,967**	
Graz/fodder crop	0 ha	@	$106 /ha		$0	
			B. Total Variable Costs:		**$121,237**	

	excl. fodder	incl. fodder
GROSS MARGIN (A-B)	**$97,776.67**	**$73,809.79**
GROSS MARGIN /EWE	**$97.78**	**$73.81**
GROSS MARGIN /DSE	**$42.51**	**$32.09**
GROSS MARGIN /HA	**$425.12**	**$320.91**

This budget should be used as a GUIDE ONLY and should be changed by the grower to take account of movements in commodity and input prices, changes in seasonal conditions and individual farm characteristics. Estimated prices are GST exclusive.

ASSUMPTIONS MERINO EWES (20 micron) - Terminal Rams

1. Flock Parameters

Flock mortality	6%	Ram %	2%
Productive life	5 years	Marking %	93%
Ewe body weight	59 kg	Weaning %	90%
DSE rating /ewe	2.3	Weaning age	3 months
Stocking rate/ha	10 dse's		

Pasture maintenance = 90kg/ha single super @ $500t + $7.00/ha application

2. Flock Structure

Sheep numbers are modified to reflect mortality throughout the year.

Age	Number of ewes
1.5	225
2.5	212
3.5	199
4.5	187
5.5	176
6.5	0
Total	1000

225 **replacements bought**

930 **lambs** → 900 **weaners** → 873 **mixed sex lambs sold**

165 **CFA's sold**

3. Wool Prices

Merino Ewe	Micron	AWEX Type	Clean price	Yield	Greasy price	Specifications (all 35n/ktex)	Proportion of Clip
- Fleece GTM	20	MF5B.	$13.30	65%	$8.67	1%VMB, 90mm	75%
- Skirtings/bellies	19	MP5B.	$12.86	56%	$7.18	4.8%VMB, 80mm	20%
- Cardings	20	MZ2B.	$6.05	52%	$3.14	2.9%VMB.	5%
					$8.10	→	used in budget

4. Sensitivity Tables - Changes in Gross Margin $/DSE (includes fodder)

Wool Cut kg/hd	Adult Greasy Wool Price $/Kg greasy				
	$4.05	$6.08	**$8.10**	$10.13	$12.15
2.58 kg	$19.91	$22.01	$24.11	$26.21	$28.32
3.87 kg	$21.78	$24.93	$28.09	$31.24	$34.39
5.16 kg	$23.69	$27.89	**$32.09**	$36.29	$40.50
6.44 kg	$25.56	$30.81	$36.06	$41.32	$46.57
7.73 kg	$27.43	$33.73	$40.04	$46.34	$52.64

Cast for age $/Hd	Replacement ewe cost $/Hd				
	$68.00	$102.00	**$136.00**	$170.00	$204.00
$45.69	$35.61	$32.29	$28.96	$25.63	$22.31
$68.53	$37.18	$33.85	$30.53	$27.20	$23.87
$91.38	$38.74	$35.42	**$32.09**	$28.77	$25.44
$114.22	$40.31	$36.98	$33.66	$30.33	$27.00
$137.07	$41.87	$38.55	$35.22	$31.90	$28.57

Domestic Lamb $/Hd	Weaning %				
	45%	68%	**90%**	113%	135%
$75.20	$2.46	$10.46	$18.46	$26.46	$34.51
$112.80	$5.87	$15.57	$25.28	$34.98	$44.73
$150.40	$9.28	$20.69	**$32.09**	$43.50	$54.96
$188.00	$12.69	$25.80	$38.91	$52.01	$65.18
$225.60	$16.10	$30.91	$45.72	$60.53	$75.41

Domestic Lamb $/Hd	Export Lamb $/Hd				
	82.61	123.92	**165.22**	206.53	247.83
$75.20	$3.49	$10.98	$18.46	$25.95	$33.43
$112.80	$10.30	$17.79	$25.28	$32.76	$40.25
$150.40	$17.12	$24.60	**$32.09**	$39.58	$47.06
$188.00	$23.93	$31.42	$38.91	$46.39	$53.88
$225.60	$30.75	$38.23	$45.72	$53.21	$60.69

Note: The above sensitivity tables vary price and quantities by +/- 25% and +/- 50%.

Crutching $/hd	Total shearing cost $/hd				
	$4.90	$7.36	**$9.81**	$12.26	$14.71
$0.96	$34.88	$33.88	$32.87	$31.87	$30.87
$1.44	$34.49	$33.48	$32.48	$31.48	$30.48
$1.92	$34.10	$33.09	**$32.09**	$31.09	$30.09
$2.40	$33.70	$32.70	$31.70	$30.70	$29.70
$2.89	$33.31	$32.31	$31.31	$30.31	$29.30

Feed m/sex lamb kg/hd/wk	Grain price $/Tonne				
	$140.00	$210.00	**$280.00**	$350.00	$420.00
2.5 kg	$38.90	$37.09	$35.28	$33.47	$31.66
3.8 kg	$38.10	$35.89	$33.69	$31.48	$29.27
5.0 kg	$37.30	$34.70	**$32.09**	$29.49	$26.88
6.3 kg	$36.50	$33.50	$30.50	$27.49	$24.49
7.5 kg	$35.71	$32.31	$28.90	$25.50	$22.10

Note: The feeding sensitivity tables vary quantities/cost by +/- 25% and +/- 50%.

