



Dinawan Wind Farm

Environmental Impact Statement

June 2024



EIS declaration

Project details			
Project name	Dinawan Wind Farm		
Application number	SSD-50725708		
Address of the land in respect of which the development application is made	The legal property description of the land to be developed is defined in Appendix F of the EIS		
Applicant details			
Applicant name	Dinawan Energy Hub Pty Ltd as trustee for Dinawan Energy Hub Trust		
Applicant address	Level 4, 1A Rialto Lane, Manly NSW 2095		
Details of person by whom this EIS was prepared			
Name	Sofia Stergio	David Richards	Kate Cox
Address	Ground Floor, 20 Chandos Street, St Leonards 2065	Level 3, 175 Scott Street, Newcastle 2300	Ground Floor, 20 Chandos Street, St Leonards 2065
Professional qualifications	Bachelor of Science	Bachelor of Environmental Science and Management	Bachelor of Science (Marine)
Declaration by registered environmental assessment practitioner			
Name	Philip Towler, Certified Environmental Practitioner (CEnvP)		
Registration number	 R80006		
Organisation registered with	Certified Environmental Practitioner (CEnvP) – EIANZ		
Declaration	The undersigned declares that this EIS: • has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021 • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates • does not contain information that is false or misleading • addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments • has been prepared having regard to the Department's State Significant Development Guidelines – Preparing an Environmental Impact Statement • contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development • contains a consolidated description of the project in a single chapter of the EIS • contains an accurate summary of the findings of any community engagement • contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.		
Signature		Date	20 June 2024

Acknowledgement of Country

We would like to acknowledge and pay respects to the Traditional Owners on which the project is proposed including the Wiradjuri people and several smaller nations of the Murrumbidgee plains. We pay our respects to Elders past, present, and emerging.

Executive summary

ES1 Introduction

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Wind Farm (the project).

The project includes the installation, operation, maintenance and decommissioning of up to 200 wind turbine generators (WTGs), and associated infrastructure. The main objective of the project is to generate and dispatch electricity from renewable sources, consistent with NSW Government policies for renewable energy generation and storage. The project will have a generation capacity of up to approximately 1,200 megawatts (MW) (AC), equivalent to the demand of more than 700,000 NSW households.

The project is on the traditional lands of the Wiradjuri people and several smaller nations of the Murrumbidgee plains, about halfway between the towns of Coleambally and Jerilderie. The project area is within the South West Renewable Energy Zone (REZ), a region selected by the NSW Government for its strong renewable energy resource potential and proximity to the existing electricity network.

A summary of key project components is provided in Figure ES1.

This environmental impact statement (EIS) accompanies a State significant development application for the project.

ES2 Strategic context

ES2.1 Project need

The National Electricity Market is undergoing rapid and significant transformation from a centralised system of -large fossil fuel (coal and gas) electricity generation towards an array of smaller-scale and widely-dispersed wind, solar and other renewable electricity generators. This change is being driven by the Commonwealth and NSW government's greenhouse gas emissions reduction targets, an evolving power supply mix, consumer preferences, ageing infrastructure and changing technologies.

While coal-fired power stations are being closed, the Australian Energy Market Operator's *2022 Integrated System Plan* (AMEO 2022) and *Draft 2024 Integrated System Plan* (AMEO 2023) forecasts significant growth in electricity demand due to the electrification of transport, industry, office and homes; reduced use of fossil fuels; and economic growth. To meet this demand, the amount of electricity delivered to the National Energy Market will need to almost double the amount delivered in 2022, with the *Draft 2024 Integrated System Plan* identifying an electricity demand of 313 terawatt hours per year by 2050.

The Commonwealth Government's target is for renewables to generate 82% of National Energy Market electricity requirements by 2030–2031.

The Dinawan Wind Farm will help meet the demand for renewable electricity by providing up to 1,200 MW of electricity generation capacity to the National Energy Market.

The project at a glance

Development corridor

7,256 ha

Development footprint

1,339 ha



Generating capacity of up to

1.2 GW



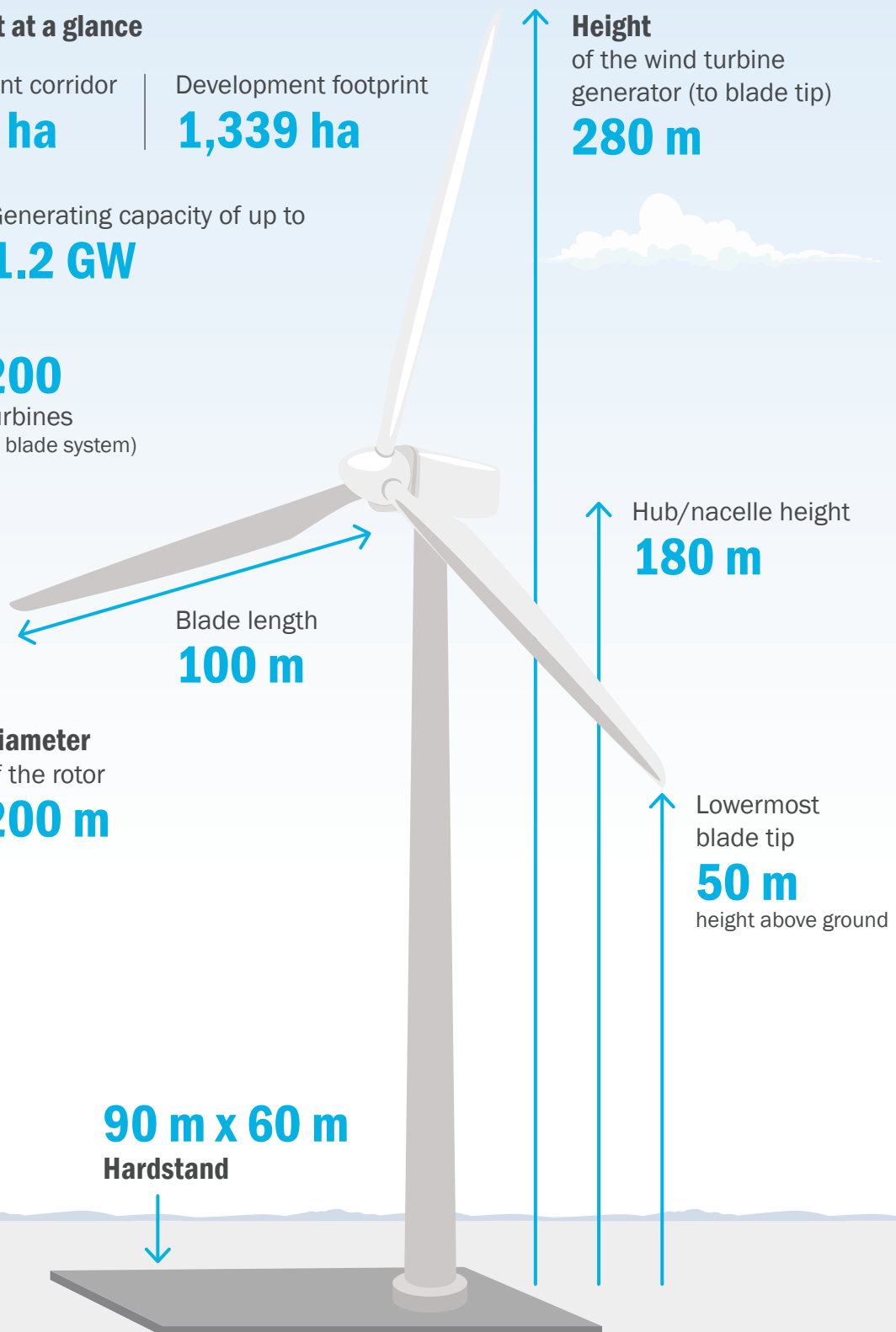
200

turbines
(3 blade system)



Diameter
of the rotor

200 m



Height

of the wind turbine
generator (to blade tip)

280 m

Hub/nacelle height

180 m

Blade length

100 m

Lowermost
blade tip

50 m

height above ground

90 m x 60 m

Hardstand

ES2.2 Site selection

The project area is ideally located for the development of a wind farm as it is:

- in an area with a strong wind resource
- within the South West REZ
- adjacent to approved transmission infrastructure – the Project EnergyConnect’s Dinawan Substation
- close to major transport networks – the Sturt and Newell highways
- distant from most residences – with all WTG locations more than 2 kilometres (km) from a non-associated residence, and only 23 non-associated residences within 8 km of a WTG
- within an agricultural area primarily used for grazing – with agricultural operations intended to continue within the project area during operation of the project
- sufficiently large to allow the development footprint to be refined within the development corridor to avoid impacts and to minimise residual impacts.

ES2.3 Project refinement

Since its inception, the development of the project has been flexible and iterative. The development corridor and development footprint in this EIS reflect an optimised envelope for the project infrastructure, based on consultation with regulatory and community stakeholders, environmental assessments, and the functional requirements of project infrastructure.

The project will be developed within a project area of approximately 39,061 hectares (ha).

Spark Renewables has maximised the avoidance of potential environmental impacts throughout the project refinement process. This followed the principles of limiting the project infrastructure footprint to the minimum required, avoiding higher value vegetation clearance where practicable, maximising the use of previously disturbed land, protecting significant heritage values where practicable, and minimising impacts on neighbouring (non-associated) landholders. Based on these principles, a development corridor of approximately 7,256 ha was defined within the project area.

Within the development corridor, the indicative extent of the project’s actual ground disturbance (e.g. all works, including temporary and permanent infrastructure) is defined as the development footprint, an area of approximately 1,339 ha. The development footprint has been sited to further minimise environmental and social impacts.

ES3 The project

A summary of key project components is provided in Table ES1 and Figure ES1. The project layout is provided in Figure ES2.

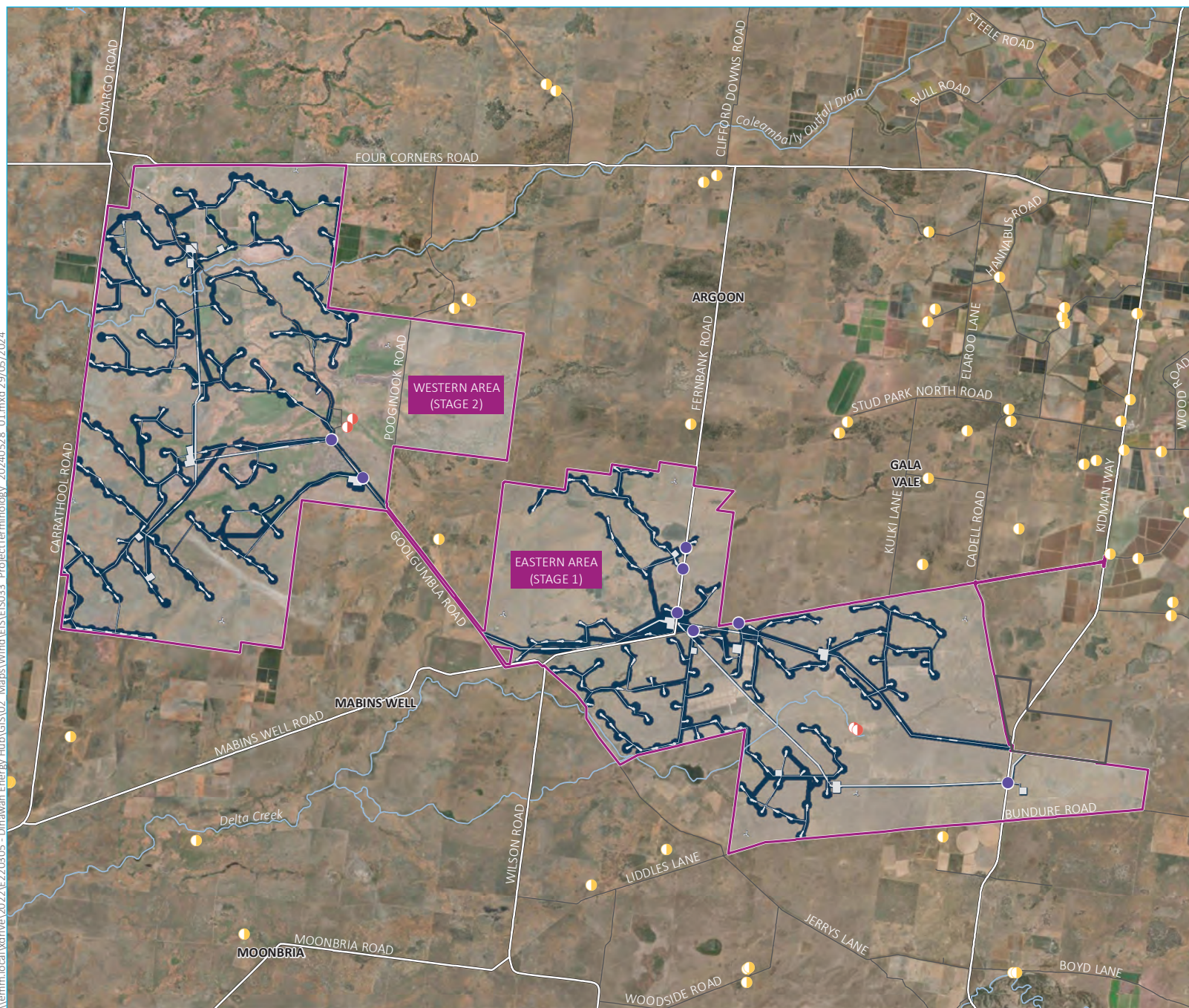
Table ES1 **Project overview**

Project element	Summary
Project area	The project area comprises 349 land parcels and is approximately 39,061 ha.
Development corridor	The development corridor (approximately 7,256 ha) is the envelope within which the project will be developed, providing the necessary flexibility for component placement during detailed design (i.e. micro-siting).
Development footprint (subset of development corridor)	The development footprint (approximately 1,339 ha) is the indicative extent of the project's ground disturbance area, including earthworks, associated with permanent infrastructure and temporary construction facilities. It is approximately 18% of the development corridor area. Approval is sought for disturbance equal to the total area of the development footprint. The exact location of the development footprint will be determined during detailed design.
Generation capacity	Approximately 1.2 GW(AC).
Project stages	The project area comprises an eastern area (within the Murrumbidgee local government area (LGA)) and a western area (predominantly within the Edward River LGA). The wind farm will be developed in two stages: • Stage 1 – eastern area • Stage 2 – western area.
Key infrastructure	• up to 200 WTGs (up to 280 m tall, ground to maximum tip height) including: – tower, nacelle, rotor and blades – concrete foundations – hardstand pad – electrical infrastructure • electrical collection system, collector substations and control rooms • electricity transmission line infrastructure (above ground and underground) • electricity transmission line infrastructure connecting the collector substations to the Dinawan Substation site • operation and maintenance (O&M) infrastructure, including: – site offices and amenities – equipment and maintenance sheds – laydown, storage and parking areas • other permanent infrastructure, including: – hardstands – water tanks – permanent meteorological monitoring masts (up to 200 m tall) – new/upgraded access tracks – access points from the public road network • temporary construction facilities, including: – worker accommodation facilities – construction compounds – site offices and amenities – concrete batching plants – construction materials storage (including stockpiles) – laydown areas – temporary meteorological monitoring masts (up to 200 m tall) – water tanks

Table ES1 **Project overview**

Project element	Summary
	– water and sediment management infrastructure – storage and parking areas – borrow pits.
Workforce	Approximately 600 personnel during peak construction. Up to 50 full-time employees and varying numbers of contractors during operation.
Hours of operation	Standard day-time construction hours (7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday) with some exceptions proposed for select works. Once operational, the project will operate continuously 24 hours per day, 7 days per week.
Project life	Construction: approximately 36 months for each stage (approximately 60 months total to allow for overlap between stages). Operation: 25–35 years with the potential to extend the operational life.
Roads	Site access points will be on Kidman Way, McLennons Bore Road, Fernbank Road and Goolgumbra Road. Upgrades to the local road network: • intersection improvements at: – Kidman Way/McLennons Bore Road – Kidman Way/Cadell Road (south) – Cadell Road/McLennons Bore Road – McLennons Bore Road/Fernbank Road – McLennons Bore Road/Wilson Road – Wilson Road/Goolgumbra Road • road upgrades on: – McLennons Bore Road – Fernbank Road – Cadell Road – Wilson Road – Goolgumbra Road. An internal network of access tracks within the development corridor will be used to access: • the eastern area from McLennons Bore Road and Fernbank Road • the western area from Goolgumbra Road.
Transport	• Maximum daily heavy vehicle movements (construction, upgrading and decommissioning): 176 • Maximum daily light vehicle movements (construction, upgrading and decommissioning): 462 Movements account for one vehicle entering the site and one vehicle leaving the site. Daily heavy vehicle movements exclude restricted access vehicles (RAVs), which will be used to transport WTG and infrastructure components from Port of Newcastle. Plant, equipment and other bulk construction materials will be sourced based on availability of suppliers/contractors.
Subdivision	Subdivision of lots may be required to create new allotments for the substations and switchyards.
Decommissioning and rehabilitation	All aboveground structures will be removed, and the land disturbed by the project will be rehabilitated to its pre-existing land use, as far as practicable unless otherwise agreed with landowners and regulators.

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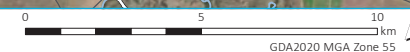
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Site access point
 - Project EnergyConnect (Transgrid)
 - Dinawan substation
 - Residence**
 - Associated
 - Non-associated
 - Existing environment**
 - Major road
 - Minor road
 - Watercourse (third order and higher)

Project layout

Dinawan Wind Farm
Environmental Impact Statement
Figure ES2



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)



ES4 Engagement

Spark Renewables has consulted with stakeholders, including neighbouring landholders, Murrumbidgee Council, Edward River Council, community groups, local Indigenous communities and local service providers since 2021 to build a local presence in the region.

A range of engagement methods have been employed. This engagement has been guided by the project's engagement plan that sets out a structured approach to engagement for the project's planning and approvals process.

The communication and stakeholder engagement objectives are as follows:

- Deliver an honest, innovative, flexible and transparent community engagement process.
- Engage with, and inform, local residents, the broader community and other stakeholders about the project, its benefits and potential impacts by providing timely and ongoing access to project information.
- Develop relationships with the community and other stakeholders to facilitate positive outcomes through the project for the community.

Initial engagement focussed on residences and landholders within 5 km of the project area, through phone calls, letter box drops and emails, coupled with broader engagement in the form of media releases, advertising and distribution of newsletters, leading up to two community information sessions held in December 2021. A survey was offered to the community information session attendees. Of the 28 attendees, 14 responded to the survey assessing potential project benefits, concerns, and community values.

Scoping phase engagement in 2022 included briefing meetings with First Nations people, business groups and landholders. Spark Renewables also engaged with Murrumbidgee Council, Edward River Council, local Members of Parliament (MPs), community groups and local service providers during this phase.

The engagement program continued during the preparation of the EIS in 2023 and 2024. This included engagement with government agencies, Murrumbidgee Council, Edward River Council, EnergyCo, nearby landholders, First Nations representatives, service providers, local businesses and the broader community.

Community views regarding the project have been varied and include positive and negative views on a range of topics. The majority of matters raised relate to the economic, environmental and social impacts of the project. These views are summarised in this EIS along with responses, including where the project has been revised in response to the feedback received.

ES5 Assessment of impacts

ES5.1 Landscape and visual

The project area has a highly modified visual character, generally characterised by flat, open land supporting agriculture.

The Landscape and Visual Assessment (LVIA) considered the potential visual impacts in accordance with the guideline *Wind Energy: Visual Assessment Bulletin for State Significant Wind Energy Development* (the Visual Bulletin) (DPE 2016). The visual impacts of the project were assessed against the visual performance objectives in the Visual Bulletin, including objectives for landscape character, public viewpoints, residence assessments, cumulative effects with other projects, shadow flicker, blade glint and aviation lighting.

A total of 22 non-associated residences within 8 km of WTG locations were assessed (one residence (R038) was excluded from the visual assessment as it is uninhabitable). Of these, 21 are likely to experience a negligible to low visual impact from the project, and one (R019) is likely to experience a high visual impact in the absence of mitigation measures. Mitigation measures, developed in consultation with the landowner, have been proposed to reduce visual impacts at R019.

Public viewpoints within the visual catchment of the project area were assessed. There are no key public viewpoints within 8 km of a WTG location.

Potential impacts from shadow flicker, blade glint and night lighting have been assessed. With the implementation of mitigation measures, no significant impacts are expected.

With the implementation of mitigation measures, the project will meet the performance objectives of the Visual Bulletin.

ES5.2 Noise and vibration

Noise and vibration were assessed for the construction and operations of the project.

Project construction is generally not predicted to exceed relevant construction noise criteria at non-associated residences. However during the construction phase, three non-associated residences (R019, R079 and R088) will temporarily be in a noise affected area, as defined by the *Interim Construction Noise Guideline* (DECC 2009). The residents will be consulted to determine appropriate measures to minimise the effects of any impacts.

With the implementation of feasible and reasonable work practices, construction activities and traffic noise will not have adverse impacts at any other non-associated residences in the vicinity of the development footprint.

Vibration criteria will not be exceeded at non-associated residences as a result of construction activities.

A draft construction noise management plan framework has been prepared in accordance with the *Interim Construction Noise Guideline* (DECC 2009) and will form the basis of the noise management plan that will be prepared prior to the start of construction.

Noise from WTG operation is predicted to comply with noise criteria determined in accordance with *Wind Energy: Noise Assessment Bulletin for State Significant Wind Energy Development* (DPE 2016c) at all non-associated residences. Similarly, noise levels from transformers are predicted to comply with noise criteria determined in accordance with the *Noise Policy for Industry* (EPA 2017) at all non-associated residences.

ES5.3 Biodiversity

A biodiversity development assessment report (BDAR) was prepared that documents the existing biodiversity and assesses the potential impact of the project on biodiversity.

The subject land (the development footprint and areas where indirect and prescribed impacts to biodiversity are predicted – approximately 31,384 ha) contains native vegetation in the form of native grasslands (natural and derived), Weeping Myall woodland, Black Box woodland, White Cypress Pine dominated sandhills and paleochannels; and wetlands and drainage systems that support seasonal and semi-permanent wetland habitats.

The iterative project design process has avoided the highest quality plant community types (PCTs) and threatened species habitat within the subject land to the extent possible. Residual impacts to biodiversity will include removal of:

- 1,145 ha of native vegetation requiring offsets (approximately 73% of which is Weeping Myall woodland in various condition states), including:
 - 604.7 ha of two NSW *Biodiversity Conservation Act 2016* (BC Act) listed threatened ecological community (TEC)

- 264.9 ha of two Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed TECs
- 144.5 ha of confirmed threatened species habitat requiring offsets
- 109.2 ha of habitat for threatened species assumed to be present (for which surveys are yet to be completed)
- 4 Yellow Gum individuals (assumed to be present in areas where surveys are yet to be completed)
- 29 scattered trees
- 15 hollow bearing trees.

Impacts to species and communities listed under the EPBC Act have been assessed. Significant impact assessments concluded that the project has potential to cause significant impacts to two TECs, Weeping Myall woodland and Natural Grasslands of the Murry Valley Plains, and two threatened species, Plains Wanderer and Superb Parrot.

Indirect impacts to biodiversity will be mitigated through the implementation of a biodiversity management plan and a bird and bat adaptive management plan (BBAMP). The BBAMP will detail the requirements for ongoing monitoring of bird and bat collisions during operations and will include adaptive management actions to address increased collision risk and unexpected fatalities.

Residual impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits. Payments into the Biodiversity Conservation Fund may also be made.

The project requires 24,521 ecosystem credits to compensate for impacts to native PCTs and ecosystem credit species. The project also requires 7,332 species credits for impacts to threatened species. These credit requirements may be reduced following completion of additional targeted surveys and further project refinement.

ES5.4 Aboriginal cultural heritage

An Aboriginal cultural heritage assessment (ACHA) was prepared that documents consultation with the local Aboriginal community and archaeological investigations to identify the extent and significance of any physical remains and intangible values of past Aboriginal visitation, use and occupation within the project area.

A total of 107 previously undocumented Aboriginal objects, sites or places were identified within and adjacent to the project area. These have been considered as 32 discrete sites and places, including a low-density distribution of predominantly surface and shallowly buried cultural materials distributed intermittently across an area of 896 ha. These sites predominantly contain surface stone artefacts, hearths and culturally modified trees.

Project refinement has resulted in the avoidance of 15 Aboriginal sites, with residual impacts to 17 sites within a 367-ha area. The project will result in a total loss of value to six moderate significance sites and partial loss in value of four sites of high significance, four of moderate and one of low value. Two sites of moderate significance will experience no loss of value, as identified cultural materials that inform the sites' significance would remain outside the development corridor and/or development footprint.

The ACHA provides mitigation measures developed in consultation with the RAPs. These include the development of an Aboriginal Cultural Heritage Management Plan to provide a framework for management of Aboriginal objects and sites during the pre-construction and construction phase and the exploration of heritage interpretation for the project. The Aboriginal Cultural Heritage Management Plan will detail the management of known Aboriginal sites and mitigation measures to further avoid and minimise impacts to Aboriginal heritage values in the development footprint, along with unanticipated finds procedures and training and reporting protocols.

ES5.5 Historical heritage

A historical heritage assessment identified historical heritage values within the project area through research and site investigations.

Eight historical heritage sites were identified within the project area. While all sites are outside the development footprint, five sites are intersected by the development corridor. Should amendments to the project's development footprint be required during further detailed design, direct impacts to identified heritage items within the development corridor will be avoided to the extent possible. Management measures for two sites are proposed if impacts to these sites cannot be avoided following detailed design. Indirect impacts to historical heritage sites are predicted to be low to negligible. An unexpected finds protocol will be implemented during construction to reduce potential impacts in the event that previously unrecorded historical objects are encountered.

ES5.6 Transport

A traffic impact assessment characterised the existing road network and assessed project traffic generation and the potential impacts. Proposed management measures, including road and intersection upgrades, are proposed to maintain or improve the operation of the road network.

The development footprint will be accessed from a total of eight site access points off Kidman Way, McLennons Bore Road, Fernbank Road and Goolgumbra Road.

Traffic generation during construction will include general access heavy vehicles and restricted access vehicles (including oversize/overmass vehicles) transporting project components, materials, plant and equipment to the project. Transport of workers will also generate traffic on the road network. At the peak of construction, it is anticipated that there will be up to 638 peak daily and 249 peak hourly vehicle movements.

Local road and intersection upgrades are proposed to accommodate the construction traffic. The level of service of key intersections and mid-block capacity on Kidman Way and McLennons Bore Road will not be adversely impacted by project construction traffic. No significant impacts to traffic flow or road safety are predicted.

During operation, traffic generated by the project will be significantly lower than during construction. Negligible transport impacts are predicted during operation.

With the implementation of the proposed road upgrades and traffic management measures, no significant transport impacts are predicted during construction, operations or decommissioning.

ES5.7 Water resources

A water resources assessment, including a flood study, was prepared that considers potential impacts to surface water and groundwater from the project.

The major watercourses in the project area are the Coleambally Irrigation Channel, Delta Creek and Coleambally Outfall Drain. Minor segments of Bublebundie Creek and Blind Creek traverse a portion of the western area of the project area. There are several ephemeral first and second order watercourses within the project area; in the eastern area these drain to Delta Creek, while in the western area they tend not to be permanently connected to a downstream channel.

The project design has minimised impacts to water resources by avoiding watercourses, infrastructure associated with Coleambally Irrigation Co-operative Limited, flood-prone areas and groundwater receptors to the maximum extent practicable. Project activities are not anticipated to intersect the regional water table and, therefore, groundwater availability for existing users is not expected to be impacted. Potential construction phase impacts, including degradation of surface water quality, physical impacts to watercourses, and altered water quantity from increased site runoff, will be avoided or minimised through the implementation of proposed mitigation measures.

The majority of infrastructure areas have been sited so that they are either free of flooding (for events up to a 1% annual exceedance probability) or subject to low flood hazard that is generally safe for people, vehicles and buildings. Residual flood risks will be managed through construction phase planning.

ES5.8 Air quality

Dust emissions from construction of the project are not anticipated to have significant impacts on nearby residences, and operational emissions from the project are expected to be negligible. Management measures will be implemented during construction to minimise dust emissions.

ES5.9 Land

A land and rehabilitation assessment considered potential impacts to land, soils and agriculture from the project.

The project will impact a very small amount of land within the South West REZ. The significance of the removal of LSC Class 4, 5 and 6 land will be minor, with the project removing approximately 0.12% of LSC Class 4 land mapped within the South West REZ.

Impacts to agriculture will be minimised as agricultural activities will continue within the development footprint during project operation.

The application of the proposed land, soil and erosion mitigation measures will prevent significant impacts on soil quality and quantity; erosion and sedimentation; and the introduction of weeds, pathogens and pest species.

With the implementation of effective land management procedures during construction and operations, and effective decommissioning and rehabilitation at the end of project life, the project will have no permanent impacts on agricultural resources or enterprises.

ES5.10 Bushfire

A bushfire assessment report was prepared for the project. A portion of the project area is on designated bushfire-prone land. Bushfire risks will be managed through design and management measures in accordance with *Planning for Bushfire Protection* (NSW RFS 2019), *a Guide to Developing a Bush Fire Emergency Management and Evacuation Plan* (NSW RFS 2014) and applicable standards.

Mitigation measures will be implemented to reduce and manage risks from bushfire and will include provision of on-site static water supply, mobile water supplies with a minimum capacity of 500 L each (e.g. vehicle-mounted tanks or standalone tankers), as well as a fire management plan and a bushfire emergency management and evacuation plan prepared in consultation with RFS (including Argoon Rural Fire Brigade). With the implementation and maintenance of the mitigation measures, the bushfire risk associated with the project will comply to the objectives and specific performance criteria of *Planning for Bushfire Protection* (NSW RFS 2019).

ES5.11 Hazards and risk

Hazards and risks associated with telecommunications, health, dangerous goods, blade throw and aviation safety were assessed.

The aviation impact assessment determined that risks associated with the project are tolerable with the implementation of mitigation measures, which includes consultation with relevant stakeholders.

The telecommunications impact assessment, human health assessment, preliminary risk screening and blade throw assessment found hazards and risks to be acceptable/negligible and no further mitigation is required.

In summary, no significant risks and hazards were identified for the project.

ES5.12 Social impact

Social impacts to the local and regional area will be largely associated with the demand for labour and the influx of the construction workforce, which will affect access to services, perceptions of safety and local community dynamics. Key social benefits will be predominantly associated with project employment, training, and business opportunities relating to direct and indirect economic activity from the project. Mitigation and enhancement strategies are proposed to minimise negative consequences and maximise the social benefits to the local community.

Spark Renewables, Murrumbidgee Council and Edward River Council have agreed on a community benefit sharing program that is predominantly delivered in partnership with the respective councils through voluntary planning agreements.

An adaptive management approach is proposed, allowing Spark Renewables to manage and respond to changing circumstances and new information through ongoing monitoring and periodic review of mitigation strategies allowing for modification if required. This adaptive approach will facilitate the effective management of social impacts and the enhancement of social benefits experienced by the community.

ES5.13 Economic

The construction and operation of the project will have net positive impacts on the level of economic activity in the regional and NSW economy by generating approximately 600 direct jobs during peak construction and 50 full time equivalent direct jobs throughout operations.

The construction and operation of the project will have net positive impacts on the level of economic activity in the regional and NSW economy, contributing to an annual average of:

- \$351 million and 967 direct and indirect jobs across the State during construction
- \$380 million and 195 direct and indirect jobs across the State during operations.

Spark Renewables will work in partnership with Murrumbidgee Council, Edward River Council and the local community to minimise potential impacts and maximise benefits to the regional economy.

ES5.14 Waste

Waste will be generated during each phase of the project, with the majority of waste generated during construction and decommissioning.

All waste produced by the project will be managed in accordance with the waste hierarchy, and will be classified, stored and handled in accordance with the *Waste Classification Guidelines – Part 1: Classifying Waste* (EPA 2014).

It is anticipated that the volumes of construction and decommissioning waste may exceed the capacity of the waste management facilities locally. Waste will be managed through commercial agreements with contractors and local councils. The implementation of the waste management plan will ensure that waste is suitably segregated, handled, and managed so local businesses and the local community are not disadvantaged by exhausting available capacity at local waste facilities.

ES5.15 Cumulative

There are a range of renewable electricity generation and transmission developments proposed in the South West REZ in the vicinity of the project, including transmission infrastructure for electricity distribution. The approval and successful construction of the transmission infrastructure, along with the outcomes of the competitive South West REZ transmission access process and securing of planning approvals, will be key factors in determining which projects will be built.

The cumulative impacts of employment and workforce, housing and short-term accommodation, regional economy, agricultural production, population change, services, amenity, traffic, and biodiversity have been assessed. There is the potential for cumulative social benefits and impacts, primarily due to the influx of workers and increased economic activity associated with the simultaneous construction of multiple renewable energy projects.

The project's construction accommodation facilities will minimise the contribution of the project to the negative cumulative impacts of projects in the region by ameliorating increased demand for labour and accommodation. The low population density and traffic volumes around the project area will minimise the potential for cumulative amenity and traffic impacts. The cumulative impact of projects within the South West REZ will result in a reduction in the extent of native vegetation and TECs within the region which will be offset through the retirement of biodiversity credits.

ES6 Project justification and conclusion

The project will contribute to the energy generation and storage targets for the South West REZ, with an indicative capacity of 1,200 MW, playing an important part in achieving the NSW Government's REZ objectives.

The project will:

- contribute to energy security and reliability in NSW by diversifying the State's energy mix as large-scale coal-fired power electricity generation is retired
- contribute to reducing greenhouse gases emissions from electricity generation, reducing the impacts of climate change and the community and the environment
- align with Commonwealth and NSW Government electricity policies and strategies and regional plans
- provide ongoing economic benefits for both the local economy within the Murrumbidgee LGA and Edward River Council and more broadly, the regional economy.

Potential impacts have been identified through the EIS technical assessments and community engagement. The project has been designed iteratively, avoiding potential impacts, where practical. Where potential impacts cannot be avoided, Spark Renewables has minimised environmental impacts and/or proposed mitigation measures to manage the extent and significance of residual impacts. Residual biodiversity impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits. Payments into the Biodiversity Conservation Fund may also be made.

The impacts have been assessed and can be adequately managed through the proposed design and mitigation and management measures proposed to be implemented during construction and operations. On balance, it is considered that the project is in the public interest.

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1 Introduction

1.1 Background

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Wind Farm (the project). The project includes the installation, operation, maintenance and decommissioning of up to 200 wind turbine generators (WTGs), and associated infrastructure. The project is on the traditional lands of the Wiradjuri people and several smaller nations of the Murrumbidgee plains, about halfway between the towns of Coleambally and Jerilderie. The project lies within the Murrumbidgee and Edward River local government areas (LGAs) in New South Wales (NSW). The regional context of the project is shown in Figure 1.1.

The project is within the South West Renewable Energy Zone (REZ), a region selected by the NSW Government for its significant potential for renewable electricity generation and regional development.

The project will connect to the Dinawan Substation as part of the Project EnergyConnect interconnector between Robertstown in South Australia and Wagga Wagga in NSW. The substation and interconnector are a separate approved project that is being built by Transgrid.

The main objective of the project is generation of electricity from renewable sources, consistent with NSW Government policy for renewable energy generation and storage. The project will have a generation capacity of up to approximately 1,200 megawatts (MW) (AC), equivalent to the demand of more than 700,000 NSW households. The project will significantly contribute to the government's planned 3.98 gigawatt (GW) network capacity for the South West REZ (NSW Government 2023). It will assist in meeting NSW and Australian Government emissions reduction targets and will abate approximately 3.2 million tonnes of greenhouse gas (GHG) emissions annually.

1.2 Project overview

The project will be developed within a project area of approximately 39,061 hectares (ha). A development corridor has been defined within the project area, an area of approximately 7,256 ha. The project will be developed within this corridor. The development corridor provides flexibility for infrastructure (including wind turbines) placement during detailed design. Within the development corridor, the indicative extent of the project's actual ground disturbance (e.g. earthworks, permanent infrastructure, temporary construction facilities) is defined as the development footprint, an area of approximately 1,339 ha. The development corridor and footprint have been refined throughout the assessment process to avoid impacts where possible and to minimise unavoidable impacts. It has been informed by the outcomes of community and stakeholder engagement and the findings of the environmental, social and economic assessments. This refinement process is described further in Section 2.7.

The project will comprise the following key components:

- a network of up to 200 three-blade WTGs with a maximum blade tip height of 280 m
- electrical connection system, collector substations and control rooms
- electricity transmission line infrastructure (above ground and underground)
- electricity transmission line infrastructure connecting the collector substations to the Dinawan Substation site

- temporary construction infrastructure, including workforce accommodation, construction compounds, site offices and amenities, concrete batching plants, construction materials storage (including stockpiles), laydown areas, temporary meteorological monitoring masts (up to 200 m high), water tanks, water and sediment management infrastructure, storage and parking areas and borrow pits
- permanent supporting infrastructure, including operation and maintenance (O&M) infrastructure (including site offices and amenities, equipment and maintenance sheds and laydown, storage and parking areas), hardstands, water tanks and up to 10 permanent meteorological monitoring masts (up to 200 m high)
- site access and internal access roads, including access points from Kidman Way, Fernbank Road, Goolgumbra Road, Willson Road and McLennons Bore Road
- road upgrades to facilitate the delivery of project infrastructure to the development corridor.

1.3 The applicant

The applicant is Dinawan Energy Hub Pty Ltd as trustee for Dinawan Energy Hub Trust, a wholly owned subsidiary of Spark Renewables.

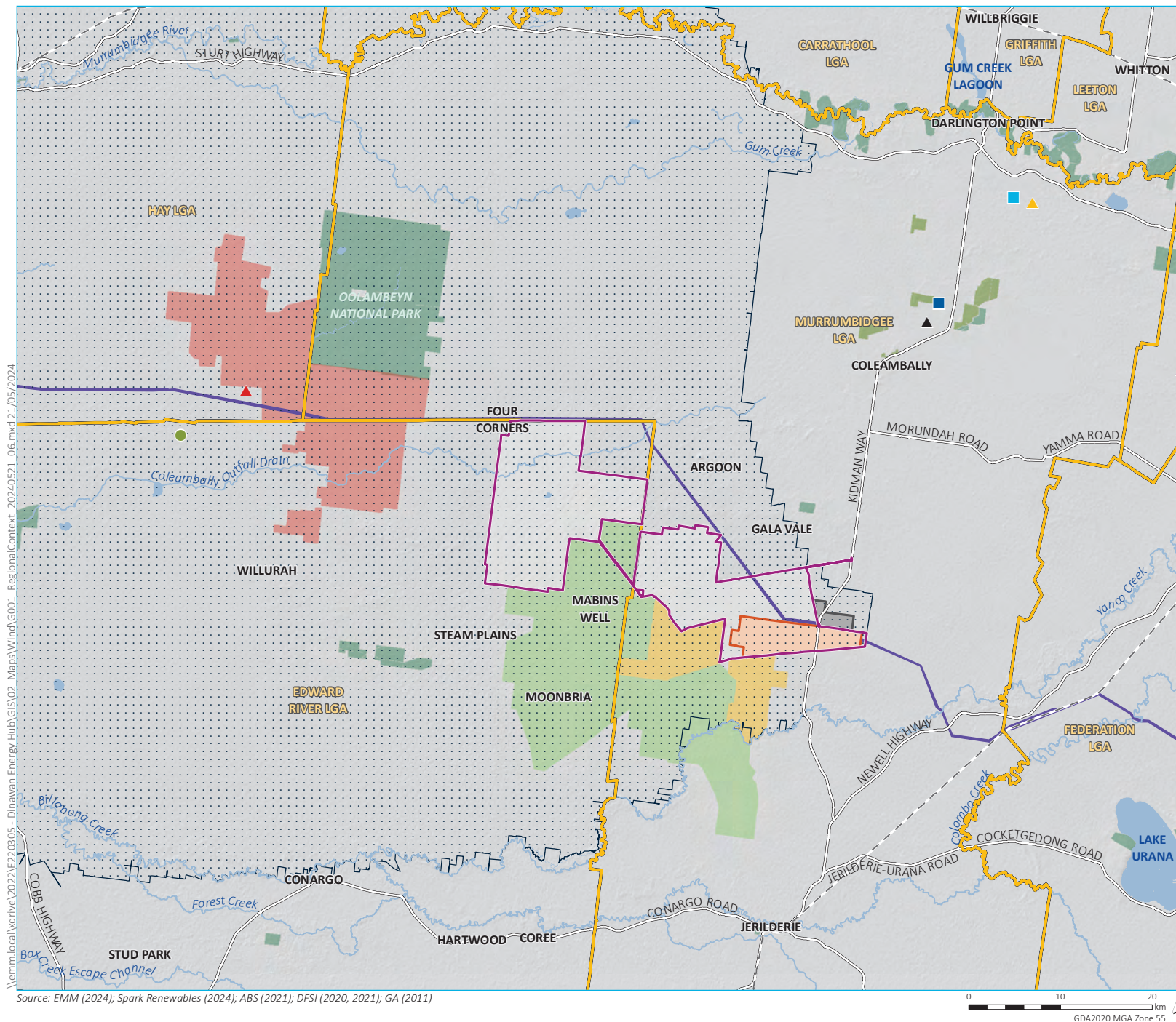
Spark Renewables is a leading developer, long-term owner, and operator of Australian renewable energy projects. The company's portfolio comprises the Bomen Solar Farm, operational since 2020, and a number of projects in the development phase. Spark Renewables is currently developing more than 7 GW of solar, wind, and renewable storage projects across the National Electricity Market (NEM), including the Dinawan Energy Hub, Mallee Wind Farm, Mallee Solar Farm and Wattle Creek Solar Farm, within NSW. Dinawan Energy Hub Pty Ltd's details are provided in Table 1.1.

Spark Renewables is a wholly owned business within Tenaga Nasional Berhad (TNB), which is the largest electricity utility in Malaysia and also the largest publicly-listed power company in south-east Asia. With the core business of providing electricity to businesses, homes and industries, TNB's activities encompass the entire electricity production and supply value chain.

In recent years, TNB has embarked on a sustainability agenda, highlighting its commitment to decarbonisation and renewable energy initiatives. TNB strives to fulfill its commitments as outlined in its Net Zero 2050 Aspiration Plan to attain both net-zero emissions and a coal-free energy portfolio by 2050, as well as implementing other environmental and social initiatives adding value to all stakeholders and the global community.

Table 1.1 **Applicant details**

Company name	Dinawan Energy Hub Pty Ltd
Contact	Julian Kasby
ACN	646 054 524
Address	Level 4, 1A Rialto Lane Manly NSW 2095 Australia



- KEY**
- Project area
 - Dinawan Solar Farm project area
 - Renewable Energy Zone
- Project EnergyConnect (Transgrid)**
- Dinawan Substation
 - Transmission line
- Neighbouring renewable energy developments**
- ▲ Coleambally Solar Farm (operating)
 - ▲ Darlington Point Solar Farm (operating)
 - Coleambally BESS (approved)
 - ▲ Yarrabee Solar Farm (approved)
 - ▲ Pottinger Solar Farm (proposed)
 - Pottinger Wind Farm (proposed)
 - Woodland BESS (proposed)
 - Yanco Delta Wind Farm (approved)
 - Argoon Wind Farm (proposed)
 - Bullawah Wind Farm (proposed)
- Existing environment**
- Rail line
 - Major road
 - Named watercourse
 - Named waterbody
 - NPWS reserve
 - State forest
 - Local government area

Regional context

Dinawan Wind Farm
Environmental Impact Statement
Figure 1.1



1.4 Related development

The project is part of the Dinawan Energy Hub, a wind farm, solar farm and battery energy storage system (BESS) project. Dinawan Energy Hub has a potential capacity of up to 2 GW based on the land available and capacity of the Dinawan Substation. Preliminary resource monitoring indicates that a mix of approximately 70% wind and 30% solar generation would result in a relatively flat, diurnal electricity generation profile. That is, the strong solar resource during the daytime complements the high level of wind resource that peaks overnight, balancing generation over a 24-hour period.

Two separate, but related, State significant development (SSD) applications for the Dinawan Energy Hub are being submitted to the NSW Department of Planning, Housing and Infrastructure (DPHI):

- Dinawan Solar Farm (SSD-50725959) – comprising a large-scale solar development up to 800 MW, including a BESS
- Dinawan Wind Farm (SSD-50725708) – comprising a large-scale wind development up to 1.2 GW.

This environmental impact statement (EIS) addresses the Dinawan Wind Farm. A separate development application and EIS has been submitted for the Dinawan Solar Farm.

Dinawan Energy Hub will connect to Project EnergyConnect's Dinawan Substation (Figure 1.1). The hub is approved by State significant infrastructure (SSI) approval SSI-9172452 and is currently under construction.

The land within the project area currently supports agricultural production, predominantly for sheep and cattle grazing. During operation, land within the project area is intended to continue to support sheep grazing; providing complementary wind energy electricity generation and agricultural production.

1.5 Purpose of this document

The project is SSD pursuant to schedule 1 of State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP), as discussed in Chapter 4. Accordingly, approval for the project is required under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This EIS has been prepared by EMM Consulting Pty Limited (EMM) on behalf of Spark Renewables in accordance with the *State significant development guidelines – preparing an environmental impact statement* (EIS Guidelines) (DPE 2022a). Other NSW Government SSD technical guidelines have been considered where applicable, as well as the *Wind Energy Guideline for State significant wind energy development* (DPE 2016a) and the *Draft wind energy guideline* (DPE 2023a).

This EIS describes the project, the existing environment, planning considerations and the statutory context for the project, potential impacts, mitigation measures, residual impacts and engagement undertaken. It is informed by the technical assessments contained in the appendices and provides an overview of these assessments. It addresses the Secretary's Environmental Assessment Requirements (SEARs) issued by DPHI and the appended agency requirements. A table indicating where the SEARs are addressed within this EIS is provided in Appendix A.

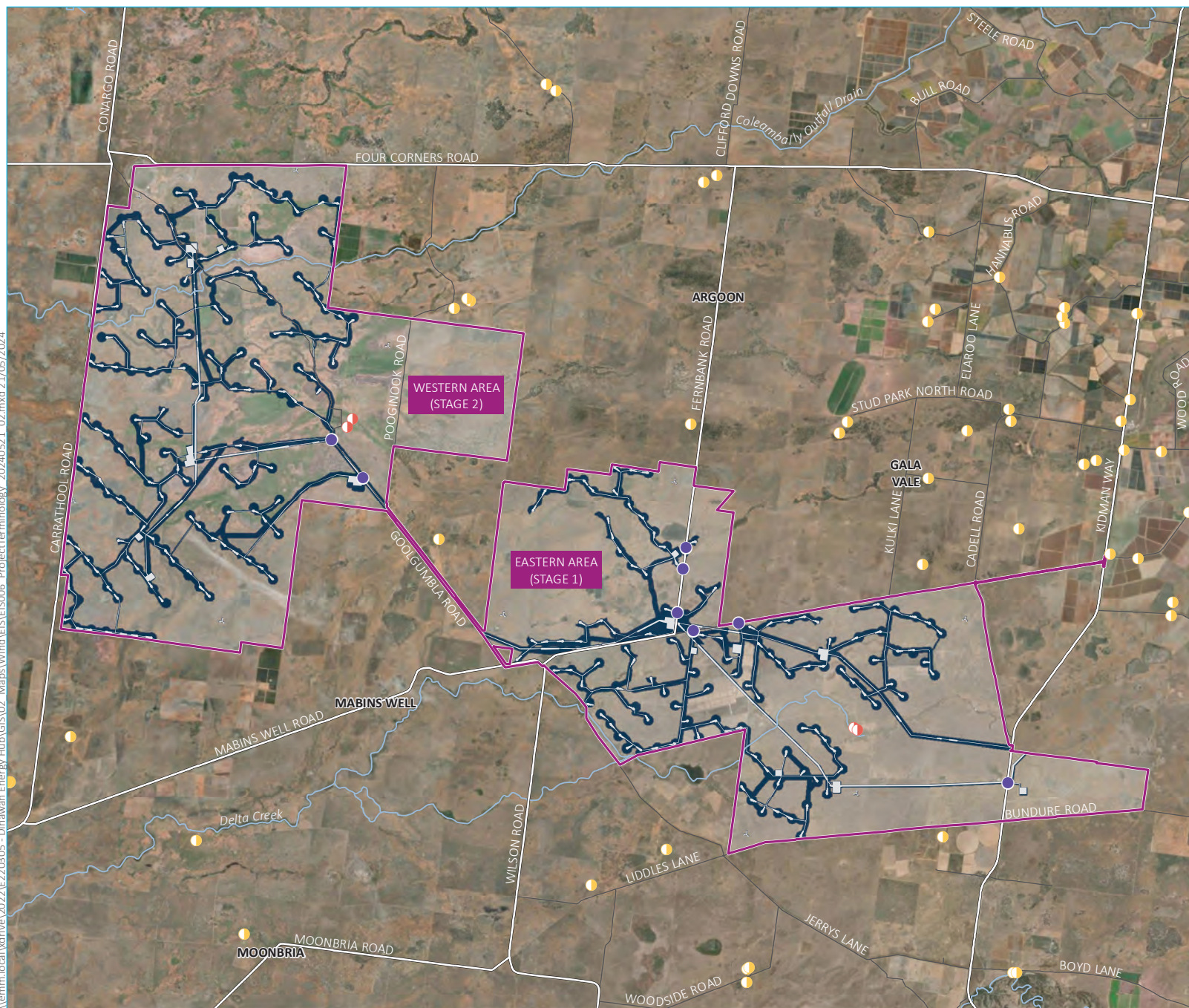
1.6 Terminology

The following terms are used throughout this EIS and are shown in Figure 1.2:

Project area: The project area comprises the land required for the project and is separated in two areas: an eastern area (stage 1) and a western area (stage 2). The project area contains the entirety of all 349 lots (Appendix F and

- Figure 3.2) that overlap with the development corridor and is approximately 39,061 ha. There are two private landholders owning land within the project area. The project area includes parts of Goolgumbula Road, Wilson Road, Fernbank Road, McLennons Bore Road and Kidman Way (including the road easement) and Coleambally Outfall Drain.
- **Development corridor:** The development corridor is an outer envelope within which project components may be placed, providing the necessary flexibility for component placement during detailed design (i.e. micro-siting). The development corridor is approximately 7,256 ha. Approval is sought for disturbance equal to the extent of the development footprint (1,339 ha), which will be wholly within the development corridor. The development corridor has been refined based on the results of environmental surveys, including biodiversity and Aboriginal cultural heritage surveys, and with consideration of community and regulatory stakeholder feedback.
- **Development footprint:** The indicative extent of the project's actual ground disturbance, including earthworks, associated with permanent infrastructure and temporary construction facilities. The development footprint will be within the development corridor; however, its exact location will be confirmed following detailed design. Total ground disturbance is not expected to exceed approximately 1,339 ha.
- **Site access points:** Locations where traffic will access the project from the public road network. Access within the development footprint will be via internal tracks.
- **Associated residence:** A dwelling whose owners have parts of their property included in a land agreement with Spark Renewables for the project (i.e. host landholder dwellings).
- **Non-associated residence:** A dwelling whose owners do not have parts of their property included in a land agreement with Spark Renewables for the project.

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- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Site access point
 - Residence**
 - Associated
 - Non-associated
 - Existing environment**
 - Major road
 - Minor road
 - Watercourse (third order and higher)

Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)

Project terminology

Dinawan Wind Farm
Environmental Impact Statement
Figure 1.2



2 Strategic context

2.1 Project need and objectives

The project would have the ability to generate up to 1,200 MW (AC) of renewable energy, playing an important role in the transition to a clean and efficient national electricity system. The project construction and operation will also contribute to the long-term economic prosperity of the host region. The following sections describe the policies and objectives relevant to the strategic objectives of the project.

2.2 Ecologically sustainable development

2.2.1 National electricity demand

The Australian Energy Market Operator's (AEMO) *Draft 2024 Integrated System Plan (ISP)* (AEMO 2023) forecasts significant growth in energy demand in the NEM, due to the “retirement of coal-fired generation, and the switch to electricity for our future transport, heating, cooling, cooking and industrial needs”. AEMO predicts that the total capacity of utility scale wind and solar will need to increase by seven-fold by 2050, from 19 GW to 126 GW. The project will help meet energy demands by providing up to 1.2 GW of renewable energy capacity to the NEM.

The project will connect to the NEM via the Dinawan Substation, a new substation being built as part of Project EnergyConnect. Project EnergyConnect is a new 330 kilovolt (kV) interconnector between NSW and South Australia, which will further strengthen the security and reliability of the NEM. The South West REZ has been designed around the new transmission line and the Dinawan Substation will be a key connection point within the REZ.

The project will contribute low-cost electricity generation at a strategic location adjacent to the Dinawan Substation. Construction of the project could alleviate the need for additional infrastructure in the South West REZ, subject to detailed grid modelling and determination of the projects selected in the South West REZ Access Scheme.

2.2.2 Climate change policy

The Commonwealth and all NEM state governments have committed to transitioning to a net zero emission economy by 2050 or sooner. The project will support this transition by contributing to the national target of 82% of NEM generation supplied from renewables by 2030.

The project will help achieve the objectives of the Commonwealth Government's Large Scale Renewable Energy Target (LRET), Paris Agreement targets and the NSW Government's Net Zero Plan and Energy Roadmap legislation.

2.2.3 Regional economic stimulus

As described in Section 6.13, the project will provide economic opportunities including:

- ongoing economic benefits for both the local economy within the Murrumbidgee and Edward River LGAs, and the regional economy within the Riverina more broadly, including:
 - demand for local and regional materials, equipment and services
 - industry capability development
 - a community benefit sharing program delivered in partnership with Murrumbidgee Council and Edward River Council through a Voluntary Planning Agreement (VPA) (refer Section 5.7)

- community initiatives funded by the project's South West REZ Access fee
- employment opportunities during construction and operation.

2.2.4 Strategic planning framework

An outline of how the project will contribute to achieving the objectives of international, national, state, regional and local government policies, plans and strategies is summarised in Table 2.1.