Sheep and wool prices thanks to MLA market reporting, AuctionsPlus and AWEX. Wool cuts based on wether trial data

This budget should be used as a GUIDE ONLY and should be changed by the grower to take account of movements in commodity and input prices, changes in seasonal conditions and individual farm characteristics. Estimated prices are GST exclusive.

MERINO WETHERS (20 micron)

Farm Enterprise Budget Series - Oct 2024 (ave. wool and sheep price Apr to Sep)

Flock size:	**1000**	**wethers**
Wether body weight:	**59**	**kgs**
DSE rating:	**1.18**	**DSEs/wether**

INCOME					**Standard Budget $**	**Your Budget $**
Wool	**number**	**class**	**kg /hd**	**$/kg**		
Shear	980	wethers	6.06	$8.17	$48,559	
	174	wethers 4 month	1.26	$3.26	$717	
Crutch	990	wethers	0.40	$5.30	$2,098	
Sheep Sales	**number**	**class**	**$ /hd**			
	159	CFA wethers	$95.53	(26.0 kg cwt)	$15,156	
Fodder	**tonnes**	**type**	**value per tonne**			
Graz/fodder crop	0 t	0	$0 /t		$0	
			A. Total Income:		**$66,530**	
VARIABLE COSTS						
Replacements	**number**	**class**	**cost ($)/hd**			
	174	wethers	$63.00	(4 months)	$10,962	
Cartage	174	wethers	$1.66		$289	
Wool Harvesting & Selling Costs				**reps**		
Shearing	1154	wethers	$9.81	1	$11,318	
Crutching	990	wethers	$2.02	1	$1,995	
Wool tax			1.50%		$771	
Commission, warehouse, testing charges			$45.62/ bale		$1,642	
Wool - cartage	36	bales	$16.00		$576	
- packs	36	packs	$14.00		$504	
Sheep Health						
Broadspectrum	826	wethers	$1.59	2	$2,628	
	174	weaners	$0.74	2	$258	
Narrowspectrum	1000	wethers	$0.47	1	$470	
Lice control	1154	wethers	$1.62	1	$1,869	
Fly control (long acting)	1000	wethers	$2.39	1	$2,391	
Vaccination- 6 in 1	1000	wethers	$0.43	1	$430	
Livestock Selling Costs						
Livestock cartage	159	CFA wethers	$1.66		$263	
Commission on sheep sales			4.50%		$682	
Levies (Yard dues, MLA Transaction levy and LLS rates)					$670	
Pasture maintenance	118 ha	@	$52 /ha		$6,136	
Fodder						
		Supplementary feed @ $280 /t				
Wethers	826	3.5 kg/hd/week	$0.28 /kg	4 weeks	$3,202	
Wether weaners	174	2.8 kg/hd/week	$0.28 /kg	10 weeks	$1,364	
	Total feed	16,308 kg	@	$280	**$4,566**	
Graz/fodder crop	0 ha	@	$0 /ha		$0	
			B. Total Variable Costs:		**$48,420**	

	excl. fodder	incl. fodder
GROSS MARGIN (A-B)	**$22,675.88**	**$18,109.71**
GROSS MARGIN /WETHER	**$22.68**	**$18.11**
GROSS MARGIN /DSE	**$19.22**	**$15.35**
GROSS MARGIN /HA	**$192.17**	**$153.47**

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ASSUMPTIONS MERINO WETHERS (20 micron)

1. Flock Parameters

Cull age	6.5 years	Adult mortality	2%
Replacement age	1.5 years	Body weight	59 kg
Productive life	5.0 years	DSE rating	1.2
Stocking rate/ha	10 dse's		

Sheep and wool prices thanks to MLA market reporting, AuctionsPlus and AWEX. Wool cuts based on wether trial data
Pasture maintenance = 90kg/ha single super @ $500t + $7.00/ha application

2. Flock Structure

Sheep numbers are modified to reflect mortality throughout the year.

Age	No. of wethers	
0.5	174	← 174 **replacements bought**
1.5	172	
2.5	169	
3.5	165	
4.5	162	
5.5	159	→ 159 **CFA's sold**
6.5	0	
Total	**1000**	

3. Wool Prices

Merino Wether	Micron	AWEX Type	Clean price	Yield	Greasy price	Specifications (all 35n/ktex)	Proportion of Clip
- Fleece GTM	20	MF5B.	$13.30	65%	$8.67	1%VMB, 90mm	80%
- Skirtings/bellies	19	MP5B.	$12.86	56%	$7.18	4.8%VMB, 80mm	15%
- Cardings	20	MZ2B.	$6.05	52%	$3.14	2.9%VMB.	5%
					$8.17	→	used in budget