Table 2.1 Alignment with key strategic planning frameworks

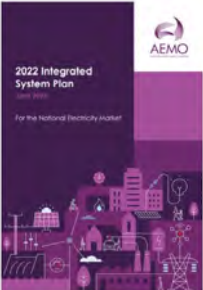
Plan, policy or strategy	Description	Alignment with strategic framework
International context		
The Paris Agreement 	The Paris Agreement is a legally binding international treaty on climate change adopted by 196 parties in 2015 which aims to limit global temperature increase to 1.5°C above pre-industrial levels. As a signatory to the agreement, the Australian Government has committed to reduce GHG emissions by 43% on 2005 levels by 2030.	The project will contribute to meeting Australia's commitments under the Paris Agreement by reducing the NEM's annual GHG emissions. Once operational, the project could abate approximately 3.2 million tonnes of GHG annually and power the equivalent of up to 700,000 NSW households.
National context		
Large-scale Renewable Energy Target (LRET) 	The Australian Government Clean Energy Regulator administers the LRET which incentivises investment in renewable energy power stations such as wind and solar farms. The LRET of 33,000 GWh of additional renewable electricity generation was met at the end of January 2021 (Clean Energy Regulator 2021). The annual target of additional renewable electricity generation will remain at 33,000 GWh until the scheme ends in 2030.	It is noted that the annual target has been met and will remain at 33,000 GW hours until the scheme ends in 2030.
Draft 2024 Integrated System Plan (ISP) 	The Draft 2024 ISP (AEMO 2023) will be finalised in June 2024. The plan is "a roadmap for the energy transition in the NEM over at least the next 20 years, in line with government policies to reach a net zero economy by 2050." REZs are identified in the Draft 2024 ISP as "high-quality resource areas where clusters of large-scale renewable energy projects can be developed using economies of scale" (AEMO 2023). The Draft 2024 ISP identifies that significant investment in the NEM is necessary, requiring a seven-fold increase in utility-scale variable renewable energy. REZs have been identified as the focus for grid-scale renewable electricity generation due to access to quality renewable resources, existing and planning transmission and a skilled workforce.	The project will contribute to the development of the South West REZ, and the NEM more broadly, by providing reliable, secure and affordable electricity to consumers. The project is strategically located adjacent to the Dinawan Substation, approved as part of Project EnergyConnect, so minimal transmission infrastructure between the project area and the Dinawan Substation is required for grid connection.

Table 2.1 Alignment with key strategic planning frameworks

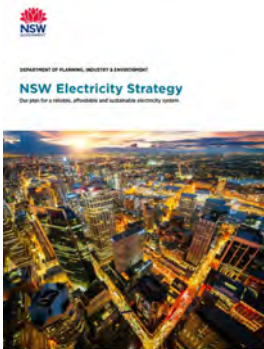
Plan, policy or strategy	Description	Alignment with strategic framework
	The ISP identifies network projects within the South West REZ, including Project EnergyConnect, HumeLink and the Wagga Wagga to Dinawan section of the Victoria to NSW Interconnector (VNI) West, which are either committed (already underway) or actionable (work should commence at earliest possible time).	
<i>Net Zero 2050</i> 	In October 2021, the Australian Government released its <i>Long-Term Emissions Reduction Plan</i> (Australian Government 2021) to achieve net zero emissions by 2050. The plan aims at reaching a net zero economy through a technology-based approach, whilst protecting relevant industries, regions and jobs. It is part of an overarching strategy for emission reduction, based on a technology-led approach which includes a Technology Investment Roadmap and its Low Emissions Technology Statements.	The project will reduce GHG emissions associated with electricity generation over its operational life. The project will contribute to the Commonwealth Government's plan to reduce Australia's GHG emissions by 43% by 2030, and net zero emissions by 2050, with 82% of Australia's energy to be derived from renewables by 2030. Once operational, the project could abate approximately 3.2 million tonnes of GHG annually and power the equivalent of up to 700,000 NSW households.
State context		
<i>NSW Electricity Strategy</i> (DPIE 2019) 	The <i>NSW Electricity Strategy</i> (DPIE 2019) is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy and sets out an approach to respond to emerging energy security challenges. The Strategy recognises that where variable generators are unable to satisfy demand, other technologies that can provide electricity on demand (such as storage) are required. Principle 1 of the NSW Electricity Strategy acknowledges that renewable electricity generation is the cheapest form of reliable electricity generation and calls upon investment into these technologies to reduce electricity prices and ensure network reliability.	With intended network capacity of around 1,200 MW, the project will contribute to the development of the declared South West REZ. The REZ will in turn meet the aims of the Electricity Strategy by contributing energy to support a secure, reliable energy system. This region has been formally identified as an ideal location to play a key role in renewable electricity generation due to an abundance of high-quality wind and solar resources, proximity to existing and planned high voltage transmission (e.g. Project EnergyConnect, HumeLink and VNI West), land-use compatibility and a strong pipeline of proposed projects.
<i>NSW Network Infrastructure Strategy</i> (EnergyCo 2023a) 	The <i>NSW Network Infrastructure Strategy</i> (EnergyCo 2023a) outlines the strategy for the practical coordination of NSW network infrastructure connecting new generation, firming and storage across the REZs in NSW.	The project is consistent with, and leverages, the 'Deliver Now' objectives for the South West REZ within the <i>NSW Network Infrastructure Strategy</i>, as it contributes to meeting the target of 2.5 GW of network capacity to the South West REZ via ISP projects, Project EnergyConnect, HumeLink and Wagga Wagga to Dinawan section of VNI West. It is noted that this network capacity target has since increased to 3.98 GW.

Table 2.1 Alignment with key strategic planning frameworks

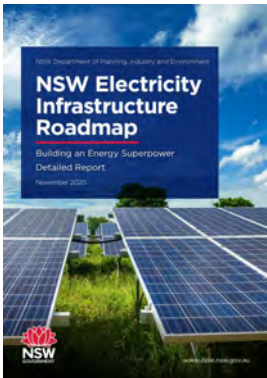
Plan, policy or strategy	Description	Alignment with strategic framework
<i>Net Zero Plan Implementation Update 2022</i> (DPE 2022b) 	The <i>Net Zero Implementation Update 2022</i> (DPE 2022b) outlines the NSW Government's plan to grow the economy and create jobs while helping the state to deliver a 70% cut in emissions by 2035, compared to 2005 levels.	The project contributes to Priority 1 of the Net Zero Plan: "Drive uptake of emissions reduction technologies that also support economic growth, or reduce cost of living or doing business." The project is within the South West REZ. The region will play a key role in a renewable energy future for NSW due to its good renewable energy resources and opportunity to utilise electricity network infrastructure. The project will utilise these benefits to contribute to the NSW Net Zero Plan.
<i>NSW Electricity Infrastructure Investment Roadmap</i> (DPIE 2020a) 	The NSW Electricity Infrastructure Investment Roadmap (DPIE 2020a) coordinates investment in transmission, generation, storage and firming infrastructure as ageing coal-fired generation plants retire. The roadmap includes actions that will deliver "whole-of system" benefits. The roadmap sets out a plan to deliver the state's first five REZs in the Central-West Orana, New England, South-West, Hunter-Central Coast, and Illawarra regions.	The project is within the South West REZ and is ideally placed to contribute to the success of the roadmap. Once operational, the project could power the equivalent of up to 700,000 NSW households.
<i>NSW Energy Security Target and Safeguard</i> (DPIE 2020b) 	The objective of the <i>NSW Energy Security Target and Safeguard</i> (DPIE 2020b) is to give the market certainty on the amount of new electricity generation and distribution capacity that is needed to deliver a reliable energy system over the medium to long term, in response to the retirement of several large coal-fired generators. The NSW Energy Security Target and Safeguard is established under the <i>NSW Electricity Infrastructure Investment Act 2020</i> and is equivalent to the maximum demand experienced in NSW every 10 years, plus a reserve margin. AEMO has been appointed as the Energy Security Target Monitor and its first report released in December 2021 (AEMO 2021) predicts a target breach over the 2029–30 period (i.e. that there will be insufficient infrastructure to meet the Energy Security Target). This signals the urgent need for new generation and transmission infrastructure to ensure energy security for NSW consumers.	The project will contribute additional electricity generation to the NEM and will assist in ensuring energy security for NSW consumers.

Table 2.1 Alignment with key strategic planning frameworks

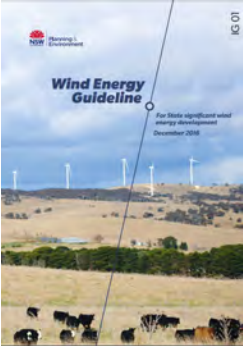
Plan, policy or strategy	Description	Alignment with strategic framework
<i>Wind Energy Guideline</i> (DPE 2016a) 	The <i>Wind Energy Guideline</i> (DPE 2016a) provides the community, industry, applicants and regulators with guidance on the planning framework for the assessment of large-scale wind projects and identifies the key planning considerations relevant to wind energy development in NSW. It is noted that the <i>Wind Energy Guideline</i> is currently being revised with a <i>Draft Wind Energy Guideline</i> published in November 2023. As the majority of technical assessments were undertaken prior to the finalisation of the updated guideline, the 2016 guideline has been the basis for the assessment for the project.	Site selection and impact assessment considerations detailed in the guideline have been used to inform the project and are considered in this EIS.
Local and regional context		
<i>Riverina Murray Regional Plan 2041</i> (DPE 2023b) 	The <i>Riverina Murray Regional Plan 2041</i> (DPE 2023b) (the Regional Plan) provides the NSW Government's vision for land use within the Riverina Murray region, which includes the Murrumbidgee LGA. A key outcome of the Regional Plan is to: "support the transition to a net zero carbon emission State by 2050, including enabling the establishment of the South West REZ". Objective 13 of the Regional Plan is to support the NSW Government's transition to net zero by 2050. The Regional Plan acknowledges that the region's climate, resources and strategic connections to utility infrastructure (including Project EnergyConnect) create significant potential for renewable energy industries.	The project directly contributes to Objective 13 of the Regional Plan by: - contributing to the national renewable energy target - promoting energy security through a more diverse energy mix - investigating areas within the region with renewable energy potential and ready access to connect with the electricity network - increasing energy efficiency - moving to lower emission energy sources. The project will also support the development of the South West REZ.
<i>Western Riverina Regional Economic Development Strategy – 2023 Update</i> (Department of Regional NSW 2023) 	The <i>Western Riverina Regional Economic Development Strategy – 2023 Update</i> (Department of Regional NSW 2023) guides the long-term economic vision and associated strategy for the Western Riverina region, which includes the Murrumbidgee, Narrandera, Leeton, Griffith and Carrathool LGAs. The strategy identifies the trend of renewable energy investment in the Western Riverina region, with a key focus on investment benefits being shared equitably across communities. It identifies a challenge where solar farms pose potential land use conflict with agricultural use, which is deemed as the region's economic specialisation. Investment in renewable energy infrastructure within the South West REZ is considered an opportunity to improve transmission connections in the area, where network capacity is currently limited. The strategy also identifies job creation as a key opportunity relating to renewable energy investment.	Renewable energy projects in the region are considered a strength for the region's economic pipeline. The project will contribute to economic growth and resilience and liveability within the region, providing employment opportunities and a community benefit sharing program community benefit schemes. Sheep grazing within the development corridor is intended to continue throughout operation, supporting the continuation of the existing agricultural land use and addressing land use conflict challenges identified in the strategy.

Table 2.1 Alignment with key strategic planning frameworks

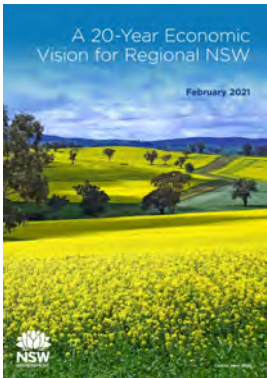
Plan, policy or strategy	Description	Alignment with strategic framework
<i>A 20-Year Economic Vision for Regional NSW</i> (NSW Government 2021) 	<i>A 20-Year Economic Vision for Regional NSW</i> (NSW Government 2021) presents a strategy with NSW government priorities for Regional NSW. The strategy provides an overview of the current economic and demographic environment, including the external economic forces impacting regional growth.	The strategy recognises a significant economic opportunity in the Western Riverina, where the South West REZ is expected to draw in private investment and diversify regional development and employment opportunities. The project will allow for investment opportunities in renewable energy, particularly in the upskilling and reskilling of workers to drive employment and economic growth.
<i>Murrumbidgee Council Economic Development Strategy</i> (Murrumbidgee Council 2019) 	The <i>Murrumbidgee Council Economic Development Strategy</i> (Murrumbidgee Council 2019) aims to guide economic development activity in the Murrumbidgee LGA. To support its implementation, six strategic themes are identified: • attract new business investment • support existing business to grow and diversify • education, training and skills development • grow the population • infrastructure • develop and promote tourism.	The project will bring new investment and employment opportunities to Murrumbidgee LGA and facilitate the delivery of electricity generation and storage infrastructure.
<i>Edward River Council Economic Development Strategy 2018–2021</i> (Edward River Council 2018) 	The <i>Edward River Economic Development Strategy</i> (Edward River Council 2018) provides an economic framework to enhance the prosperity of the Edward River LGA through a distinct focus on business growth from strengthening existing businesses, attracting new industry, developing export knowledge, capacity and markets; and growing visitor markets. Actions are focused on forming or strengthening partnerships, allocating or accessing key resources and infrastructure and unlocking opportunities to various markets. Six strategic themes have been identified: • attract new business investment • support existing businesses to grow • infrastructure provision • innovation, education and skills development • revitalise and activate the central business district (CBD) • market the region.	The project will bring new investment opportunities and facilitate the delivery of electricity infrastructure to support new development in the Edward River LGA.

Table 2.1 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
<i>Murrumbidgee Council Local Strategic Planning Statement</i> (Murrumbidgee Council 2020) 	The <i>Murrumbidgee Council Local Strategic Planning Statement</i> (the statement) (Murrumbidgee Council 2020) is an important and significant step in planning for the future of the Murrumbidgee LGA. It will inform and guide Murrumbidgee Council's decision-making on planning matters and outlines a vision for a thriving and prosperous region over the next 20 years. The statement sets out strategic agenda items to encourage economic growth, including the development of renewable energy projects and nominates Murrumbidgee Council's ambition to support projects for renewable energy.	The project will contribute to economic growth within the Murrumbidgee LGA and Spark Renewables will continue to engage with Murrumbidgee Council throughout the planning and assessment process.
<i>Murrumbidgee Council Community Strategic Plan 2022–2032</i> (Murrumbidgee Council 2022) 	The <i>Murrumbidgee Council Community Strategic Plan 2022–2032</i> (Murrumbidgee Council 2022) aims to prepare a shared vision for the communities over the 10 years to 2032. Strategic aims for the natural environment are: • protection of the natural environment for future generations • careful management of resources • balance between growth, development and environmental protection. The community vision for the economy is: “Our thriving economy enjoys business and investment growth, with new and existing businesses and industries proactively achieving development and business success. We spread the word about the magic of our area, with visitors joining with locals to relish our beautiful natural environment and other tourist assets.”	The project will support economic and industrial growth and diversification in the Murrumbidgee LGA. The development corridor has been refined to avoid impacts where possible and management and mitigation measures are proposed to protect key environmental features within and adjacent to the development corridor.
<i>Edward River Council Community Strategic Plan 2022–2050</i> (Edward River Council 2022) 	The <i>Edward River Council Community Strategic Plan 2022–2050</i> (Edward River Council 2022) identifies the community's main priorities and aspirations for the future and the strategies that will be implemented to achieve the shared vision for the future of the Edward River LGA. The shared vision is underpinned by five strategic outcomes: • shaping the future • an open and connected community • encouraging growth through partnerships • delivering community assets and services • accountable leadership and responsive administration	The project will promote local and regional economic growth through the development of renewable electricity generation.

2.3 Site selection and justification

The project area is ideally located for the development of a wind farm for the following key reasons:

- **Location with the South West REZ** – the project area is in a REZ formally declared for significant investment in renewable electricity generation, storage and transmission projects.
- **Proximity to approved transmission infrastructure** – the project area is adjacent to Project EnergyConnect’s Dinawan Substation, which will export the electricity generated by the project directly into the grid.
- **Proximity to major transport networks** – the project will be accessed from Kidman Way via short local road connections. Kidman Way is an approved B-Double route, with access to the Sturt and Newell highways. Local roads including McLennons Bore Road, Fernbank Road, Cadell Road, Wilson Road and Goolgumbla Road will be used to access the project from Kidman Way.
- **Few surrounding receptors** – the land surrounding the project area is sparsely populated. There are 23 non-associated residences within 5 km of the development corridor, with two non-associated residences, R079 and R088, within 1 km of the development corridor (see Figure 2.1). There are no non-associated residences within 2 km of a WTG.
- **Strong wind resource** – the project area is relatively flat and has a very good wind resource that peaks overnight.
- **Compatible surrounding land use** – the existing agricultural land use within and surrounding the project area is compatible with a large-scale wind farm, and agriculture will continue within the project area throughout wind farm operation.
- **Preliminary investigations and constraints analysis indicated a high potential to avoid and minimise impacts** – the construction and operation of a wind farm is not anticipated to result in significant adverse biophysical, cultural, social or economic impacts.

The project has been designed to avoid (wherever possible), and minimise, environmental, community and landholder impacts, as discussed further in Section 2.7.4.

2.4 Key features of the site and surrounds

Key features of the project area and surrounds are summarised in Table 2.2 and the local context is shown in Figure 2.1.

Table 2.2 **Key features of the project area and surrounds**

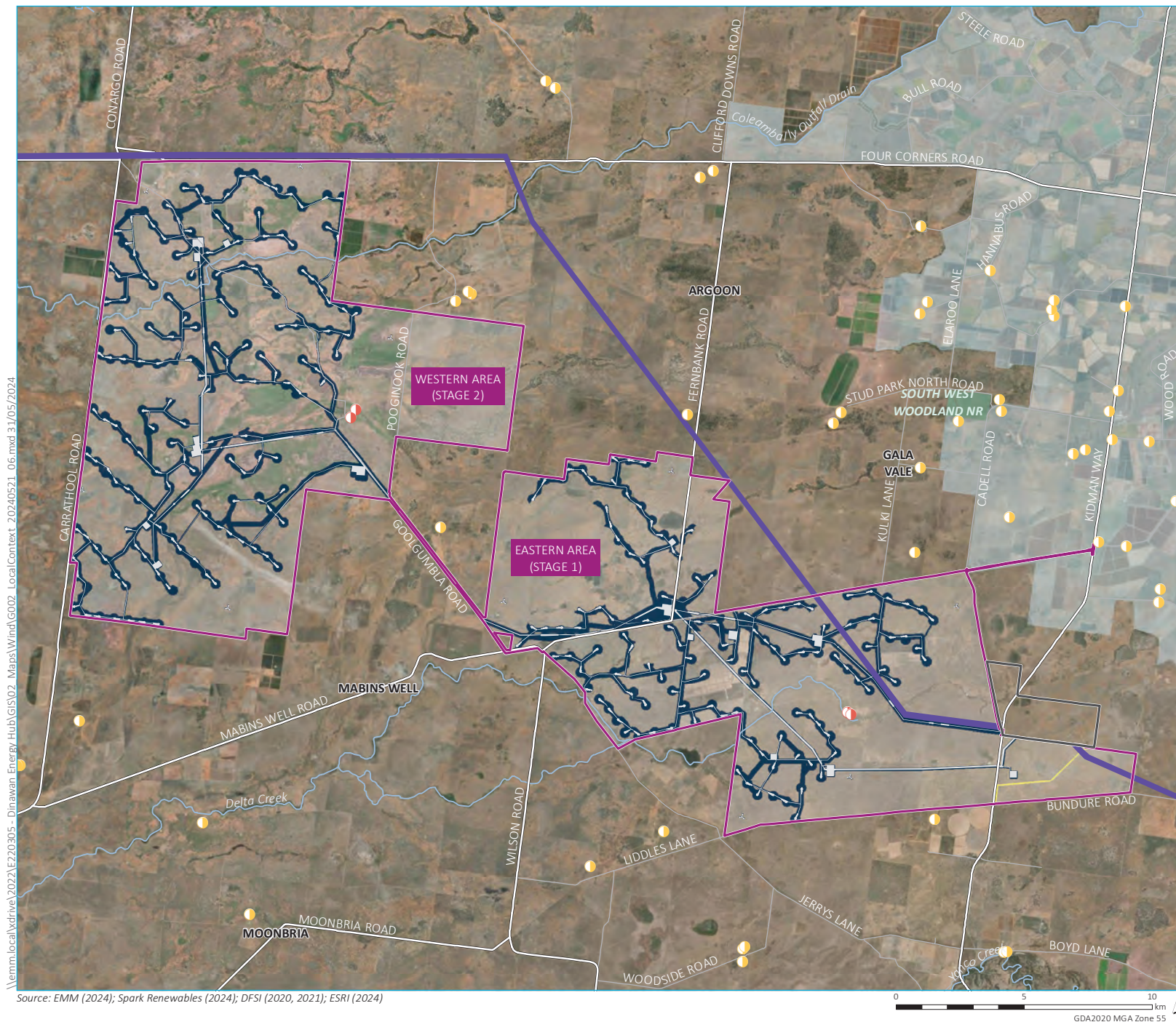
Aspect	Description
Local government area	The project area is within the Murrumbidgee LGA and Edward River LGA.
Land zoning	The project area is zoned RU1 Primary Production under the <i>Jerilderie Local Environmental Plan 2012</i> (Jerilderie LEP) and <i>Conargo Local Environmental Plan 2013</i> (Conargo LEP) (Figure 2.2). Kidman Way is zoned SP2 – Infrastructure (Classified Road) under the Jerilderie LEP where it passes through the project area. The objectives of the RU1 zone are: • to encourage sustainable primary industry production by maintaining and enhancing the natural resource base • to encourage diversity in primary industry enterprises and systems appropriate for the area • to minimise the fragmentation and alienation of resource lands • to minimise conflict between land uses within this zone and land uses within adjoining zones. The project is generally consistent with the land use objectives of the RU1 zone. The project will not preclude the ongoing use of the development corridor for primary industry production. The project has been developed with the host landholders to ensure that agricultural land uses can continue during construction, operation and following decommissioning, and do not fragment agricultural resources. An assessment of potential land use conflicts has been completed in Appendix E.8 and Section 6.9.3. The objectives of the SP2 – Infrastructure (Classified Road) are: • to provide for infrastructure and related uses • to prevent development that is not compatible with or that may detract from the provision of infrastructure. Project-related road upgrades will be undertaken in this zone. The project is consistent with the objectives of the SP2 zone.
Nearby townships	Coleambally (population of 1,152) and Jerilderie (population of 922) are within approximately 30 km of the project area (ABS 2021a, 2021b).
Major population centres	Griffith (85 km north) and Wagga Wagga (135 km east) are the closest major population centres.
Landscape	The landscape within and surrounding the project area is largely flat with some minor drainage depressions that hold water during rainfall and flooding.
Land use	Land within and surrounding the project area is used for agriculture. The land within the project area is predominantly used for sheep and cattle grazing.
Site history	The project area is on the traditional lands of the Wiradjuri people and several smaller nations of the Murrumbidgee plains. The project area forms part of pastoral stations established following European settlement in the area from around the 1850s. In particular, the project area is closely associated with Yanko Station and later the Goolgumbbla property.
Land ownership	There are six relevant landowners for the project area: • two private landholders who own the majority of land parcels within the project area • Coleambally Irrigation Co-operative Limited (CICL) who owns the Coleambally Irrigation Channel which runs through the project area east of Kidman Way and manages the Coleambally Outfall Drain which runs through the north-western corner of the project area • Murrumbidgee Council who is the owner of the public road network land in the Murrumbidgee LGA (i.e. Kidman Way, McLennons Bore Road, Fernbank Road and Wilson Road) • Edward River Council who is the owner of the public road network land in the Edward River LGA (i.e. Goolgumbbla Road) • NSW Government which owns parcels of Crown land (including travelling stock reserves) within the project area.

Table 2.2 **Key features of the project area and surrounds**

Aspect	Description
Residences	There are 23 non-associated residences within 8 km of a WTG location: • no non-associated residences within 2 km of a WTG • four non-associated residences within 3.75 km of a WTG • ten non-associated residences between 3.75 km and 5.5 km of a WTG • nine non-associated residences between 5.5 km and 8 km of a WTG.
Nearby natural features	Coleambally Outfall Drain runs through the north-west of the project area. Delta Creek is a third order stream that runs through the south-east of the project area. The largest nearby watercourse is Yanco Creek, approximately 6 km south of the project area, which flows south-west toward the Murray River. Minor segments of Bublebundie Creek and Blind Creek are in the north-west corner of the project area. There are several other ephemeral first and second order watercourses within the project area which drain to Delta Creek. The nearest national parks, nature reserves and state forest areas are: • Oolambeyan National Park, approximately 11 km north-west • South-West Woodland Nature Reserves, comprising of: – Edgar and Puckawidgee precincts, approximately 10 km to the south-west – Kulki precinct, approximately 6 km to the north • Murrumbidgee Valley National Park, approximately 30 km to the north-east • Bretts State Forest, approximately 24 km to the north-east.
Nearby infrastructure	Key transport infrastructure includes the following: • Kidman Way, a sealed regional road that intersects the project area. It runs from the Newell Highway at its southern extent, north towards Griffith. • Newell Highway, which intersects with Kidman Way approximately 19 km south of the project area and connects the region to major population centres across NSW, as well as Queensland and Victoria. • Sturt Highway, which intersects with Kidman Way, approximately 43 km north of the project area, and connects the region to major population centres in NSW, Victoria and South Australia. • Fernbank Road, McLennons Bore Road, Goolgumbra Road and Pooginook Road are unsealed roads within the project area. • Local roads in the vicinity of the project area include Bundure Road, Liddles Lane, Cadell Road, Jerrys Lane and Mabins Well Road. Cadell Road is a sealed road, while Bundure Road, Liddles Lane, Jerrys Lane and Mabins Well Road are unsealed and service local traffic only. Coleambally irrigation channel runs through the south-eastern portion of the project area, east of Kidman Way. Coleambally Outfall Drain runs through the north-western portion of the project area. Both irrigation channels deliver water to irrigated properties within the Coleambally irrigation area. Project EnergyConnect's Dinawan Substation and transmission line (SSI-9172452) are currently under construction immediately adjacent to the project area.
Surrounding development	The project area is within the South West REZ. Renewable energy and transmission developments (approved, proposed and operational) within close proximity to the project are listed in Section 2.5 and shown on Figure 1.1.
Planning context	The project area does not contain any land identified as: • biophysical strategic agricultural land (BSAL) • flood planning area. Parts of the project area that reside in Edward River Council are identified as category 3 bushfire prone land. Parts of the project area are mapped as 'environmentally sensitive – biodiversity', 'environmentally sensitive – wetland' and 'environmentally sensitive – groundwater vulnerable' on the Jerilderie and Conargo LEPs. There are parcels of Crown land (including travelling stock reserves) within the project area (Figure 2.3).
Mining leases	No mining tenements within the project area were identified in a search of MinView. The closest is Exploration Lease (EL) 9366, approximately 25 km east of the project area.

Table 2.2 **Key features of the project area and surrounds**

Aspect	Description
Key risks or hazards for the project	Key risks and hazards considered include: • Flooding – a flooding assessment has been completed (Section 6.7 and Appendix E.7) to inform project design refinement to ensure that flood risks including frequency of occurrence, flood depth and flow velocity within and surrounding the development corridor are adequately considered in project design. • Hazards – parts of the project area within Edward River Council are mapped as bushfire prone land. A bushfire assessment has been completed for the project (Section 6.10 and Appendix E.12). No other hazards mapped were identified within the development corridor, including contaminated land, steep slopes, land subject to mine subsidence or other hazards. A hazards and risks assessment (Appendix E.13), telecommunications impact assessment (Appendix E.10), human health assessment (Appendix E.11) and aviation impact assessment (Appendix E.9) has been completed for the project (Section 6.11).



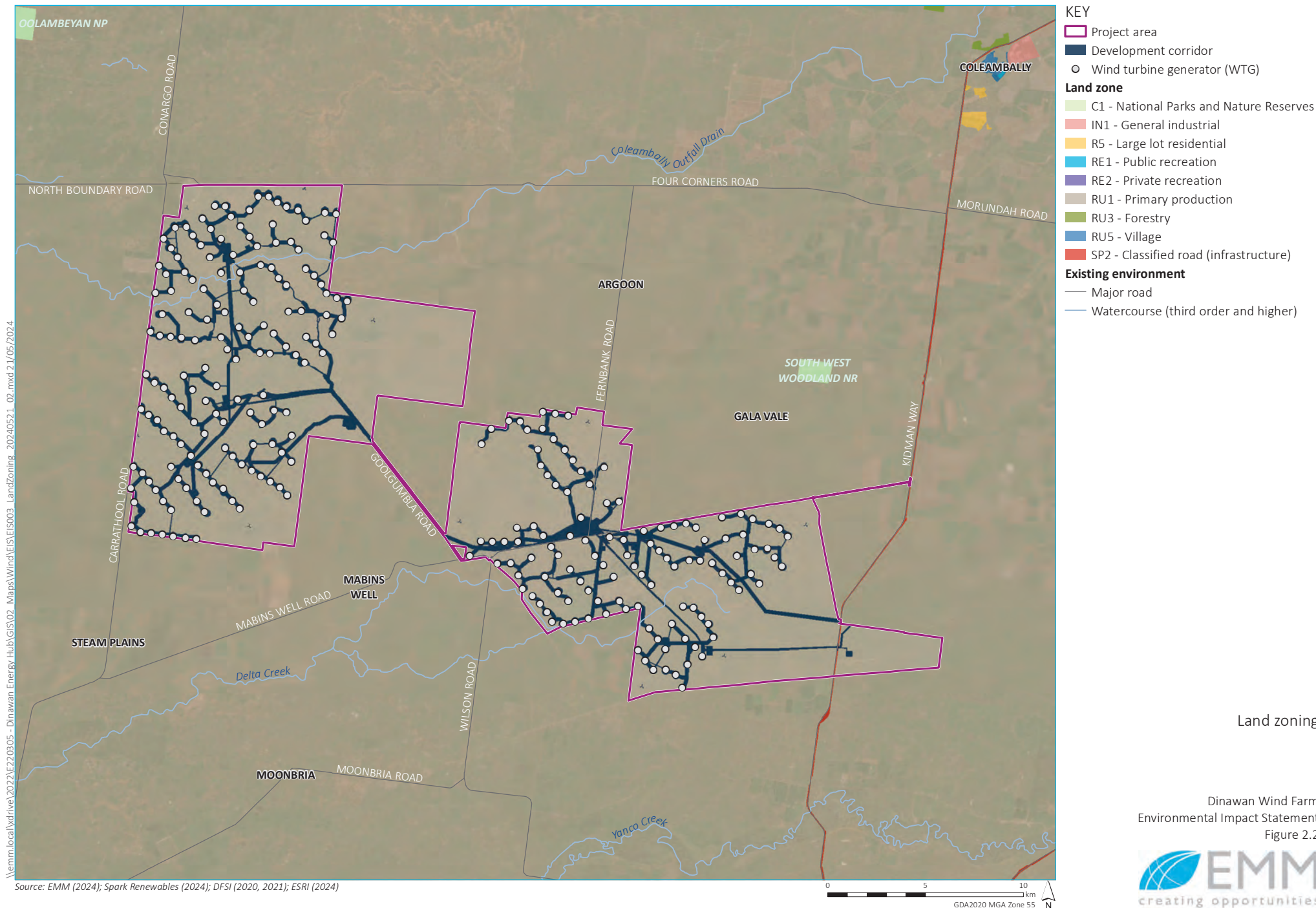
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Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)

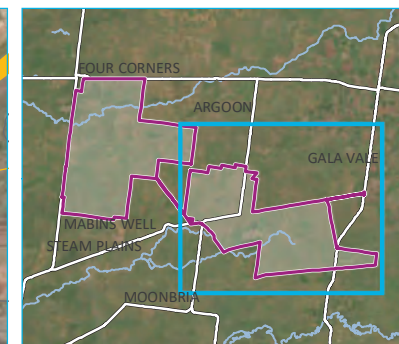
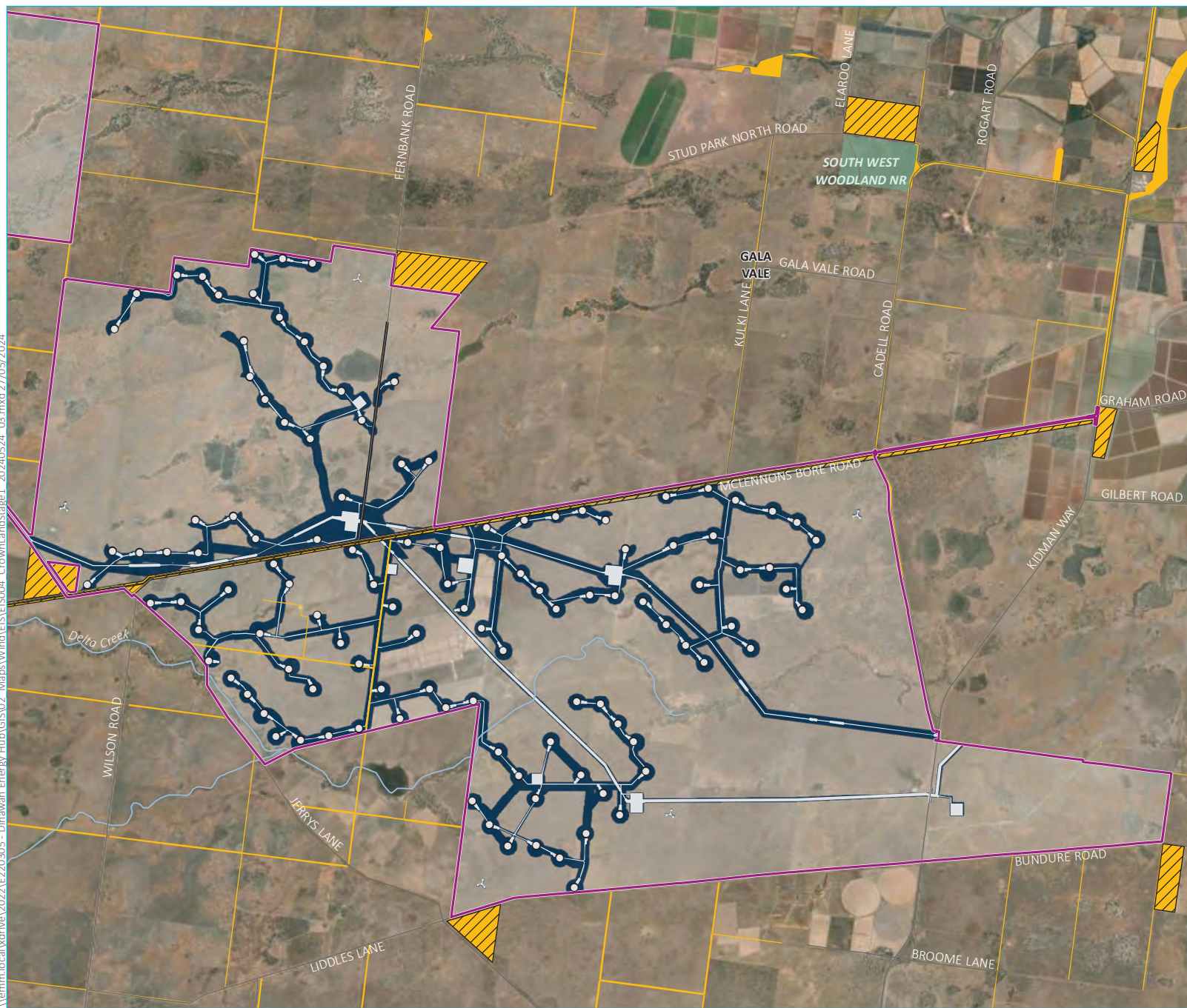
Local context

Dinawan Wind Farm
Environmental Impact Statement
Figure 2.1





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- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Wind turbine generator (WTG)
 - Crown land
 - Travelling stock reserve
- Existing environment**
- Road
 - Watercourse (third order and higher)
 - NPWS reserve

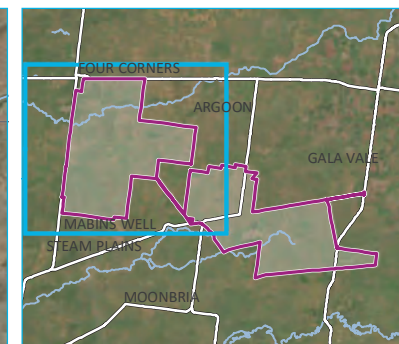
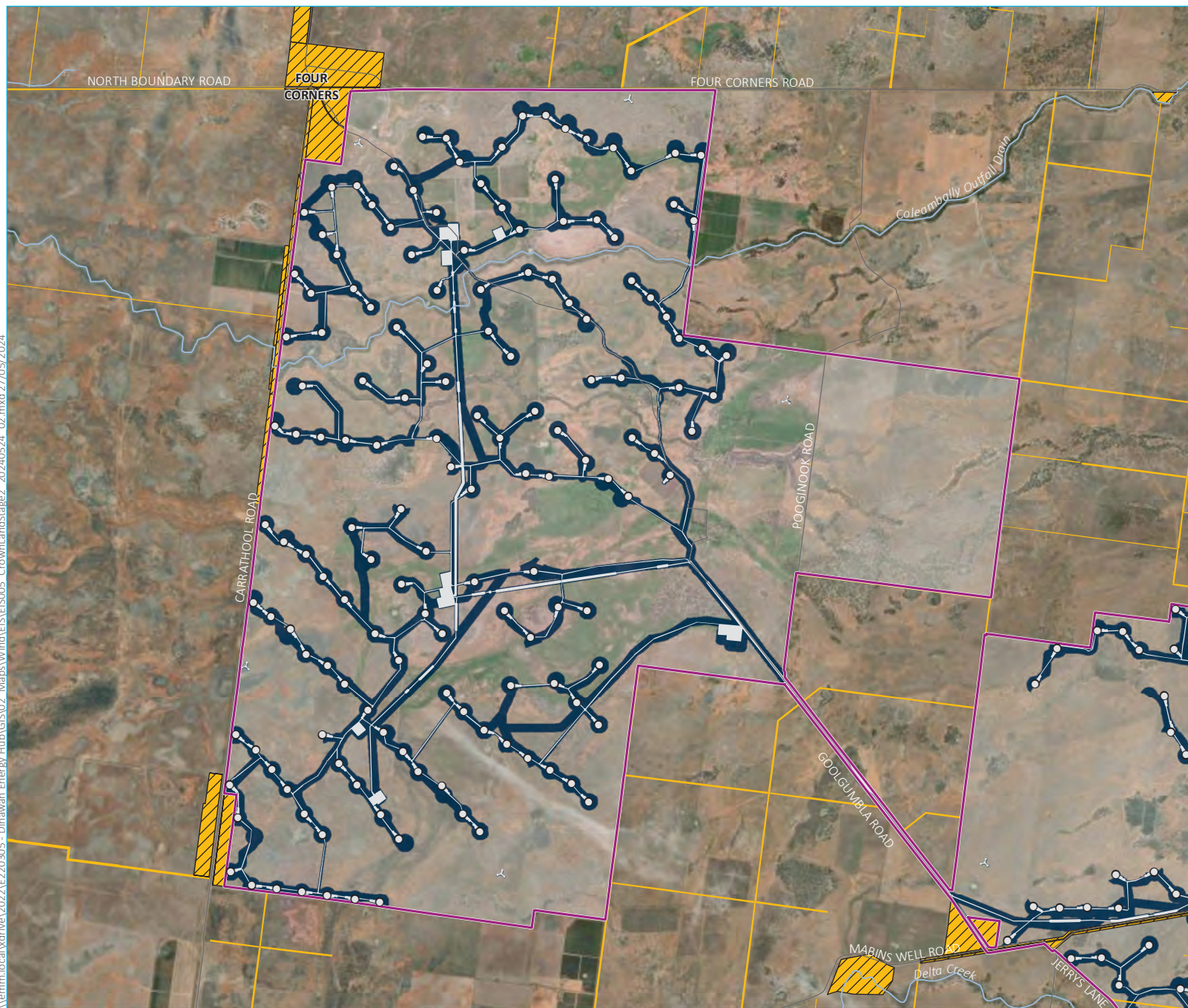
Crown land within the project area
- eastern area (Stage 1)

Dinawan Wind Farm
Environmental Impact Statement
Figure 2.3a



Source: EMM (2024); Spark Renewables (2024); DCSSS (2023); DFSI (2020, 2021); ESRI (2024)

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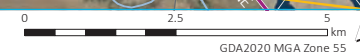
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Wind turbine generator (WTG)
 - Crown land
 - Travelling stock reserve
- Existing environment**
- Road
 - Watercourse (third order and higher)

Crown land within the project area
- western area (Stage 2)

Dinawan Wind Farm
Environmental Impact Statement
Figure 2.3b



Source: EMM (2024); Spark Renewables (2024); DCSSS (2023); DFSI (2020, 2021); ESRI (2024)



2.5 Surrounding development

The project is within the South West REZ, which has a target network capacity of 3.98 GW, and has been identified as a key location in NSW for the delivery of renewable energy infrastructure. There are a number of operating, approved and proposed renewable energy developments, and infrastructure to facilitate these developments, in the region, as summarised in Table 2.3 and shown in Figure 1.1.

Table 2.3 Surrounding renewable developments and infrastructure

Project	Development type	Proximity to the project	Status
Project EnergyConnect	Electricity transmission	Adjacent – transmission line and Dinawan Substation adjacent to project area.	Approved – under construction
Dinawan Solar Farm	Solar farm and BESS	Within – part of the Dinawan Energy Hub within the project area.	Proposed – responding to submissions
Argoon Wind Farm	Wind farm and BESS	Adjacent – south of the project area.	Proposed – EIS in preparation
Victoria to NSW Interconnector (VNI) West	Electricity transmission	Exact location to be confirmed; however, likely to intersect the project area.	Proposed – pre-scoping phase
Yanco Delta Wind Farm	Wind farm and BESS	Adjacent – south of the project area.	Approved – not constructed
Bullawah Wind Farm	Wind farm and BESS	10 km west of the project area.	Proposed – EIS in preparation
Pottinger Wind Farm	Wind farm and BESS	25 km west of the project area	Proposed – EIS in preparation
Pottinger Solar Farm	Solar farm and BESS	25 km west of the project area.	Proposed – EIS in preparation
Coleambally Solar Farm	Solar farm	30 km north of the project area.	Operating
Coleambally BESS	BESS	30 km north of the project area.	Approved – not constructed
Conargo Wind Farm	Wind farm and BESS	33 km south of the project area.	Proposed – requesting SEARs
Booorooban (Saltbush) Wind Farm	Wind farm and BESS	43 km west of the project area.	Proposed – requesting SEARs
Darlington Point Solar Farm	Solar farm and BESS	45 km north of the project area.	Operating
Woodland BESS	BESS	45 km north of the project area.	Proposed – under assessment
Yarrabee Solar Farm	Solar farm and BESS	45 km north-east of the project area.	Approved – not constructed
The Plains Wind Farm	Wind farm	55 km west of the project area	Proposed – EIS on exhibition
The Plains Solar Farm	Solar farm and BESS	60 km west of the project area.	Proposed – EIS on exhibition
Currawarra Solar Farm	Solar farm	60 km south of the project area.	Approved – not constructed

Table 2.3 **Surrounding renewable developments and infrastructure**

Project	Development type	Proximity to the project	Status
Deniliquin East BESS	BESS	70 km south-west of the project area.	Proposed – EIS in preparation
Romani Solar Farm	Solar farm and BESS	75 km west of the project area.	Proposed – EIS in preparation
Tarleigh Park Solar Farm	Solar farm	75 km south-west of the project area.	Approved – not constructed
Tchelery Wind Farm	Wind farm	100 km west of the project area	Proposed – EIS in preparation
Baldon Wind Farm	Wind farm	100 km west of the project area.	Proposed – EIS in preparation

Notes: Distances are measured from closest boundary points based on publicly available information at the time of preparation.

Other SSD and SSI projects within the region are listed in Table 2.4.

Table 2.4 **Other SSD and SSI projects within the region**

Project	Development type	Proximity to the project	Status
Billabong Creek Environmental Water Regulators	Water management infrastructure	50 km south-west of the project area.	Proposed – EIS in preparation

Cumulative impacts from the project and surrounding developments have been assessed in accordance with the *Cumulative impact assessment guidelines for State significant projects* (DPE 2022c) and are discussed in Section 6.15.

2.6 South West Renewable Energy Zone Access Scheme

The opportunity to develop wind and solar projects in the South West REZ has been recognised by industry and there is strong competition amongst developers to secure and utilise the limited transmission capacity that will be made available. For example, the NSW Government registration of interest for the South West REZ received 49 registrations, representing 34 GW of potential electricity generation and storage (more than 13 times the originally intended 2.5 GW capacity). In response to this demand, the intended capacity of the South West REZ has been increased to 3.98 GW.

Access to the South West REZ transmission lines will be managed by the NSW Government in accordance with the *NSW Electricity Infrastructure Investment Act 2020*. A competitive tender process for transmission ‘access rights’ will be administered by AEMO Services. The Dinawan Wind Farm will be subject to the competitive tendering process for access rights.

Projects competing in the access right auctions will be evaluated by AEMO Services according to a comprehensive list of merit criteria that include:

- financial value
- commercial departures
- impact on electricity system

- pathway to commercial operation
- organisational capacity to deliver
- community engagement, shared benefits and land use
- regional economic development.

The projects, and hence the mix of technologies and the sizes of the projects, that will be built in the South West REZ will be determined by the outcomes of this competitive auction process.

2.7 Project options and alternatives considered

Alternatives to the project have been considered, including alternative locations, alternative project layouts and not proceeding with the project.

2.7.1 'Do nothing'

The 'do nothing' scenario would allow for the continued use of the project area for agricultural production and would avoid the residual environmental and social impacts described in this EIS; however, it would also forego project benefits, which include:

- provision of renewable electricity generation and storage capacity, with potential to power the equivalent of approximately 700,000 NSW households, which will:
 - directly support the objectives of the NEM to provide reliable, secure and affordable electricity to consumers
 - support the development of the South West REZ
 - significantly contribute to the shift away from coal-fired power generation
- economic and social growth within the Murrumbidgee LGA, Edward River LGA and surrounds
- new employment opportunities for approximately 600 personnel in the construction phase and up to 50 full-time employees during operation.

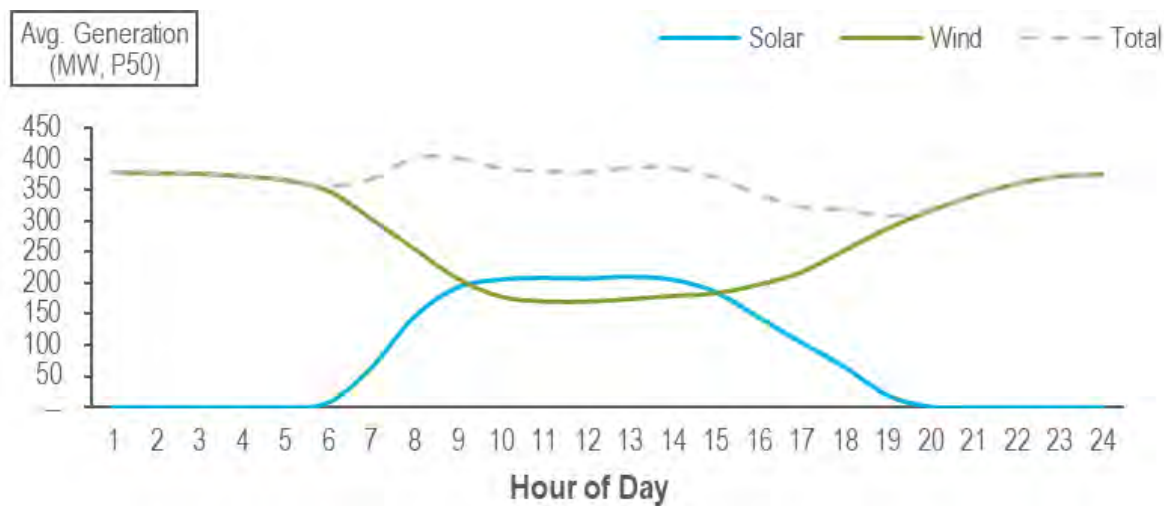
2.7.2 Alternative locations

Determining the location of a project of this scale requires detailed consideration of developable area, topography, environmental constraints, land ownership, proximity to existing and/or proposed energy transmission infrastructure and available network capacity. Major townships and areas of high agricultural and biodiversity value need to be avoided.

The selected project area is highly suitable for a wind farm as identified in Section 2.3. Alternatives to the project area were considered by Spark Renewables as part of the site identification process, including other potential sites in NSW. The primary constraint when considering locations elsewhere in NSW, including outside of the REZs, is the distance of the project from the transmission network – both existing and planned. While a broad range of alternative locations were initially considered, the project area was favoured as it is adjacent to the Dinawan Substation. Alternative locations which are further away from transmission infrastructure would require longer transmission lines and easements to connect into the network, with associated additional environmental and social impacts. As such, the selected project area is considered optimal for development of the project.

The project is ideally located to complement the Dinawan Solar Farm, which was located to utilise the strong solar resources within the South West REZ. The strong solar resource during the daytime complements the high level of wind generation that peaks overnight. The Dinawan Energy Hub components have been designed to balance energy supply across the day and make highly efficient use of the available transmission infrastructure. The night-time wind profile of the area and its anti-correlation with solar is shown in Figure 2.4.

Notwithstanding the benefits from co-location of wind and solar electricity generation, the Dinawan Solar Farm and Dinawan Wind Farm will operate as standalone projects. They have been designed and assessed to enable either project to proceed without the other.



Source: Spark Renewables (2023).

Figure 2.4 Combined wind and solar electricity generation profile throughout the day

2.7.3 Alternative project layouts

Once the project area was identified, environmental and social constraints were considered in greater detail to refine the development corridor within the project area. The development corridor and indicative project layout have been the subject of an iterative design process that has been informed by the outcomes of technical environmental assessments (including biodiversity, Aboriginal cultural heritage, water, visual amenity and noise and vibration) and outcomes of engagement with community and regulatory stakeholders.

On-site meteorological monitoring has been implemented since December 2022 to optimise the placement of WTGs. The wind resource is relatively consistent across the project area, so consideration of environmental constraints has been a key driver, as well as optimising spacing between WTG locations.

The following key principles were applied throughout the development corridor refinement process:

- Minimise vegetation clearing and prioritise avoidance of significant biodiversity values – the results of multiple biodiversity surveys over several seasons (2021–2024) have enabled the progressive refinement of the development corridor, avoiding areas of higher conservation value, threatened species habitat and native vegetation to the maximum practicable extent.
- Maximise use of previously disturbed land – the development corridor has been selected to maximise the use of land previously modified by agricultural operations (including cleared areas), established access tracks and local roads.

- Avoid impacts to significant Aboriginal cultural and historical heritage values – areas of high archaeological sensitivity and Aboriginal and historical sites identified during fieldwork have been avoided through refinements to the development corridor to the maximum practicable extent.
- Minimise direct and indirect impacts on neighbouring landholders – setbacks to nearby residences and adjoining properties have been introduced and key infrastructure (including WTGs, permanent meteorological monitoring masts, substations and accommodation facilities) has been located a minimum of 2 km from the closest non-associated residence.
- An ongoing flexible approach to design, with continual refinement of the development corridor during 2023 and 2024, in response to identified environmental constraints.

The evolution of the project layout from a broad investigation area through to the proposed development corridor is described in Table 2.5 and shown on Figure 2.5.

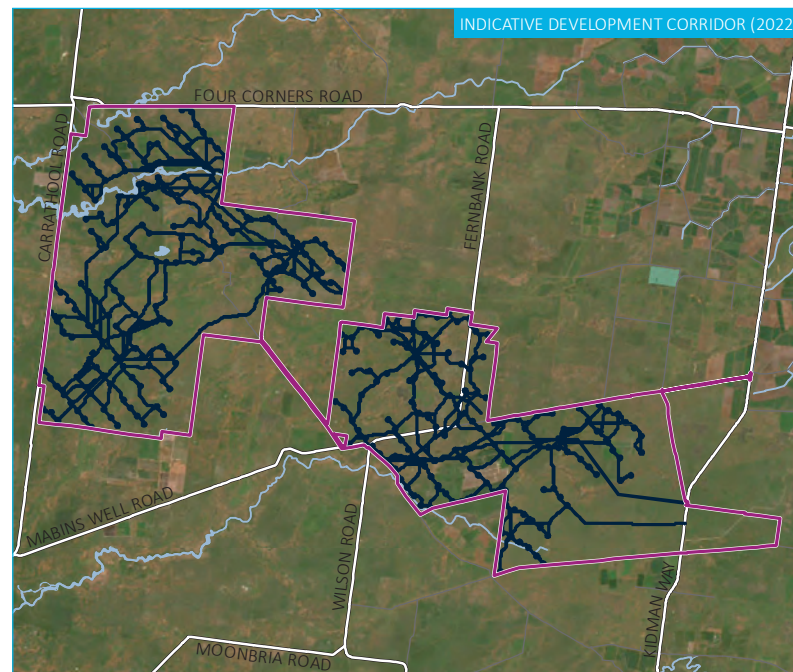
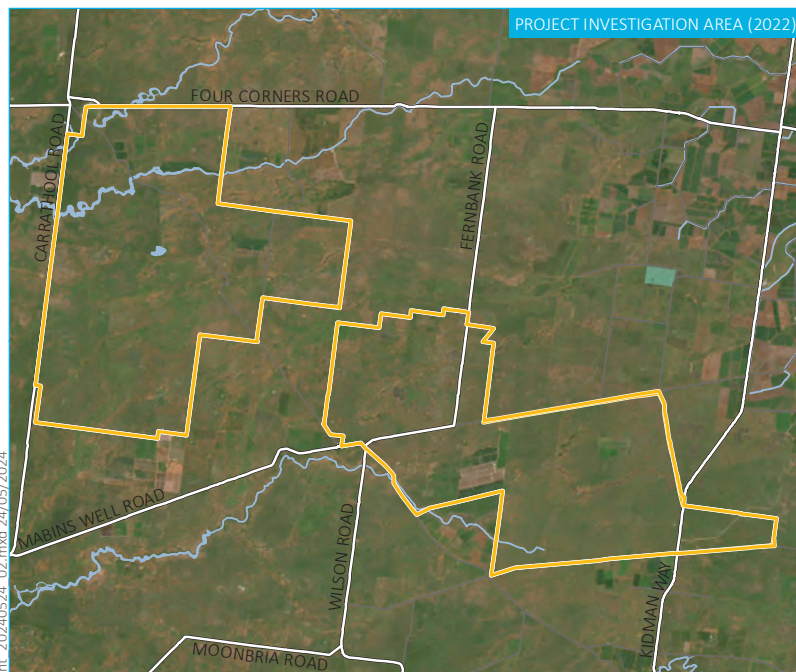
Table 2.5 **Refinement in project layouts**

Footprint	Area (ha)	Key considerations informing refinements
Project investigation area (2022)	39,000	• Proximity to Project EnergyConnect’s Dinawan Substation • Strong wind resource • Strong solar resource to allow co-location with Dinawan Solar Project • Favourable topography and compatible surrounding land use • Access to local and regional road network • Few surrounding receptors • Minimal number of landholders • Setbacks from National Parks and other known protected areas, certified aerodromes, existing and planned transmission infrastructure and regional road corridors
Indicative development corridor (2022)	10,300	The indicative development corridor presented in the <i>Dinawan Wind Farm scoping report</i> (EMM 2022) avoided the following key constraints to the extent practicable: • WTG placement in areas of high archaeological sensitivity that were identified during preliminary archaeological investigations • areas of higher biodiversity value, including mapped wetlands and higher condition Plant Community Types (PCTs) • mapped important habitat for Plains Wanderer • WTG placement in PCTs dominated by Black Box and White Cypress Pine woodland • areas directly adjacent to Oolambeyan National Park (including a 11 km setback to the closest WTG) • areas directly adjacent to Kidman Way (including a 3.3 km setback to the closest WTG) • agricultural land mapped as land and soil capability (LSC) class 3.
Refined development corridor (2023)	7,956	The development corridor continued to be refined and optimised to consider outcomes of ongoing environmental investigations, including: • seasonal biodiversity surveys throughout 2022 and 2023 • Aboriginal heritage field surveys and test excavations • historical heritage field surveys and research • flood modelling and consideration of flood risks and infrastructure placement • preliminary visual assessments from public and private viewpoints • preliminary telecommunications assessments (including potential for project infrastructure to interact with point-to-point microwave links).

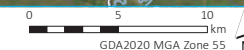
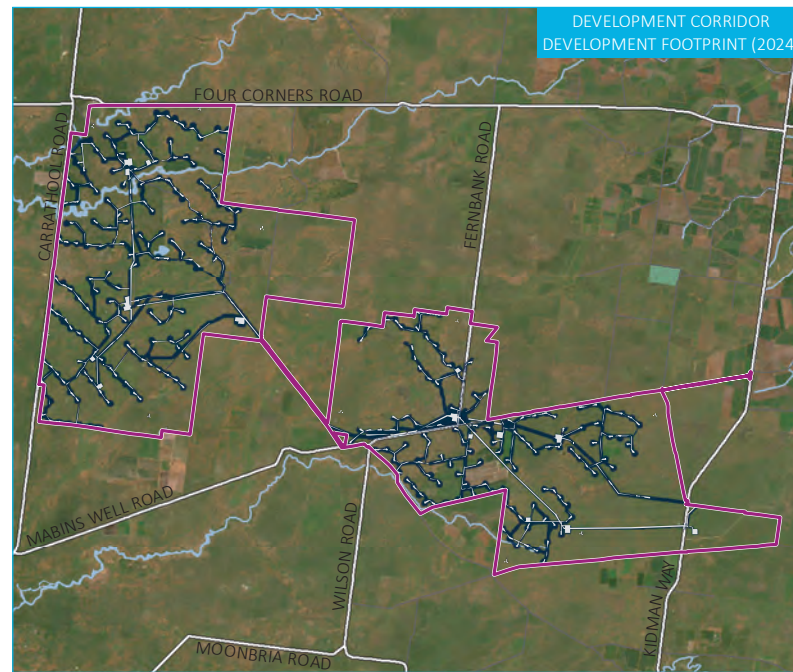
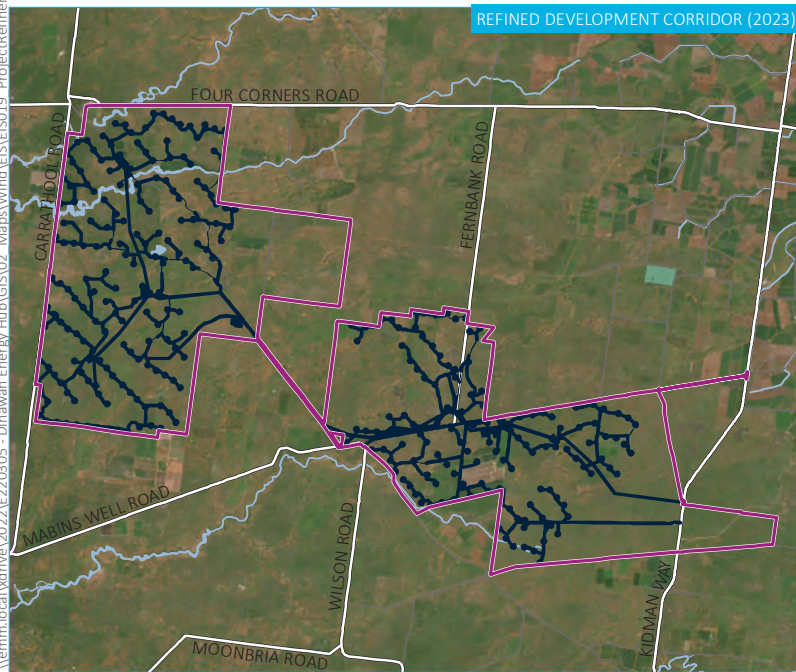
Table 2.5 Refinement in project layouts

Footprint	Area (ha)	Key considerations informing refinements
		Refinements included optimisation of the locations and number of WTGs and permanent meteorological masts, as well as the network of access tracks and electrical reticulation between WTGs, collector substations and Dinawan Substation. Locations for temporary accommodation facilities were also identified on-site and included consideration of setbacks to neighbouring residences.
Development corridor	7,256	The development corridor was refined to an area that provides an envelope for the development of the project, providing necessary flexibility for project component placement during detailed design (i.e. micro-siting).The development footprint is the indicative extent of disturbance assessed for this EIS and was reduced through an iterative process in response to identified environmental constraints. Further detail on the project refinement process is presented in Section 2.7.4.
Development footprint (2024)	1,339	

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- KEY**
- Project area
 - Project investigation area
 - Development corridor
 - Development footprint
- Existing environment**
- Major road
 - Minor road
 - Named watercourse
 - Named waterbody
 - NPWS reserve



Key steps in project refinement

Dinawan Wind Farm
Environmental Impact Statement
Figure 2.5



Source: EMM (2024); Spark Renewables (2024); DCSSS (2023); ESRI (2024); GA (2009)

2.7.4 Development corridor and footprint refinement

Throughout the preparation of the EIS, the development corridor and footprint has been refined based on the outcomes of environmental surveys and studies. A summary of the key environmental constraints considered as part of the refinement process and selection of the development corridor and footprint is provided in Table 2.6 and shown on Figure 2.6.

Table 2.6 Key considerations during project refinement

Aspect	Key considerations
Landscape and visual	Avoidance of vegetation clearing where possible to maintain existing levels of visual screening provided by vegetation. Incorporation of setbacks from potential viewpoints including placement of WTGs at least 2 km from non-associated residences and placement of substation and switchyard infrastructure at least 4 km from non-associated residences.
Noise and vibration	Maximising setback distances of WTGs (>2 km) and collector substations (>4 km) from non-associated residences. Selecting a WTG model with serrated trailing edges to reduce trailing edge noise.
Biodiversity	As a result of identified biodiversity constraints and subsequent design refinements, 214 WTG locations have been relocated to avoid and minimise biodiversity impacts (i.e. approximately 80% of the assessed WTG locations within the development footprint). Although impacts to native vegetation, threatened species habitat and TECs will occur, project refinements have avoided or minimised impacts to the areas with the highest biodiversity values. Key avoidance and minimisation of impact measures include: • prioritising avoidance of impacts to PCT 26 (intact), which has the highest vegetation integrity score and is an EPBC Act listed TEC, and is known habitat for Painted Honeyeater and Grey-crowned Babbler • minimising disturbance through preferential use of existing access tracks and public roads for site access and transmission line easements and co-locating access tracks with electrical cabling and transmission line easements • minimising removal of habitat trees for threatened species, including Superb Parrot and Corben's Long-eared Bat • avoidance of direct impacts to important mapped habitat areas for Plains Wanderer to the extent possible • removing and/or relocating WTGs away from large bird nests observed during surveys • siting WTGs at least 200 m away from PCT 13, PCT 15, PCT 10 and PCT 28 to the extent possible • avoidance of approximately 78% of hollow-bearing trees recorded within the development corridor • avoidance and minimisation of impacts to large patches of Silky Swainsona-pea and Slender Darling Pea.
Aboriginal cultural heritage	Avoidance of Aboriginal Heritage Information Management Information System (AHIMS) listed sites to the extent practicable. Maximising avoidance of areas of higher archaeological potential identified in the initial archaeological constraints modelling including identified aeolian, paleochannels, and watercourses features; and the eastern fringes of Gilgai and ephemeral wetlands. This is most noticeable in the western area, where sand dunes and/or sandy soil profiles have been predicted and/or observed. Avoidance of impacts to 15 cultural heritage sites (including two sites considered of high cultural value), including hearths, occupation areas and culturally modified trees. This equates to approximately 47% of the identified cultural assemblage being unharmed. Substation, switch yard and transmission line options in the western area underwent significant refinements and redesign to avoid DEHW-CS1, a source-bordering dune that was identified as being of high scientific and cultural significance by project archaeologists and RAPs.
Historical heritage	Avoidance of impacts to sites identified during research and field assessments as part of the preparation of the Statement of Heritage Impact, including late nineteenth and early twentieth century pastoral and agricultural sites).

Table 2.6 **Key considerations during project refinement**

Aspect	Key considerations
Transport	Consideration of proximity to, and capacity of, the local and regional road network and ability to transport the necessary infrastructure to the development footprint and resource the workforce demand during construction. Design of construction traffic routes to minimise vehicle movements on the public road network to the extent practicable. The use of on-site accommodation facilities by up to 75% of the project's peak construction workforce will reduce the number of daily vehicles travelling to and from site on the local and regional road network.
Water resources	The development footprint has been designed to minimise impacts on watercourses, where possible. Flood modelling outputs resulted in refinements being applied to the extent of the development footprint and placement of project infrastructure based on modelled inundation of greater than 50 cm under the 1% annual exceedance probability (AEP) event.
Land use	Spark Renewables has designed the project to minimise impacts on agricultural land, wherever possible. In addition, as part of the land use conflict risk assessment (LUCRA), impacts to neighbouring agricultural operations have also been considered.
Hazards and risks	Setbacks to residences have been introduced to reduce blade throw risk, with WTGs a minimum of 2 km from the closest non-associated residence.
Socio-economic	The capacity of regional cities and towns including Griffith, as well as Coleambally and Jerilderie and subsequent availability of local businesses, services and a local labour force have been considered. A key refinement based on the social impact assessment was the inclusion of an accommodation facility to minimise impacts on local housing availability and short-term accommodation providers.

In those instances where impacts cannot be avoided, Spark Renewables' design principles have been applied to minimise environmental impacts. Mitigation measures will be implemented to manage the extent and severity of any residual environmental impacts (see Appendix D).

Additional refinements to the development corridor and development footprint will be guided by further avoidance of environmental constraints, the outcomes of the South West REZ Access Scheme and identification of engineering efficiencies during detailed design. These factors will inform the selection of the 200 WTG locations for construction and operation.

Detailed design will allow the most suitable types of infrastructure to be identified and deployed for use in the project. Details of infrastructure and elements to be installed or constructed (e.g. the WTG supplier and model) will be determined during the detailed design process.

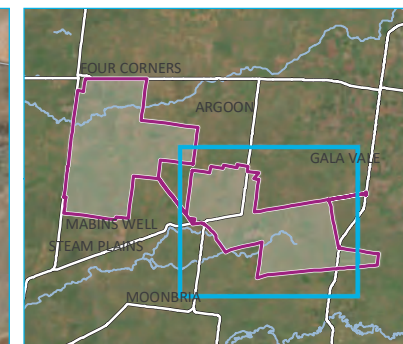
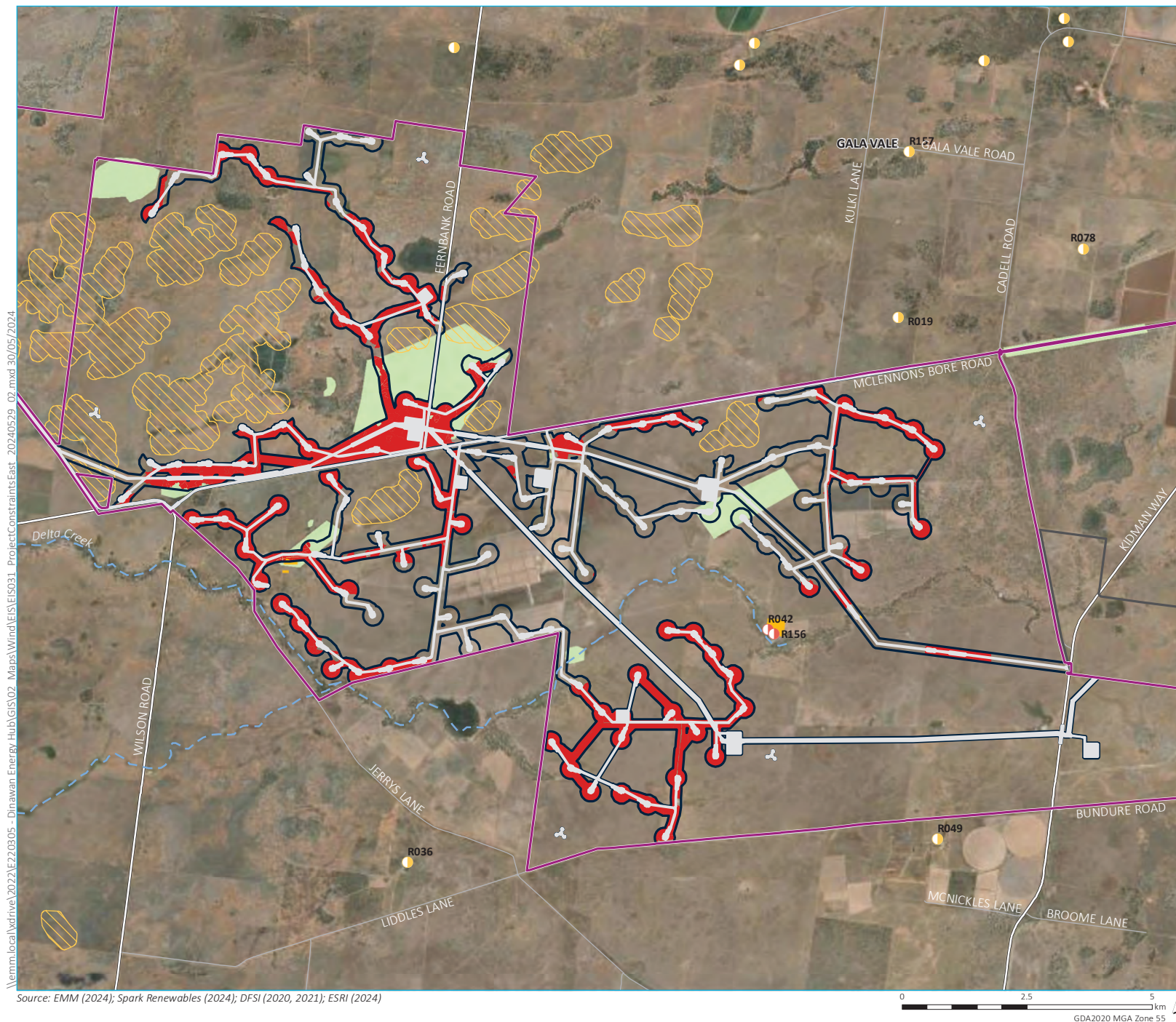
The potential sources of project components, construction materials and water, and the locations of construction workforce accommodation have been reviewed during the preparation of this EIS. However, this information will be finalised following appointment of the construction contractor post-approval. This EIS has identified and assessed scenarios that capture the range of potential sources and routes.

2.8 Agreements with other parties

Spark Renewables has entered into agreements (or is currently negotiating terms) with stakeholders to mitigate and/or offset the impacts of the project. These are summarised in Table 2.7.

Table 2.7 **Agreements with other parties**

Stakeholder	Description
Landowners within the project area	Spark Renewables has entered into agreements with host landowners within the project area.
Edward River Council and Murrumbidgee Council	Spark Renewables will enter into VPAs with each council to deliver a community benefit sharing program (refer Section 5.7).



- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Project EnergyConnect (Transgrid)**
 - Dinawan substation
 - Project constraints**
 - Historical heritage site
 - Aboriginal heritage site
 - Threatened ecological community (TEC)
 - Plains Wanderer – mapped important habitat
 - Residence**
 - Associated
 - Non-associated
 - Strahler stream order (third order and higher)**
 - 3rd order
 - Existing environment**
 - Major road
 - Minor road

Project constraints - eastern area

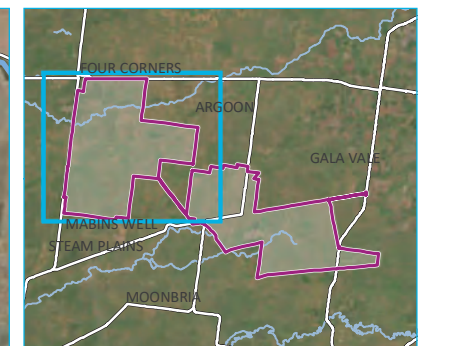
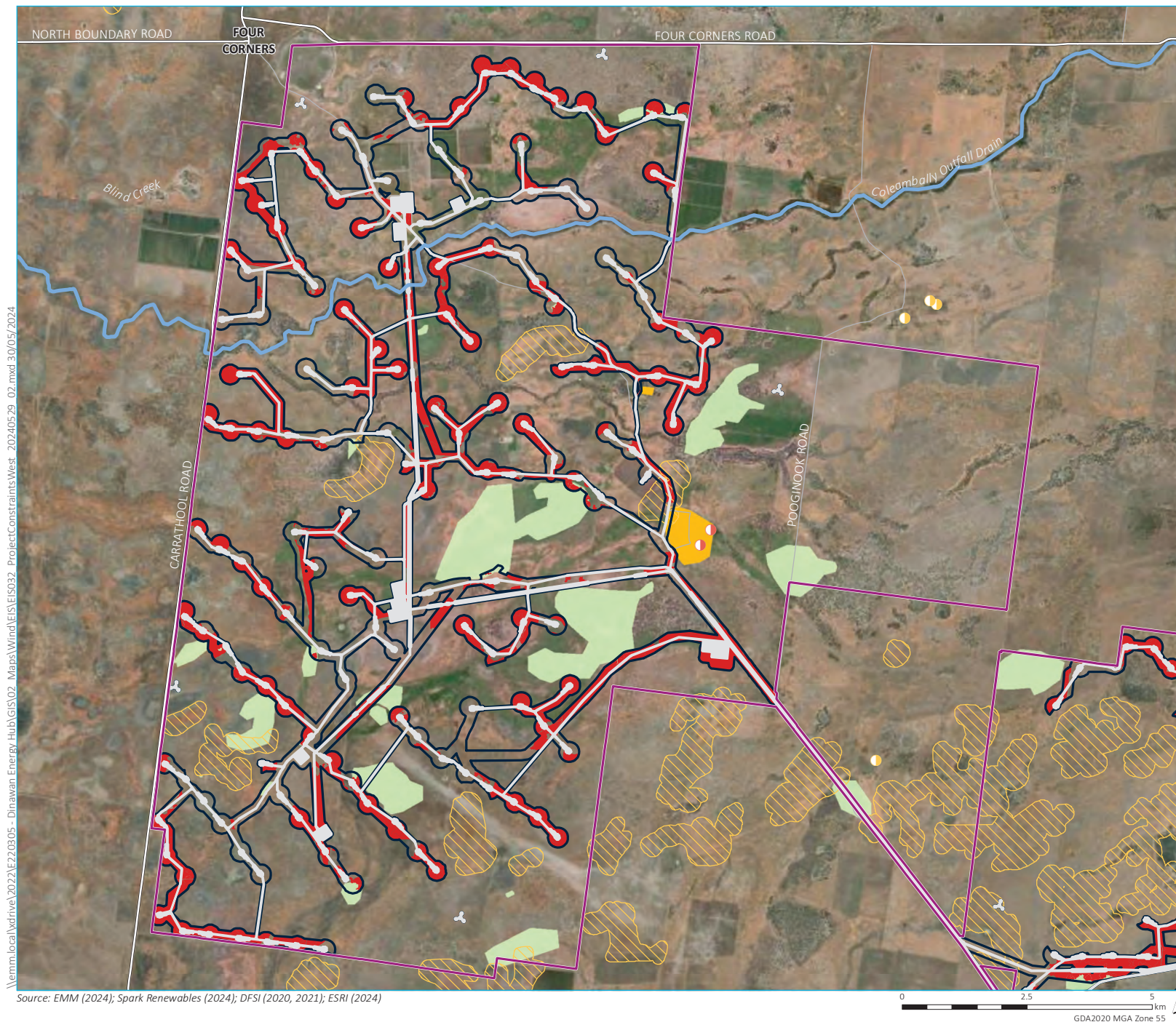
Dinawan Wind Farm
Environmental Impact Statement
Figure 2.6a



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Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)

0 2.5 5
km
GDA2020 MGA Zone 55



- KEY**
- Project area
 - Development corridor
 - Development footprint
- Project constraints**
- Historical heritage site
 - Aboriginal heritage site
 - Threatened ecological community (TEC)
 - Plains Wanderer – mapped important habitat
- Residence**
- Associated
 - Non-associated
- Strahler stream order (third order and higher)**
- 9th order
- Existing environment**
- Major road
 - Minor road

Project constraints - western area

3 Project description

3.1 Overview

The project includes the installation, operation, maintenance and decommissioning of a wind farm with up to 200 WTGs and supporting infrastructure (Figure 3.1). The project will have a generation capacity of up to approximately 1.2 GW.

The project area; physical layout and design; activities and project timing are detailed in the following sections. An overview of the project is provided in Table 3.1.

Table 3.1 Project overview

Project element	Summary
Project area	The project area is comprised of 349 land parcels and is approximately 39,061 ha.
Development corridor	The development corridor (approximately 7,256 ha) is the envelope within which the project will be developed, providing the necessary flexibility for component placement during detailed design (i.e. micro-siting).
Development footprint (subset of development corridor)	The development footprint (approximately 1,339 ha) is the indicative extent of the project's ground disturbance area, including earthworks, associated with permanent infrastructure and temporary construction facilities. It is approximately 18% of the development corridor area. Approval is sought for disturbance equal to the total area of the development footprint. The exact location of the development footprint will be determined during detailed design.
Generation capacity	Approximately 1.2 GW(AC).
Project stages	The project area comprises an eastern area (within the Murrumbidgee LGA) and a western area (predominantly within the Edward River LGA). The wind farm will be developed in two stages: • Stage 1 – eastern area • Stage 2 – western area.
Key infrastructure	• up to 200 WTGs (up to 280 m tall, ground to maximum tip height) including: – tower, nacelle, rotor and blades – concrete foundations – hardstand pad – electrical infrastructure • electrical collection system, collector substations and control rooms • electricity transmission line infrastructure (above ground and underground) • electricity transmission line infrastructure connecting the collector substations to the Dinawan Substation site • operation and maintenance (O&M) infrastructure, including: – site offices and amenities – equipment and maintenance sheds – laydown, storage and parking areas • other permanent infrastructure, including: – hardstands – water tanks – permanent meteorological monitoring masts (up to 200 m tall) – new/upgraded access tracks – access points from the public road network

Table 3.1 **Project overview**

Project element	Summary
	- temporary construction facilities, including: - worker accommodation facilities - construction compounds - site offices and amenities - concrete batching plants - construction materials storage (including stockpiles) - laydown areas - temporary meteorological monitoring masts (up to 200 m tall) - water tanks - water and sediment management infrastructure - storage and parking areas - borrow pits.
Workforce	Approximately 600 personnel during peak construction. Up to 50 full-time employees and varying numbers of contractors during operation.
Hours of operation	Standard day-time construction hours (7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday). Once operational, the project will operate continuously 24 hours per day, 7 days per week.
Project life	Construction: approximately 36 months for each stage (approximately 60 months total to allow for overlap between stages). Operation: 25–35 years with the potential to extend the operational life.
Roads	Site access points will be on Kidman Way, McLennons Bore Road, Fernbank Road and Goolgumbla Road. Upgrades to the local road network: - intersection improvements at: - Kidman Way/McLennons Bore Road - Kidman Way/Cadell Road (south) - Cadell Road/McLennons Bore Road - McLennons Bore Road/Fernbank Road - McLennons Bore Road/Wilson Road - Wilson Road/Goolgumbla Road - road upgrades on: - McLennons Bore Road - Fernbank Road - Cadell Road - Wilson Road - Goolgumbla Road. An internal network of access tracks within the development corridor will be used to access: - the eastern area from McLennons Bore Road and Fernbank Road - the western area from Goolgumbla Road.

Table 3.1 **Project overview**

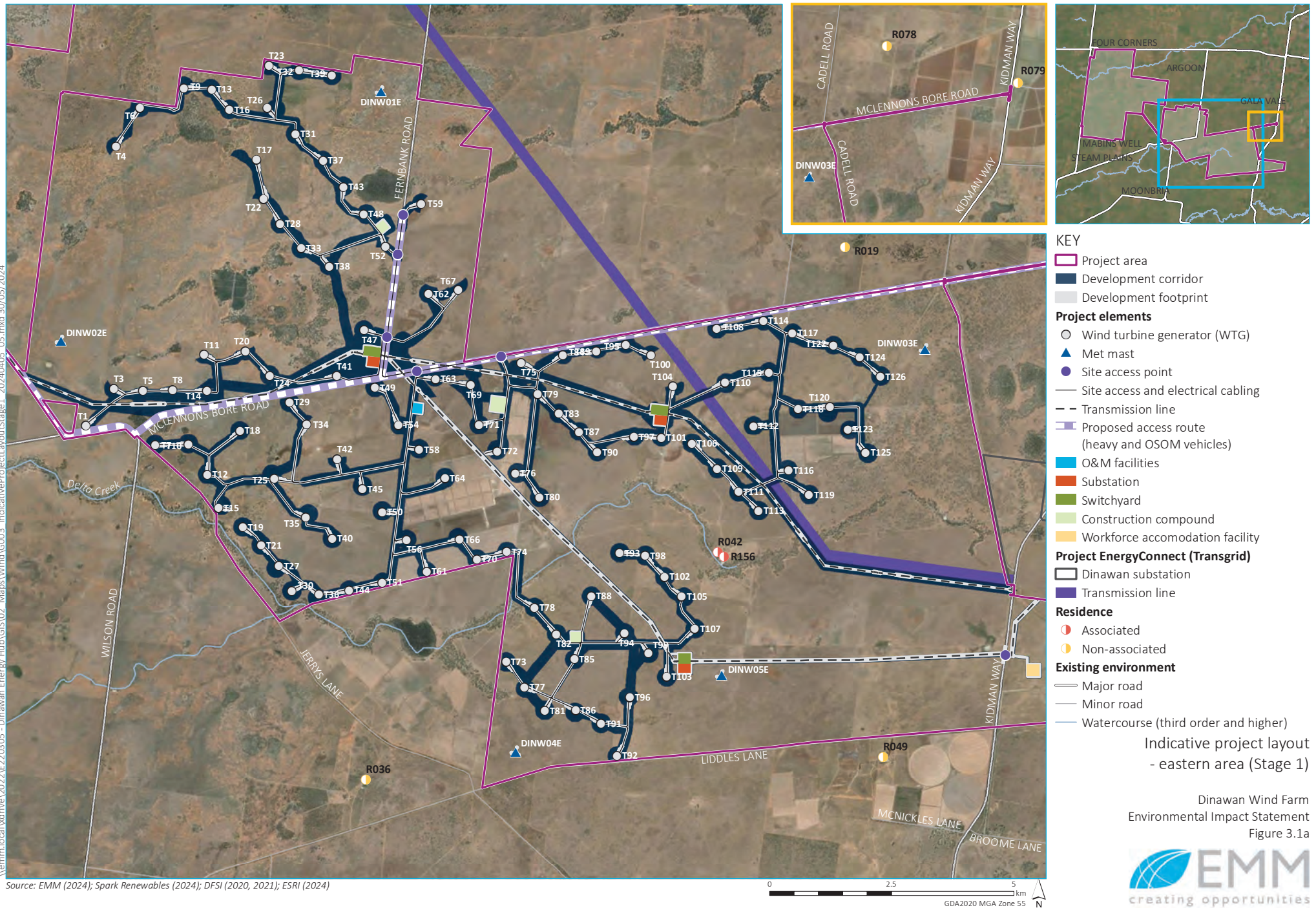
Project element	Summary
Transport	• Maximum daily heavy vehicle movements (construction, upgrading and decommissioning): 176 • Maximum daily light vehicle movements (construction, upgrading and decommissioning): 462 Movements account for one vehicle entering the site and one vehicle leaving the site. Daily heavy vehicle movements exclude restricted access vehicles (RAVs), which will be used to transport WTG and infrastructure components from Port of Newcastle. Plant, equipment and other bulk construction materials will be sourced based on availability of suppliers/contractors.
Subdivision	Subdivision of lots may be required to create new allotments for the substations and switchyards.
Decommissioning and rehabilitation	All aboveground structures will be removed and the land disturbed by the project will be rehabilitated to its pre-existing land use, as far as practicable unless otherwise agreed with landowners and regulators.

3.2 Project refinement and flexibility

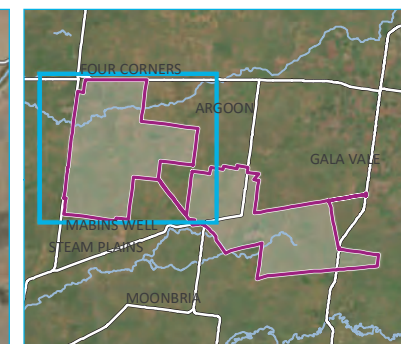
Project infrastructure will be contained within the development corridor, which will provide the necessary flexibility for further detailed design (micro-siting) of the development footprint.

The development application seeks approval for disturbance of up to 1,339 ha, indicatively shown as the development footprint, wholly within the development corridor. As part of detailed design, the development footprint may move within the development corridor to facilitate optimal placement of infrastructure.

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- KEY**
- Project area
 - Development corridor
 - Development footprint
- Project elements**
- Wind turbine generator (WTG)
 - Met mast
 - Site access point
 - Site access and electrical cabling
 - Transmission line
 - Proposed access route (heavy and OSOM vehicles)
 - O&M facilities
 - Substation
 - Switchyard
 - Construction compound
 - Workforce accommodation facility
- Project EnergyConnect (Transgrid)**
- Transmission line
- Residence**
- Associated
 - Non-associated
- Existing environment**
- Bridge
 - Major road
 - Minor road
 - Watercourse (third order and higher)

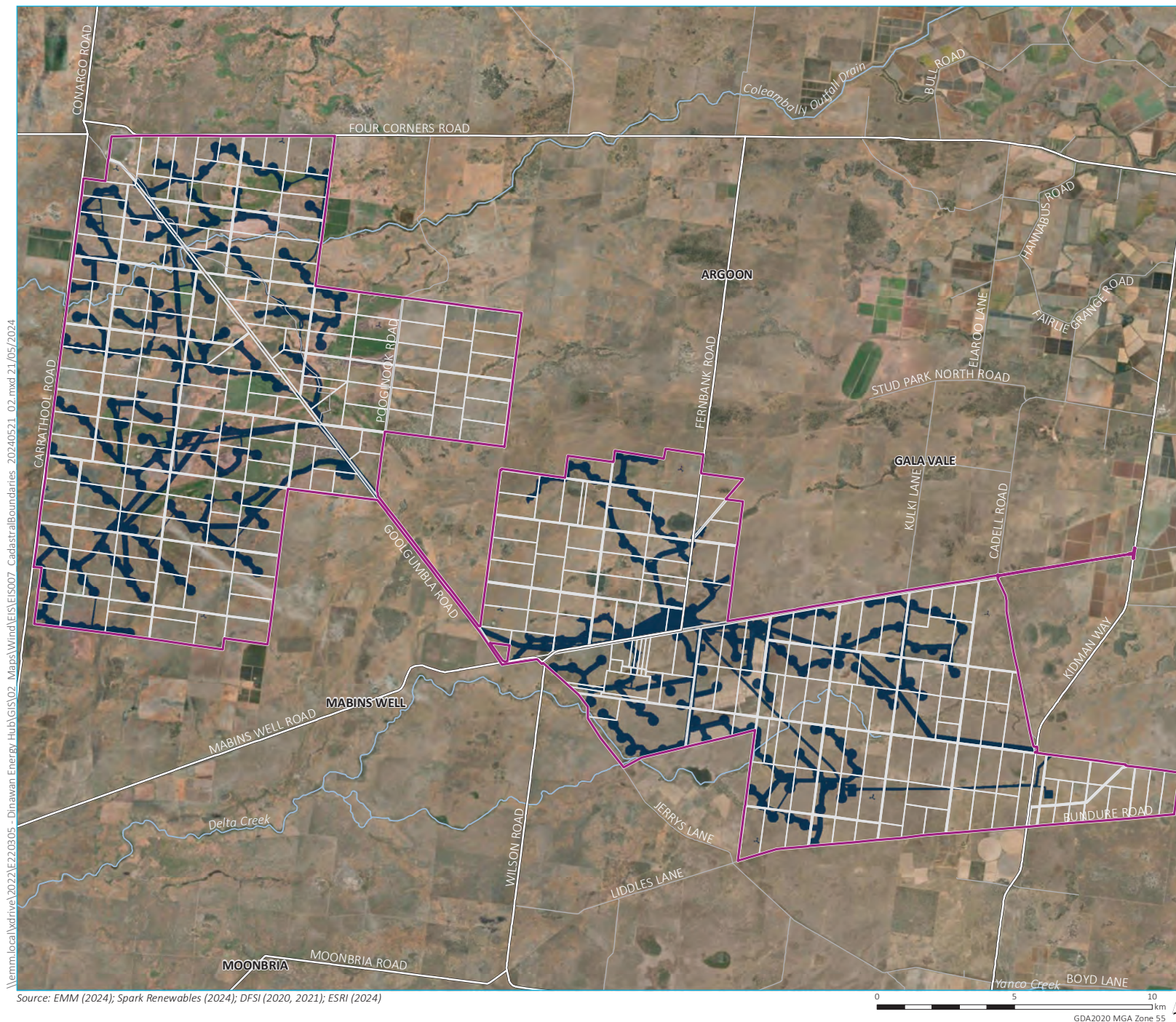
Indicative project layout
- western area (Stage 2)

Dinawan Wind Farm
Environmental Impact Statement
Figure 3.1b



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)





- KEY**
- Project area
 - Development corridor
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)
 - Cadastral land

Cadastral boundaries within the project area

Dinawan Wind Farm
Environmental Impact Statement
Figure 3.2



3.3 Physical layout and design

The physical layout and design of the project is summarised in Table 3.2 and described in the following sections. An indicative project layout is provided in Figure 3.1.

Table 3.2 Key project components

Project component	Proposed to be constructed	Options assessed
Permanent infrastructure		
Wind turbine generators (WTG) and hardstand areas	Up to 200 WTGS as shown in Figure 3.1, each with an approximate 20 m wide foundation and 90 m by 60 m hardstand area.	A total of 267 WTG locations have been assessed.
Collector substations and switchyards	Up to five substations and switchyards, as shown in Figure 3.1.	A total of six potential locations have been assessed.
Operation and maintenance (O&M) facilities	Two O&M facilities, as shown in Figure 3.1.	-
Permanent meteorological monitoring masts	Up to 10 permanent meteorological monitoring masts, up to 200 m tall, as shown in Figure 3.1.	-
Network connection	Overhead transmission lines (330 kV) will connect the collector substations to the Dinawan Substation site. Indicative transmission line corridors are provided on Figure 3.1.	Two connection points to the Dinawan Substation site have been assessed; only one is expected to be constructed.
Site access points	Eight site access points, as shown in Figure 3.1.	-
Temporary infrastructure		
Construction compounds	Up to six construction compounds, as shown in Figure 3.1.	-
Worker accommodation facilities	Up to two accommodation facilities, as shown in Figure 3.1.	Three locations have been assessed.

3.3.1 Wind turbines

i General

The wind farm will have a generation capacity of up to approximately 1.2 GW. The project will include the installation of up to 200 WTGs across the eastern and western areas of the project area (Figure 3.1), positioned to balance maximisation of electricity generation from the available wind resource, with minimisation of environmental impacts.

The indicative layout includes:

- up to 117 WTGs in the eastern area
- up to 150 WTGs in the western area.

The proposed layout is indicative and will be optimised during detailed design. The number of WTGs will not exceed 200 in total. The selection of the final WTG model for construction may also result in amendments to the proposed layout.

Each WTG will have three blades with the rotor and nacelle mounted on a tower, with an internal ladder or lift. Components of a typical WTG are illustrated in Figure 3.3.

Indicative coordinates for each WTG are provided in Appendix G. Allowance for micro-siting of WTGs by up to 100 m radius from these locations is required and has been included in the development footprint and development corridor. Other infrastructure components, including collector substations, O&M facilities, temporary construction facilities, electrical cabling and access tracks, will also be micro-sited within the development corridor.

Micro-siting will allow design refinements that will benefit constructability and plant and equipment access without requiring a modification to the development application.

ii Foundations

Each WTG will have a foundation approximately 20 m wide (approximately 400 m²) to a depth of approximately 3–5 m. The size, depth and type of each foundation will be determined as part of detailed design based on geotechnical conditions.

Topsoil and spoil from excavations will be stockpiled for reuse to backfill over the foundation and/or as part of vegetation rehabilitation around the WTG. Excess material will be utilised elsewhere within the development corridor (e.g. to form access tracks) or be exported off-site for beneficial reuse.

iii Hardstand

A permanent hardstand, approximately 90 m by 60 m (approximately 5,400 m²), will be established at each WTG during construction. This will be used as a laydown area and by the plant and equipment installing the WTG components. The hardstand will be used for maintenance and repair of the WTG during operation.

3.3.2 Electrical collection system

Electricity produced by each WTG will be transformed from low-voltage to medium-voltage (33 kV or greater) by a transformer located within the nacelle or adjacent to the WTG.

A network of underground and overhead powerlines within the development corridor will connect WTGs to up to five collector substations. Connections will include power, earthing, and communications cables. The exact routes of overhead and underground lines will be determined as part of detailed design.

Underground cables will be installed at least 600 millimetres (mm) below ground level.

The project electrical network is expected to comprise 33 kV circuits between the WTGs and collector substations, and a 132 kV or 330 kV transmission line between the collector substations and Dinawan Substation. Overhead electricity lines will be between 20 and 80 m tall depending on the capacity of the line and type of power pole/transmission tower. The distance between power poles and transmission towers will be dependent on the type used.

The eastern area and western area will be connected via an underground or overhead line within the road reserve of Goolgumbla Road. An indicative alignment for this infrastructure is shown on Figure 3.1.

Powerlines may need to cross Coleambally Outfall Drain and other unnamed watercourses. Overhead and/or underground (installed by horizontal directional drilling) crossings may be used. Physical disturbance within the drain, waterfront land and associated riparian corridors will be avoided to the extent possible.

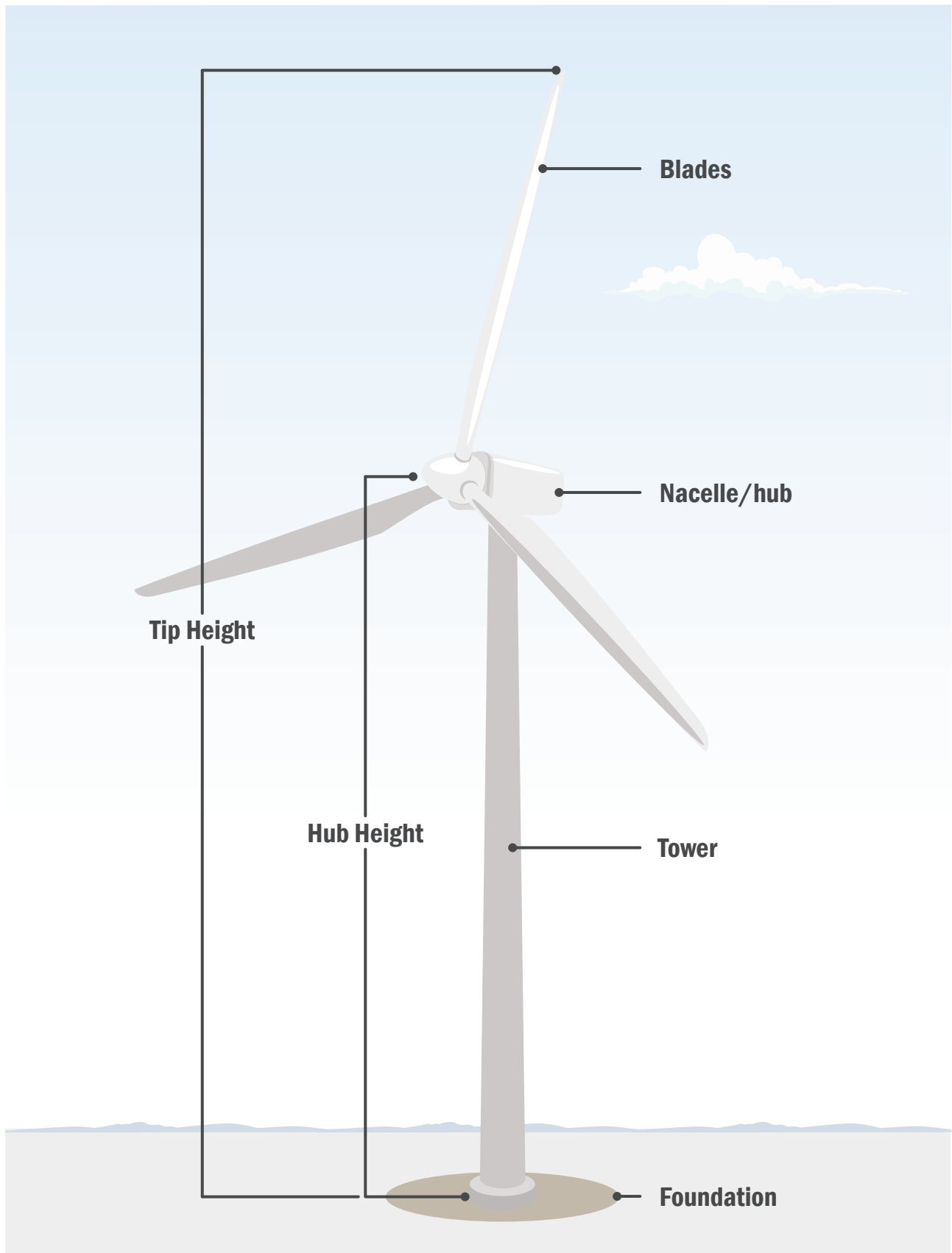


Figure 3.3 Wind turbine generator components

3.3.3 Collector substations and switchyards

Collector substations will convert 33 kV AC electricity from the WTGs to 330 kV for export to the Dinawan Substation. Indicative sites for the collector substations and switchyards are provided on Figure 3.1 and an indicative collector substation is shown in Photograph 3.1. Ancillary infrastructure may also be placed within the substation and/or switchyard site.



Photograph 3.1 Example of a substation

Subdivision of lots may be required for the construction, operation and maintenance of each substation and/or switchyard. If subdivision occurs, it is envisaged that the subdivided lot would be consolidated back into a single lot at the end of the operational life of the substation and/or switchyard.

Substations and switchyards are located on land zoned RU1 Primary Production under the Jerilderie and Conargo LEPs (refer Figure 2.2), with associated minimum lot sizes of at least 200 ha. The subdivision of any lots selected for the collector substations and/or switchyards will result in lot sizes that are less than the minimum lot size under the relevant LEPs. Notwithstanding, in accordance with section 4.38 of the EP&A Act, any proposed subdivision will be permissible subject to the approval of the Minister for Planning and Public Spaces or their delegate.

Murrumbidgee Council, Edward River Council, DPHI and the project landholders will be consulted about any proposed subdivisions.

3.3.4 Network connection

The Dinawan Substation site, part of Project EnergyConnect, is the preferred point of connection to Transgrid's network. The Dinawan Substation will be constructed on land adjacent to the project area (Figure 3.1).

Overhead 330 kV transmission lines will connect the collector substations to the Dinawan Substation site. Indicative transmission line corridors are provided on Figure 3.1 and an example of an overhead transmission line is shown in Photograph 3.2. The overhead transmission lines will be within the development corridor, with the design and location determined as part of detailed design.

The project's overhead transmission line will cross Kidman Way before entering Dinawan Substation site. The transmission towers are expected to be 40–80 m tall. The distance between transmission towers will be dependent on the type of structure used. A conceptual representation of the transmission lines crossing Kidman Way is provided in Figure 3.4.

Overhead 330 kV transmission lines within the development corridor are part of this application. The portion of the transmission line and connection infrastructure within Project EnergyConnect's project area (i.e. Lot 1 of DP 1282091) at Dinawan Substation is as defined in *EnergyConnect (NSW – Eastern Section) Environmental Impact Statement* (Transgrid 2022) and as approved under SSI-9172452.



Photograph 3.2 **Example of an overhead transmission line**

3.3.5 Supporting infrastructure

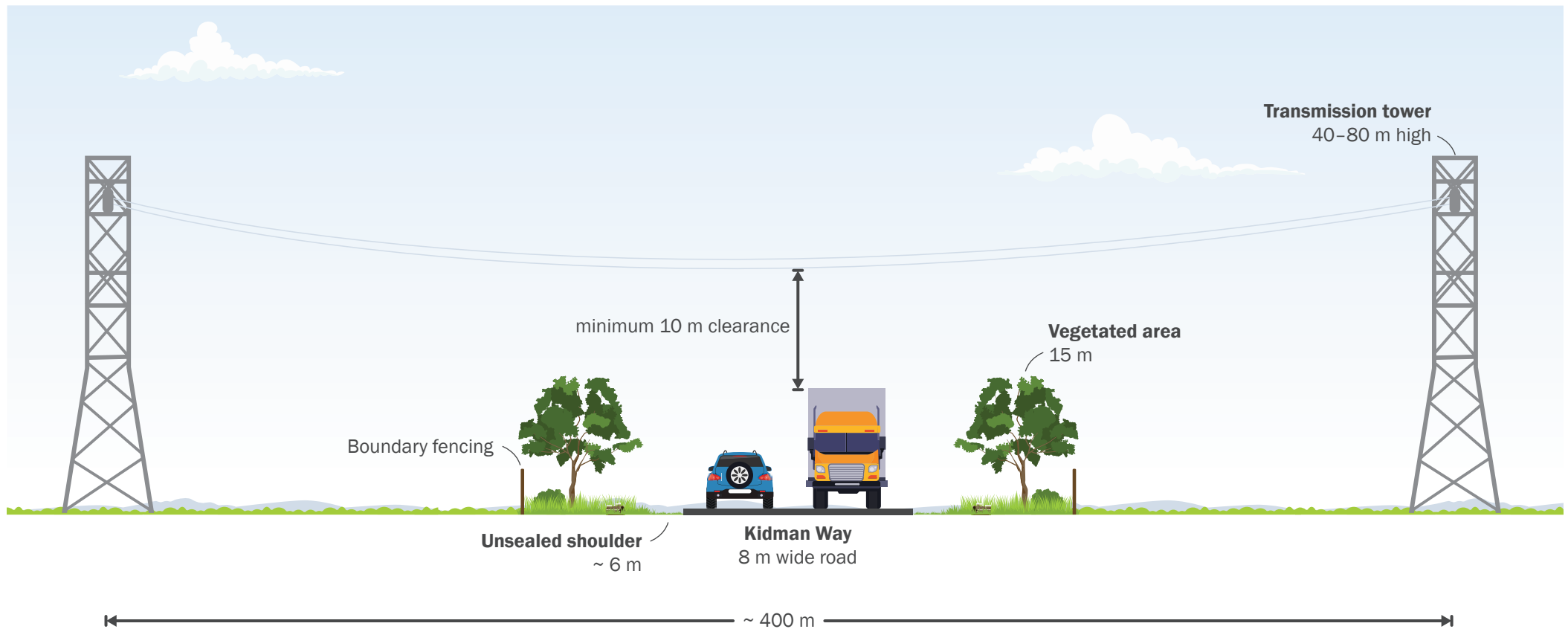
i Construction

a Worker accommodation facilities

Temporary worker accommodation facilities for non-local construction employees (where skills cannot be sourced locally) are proposed in the eastern area for Stage 1 and the western area for Stage 2. Indicative locations are shown on Figure 3.1. Each accommodation facility will be established early in the construction phase for each stage of the project. Each facility will accommodate up to 450 workers.

The indicative location of the accommodation facility in the eastern area is shown in Figure 3.1. This accommodation facility will be co-located with the temporary Dinawan Solar Farm worker accommodation facility, if the Solar Farm project (SSD-50725959) is approved.

The indicative locations for the two accommodation facility options in the western area are shown in Figure 3.1.



NOT TO SCALE
FOR THE PURPOSES OF THIS ILLUSTRATION -
DISTANCES & HEIGHTS ARE EXAGGERATED

Figure 3.4 Overhead transmission line across Kidman Way

Each accommodation facility site is approximately 6 ha and will include:

- modular and relocatable single rooms/quarters
- office building(s)
- mess area (including stores, kitchen and dining area)
- laundry facilities
- toilet and shower facilities
- car and shuttle bus parking area
- a medical centre or first aid room staffed by personnel with suitable first-aid/medical training
- recreation areas.

The layout of the accommodation facilities will be determined during detailed design. All components will be within the development corridor.

Each facility will principally accommodate employees and long-stay contractors, and will have the capacity to accommodate approximately 75% (450 people) of the project's peak construction workforce (600 people) on the basis that approximately 25% of the workforce will be locally based.

The facilities will use modular and relocatable single rooms/quarters and will be 'scaled up' and 'scaled down' based on construction workforce requirements.

b Concrete batching plants

Concrete will be used for WTG foundations, as well as other infrastructure within the development corridor, including pads for collector substations and O&M facilities. Up to six temporary concrete batching plants will be required. These will be located within the construction compounds. Typically only one concrete batching plant will be operating at any point in time with the infrastructure relocated between the construction compounds.

Concrete batching plants will typically include cement silos, stockpile areas for aggregate and admixture, water and waste water storage tanks, bunded refuelling bay and parking.

Water for concrete production will be transported to site via water trucks and/or sourced from groundwater bores (subject to water quality). Concrete production materials, including cement, aggregate and sand, needed for concrete production will generally be sourced from local or regional suppliers.

c Temporary supporting infrastructure

Other temporary supporting infrastructure during construction will include:

- construction compounds
- site offices and amenities
- construction materials storage (including stockpiles)
- laydown areas
- temporary meteorological monitoring masts (up to 200 m tall)

- water tanks
- water and sediment management infrastructure
- storage and parking areas
- borrow pits.

ii Operation

Permanent supporting infrastructure during operation will include:

- O&M facilities, including offices, amenities, equipment storage sheds and parking, in the eastern and western areas (Figure 3.1 and Photograph 3.3)
- up to 10 permanent meteorological monitoring masts, up to 200 m tall (Figure 3.1).
- hardstands
- water tanks.

Hardstands and water tanks will be within the development corridor, with locations determined as part of detailed design.

Security fencing will be installed around the perimeter of high voltage electrical equipment such as the collector substations. Signage will clearly identify hazards within the development corridor.

Lighting, security cameras and weather stations will be installed where necessary for safety, operational maintenance, and security purposes. Lightning protection will be provided as required.

Areas within the development corridor may be landscaped as required.



Photograph 3.3 Example of an operations and maintenance facility

3.3.6 Transport

i Transport and site access

Transport to the site will be from Kidman Way, which connects to the regional road network including Sturt Highway to the north and Newell Highway to the south.

Project components, infrastructure, plant and equipment and construction materials will be transported to the development corridor by general access heavy vehicles and restricted access vehicles (RAVs). A RAV is a heavy vehicle that exceeds a prescribed weight and/or dimension limits specified by the National Heavy Vehicle Regulator. RAVs will include oversize/overmass (OSOM) vehicles which generally transport a large indivisible item and exceed the prescribed mass or dimension requirements.

Heavy vehicles, including RAVs, will access the project area from Kidman Way via the intersection with McLennons Bore Road. Vehicles will travel along McLennons Bore Road to access Fernbank Road, Wilson Road and Goolgumbra Road to designated site access points (Figure 3.1). The Kidman Way is an approved route for vehicles up to 36.5 m long.

Project components, infrastructure, plant and equipment and construction materials will be sourced from various locations within NSW and Australia depending on the suppliers/contractors and availability.

Some project components, such as WTG components, substation equipment and O&M components, will be imported from outside of Australia. Imported project components will be delivered to site from the Port of Newcastle and transported to the project area using RAVs for OSOM loads.

Other heavy plant and equipment, such as cranes to erect WTGs, earthmoving equipment and other loads that exceed mass or size restrictions for the road network will also be transported to site using RAVs.

Light vehicles will access the project area from two intersections, Kidman Way at McLennons Bore Road, and Kidman Way at Cadell Road (south). Vehicles will use McLennons Bore Road, Fernbank Road, Wilson Road and Goolgumbra Road to reach designated site access points.

Light and heavy vehicles will also access the accommodation facility for the eastern area from a site access point on Kidman Way (Figure 3.1).

Site access points are shown on Figure 3.1 and listed in Table 3.3. New intersections are proposed at these locations for project-related traffic.

Table 3.3 Site access points

Road	Site access	Project stage
McLennons Bore Road	Two site access points providing access to the development corridor on the southern side of McLennons Bore Road.	Stage 1
Fernbank Road	Three site access points providing access to the development corridor east and west off Fernbank Road.	Stage 1
Kidman Way	One site access point providing access to the accommodation facility in the eastern area.	Stage 1
Goolgumbra Road	Two site access points providing access to the development corridor off Goolgumbra Road.	Stage 2

ii Road and intersection upgrades

Local road and intersection upgrades are proposed to facilitate vehicle movements from Kidman Way to the site access points. The proposed road and intersection upgrades are listed in Table 3.4 and further detail is provided in Table 6.23. One new intersection is proposed on Kidman Way which will provide access to the development corridor east of Kidman Way, where the accommodation facility for the eastern area will be located. The intersection will be constructed within the development footprint and Kidman Way road reserve.