4. Sensitivity Tables - Changes in Gross Margin $/DSE (includes fodder)

Wool Cut kg/hd	Wether Greasy Wool Price $/Kg greasy				
	$4.09	$6.13	**$8.17**	$10.21	$12.26
3.03 kg	-$14.03	-$8.96	-$3.89	$1.17	$6.24
4.55 kg	-$9.47	-$1.87	$5.73	$13.33	$20.93
6.06 kg	-$4.92	$5.21	**$15.35**	$25.48	$35.61
7.58 kg	-$0.43	$12.24	$24.90	$37.57	$50.24
9.10 kg	$4.12	$19.32	$34.52	$49.73	$64.93

Crutching $/hd	Total shearing Cost $/hd				
	$4.90	$7.36	**$9.81**	$12.26	$14.71
$1.01	$20.99	$18.59	$16.19	$13.79	$11.40
$1.51	$20.57	$18.17	$15.77	$13.37	$10.97
$2.02	$20.14	$17.75	**$15.35**	$12.95	$10.55
$2.52	$19.72	$17.32	$14.92	$12.53	$10.13
$3.02	$19.30	$16.90	$14.50	$12.10	$9.71

CFA wethers $/hd	Replacement wethers $/Hd				
	$31.50	$47.25	**$63.00**	$78.75	$94.50
$47.77	$13.86	$11.54	$9.21	$6.89	$4.57
$71.65	$16.93	$14.60	$12.28	$9.96	$7.64
$95.53	$19.99	$17.67	**$15.35**	$13.02	$10.70
$119.42	$23.06	$20.74	$18.41	$16.09	$13.77
$143.30	$26.13	$23.80	$21.48	$19.16	$16.84

Note: The above sensitivity tables vary price and quantities by +/- 25% and +/- 50%.

M.Weth. Wean. kg/Hd/wk	Feeding Adult Wethers kg/Hd/week				
	1.73 kg	2.60 kg	**3.46 kg**	4.33 kg	5.19 kg
1.4 kg	$17.28	$16.60	$15.93	$15.25	$14.57
2.1 kg	$16.99	$16.31	$15.64	$14.96	$14.28
2.8 kg	$16.70	$16.03	**$15.35**	$14.67	$13.99
3.5 kg	$16.41	$15.74	$15.06	$14.38	$13.70
4.2 kg	$16.13	$15.45	$14.77	$14.09	$13.41

Adult Wethers kg/hd/wk	Grain price $/Tonne				
	$140.00	$210.00	**$280.00**	$350.00	$420.00
1.7 kg	$17.96	$17.33	$16.70	$16.08	$15.45
2.6 kg	$17.62	$16.82	$16.03	$15.23	$14.43
3.5 kg	$17.28	$16.31	**$15.35**	$14.38	$13.41
4.3 kg	$16.94	$15.81	$14.67	$13.53	$12.39
5.2 kg	$16.60	$15.30	$13.99	$12.68	$11.38

Note: The feeding sensitivity tables vary quantities/cost by +/- 25% and +/- 50%.

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Attachment 2
Other regional weeds list – Murray LLS

Common name	Scientific name
African boxthorn	*Lycium ferocissimum*
Athel pine	*Tamarix aphylla*
Bathurst burr	*Xanthium spp.*
Bear-skin fescue	*Festuca gautieri*
Bitter stonecrop	*Sedum acre*
Blackberry	*Rubus fruticosus* (agg.)
Blue heliotrope	*Heliotropium amplexicaule*
Box elder	*Acer negundo*
Bridal creeper	*Asparagus asparagoides*
Buffalo burr	*Solanum rostratum*
Camel thorn	*Alhagi pseudalhagi*
Cape tulips	*Moraea flaccida* and *M. miniata*
Columbus grass	*Sorghum* x *almum*
Galenia	*Galenia pubescens*
Galvanised burr	*Sclerolaena birchii*
Golden dodder	*Cuscuta campestris*
Harrisia cactus	*Harrisia martinii* and *H. tortuosa*
Himalaya honeysuckle	*Leycesteria formosa*
Honey locust	*Gleditsia triacanthos*
Horehound	*Marrubium vulgare*
Johnson grass	*Sorghum halepense*
Khaki weed	*Alternanthera pungens*
Long leaf willow primrose	*Ludwigia longifolia*
Pampas grass	*Cortaderia* spp.
Prickly pear	*Cylindropuntia* spp.
Prickly pears	*Opuntia* spp.
Red rice	*Oryza rufipogon*
Reed canary grass	*Phalaris arundinacea*
Reed sweet-grass	*Glyceria maxima*
Rhus tree	*Toxicodendron succedaneum*
Scotch - Illyrian thistles	*Onopordum* spp.
Silk forage sorghum	*Sorghum* spp. hybrid cv. "silk"
Silverleaf nightshade	*Solanum elaeagnifolium*
Spanish heath	*Erica lusitanica*
Spiny burr grass	*Cenchrus incertus and C. longispinus*
Spiny emex	*Emex australis*
St Barnaby's thistle	*Centaurea solstitialis*
St John's wort	*Hypericum perforatum*
Star thistle	*Centaurea calcitrapa*
Sweet briar	*Rosa rubiginosa*
Tamarix	*Tamarix ramosissima*
Tangled hypericum	*Hypericum triquetrifolium*
Tree of heaven	*Ailanthus altissima*