Table 3.4 Road and intersection upgrades

Location	Upgrade requirements	Project stage
Road upgrades		
McLennons Bore Road - between Kidman Way and Cadell Road	Road upgrade and widening	Stage 1
McLennons Bore Road – between Cadell Road and Wilson Road	Road widening	Stage 1
Fernbank Road – between McLennons Bore Road and the site access points	Road widening	Stage 1
Wilson Road – between McLennons Bore Road and Goolgumbra Road	Road widening	Stage 2
Goolgumbra Road – between Wilson Road and the site access point	Road widening	Stage 2
Intersection upgrades		
Kidman Way and McLennons Bore Road	Upgrade of existing intersection	Stage 1
Kidman Way and Cadell Road (south)	Upgrade of existing intersection	Stage 1
Kidman Way – new intersection to access development corridor east of Kidman Way	New intersection for site access point	Stage 1
McLennons Bore Road and Cadell Road	Upgrade of existing intersection	Stage 1
McLennons Bore Road and Fernbank Road	Upgrade of existing intersection	Stage 1
McLennons Bore Road	New intersections for site access point	Stage 1
Fernbank Road	New intersections for site access point	Stage 1
McLennons Bore Road and Wilson Road	Upgrade of existing intersection	Stage 2
Goolgumbra Road	New intersections for site access point	Stage 2

Proposed road and intersection upgrades are described in the traffic impact assessment (Appendix E.6).

iii Internal access tracks

An internal network of unsealed access tracks will be established within the development footprint. The internal tracks will provide access during construction, for maintenance during operation, and for emergency response.

The tracks will consist of upgraded existing tracks, where possible, and new tracks. Subject to detailed design, internal access tracks will be 2–6 m wide. Some sections may be wider to allow general access heavy vehicle and RAV movements.

Tracks will be available for use for agricultural activities within the project area.

Existing bridges across the Coleambally Outfall Drain and other unnamed watercourses will be utilised for site access (Figure 3.1). Existing bridges will undergo further assessment and may require upgrades to be undertaken in consultation with the asset owner, CICL.

3.3.7 Services

There is no existing water, sewerage or electricity infrastructure on-site. During construction, the accommodation facilities will require water, telecommunications, sewage treatment, electricity, diesel, grease and waste management. This includes the following:

- Potable water will be delivered by truck, and stored in tanks that are connected to the units and communal infrastructure. Rainwater tank/s will be installed to capture water that can be used for non-potable functions such as toilet flushing, laundry, vehicle washing and landscape irrigation.
- An on-site sewage treatment plant will be installed and will produce treated wastewater that can be used during construction of the project. Subject to appropriate treatment, treated water may be used to supplement rainwater captured for non-potable functions such as toilet flushing. The processing capacity of the on-site sewage treatment plant will be below the threshold specified in Section 36 of Schedule 1 of the NSW *Protection of the Environment Operations Act 1997*, and therefore an environment protection licence (EPL) will not be required for this part of the project.
- The cellular network will be used for telecommunications during construction.
- Electricity may be sourced from the local distribution network (where available), on-site using solar panels/batteries and diesel generation where access to the grid is unavailable.
- Diesel will be delivered and stored within bunded storage tanks that comply with the relevant standards.
- The accommodation facilities kitchens will be equipped with a grease trap that will be pumped out regularly.
- The accommodation facilities will generate putrescible waste, recyclable waste and general waste. Waste will be collected and stored in waste bins that are emptied and removed by truck to licensed landfill and recycling centres, which have the required capacity, at least weekly. No waste will be deposited on site.

On-site sewerage collection/treatment infrastructure will continue to be used during operation.

There is an existing 11 kV overhead transmission line that crosses McLennons Bore Road close to its intersection with Cadell Road. Murrumbidgee Council and the asset owner, Essential Energy, will be consulted if impacts to this asset are identified during detailed design. Temporary adjustments to part of the 11 kV line may be required to enable safe passage of OSOM vehicles. This could involve raising the line to an appropriate height at the site access point or burying part of the line.

3.4 Uses and activities

3.4.1 Early works

Early works will commence prior to construction, and will include, but are not limited to:

- road/intersection upgrades and maintenance works on the public road network
- site, building and/or road surveys to inform infrastructure placement

- installation of fencing
- artefact survey and/or salvage
- overhead line safety marking
- geotechnical investigations including drilling and/or surveying
- installation of temporary meteorological masts.

3.4.2 Construction

i Site preparation

Staged site preparation works will include:

- construction of site access points
- construction of worker accommodation facilities
- earthworks
- upgrading existing tracks/construction of new access tracks within the development corridor
- upgrading existing bridges across the Coleambally Outfall Drain (western area only, if required)
- establishment of temporary construction infrastructure described in Section 3.3.5i
- ongoing geotechnical investigations to confirm ground conditions.

Earthworks will include excavation of foundations (including for WTGs, transmission infrastructure and hardstands), access track formation, drainage works, and pad formation.

Management measures to mitigate potential impacts on the environment and receptors will be implemented as part of site preparation works. These will include erosion and sediment controls such as drainage channel improvements and construction of sediment control ponds. Grading adjacent to first and second order streams and drainage channels may be required to manage erosion during construction.

Laydown areas, waste handling, and fuel and chemical storage areas will be strategically placed to minimise potential environmental impacts during construction.

ii Worker accommodation facilities

As described in Section 3.3.5ia, worker accommodation facilities will be constructed progressively as construction of the project progresses (each up to 450-person capacity).

Construction of the worker accommodation facilities will require stripping of topsoil where necessary, and construction of hardstand, walkways and carparks. Minor earthworks, including levelling, may be required prior to delivery and construction of prefabricated demountable units and utility infrastructure. The need for heavy earthworks and compaction is expected to be low due to the flat topography of the development footprint and will be minimised as much as practicable.

The facilities will be designed and operated to comply with *Planning for Bushfire Protection* (RFS 2019) and *AS3959-2018 Construction in Fire Prone Areas*. The accommodation facility development footprints will provide an asset protection zone (APZ) between bushfire hazards and buildings (including roads) that is compliant with the relevant standards.

Each facility will be operated by about 5–10 staff (including administration, cleaning, food preparation, maintenance and security staff). Once operational, each accommodation facility will be used for 24 hours a day, 7 days a week. Where possible, local businesses will be engaged to supply goods and services to the facility, typically consisting of laundry, cleaning and catering.

The facility operator will implement a safety management system that is compliant with relevant legislative requirements, standards, and codes of practices and include processes and procedures to respond to and manage emergencies.

Following the completion of project construction, the accommodation facility may be maintained for use by the construction workforce associated with other developments in the region, if this is approved as part of future development applications. Otherwise, the accommodation facility will be decommissioned.

The prefabricated demountable units will be removed as the construction workforce decreases. Once construction is complete, communal infrastructure, such as the dining hall, water storage and fencing will be removed to enable the site to be generally restored to its former condition.

iii Construction activities

Construction activities will include:

- construction of hardstand areas
- delivery of project infrastructure (including WTG components)
- construction of footings for the WTGs and permanent meteorological monitoring masts
- erection of permanent meteorological monitoring masts and WTG components
- erecting power poles and transmission towers, and stringing lines and/or trenching and line installation
- installation of substations
- construction of O&M facilities
- test and commission project infrastructure
- rehabilitation and revegetation.

The majority of infrastructure will be prefabricated, and delivered and assembled on site.

iv Construction plant and equipment

Plant and equipment required for the construction of the project will include:

- earthmoving plant
- cable trenching and laying equipment
- material handling equipment (including forklifts and cranes)
- machinery and equipment for connection infrastructure establishment
- water trucks for dust suppression
- light vehicles for personnel transport.

v Workforce

A workforce of approximately 600 personnel will be on-site during peak construction.

The construction workforce will be sourced from the local area as far as practicable.

Non-local construction staff will use the temporary construction accommodation facilities for the project, Project EnergyConnect's Dinawan accommodation facility (subject to agreement with Transgrid) and if required, available rental, motel and other accommodation in surrounding townships and regional centres (including Coleambally, Griffith, Deniliquin, Narrandera, Jerilderie and Darlington Point).

3.4.3 Operation

i Activities

The WTGs and infrastructure will be maintained during operation to ensure ongoing efficient electricity generation, energy storage and site operation. Maintenance will include:

- servicing WTGs, collector substations, and other infrastructure, with repair or replacement of components where required
- vegetation maintenance
- weed and pest management
- fence and access road management
- internal track management
- drainage and erosion management
- landscaping (if required).

The O&M facilities will include site offices, amenities, equipment and maintenance sheds, laydown, storage and parking for operation. There will be an O&M facility for both the eastern and western areas (see Figure 3.1).

Light vehicle access will be required throughout operation. Heavy vehicles will also be required on occasions for operational and maintenance activities.

Security monitoring will be undertaken by the operational workforce. Security cameras may be utilised to assist with monitoring project infrastructure.

Livestock will graze with the development corridor during operation.

ii Workforce

Project operation will require up to 50 full-time employees. Project operation will be supported by contractor roles for vegetation, weed and pest management, cleaning, equipment calibration and internal road maintenance.

3.4.4 Decommissioning

Once the project reaches the end of its operational life, a decision will be made to either decommission or re-power the facility, subject to approval requirements.

If the project is decommissioned, all aboveground structures will be removed (unless otherwise agreed with landowners and regulators) and the site rehabilitated generally to its pre-existing land use, as far as practicable. Project infrastructure will be managed in accordance with the waste management hierarchy and contemporary waste management legislation.

If re-powering is proposed, stakeholders will be consulted and the required approvals sought.

3.4.5 Water demand

Water will be required during construction and operation. An estimate of water demand is provided in Table 3.5.

Table 3.5 Indicative water demand

Activity	Water requirement	Source
Construction (non-potable)	176 megalitres (ML) over 5 years	Water will be sourced primarily from existing extraction bores that are owned by landholders associated to the project, where each bore has an applicable water access license (WAL). Demand for groundwater will be minimised by opportunistic use of water from rainwater tanks collecting roof runoff, reuse of water captured by construction sediment basins and extraction from existing landholder dams in accordance with harvestable rights.
Construction (potable)	188 ML over 5 years	Trucked to site by commercial water provider.

During operation, non-potable water will continue to be sourced from groundwater sources via existing landowner bores. This will be supplemented by sources such as potable water trucked into site and stored in tanks.

3.5 Timing

3.5.1 Early works

Early works will be undertaken ahead of commencement of construction as described in Section 3.4.1.

3.5.2 Construction

Project construction is expected to commence in 2025, subject to receiving the required approvals. Construction is expected to be completed over approximately 60 months.

It is anticipated that the project will be constructed in two stages (see Section 3.5.4).

Construction activities will be undertaken during standard construction hours (7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday). Exceptions to these hours may include:

- deliveries by heavy vehicles and RAVs outside of peak traffic times
- concrete batching and pouring
- crane movements between WTG sites
- activities that are inaudible at non-associated residences
- activities for WTG construction hindered by adverse weather conditions.

The relevant council and surrounding landholders will be notified of any work outside of standard construction hours.

3.5.3 Operation

Stage 1 of the project is expected to be commissioned in 2027–2028, subject to the availability of grid access.

The project will operate continuously, 24 hours per day, 7 days per week.

The operational lifespan of the project is expected to be in excess of 25–30 years, depending on the nature of WTG technology and energy market demands.

3.5.4 Staging

i Construction staging

The project's generation capacity and connection to the electricity grid will be dependent on the outcomes of the South West REZ Access Scheme and the construction of electricity distribution infrastructure, including Dinawan Substation.

It is anticipated that the project will be constructed in two overlapping stages:

- Stage 1 – development of the wind farm in the eastern area.
- Stage 2 – development of the wind farm in the western area.

The road upgrades listed in Section 3.3.6ii have been separated into two stages based on access requirements for Stage 1 and Stage 2 of the project.

As a conservative assumption, technical studies prepared for this EIS have assessed the concurrent construction of the eastern part of Dinawan Wind Farm and the adjoining Dinawan Solar Farm (subject to a separate application) as this scenario would have the greatest construction workforce demands and vehicle movements.

The sequencing of the project will be determined as part of detailed design. Sequencing is likely to include overlap between Stage 1 and Stage 2 activities but is likely will involve the following steps:

- early works ahead of commencement of construction
- construction of supporting infrastructure and grid connection works
- construction of wind farm and associated infrastructure.

ii Staging biodiversity offset credit retirements

As described in the Biodiversity Development Assessment Report (BDAR) (Appendix E.3), biodiversity credits will be retired to compensate for biodiversity impacts. It is proposed to retire the project's biodiversity credit liability in two stages, the first prior to the commencement of construction in the Stage 1 area and the second prior to the commencement of construction in the Stage 2 area. Offset staging will be confirmed prior to the commencement of construction.

iii Operation and decommissioning

Following construction, subsequent phases of the project will be:

- operation (25–35 years)

decommissioning (1–2 years).

4 Statutory context

This chapter identifies the key relevant statutory requirements for the project having regard to the EP&A Act and NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation), and other relevant NSW and Commonwealth legislation and environmental planning instruments.

This chapter addresses:

- permissibility
- power to grant approval (i.e. approval pathway)
- other approvals required to carry out the project
- pre-conditions to exercising the power to grant approval
- mandatory matters for consideration (Appendix B).

Relevant statutory requirements are considered in detail in the assessment sections of the EIS (Chapter 5) and supporting technical reports in Appendix E.

4.1 Characterisation and permissibility

Chapter 2, Part 2.3 of State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) specifies development controls for infrastructure. Under the Transport and Infrastructure SEPP, the project is best characterised under Division 4 which relates to electricity generating works. Section 2.35 defines electricity generating works:

electricity generating works means a building or place used for the following purposes, but does not include a solar energy system—

- (a) making or generating electricity,
- (b) electricity storage.

Therefore, the project is defined as electricity generating works under the Transport and Infrastructure SEPP.

Section 2.36 specifies development permitted with consent. Section 2.36(1) states:

(1) Development for the purpose of electricity generating works may be carried out by any person with consent on the following land—

- (a) in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source—on any land,
- (b) in any other case—any land in a prescribed non-residential zone.

The project is consistent with section 2.36(1)(b), being electricity generating works carried out on land in a prescribed non-residential zone, namely land zoned RU1 Primary Production. Therefore, the project is permissible with consent.

4.2 Power to grant approval

Approval for the project is sought under Division 4.7 of the EP&A Act. The project is SSD as it is development listed in Schedule 1, section 20 (development for the purpose of electricity generating works that has a capital investment value of more than \$30 million) of State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP).

The consent authority for SSD is the NSW Minister for Planning and Public Spaces.

Pursuant to section 2.7(1) of the Planning Systems SEPP, the NSW Independent Planning Commission (IPC) will be the consent authority for the project if:

- Murrumbidgee Council or Edward River Council makes a submission by way of objection
- at least 50 submissions (other than from a council) are made by the public by way of objection
- a reportable political donation under section 10.4 of the EP&A Act is made by the proponent in connection with this development application.

Otherwise, the application will be determined by the Minister.

4.3 Other approvals

This section identifies the other approvals that are required to carry out the project and explains why they are required. These approvals are outlined in Table 4.1 and have been grouped into the following categories:

- Commonwealth approvals
- consistent approvals, which are approvals that cannot be refused and are required to be issued consistently under section 4.42 of the EP&A Act if the SSD application is approved
- other approvals, which are approvals that are not expressly integrated into the SSD assessment process
- approvals not required, which are approvals that would be required if the project was not SSD as per section 4.41 of the EP&A Act.

Table 4.1 Other approvals

Approval	Requirement
Commonwealth approvals	
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	Under the EPBC Act, an action that may or will have a significant impact on matters of national environmental significance (MNES), or the environment generally for 'Commonwealth agencies', is to be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for determination as to whether or not it is a 'Controlled Action' requiring approval under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act). Spark Renewables referred the project to DCCEEW. DCCEEW determined that the project is a Controlled Action, on the basis that it is likely to have a significant impact on EPBC Act listed threatened species and communities. The Commonwealth Government's bilateral agreement with the NSW Government applies to the project. Accordingly, DPHI issued supplementary SEARs that included DCCEEW's assessment requirements.

Table 4.1 **Other approvals**

Approval	Requirement
	Each of the matters raised in the supplementary SEARs have been addressed in this EIS (biodiversity – Section 6.3 and Appendix E.3). Appendix A summarises how the EIS addresses the relevant SEARs. The Commonwealth Minister for the Environment will be informed by the EIS and associated NSW assessment processes in their decision on whether to approve the project under the EPBC Act.
<i>Native Title Act 1993</i>	The Commonwealth <i>Native Title Act 1993</i> recognises and protects native title rights in Australia. It allows a native title determination application (native title claim) to be made for land or waters where native title has not been validly extinguished, for example, extinguished by the grant of freehold title to land. Claimants whose native title claims have been registered have the right to negotiate about some future acts, such as mining or granting of a lease over the land covered by their native title claim. Where a native title claim is not registered, a development can proceed through mediation and determination processes, though claimants will not be able to participate in future act negotiations. There are no current native title claims relevant to the project area.
Civil Aviation Regulation 1988	Reporting of tall structures is required under the Civil Aviation Regulations 1988. A detailed aviation assessment has been undertaken as part of the preparation of this EIS (Section 6.11.6). Engagement with relevant agencies has been undertaken including the Civil Aviation Safety Authority and Airservices Australia (Chapter 1).
Heavy Vehicle National Law	Approvals are required for the transport of wind turbines and associated infrastructure by oversize and overmass (OSOM) vehicles. The requirements for such OSOM transport are assessed in a route analysis study (Section 6.6 and Appendix E.6).
Consistent approvals	
An environment protection licence (EPL) under part 3 of the NSW <i>Protection of the Environment Operations Act 1997</i> (POEO Act)	The generation of electricity by means of wind turbines is an activity listed in Schedule 1 of the POEO Act and therefore an EPL will be required for the project.
An approval under section 138 of the NSW <i>Roads Act 1993</i>	Approval will be required under section 138 of the NSW <i>Roads Act 1993</i>, for any works in, on or over a public road. Approval will be required from: • Transport for NSW (Kidman Way) • Murrumbidgee Council (McLennons Bore Road, Fernbank Road and Wilson Road) • Edward River Council (Goolgumbula Road).
Other NSW approvals	
Approvals under Part 4 and Part 5 of the NSW <i>Crown Land Management Act 2016</i> .	A number of Crown land parcels within the project area (Figure 2.1) will contain project infrastructure so a licence for occupation and/or use will be required from NSW Crown Lands.
Water access licences under the NSW <i>Water Management Act 2000</i>	The project landholders hold a number of water access licences (WALs). Further discussions on water licensing for the project is provided in Section 6.7.

Table 4.1 Other approvals

Approval	Requirement
Approvals not required	
A permit under the NSW <i>Fisheries Management Act 1994</i> to block fish passage or dredge or carry out reclamation work on water land	The project will require works within waterfront land, including upgrades of existing crossings and/or establishing new crossings over watercourses within the development corridor. Where instream works (i.e. activities within the mapped corridor of a watercourse) are proposed, these works will be designed and constructed to consider local hydraulic conditions, minimise local flooding impacts, and consistent with relevant guidelines, including <i>Policies and Guidelines on Fish-Friendly Waterway Crossings</i> (NSW Fisheries 2003), <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (DPI 2013) and <i>Guidelines for Controlled Activities on Waterfront Land</i> (NRAR 2018).
An Aboriginal heritage impact permit under section 90 of the NSW <i>National Parks and Wildlife Act 1974</i>	Avoidance of Aboriginal cultural heritage values has been a key aspect of the project refinement process (refer to Section 6.4). Prior to commencement of construction, an Aboriginal Cultural Heritage Management Plan will be developed by a heritage specialist in consultation with DPHI, registered Aboriginal parties (RAPs) and Heritage NSW and will detail the management and mitigation of known Aboriginal sites along with unanticipated finds procedures, and training and reporting protocols.
An approval under Part 4, or an excavation permit under section 139, of the <i>Heritage Act 1977</i>	No direct impacts to heritage items as a result of the project are predicted.
A bushfire safety authority under section 100B of the NSW <i>Rural Fires Act 1997</i>	Bushfire risks associated with the project have been assessed in accordance with <i>Planning for Bushfire Protection</i> (NSW RFS 2019) (refer to Section 6.10).
A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the NSW <i>Water Management Act 2000</i>	Works near or within watercourses within the development corridor will be required as part of the project and will be carried out generally in accordance with <i>Guidelines for Controlled Activities on Waterfront Land</i> (NRAR 2018).

4.4 Pre-conditions to exercising the power to grant approval

Pre-conditions to exercising the power to grant approval for the project are provided in Table 4.2.

Table 4.2 Pre-conditions to approval

Statutory reference	Pre-condition	Relevance	Section in EIS
<i>State Environmental Planning Policy (Resilience and Hazards) 2021</i> , section 4.6(1) (contamination and remediation to be considered in determining development application)	A consent authority must not consent to the carrying out of any development on land unless: a) it has considered whether the land is contaminated, and b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and	The project involves an additional use to the current agricultural use (grazing). An assessment of land use and soils has been conducted as part of the EIS.	Section 6.9 and Appendix E.8 (land)

Table 4.2 **Pre-conditions to approval**

Statutory reference	Pre-condition	Relevance	Section in EIS
	c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.		
<i>State Environmental Planning Policy (Transport and Infrastructure) 2021, Section 2.118 (development with frontage to classified road)</i>	The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that: a) where practicable and safe, vehicular access to the land is provided by a road other than the classified road, and b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of – (i) the design of the vehicular access to the land, or – (ii) the emission of smoke or dust from the development, or – (iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.	The development corridor is adjacent to Kidman Way, a State classified road. A new intersection on Kidman Way is proposed as part of the project. Justification for the creation of a new intersection on Kidman Way is provided in Section 4.1.1 of Appendix E.6. Existing intersections at Kidman Way/McLennons Bore Road and Kidman Way/Cadell Road (south) are proposed to be upgraded (refer Section 6.1 of Appendix E.6). The traffic impact assessment in Appendix E.6 demonstrates that the project will not adversely affect the safety, efficiency and ongoing operation of the classified road. Project-related vehicle movements on Kidman Way during construction and operation have been considered as part of the EIS. As a renewable energy development, the project is not sensitive to traffic noise or vehicle emissions.	Section 6.6 and Appendix E.6 (traffic)
Jerilderie LEP, clause 4.6 Conargo LEP, clause 4.6 (exceptions to development standards)	Development consent must not be granted under this clause for a subdivision of land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU3 Forestry, Zone RU4 Primary Production Small Lots, Zone RU6 Transition, Zone R5 Large Lot Residential, Zone C2 Environmental Conservation, Zone C3 Environmental Management or Zone C4 Environmental Living if— a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.	The land on which the substations and switchyards are to be constructed may require subdivision. At the end of the operational life of the substations and switchyards, the infrastructure on the subdivided lots will be decommissioned and applications may be made to reconsolidate the lots back into the residual lot (in consultation with relevant landholders at that time).	Section 3.3.3

Table 4.2 **Pre-conditions to approval**

Statutory reference	Pre-condition	Relevance	Section in EIS
		The subdivision of the lot(s) would result in a lot size that is less than the minimum lot size under the Jerilderie LEP (relevant minimum lot size of 213 ha) and Conargo LEP (relevant minimum lot size of 200 ha). Notwithstanding, in accordance with the provisions of section 4.38 of the EP&A Act, the proposed subdivision will be permissible subject to the approval of the Minister for Planning or their delegate.	
Jerilderie LEP, clause 6.4 Conargo LEP, clause 6.3 (terrestrial biodiversity)	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that— a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	Part of the development corridor is identified as ‘biodiversity’ on the Jerilderie LEP and Conargo LEP terrestrial biodiversity map. Potential impacts to biodiversity have been assessed as part of the biodiversity development assessment report (BDAR). The project has been designed in accordance with the avoid, minimise, mitigate hierarchy of principles.	Section 6.3 and Appendix E.3 (biodiversity)
Jerilderie LEP, clause 6.5 (groundwater vulnerability)	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that— a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	Part of the development corridor is identified as ‘groundwater vulnerable’ on the Jerilderie LEP groundwater vulnerability map. Groundwater is not anticipated to be impacted by the project.	Section 6.7 and Appendix E.7 (water resources)
Jerilderie LEP, clause 6.7 Conargo LEP, clause 6.6 (wetlands)	Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that— a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	Part of the development corridor is identified as ‘wetland’ on the Jerilderie LEP and Conargo LEP wetland map. Potential impacts to biodiversity and water resources have been assessed as part of the BDAR and Water Resources Assessment.	Section 6.3 and Appendix E.3 (biodiversity) Section 6.7 and Appendix E.7 (water resources)

Table 4.2 **Pre-conditions to approval**

Statutory reference	Pre-condition	Relevance	Section in EIS
Jerilderie LEP, clause 6.8 Conargo LEP, clause 6.8 (essential services)	Development consent must not be granted to development unless the consent authority is satisfied that any of the following services that are essential for the development are available or that adequate arrangements have been made to make them available when required— a) the supply of water b) the supply of electricity c) the disposal and management of sewage d) stormwater drainage or on-site conservation e) suitable road access.	Essential services (including site access) have been considered in the project design.	Chapter 3

4.5 Mandatory considerations

Mandatory considerations have been summarised in Appendix B.

5 Engagement

5.1 Introduction

Spark Renewables has been consulting with stakeholders and building a local presence in the region since 2021. A range of engagement methods have been employed to consult with local landholders, neighbouring property owners, Murrumbidgee Council, Edward River Council, community groups, local Indigenous communities and local service providers.

This chapter provides an overview of the communication and engagement activities carried out before and during the preparation of this EIS, as well as planned future engagement activities. It also summarises the community views in relation to the project, as understood by the data and information gathered during the consultation. In doing so, this chapter demonstrates compliance with the consultation requirements set out in the *Undertaking Engagement Guidelines for State Significant Projects* (SSD Engagement Guidelines) (DPE 2022d).

This chapter discusses community engagement, where ‘community’ is defined in accordance with the SSD Engagement Guidelines (DPE 2022d) as:

the people and groups that are interested in, or affected by a State significant project, such as local residents, community groups, Aboriginal and Torres Strait Islander communities, culturally and linguistically diverse communities, peak bodies, and businesses

Details on the issues raised by the community, and where these issues have been addressed in the EIS, are provided in Table 5.6 in Section 5.5.

5.2 Consultation approach

Spark Renewables prepared a community engagement management plan (engagement plan) to support the delivery of meaningful engagement that considers the needs of all stakeholders. The engagement plan was prepared with reference to the SSD Engagement Guidelines (DPE 2022d). The engagement plan sets out a structured approach to engagement with key stakeholders and communication protocols for the duration of the project’s planning and approvals process.

5.2.1 Communication and engagement objectives

The communication and stakeholder engagement objectives for the project, as described in the engagement plan are as follows:

- Deliver an honest, innovative, flexible and transparent community engagement process.
- Engage with, and inform, local residents, the broader community and other stakeholders about the project, its benefits and potential impacts by providing timely and ongoing access to project information.
- Develop relationships with the community and other stakeholders to facilitate positive outcomes through the project for the community.

5.2.2 Key stakeholders

Spark Renewables has developed strong relationships with the local community and project stakeholders. Initial stakeholder mapping involved developing a comprehensive list of organisations and individuals, with stakeholders categorised into groups based on their potential interest and interaction with the project location.

Key stakeholders for the project include:

- Government stakeholders:
 - DPHI
 - Murrumbidgee Council
 - Edward River Council
 - NSW DCCEEW 's Biodiversity, Conservation and Science Division (BCS)
 - Transport for NSW (TfNSW)
 - Energy Corporation of NSW (EnergyCo)
 - Commonwealth DCCEEW
 - NSW National Parks and Wildlife Service
 - Heritage NSW
 - Murray Local Land Services
 - NSW DCCEEW Water Group
 - NSW Environment Protection Authority (EPA)
 - Crown Lands
 - Regional NSW – Mining, Exploration & Geoscience
 - Department of Primary Industries – Agriculture and Fisheries divisions
 - Department of Customer Service – NSW Telco Authority
 - Fire & Rescue NSW
 - NSW Rural Fire Service (RFS)
 - Commonwealth Department of Defence
 - Civil Aviation Safety Authority
 - Airservices Australia
- Community stakeholders:
 - host landholders
 - nearby landholders
 - CICL
 - First Nations representatives including RAPs

- broader community (including residents of Jerilderie, Darlington Point and Coleambally)
- local community groups
- local business and service providers
- members of Argoon RFS Brigade
- Other stakeholders:
 - Transgrid
 - Elecnor Australia (formerly SecureEnergyJV)
 - NSW Aboriginal Land Council
 - WaterNSW.

Engagement with the project's host landholders commenced in 2021 and is ongoing. Spark Renewables has entered into a commercial agreement with these landholders. Engagement with host landholders is not described in this EIS.

5.2.3 Engagement tools

The engagement process was designed to be inclusive, transparent, structured and meaningful for the local community and other stakeholders. It included a variety of communication tools and activities to promote awareness of the project, provide information and encourage feedback.

Multiple and diverse opportunities to engage and provide feedback were incorporated in the EIS engagement program, including one-on-one interviews, community information sessions and traditional communication channels like newsletters. This approach encouraged the representation of diverse stakeholder groups and age demographics within the consultation process.

A summary of the communication and engagement tools utilised is provided in Table 5.1.

Table 5.1 Summary of key engagement tools

	Tool	Description	Timing	Target stakeholder groups
	Project website	Provides regular updates on the project, links to key project documents, and details opportunities for participation. The project website can be accessed via the following link: https://sparkrenewables.com/dinawan-energy-hub/ This page also includes a query/feedback form.	Launched 30 September 2021 – ongoing	All stakeholders
	Project email address	A dedicated project email address – info@dinawanenergyhub.com – answers queries from community and other stakeholders. The project email address has been promoted on all community notifications and advertising.	Launched 30 September 2021 – ongoing	All stakeholders

Table 5.1 **Summary of key engagement tools**

	Tool	Description	Timing	Target stakeholder groups
	Community information line	A dedicated number for stakeholders to contact Spark Renewables. The number is 1300 271 419.	Ongoing	All stakeholders
	Face to face meetings	Face to face meetings have been held with government agencies, host and nearby landholders and key stakeholders throughout project development.	Ongoing	All stakeholders
	In-depth social impact assessment (SIA) interviews	Interviews and group discussions to gain in-depth insights into key socio-economic issues from the perspective of key stakeholders likely to experience project impacts and benefits.	May–June 2023	Nearby landholders, First Nations stakeholders, Murrumbidgee and Edward River councils, the local community and business and special interest groups.
	Surveys	A community feedback and values survey was established during the scoping phase and was promoted online and at community information sessions. A separate survey was distributed to communities near the project to gauge interest in a scheme where community members could invest in a community solar farm. This was being investigated as an option for community benefit sharing as part of the project; however, due to a lack of interest is no longer being pursued by Spark Renewables.	December 2021 – ongoing	General community
	Community information and drop-in sessions	Four rounds of community information sessions have been completed to provide information to the community and seek feedback about the project. In December 2021, the first community information sessions were held at the Coleambally Bowling Club and Jerilderie Council Hall. In October 2022, Spark Renewables provided a project update and engaged further with the community with a market stall at the Taste Coly Festival in Coleambally. In August 2023, Spark Renewables held a series of three workshops at the Coleambally Community Club, Jerilderie Civic Centre and the Darlington Point Sports Club. The workshops provided a project update and sought feedback on the project’s community benefit sharing program.	December 2021 October 2022 August 2023 December 2023 May 2024	General community

Table 5.1 **Summary of key engagement tools**

Tool	Description	Timing	Target stakeholder groups
	In November and December 2023, Spark Renewables set up temporary offices in Coleambally and Jerilderie for four weeks during the public exhibition of the Dinawan Solar Farm EIS. The community were given the opportunity to ‘drop-in’ and discuss any questions relevant to both Dinawan Solar Farm and Dinawan Wind Farm, including general project information and outcomes of environmental assessments. In May 2024, Spark Renewables hosted an information session for members of the Argoon RFS Brigade, many of whom are neighbouring landowners. During the session, Spark Renewables shared the findings of select technical assessments, listened to feedback and provided an update on the community benefits fund.		
	Project newsletters Five project newsletters have been provided to keep key stakeholders, those on the project mailing list and the local community updated about the project and to promote upcoming consultation events. An additional newsletter was distributed to promote a survey gauging interest on whether the community would be interested in a scheme to invest in a community solar project related to the Dinawan Energy Hub.	October 2021 November 2022 May 2023 October 2023 November 2023	All stakeholders
	Media advertising Community consultation events have been advertised on local radio and newspapers.	Select events	General community
	Project email mailing list A project email distribution list has been maintained to keep stakeholders that have expressed an interest informed about the project.	Launched 30 September 2021 - ongoing	All stakeholders
	Procurement and employment register A procurement and employment register has been established recording details of individuals and businesses that have expressed an interest in being involved in the project.	Established following initial community consultation sessions in 2021 - ongoing	Individuals and local business

5.3 Early project communication and engagement

5.3.1 Overview

Spark Renewables recognises the importance of stakeholder engagement to the success of the project. Consultation and engagement with affected parties, stakeholders, and the broader community has been an integral part of the development of the project as well as informing the scoping of investigations for this EIS. Spark Renewables has been building a local presence in the region since 2021. At the stage of assessing the potential for a solar project in the area, Spark Renewables undertook one-on-one meetings with local landholders, including landholders associated with the project and nearby landholders. In 2022, detailed discussions were held with nearby landholders prior to the lodgement of the project's SSD application and to inform preparation of the scoping report.

Spark Renewables has also engaged with Murrumbidgee Council, Edward River Council, local members for parliament, community groups and local service providers.

Spark Renewables' engagement principles – adopting a model of consulting early and often, with a view of minimising surprises for the community and stakeholders – align with the SSD Engagement Guidelines.

5.3.2 Engagement activities

Early project and scoping phase engagement commenced in 2021 and is summarised in Table 5.2. Initial engagement focussed on residences and landholders within 5 km of the project investigation area of the Dinawan Energy Hub (Figure 2.5), through phone calls, letter box drops and emails, coupled with broader engagement in the form of media releases, advertising and distribution of newsletters, leading up to two community information sessions held in December 2021. Engagement in 2022, during the scoping phase, included briefing meetings with First Nations people, business groups and nearby landholders. The Dinawan Wind Farm Scoping Report was submitted in November 2022.

Table 5.2 Early and scoping phase engagement with community stakeholders

Method	Timing	Purpose	Stakeholders
Media release	15 July 2021	To announce the intent of Dinawan Energy Hub and purpose to the industry, investors and marketplace and stakeholders broadly. Public link: https://sparkrenewables.com/wp-content/uploads/2021/10/Spark-Renewables_media-release-proposed-Dinawan-Energy-Hub-Project-Final.pdf	All Investors Industry Media
Launch of Spark Renewables website	30 September 2021	To provide a comprehensive online portal for Spark Renewables and its projects. Project website: www.dinawanenergyhub.com.au	All
Phone calls, emails and letterbox drop	18–22 October 2021	To provide a project overview, discuss the proposed Dinawan Energy Hub and promote drop-in sessions. Newsletters were delivered to 25 residences within a 5 km radius of the investigation area for Dinawan Energy Hub. Calls were made to those residences whose phone numbers were publicly available. Emails were sent to nearby residences, stakeholders and organisations whose email addresses were publicly available.	Project neighbours

Table 5.2 Early and scoping phase engagement with community stakeholders

Method	Timing	Purpose	Stakeholders
Media release and Community Newsletter 1	21 October 2021	To announce the Dinawan Energy Hub drop-in sessions to the community, provide links to website, contact information and high-level timelines for the phases. Media release: https://sparkrenewables.com/wp-content/uploads/2021/10/Dinawan-Energy-Hub-Media-Release.pdf Newsletter 1: https://sparkrenewables.com/wp-content/uploads/2021/10/DEH-Newsletter-Number-1.pdf	Media Community Businesses
Briefing letters and media release	29 October 2021	To provide an update on Dinawan Energy Hub (including links to website, contact information and high-level timeline).	Industry Business leaders
Advertisements published in newspapers and radio	22 November–6 December 2021	To promote drop-in sessions to community. These included: • One week campaign across four radio stations, with announcements three times a day and an interview with the project manager. • Ad placement in South Riverina and Griffith Area News.	Media Community
Website Newsletters	November–December 2021	To provide updates on Dinawan Energy Hub and share notes and feedback received from the community during scoping. Ongoing updates to the project website and Spark Renewables' Instagram account with posts and stories.	Community
Community information drop-in sessions	7–8 December 2021	To provide the community with an overview of the Dinawan Energy Hub and seek initial input. There were six information posters on display, detailed maps and the opportunity to complete a community perceptions survey: • https://sparkrenewables.com/dinawan-news/dinawan-energy-hub-initial-community-consultation-sessions/ • https://www.surveymonkey.com/r/WNJ6RRH	Community Businesses Murrumbidgee Council CICL
Briefing meetings	May–June 2022	Project briefing and introduction/update: • 19 May 2022 presentation to Lions Club (Coleambally) • 20 May 2022 meeting with Wiradjuri Elders • 8 June 2022 meeting with EnergyCo	Business groups Traditional Owners Industry
Phone calls and face to face meetings	May 2022 June 2022 September 2022	Project briefing, discuss areas of concern and provide update ahead of submission of scoping report.	Nearby landholders

5.3.3 Community values survey

A survey was offered to attendees at the community information sessions in December 2021. Of the 28 attendees, 14 responded to the survey assessing potential project benefits, concerns, and community values. Most respondents lived locally in rural localities and the townships of Coleambally and Jerilderie.

The highest proportion of benefits, concerns and values selected from a list of possible options by respondents is presented in Table 5.3, including the percentage of respondents that selected the relevant option.

Table 5.3 Community values survey outcomes – benefits, concerns and local values

Aspect	Proportion of respondents
Benefits of the project	- Investment in local community – 71% - Road upgrades and better access to the Rural Fire Service – 62% - Clean energy generation – 54% - Employment opportunities – 46%
Concerns about the project	- Risk of fire – 57% - Potential impacts to native flora and fauna – 46% - Traffic and road safety – 23% - Visual impacts – 23% - Land use – 23%
Values of the local and regional area	- Farming land – 38% - Landscape – 23% - Native flora and fauna – 23%

Information gathered directly from community members, and through the surveys assessing community values and perceived benefits and impacts, has been invaluable to the development process in shaping an understanding of what can be achieved and what Spark Renewables can do to support the community's information needs and project expectations.

5.4 EIS engagement

Engagement during EIS preparation included detailed discussions with key stakeholders, as well as regular community updates and face to face consultation sessions as described below.

5.4.1 Government stakeholders

Government engagement commenced in 2021 and has continued throughout the preparation of this EIS. A summary of key engagement with government agencies is provided in Table 5.4.

Table 5.4 Summary of EIS engagement – government stakeholders

Stakeholder / group	Method of engagement	Timing	Engagement summary
DPHI	Meeting	17 August 2023	Meeting with DPE, Murrumbidgee Council, Edward River Council and BCS to provide a briefing on initial assessment findings and discuss approach to key issues. Whilst the focus of this meeting was Dinawan Solar Farm, matters discussed included reference to Dinawan Wind Farm including project layout, construction workforce accommodation, traffic and transport (including impacts on local roads) and cumulative impacts.
	Meeting	15 December 2024	Meeting to provide an update on EIS progress. Matters discussed included project layout, consultation outcomes, general assessment updates, construction workforce accommodation strategy, traffic and transport (including impacts on local roads and OSOM route), cumulative impacts, bird and bat utilisation surveys, closest receptors and timeframes for lodgement.

Table 5.4 **Summary of EIS engagement – government stakeholders**

Stakeholder / group	Method of engagement	Timing	Engagement summary
	Meeting	18 March 2024	Meeting to provide an update on EIS progress. Matters discussed included consultation outcomes and general assessment updates (with a focus on visual and traffic).
BCS	Meeting	15 September 2022	Meeting to provide a project overview and commence discussions around variations to threatened flora surveys.
	Meeting	9 February 2023	Meeting to provide an update on biodiversity assessment. Matters discussed included PCT mapping and survey extent, timing and methodology.
	Site visit	20 June 2023	Site visit with BCS. Vegetation mapping was provided to BCS prior to the site visit and was reviewed on-site. Matters discussed included avoidance and minimisation, indirect impacts, partial clearing, threatened flora surveys, mitigation and management measures and potential stewardship sites.
	Meeting	17 August 2023	Meeting with DPE, Murrumbidgee Council, Edward River Council and BCS to provide a briefing on initial assessment findings and discuss approach to key issues. Whilst the focus of this meeting was Dinawan Solar Farm, matters discussed included reference to Dinawan Wind Farm including project layout, construction workforce accommodation, traffic and transport (including impacts on local roads) and cumulative impacts.
	Letters	Multiple	Letter correspondence relating to requested variation of threatened flora survey methodology.
	Meeting	17 April 2024	Meeting with BCS to outline the key findings of the BDAR prior to submission of the EIS. Matters discussed included a general project update, impact avoidance, survey coverage and methodology and an overview of key impacts.
Murrumbidgee Council	Meeting	25 October 2021	Spark Renewables provided a briefing and discussed the project generally. Key matters discussed included site selection, capital investment value and community benefit sharing, community engagement and sentiment, logistics and transport, workforce accommodation, electrical infrastructure and amenity impacts to neighbouring non-associated residences.
	Consultation session	8 December 2021	General Manager of Murrumbidgee Council attended the consultation session and met with Spark Renewables to discuss worker accommodation, community benefit sharing and potential for local infrastructure upgrades including telecommunications.
	Meeting	20 September 2022	In-person project update provided prior to scoping report submission.
	Meeting	29 May 2023	Spark Renewables provided a project update for Council. Key matters discussed included transport assessment and proposed site access, community benefit sharing, construction worker accommodation and waste management.

Table 5.4 Summary of EIS engagement – government stakeholders

Stakeholder / group	Method of engagement	Timing	Engagement summary
	Meeting	17 August 2023	Meeting with DPE, Murrumbidgee Council, Edward River Council and BCS to provide a briefing on initial assessment findings and discuss approach to key issues. Whilst the focus of this meeting was Dinawan Solar Farm, matters discussed included reference to Dinawan Wind Farm including project layout, construction workforce accommodation, traffic and transport (including impacts on local roads) and cumulative impacts.
	Meeting	23 August 2023	Meeting to discuss proposed approach to community benefit sharing incorporating feedback from community members following the first workshop and previous interviews conducted as part of the SIA.
	Meeting	4 October 2023	Meeting to discuss general terms and structure for the VPA for Dinawan Solar Farm and Dinawan Wind Farm.
	Meeting	20 November 2023	Meeting to discuss the Dinawan Solar Farm EIS during the public exhibition period and continue discussions around VPA for both Dinawan Solar Farm and Dinawan Wind Farm.
	Meeting	17 January 2024	Meeting to discuss terms and structure for the VPA for Dinawan Solar Farm and Dinawan Wind Farm, community benefits and telecommunications.
	Meeting	28 February 2024	Meeting to discuss terms and structure for the VPA for Dinawan Solar Farm and Dinawan Wind Farm, community benefits ideas, fire risks and road upgrades to be needed.
	Meeting	9 April 2024	Meeting to discuss terms and structure for the VPA for Dinawan Solar Farm and Dinawan Wind Farm.
	Meeting	9 May 2024	Meeting with Murrumbidgee Council traffic engineers to discuss proposed road and intersection upgrades for the project.
Edward River Council	Meeting	21 September 2022	Meeting with Edward River Council to provide a project briefing prior to lodging scoping report. Spark Renewables provided a presentation on the project and showed preliminary project plans. Key issues for council were discussed including roads, waste, accommodation and community benefit sharing.
	Meeting	17 August 2023	Meeting with DPE, Murrumbidgee Council, Edward River Council and BCS to provide a briefing on initial assessment findings and discuss approach to key issues. Whilst the focus of this meeting was Dinawan Solar Farm, matters discussed included reference to Dinawan Wind Farm including project layout, construction workforce accommodation, traffic and transport (including impacts on local roads) and cumulative impacts.
	Meeting	16 January 2024	Meeting with Edward River Council to provide project update, discuss community benefits and VPA for Dinawan Solar Farm and Dinawan Wind Farm, and discuss road upgrades and usage.
Commonwealth DCCEEW	Meeting	15 November 2022	Pre-referral meeting with Commonwealth DCCEEW. Matters discussed included an overview of the project and Spark Renewables, as well as outcomes of preliminary biodiversity investigations and how this informed design refinement.

Table 5.4 Summary of EIS engagement – government stakeholders

Stakeholder / group	Method of engagement	Timing	Engagement summary
	Site visit	3 April 2023	Commonwealth DCCEEW attended a site visit and were provided an overview of the project area for both Dinawan Solar Farm and Dinawan Wind Farm. Matters discussed included potential impacts to MNES, including TECs, threatened species and migratory species.
EnergyCo	Meeting	8 June 2022	Meeting held with EnergyCo to discuss Spark Renewables South West REZ project and understand EnergyCo approach to the REZ rollout.
	Reference group	Ongoing	Spark Renewables has been involved in regular developer reference group meetings for the South West REZ including providing feedback on the draft access scheme.
TfNSW	Meeting	8 May 2023	Meeting to provide a project overview (including proposed access points from Kidman Way) and an update on the traffic impact assessment.
	Meeting	14 March 2024	Meeting to discuss the TfNSW submission on Dinawan Solar Farm and to update TfNSW on status of Dinawan Wind Farm EIS and TIA.
Heritage NSW	Email	13 July 2023	Notification of test excavation program as part of ACHA.
NSW National Parks and Wildlife Service (NPWS)	Letter	20 March 2024	Letter with project update and offering to meet to discuss the project.
	Meeting	2 May 2024	Meeting to provide project update and information about project distance from national parks. NPWS asked questions about the project's potential impacts on Plains Wanderer and native vegetation.
Murray Local Land Services	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project.
DCCEEW Water Group	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project.
NSW Environment Protection Authority	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project.
DPHI Crown Lands	Letter	21 February 2024	Letter with project update and offering to meet to discuss the project.
	Meeting	6 March 2024	Meeting to discuss potential interactions between Crown land (including travelling stock reserves and paper roads) and project infrastructure, as well as the process to obtain landowner's consent to lodge this EIS.
	Emails	Multiple	Following the meeting in March, Spark Renewables and Crown Lands have continued to discuss the project's potential impacts on Crown land. Crown Lands provided their consent for the lodgement of this EIS.
Regional NSW – Mining, Exploration & Geoscience	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project.
	Letter	20 March 2024	Letter with project update and offering to meet to discuss the project.

Table 5.4 Summary of EIS engagement – government stakeholders

Stakeholder / group	Method of engagement	Timing	Engagement summary
NSW Department of Primary Industries – Agriculture	Meeting	12 April 2024	Meeting to provide project update and discuss findings and recommendations from select technical assessments (including potential impacts on agriculture, flood assessment outcomes and ongoing biosecurity management).
NSW Department of Primary Industries – Fisheries	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project. A phone call on 25 March 2024 confirmed there was no requirement for detailed engagement at this time and that the BDAR and water resources assessment should include consideration of potential impacts on key fish habitat and threatened species.
Department of Customer Service – NSW Telco Authority	Letter	23 April 2024	Letter with project update and offering to meet to discuss the project.
Fire & Rescue NSW	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project.
NSW Rural Fire Service	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project.
	Meeting	18 April 2024	Meeting to discuss findings of bushfire assessment. NSW RFS provided feedback on mitigation measures for bushfire protection and preparedness that were incorporated into the report (Appendix E.12).
Commonwealth Department of Defence	Letter	20 March 2024	Formal letter offering a project update and requesting consultation about the project.
Civil Aviation Safety Authority	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project. Targeted engagement with CASA will also be undertaken as part of their review of the Aviation Impact Assessment (Appendix E.9).
Airservices Australia	Letter	12 March 2024	Letter with project update and offering to meet to discuss the project. Targeted engagement with Airservices Australia will also be undertaken as part of their review of the Aviation Impact Assessment (Appendix E.9).

5.4.2 Community stakeholders

Spark Renewables has actively engaged with nearby landholders, local businesses and the broader community throughout the preparation of the EIS as summarised in Table 5.5.

The issues raised and how they have been addressed, including where the design of the development has been amended, is described in Section 5.5.

Table 5.5 **Summary of EIS engagement – community**

Stakeholder/group	Methods of engagement	Timing	Engagement summary
Adjoining and nearby landholders	Letter box drop	April 2023	Spark Renewables has used a range of methods to engage with nearby landholders.
	Project website	June 2023	An initial letterbox drop with the first community newsletter was completed in October 2021. Since then, follow up newsletters and personalised correspondence has continued including emails, phone calls and one on one meetings with neighbours to inform them about the project and address their questions and concerns.
	Phone calls	July 2023	
	Emails	August 2023	
	Face to face meetings	October 2023	Spark Renewables has consulted with neighbours regarding the Dinawan Energy Hub as a whole inclusive of both Dinawan Wind Farm and Dinawan Solar Farm to minimise consultation fatigue and to provide transparency.
	Consultation sessions	November 2023	
		January 2024	Nearby landholders also attended the community consultation sessions held to inform the broader community.
		February 2024	
Local community (with focus on Jerilderie and Coleambally)		April 2024	Spark Renewables has established clear channels of communication and has engaged in targeted consultation with all owners of residences within 8 km of a WTG, and has undertaken significant consultation with this group of stakeholders.
		May 2024	
	Letter box drop	Ongoing since project announcement in 2021	Consultation with the local community has involved a range of engagement methods including providing information and receiving feedback via the project website, project newsletters, surveys and community consultation sessions.
	Project website		Consultation sessions with the local community were held in 2021, 2022 and 2023 at local venues in Coleambally and Jerilderie, as well as an interactive information stall at the Coly Taste festival in Coleambally.
	Newsletters		Three community information sessions were held in Coleambally, Jerilderie and Darlington Point in August 2023, which provided a general project update and focused on the approach to community benefit sharing.
	Consultation sessions		Spark Renewables explored providing the nearby community an opportunity to invest in the project (or a standalone community solar project associated with the project) in order to financially benefit from the project. A survey was distributed to the communities near the project to gauge interest in a scheme where community members could invest in a community solar farm in Q4 2023. The survey results showed that there was little interest in the opportunity.
	Surveys		Spark Renewables set up temporary offices in Coleambally and Jerilderie for four weeks during the public exhibition of the Dinawan Solar Farm EIS (November and December 2023). While the focus was on the Dinawan Solar Farm, Spark Renewables also provided verbal updates and answered questions about Dinawan Wind Farm.
	Temporary offices		

Table 5.5 **Summary of EIS engagement – community**

Stakeholder/group	Methods of engagement	Timing	Engagement summary
Coleambally Irrigation Co-operative Limited (CICL)	Newsletters Face to face meetings Emails Consultation sessions Site visit	Ongoing since project announcement in 2021	CICL own land within the project area associated with Coleambally Irrigation Channel (east of Kidman Way) and have an easement within the project area and development footprint that is associated with Coleambally Outfall Drain. This easement is in the process of being transferred from the NSW Water Conservation and Irrigation Commission. Spark Renewables commenced consultation with CICL shortly after the project announcement. CICL staff attended the first consultation session held in Coleambally in 2021. In October 2022, Spark Renewables and CICL completed a site visit to inspect the project area and discuss key issues including potential interactions with the Coleambally Irrigation Channel, Coleambally Outfall Drain, flooding, fire and ground conditions. Subsequent discussions with CICL via email and meetings have focused on interactions with CICL infrastructure including use of CICL bridges, interactions with Coleambally Outfall Drain, landowner's consent, flooding risks and fire management.
First Nations groups and businesses	Phone calls Emails Face to face meetings Consultation sessions	Ongoing since November 2022	Spark Renewables has engaged with First Nations community groups and businesses in discussions around opportunities for employment and how to access the project's community benefit sharing fund. Spark Renewables has commenced detailed stakeholder interest and capability mapping that will inform the project's Aboriginal Participation Plan that is being prepared in accordance with the <i>NSW First Nations Guidelines</i> (Office of Energy and Climate Change 2022). Consultation has also been completed regarding the protection of cultural heritage values as part of the Aboriginal Cultural Heritage Assessment (ACHA). This consultation was carried out in accordance with <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents</i> (DECCW 2010a), and is detailed in Appendix E.4. To support the project's First Nations engagement, Spark Renewables has employed an Aboriginal Community Engagement Coordinator from the local community as a part of the project team whose role is to champion opportunities for First Nations people on the project. This approach has resulted in a high level of engagement and understanding between Spark Renewables and First Nations stakeholders and will help the project deliver benefits to First Nations people as the project progresses towards delivery and operation. Spark Renewables has sought opportunities to support First Nations groups and businesses through their engagement with the local community. A key engagement activity with local First Nations people involved Spark Renewables completing a whole of business Aboriginal cultural awareness training with traditional owners involved in the project's ACHA.

Table 5.5 **Summary of EIS engagement – community**

Stakeholder/group	Methods of engagement	Timing	Engagement summary
Local community groups and service providers	Phone calls Emails Face to face meetings Consultation sessions	Ongoing since project announcement in 2021	Spark Renewables has engaged with local community groups and their representatives through a range of activities and has received valuable feedback regarding potential impacts and community benefit sharing (see Section 5.5). Engagement included correspondence introducing and answering questions about the project, attendance at community information sessions and face to face meetings. Engagement has also involved sponsorship of community services and events including VRA Rescue NSW Coleambally, Taste Coleambally Festival and the Koori Rugby League Knockout Carnival. Key groups engaged include Coleambally Lions Club, Coleambally Community Club, VRA Rescue NSW Coleambally, Taste Coleambally, Coleambally Preschool Association, Narrandera Wiradjuri Warriors Rugby Club and Argoon RFS Brigade.
Local business and industry groups	Phone calls Emails Face to face meetings Consultation sessions	Ongoing since project announcement in 2021	Spark Renewables has engaged with local business and industry groups through a range of activities. Engagement has included correspondence introducing and answering questions about the project and face to face meetings. Key groups engaged include Coleambally Chamber of Commerce, Griffith Business Chamber, Coleambally Ricegrowers Association, Industry Capability Network, Murray-Riverina NSW Business Chamber, Regional Development Australia, Sureway Employment and Training and Wagga Wagga Business Chamber.

5.4.3 Other stakeholders

Spark Renewables has engaged with Transgrid regarding potential interactions with transmission projects including VNI West and Project EnergyConnect. Discussions since 2021 have included an initial project briefing, project updates and ongoing discussions about potential interactions with Transgrid projects.

Spark Renewables has also engaged with Elecnor Australia (formerly SecureEnergyJV), which is working on the construction of Project EnergyConnect, to discuss potential areas for collaboration in delivery of South West REZ projects. Valuable feedback has been received on several aspects of project planning including community engagement, stakeholder mapping, local employment strategies, regional conditions and constraints, construction timing and coordination.

Griffith Local Aboriginal Land Council were identified as the relevant Local Aboriginal Land Council for the project. As part of the ACHA, Spark Renewables and EMM have engaged with Griffith Local Aboriginal Land Council who are a registered Aboriginal party for the project. This consultation was carried out in accordance with *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a) and is detailed in Appendix E.4.

Spark Renewables provided WaterNSW an opportunity to meet to discuss the project in March 2023. WaterNSW noted that as the project is not near any WaterNSW land or major assets, a meeting was not required; however, they requested an opportunity to review this EIS. A copy of the EIS will be sent to WaterNSW.

5.4.4 Social impact assessment

A summary of SIA engagement is provided in Appendix E.14.

5.5 Community views

Community interest in the project has been local (i.e. less than 5 km from the project) and regional (i.e. up to approximately 100 km from the project). Feedback from the broader community has been varied and includes both positive and negative views on a range of topics.

A summary of the key findings of community engagement carried out to date is provided in Table C.1 of Appendix C. Community views regarding the project have been understood through the ongoing consultation and engagement activities described above. The majority of matters raised relate to the economic, environmental and social impacts of the project.

5.6 Engagement to be carried out

This EIS will be placed on public exhibition for a minimum of 30 days by DPHI and will be available online through the Major Projects website. Submissions will be sought from government and community stakeholders. Any submissions received by DPHI will be reviewed and forwarded to Spark Renewables to consider and respond to (via a submissions report).

Engagement with key stakeholders will continue through EIS exhibition and subsequent phases of the assessment, including:

- during public exhibition of the EIS, Spark Renewables will hold a drop-in information session(s) in Jerilderie and Coleambally to answer questions from the community about the content of this EIS and provide a summary of the project and key assessment findings
- ongoing consultation with Murrumbidgee Council, Edward River Council and TfNSW relating to project site access design (road and intersection upgrades)
- ongoing consultation with Murrumbidgee Council and Edward River Council to finalise the VPA for the project's community benefit sharing fund

- ongoing consultation with other agencies as required to address issues raised during exhibition of the EIS and as part of preparation of the submissions report
- ongoing consultation with CICL regarding detailed design and construction methods for bridge upgrades and cable crossings over the Coleambally Outfall Drain
- ongoing consultation with nearby neighbours to continue discussions regarding neighbour benefit sharing arrangements, community benefit schemes and other potential funding opportunities available through South West REZ initiatives
- ongoing consultation with neighbours, nearby landholders and local businesses through provision of project updates via email, the project website and community newsletters.

If development consent is granted for the project, Spark Renewables will continue to engage with stakeholders, including community members, throughout the construction and operation of the project.

Principle engagement and consultation activities that will be considered beyond determination of the project, if approved, are:

- ongoing consultation with local business and industry about opportunities for local procurement and employment
- ongoing consultation with local First Nations groups in relation to development of the project's Aboriginal Participation Plan
- ongoing consultation with neighbours and nearby landholders and local businesses through provision of project updates via email, the project website and community newsletters
- regular community notifications and updates as the project progresses through construction and into operation
- ongoing operation of the community telephone line, email address, mailbox and website, with set response times for project queries and complaints.

5.7 Community benefit sharing and Voluntary Planning Agreement

Spark Renewables is committed to delivering a project that provides a positive legacy for the local community.

Consultation regarding a community benefit sharing program to support the local community commenced with Murrumbidgee Council in 2021 and with Edward River Council in 2022. Since this time, Spark Renewables has consulted with Murrumbidgee Council, Edward River Council and the local community to design a benefit sharing program that provides maximum value to the community affected by the project. These discussions resulted in a series of three workshops held in August 2023 in Coleambally, Darlington Point and Jerilderie. The workshops were advertised, and personal invitations were extended to community members who had previously expressed interest in the community benefit sharing program. The workshops sought feedback to inform the design of a community benefit fund for the project. During each workshop, Spark Renewables presented a project update, a summary of community benefit sharing options, feedback from previous consultation on this topic and provided an outline of a potential structure for a community benefit fund.

Spark Renewables discussed the feedback from these sessions and has continued discussing ways to share project benefits with the community with Murrumbidgee Council and Edward River Council. Spark Renewables and Murrumbidgee Council have agreed on a community benefit sharing program that is predominantly delivered in partnership with the council through VPAs. Spark Renewables is in ongoing consultation with Edward River Council to agree on the VPA for the project's community benefit sharing fund. Below outlines the key terms of the community benefit sharing program and VPAs that have been agreed upon with Murrumbidgee Council and that are being discussed with Edward River Council:

1. Spark Renewables will provide funding for benefit sharing initiatives associated with Dinawan Wind Farm.
2. The total fund amount (TFA) will be an annual payment of \$1,050 per megawatt (MW) of capacity under construction or operational within the respective LGA.
3. The first annual payments will be made after the commencement of construction of the relevant stage.
4. After the initial annual payments, future payments will be escalated in line with consumer price index (CPI).
5. The TFA will be based on Dinawan Wind Farm's nameplate capacity.
6. The TFA will be allocated as follows:
 - a) 70% of the funding (\$735 per MW) will be provided to the respective council hosting the wind capacity for projects identified in that council's approved Development Contributions Plan or Community Strategic Plan.
 - b) 15% of the funding (\$157.50 per MW) will go to a Community Benefit Fund to be administered by a committee of the relevant council, which will provide annual grant funding to initiatives that are put forward by and benefit the local and broader community.
 - c) 15% of the funding (\$157.50 per MW) will be administered by Spark Renewables (or the project owner) and will go to initiatives to share project benefits with the neighbouring community and local Aboriginal and Torres Strait Islander communities.
7. The Community Benefit Fund will:
 - a) be administered by a committee of the relevant council, which will include representatives from the local community, Spark Renewables (or the project owner) and the respective council
 - b) prioritise funding for suitable projects located closer to the project
 - c) prioritise projects that receive co-funding or in-kind support from other sources
 - d) be used for environmental programs, enhancing local biodiversity, recreational facilities, education programs, arts or cultural programs and other initiatives that benefit the local community.

5.8 Monitoring and evaluation

To facilitate open communication and active complaint resolution, it is important that local stakeholders are able to raise issues and complaints in a formal way. A complaints and grievances management mechanism will be developed and implemented for the project that includes processes to address matters raised and the timely provision of information to the community. The complaints and grievances management mechanism will allow anyone in the community to submit questions, comments, suggestions, and complaints if they believe a practice is having a detrimental impact on the community, the environment or their quality of life. The complaints and grievances management process will be publicly available and include a feedback process through which the complaint is provided with information relation to how their concern has been assessed, considered and, where feasible, addressed.

5.9 Regulatory requirements

Engagement by Spark Renewables has been in accordance with the requirements of the SSD Engagement Guidelines and the project SEARs (Table 5.6).

In addition, EMM has consulted with stakeholders to inform the SIA in accordance with DPHI's *Social Impact Assessment Guideline for State Significant Projects* (SIA Guideline) (DPE 2023c); and the *Technical Supplement: Social Impact Assessment Guideline for State significant Projects* (SIA Technical Supplement) (DPE 2023d). A full description of the SIA engagement program is provided in the SIA (refer to Appendix E.14).

Table 5.6 Compliance with community participation objectives

Community participation objectives	Compliance
Identify the people or groups who are interested in or are likely to be affected by the project.	Parties interested in and likely to be affected by the project have been identified (Section 5.2.2).
Use appropriate engagement techniques. This is particularly important when engaging with specific groups, such as Aboriginal and Torres Strait Islander groups, where engagement should be a discrete, planned activity undertaken by and with experienced Indigenous engagement specialist.	A range of engagement techniques were adopted for the EIS consultation program (Section 5.2.3). A summary of engagement with Aboriginal and Torres Strait Islander individuals and groups is provided in Section 6.4.
Ensure the community are provided with safe, respectful and inclusive opportunities to express their views.	A range of engagement techniques were adopted for the EIS consultation program and included online and face to face opportunities across multiple times and venues with a view to ensuring engagement was inclusive for, and accessible by, the community. Spark Renewables focussed on providing safe and respectful environments for community engagement.
Involve the community, councils and government agencies early in the development of the proposal, to enable their views to be considered in project planning and design.	Spark Renewables has been building relationships in the region since 2021 using a range of engagement mechanisms to consult with nearby landholders, Murrumbidgee Council, Edward River Council, community groups and local service providers. A description of how the community and other stakeholders have been involved in the EIS engagement process is provided in Section 5.4.
Be innovative in their engagement approach and tailor engagement activities to suit the context, scale and nature of the project.	A number of different and complementary engagement techniques were adopted for the EIS consultation program as discussed in Section 5.2.3. Engagement activities have developed over time in response to feedback received on the most effective means to communicate with people in the local community.

Table 5.6 Compliance with community participation objectives

Community participation objectives	Compliance
Provide clear and concise information about what is proposed and the likely impacts for the relevant people or group they are engaging with.	Engagement activities have provided the local community with information on the project and likely impacts (Table 5.5). The project description is provided in Chapter 3, and a summary of impacts in Chapter 6 of this EIS.
Clearly outline how and when the community can be involved in the process.	Spark Renewables has adopted various methods to keep the community informed of opportunities for participation in the EIS process. As described in Section 5.2.3, a website and mailing group has been established for the project. In addition to providing regular updates on the project and links to key project documents, the website provides an opportunity to submit feedback and contact the project team. Section 5.6 describes how Spark Renewables proposes to engage with the community as the project progresses.
Make it easy for the community to access information and provide feedback.	The tools used to provide the community an opportunity to provide feedback are described in Section 5.2.3.
Seek to understand issues of concern for all affected people and groups and respond appropriately to those concerns.	Section 5.5 describes the matters raised during community consultation and how these have been addressed as part of the preparation of this EIS.
Provide feedback about how community and stakeholder views were used to shape the project or considered in making decisions.	Community feedback has been considered and responded to throughout planning and preparation of this EIS. Section 2.7 describes the project options and alternatives considered.
Be able to demonstrate how the demography of the area affected has been considered in how and what engagement activities have been undertaken.	Engagement activities developed over time in response to feedback received on the most effective means to communicate with people in the local community. Feedback from scoping and early EIS engagement activities provided context that allowed Spark Renewables to: • offer a range of engagement modes suitable to the culture, lifestyle, and personal preference of stakeholders, including one-on-one interviews, group discussions and presentations • offer suitable times and locations for meetings.

6 Assessment of impacts

6.1 Landscape and visual

6.1.1 Introduction

A landscape and visual impact assessment (LVIA) was prepared for the project by Moir Landscape Architecture and is provided in Appendix E.1. The LVIA was prepared in accordance with methods outlined in *Wind Energy: Visual Assessment Bulletin* (the Visual Bulletin) (DPE 2016b). The relevant SEARs and how they have been addressed are summarised in Section 2.1 of the LVIA (Appendix E.5).

The term ‘study area’ used in this section corresponds to an area that includes an approximately 8 km wide buffer from the WTG locations, in accordance with the Visual Bulletin (DPE 2016b).

6.1.2 Existing environment

i Visual baseline study and landscape character assessment

Visual baseline investigations of the study area included desktop analysis, fieldwork, and community consultation. The project is within the Riverina Bioregion, characterised by flat topography with minor undulations. The regional landscape character is defined by extensive flat, open landscapes utilised for grazing and dryland or irrigated cropping, as is typical of the Southwest NSW and Riverina region.

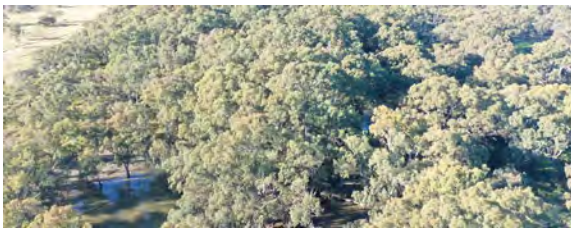
Vegetation has been cleared across much of the study area to support the agricultural activities, leaving a landscape that is generally open. Patchy to dense vegetation is located along creek lines and shallow depressions and is associated with residences. Key hydrological features within the study area are Coleambally Outfall Drain, Delta Creek, Coleambally Irrigation Channel and Yanco Creek.

Roads within the project area include Kidman Way, which provides important transport connections in the area; and McLennons Bore Road, Fernbank Road, Liddles Lane, Bundure Road, Carrathool Road, Mabins Well Road, Wilson and Pooginook Road, which are low-use roads providing access to farms and rural residences.

Community consultation has been ongoing throughout the project (see Chapter 5). Consultation on the potential visual impacts of the project included face to face meetings and the distribution of a survey to landholders and interest groups between November 2021 and May 2022. The survey was also made available on the project website. Fourteen survey responses were received. The survey found that the key values for the majority of the community are ‘farming’, closely followed by ‘landscape’ and ‘native flora and fauna’. The survey also found that creek lines were a valued landscape feature, and Yanco Creek was identified by stakeholders as a key landscape feature.

In accordance with the Visual Bulletin, the landscape was broadly categorised into five Landscape Character Units (LCUs) as part of the baseline investigation. The LCUs have been informed by land use patterns, vegetation coverage, topographical maps, site images and site inspection. A scenic quality rating was determined for each LCU, which was used to define Visual Influence Zones which are assessed against objectives outlined in the Visual Bulletin. The LCUs are described in Table 6.1, and the general extent of the LCUs is presented in Table 6.1. The existing landscape character is generally of low scenic quality as it is a modified landscape without distinct landscape features.

Table 6.1 **Landscape character units in the study area**

LCU	Name and description	Indicative photo	Scenic quality rating
LCU01	Grassy woodlands – dense woodlands of eucalypts, white cypress pine and yellow box canopies with grasses as understorey vegetation on a generally flat topography with minor undulations.		Low
LCU02	Seasonal water corridors – flat to gently undulating vegetation corridors that carry seasonal water flows including Delta Creek and Coleambally Outfall Drain.		Moderate
LCU03	Swamps and floodplains – flat, shallow sub-circular depressions that occasionally accommodate excess flows from the seasonal water corridors.		Low
LCU04	Grassy plains – vast, open land parcels that are utilised for native and modified grazing pastures, and as cropping areas (irrigated and dry).		Low
LCU05	Yanco Creek environs – dense clumps of willow trees that populate gently undulating embankments of Yanco Creek in an otherwise flat, treeless landscape in the vicinity of Yanco Creek. The creek carries water through most seasons as acts as an important wildlife corridor. There is only a small area of this LCU within the study area, to the south of the project area, greater than 7 km from the closest WTG.		Moderate

ii Zone of visual influence

A zone of visual influence was determined based on a digital terrain model, in accordance with the Visual Bulletin, to give a worst-case assessment of the visibility of the project WTGs, without accounting for screening from vegetation or structures (see Figure 17 and Figure 18 in LVIA (Appendix E.1)). Due to the flat topography, the project WTGs will be visible from most locations within the study area, with areas of lower visibility south of the project near Yanco Creek and north-east of the project near Four Corners Road.

The zone of visual influence informed the impact assessment for residences and public viewpoints.

The Visual Bulletin requires assessment of ‘key viewpoints’, identified as key viewing locations identified within the visual catchment of the project. There are no key viewpoints within 8 km of a WTG location. Key viewpoints outside the study area within the visual catchment included Yanco Bridge Rest Area, located approximately 9 km south-east of the project area, and Oolambeyan Homestead Picnic Area located approximately 23 km north-west of the project area.

Twenty-five public viewpoints were identified and informed by community feedback. The viewpoints are representative of a range of views from the visual catchment of the project (Figure 6.1).

A visual influence zone (VIZ) rating was assigned for each public viewpoint, from low (VIZ3) to high (VIZ1), based on the sensitivity of the viewpoint to changes in the landscape, the distance and corresponding visibility of the project and the scenic quality class. Each VIZ rating has performance objectives prescribed in the Visual Bulletin to guide the assessment of impacts, summarised in Table 6.2.

Table 6.2 Performance objectives for VIZ ratings

Performance objectives	Visual influence zone		
	VIZ 1 – high	VIZ 2 – moderate	VIZ 3 – low
Visual magnitude	Avoid turbines or provide detailed justification of turbines below the blue line visual magnitude threshold in the Visual Bulletin (5,500 m for the project)	Manage impacts as far as practicable, justify residual impacts, and describe proposed mitigation measures below the black line visual magnitude threshold in the Visual Bulletin (3,750 m for the project). Consider screening between the blue line and the black line.	Consider screening below the black line visual magnitude threshold in the Visual Bulletin (within 3,750 m).
Landscape scenic integrity	Wind turbines should not cause more than a low level modification of the visual catchment. Turbines are seen as either very small and/or faint, or as of a size and colour contrast (under clear, haze-free atmospheric conditions) that they would not compete with major elements of the existing visual catchment.	Wind turbines should not cause significant modification of the visual catchment. Turbines may be visually apparent and could become a major element in the landscape but should not dominate the existing visual catchment.	No Visual Performance objective applies.
Key feature disruption	Avoid wind turbines or ancillary facilities that result in the removal or visual alteration/disruption of identified key landscape features. This includes any major or visually significant landform, waterform, vegetation or cultural features that have visual prominence or are focal points.	Minimise impact of wind turbines or ancillary facilities that result in the removal or visual alteration/disruption of identified key landscape features. This includes any major or visually significant landform, waterform, vegetation or cultural features that have visual prominence or are focal points.	No Visual Performance objective applies

Of the 25 public viewpoint locations:

- 23 public viewpoints were rated as being within a low visual influence zone (VIZ3) – there are no visual performance objectives relevant for VIZ3 for which assessment is required
- two public viewpoints (VP15 and VP22) were assessed as being within a moderate visual influence zone (VIZ2) – both viewpoints are on local roads which have low viewpoint sensitivity.

No key landscape features are anticipated to be disrupted by the project.

iv Residence locations

The preliminary visual analysis identified 23 residence locations (non-associated residences) within 8 km of a WTG location (Figure 6.1). One non-associated residence (R038) has been excluded from the visual assessment as it is uninhabitable, with the remaining 22 non-associated residences comprising:

- four non-associated residences within 3.75 km of a WTG location (of which two residences are associated with another wind farm) and were assessed as being within a moderate visual influence zone (VIZ2)
- nine non-associated residences between 3.75 km and 5.5 km of a WTG location (of which three residences are associated with another wind farm) – of these, one (R091) was assessed as being within a moderate visual influence zone (VIZ2) and eight were assessed as being within a low visual influence zone (VIZ3)
- nine non-associated residences between 5.5 km and 8 km of a WTG location (of which two residences are associated with another wind farm) and were assessed as being within a low visual influence zone (VIZ3).

6.1.3 Avoidance and minimisation through design

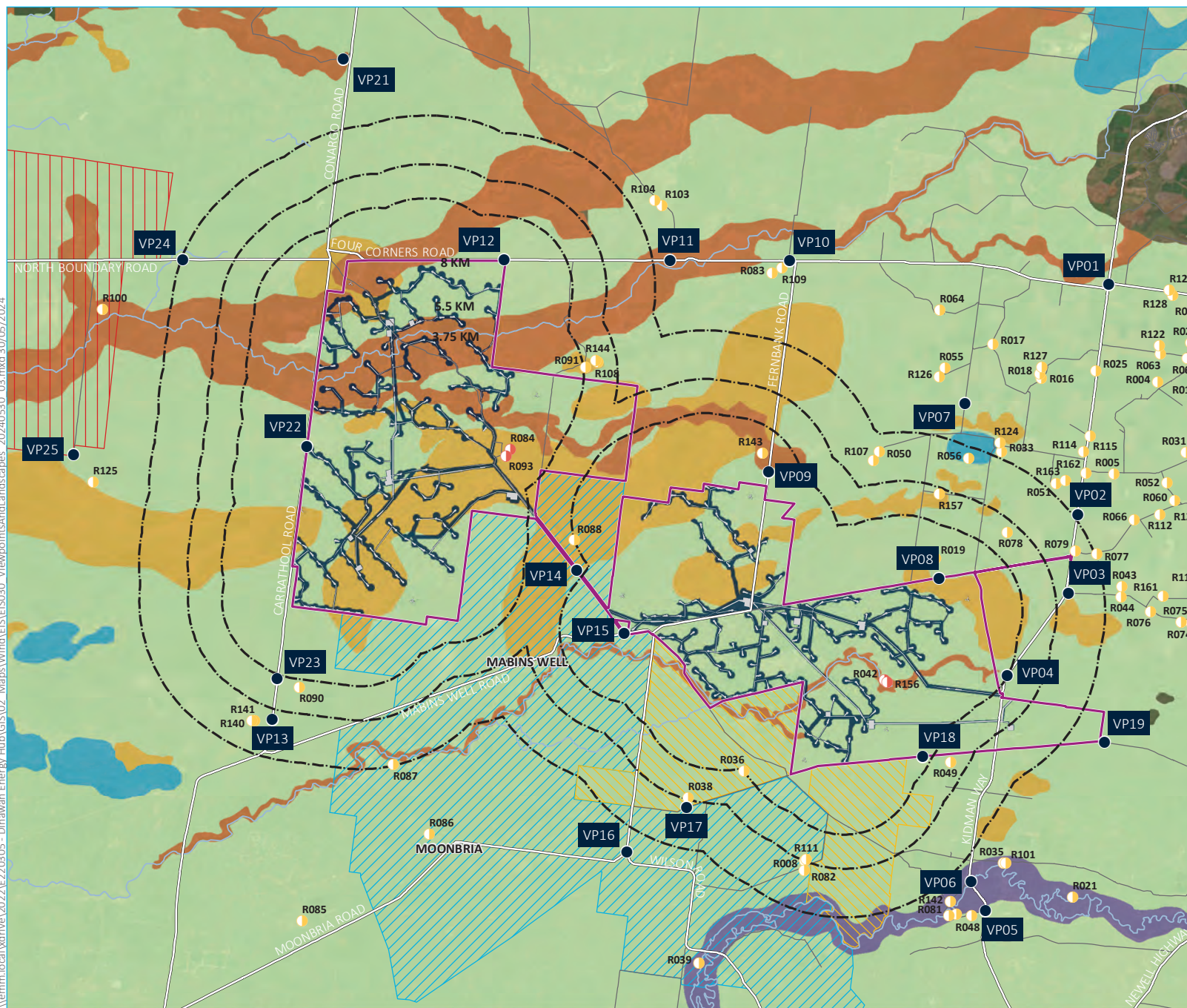
The following design considerations have been adopted in the project design to avoid and reduce visual impacts:

- Avoidance of vegetation clearing where possible to maintain existing levels of visual screening provided by vegetation.
- Consideration of the colours of ancillary structures to ensure minimal contrast and to help blend into the surrounding landscape to the extent practicable.
- Incorporation of setbacks from viewpoints, including:
 - placement of WTGs at least 2 km from non-associated residences
 - placement of substation and switchyard infrastructure at least 4 km from non-associated residences.

6.1.4 Potential impacts

The visual impact assessment considers the day-to-day visual effects of the project on peoples' views. Visual impacts of the project are considered in terms of impacts to the overall landscape character, impacts at non-associated residences, and impacts at public viewpoints in accordance with the Visual Bulletin. The assessment of visual impacts primarily focused on the impacts of the WTGs given their size, but visual impacts of other project infrastructure were also assessed.

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- KEY**
- Project area
 - Development corridor
 - Development footprint
 - WTG buffer
 - Public viewpoint location
- Residence**
- Associated
 - Non-associated
- Landscape character unit**
- LCU01 - Grassy Woodlands
 - LCU02 - Seasonal Water Corridors
 - LCU03 - Swamps and Floodplains
 - LCU04 - Grassy Plains
 - LCU05 - Yanco Creek Environs
- Neighbouring wind farm developments**
- Yanco Delta Wind Farm (approved)
 - Argoon Wind Farm (proposed)
 - Bullawah Wind Farm (proposed)
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Viewpoint locations and landscape character zones in the study area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.1



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)



i Landscape character

Impacts to the LCUs were assessed based on the scenic quality, the visual sensitivity of the view to changes from the project and the magnitude of change to the landscape from the project.

A summary of the impacts to the LCUs is presented in Table 6.3.

Table 6.3 Impact to landscape character units

LCU	Name and description	Scenic quality rating	Sensitivity	Magnitude	Landscape character impact
LCU01	Grassy woodlands	Low	Low	Low	Low – the visual character will remain unaltered as the project is sited to avoid these areas.
LCU02	Seasonal water corridors	Moderate	Moderate	Moderate	Moderate – vegetation along creek corridors may help screen views in certain areas within the project area, however it is likely that where open views towards the project are available, the project will be the dominant element of the view.
LCU03	Swamps and Floodplains	Low	Low	Moderate	Low to moderate – views of the project are likely to be dominant within the LCU at some close locations. Scattered mid-story shrubs may help reduce the visual impact in certain areas.
LCU04	Grassy plains	Low	Low	Low	Low – while the project is likely to be the dominant feature from views in this LCU, as the landscape is generally open with minimal obtrusive elements, the landscape is heavily modified and has a low sensitivity to change.
LCU05	Yanco creek environs	Moderate	Moderate	Low	Low to moderate – views of the project from Yanco Creek are likely to be limited due to screening from existing vegetation and the distance to the project.

In general, the project, in particular the WTGs, will become a feature of the visual landscape due to the addition of vertical turbines in a landscape with unencumbered views across large flat expanses of land, low vegetation typical of the region and lack of built structures. The project is likely to be visible from all LCUs in the study area.

As the landscape has not been identified as sensitive or rare, the impact of the project on the landscape character of the region is expected to be low to moderate.

ii Viewpoints

Of the 25 viewpoints assessed, 2 locations (VP15 and VP22), both within the study area, were rated as VIZ2, and 23 locations were rated as VIZ3. Photomontages for VP15 and VP22 found that the project is likely to be the dominant feature at these viewpoints (see PM12, PM14a and PM14b in Appendix D of the LVIA (Appendix E.1)). VP15 and VP22 are on low-use roads, have a low viewer sensitivity level, a low scenic quality rating and no key landscape features. Therefore, no mitigation measures are proposed at these locations.

The Yanco Bridge Rest Area (V06) is a key public viewpoint that is more than 8 km from a WTG location, rated as VIZ3. This location was identified by stakeholders during community consultation as a key viewpoint. A photomontage for this viewpoint found that views of the project will be screened by existing vegetation (see PM13 in Appendix D of the LVIA (Appendix E.1)).

Spark Renewables has engaged in targeted consultation with all non-associated residences within 8 km of WTGs and has undertaken significant consultation with this group of stakeholders regarding visual impacts. Face-to-face meetings were prioritised with residences within 3.75 km of a WTG (R019, R036 and R143), which occurred between May and October 2022 and again between April and June 2023 to discuss the project and potential visual impacts. Of the four receptors within 3.75 km of a WTG, two (R036 and R088) are associated with another wind farm project. Multiple phone conversations occurred with landholders for R088; however, no face-to-face meetings have been held to date.

The proposed methodology for assessment of visual impacts was outlined in discussions with these stakeholders, including the preparation of photomontages and requirement for a site visit to the residence locations. Views towards the project area were photographed at three of the residences (R019, R036 and R143) in August 2023 and March 2024 to enable the preparation of photomontages. Draft photomontages were shared with these stakeholders during consultation. It was observed that in general, the flat landscape and the presence of vegetation around these residences provided a good level of screening.

There are 22 non-associated residences in the study area (Figure 6.1). Potential visual impacts at these residences were assessed using:

- 3D modelling of topography to determine visibility of turbines from each residence
- application of aerial imagery to the 3D modelling to assess the direction and extent of potentially visible WTGs and to identify intervening elements, such as structures, wind break planting or vegetation, which may reduce the potential visibility
- a site inspection, where possible, to ground-truth 3D modelling and aerial image interpretation, and take photographs of views from the residence
- preparation of photomontages (combination of a photograph of an existing view with a computer-rendered image of a proposed development) or wireframe diagrams (computer generated image based on a digital terrain model, that indicates the 3D shape of the landscape in combination with additional elements) from residences to represent potential impacts of the project
- evaluation of the VIZ and relevant performance objectives for each residence (see Table 6.2)
- application of a visual impact rating at each residence.

The assessment applied the multiple wind turbine tool (in accordance with the Visual Bulletin) to provide a preliminary indication of the potential cumulative impacts from the project and other wind farms within the surrounding area. A two-dimensional assessment of the project, Yanco Delta Wind Farm, Argoon Wind Farm and Bullawah Wind Farm was conducted to determine which non-associated residences would have views of WTGs in three or more 60-degree sectors, in accordance with the Visual Bulletin.

The assessment identified that, of the 22 non-associated residences in the study area, nine will have views of turbines associated with the project as well as turbines from surrounding proposed and/or approved wind farms in three or more 60 degree sectors (as calculated in accordance with the Visual Bulletin) and require assessment of cumulative impacts. The remaining 13 non-associated residences will have turbines within up to two 60 degree sectors, which is deemed acceptable in accordance with the Visual Bulletin.

Wireframe diagrams for non-associated residences were prepared to determine the visual impacts from the project (see Appendix C of the LVIA (Appendix E.1)). A representative wireframe using LiDAR data instead of a photomontage was prepared for one non-associated residence, R088, as access to the property was not granted. It is noted that R088 is an associated landowner with the Yanco Delta Wind Farm.

Photomontage assessments were prepared for 11 non-associated residences on the basis of the wireframe analysis (see Appendix D of the LVIA in Appendix E.1 of this EIS). Photomontage locations were selected to represent a worst-case scenario for the viewpoint, with localised screening (such as vegetation) avoided to maximise visibility. Photomontages were completed for three of the four residences within 3.75 km of a WTG. A photomontage was also offered to an additional residence (R091), given its proximity to a WTG (3.88 km); however, access to the property was not granted. The results of the wireframes and photomontage assessment are provided in Table 6.4.

Table 6.4 Visual impact to residences

Residence ID	Distance to nearest WTG location (km)	Associated projects with WTG visible ¹	Number of 60-degree sectors with visible WTGs	Visual impact rating	Mitigated visual impact rating
Non-associated residences within 3.75 km of a WTG location					
R019	2.03	-	2	High	Low
R143	2.49	-	2	Low	-
R036	3.75	Argoon Wind Farm	4	Negligible	-
R088	3.75	Yanco Delta Wind Farm	4	Low	-
Non-associated residences within 3.75–5.5 km of a WTG location					
R091	3.88	-	3	Low	-
R090	4.16	Yanco Delta Wind Farm	1	Negligible	-
R144	4.43	-	3	Low	-
R108	4.54	-	3	Low	-
R049	4.67	-	3	Low	-
R078	4.98	-	1	Negligible	-
R157	5.17	-	1	Negligible	-
R111	5.38	Argoon Wind Farm	3	Negligible	-
R008	5.47	Argoon Wind Farm	3	Negligible	-
Non-associated residences within 5.5–8 km of a WTG					
R082	5.95	Argoon Wind Farm	3	Low	-
R141	6.43	-	1	Low	-
R140	6.47	-	1	Negligible	-
R107	6.47	-	2	Low	-
R092	6.48	-	1	Negligible	-
R050	7.09	-	2	Low	-
R079	7.16	-	1	Negligible	-
R056	7.42	-	1	Negligible	-
R087	7.95	Yanco Delta Wind Farm	1	Negligible	-

Notes: 1. Where non-associated residences are associated residences of another project, views of WTGs associated with that project have been removed from the multiple wind turbine tool assessment.

Without mitigation, the project is predicted to have:

- a high visual impact on one non-associated residence (R019)
- a low visual impact on 10 non-associated residences
- a negligible visual impact on 11 non-associated residences.

With implementation of mitigation measures at R019, as outlined in Section 6.1.5, the project will have a low visual impact on R019. No issues were raised by the landholder with the proposed mitigation measures.

The assessment of cumulative impacts identified that existing screening factors such as vegetation and farm buildings reduced the number of 60 degree sectors visible from all nine non-associated residences at which cumulative impacts were assessed. Therefore, the cumulative assessment indicates that the number of sectors occupied by the project are no greater than two 60 degree sectors for all non-associated residences which is deemed acceptable in accordance with the Visual Bulletin.

iv Dwelling entitlements

Potential visibility of the project from lots with dwelling entitlements has been considered (refer Section 9 of Appendix E.1). A total of 32 lots with dwelling entitlements have been identified within the study area. Due to the flat topography, the majority of the project is likely to be visible from all of these lots. Recommendations to reduce the visibility of project infrastructure for any future residences constructed on these lots are provided in Table 15 to 18 of the LVIA (Appendix E.1). While dwelling entitlements could be taken up in the future, there are no known approved developments or lodged development applications within 8 km of the nearest WTG.

v Shadow flicker and blade glint

Shadow flicker occurs when rotating WTGs create moving shadows as blades pass between a viewpoint and the sun. Shadow flicker was modelled using WindPro software to determine the maximum number of hours in a year that a viewpoint could be impacted by shadow flicker. The actual period will depend on screening from vegetation and structures, cloud cover, wind (and therefore turbine) direction, the aspect (view direction) of residences and hours of operation of the project.

No shadow flicker impacts are expected at non-associated residences. A number of public roads are predicted to experience shadow flicker, which may cause annoyance to public road users. These include Carrathool Road, Fernbank Road, Jerrys Lane, Liddles Lane, Wilson Road, Four Corners Road and McLennons Bore Road. There are no guidelines in the Visual Bulletin relating to the acceptable level of shadow flicker on road users; however, as these roads carry low traffic volumes, impacts are not considered to be significant.

Blade glint, which refers to the regular reflection off one or more rotating blades, can have temporary effects at any location, though the majority of glint occurs where the viewer is located above the altitude of the turbine hub. The Visual Bulletin recommends that turbine blades be finished with a low reflectivity surface treatment to ensure any actual or perceived blade glint impact is minimised. All major wind turbine blade manufacturers currently finish blades with a low reflectivity treatment. Therefore, the risk of blade glint is considered to be very low, provided the mitigation measures in Section 6.1.5 are implemented.

vi Other project infrastructure

Most project infrastructure, such as substations, switchyards and O&M buildings, are not likely to be visible from non-associated residences due to setback distances and screening by existing vegetation. Project infrastructure has the potential to be visible from some low-use local roads, such as Fernbank Road, McLennons Bore Road and Goolgumbra Road, however viewer sensitivity is expected to be low.

The overhead transmission line to connect the on-site substations to the Dinawan Substation will be up to 80 m high and will be visible in the landscape. The overhead transmission lines are likely to be similar in appearance to existing 220 kV transmission lines in the area, and the Project EnergyConnect 330 kV transmission line that is currently under construction. Visual impacts associated with the overhead transmission line are therefore predicted to be low.

Permanent meteorological monitoring masts are likely to be visible from public viewing locations surrounding the project. No key landscape features are likely to be impacted.

Impacts associated with construction infrastructure are expected to be temporary, occurring during the five-year construction period. Mitigation measures will be adopted to reduce the visual impacts of project infrastructure during operation and construction, as outlined in Section 6.1.5.

vii Night lighting

Due to the relatively isolated location of the project, there are few existing sources of lighting in the night-time landscape. During operation, lighting of turbines and associated infrastructure has the potential to have visual impacts.

Aviation hazard lighting on the WTGs has the potential to be visible from distances in excess of 20 km (Scottish Natural Heritage 2017). This lighting may impact receptors viewing the landscape at night, in particular night-sky enthusiasts, photographers, star gazers, campers and landowners who can see one or more the turbines from their land. Aviation hazard lighting requirements are the subject to ongoing consultation with CASA and Air Services Australia. If aviation hazard lighting is required for the project, mitigation measures will be implemented to reduce the impact in consultation with relevant aviation authorities.

Night lighting of ancillary infrastructure will only be required for security at the substations and O&M facility. It is unlikely that the proposed night lighting will create a noticeable impact on the existing night-time landscape as infrastructure will be sited away from existing residences and accessible viewpoints as low brightness lights will be used.

6.1.5 Mitigation measures

Proposed measures to manage and mitigate potential landscape and visual impacts are outlined in Table 6.5.

Table 6.5 Landscape and visual mitigation measures

ID	Mitigation measures
LV1	The WTGs will have a predominantly matte white (or other non-reflective) finish.
LV2	Visual screening planting will be undertaken at non-associated residence R019, or as otherwise agreed with the landowner. An indicative example of visual screening is provided in Appendix E of the LVIA (Appendix E.1 of the EIS). The following general guidelines for planning landscaping and visual screening will be adopted: • planting will occur post-construction in consultation with the landowner • planting will remain in keeping with existing landscape character • species selection will be typical of the area, with a preference for locally native species • planting layout will avoid screening views of the broader landscape • landscaping will avoid the clearing of existing vegetation, and where required, reinstate any lost vegetation.
LV3	The following mitigation measures will be considered during detailed design of the project to mitigate the visual impact of transmission lines: • selecting routes for overhead transmission lines to reduce visibility from surrounding areas and minimise vegetation loss • using subtle colours and a low reflectivity surface treatment on power poles to ensure that glint is minimised.
LV4	The following mitigation measures will be adopted to reduce any residual visual impacts from O&M facilities: • siting O&M facilities to ensure minimal screening vegetation loss • using a recessive colour palette to blend structures into the existing landscape • avoiding unnecessary lighting, signage on fences and logos.
LV5	If aviation hazard lighting is required on the WTGs or meteorological monitoring masts, measures to reduce the impact of lighting will be considered in consultation with relevant aviation authorities.

6.1.6 Conclusion

The project area has a highly modified visual character, generally characterised by flat, open land that supports agriculture. The visual impacts of the project have been assessed against the visual performance objectives in the Visual Bulletin, including objectives for landscape character, public viewpoints, residence assessments, cumulative effects with other projects, shadow flicker, blade glint and aviation lighting.

Of the 22 non-associated residences within 8 km of WTG locations, 21 are likely to experience a negligible to low visual impact and one (R019) is likely to experience a high visual impact. Mitigation measures, developed in consultation with the landowner, will potentially reduce visual impacts at R019.

There are no key public viewpoint locations within 8 km of a WTG location. Key viewpoints greater than 8 km from the project area were assessed. Views towards the project will be screened by existing vegetation at each location. Potential impacts have been identified for shadow flicker, blade glint and night lighting. With the implementation of mitigation measures in Section 6.1.5, the project will meet the performance objectives of the Visual Bulletin.

6.2 Noise and vibration

6.2.1 Introduction

A noise impact assessment was prepared for the project by Echo Acoustics and is provided in Appendix E.2. The noise impact assessment was prepared in accordance with *Wind Energy: Noise Assessment Bulletin for State Significant Wind Energy Development* (DPE 2016c) (the Noise Bulletin), *Noise Policy for Industry* (EPA 2017) (NPfI), *Interim Construction Noise Guideline* (DECC 2009), *Road Noise Policy* (DECCW 2011) and *Assessing Vibration: A Technical Guideline* (DECC 2006). The relevant SEARs and how they are addressed is summarised in 'Assessment Criteria' section of the noise impact assessment (Appendix E.2).

6.2.2 Existing environment

Land uses in and surrounding the project area are primarily agricultural. Ambient noise levels are typically low, dominated by rural and road traffic noise sources.

The minimum rated background noise level (RBL) has been adopted as a conservative assumption, as outlined in the NPfI. This approach is common for projects in rural areas with low ambient noise levels. The minimum RBL of 35 decibels (dB) on the A-weighted scale (dB(A)) for the daytime period and 30 dB(A) for the evening/night-time period have been adopted. The A-weighted scale adjusts the measurement of sound to be more representative to human perceptions of loudness. Background noise monitoring will be conducted prior to construction of the project to determine existing noise levels in the ambient environment.

There are 23 non-associated residences with 8 km of a WTG (Figure 6.2), which form the assessment locations for the noise impact assessment. The closest non-associated residence is R19, 2.03 km from the nearest WTG.

6.2.3 Avoidance and minimisation through design

The following project design measures have been adopted to avoid or reduce noise impacts:

- maximising setback distances of WTGs from non-associated residences
- selecting a WTG model with serrated trailing edges to reduce trailing edge noise.

6.2.4 Potential impacts

i Construction noise

Project construction will generate noise over 5 years. For the purposes of assessing construction noise, 12 representative construction scenarios were modelled (Table 6.6). Sound power levels for each scenario were established based on construction noise measurements and data available in *Guideline for the Management of Noise and Vibration: Construction and Maintenance Activities* (SA DIT 2021). A noise model was used to predict noise levels at the nearest non-associated residences for each construction scenario based on weather conditions that are most conducive to the propagation of noise. The modelling assumed the continuous and concurrent operation of all construction equipment, providing a conservative assessment.

The *Interim Construction Noise Guideline* (DECC 2009) defines a 'noise affected area' as an area where:

- predicted noise levels equal the RBL + 10 dB (or greater) during standard construction hours
- predicted noise levels equal the RBL + 5 dB (or greater) outside standard construction hours.

A 'highly noise affected area' is an area where predicted noise levels exceed 75 dB(A).

A receptor is considered to be noise affected by construction noise when the following criteria are exceeded:

- 45 dB(A) during standard construction hours (7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday)
- 35 dB(A) outside standard construction hours.

The noise levels at the closest non-associated receptors for each construction noise scenario are presented in Table 6.6.

Table 6.6 Predicted construction noise levels at closest non-associated residences

Construction scenario	Sound power level ¹ (dB(A))	Noise level at closest non-associated residence	Distance to be noise affected			Non-associated residences within the noise affected area
			Highly noise affected – greater than 75 dB(A)	Standard hours – greater than 45 dB(A)	Outside standard hours – greater than 35 dB(A)	
Road upgrades (Kidman Way, McLennons Bore Road, Wilson Road, Fernbank Road and Goolgumbra Road)	118	Less than 69 dB(A) at R079 (175 m from Kidman Way road upgrades) Less than 51 dB(A) at R088 (800 m from Goolgumbra Road upgrades) Less than 49 dB(A) at R019 (1,000 m from McLennons Bore Road upgrades)	Less than 100 m	Less than 1,300 m	Construction activity not proposed outside standard hours	R079 – road upgrades at Kidman Way/McLennons Bore Road R019 - McLennons Bore Road upgrades R088 - Goolgumbra Road upgrades
Site mobilisation and compound establishment	121	Less than 35 dB(A) at R049 (3,350 m from the accommodation camp in the eastern area)	Less than 125 m	Less than 1,700 m	Construction activity not proposed outside standard hours	-
Concrete batching (located at construction compounds)	117	Less than 30 dB(A) at R088 (3,600 m from the eastern construction compound in the eastern area)	Less than 85 m	Less than 1,200 m	Less than 2,250 m	-
Internal access road and hardstand construction	119	Less than 41 dB(A) at R019 (1,800 m from the development footprint)	Less than 100 m	Less than 1,400 m	Construction activity not proposed outside standard hours	-
WTG foundation construction	118	Less than 40 dB(A) at R019 (2,000 m from a WTG in the eastern area)	Less than 100 m	Less than 1,300 m	Construction activity not proposed outside standard hours	-
Concrete pour	114	Less than 36 dB(A) at R019 (2,000 m from a WTG in the eastern area)	Less than 60 m	Less than 1,100 m	Less than 2,100 m	R019
Electrical trenching and cabling	118	Less than 40 dB(A) at R019 (2,000 m from a WTG in the eastern area)	Less than 100 m	Less than 1,300 m	Construction activity not proposed outside standard hours	-
Transmission line installation	116	Less than 49 dB(A) at R088 (800 m from the development footprint)	Less than 75 m	Less than 1,100 m	Construction activity not proposed outside standard hours	R088

Table 6.6 Predicted construction noise levels at closest non-associated residences

Construction scenario	Sound power level ¹ (dB(A))	Noise level at closest non-associated residence	Distance to be noise affected			Non-associated residences within the noise affected area
			Highly noise affected – greater than 75 dB(A)	Standard hours – greater than 45 dB(A)	Outside standard hours – greater than 35 dB(A)	
Crane movements	113	Less than 35 dB(A) at R019 (1,800 m from the development corridor)	Less than 60 m	Less than 900 m	Less than 1,800 m	-
WTG installation, commissioning and testing	116	Less than 38 dB(A) at R019 (2,000 m from a WTG in the eastern area)	Less than 80 m	Less than 1,100 m	Less than 2,250 m	R019
Substation and electrical connection construction	120	Less than 31 dB(A) at R049 (4,300 m from a substation in the eastern area)	Less than 110 m	Less than 1,500 m	Construction activity not proposed outside standard hours	-
Decommission temporary structures and demobilisation	117	Less than 31 dB(A) at R049 (3,350 m from the accommodation camp in the eastern area)	Less than 85 m	Less than 1,200 m	Construction activity not proposed outside standard hours	-

Note:

1. Sound power level is the amount of sound energy an activity produces for a given operation. The sound power level is a constant value for a given activity regardless of distance or shielding to the noise source, similar to the power rating on a light globe (which remains constant).
The sound power level above is the sum of the sound power level of all construction equipment to be used during each construction stage.

No non-associated residences are highly noise affected.

Three non-associated residences (R019, R079 and R088) will temporarily be within a noise affected area during the construction phase, for the following construction scenarios, in limited areas of the development corridor, during standard construction hours:

- road upgrades:
 - R079 – road upgrades at Kidman Way/McLennons Bore Road
 - R019 – road upgrades along McLennons Bore Road
 - R088 – road upgrades along Goolgumbula Road
- R088 – transmission line installation

Concrete pour activities and WTG installation, commissioning and testing outside of standard hours will generate noise levels that will temporarily exceed the out-of-hours noise effected criterion at R019. During standard-hours the criterion is not exceeded.

With the implementation of feasible and reasonable work practices, construction activities will not have adverse impacts at any other non-associated residences in the vicinity of the development footprint.

ii Traffic noise

The project will increase traffic on local roads, predominantly during the construction phase.

Predicted traffic noise levels at the non-associated residences that are close to the roads being used for the project (R025 and R079) are provided in Table 6.7, based on construction traffic volumes. The predicted traffic noise levels are assessed against the criteria outlined in the *Road Noise Policy* (DECCW 2011) criteria in Table 6.7.

Table 6.7 Predicted traffic noise levels at closest non-associated residences

Road category	Noise at closest assessment location		Assessment criterion ¹	Assessment criterion met
	Existing	Existing plus construction		
Freeway/arterial/sub-arterial roads (Kidman Way)	57 dB(A) at R025 (55 m from Kidman Way)	59 dB(A) at R025 (55 m from Kidman Way)	L _{Aeq, 15 hours} 60 dB(A) (external))	Yes
Local roads (McLennons Bore Road, Wilson Road, Fernbank Road and Goolgumbula Road)	33 dB(A) at R079 (380 m from McLennons Bore Road)	43 dB(A) at R079 (380 m from McLennons Bore Road)	L _{Aeq, 1 hour} 55 dB(A) (external))	Yes

1. L_{Aeq} is the logarithmic average equivalent for over a given time period e.g. 1 hour, 15 hours.

Construction traffic noise from the project is predicted to meet the *Road Noise Policy* criteria. During operation and decommissioning, traffic volumes will be lower and it is predicted that the traffic noise during these phases will also meet the *Road Noise Policy* criteria.

With the implementation of feasible and reasonable work practices, construction activities will not have adverse impacts at any other non-associated residences in the vicinity of the development footprint.

iii Vibration

The project construction may result in localised vibration from activities such as trenching, excavation and compaction. However, nearby non-associated residences are located at sufficient distances from the development corridor that vibration levels are expected to be imperceptible and to comply with the assessment criteria in *Assessing Vibration: A Technical Guideline* (DECC 2006).

iv Operation noise

The project will generate noise during operation, primarily from operation of the WTGs and ancillary infrastructure (primarily transformers within each substation). The noise from WTGs and all other project components are assessed differently as discussed below.

a Wind turbine generator layout

Noise from the operation of WTGs has been assessed in accordance with the Noise Bulletin using a three-dimensional model, based on the algorithm provided in *International Standard ISO 9613-2:1996 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation* (ISO 1996) (the International Standard). The International Standard specifies a method for predicting noise levels at a distance from a noise source under meteorological conditions favourable to noise propagation.

The noise model was used to assess the cumulative effect of 267 WTGs operating concurrently across the eastern and western areas. Therefore, this assessment presents a conservative approach, as approval is sought for the construction and operation of up to 200 WTGs. Noise levels from the WTGs have been predicted based on equivalent noise levels produced by the Vestas V162-6.0 WTG model with serrated trailing edges.

Based on the low background ambient noise levels, the Noise Bulletin requires a base equivalent noise level of 35 dB(A) (L_{Aeq,10 minute}) to be adopted at assessment locations.

Predicted noise levels for each non-associated residence within 8 km of a WTG are shown in Table 6.8. Noise level contours are presented in Figure 6.2. The noise model predicts that noise levels from WTGs will be lower than the base equivalent noise level of 35 dB(A) at all non-associated residences within 8 km.

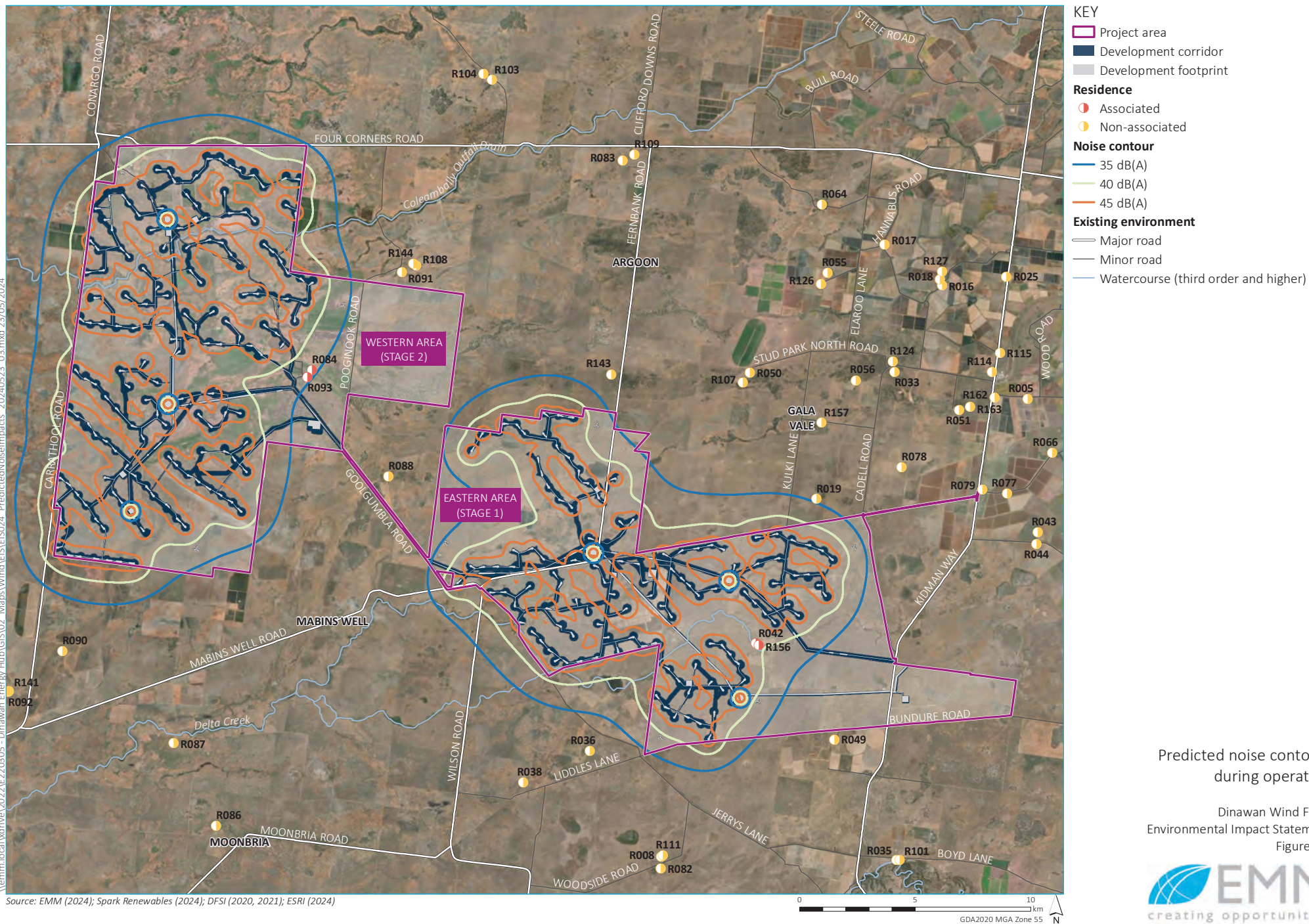
Table 6.8 Predicted WTG noise levels at non-associated residences

Non-associated residence	Distance to closest WTG (m)	Predicted noise level ¹ (dB(A))
R019	2,042	34
R143	2,496	31
R036	3,753	31
R088	3,754	30
R091	3,892	29
R090	4,172	28
R144	4,441	29
R108	4,553	28
R049	4,669	28
R078	4,980	26
R157	5,180	27
R111	5,382	25
R038	5,404	27
R008	5,467	25
R082	5,954	25
R141	6,416	24
R092	6,446	24
R140	6,470	24
R107	6,722	26
R050	7,097	26
R079	7,165	22
R056	7,423	24
R087	7,952	23

Note: 1. Assumes integer hub height wind speed of 10 m/s

Impacts from special noise characteristics such as tonal noise, low frequency noise and intermittent noise were also assessed for WTGs. Noise levels are predicted to meet the relevant criteria.

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b Ancillary infrastructure

Noise from ancillary infrastructure has been assessed in accordance with the NPfI, which provides noise trigger levels for commercial and industrial premises.

Of the ancillary infrastructure components, the transformers within the substations will have the highest sound power levels (101 dB(A)). Therefore, noise levels at non-associated residences were modelled based on noise generated by these transformers. It was assumed that there would be one 300 MVA transformer in each of the six substation locations (three in the eastern area and three in the western area).

All transformers will be more than 4 km from the closest non-associated residences.

Modelling included weather conditions that are most conducive to the propagation of noise to provide a conservative assessment.

The noise trigger level is 40 dB(A) for the day period and 35 dB(A) for the evening and night periods based on the NPfI. Impacts from special noise characteristics such as tonal noise, low frequency noise and intermittent noise were also assessed.

Noise from the transformers at the six substation locations is predicted to meet the noise trigger levels at all assessment locations.

6.2.5 Mitigation measures

Construction noise management measures, documented in a construction noise management plan, will be implemented in accordance with the *Interim Construction Noise Guideline* (DECC 2009).

The construction noise management plan will be based on the draft construction noise management plan framework provided in the noise impact assessment (Appendix E.2). This will be updated prior to the commencement of construction and will be based on the noise mitigation measures outlined in Table 6.9.

Construction, operation and decommissioning noise mitigation measures are outlined in Table 6.9.

Table 6.9 Noise mitigation measures

ID	Mitigation measure
N1	Background noise monitoring will verify existing background noise levels prior to construction.
N2	Noise modelling will be updated prior to construction to confirm that the final WTG layout complies with the noise assessment criteria.
N3	A construction noise management plan will be prepared to manage noise during construction and will include specific measures to minimise noise at assessment locations that are noise affected (R019, R079, R088).
N4	Construction work activities will be scheduled to minimise noise impacts, including: • with the exception of the categories below, construction will be undertaken during standard construction hours: – Monday to Friday 7 am to 6 pm – Saturday 8 am to 1 pm – no work on Sundays or public holidays • works outside the standard hours listed above will be within the following categories: – deliveries by heavy vehicles and RAVs outside of peak traffic times – concrete batching and pouring – crane movements between WTG sites – activities that are inaudible at non-associated residences – activities for WTG construction hindered by adverse weather conditions.

Table 6.9 Noise mitigation measures

ID	Mitigation measure
N5	Construction infrastructure, including construction compounds, and plant and equipment will be placed to minimise noise impacts by: • placing fixed plant and equipment as far as practicable from non-associated residences • locating the site access points, construction compounds and parking areas as far as practicable from non-associated residences • maximising acoustic shielding by the use of temporary site buildings and materials stockpiles as noise barriers to R019, R079 and R088, where practicable.
N6	Residents in R019, R079 and R088 (which will be potentially impacted by construction noise) will be consulted to determine appropriate measures to minimise the effects of any impacts.
N7	Construction work practices to manage construction noise on-site and construction-related traffic will be documented in the construction noise management plan and will be implemented to minimise noise impacts.

6.2.6 Conclusion

Three non-associated residences (R019, R079 and R088) will temporarily be in a noise affected area, as defined by the *Interim Construction Noise Guideline* (DECC 2009), during the construction phase. The residents will be consulted to determine appropriate measures to minimise the effects of any impacts.

With the implementation of feasible and reasonable work practices, construction activities and traffic noise will not have adverse impacts at any other non-associated residences in the vicinity of the development footprint.

Vibration criteria will not be exceeded at non-associated residences as a result of construction activities.

A draft construction noise management plan framework has been prepared in accordance with the *Interim Construction Noise Guideline* (DECC 2009) and will form the basis of the noise management plan that will be prepared prior to the start of construction.

Noise levels from WTG operation are predicted to comply with noise criteria determined using the Noise Bulletin at all non-associated residences. Similarly, noise levels from transformers are predicted to comply with noise criteria determined using the NPfI at all non-associated residences.

6.3 Biodiversity

6.3.1 Introduction

A biodiversity development assessment report (BDAR) was prepared for the project by Biosis and is provided in Appendix E.1. The BDAR assesses the potential impact of the project on biodiversity under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth EPBC Act; describes strategies implemented to avoid and/or minimise impacts; recommends measures to minimise indirect impacts; and identifies biodiversity offset requirements under the *Biodiversity Assessment Method* (BAM) (DPIE 2020c) for impacts that cannot be avoided. The relevant SEARs and how they are addressed, are summarised in Section 1.5 of the BDAR (Appendix E.3).

The term 'subject land' is used in this section, consistent with the BAM (DPIE 2020c). The subject land is the development corridor (7,256 ha) plus a minimum 500 m wide buffer from its boundary (Figure 6.3). The subject land is approximately 31,384 ha. It includes the land which will be impacted directly and indirectly by the project.

6.3.2 Existing environment

i Landscape context

The subject land is within the Riverina Interim Biogeographic Regionalisation of Australia (IBRA) bioregion and the Murrumbidgee IBRA subregion. Vegetation within the subject land is predominantly native, with varying condition as a result of agricultural land use. Agricultural land use has contributed to overstorey removal, resulting in large areas of derived native grasslands (DNG, where trees have been cleared from the original vegetation community), areas of natural grasslands and fragmented and regenerating woodlands.

The subject land is largely flat with some minor drainage depressions that temporarily hold water during and following rainfall. Minor topographic depressions within the subject land hold water for longer, creating scattered swamp or wetland environments. There are multiple ephemeral waterways within the subject land, including three named, natural waterways: Delta Creek, Blind Creek and Bublebundie Creek. Ephemeral waterways provide transient aquatic habitat corridors for frog and fish species across the subject land during optimal environmental conditions, such as after significant rainfall and flooding events.

Coleambally Outfall Drain is an artificial perennial watercourse in the subject land that supplies water throughout the year for irrigation activities in the Coleambally Irrigation Area. The aquatic habitat that it provides is in low condition with limited vegetation present.

There is no key fish habitat within the subject land; however, Delta Creek and Coleambally Outfall Drain are mapped as potential habitat for two threatened freshwater fish species, Flathead Galaxias (*Galaxias rostratus*) and Silver Perch (*Bidyanus bidyanus*) (DPI Fisheries 2024).

Groundwater dependent ecosystems (GDEs) are ecosystems which require access to groundwater on a permanent or intermittent basis. There are multiple mapped GDEs with medium to high value within the subject land, the majority of which have been avoided by the development corridor. Mapped GDEs intersecting the development corridor are typically associated with River Red Gum, Lignum wetland and Canegrass wetland vegetation communities.

There is approximately 1,977 ha of non-native vegetation within the subject land, which is associated with areas of cropping, existing roads and access tracks, fencelines, dams, rural infrastructure and residences.

The subject land does not contain karst, caves, crevices, cliffs or other areas of geological significance.

ii Native vegetation

There is approximately 50,743 ha of native vegetation within the subject land and a 1,500 m wide buffer (approximately 89% native vegetation cover).

a Plant community types

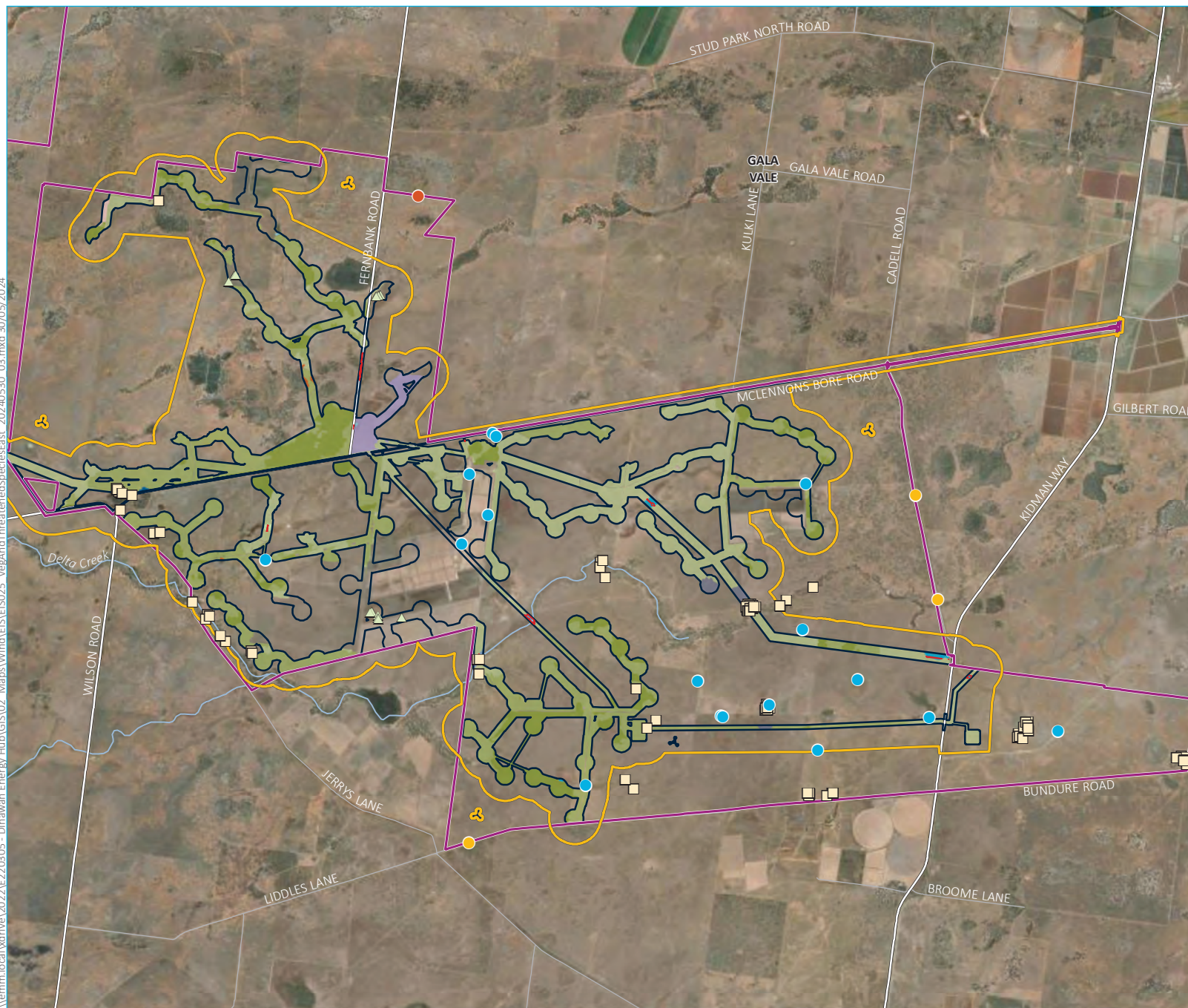
Vegetation zones have been used to identify the different condition states of plant community types (PCTs) within the subject land. There are 10 identified PCTs, in varying condition, within the subject land (Table 6.10 and Figure 6.3). Detailed descriptions of each PCT are provided in Section 3.2.3 of the BDAR (Appendix E.3).

Table 6.10 **Plant community types and vegetation integrity within the development footprint and development corridor**

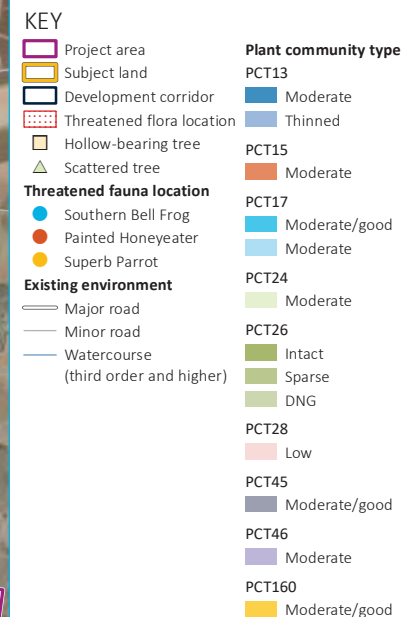
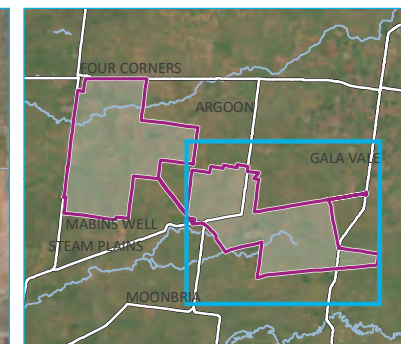
Plant community type	Condition	Development footprint ¹ (ha)	Development corridor ¹ (ha)	Vegetation integrity (VI) score
PCT 10 River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate	0.33	9.35	29.2
PCT 13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).	Moderate	4.83	19.71	63.9
	Thinned	9.14	29.17	72.4
PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate	6.20	34.32	71.5
	Thinned	1.61	7.05	63.3
PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate good	1.84	15.00	70.8
	Moderate	1.09	3.06	42.1
PCT 24 Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains	Moderate	0.23	2.52	29.0
PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	DNG	395.93	2,282.95	19.6
	Intact	133.14	871.09	64.2
	Sparse	416.60	2,137.46	39.5
PCT 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Low	54.00	278.04	42.6
	Moderate	0.98	25.36	76.4
PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate good	8.83	57.00	92.1
PCT 46 Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	Moderate	105.59	620.14	84.3
PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains	Moderate good	4.07	42.34	81.8
	Moderate	0.84	5.75	39.5

Notes: 1. Excludes areas of non-native vegetation within the subject land.

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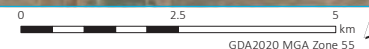


Source: EMM (2024); Spark Renewables (2024); Biosis (2024); DFSI (2020, 2021); ESRI (2024)

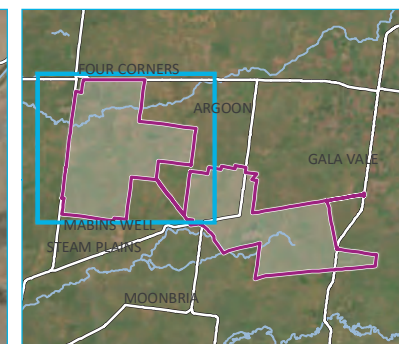


Vegetation and threatened species within the subject land and development corridor - eastern area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.3a



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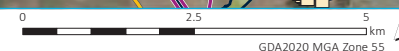
KEY	
 	Project area
 	Subject land
 	Development corridor
 	Threatened flora location
	Hollow-bearing tree
	Scattered tree
Threatened fauna location	
●	Southern Bell Frog
●	Painted Honeyeater
●	Superb Parrot
Existing environment	
—	Major road
—	Minor road
—	Watercourse (third order and higher)
Plant community type	
PCT10	Moderate
PCT13	Moderate
	Thinned
PCT15	Moderate
	Thinned
PCT17	Moderate/good
	Moderate
PCT26	Intact
	Sparse
	DNG
PCT28	Moderate
	Low
PCT45	Moderate/good
PCT46	Moderate
PCT160	Moderate/good
	Moderate

Vegetation and threatened species within the subject land and development corridor - western area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.3b



Source: EMM (2024); Spark Renewables (2024); Biosis (2024); DFSI (2020, 2021); ESRI (2024)



The majority of native vegetation within the development corridor (73%) and development footprint (71%) aligns with PCT 26 Weeping Myall woodland and occurs in three condition states:

- intact (Photograph 6.1)
- DNG (Photograph 6.2)
- sparse (Photograph 6.3).



Photograph 6.1 **Example of PCT 26 (intact) within the subject land**



Photograph 6.2 **Example of PCT 26 (DNG) within the subject land**



Photograph 6.3 **Example of PCT 26 (sparse) within the subject land**

b Threatened ecological communities

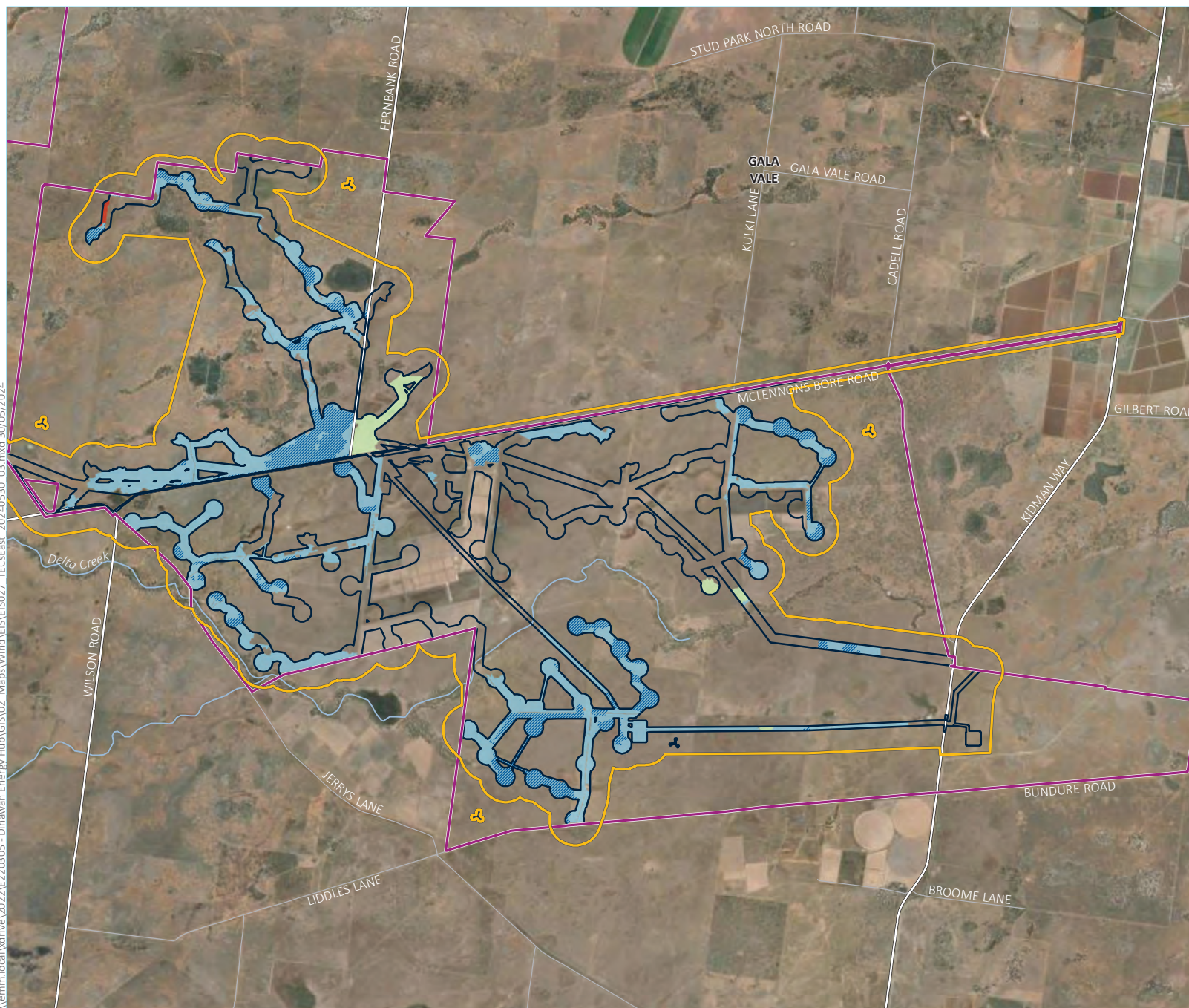
Vegetation within the subject land and development corridor aligns with four threatened ecological communities (TECs) (Table 6.11 and Figure 6.4). Further descriptions of these TECs are provided in Section 3.2.4 of the BDAR (Appendix E.3).

Table 6.11 Threatened ecological communities within the subject land

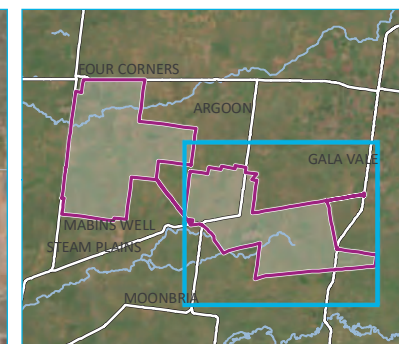
Threatened ecological community	Listing status	Alignment with PCTs within the subject land	Subject land (ha)	Development corridor (ha)	Development footprint (ha)	Comments
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered (BC Act)	The listing does not contain key diagnostics or condition thresholds for this TEC and relies on a general description of the community and a list of characteristic plant species. Sparse and intact patches of PCT 26 were determined to meet the criteria for this TEC. DNG patches of PCT 26 did not meet the criteria for this TEC.	5,814.3	3,008.55	549.75	The total area of this TEC within the development footprint is approximately: • 9% of the extent of this TEC identified within the subject land • 18% of the extent of this TEC identified within the development corridor.
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Endangered (BC Act)	All patches of PCT 28 were determined to meet the criteria for this TEC.	1,099.6	303.4	54.98	The total area of this TEC within the development footprint is approximately: • 5% of the extent of this TEC identified within the subject land • 18% of the extent of this TEC identified within the development corridor.
Weeping Myall Woodlands	Endangered (EPBC Act)	All intact patches of PCT 26 and select sparse patches of PCT 26 (approximately 5%) were determined to meet the criteria for this TEC.	Not available ¹	991.34	150.46	The total area of this TEC within the development footprint is approximately 15% of the extent of this TEC identified within the development corridor.
Natural Grasslands of the Murray Valley Plains	Critically endangered (EPBC Act)	As a precautionary measure, all patches of PCT 45 and PCT 46 were determined to meet the criteria for this TEC.	Not available ¹	677.14	114.42	The total area of this TEC within the development footprint is approximately 17% of the extent of this TEC identified within the development corridor.

Notes: 1. Alignment of vegetation with EPBC Act listed TECs was not confirmed within the full extent of the subject land.

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Source: EMM (2024); Spark Renewables (2024); Biosis (2024); DFSI (2020, 2021); ESRI (2024)

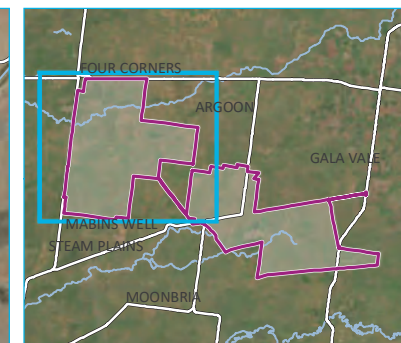
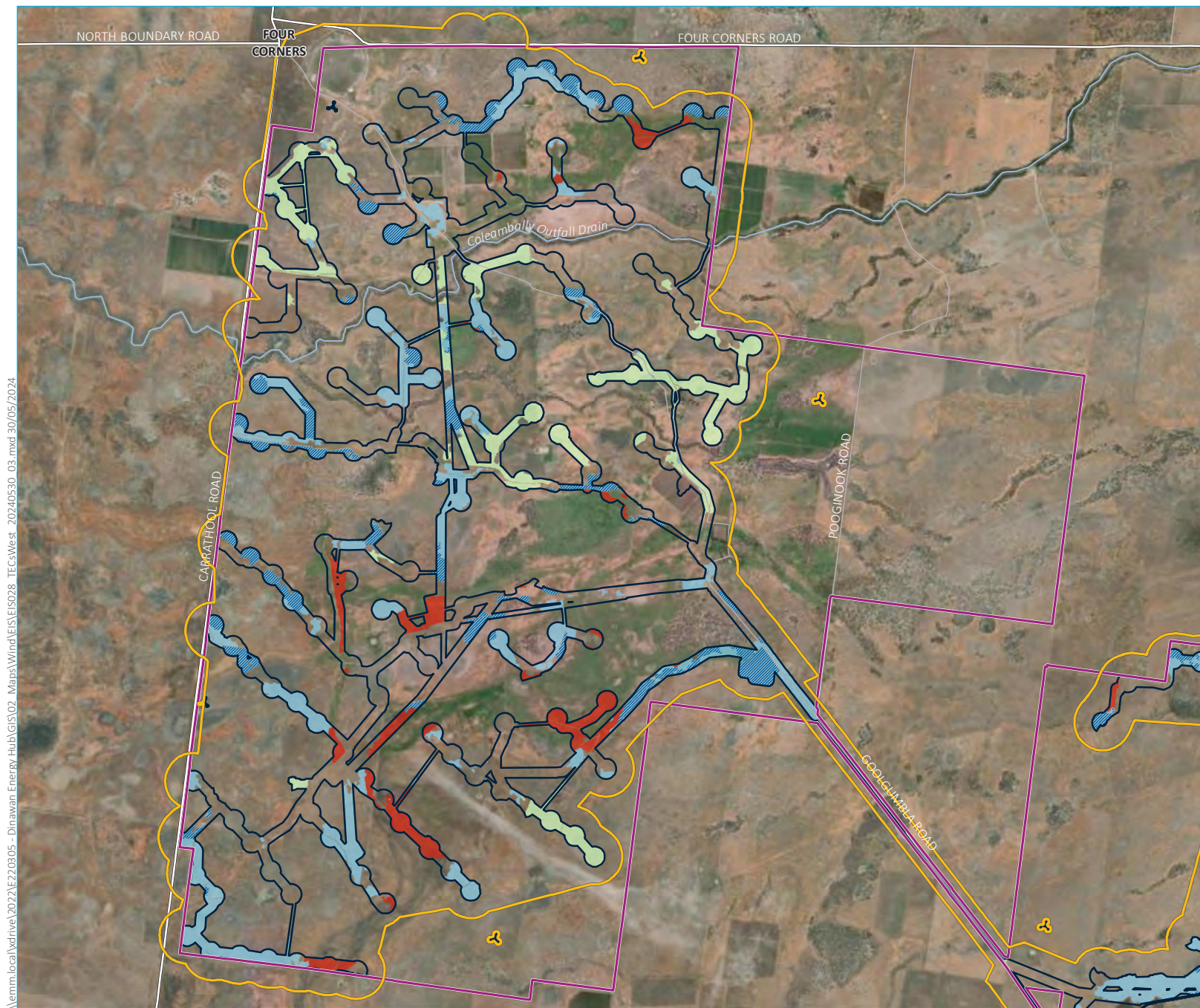


- KEY**
- Project area
 - Subject land
 - Development corridor
- Threatened ecological communities**
- Myall Woodland (BC Act)
 - Sandhill Pine Woodland (BC Act)
 - Weeping Myall Woodlands (EPBC Act)
 - Natural Grasslands (EPBC Act)
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Threatened ecological communities
within the development corridor
- eastern area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.4a





KEY

Project area

Subject land

Development corridor

Threatened ecological communities

Myall Woodland (BC Act)

Sandhill Pine Woodland (BC Act)

Weeping Myall Woodlands (EPBC Act)

Natural Grasslands (EPBC Act)

Existing environment

Major road

Minor road

Watercourse (third order and higher)

Threatened ecological communities
within the development corridor
- western area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.4b



iii Threatened species

a Ecosystem credit species

Of 33 ecosystem credit species predicted to occur within the subject land (refer Table 24 of Appendix E.3), 13 were recorded during field surveys within or in proximity to the subject land (refer Figure 6.3):

- Black Falcon (*Falco subniger*) – listed as ‘vulnerable’ under the BC Act
- Diamond Firetail (*Stagonopleura guttata*) – listed as ‘vulnerable’ under the BC Act and EPBC Act
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) – listed as ‘vulnerable’ under the BC Act
- Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) – listed as ‘vulnerable’ under the BC Act
- Painted Honeyeater (*Grantiella picta*) – listed as ‘vulnerable’ under the BC Act and EPBC Act
- Pied Honeyeater (*Certhionyx variegatus*) – listed as ‘vulnerable’ under the BC Act
- Southern Whiteface (*Aphelocephala leucopsis*) – listed as ‘vulnerable’ under the BC Act and EPBC Act
- Spotted Harrier (*Circus assimilis*) – listed as ‘vulnerable’ under the BC Act
- Superb Parrot (*Polytelis swainsonii*) – listed as ‘vulnerable’ under the BC Act and EPBC Act
- White-fronted Chat (*Epthianura albifrons*) – listed as ‘vulnerable’ under the BC Act
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) – listed as ‘vulnerable’ under the BC Act
- Inland Forest Bat (*Vespadelus baverstocki*) – listed as ‘vulnerable’ under the BC Act
- Little Pied Bat (*Chalinolobus picatus*) – listed as ‘vulnerable’ under the BC Act.

Targeted surveys were not required for ecosystem credit species as these species are assumed to occur, based on the identified PCTs, calculated patch sizes, habitat constraints and native vegetation cover.

Species listed above that were identified within or in proximity to the subject land but aren’t shown on Figure 6.3 were recorded as part of bird utilisation surveys.

b Species credit species

Species credit species are threatened species for which vegetation and landscape features cannot reliably predict the likelihood of their occurrence, or components of their habitat. Species credit species with a medium or high potential or a known occurrence within the subject land are listed in Table 6.12. Species with low potential to occur within the subject land were excluded from field survey. A full list of species credit species predicted to occur within the subject land is presented in Appendix 2 of the BDAR (Appendix E.3).

Table 6.12 Species credit species with potential to occur within the subject land

Name	Listing	Survey outcome	Potential for impact	Species polygon required ²
Flora				
A spear-grass (<i>Austrostipa wakoolica</i>) ¹	Endangered - BC Act and EPBC Act	Not recorded during survey to date. Assumed present where further survey is required.	Low	Yes – refer Figure 12A of Appendix E.3
Claypan Daisy (<i>Brachyscome muelleroides</i>)	Vulnerable - BC Act and EPBC Act	Not recorded.	Low	Not required
Mossgiel Daisy (<i>Brachyscome papillosa</i>) ¹	Vulnerable - BC Act and EPBC Act	Not recorded during survey to date. Assumed present where further survey is required.	Low	Yes – refer Figure 12A of Appendix E.3
Bindweed (<i>Convolvulus tedmoorei</i>) ¹	Endangered - BC Act	Not recorded during survey to date. Assumed present where further survey is required.	Low	Yes – refer Figure 12A of Appendix E.3
Yellow Gum (<i>Eucalyptus leucoxydon</i> subsp. <i>Pruinosa</i>) ¹	Vulnerable - BC Act	Not recorded during survey to date. Assumed present where further survey is required.	Low	Yes – refer Figure 12A of Appendix E.3
Lanky Buttons (<i>Leptorhynchus orientalis</i>) ¹	Endangered - BC Act	Not recorded during survey to date. Assumed present where further survey is required.	Medium	Yes – refer Figure 12A of Appendix E.3
Winged Peppergrass (<i>Lepidium monoplacoides</i>) ¹	Endangered - BC Act and EPBC Act	Not recorded during survey to date. Assumed present where further survey is required.	Low	Yes – refer Figure 12A of Appendix E.3
Chariot Wheels (<i>Maireana cheelii</i>)	Vulnerable - BC Act and EPBC Act	Not recorded.	Low	Not required
Austral Pillwort (<i>Pilularia novae-hollandiae</i>) ¹	Endangered - BC Act	Not recorded during survey to date. Assumed present where further survey is required.	Low	Yes – refer Figure 12A of Appendix E.3
Turnip Copperburr (<i>Sclerolaena napiformis</i>)	Endangered - BC Act and EPBC Act	Not recorded.	Low	Not required
Red Darling Pea (<i>Swainsona plagiotropis</i>) ¹	Vulnerable - BC Act and EPBC Act	Not recorded.	Low	Not required
Slender Darling Pea (<i>Swainsona murrayana</i>) ¹	Vulnerable - BC Act and EPBC Act	Recorded during surveys. Assumed present where further survey is required.	High	Yes – refer Figure 12A of Appendix E.3
Silky Swainsona-pea (<i>Swainsona sericea</i>) ¹	Vulnerable - BC Act	Recorded during surveys. Assumed present where further survey is required.	High	Yes – refer Figure 12A of Appendix E.3

Table 6.12 Species credit species with potential to occur within the subject land

Name	Listing	Survey outcome	Potential for impact	Species polygon required ²
Fauna				
Australian Bustard (<i>Ardeotis australis</i>)	Endangered - BC Act	Not recorded.	Low	Not required
Barking Owl (<i>Ninox connivens</i>)	Vulnerable - BC Act	Not recorded. Assumed present in select vegetation zones. ³	Low	Yes – refer Figure 12B of Appendix E.3
Little Eagle (breeding) (<i>Hieraaetus morphnoides</i>)	Vulnerable - BC Act	Not recorded.	Medium	Not required
Major Mitchell's Cockatoo (breeding) (<i>Lophochroa leadbeateri</i>)	Vulnerable - BC Act and EPBC Act	Not recorded.	Low	Not required
Masked Owl (<i>Tyto novaehollandiae</i>)	Vulnerable - BC Act	Not recorded. Assumed present in select vegetation zones. ³	Low	Yes – refer Figure 12B of Appendix E.3
Plains Wanderer (<i>Pedionomus torquatus</i>)	Endangered - BC Act; critically endangered - EPBC Act	Not recorded; however, the development footprint intersects 4.02 ha of mapped important habitat.	Medium	Yes – refer Figure 12B of Appendix E.3
Southern Bell Frog (<i>Litoria raniformis</i>)	Endangered - BC Act; vulnerable - EPBC Act	Recorded.	High	Yes – refer Figure 12B of Appendix E.3
Square-tailed Kite (breeding) (<i>Lophoictinia isura</i>)	Vulnerable - BC Act	Not recorded.	Low	Not required
Superb Parrot (breeding) (<i>Polytelis swainsonii</i>)	Vulnerable - BC Act and EPBC Act	Recorded during surveys. Assumed to breed within the development footprint in select vegetation zones due to the presence of paired individuals and juveniles.	High	Yes – refer Figure 12B of Appendix E.3
White-bellied Sea-Eagle (breeding) (<i>Haliaeetus leucogaster</i>)	Vulnerable - BC Act	Not recorded.	Low	Not required

1. Surveys for these species could not be completed as part of the preparation of the BDAR due to inclement weather. Species has been assumed to be present within areas of potentially suitable habitat and will be subject to further surveys in Spring 2024.
2. Polygon attributes are defined in Table 45 of Appendix E.3.
3. To align with the latest regulatory guidance and requirements regarding forest owls, this species has been assumed present in select vegetation zones (despite not being recorded during surveys).

Bird and bat utilisation surveys (BBUS) were conducted across eight seasons from August 2022 to March 2024 and included two surveys for each season (winter, spring, summer and autumn). The purpose of these surveys was to inform collision risk modelling, which has been used to predict the likelihood of WTG blade strike to bird and bat species.

A total of 26 fixed survey sites were established, including 16 impact sites and 10 control sites, with 729 replicates collected during the survey periods. The impact sites were considered representative of potential WTG positions and were positioned in various vegetation zones to capture data in different habitat types. In addition to the BBUS, large stick nest and hollow bearing tree surveys were conducted.

A total of 131 bird species were recorded within the subject land, including 121 species recorded during the BBUS and 20 additional bird species recorded as incidental observations. The number of species varied across seasons for bird utilisation and incidental surveys with the highest diversity in spring (90 species recorded), closely followed by summer (88 species recorded) and autumn (86 species recorded), with the lowest diversity in winter (67 species recorded).

A total of 14 bat species were positively identified (i.e. a call identification rating of ‘almost certain’ or ‘probable’ was recorded). Four additional bat species may also have been recorded; however, reliable identification to species level was not possible due to similarity of call characteristics between species.

6.3.3 Avoidance and minimisation through design

A key constraint considered during the site selection and design refinement process has been avoidance and minimisation of impacts on biodiversity. A preliminary ecological study was undertaken over 54,000 ha and resulted in the identification of ‘no-go’ areas and high, moderate and low constraints within the area of investigation (Figure 16 of Appendix E.3). The highest constraint ratings included:

- a 200 m wide ‘no-go’ zone around Oolambeyan National Park
- a 200 m setback from mapped wetlands
- a 100 m wide buffer around mapped Plains Wanderer Important Habitat Areas
- a 300 m setback from treed watercourses
- PCTs within 300 m of a watercourse
- regionally mapped EPBC Act and BC Act listed TECs.
- potential EPBC Act listed grassland TECs.

There is a high proportion of native vegetation in the region. The intent of the preliminary ecological study was to identify ecological constraints to allow the project design to avoid impacts to the highest ecological values as far as possible. These constraints informed the selection of the project investigation area (refer to Figure 2.5), which was the subject of detailed biodiversity fieldwork during the preparation of the BDAR. The locations of the indicative development corridor, refined development corridor, development corridor and development footprint (refer to Figure 2.5) were driven by avoidance of the highest quality PCTs and threatened species habitat.

Due to the extent of native vegetation within the broader region, South West REZ and subject land, complete avoidance of impacts was not possible.

Although impacts to native vegetation, threatened species habitat and TECs will occur, project refinements have avoided or minimised impacts to the areas with the highest biodiversity values. Key avoidance and minimisation of impact measures include:

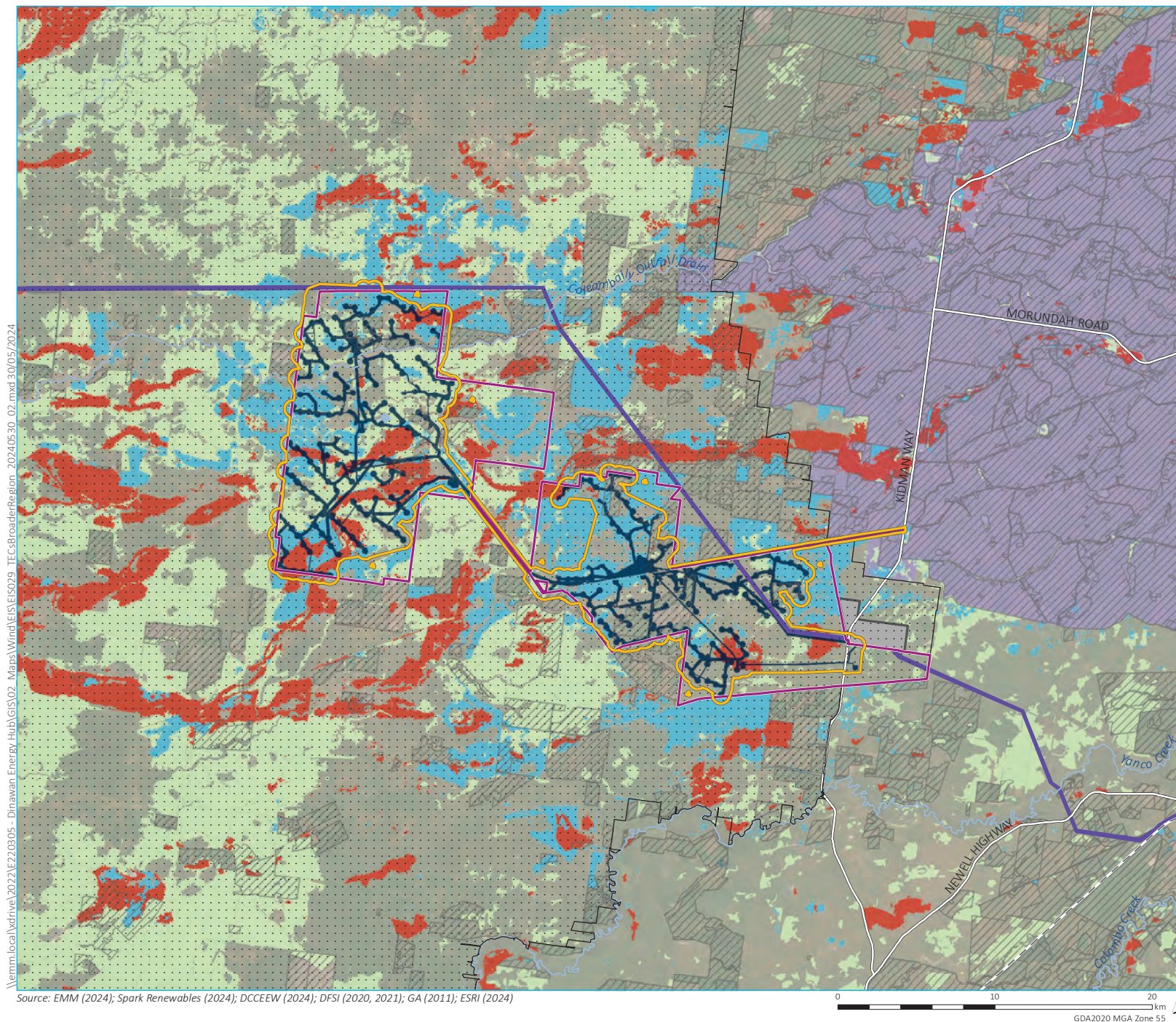
- prioritising avoidance of impacts to PCT 26 (intact), which has the highest vegetation integrity score and is an EPBC Act listed TEC, and is known habitat for Painted Honeyeater and Grey-crowned Babbler
- minimising disturbance through preferential use of existing access tracks and public roads for site access and transmission line easements and co-locating access tracks with electrical cabling and transmission line easements
- minimising removal of habitat trees for threatened species, including Superb Parrot and Corben's Long-eared Bat (*Nyctophilus corbeni*)
- avoidance of direct impacts to important mapped habitat areas for Plains Wanderer to the extent possible
- removing and/or relocating WTGs away from large bird nests observed during surveys
- siting WTGs at least 200 m away from PCT 13, PCT 15, PCT 10 and PCT 28 to the extent possible
- avoidance of approximately 78% of hollow-bearing trees recorded within the development corridor (refer Figure 6.3)
- avoidance and minimisation of impacts to large patches of Silky Swainsona-pea and Slender Darling Pea (refer Figure 6.3).

As a result of identified biodiversity constraints and subsequent design refinements, 214 WTG locations have been relocated to avoid and minimise biodiversity impacts (i.e. approximately 80% of the assessed WTG locations within the development footprint).

The TECs that will be impacted by the project occur extensively in the south-east portion of the South West REZ and surrounds, except in the Coleambally Irrigation Area (see Section 6.7.2i) and areas of modified agricultural land (Figure 6.5). The prevalence of native vegetation in this region is due to the prevalence of grazing which allows native vegetation to persist in various conditions. Areas shown on Figure 6.5 as 'modified agricultural land' have been identified within the Australian Land Use and Management Classification as grazing (irrigated and/or modified pastures) and cropping (including irrigated cropping), which often results in complete removal of native vegetation.

It is not possible to develop a viable large-scale wind farm within the region/South West REZ with no impacts to native vegetation.

Locally, the extent of native vegetation in the subject land and surrounds means that impacts to TECs cannot be completely avoided by the project. The project refinement process has therefore focused on avoiding higher quality woodland and forested areas, as well as areas of TEC and habitat of highest value that are likely to contain, or have recorded, threatened species. As a result, the development footprint contains land previously disturbed by low intensity agriculture, which contains DNG and lower condition vegetation, to the extent possible.



- KEY**
- Project area
 - Subject land
 - Development corridor
 - Renewable Energy Zone

Project EnergyConnect (Transgrid)

- Dinawan Substation
- Transmission line

Threatened ecological community

- Weeping Myall Woodlands
- Sandhill Pine Woodlands
- Natural Grasslands

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- Coleambally irrigation area
- Modified agricultural land*

*Modified agricultural land is from Australian Land Use and Management Classification and includes 3.2.0 Grazing modified pastures, 3.3.0 Cropping, 4.2.0 Grazing irrigated modified pastures, 4.3.0 Irrigated cropping

Since project inception, avoidance and minimisation of direct impacts to TECs (specifically, the EPBC Act listed TECs) has been a key driver in both site selection and project refinement. As described in Section 2.3, a key driver for site selection has been the proximity of the development footprint to the approved Dinawan Substation for connection to the electricity network. By selecting a site within close proximity to the substation, the project maximises energy generation efficiencies and minimises the requirement for linear transmission infrastructure to connect to the network, which would have biodiversity (and other) impacts. The project area is, on balance, considered to be in an optimal location.

6.3.4 Potential impacts

i Direct impacts

The project's direct impacts on biodiversity within the development footprint, and associated credit requirements, are listed in Table 6.13.

Table 6.13 Direct impacts and offsets required

Vegetation zone/species	Area of direct impact (ha)	Total credit requirement
PCT 10 (moderate)	0.33	4
PCT 13 (moderate)	4.83	135
PCT 13 (thinned)	9.14	289
PCT 15 (moderate)	6.2	194
PCT 15 (thinned)	1.61	45
PCT 17 (moderate good)	1.84	57
PCT 17 (moderate)	1.09	20
PCT 24 (moderate)	0.23	3
PCT 26 (DNG)	395.93	3,873
PCT 26 (intact)	133.14	4,272
PCT 26 (sparse)	416.6	8,234
PCT 28 (low)	54	1,149
PCT 28 (moderate)	0.98	37
PCT 45 (moderate good)	8.83	508
PCT 46 (moderate)	105.59	5,564
PCT 160 (moderate good)	4.07	125
PCT 160 (moderate)	0.84	12
Total ecosystem credits		24,521
Slender Darling Pea ¹	11.49	344
Silky Swainsona-pea ¹	11.49	344
A spear-grass ²	0.98	37
Mossgiel Daisy ²	10.93	383

Table 6.13 **Direct impacts and offsets required**

Vegetation zone/species	Area of direct impact (ha)	Total credit requirement
Bindweed ²	3.13	135
Yellow Gum ²	4 individuals	8
Winged Peppercress ²	10.93	383
Lanky Buttons ²	0.23	3
Austral Pillwort ²	8.78	464
Barking Owl ²	28.31	910
Masked Owl ²	28.31	910
Plains Wanderer	4.02	199
Superb Parrot	40.01	1,146
Southern Bell Frog	95.06	2,066
Total species credits		7,332

1. Includes 2.7 ha of confirmed Slender Darling Pea and Silky Swainsona-pea habitat and 8.79 ha of assumed habitat.

2. Assumed impacts where representative and adequate survey is yet to be undertaken with survey to be completed in Spring 2024.

Of the 67 hollow-bearing trees recorded within the development corridor, the project will result in the loss of 15 hollow-bearing trees. These trees contain small, medium and large hollows, or a combination of all three.

The project will also have a direct impact on 29 scattered trees with a subsequent offset requirement of 19 credits.

The project will have a direct impact on 604.73 ha of BC Act listed and 264.88 ha of EPBC Act listed TECs:

- 549.75 ha of the Myall Woodland TEC listed under the BC Act (i.e. areas identified as PCT 26 (sparse) and PCT 26 (intact))
- 54.98 ha of the Sandhill Pine Woodland TEC listed under the BC Act (i.e. areas identified as PCT 28 (low) and PCT 28 (moderate))
- 150.46 ha of the Weeping Myall Woodland TEC listed under the EPBC Act (i.e. areas identified as PCT 26 (intact) and part of the area identified as PCT 26 (sparse))
- 114.42 ha of the Natural Grasslands of the Murray Valley Plains TEC listed under the EPBC Act (i.e. areas identified as PCT 45 (moderate to good) and PCT 46 (moderate)).

The project will impact:

- 144.5 ha of confirmed threatened species habitat requiring offsets
- 109.2 ha of habitat for threatened species assumed to be present (for which surveys are yet to be completed).

ii Indirect impacts

Indirect impacts on biodiversity may occur in areas outside the development footprint. Potential indirect impacts arising from the project are detailed in Table 80 of Appendix E.3 and are summarised as:

- negligible likelihood of occurrence and consequence for biodiversity:
 - removal and disturbance of rocks, including bush rock
 - wood collection
 - rubbish dumping
 - fertiliser drift
 - inhibition of nitrogen fixation and increased soil salinity
 - reduced viability of adjacent habitat due to noise, dust or light spill
- low likelihood of occurrence and consequence for biodiversity:
 - inadvertent impacts on adjacent habitat or vegetation
 - reduced viability of adjacent habitat due to edge effects
 - transport of weeds and pathogens from within the development footprint to adjacent vegetation
 - increased risk of starvation, exposure and loss of shade or shelter
 - loss of breeding habitats
 - trampling of threatened flora species
 - changed fire regimes
 - fragmentation of movement corridors
 - impacts to Oolambeyan National Park and the South West Woodland Nature Reserve (Kulki Precinct)
 - collision (transmission line strike), electrocution, and exposure to electrical and magnetic fields due to powerlines
- moderate likelihood of occurrence and consequence for biodiversity:
 - increase in predators and pest animal populations
 - disturbance to specialist breeding and foraging habitat (as a result of direct and indirect impacts to mapped important habitat areas for Plains Wanderer).

iii Prescribed impacts

Prescribed impacts are additional biodiversity impacts identified under clause 6.1 of the NSW Biodiversity Conservation Regulation 2017 (BC Regulation) and listed in the BAM. Prescribed impacts relevant to the project are:

- Human-made structures and non-native vegetation – irrigation infrastructure within the subject land is utilised by water birds and the Southern Bell Frog. The consequence of removal of dams as a habitat feature is considered to be low. Existing transmission lines and rural infrastructure (e.g. sheds and fences) may be used by avian fauna species for nesting. Many small and moderate nests were recorded within the subject land, but outside of the development corridor. The consequence of removal of these features is considered to be low. The project's impacts on non-native vegetation will have a negligible impact on threatened and non-threatened species that utilise this habitat.
- Habitat connectivity – avoidance of woody areas within the subject land will allow for the continued uninterrupted movement of the majority of fauna species during construction and operation of the project. While the project will reduce local scale connectivity, this is unlikely to prevent genetic exchange of the threatened entities known, or assumed to be, inhabiting the subject land and broader area.
- Waterbodies, water quality and hydrological processes – the project will not impact hydrological flows and excavations will not intercept the groundwater table. Appropriate controls to effectively manage surface and groundwater resources are outlined in Section 6.7.
- Vehicle strikes – the project will increase vehicle movements, predominately during construction. This has potential to result in increased vehicles strikes of fauna.

These impacts are discussed in detail in Section 8.3 of Appendix E.3.

iv Bird and bat collision risk and barrier effect

In addition to direct loss of habitat from during construction, indirect impacts on birds and bats could arise from the operation of WTGs through:

- blade strike
- barotrauma due to low air pressure zones at the blade tips
- reduction of habitat connectivity between essential resources (i.e. WTGs create a barrier effect)
- avoidance of habitat due to air disturbance surrounding operational WTGs (i.e. habitat sterilisation).

Bird and bat collision risk and barrier effects have been assessed using a combination of collision risk modelling and risk assessments. While impacts to microbat species may occur as a result of turbine strike, it is considered unlikely that additional impacts will occur as a result of barotrauma. The pressure changes necessary to cause barotrauma in microbats are anticipated to occur at such close proximity to the blade itself, it is considered unlikely a microbat could experience barotrauma without simultaneously being struck by the blade itself.

a Collision risk modelling

Collision risk modelling (refer Section 6.1 of Appendix E.3), using BBUS data, has been used to predict which bird and bat flight movements could be at risk of collision with a WTG during each year of operation. This was based on species that were recorded flying at the height at which the WTG blades are proposed to rotate. The model's results are expressed as the number of flights at risk of collision per year for each species. Based on an assumption that the collision avoidance capacity of recorded species is 95%, the results of the collision risk model predict:

- four species with less than one annual flight will be at some risk of collision
- eight species with one to five annual flights will be at some risk of collision
- six species with greater than five annual flights will be at some risk of collision.

Of the threatened species recorded during the BBUS, the collision risk model predicts that Superb Parrot will have three annual flights and Black Falcon and Spotted Harrier will have less than one annual flight that will be at some risk of collision.

b Risk assessments

Risk assessments have identified bird and bat species considered to be at risk of collision with WTGs (refer to Section 6.2 of Appendix E.3). A total of 23 species of birds (1 'high risk', 4 'moderate risk' and 18 'low risk') and 7 species of bats (all 'low risk') are considered to be at more than a negligible risk of impact from turbine collisions, and thus 'at-risk' as a result of the project (refer to Table 64 of Appendix E.3).

Risk assessments (refer to Section 6.3 of Appendix E.3) for individual WTGs considered the likelihood of each turbine resulting in collisions with bird and bat species. The collision risk is largely dependent on the proximity of surrounding habitat types to WTGs, and the potential consequence on bird and bat species utilising those habitats if they were to collide with a WTG. The latter is largely driven by the 'at-risk' and conservation status of the species. In total, 77% of the WTGs fall within a low to moderate risk category, whilst the remaining 23% fall within the high and very high category.

v Serious and irreversible impacts

An impact is regarded as serious and irreversible (SAIL) if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or an ecological community becoming extinct, on the basis of four principles described in the BC Regulation. Four species that may be impacted by the project are considered to meet these principles: Plains Wanderer, Austral Pillwort, Claypan Daisy and Bindweed.

A detailed SAIL assessment is provided in Appendix 5 of Appendix E.3 and a summary is provided in Table 6.14.

Table 6.14 Summary of serious and irreversible impacts

Species	Summary of assessment
Austral Pillwort	The avoidance of higher quality biodiversity values within the subject land through project refinements included avoidance of potential habitat for Austral Pillwort to the extent practicable. Surveys for Austral Pillwort were undertaken in November 2023 after planned survey in November 2022 was interrupted by flooding. No individuals have been recorded to date in optimal areas of microhabitats. Further survey is planned for November 2024. In the absence of the required total survey effort, Austral Pillwort is assumed to be present within 8.78 ha of suitable habitat. Potential indirect impacts will be managed through the implementation of the biodiversity management plan (BMP).

Table 6.14 **Summary of serious and irreversible impacts**

Species	Summary of assessment
Claypan Daisy	The avoidance of higher quality biodiversity values within the subject land through project refinements included avoidance of potential habitat for Claypan Daisy to the extent practicable. Surveys for Claypan Daisy were undertaken in 2022 and 2023 and this species has not been recorded to date. Recent design refinements have resulted in gaps in the survey effort and further survey is planned for Spring 2024; however, overall, the survey undertaken to date is considered representative of the potential habitat for Claypan Daisy within the subject land. Potential indirect impacts will be managed through the implementation of the BMP.
Bindweed	The avoidance of higher quality biodiversity values within the subject land through project refinements included avoidance of potential habitat for Bindweed to the extent practicable. Targeted surveys for Bindweed have not identified this species within the subject land. Further survey is planned for November 2024 in targeted areas of habitat. In the absence of the required total survey effort, Bindweed is assumed to be present within 3.13 ha of suitable habitat. Potential indirect impacts will be managed through the implementation of the BMP.
Plains Wanderer	As part of site selection and project refinement, a key consideration has been the avoidance of impacts to Plains Wanderer habitat including avoidance of areas of mapped important habitat to the extent practicable. Approximately 4 ha of NSW DCCEEW's mapped important habitat for Plains Wanderer is within the development footprint (0.62% of the total mapped important habitat within the subject land). Impacts to approximately 1 ha will be related to road upgrades and transmission line infrastructure proposed along Goolgumbra Road, an existing public road, and upgrades to existing farm access tracks that intersect with mapped important habitat. Targeted surveys did not detect this species within the subject land; however, based on the extent of occurrence, the area of occupancy and carrying capacity, the subject land could potentially support four pairs of birds. At the time of the targeted surveys (April 2023), limited areas of the grasslands within the development corridor were considered to be optimal Plains Wanderer habitat, including areas mapped by NSW DCCEEW as important habitat. Due to the dynamic nature of the grassland habitat critical to this species, areas within the subject land may be suitable for this species in the future; however, the most optimal areas have been avoided by the development footprint as far as practicable. Indirect impacts, such as those associated with increased fragmentation and isolation of suitable habitat, are considered unlikely to be substantial as a result of the project. Potential indirect impacts will be managed through the implementation of the BMP.

vi **Matters of National Environmental Significance**

The Commonwealth DCCEEW identified “listed threatened species and communities (sections 18 & 18A)” as the relevant controlling provision in their 12 July 2023 determination that the project will require assessment and approval under the EPBC Act before it can proceed.

A summary of the MNES identified by Commonwealth DCCEEW as likely to be significantly impacted or possibly at risk, based on the information provided in the EPBC Referral in April 2023 (see Section 4.3), is provided in Table 6.15.

Appendix 6 of Appendix E.3 provides detailed assessments of potential impacts on these species and communities in accordance with *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (Australian Government 2013).

Table 6.15 EPBC Act listed threatened species and ecological communities identified by DCCEEW

Threatened species or ecological community <i>DCCEEW rating¹</i>	Assessment summary
Weeping Myall woodlands <i>Significant impact likely</i>	Significant impact likely Weeping Myall woodlands is the dominant vegetation community within the development footprint and broader region. It occurs in different conditions: intact, sparse and DNG. The development corridor contains 991.3 ha of Weeping Myall woodlands, of which 150.46 ha is within the development footprint and will be directly impacted (Figure 6.4). It is estimated that there is approximately 5,771 ha of intact Weeping Myall woodlands within the subject land; however, it is uncertain how much of this area would meet the requirements of the EPBC Act listing. The project is considered likely to have a significant impact on this TEC due to the removal of approximately 150.46 ha, which would reduce the extent of this TEC.
Natural Grasslands of the Murray Valley Plains <i>Significant impact likely</i>	Significant impact likely Impacts to known areas of Natural Grasslands of the Murray Valley Plains TEC have been avoided to the extent practicable. The project will impact 114 ha (i.e. PCT 45 and PCT 46) of small, isolated patches or fringing areas of larger more connected patches (Figure 6.4). It is estimated that there is approximately 5,699 ha of Riverine plain grassland communities (i.e. PCT 45 and PCT 46) within the subject land; however, it is uncertain how much of this area would meet the requirements of the EPBC Act listing. Within the broader area, it is estimated that approximately 61,000 ha of this TEC remains within the Riverina region. The removal of 114 ha of this TEC equates to 0.2% of the expected extent of this TEC within the Riverina region. The BMP will include weed and biosecurity management measures to mitigate potential indirect impacts on this TEC. The BMP will also include adaptive management strategies, including measures to monitor predicted and uncertain impacts that will trigger adaptive management actions, allowing effective and quick responses. The project is considered likely to have a significant impact on this TEC due to the removal of approximately 114 ha, which would reduce the extent of this TEC.
Plains Wanderer <i>Significant impact likely</i>	Significant impact possible Avoidance (with suitable buffers) of Plains Wanderer habitat and mapped important areas has been a key consideration during site selection and project refinement. The Plains Wanderer was not recorded during targeted surveys (which included nocturnal transects and acoustic detection) within the subject land. Direct impacts to Plains Wanderer habitat will be limited to: • 4 ha of mapped important habitat • areas of PCT 45 and PCT 46 (total of 114 ha), which may provide habitat in the future due to the dynamic nature of grassland communities in the Riverina. The BMP will include weed and pest management measures to mitigate potential indirect impacts on Plains Wanderer. The BMP will also include adaptive management strategies, including measures to monitor predicted and uncertain impacts that will trigger adaptive management actions, allowing effective and quick responses. The project is considered likely to adversely impact habitat critical to the survival of the species and reduce the area of occupancy of a population. Direct impacts equate to approximately 0.62% of mapped important habitat within the subject land.

Table 6.15 EPBC Act listed threatened species and ecological communities identified by DCCEEW

Threatened species or ecological community DCCEEW rating ¹	Assessment summary
Superb Parrot Require further assessment to determine if significantly impacted	Potential for significant impact based on reduced occupancy and collision risk The Superb Parrot has been recorded foraging within the subject land. Numerous paired individuals and juveniles were observed. No evidence of breeding was found. Potential nesting hollows were found to be used by other, more common, species. Areas of high biodiversity value, including most likely habitat for Superb Parrot has been avoided as much as possible. Superb Parrots are at risk of collisions with WTGs. Potential indirect impacts will be managed through the implementation of the BMP and bird and bat adaptive management plan (BBAMP), which will include pre-clearance surveys, adaptive management should collisions occur and unexpected finds procedures. Additional baseline surveys will also be undertaken within areas of expected high use for Superb Parrot prior to vegetation clearing.
Slender Darling Pea Require further assessment to determine if significantly impacted	Significant impact unlikely Slender Darling Pea was recorded during targeted surveys. The species was found in discrete areas with reduced grass cover and increased forb richness and was not identified in areas dominated by thick grass cover. Approximately 500 individuals were recorded and 42 ha of optimal habitat identified. The development footprint has been refined to avoid and minimise impacts to large patches of Slender Darling Pea to ensure a viable local population can be maintained. The project will directly impact approximately 2.7 ha of suitable habitat that is known to host isolated individuals and small patches. This represents approximately 6% of the local population recorded within the subject land. This species has also been assumed present in 8.8 ha of potential habitat where adequate survey is yet to be completed. Potential indirect impacts will be managed through the implementation of the BMP, which will include pre-clearance surveys, adaptive management and unexpected finds procedures. It is unlikely that significant impacts will occur to this species as a result of the project.
Spear Grass Require further assessment to determine if significantly impacted	Significant impact unlikely The presence of Spear Grass has not been surveyed adequately to date due to flooding and access constraints. It will be subject to further survey prior to project determination. Most likely habitat for this species has been avoided as much as possible. This species can be associated with PCT 17 and PCT 26. For PCT 26, it is assumed this species will only occur in areas subject to more frequent flooding. Potential indirect impacts will be managed through the implementation of the BMP, which will include pre-clearance surveys, adaptive management and unexpected finds procedures. It is unlikely that significant impacts will occur to this species as a result of the project.
Southern Bell Frog Require further assessment to determine if significantly impacted	Significant impact unlikely This species has been recorded within the subject land. Records occurred following above average rainfall and flooding conditions that likely washed individuals from a stronghold area in the Coleambally Irrigation Area (Figure 6.5) or via flooding events in Delta Creek and Coleambally Outfall Drain. Areas of high biodiversity value, and therefore most likely habitat for this species, have been avoided to the extent practicable. Direct impacts will be limited with most impacts associated to adjacent buffers and dispersal habitat. Potential indirect impacts will be managed through the implementation of the BMP, which will include pre-clearance surveys, adaptive management and unexpected finds procedures. It is unlikely that significant impacts will occur to this species as a result of the project.

Table 6.15 EPBC Act listed threatened species and ecological communities identified by DCCEEW

Threatened species or ecological community DCCEEW rating ¹	Assessment summary
Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>) Require further assessment to determine if significantly impacted	Significant impact unlikely A call complex was identified during the bat utilisation surveys which has the potential of being Corben's Long-eared Bat. This species often flies at low levels and is unlikely to fly at a height where it would be exposed to potential collision risk. Impacts to habitat for this species have been minimised to the extent possible. As there is a high abundance of small and medium hollows within the subject land, the removal of 15 hollow bearing trees is unlikely to impact the species. Potential indirect impacts will be managed through the implementation of the BMP, which will include pre-clearance surveys, adaptive management and unexpected finds procedures. It is unlikely that significant impacts will occur to this species as a result of the project.
Sand-hill Spider Orchid (<i>Caladenia arenaria</i>) Require further assessment to determine if significantly impacted	Significant impact unlikely Sand-hill Spider Orchid has a limited geographic distribution and specific habitat requirements. The subject land is not 'east of Jerilderie' and microhabitat within the White Cypress Pine communities has groundcover which is degraded. It is unlikely that significant impacts will occur to this species as a result of the project.
Claypan Daisy Mossgiel Daisy ² Winged Peppercross Turnip Copperburr Chariot Wheels Red Darling Pea	Significant impact unlikely Targeted surveys did not identify species for these flora species within the subject land. It is unlikely that significant impacts will occur to these species as a result of the project.
Eastern Major Mitchell's Cockatoo (<i>Lophochroa leadbeateri</i> <i>leadbeateri</i>) Australasian Bittern (<i>Botaurus poiciloptilus</i>) Australian Painted Snipe Southern Whiteface Painted Honeyeater Diamond Firetail (<i>Stagonopleura guttata</i>) Blue-winged Parrot (<i>Neophema chrysostoma</i>) Fork Tailed Swift ² White-throated Needletail (<i>Hirundapus caudacutus</i>) ² Require further assessment to determine if significantly impacted	Significant impact unlikely Southern Whiteface, Painted Honeyeater, Diamond Firetail and Fork Tailed Swift have been recorded within the development footprint. Australasian Bittern and Australian Painted Snipe have been observed opportunistically within or adjacent to the subject land. Eastern Major Mitchell's Cockatoo, White-throated Needletail and Blue-winged Parrot have been surveyed and are unlikely to be present. Areas of high biodiversity value, including most likely habitat for these species have been avoided as much as possible. Potential indirect impacts will be managed through the implementation of the BMP and BBAMP, which will include pre-clearance surveys, adaptive management should collisions occur and unexpected finds procedures. It is unlikely that significant impacts will occur to these species as a result of the project.

1. Commonwealth DCCEEW Decision on referral and assessment approach – bilateral agreement for Dinawan Wind Farm (EPBC ref: 2023/09537), 12 July 2023.
2. Not included in Commonwealth DCCEEW Decision advice; however, considered as part of MNES assessment in Appendix 6 of Appendix E.3.

vii Aquatic species, populations and ecological communities

Potential habitat for two threatened aquatic species, Flathead Galaxias and Silver Perch, is mapped on DPI's spatial data portal within sections of Coleambally Outfall Drain and Delta Creek within the subject land. These sections are mapped as 'poor' freshwater fish community habitat (DPI Fisheries 2024).

There are no BioNet Atlas of NSW records of threatened aquatic species, including Flathead Galaxias and Silver Perch, within 10 km of the subject land.

Direct impacts to areas of potential habitat for these species will be limited to Coleambally Outfall Drain, a modified channel used to supply water for irrigation. Water pooling and minor flow were observed within the Coleambally Outfall Drain during surveys within the subject land. Water quality was poor in the drain.

Habitat within the Coleambally Outfall Drain is highly modified. The channel may be used as transitional habitat between areas of suitable breeding and foraging areas; however it is considered highly unlikely to support breeding of Flathead Galaxias or Silver Perch during low or high flows.

As there is no key fish habitat mapped within 10 km of the subject land, and as waterways within the subject land do not support significant aquatic ecological communities, the project is unlikely to result in impacts to fish passage. Potential indirect impacts on aquatic species will be managed through the implementation of the BMP, which will include adaptive management and unexpected finds procedures.

viii Groundwater dependent ecosystems

Groundwater from existing landowner entitlements will be used to supply non-potable water for construction and operation. As outlined in Section 6.7, with the implementation of standard management measures, no impacts to groundwater quality or supply are expected. Groundwater availability for existing groundwater users in the vicinity of the project (including GDEs) will not be impacted as project construction activities are not anticipated to intersect the regional water table.

6.3.5 Biodiversity offset strategy

There are three main options to offset biodiversity impacts that cannot be avoided:

- payment to the Biodiversity Conservation Fund managed by the Biodiversity Conservation Trust
- purchase of credits from the open market
- establishment of a biodiversity stewardship site(s) to generate credits to offset biodiversity impacts of the project.

Spark Renewables has commenced investigations into the establishment of local biodiversity stewardship sites. Five properties, with a total area of 11,785 ha, have been subject to desktop and on-ground assessment to determine their suitability for establishment of biodiversity stewardship sites. This has included background research, field investigation, credit calculations and suitability assessments. A sixth site, as well as areas excised from the development footprint for Dinawan Solar Farm, have also been identified as potentially suitable for stewardship site establishment and are currently under assessment.

Field investigations have confirmed the presence of nine different PCTs across the five properties, including six of the ten PCTs that require offsetting as part of the project (refer Table 96 of Appendix E.3). Threatened species habitat has also been assessed and habitat has been recorded for a number of species expected to require offsets as a result of the project (including Silky Swainson-pea, Superb Parrot and Southern Bell Frog). Further investigations will be undertaken during appropriate seasons to determine the presence of threatened species at the subject properties. If found to be present, stewardship sites will be used to generate species credits.

The stewardship site investigations and resulting biodiversity credit estimates prepared demonstrate that the subject properties could provide a significant proportion the ecosystem credits required for the project (refer Section 11.3 of Appendix E.3). Management actions that would be required following the establishment of a biodiversity stewardship site across the subject properties have been identified and no significant constraints to the establishment of a biodiversity stewardship site within each property have been identified.

Spark Renewables will continue to investigate biodiversity stewardship site options during the assessment process.

The BDAR considers the staged (Stage 1 and Stage 2) retirement of the project's biodiversity credit liability, should staging be required (refer Section 11.4 of Appendix E.3). The credits associated with residual impacts from Stage 1 will be retired prior to construction of Stage 1 commencing. Similarly, the credits associated with residual impacts from Stage 2 will be retired prior to construction of Stage 2 commencing. Spark Renewables will confirm the offset staging plan with DPHI prior to the commencement of construction.

6.3.6 Mitigation measures

The measures proposed to mitigate residual impacts to biodiversity are provided in Table 6.16. These include the development of a biodiversity management plan (BMP) and bird and bat adaptive management plan (BBAMP).

Table 6.16 **Biodiversity mitigation measures**

ID	Mitigation measure
B1	Detailed design of the project will: • avoid and minimise the loss of native vegetation and habitat, including consideration of the results of biodiversity survey in Spring 2024 • avoid and minimise impacts to breeding habitat for fauna, including threatened species to the extent possible.
B2	A BMP will be prepared by a qualified ecologist in consultation with NSW DCCEEW. The BMP will include: • a plan for adaptive management and for implementing, evaluating and reporting on the effectiveness of all mitigation measures • survey requirements prior to micro-siting of infrastructure within the development corridor (including criteria that must be met to ensure there is no increase to biodiversity impacts as a result of micro-siting during detailed design) • figures showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features, revegetation areas and retained tree hollows • pre-clearing survey requirements and clearing protocols (including specific measures for threatened species, nests, construction in waterways and removal of dams) • procedures for unexpected threatened species finds (including relocation requirements) • procedures for monitoring of retained threatened flora species • procedures for fauna handling, monitoring and management, including identification and reporting of fauna mortalities • speed limits for project-related vehicles on local roads and access tracks • sub-plans for weed and biosecurity management, pest animal management and rehabilitation management • measures to reduce the risk of spreading weeds and pathogens, and other biosecurity items into or out of the development footprint, including: – collection of baseline weed and invasive pest data to determine if an increase of key emerging weeds or invasive pests occurs during construction or operation – consultation with Local Land Services and neighbouring landholders on fox control and baiting programs • training and education awareness for all staff on key threatened species, both flora and fauna, relevant to the region and project • monitoring of soil and water controls to prevent indirect impacts associated with water pollution to all waterways • biodiversity performance targets, monitoring criteria, corrective actions, timing and responsibilities • annual reporting and consultation requirements.

Table 6.16 **Biodiversity mitigation measures**

ID	Mitigation measure
B3	Noise during construction will be managed as part of the construction noise management plan (NMP). The NMP will include noise management strategies for construction works adjacent to known breeding habitats.
B4	Shading and artificial light impacts will be minimised where possible through detailed design and lighting will be designed in general accordance with AS/NZS 4282:2019 Control of the Obtrusive Effects of Outdoor Lighting.
B5	Adaptive management strategies within the BMP will consider any new and relevant data from ongoing assessment and monitoring. This will include measures to monitor predicted and uncertain impacts that will trigger adaptive management actions, allowing effective and quick responses. The strategies will include consideration of impacts on biodiversity that are uncertain such as: • inadvertent impacts to native vegetation adjacent to the development footprint • introduction of pests, pathogens and weeds to native vegetation adjacent to the development footprint and further afield • degradation of downstream habitats via worsening of water quality or alteration to hydrological processes • vehicle strikes.
B6	Measures will be implemented to protect vegetation and fauna habitat outside the development footprint, including minimising indirect impacts, especially to known threatened flora species and potential fauna species.
B7	A BBAMP will be prepared in consultation with DPHI and NSW DCCEE prior to operation and will: • address the prescribed impacts associated with blade strike impacts • include trigger levels to manage impacts during operation (including timing of implementation of additional mitigation measures) – the purpose of these triggers will be to identify unacceptable events and subsequent mitigation measures, providing an ongoing feedback loop and reducing the potential for the project to result in substantial unforeseen operational impacts to bird and bat species • develop the impacts monitoring framework, including baseline and operation monitoring.

6.3.7 Conclusion

The subject land contains native vegetation in the form of native grasslands (natural and derived), Weeping Myall woodland, Black Box woodland and White Cypress Pine-dominated sandhills. There are wetlands and drainage systems that support seasonal and semi-permanent wetland habitats.

The iterative project design process has avoided the highest quality PCTs and threatened species habitat within the subject land to the extent possible. Residual impacts to biodiversity will include removal of:

- 1,145 ha of native vegetation requiring offsets (approximately 73% of which is Weeping Myall woodland in various condition states), including:
 - 604.7 ha of BC Act listed TEC
 - 264.9 ha of EPBC Act listed TEC
- 144.5 ha of confirmed threatened species habitat requiring offsets
- 109.2 ha of habitat for threatened species assumed to be present (for which surveys are yet to be completed)
- 4 Yellow Gum individuals (assumed to be present in areas where surveys are yet to be completed)

- 29 scattered trees
- 15 hollow bearing trees.

Indirect impacts to biodiversity will be further mitigated through the implementation of a BMP and BBAMP. The BBAMP will detail the requirements for ongoing monitoring of bird and bat collisions during operation (including actions to address unexpected fatalities and increased collision risk).

Assessment of the potential for significant impacts to species and communities listed under the EPBC Act found that the project is likely to have a significant impact on two TECs, Weeping Myall woodland and Natural Grasslands of the Murry Valley Plains; and has potential to have a significant impact on two threatened species, Plains Wanderer and Superb Parrot.

Residual impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits.

The project requires 24,521 ecosystem credits to compensate for impacts to native PCTs and ecosystem credit species. The project also requires 7,332 species credits to compensate for impacts to threatened species; however, this may be reduced following completion of additional targeted surveys and further design refinement.

6.4 Aboriginal cultural heritage

6.4.1 Introduction

An Aboriginal cultural heritage assessment (ACHA) was prepared for the project by EMM and is provided in Appendix E.4. The ACHA documents consultation with the local Aboriginal community and archaeological investigations completed to identify the extent and significance of any physical remains and intangible values of past Aboriginal visitation, use and occupation within the project area.

The ACHA was prepared in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents in NSW 2010*, *Code of Practice for Archaeological Investigation in NSW* (DECCW 2010a), and where relevant the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011). The relevant SEARs and how they have been addressed are summarised in Section 1.2 of the ACHA (Appendix E.4).

6.4.2 Aboriginal consultation

Consultation for the ACHA was conducted in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b), which prescribes a four-stage process. The application of this process is described below.

Consultation included additional project-specific communication strategies to promote transparent and frequent two-way dialogue between the Aboriginal community and the project. These latter activities included several Aboriginal focus group meetings (face-to-face) throughout the assessment process, and other meetings as requested by the local Aboriginal community, and a range of on-Country opportunities.

i Stage 1 – Notification of project proposal and registration of interest

Relevant government agencies, including Heritage NSW, Griffith Local Aboriginal Land Council, Department of Regional NSW Local Land Services, Office of the Registrar Aboriginal Land Rights Act 1983 (NSW), and National Native Title Service Corporation Ltd, were contacted and asked to provide a list of Aboriginal parties to contact in relation to the project. A notification of the project was also placed in the Narrandera Angus, The Area News and the Weekend Advertiser, with a request for Aboriginal knowledge holders to register interest in the project.

Six Aboriginal parties registered their interest in the project (referred to as registered Aboriginal parties (RAPs)):

- Griffith Local Aboriginal Land Council
- Bundyi Aboriginal Cultural Knowledge
- Bidya Marra Consultancy
- Bangarang Aboriginal Corporation
- Yarkuwa Indigenous Knowledge Centre
- Roley Williams.

ii Stage 2 – Presentation of information about the proposed project

A letter was issued to all RAPs on 23 January 2023 which provided project information, information on previous Aboriginal heritage investigations in the area and the proposed assessment methods for the project, with a request for input and feedback.

iii Stage 3 – Gathering information about cultural significance

Information about cultural significance was sought from RAPs throughout the preparation of the ACHA via methods including:

- five Aboriginal focus group meetings
- participation in a 34-day field survey of the development corridor and surrounds
- participation in a 9-day archaeological test excavation program within the development corridor.

Ultimately, over 240 interactions have been undertaken with the RAPs across these opportunities. With five of the six organisations, Griffith LALC, Bundyi Aboriginal Cultural Knowledge, Bidya Marra Consultancy, Bangarang Aboriginal Corporation, and Roley Williams, participating in these opportunities, and totalling over 170 person days on-site cumulatively.

Discussions with the RAPs have been extensive over the 18-month assessment process. Feedback on the project and ACHA activities has generally been positive, with a strong focus on the wide variety of cultural materials identified during the survey efforts, and particularly the cultural values of the region, acknowledging Aboriginal burials in the broader region, and broader socio-economic benefits from the project. Outcomes from the consultation process have resulted in the redesign of the development footprint and development corridor to avoid impacts to Aboriginal sites and areas of high archaeological potential, and in the consideration of mitigation measures where adverse impact may be expected.

iv Stage 4 – Review of draft cultural heritage assessment report

A draft version of the ACHA was issued to RAPs for review on 8 April 2024. While no written comments were submitted by any parties, verbal responses were received from RAPs at an Aboriginal focus group meeting on 10 May 2024. Following the Aboriginal focus group meeting, mitigation measures were amended to avoid DEHW-2023-HH1. RAP feedback and EMM responses have been summarised in Section 3.4 of the ACHA (Appendix E.4).

6.4.3 Existing environment

i Ethnographic context

The project is on the traditional lands of the Wiradjuri people and several smaller nations of the Murrumbidgee plains, the largest Aboriginal territory in NSW. The Wiradjuri people are still based in NSW.

Historically, Wiradjuri clans would generally build small villages that acted as a home base for wider foraging, hunting and social activity that would take people into other areas. Stone and wooden implements were commonly used. Due to their material type, stone implements are still apparent in the landscape today, and include many items such as ground-edge axes, adze, blades, scrapers, grinding stones, hammer stones and other tools made from sedimentary and volcanic rock. Wooden implements also were important and used daily but have not survived in the archaeological record.

A review of historical records for the region shows extensive interactions with Europeans over the last 200 years, including numerous incidences of frontier violence. Although recorded events occurred nearby, no incidents appear directly associated with the project area itself. Due to the negative impacts of European settlement, a breakdown of the clan system occurred in the late nineteenth century, wherein Aboriginal people in the Lachlan to Murrumbidgee River regions primarily lived in settlements and large pastoral properties, continuing to maintain their identity as Wiradjuri people.

ii Landscape features and archaeological context

Landscape and natural features were an important factor in the choice of camping, transitory and ceremonial areas used by Aboriginal people. These features, along with historical land use, also play a role in the level of preservation and the integrity of archaeological sites. The environmental context of the project area and the associated predictions of archaeological potential are summarised as follows:

- The project area is characterised as an exceptionally flat, open riverine plain landscape with low relief and low slope gradients. Lunettes and source-bordering dunes are common in the broader regional landscape where previous ground disturbance is minimal, such as those associated with Lake Mungo, Lake Urana, and Barren Box swamp, among others in the Riverina region. In addition, prevailing winds cause similar crescent-shaped accumulations of sediment on the eastern margins of shallow wetlands and shallow depressions (known by the Wiradjuri word, Gilgai), but these 'Gilgai mounds' are comparatively very shallow and of a far younger antiquity than the lunettes associated with the lakes. Burials are notably associated with landforms retaining deeper soil profiles, such as along watercourses, within earth mounds and sand dunes, or under rock ledges.
- The floodplain would have contained a variety of resources that would have been important to Aboriginal people in the past and culturally modified trees, hearths, and surface stone materials have potential to be present. Due to a lack of suitable sandstone geology and steep relief, it is highly unlikely that grinding grooves and rockshelters (or associated features) would be present within the project area.
- The soil groups within the project area are generally shallow with a high clay content and are prone to wind and sheet erosion. These soil types reduce the potential for subsurface artefacts to remain in situ and therefore the ability to assess the temporal use of the site.

- The project area contains a wide variety of flora and fauna, which would have been desirable for Aboriginal people as sources of food, tools, and medicine, as well as for totemic and/or cultural purposes. Much of the vegetation has been cleared during the historical period due to the extensive pastoral industry in this region.
- The project area has been subject to natural and anthropogenic disturbance that will affect the survivability of cultural materials if present.

A search of the Aboriginal Heritage Information Management System (AHIMS) returned 227 Aboriginal sites and/or objects recorded within a 6,900 km² search area. This search result includes 35 Aboriginal sites previously identified by EMM during field investigations for Dinawan Solar Farm between March and September 2023, which are all within the project area. The search results include a variety of site types often with multiple site features, but generally comprising stone artefact sites (52%), culturally modified trees (32%) and hearth sites (19%), as well as earth mounds, potential archaeological deposits, a burial, and a water hole. Nearly all sites were documented in proximity to water sources – creeklines, paleochannels (the remnant of an inactive river or stream channel that has been filled or buried), small waterholes or Gilgai, swamps and wetlands.

Numerous archaeological assessments have been conducted in proximity to the project area. The findings are consistent with the regional context, with artefact sites, hearths, culturally modified trees, and to a lesser extent earth mounds and burials identified within alluvial and floodplain contexts.

iii Field investigations

Field surveys of the project area were undertaken by EMM archaeologists and representatives from the RAPs over a total of 34 days, initially between April and June 2023 (30 days), with additional survey in September 2023 (1 day) and January 2024 (3 days). The field surveys focused on the development corridor and included approximately 413 km of pedestrian transects and over 700 individual points of observation and documentation. Field surveys covered approximately 4,952 ha (~68%) within the development corridor. Additional areas outside of the development corridor were investigated prior to them being excluded due to project redesign.

Key landscape features of the project area are as follows:

- The northern portion of the western area is bisected by the Coleambally Outfall Drain, an ephemeral drainage line that has been modified by construction of a large irrigation canal.
- Several shallow drainage depressions intersect with the development corridor, including lower order tributaries to Delta Creek and Blind Creek. Other hydrological features include several wetlands with stands of remnant grey box trees, and wide, shallow Gilgai in the western portion of the project area.
- Areas of aeolian (wind-blown) and alluvial (water derived) formation, often intersecting documented rudosol soil landscapes, evident across the western and south-eastern portions of the project area.
- Sections of chromosols (pebbled upper layers with a contrast to reddish sand soils below) were evident in the development corridor in the north-eastern corner of the western area and along the northern section of the eastern area.
- Ground disturbance across the project area is extensive, initially being cleared in the nineteenth century for irrigation farming, which continues to the present.

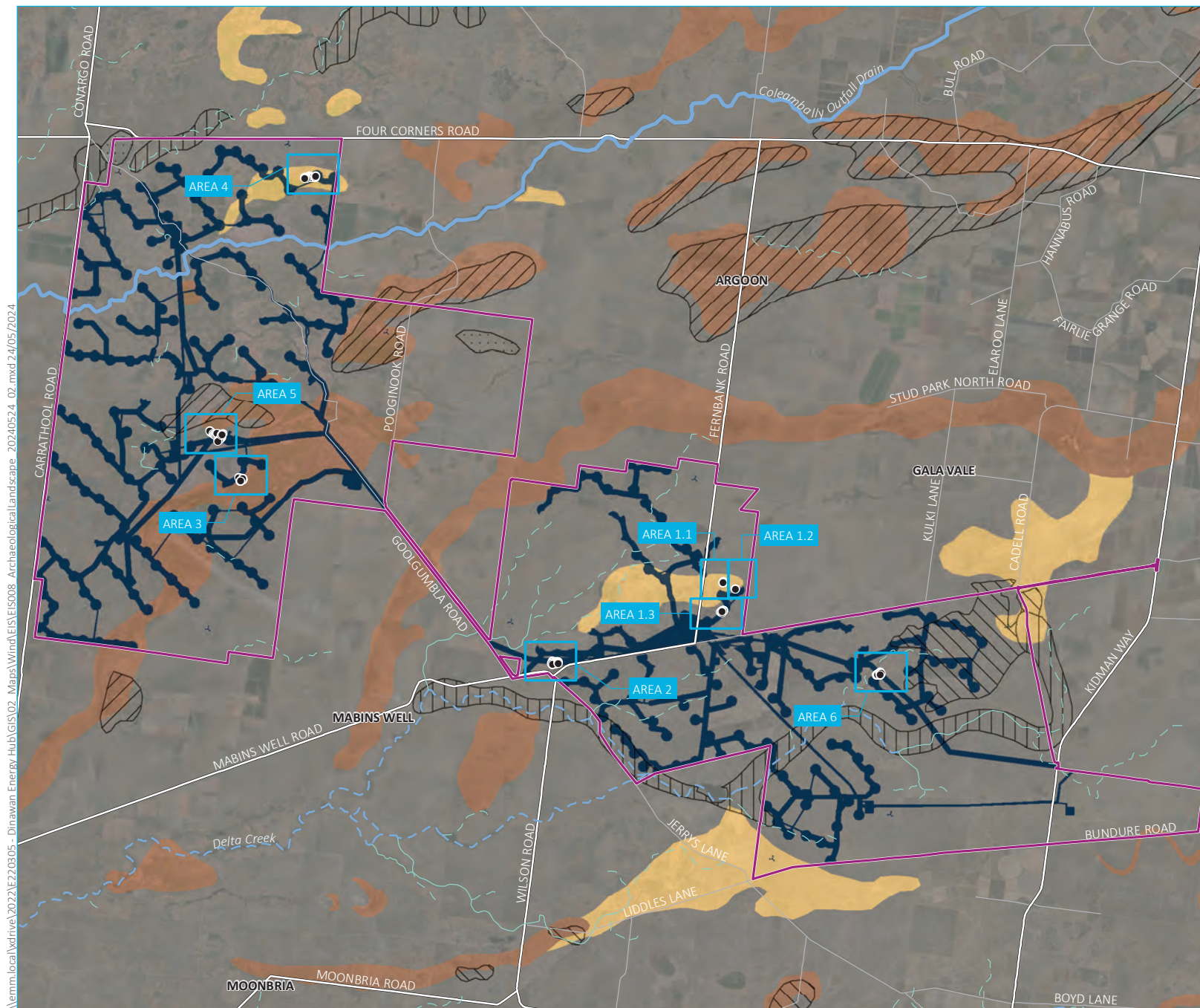
Following development footprint refinement, a test excavation program was conducted over a nine-day period from 28 August to 8 September 2023 across six main areas within the project area - in locations where sites had previously been identified, where deeper soil profiles were observed, and/or where landforms were representative of the project area. A total of 97 test pits were excavated across the six areas, mostly in proximity to water sources such as Gilgai depressions, ephemeral wetlands, or paleochannels. The average depth of excavation across the test pits was approximately 30 cm, with some areas extending as much as 80 cm below ground surface. A total of 41 artefacts were recovered, all generally in the upper 50 cm of the soil profile. Of these, 20 artefacts were recovered from one site (DEHW-2023-ASPAD4 integrated into DEHW-OA9 and unlikely to be harmed by the project), which is located on the eastern fringe of a wide, shallow Gilgai depression. Overall, it was considered that the test excavations demonstrated that cultural materials are likely constrained to the surface and/or near surface of the project area in most circumstances.

A total of 107 previously undocumented Aboriginal objects, sites or places were identified within and adjacent to the project area. Overall, various site validation activities undertaken over an 18-month period resulted in the duplication, refinement, re-interpretation and overlap of results. When combining and ratifying these findings, these data have been rationalised into 32 discrete sites and places including a low-density distribution of predominantly surface and shallowly buried cultural materials distributed intermittently across the project area (Table 6.17 and Figure 6.6).

These sites comprise the following:

- Fourteen archaeological sites comprising:
 - Ten hearths with various associated stone cultural materials.
 - Four culturally modified trees with tentative classifications, requiring further assessment to confirm their status.
- Twelve occupation areas – these are characterised as broader locales with areas ranging from 0.6 ha to 485 ha (average size of approximately 69 ha) where a range of cultural materials are found in proximity to each other and where further objects and/or sites are expected. These include hearth/oven complexes, moderate and/or dense stone artefact scatters (more than 15 artefacts/m²), culturally modified trees, and/or subsurface cultural deposits.
- Five cultural sites – these include two potential ring trees, a potential women’s tree, a historic blaze tree and a site which comprises a cluster of culturally significant sites including a source-bordering dune in the centre of the western part of the project area (described as DEHW-CS1).
- A low-density stone artefact background scatter site (1–15 artefacts/m²) and eroded hearths or scattered heat retainers intermittently dispersed across the project area, which are collectively referred to as DEHW-BS1. This site includes 51 discrete site recordings.

A summary of the Aboriginal sites and objects within the project area is presented in Table 6.17.



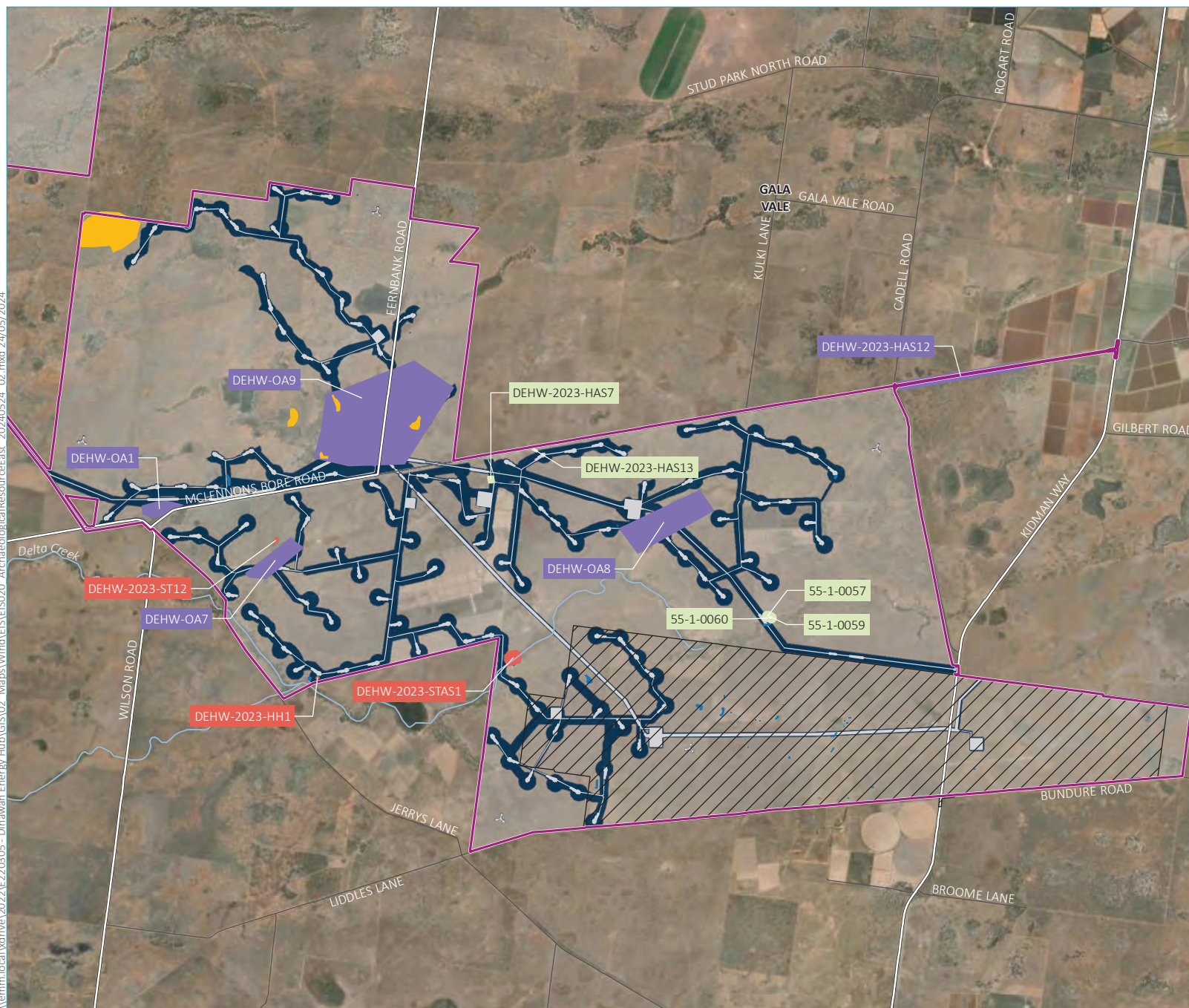
- KEY**
- Project area
 - Development corridor
 - Test pit
- Surface geology (250k)**
- Aeolian sand plain
 - Alluvium
 - Claypan and lacustrine deposits
 - Source-bordering dunes
- Australian soil classification order**
- Chromosols
 - Rudosols
 - Vertosols
- Strahler stream order**
- 1st order
 - 2nd order
 - 3rd order
 - 9th order
- Existing environment**
- Major road
 - Minor road

Archaeological landscape features
and test excavation areas
in the project area

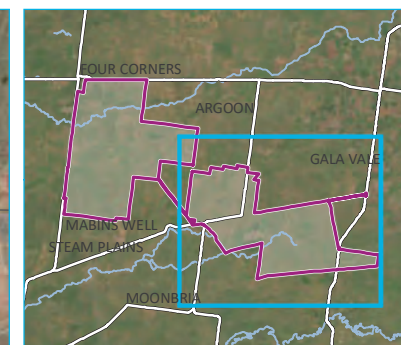
Dinawan Wind Farm
Environmental Impact Statement
Figure 6.6



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Source: EMM (2024); Spark Renewables (2024); DCS55 (2023); ESRI (2024)



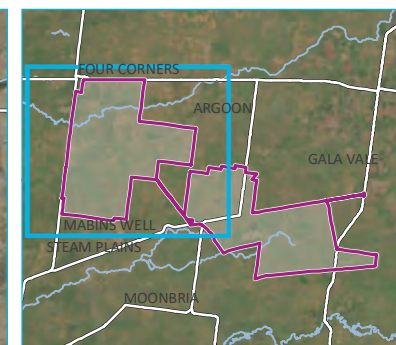
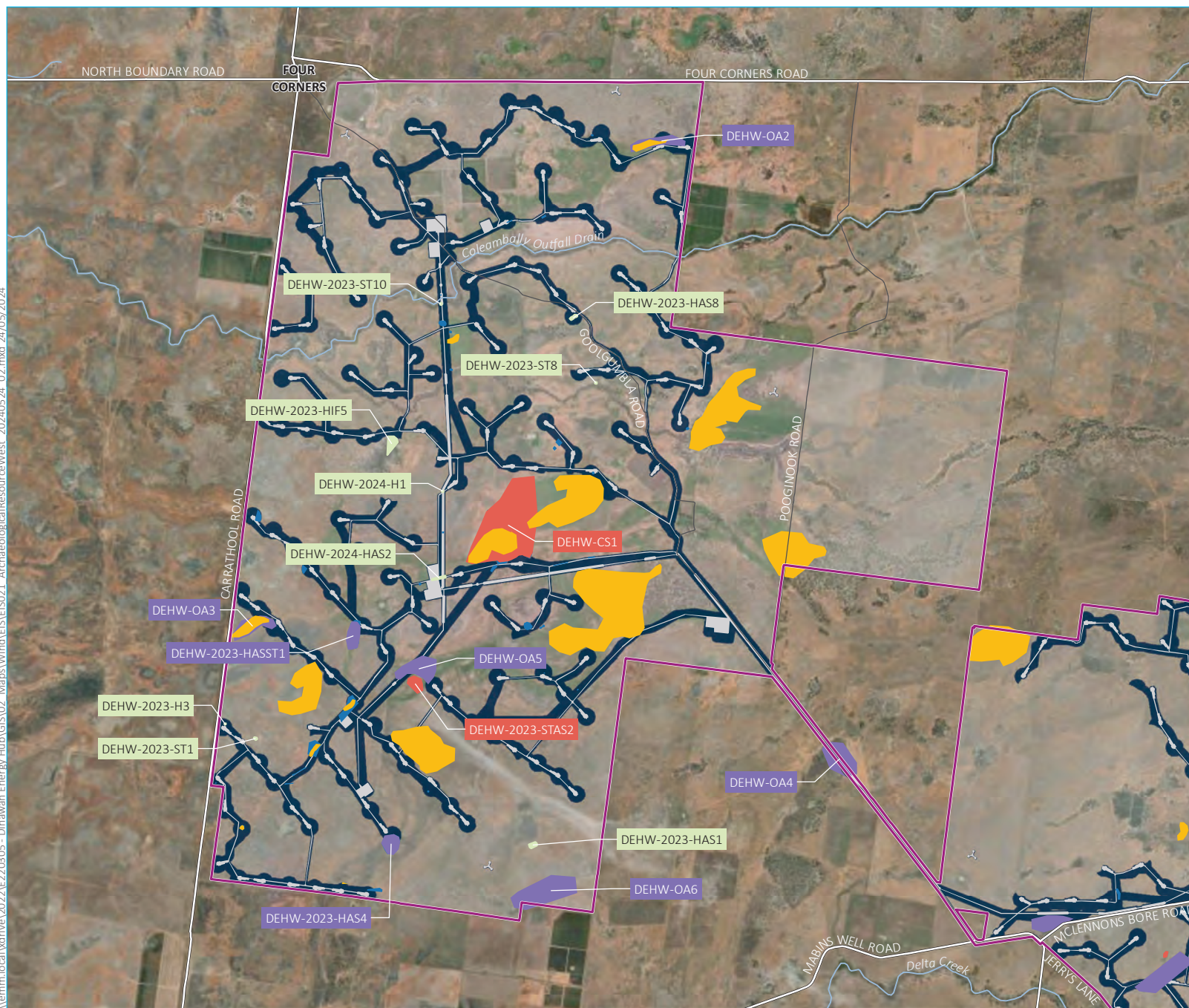
- KEY**
- Project area
 - Project area - Dinawan Solar Farm
 - Development corridor
 - Development footprint
- Identified cultural materials**
- Cultural site
 - Occupation area
 - Sand body
 - Archaeological site
 - Background scatter (DEHW-BS1)
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Identified Aboriginal heritage sites
(Eastern area)

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.7a



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- KEY**
- Project area
 - Development corridor
 - Development footprint
- Identified cultural materials**
- Cultural site
 - Occupation area
 - Sand body
 - Archaeological site
 - Background scatter (DEHW-BS1)
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Identified Aboriginal heritage sites
(Western area)

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.7b



Source: EMM (2024); Spark Renewables (2024); DCS55 (2023); ESRI (2024)

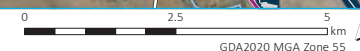


Table 6.17 Potential impacts to identified Aboriginal objects and sites

Site	AHIMS #	Incorporates	Site type	Status	Significance	Within development corridor	Within development footprint
Outside development corridor– no impact							
DEHW-2023-STAS2	48-6-0250	-	Cultural site	Valid	Moderate	No	No
DEHW-2023-ST8	48-6-0253	-	Culturally modified tree	Tentative	Moderate	No	No
DEHW-2023-ST1	48-6-0273	-	Culturally modified tree	Tentative	Moderate	No	No
PEC-E-47	55-1-0057	-	Hearth	Valid	Moderate	No	No
PEC-E-49	55-1-0059	-	Culturally modified tree	Tentative	Moderate	No	No
PEC-E-50	55-1-0060	-	Hearth	Valid	Moderate	No	No
DEHW-2023-HAS1	54-3-0071	-	Hearth, artefact scatter	Valid	Moderate	No	No
DEHW-2023-ST12	55-1-0144	-	Cultural site	Valid	Moderate	No	No
DEHW-OA6	54-3-0076	#54-3-0068, #54-3-0067	Occupation area – artefact scatter	Valid	Moderate	No	No
Commitment to avoid – no impact							
DEHW-2023-HIF5	48-6-0283	-	Hearth, isolated find	Valid	Moderate	Yes – 13% of site	No
DEHW-2023-HAS4	54-3-0070	-	Occupation area – Hearth, artefact scatter	Valid	Moderate	Yes – 42% of site	No
DEHW-2023-HH1	49-4-0245	-	Cultural site – culturally modified tree	Valid	Moderate	Yes – 100% of site	No
DEHW-2023-HAS13	55-1-0162	#55-1-0052, #55-1-0053	Hearth, artefact scatter	Valid	Moderate	Yes – 6% of site	No
DEHW-OA3	48-6-0308	#48-6-0266, #48-6-0252	Occupation area – hearth, artefact scatter, archaeological deposit, potential culturally modified tree	Valid	High	Yes – 28.5% of site	Yes – 1% of site

Table 6.17 Potential impacts to identified Aboriginal objects and sites

Site	AHIMS #	Incorporates	Site type	Status	Significance	Within development corridor	Within development footprint
DEHW-CS1	48-6-0310	#48-6-0260, #48-6-0249, #48-6-0248, #48-6-0247, #48-6-0271, #48-6-0270, #48-6-0268	Cultural site	Valid	High	Yes – 6% of site	No
Direct impact – no loss of value							
DEHW-2023-STAS1	55-1-0143	-	Cultural site	Valid	Moderate	Yes – 13% of site	No
DEHW-OA9	55-1-0170	#55-1-0156, #55-1-0155, #55-1-0154, #55-1-0160, #55-1-0140, #55-1-0139, #55-1-0138, #55-1-0151, #55-1-0150, #55-1-0149, #55-1-0168	Occupation area – artefact scatter, archaeological deposit, culturally modified tree, hearth	Valid	Moderate	Yes – 38% of site	Yes – 9% of site
Direct impact - partial loss of value							
DEHW-2023-HASST1	48-6-0264	-	Occupation area – Hearth, artefact scatter, potential culturally modified tree	Valid	High	Yes – 18% of site	No
DEHW-2023-HAS12	55-1-0163	-	Occupation area – Hearth, artefact scatter	Valid	High	Yes – 14% of site	Yes – 14% of site

Table 6.17 **Potential impacts to identified Aboriginal objects and sites**

Site	AHIMS #	Incorporates	Site type	Status	Significance	Within development corridor	Within development footprint
DEHW-OA1	55-1-0172	#55-1-0161, #55-1-0148, #55-1-0147, #55-1-0146, #55-1-0145, #48-6-0279.	Occupation area – hearth, artefact scatter, potential culturally modified tree	Valid	High	Yes – 54% of site	Yes – 1% of site
DEHW-OA2	49-4-0243	#49-4-0237, #49-4-0234	Occupation area – hearth, artefact scatter	Valid	Moderate	Yes – 31% of site	Yes – 1% of site
DEHW-OA4	49-4-0244	#49-4-0236, #48-6-0273	Occupation area – hearth, artefact scatter, archaeological deposits, potential culturally modified tree	Valid	High	Yes – 24% of site	Yes – 13% of site
DEHW-OA5	48-6-0309	#48-6-026, #48-6-0258, #48-6-0256, #48-6-0284	Occupation area – hearth, artefact scatter	Valid	Moderate	Yes – 43% of site	Yes – 10% of site
DEHW-OA7	55-1-0171	#55-1-0152, #55-1-0141, #55-1-0158	Occupation area – artefact scatter	Valid	Moderate	Yes – 58% of site	Yes – 4% of site
DEHW-OA8	55-1-0169	#55-1-0167, #55-1-0153, #55-1-0164, #55-1-0054, #55-1-0055, #55-1-0056	Occupation area – hearth, artefact scatter	Valid	Moderate	Yes – 31.5% of site	Yes – 5% of site
DEHW-BS1	-	51 sites (refer to ACHA (Appendix E.4) for further detail)	Background scatter – low density artefact scatter	Valid	Low	Yes – intermittently dispersed across the project area	Yes – intermittently dispersed across the project area

Table 6.17 **Potential impacts to identified Aboriginal objects and sites**

Site	AHIMS #	Incorporates	Site type	Status	Significance	Within development corridor	Within development footprint
Complete loss of value							
DEHW-2023-H3	48-6-0257	-	Hearth	Valid	Moderate	Yes – 100% of site	No
DEHW-2023-ST10	48-6-0251	-	Culturally modified tree	Tentative	Moderate	Yes – 100% of site	Yes – 67% of site
DEHW-2023-HAS8	48-6-0267	-	Hearth, artefact scatter	Valid	Moderate	Yes – 100% of site	No
DEHW-2024-HAS2	48-6-0271	-	Hearth, artefact scatter	Valid	Moderate	Yes – 100% of site	Yes – 100% of site
DEHW-2024-H1	48-6-0289	-	Hearth	Valid	Moderate	Yes – 100% of site	Yes – 100% of site
DEHW-2023-HAS7	55-1-0165	-	Hearth, artefact scatter	Valid	Moderate	Yes – 86% of site	Yes – 1% of site

6.4.4 Avoidance and minimisation through design

The project's development footprint and development corridor have been iteratively refined throughout the assessment process, informed by local Aboriginal community inputs, the ACHA desktop information, field surveys and test excavation findings as they have become available.

Areas of higher archaeological potential identified during initial archaeological predictive modelling – including aeolian landforms, paleochannels, and watercourses, and the eastern fringes of Gilgai and ephemeral wetlands – were avoided as part of preliminary project design. Further avoidance was incorporated into the development footprint in the western project area, where more sand dunes and/or sandy soil profiles were observed, and most notably captures in DEHW-CS1.

Of the 32 sites identified within or in proximity to the project area, a total of 15 sites (47%) were avoided through project design and/or project commitment to avoid (Table 6.17). Of these 15 sites, 9 sites are outside of the development corridor, while 6 sites are within the development corridor but will not be impacted by the project. These sites extended across a range of site types, including hearths, occupation areas and culturally modified trees, and were variously of high and moderate significance.

Avoidance focused on cultural sites and places considered of high value to the local Aboriginal community, and sand dune and aeolian landforms with the potential to contain deeply buried cultural sites and/or burials, including:

- avoidance of the source-bordering dune DEHW-CS1 and other significant cultural areas including two potential ring trees DEHW-2023-STAS2 (#48-6-0250) and DEHW-2023-ST12 (#55-1-0144) and key cultural components of a potential women's area DEHW-2023-STAS1 (#55-1-0143). Following meetings to discuss the review of the ACHA, DEHW-2023-HH1 (#49-4-0245) will also be avoided by the project
- avoidance of archaeologically significant sites, including PEC-E-47 (#55-1-0057), PEC-E-50 (#55-1-0060), DEHW-2023-HAS1 (#54-3-0071), DEHW-OA6, PEC-E-49 (#55-1-0059), DEHW-2023-ST1 (#48-6-0273), and DEHW-2023-ST8 (#48-6-0253)
- commitment to avoid the curtilages of archaeologically significant sites within the development corridor, including DEHW-OA3, DEHW-2023-HAS4 (#54-3-0070), DEHW-2023-HAS13 (#55-1-0162), and DEHW-2023-HIF5 (#48-6-0283), and key identified cultural material components within DEHW-OA1, and DEHW-OA2, and DEHW-OA9.

6.4.5 Potential impacts

Following the refinement of the development footprint, 17 Aboriginal sites have been assessed as being directly impacted by the project (Table 6.17 and Figure 6.8). Of these:

- six sites of moderate significance are assessed being subject to **complete loss**:
 - one hearth (DEHW-2024-H1 [#48-6-0289])
 - four hearths with associated features (DEHW-2023-H3 [#48-6-0257], DEHW-2023-HAS7 [#55-1-0165], DEHW-2023-HAS8 [#48-6-0267], and DEHW-2024-HAS2 [#48-6-0271])
 - one potentially culturally modified tree (DEHW-2023-ST10 [#48-6-0251]).

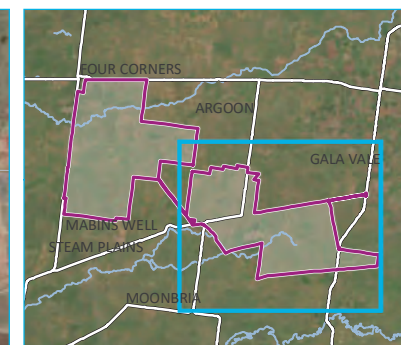
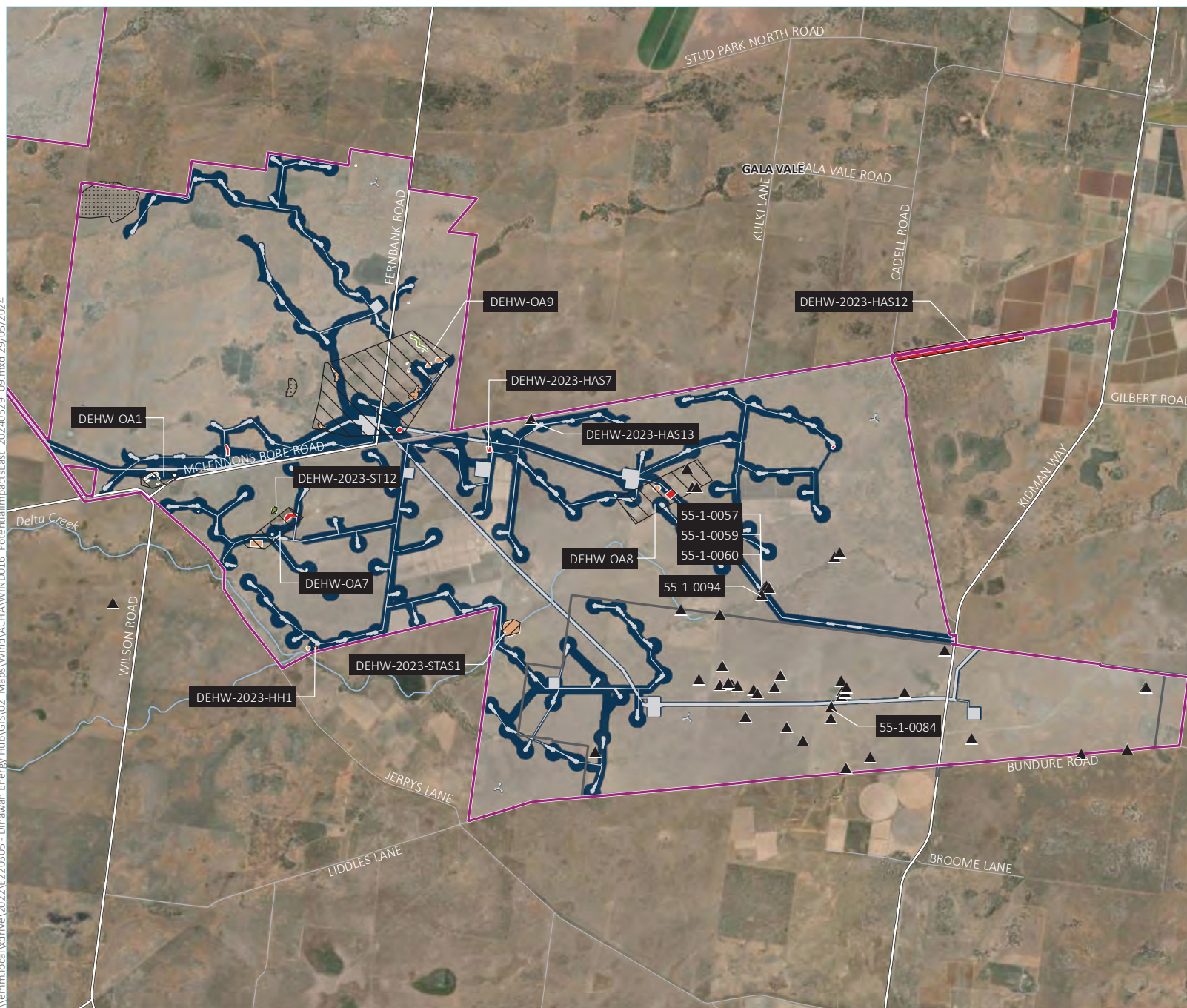
- nine sites of varying significance are assessed as being subject to **partial loss** (includes six occupation areas which are spatially extensive and only partially within the development corridor and/or development footprint):
 - four sites of high significance (DEHW-OA1 and DEHW-OA4, and hearths with associated features DEHW-2023-HASST1 and DEHW-2023-HAS12)
 - four sites of moderate significance (DEHW-OA2, DEHW-OA5, DEHW-OA7 and DEHW-OA8)
 - one site of low significance, a broad background scatter (DEHW-BS1).
- two sites of moderate significance will experience **no loss of value**, as identified cultural materials that inform the sites' significance would remain outside the development corridor and/or development footprint, even where the broad site listing is partially within the development corridor:
 - one occupation area (DEHW-OA9)
 - one cultural site (DEHW-2023-STAS1).

In total, approximately 311 ha (34.7%) of recorded sites are within the development corridor, of which approximately 57 ha (6.3%) are within the development footprint. Approximately 527 ha of areas encompassed by the occupation areas would remain unaffected.

There are interspersed cultural materials – including low-density artefact scatters, isolated finds, and eroded hearths – across the entire project area where there are ephemeral drainage lines, Gilgai, and wetlands. These sites, encompassed within DEHW-BS1, reflect the long-term, transient use of the landscape over several thousand years but are considered to have limited archaeological significance. It would be expected that interspersed campsites would be encountered disparately within the development corridor.

Extensive project refinement has limited the potential cumulative impacts from the project. Where impacts are proposed, they seek to prioritise partial impacts, and substantive portions of the cultural materials will remain unaffected. Regardless, archaeological mitigation of cultural materials being adversely affected is proposed to offset some of these impacts. Measures to mitigate impacts are in Section 6.4.6.

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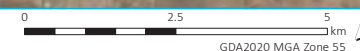
- KEY**
- Project area
 - Project area - solar
 - Development corridor
 - Development footprint
 - ▲ Existing AHIMS site
- Project impact**
- Directly impacted
 - Potentially impacted
 - No impacts
- Identified cultural materials**
- Cultural site
 - Occupation area
 - Sand body
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Potential impacts to
identified Aboriginal sites
(Eastern area)

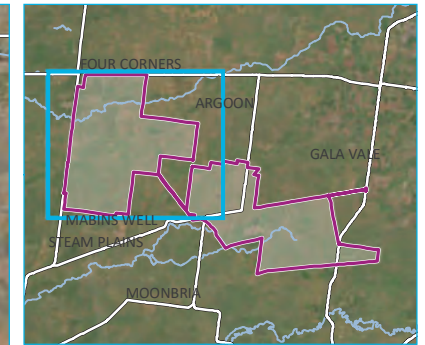
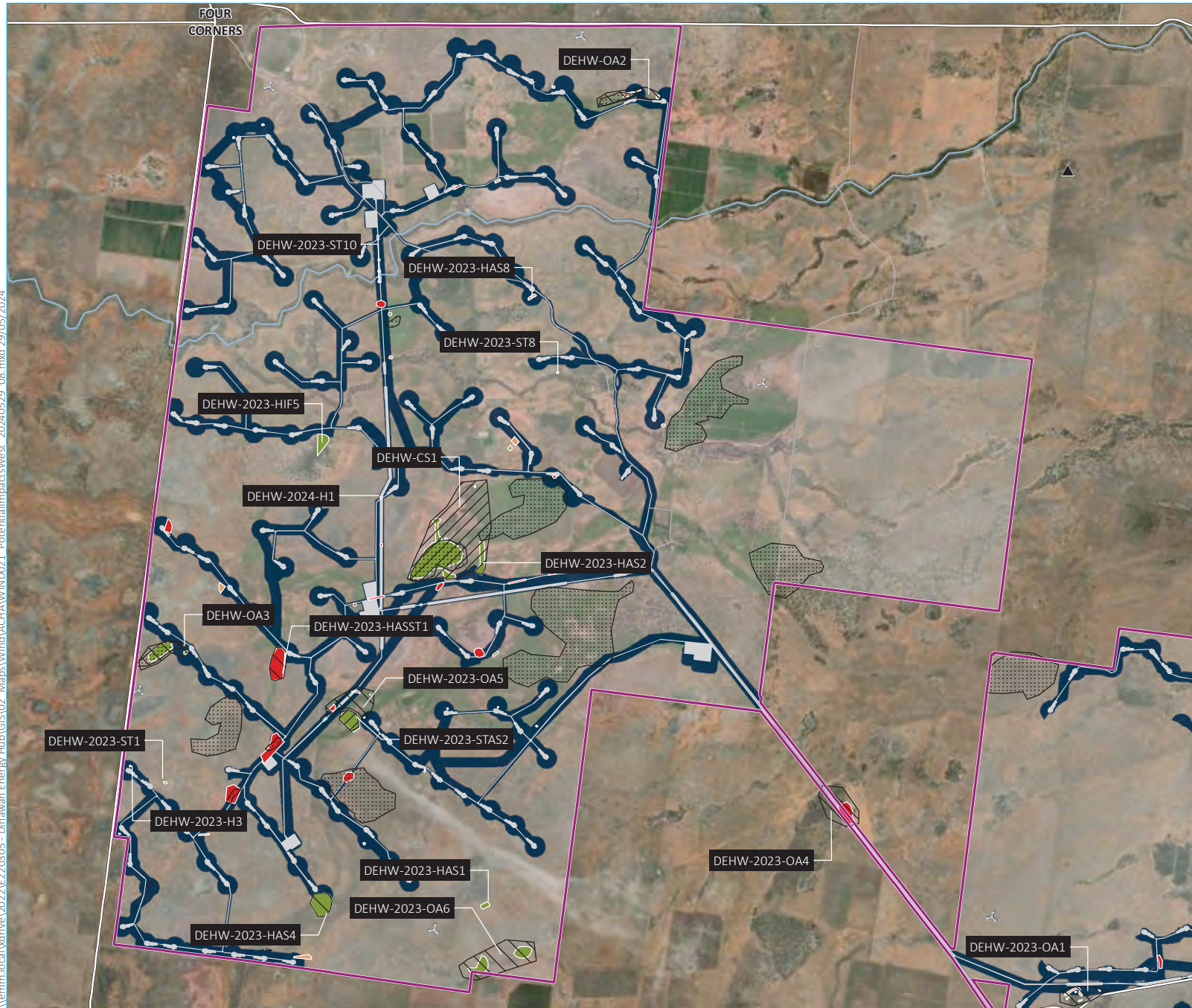
Dinawan Wind Farm
Environmental Impact Statement
Figure 6.8a



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)



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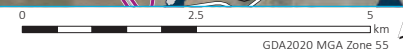
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - ▲ Existing AHIMS site
- Project impact**
- Directly impacted
 - Potentially impacted
 - No impacts
- Identified cultural materials**
- Cultural site
 - Occupation area
 - Sand body
- Existing environment**
- Major road
 - Minor road
 - Watercourse (3rd order and higher)

Potential impacts to
identified Aboriginal sites
(Western area)

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.8b



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)



6.4.6 Mitigation measures

The measures proposed to mitigate residual impacts to Aboriginal cultural materials and values are provided in Table 6.18. These include the development of an Aboriginal Cultural Heritage Management Plan (ACHMP) to provide the framework for Aboriginal heritage management during the construction, operation and decommissioning of the project.

Further information on the contents and methods of mitigation to be considered by the ACHMP are included as 'guiding principles' in Attachment F of the ACHA (Appendix E.4). The guiding principles include further information on avoidance, Aboriginal consultation, and mitigation measures such as archival recording, surface artefact recovery, and archaeological salvage excavations, etc. Exploration of potential heritage interpretation from the project is also included in the mitigation measures and further explored in the guiding principles.

Table 6.18 Management and mitigation measures for Aboriginal cultural heritage

Reference	Mitigation measure
AH1	The project will avoid impacts to the following identified Aboriginal objects and/or sites within or near the development corridor: • hearths and associated cultural materials: DEHW-2023-HAS13 (#55-1-0162), DEHW-2023-HIF5 (#48-6-0283), PEC-E-47 (#55-1-0057), PEC-E-50 (#55-1-0060), DEHW-2023-HAS1 (#54-3-0071), PEC-E-49 (#55-1-0059), DEHW-2023-ST1 (#48-6-0273), and DEHW-2023-ST8 (#48-6-0253). • occupation area: DEHW-OA3 (#48-6-0308), DEHW-OA6 (#54-3-0076), and DEHW-2023-HAS4 (#54-3-0070) • cultural sites: DEHW-CS1 (AHIMS #48-6-0310) and other significant cultural areas including two potential ring trees (DEHW-2023-STAS2 (#48-6-0250) and DEHW-2023-ST12 (#55-1-0144)), a potential culturally modified tree, DEHW-2023-HH1 (#49-4-0245), and key identified cultural material components within a potential women's area DEHW-2023-STAS1 (#55-1-0143). Site-specific avoidance measures developed to address this commitment will be integrated into AH3.
AH2	The project will investigate the micro-siting of project infrastructure and construction activities in consultation with an Aboriginal heritage specialist to avoid or minimise impacts to: • hearths and associated cultural materials: DEHW-2023-H3 (#48-6-0257), DEHW-2024-HAS8 (#48-6-0267), DEHW-2024-HAS7 (#55-1-0165) and DEHW-2023-HAS12 (#55-1-0163) • a culturally modified tree: DEHW-2023-ST10 (#48-6-0251) • occupation area: DEHW-2023-HASST1 (#48-6-0264), DEHW-OA1 (#55-1-0172), DEHW-OA2 (#49-4-0243), DEHW-OA4 (#49-4-0244), DEHW-OA5 (#48-6-0309), DEHW-OA7 (#55-1-0171), DEHW-OA8 (#55-1-0169), and DEHW-OA9 (#55-1-0170) • areas of higher archaeological potential including identified aeolian, paleochannels, and watercourses features; and the eastern fringes of Gilgai and ephemeral wetlands. These are prevalent in the western project area, where sand dunes and/or sandy soil profiles have been predicted and/or observed. Management and any site-specific mitigation measures developed to address this commitment will be integrated into AH3.
AH3	An ACHMP will be prepared by a suitably qualified heritage professional in consultation with the RAPs and Heritage NSW. The ACHMP will describe: • processes, timing, communication methods and project involvement for maintaining Aboriginal community consultation and participation through the remainder of the project • content of a cultural heritage induction package for all project staff and contractors • methods for documenting and archival recording of any Aboriginal sites and/or objects that will be impacted by the project • recording and archaeological mitigation requirements for archaeological test/salvage excavations/monitoring of Aboriginal sites and/or objects that will be impacted by the project • methods for surface collection of identified isolated objects and stone artefact scatters that will be impacted by the project • methods for mitigation and/or recovery of culturally modified trees that will be impacted by the project

Table 6.18 Management and mitigation measures for Aboriginal cultural heritage

Reference	Mitigation measure
	• methods for delineation and protection of Aboriginal sites and/or objects within or in close proximity to the development corridor, including clear marking, appropriate screen for any gender-specific areas and surface protection • procedures for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project • procedures for the curation and long-term management of recovered cultural materials • methods of post-excavation analysis and reporting of the archaeological investigations, including suitable collection and processing of stone artefacts, paleo-environmental, chronological and other soils from archaeological activities • a monitoring regime for implementing the above measures.
AH4	An inspection will be undertaken by a qualified arboriculturist of all tentatively identified culturally modified trees to confirm whether the modifications have formed through anthropogenic or natural processes. The findings of this inspection and the management of confirmed culturally modified trees will be described in the ACHMP (AH3).
AH5	An Aboriginal heritage-interpretation strategy and plan will be developed by an Aboriginal heritage specialist, in consultation with the RAPs. The plan will identify the interpretive Aboriginal heritage values of the project area and provide direction for interpretive installations and devices.
AH6	Consultation regarding cultural heritage management will be maintained with the RAPs.
AH7	A copy of the ACHA and all relevant AHIMS site recording forms and information for the project will be lodged with Heritage NSW and provided to each of the RAPs.

Note: Further details and information for all mitigation measures are provided in the guiding principles (Attachment F of Appendix E.4) and should be read in conjunction with these measures.

6.4.7 Conclusion

Extensive on-Country investigations with the local Aboriginal community identified a substantive cultural assemblage across the project area, dominated by surface stone artefacts, hearths and culturally modified trees. These data were interpreted as 32 Aboriginal objects and/or sites within the project area and surrounds, and totalling approximately 896 ha in size. Project refinement has resulted in the avoidance of 15 Aboriginal sites, with residual impacts to 17 sites encompassing approximately 367 ha. The project will result in a total loss of value to six moderate significance sites; and partial loss in value of four sites of high significance, four of moderate and one of low value.

The ACHA has developed mitigation measures in consultation with the RAPs. These include the development of an Aboriginal Cultural Heritage Management Plan to provide a framework for management of Aboriginal objects and sites during the pre-construction and construction phase and the exploration of heritage interpretation for the project. The Aboriginal Cultural Heritage Management Plan will detail the management of known Aboriginal sites and mitigation measures to further avoid and minimise impacts to Aboriginal heritage values in the development footprint, along with unanticipated finds procedures and training and reporting protocols.

6.5 Historical heritage

6.5.1 Introduction

A statement of heritage impact was prepared by EMM for the project and is provided in Appendix E.5. The statement of heritage impact documents archaeological potential and includes desktop and field investigations of the project area.

The statement of heritage impact has been prepared in general accordance with the *NSW Heritage Manual* (NSW Heritage Office and NSW Department of Urban Affairs and Planning 1996) and addresses the SEARs relevant to historical heritage. The relevant SEARs and how they have been addressed are summarised in Section 2.2 of the statement of heritage impact (Appendix E.5).

6.5.2 Existing environment

i Overview

The project will be constructed in a region that has a history of European exploration and settlement dating back to the mid-nineteenth century, centred around pastoral and agricultural activities.

The suitability of the vast flat plains, grasslands and creeks for agriculture have contributed to the dominant agricultural and pastoral character of the region. Records of subdivisions and property ownership show the existence of dwellings from the late 1870s. The landscape features and history of the region are an important guide to the potential sites of historical structures, which would have included huts, cottages, homesteads, outbuildings, and critical water source structures including stock tanks and wells.

There has been extensive ground disturbance across the project area, with activities including the installation of irrigation channels, fences, tracks and dams. The area continues to be used for agriculture.

ii Register search

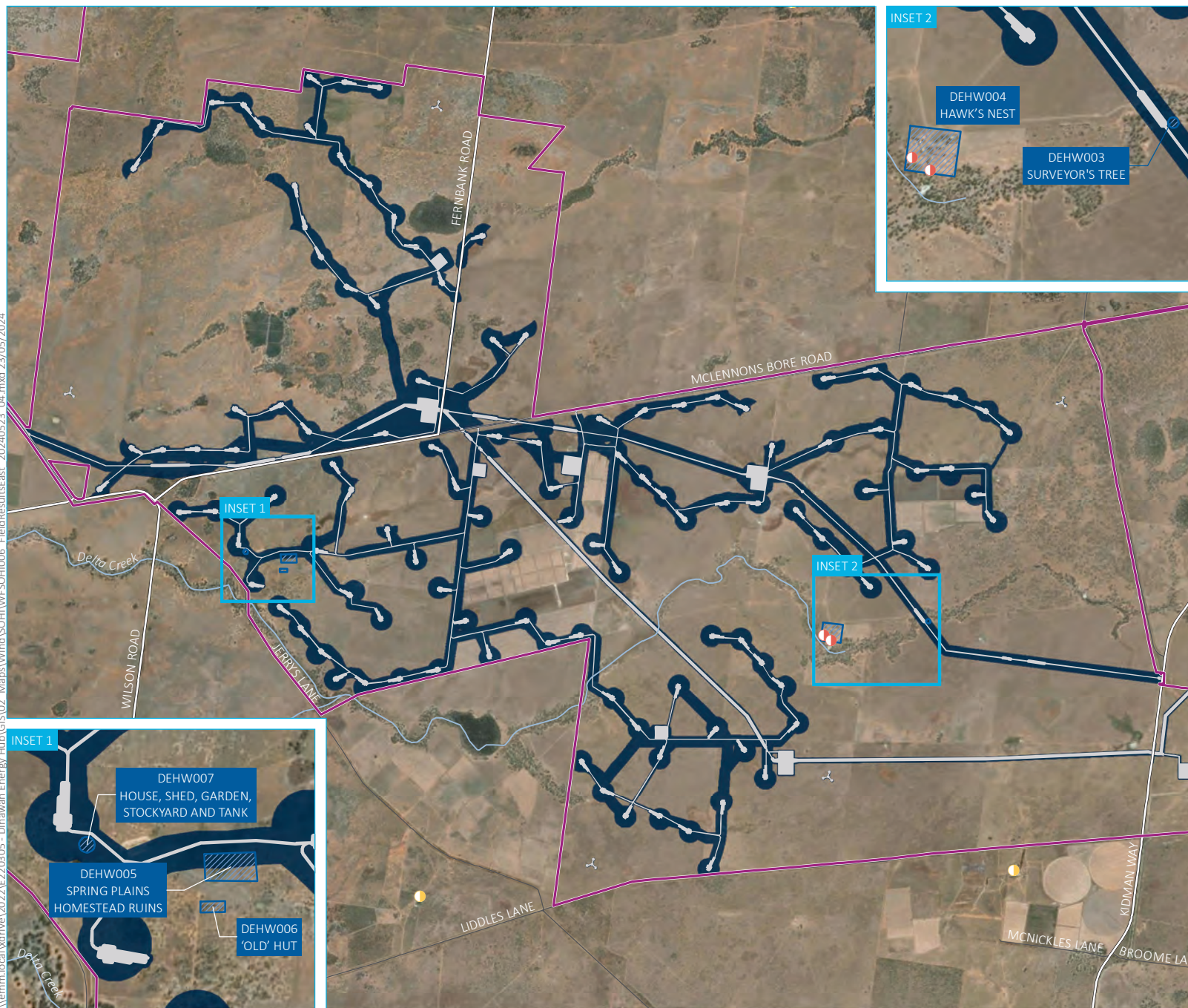
A search of national, State and local heritage registers found no listed heritage sites in, or within 5 km of, the project area.

iii Field investigations

Analysis of landscape features and relevant historical maps and plans specific to the project area identified six potential historical sites for further investigation. EMM archaeologists conducted a historical heritage survey of the project area in July 2023 that focussed on these potential sites. A total of eight historical sites were identified within the project area (Figure 6.9 and Table 6.19). The broader cultural landscape within the project area has also been identified as holding historical value.

The identified historical heritage sites were assessed against the heritage significance criteria outlined in *Assessing Heritage Significance* (DPE 2023e). All identified historical heritage sites were found to be of local significance (Table 6.19).

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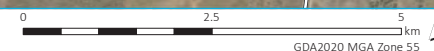
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Identified heritage site - surveyed
- Residence**
- Associated
 - Non-associated
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Identified historical heritage sites
- eastern area

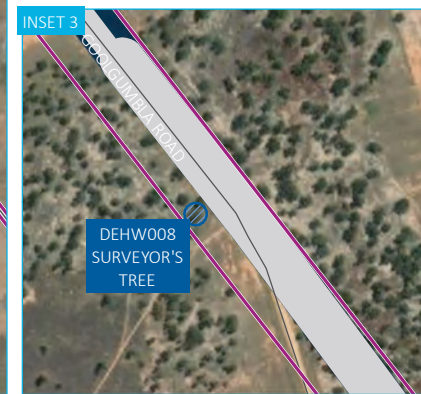
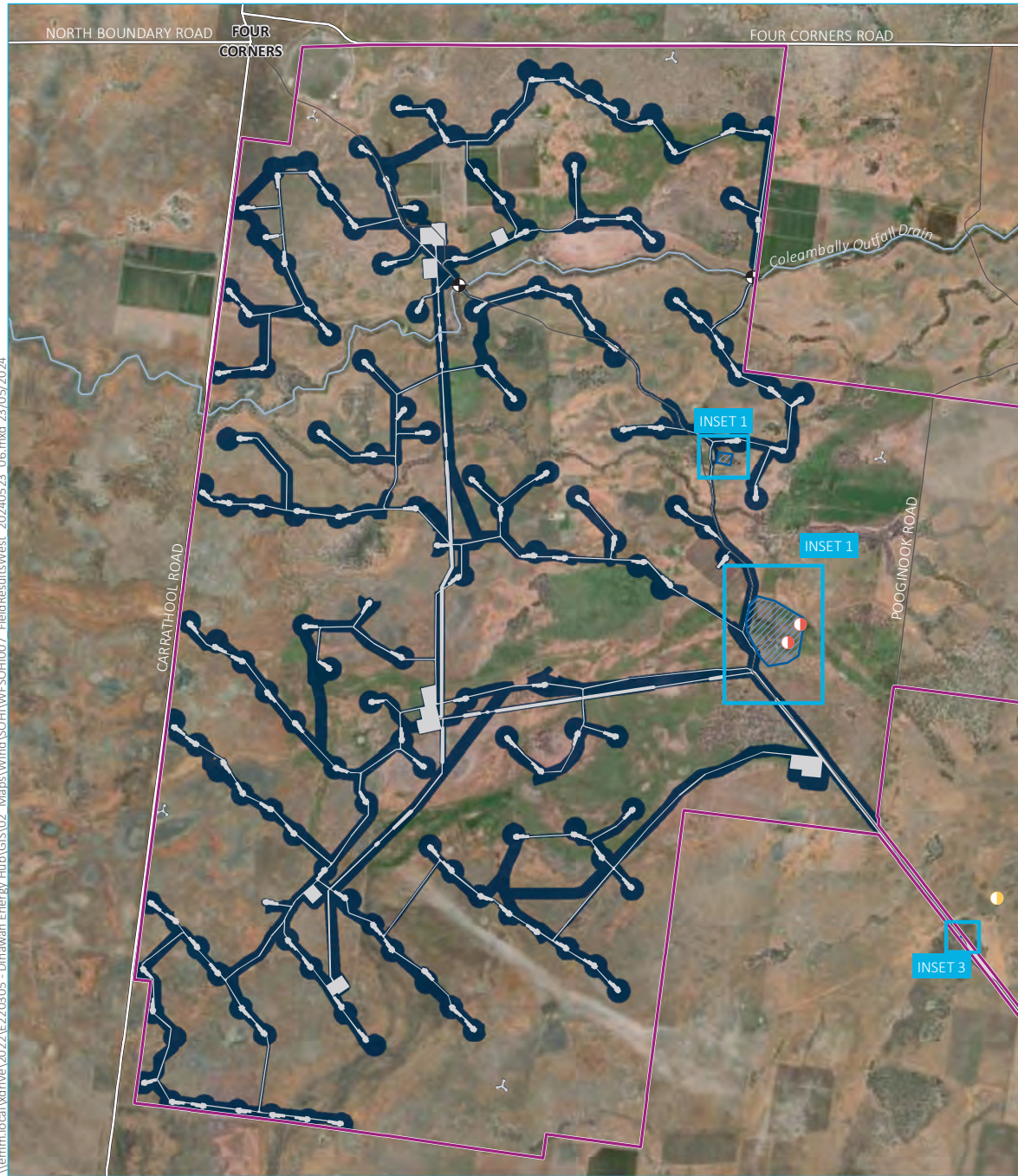
Dinawan Wind Farm
Environmental Impact Statement
Figure 6.9a



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)



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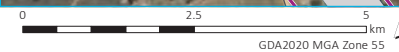
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Identified heritage site - surveyed
- Residence**
- Associated
 - Non-associated
- Existing environment**
- ◆ Bridge
 - Major road
 - Minor road
 - Watercourse (third order and higher)

Identified historical heritage sites
- western area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.9b



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021); ESRI (2024)



6.5.3 Avoidance and minimisation through design

The findings of the historical heritage survey were used to inform the refinement of the development footprint, which has avoided direct impacts to all eight identified sites.

6.5.4 Potential impacts

The project has the potential to impact the sites of identified heritage significance through direct and indirect impacts:

- Direct impacts – in the form of demolition of structures and ground disturbance, such as through the construction of project infrastructure; access track establishment and public road upgrades. The development footprint has been refined so that no sites will be directly impacted. Of the eight sites of historical heritage value, three are completely outside the development corridor/footprint, while five are located outside the development footprint but within the development corridor. Should amendments to the project's development footprint be required during further detailed design, direct impacts to identified heritage items within the development corridor will be avoided to the extent possible.
- Indirect impacts, including changes to the way sites are visually experienced due to the placement of infrastructure, and potential vibration impacts from construction activities close to a site.

A summary of the direct and indirect impacts to identified heritage sites is provided in Table 6.19.

Table 6.19 **Potential impacts to identified historical heritage sites**

ID	Site name and description	Indicative site photo	Significance	Within development footprint	Within development corridor	Potential impacts
DEHW001	Goolgumbbla Station – head station for the Goolgumbbla Run, well established by 1881. The property consists of a main house, garden, various outbuildings, sheds, timber stockyards, and other farming buildings. Some structures have been modified, reconfigured or extended, including the installation of a swimming pool and repainting and reflooring of some structures.		Local	No	Yes	No direct impacts. Low indirect impacts from change to visual aesthetics. Negligible indirect impacts from vibration.
DEHW002	Shearers quarters – early twentieth century shearers quarters located north of the Goolgumbbla homestead. Comprising three early twentieth century structures and one later addition, connected by sandstock brick paving in a running bond pattern. Exhibits early twentieth century construction techniques with subsequent renovations, additions, and extensions.		Local	No	Yes	No direct impacts. Negligible indirect impacts from vibration.

Table 6.19 **Potential impacts to identified historical heritage sites**

ID	Site name and description	Indicative site photo	Significance	Within development footprint	Within development corridor	Potential impacts
DEHW003	Surveyor's tree – a native tree positioned at true north, featuring a non-Aboriginal scar marked with the inscription "BM FH 445."		Local	No	Yes	No direct impacts. Negligible indirect impacts from vibration.
DEHW004	Hawk's Nest – established in the twentieth century, constitutes a farming complex with original cottage now in a state of disrepair. Among the notable features are milk sheds, a chicken shed, windmill, tank stand, grain shed, shearing shed, machinery shed, stockyards, shearing quarters, drenching station, and a stock loading ramp. A recent residence has been built and is currently inhabited.		Local	No	No	No direct impacts. Negligible indirect impacts from vibration.

Table 6.19 **Potential impacts to identified historical heritage sites**

ID	Site name and description	Indicative site photo	Significance	Within development footprint	Within development corridor	Potential impacts
DEHW005	Spring Plains homestead ruins – significant scattering of fragmented red sandstock bricks, some with remnants of lime mortar and paint, including a few intact examples. To the east, remnants of a chicken coop were evident, featuring chicken wire, timber posts, and metal components. To the west, a small, brick ruin bonded with sandy cement mortar was found in situ, along with possible stack bond brick paving. Peppercorn trees formed a circular pattern around the homestead ruins. A deep depression to the south served as a scrap yard, containing remnants of old vehicles, glass bottles, ceramic fragments, marbles, clay pipe stems, scrap metal, and other discarded items. Aboriginal artefacts were also discovered on site. Other artefacts include scattered scrap metal and timber scattered across the site, potentially indicating previous structures or debris. The southern area appeared heavily disturbed due to rabbit warrens and the nature of the scrapyard, which served as a dumping ground for more modern discarded materials, making it unlikely to contain secure deposits. No evidence of the grave mentioned in archival research was found on site.		Local	No	Yes	No direct impacts. Negligible indirect impacts from vibration.

Table 6.19 **Potential impacts to identified historical heritage sites**

ID	Site name and description	Indicative site photo	Significance	Within development footprint	Within development corridor	Potential impacts
DEHW006	'Old' hut – scatter of artefacts, including timber, glass, and ceramic fragments, found near the location of an annotated hut in historic plans indicating that the hut likely stood in this vicinity. However, there is no foundational evidence of the hut or its remains in the area, suggesting that it may have been demolished or destroyed due to abandonment.		Local	No	No	No direct impacts. Negligible indirect impacts from vibration.
DEHW007	House, shed, garden, stockyard and tank – stand of peppercorn trees identified near the location of the annotated features in historical maps and plans. However, no structural evidence or artefacts were found in the georeferenced area or its surroundings.		Local	No	Yes	No direct impacts. Negligible indirect impacts from vibration.

Table 6.19 **Potential impacts to identified historical heritage sites**

ID	Site name and description	Indicative site photo	Significance	Within development footprint	Within development corridor	Potential impacts
DEHW008	A native tree featuring a scar potentially of Aboriginal origin, marked with the inscription 'BM 38'. This site is identified in the ACHA as part of DEHW-OA4.		Local	No	No	No direct impacts. Negligible indirect impacts from vibration. Negligible indirect impacts from change to visual aesthetics.

There will be no direct impacts to the eight historical heritage sites within the project area. Indirect impacts are predicted to be low to negligible. The cultural landscape will experience unavoidable indirect visual impacts from the project as it will diminish the rural character of the landscape. However, the likely magnitude of these impacts is expected to be low as the project will modify the landscape rather than destroy it. Impacts to the landscape and visual character of the project area are described in Section 6.1.

Should amendments to the project's development footprint be required during further detailed design, direct impacts to identified heritage items within the development corridor will be avoided to the extent possible. Management measures for DEHW001 and DEHW003 have been provided if impacts to these sites cannot be avoided following detailed design.

6.5.5 Mitigation measures

Proposed measures to manage and mitigate potential historical heritage impacts are outlined in Table 6.20.

Table 6.20 Historical heritage mitigation and management measures

ID	Management measures
HH1	The project's construction environmental management plan (CEMP) will provide the following to mitigate risks to heritage items during construction: • list of identified heritage sites • site-specific management measures outlined in mitigation measure HH2 (including clearly defined responsibilities and actions) • an unexpected finds protocol • heritage awareness and management training as part of the induction process • management measures to be implemented if there will be impacts to heritage items due to changes to the development footprint.
HH2	DEHW003, DEHW005 and DEHW008 will be clearly demarcated with markers and signage. Construction personnel will be informed of any restrictions regarding DEHW003, DEHW005 and DEHW008, before commencing work near these sites.
HH3	If the development footprint is amended in proximity of DEHW001 and impacts to the ram shed and stockyards cannot be avoided, archival recording of the site will be required prior to impacts occurring.
HH4	If the development footprint is amended in proximity of DEHW003 and impacts cannot be avoided, archival recording of the site will be required prior to impacts occurring. Subject to the easement requirements of the transmission line, Spark Renewables should consult with an arborist to determine whether the tree can be partially removed (i.e. maintained in situ below any height limitations for vegetation within the easement), whilst avoiding impacting the marking on the tree or its longevity.

6.5.6 Conclusion

A total of eight historical heritage sites of local significance have been identified in the project area. While all sites are outside the development footprint, five sites are intersected by the development corridor.

Direct impacts to all identified heritage sites within the development corridor will be avoided. Indirect impacts are predicted to be low to negligible. There will be a low adverse effect on the broader cultural landscape due to the placement of project infrastructure in a predominantly rural landscape.

Should amendments to the project's development footprint be required during further detailed design, direct impacts to identified heritage items within the development corridor will be avoided to the extent possible. Management measures for two sites have been provided if impacts to these sites cannot be avoided following detailed design.

6.6 Transport

6.6.1 Introduction

A traffic impact assessment was prepared by EMM in accordance with the requirements of the NSW Government's *Guide to Traffic Generating Developments* (RTA 2002) and is provided in Appendix E.6. The relevant requirements of the SEARs and how they are addressed, are summarised in Table 2.1 of Appendix E.6.

6.6.2 Existing environment

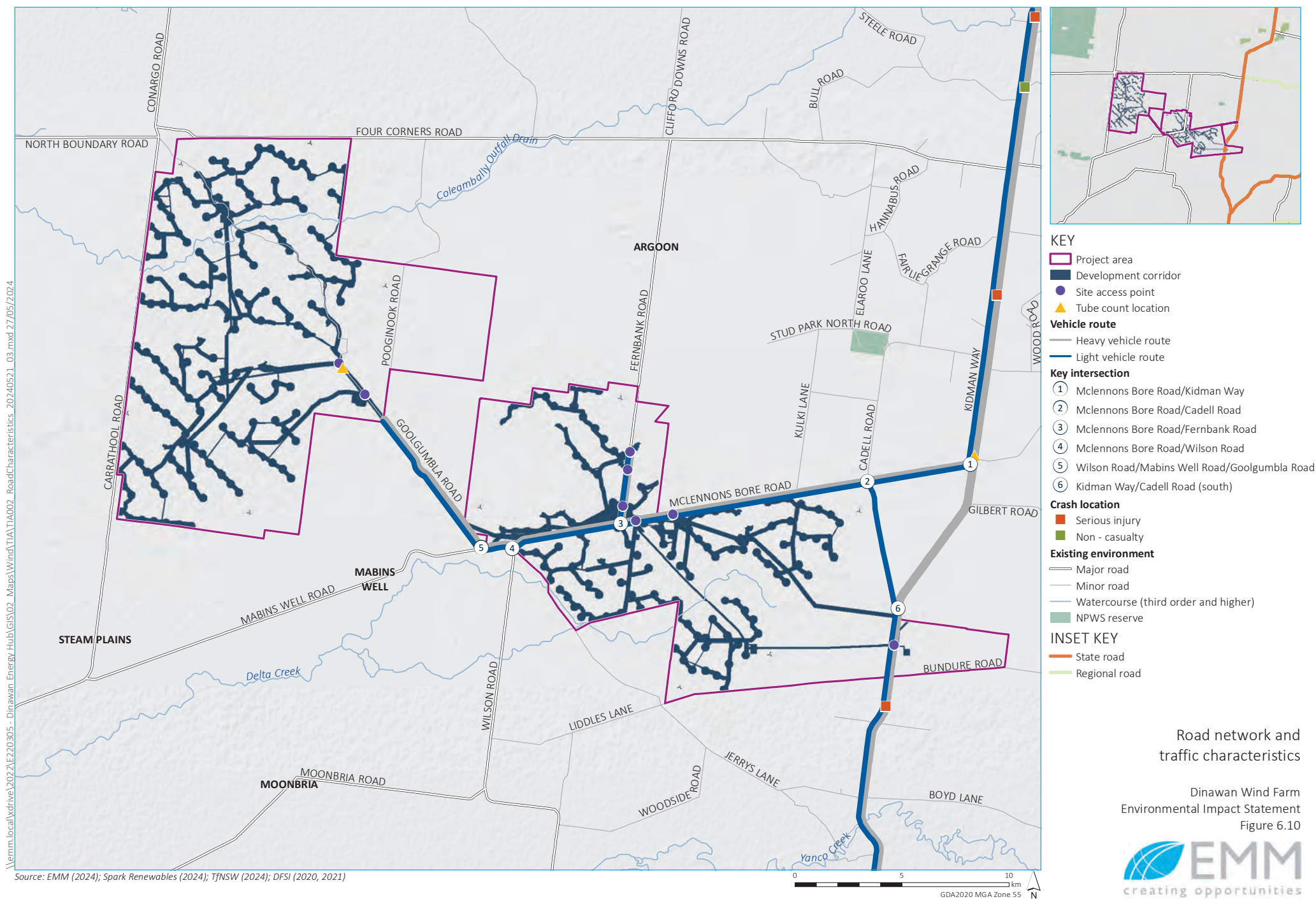
i Road network and site access

The local road network and site access points are shown on Figure 6.10. Key roads in the vicinity of the project are:

- Kidman Way – a sealed State road between Bourke to the north and Newell Highway, near Jerilderie, to the south with one lane in each direction. Kidman Way carries regional and local traffic with a speed limit of 100 kilometres per hour (km/h). Kidman Way is approved for use by large heavy vehicles, including 25/26 m long B-doubles and 36.5 m long road trains. TfNSW is the relevant road authority for Kidman Way.
- Cadell Road – a sealed local road with no marked lanes between Kidman Way, Coleambally (north) and Kidman Way, Bundure (south). Cadell Road carries local traffic with a speed limit of 100 km/h. Cadell Road is approved for use by large heavy vehicles, including 25/26 m long B-doubles and 36.5 m long road trains between 1 November and 30 May. Murrumbidgee Council is the relevant road authority for Cadell Road.
- McLennons Bore Road – an unsealed local road with no marked lanes between Kidman Way (east) and Wilson Road (west). McLennons Bore Road carries local traffic with a speed limit of 100 km/h. McLennons Bore Road is approved for use by large heavy vehicles, including 25/26 m long B-doubles and 36.5 m long road trains between 1 November and 30 May. Murrumbidgee Council is the relevant road authority for McLennons Bore Road.
- Fernbank Road – an unsealed local road with no marked lanes between McLennons Bore Road (south) and Four Corners Road (north). Fernbank Road carries local traffic with a speed limit of 100 km/h. Murrumbidgee Council is the relevant road authority for Fernbank Road.
- Wilson Road – an unsealed local road with no marked lanes between Goolgumbla Road (north) and Bolton Street (south). Wilson Road carries local traffic with a speed limit of 100 km/h. Murrumbidgee Council is the relevant road authority for Wilson Road.
- Goolgumbla Road – an unsealed local road with no marked lanes between Wilson Road (south) and Goolgumbla Station (north). Goolgumbla Road carries local traffic with a posted speed limit of 100 km/h. Edward River Council is the relevant road authority for Goolgumbla Road.

Road upgrades are proposed to enhance the suitability of these roads for heavy and OSOM vehicles (Table 6.23).

There are no railway lines, trains stations, level crossings or other railway facilities within or adjacent to the project area.



Source: EMM (2024); Spark Renewables (2024); TfNSW (2024); DFSI (2020, 2021)

Parcels of Crown land and travelling stock reserves have been identified along sections of McLennons Bore Road, Fernbank Road and Wilson Road (Figure 2.3) that will be used by project-related traffic. Consultation with DPHI's Crown Lands (Griffith and Hay District Office) about potential impacts on Crown land and travelling stock reserves is ongoing.

ii Existing traffic volumes

Tube count traffic surveys were undertaken on Kidman Way and Goolgumbra Road for a seven-day period between 14 February 2024 and 21 February 2024 to determine existing traffic volumes. Existing traffic volumes on Kidman Way (bi-directionally) are around 860 vehicles per day, with approximately 45% heavy vehicles. Existing traffic volumes on Goolgumbra Road are around nine vehicles per day with no heavy vehicles recorded.

Key intersections (Figure 6.10) that will be affected by project-related traffic were surveyed on 15 February 2024 (Section 3.3.1 of Appendix E.6). The morning (AM) and afternoon (PM) peak hours observed at each intersection were varied. Baseline AM and PM peak hour intersection traffic volumes are shown in Figure 6.11 and Figure 6.12. A 1.6% annual growth rate was applied to calculate future baseline traffic volumes.

iii Road safety

Crash data between 2018 and 2022 indicates that there were five non-fatal crashes within the vicinity of the project (Figure 6.10), all on Kidman Way. This crash rate is considered low and indicates that the road currently can be considered to be safe.

iv Public transport, school zones, school buses, pedestrians and cyclists

There are generally no public transport and pedestrian facilities in the vicinity of the project due to the rural nature of the area. A daily V-line bus service travels on Kidman Way in both directions between Jerilderie and Coleambally. Several school bus services also travel on Kidman Way in both directions. No bus stops or school zones have been identified in the vicinity of the project area.

There are no formal parking facilities in the vicinity of the project due to the rural nature of the area.

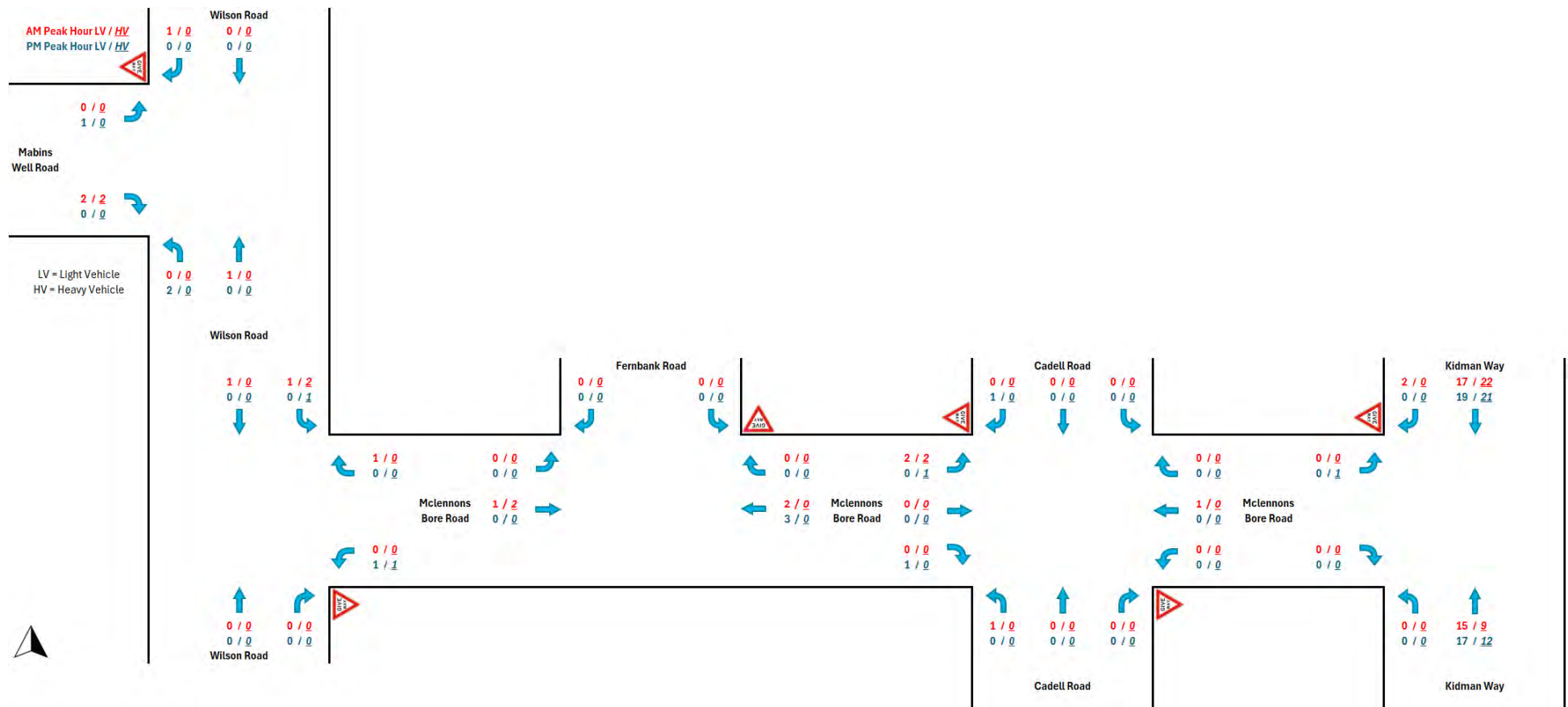


Figure 6.11 Baseline AM and PM peak hour intersection traffic volumes (north)

Note: Wilson Road becomes Goolgumbra Road approximately 1.7 km north of the Wilson Road and Mabins Well Road intersection

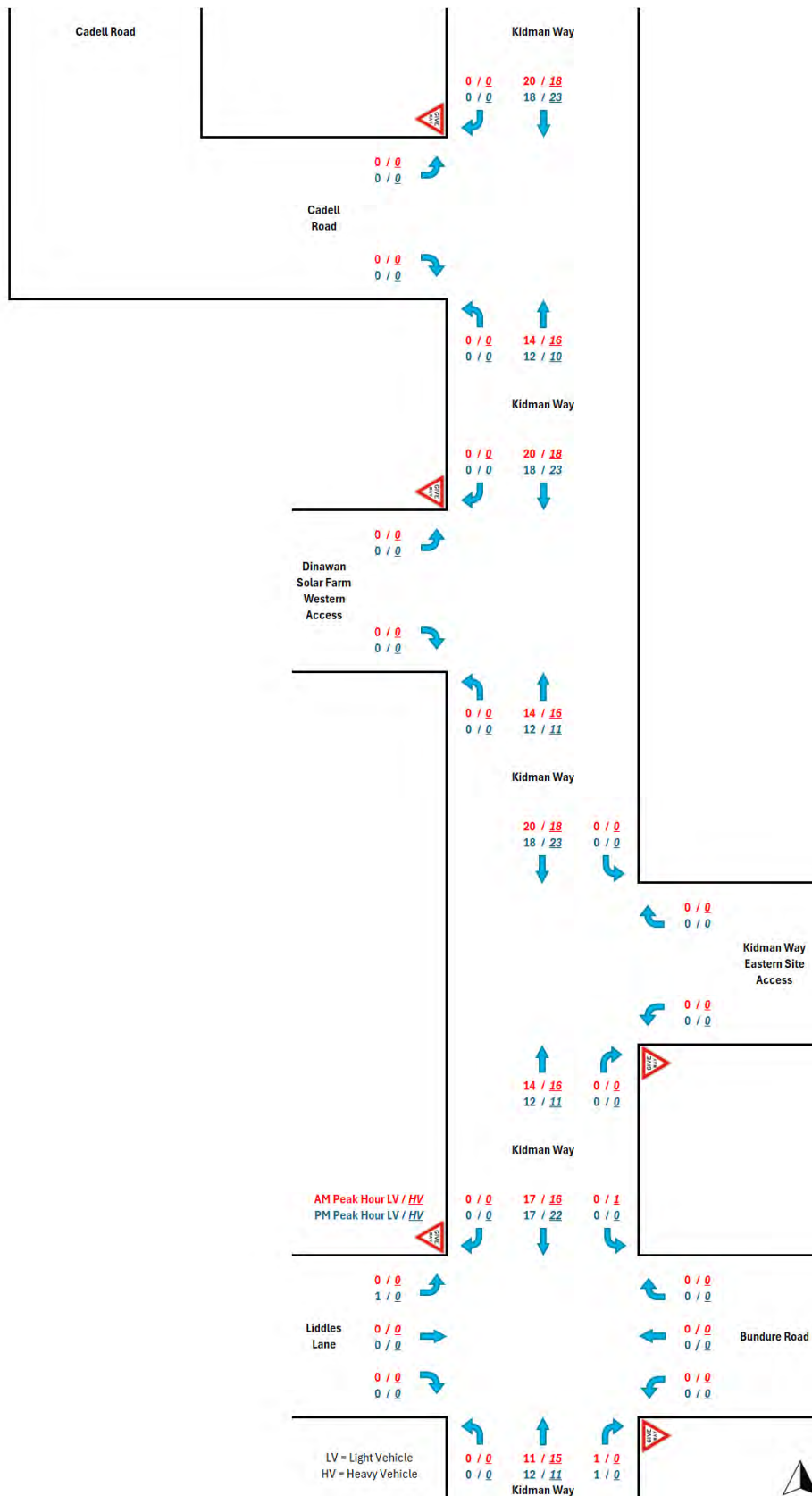


Figure 6.12 Baseline AM and PM peak hour intersection traffic volumes (south)

6.6.3 Potential impacts

i Site access points

Eight site access points to the from public roads are proposed to provide access to the project area during construction and operation (Figure 6.10):

- **Kidman Way** (Kidman Way Eastern Site Access) – one site access point is proposed from Kidman Way approximately 1.7 km south of Cadell Road. This will be used to access the accommodation facility.
- **McLennons Bore Road** – two site access points are proposed from McLennons Bore Road approximately 14 km and 16 km west of Kidman Way. These will be used to access the eastern area. Vehicles using these access points will travel along Kidman Way, Cadell Road (south) (light vehicles and shuttle buses only) and McLennons Bore Road.
- **Fernbank Road** – three site access points are proposed from Fernbank Road approximately 0.8 km, 2.5 km and 3.3 km north of McLennons Bore Road. These will be used for access to the eastern area. Vehicles using these access points will travel along Kidman Way, Cadell Road (south) (light vehicles and shuttle buses only), McLennons Bore Road and Fernbank Road.
- **Goolgumbra Road** – two site access points are proposed from Goolgumbra Road approximately 9 km and 11 km north of Mabens Well Road. These will be used for access to the western area, including the accommodation facility. Vehicles using these access points will travel along Kidman Way, Cadell Road (south), McLennons Bore Road, Wilson Road and Goolgumbra Road.

ii Traffic generation and distribution

Construction traffic for the project will consist of:

- light vehicles and shuttle buses transporting construction staff
- heavy vehicles (up to 36.5 m long) for construction activities to transport construction materials (including water, sand and aggregate), construction plant and equipment, and project components to the development footprint
- OSOM vehicles for deliveries of WTG components, power transformers and other large equipment.

Traffic distribution for light and heavy vehicles going to/from the development footprint during construction is likely to comprise the following:

- Traffic from the local workforce that are not staying in one of the accommodation facilities – traffic may come from Griffith or Coleambally, to the north, or from Jerilderie or Deniliquin, to the south.
- Regional light and heavy vehicle traffic – traffic coming from the east via Narrandera or Wagga Wagga will travel west on Sturt Highway then turn south on Kidman Way, while traffic coming from the south on Newell Highway will turn north on Kidman Way.

Two peak construction traffic scenarios were assessed:

- Month 15 (Stage 1) – initial peak construction, with construction activities occurring within the eastern area, with access via the Kidman Way (predominantly accommodation facility traffic), McLennons Bore Road and Fernbank Road site access points.
- Month 37 (Stage 2) – a second construction peak, with construction activities occurring within the western area, with access via the Goolgumbbla Road site access points.

These assumed a traffic distribution of 50% to/from the north, and 50% to/from the south, on Kidman Way for light and heavy vehicles (excluding OSOM vehicles).

The assumed number of peak hour light vehicle and shuttle bus movements for month 15 and month 37 are highly conservative as it is likely that all light vehicles (including shuttle buses) will arrive and depart outside of the AM and PM peaks given the proposed construction hours.

The use of the accommodation facilities will minimise private vehicle trips and result in a lower increase in traffic volumes on the road network than if all workers were accommodated off-site throughout the region.

a Construction month 15 (Stage 1)

For month 15, it was assumed that approximately 75% of the peak construction workforce of 600 people will reside in the accommodation facility east of Kidman Way and that shuttle buses will be used to transport 450 workers residing in the accommodation facility to and from their active work areas, with the remaining 150 workers driving to and from the development footprint from other locations in the region.

The estimated daily traffic movements and peak hour movements for month 15 are shown in Table 6.21.

Table 6.21 Estimated daily and peak hourly construction trips – month 15

Vehicle type	Daily		Peak hour ²	
	Trips ¹	Movements	Peak AM movements	Peak PM movements
Light vehicles (excluding shuttle buses) ³	153	306	153	153
Heavy vehicles	88	176	18	18
Shuttle bus (classified as light vehicles)	78	156	78	78
Total	319	638	249	249

1. A 'trip' is defined as a vehicle entering the site once (1 movement) and a vehicle exiting the site once (1 movement).
2. Light vehicle and shuttle bus movements have been conservatively assumed to be incoming during morning peak and outgoing during evening peak hours.
3. For the purposes of the traffic assessment, it was conservatively assumed that the peak construction workforce will be 610 people, contributing to 153 daily light vehicles from the project's local workforce.

The expected distributions of light and heavy vehicle traffic accessing the development footprint during construction month 15 are shown in Figure 6.13.



Source: SIX Maps

Note: The project's Stage 1 construction traffic could access any of the site access points proposed on McLennons Bore Road and Fernbank Road; however, it was conservatively assumed that all vehicles would turn onto Fernbank Road.

Figure 6.13 Road network and site access traffic distribution – month 15

The peak hour construction traffic volume for month 15 have been combined with baseline traffic volume to estimate the total traffic volumes, see Figure 4.5 of Appendix E.6.

The impacts of these traffic volumes are described below.

b Construction month 37 (Stage 2)

For month 37, it was assumed that approximately 75% of the peak construction workforce of 600 people will reside in the accommodation facility west of Goolgumbula Road and that shuttle buses will be used to transport 450 workers residing in the accommodation facility to and from their active work areas via internal access tracks, with the remaining 150 workers driving to and from the development footprint from other locations in the region.

The estimated daily traffic movements and peak hour movements for month 37 are shown in Table 6.22.

Table 6.22 Estimated daily and peak hourly construction trips – month 37

Peak construction stage	Daily		Peak hour ²	
	Trips	Movements	Peak AM movements	Peak PM movements
Light vehicles ¹	153	306	153	153
Heavy vehicles	100	200	20	20
Total	253	506	173	173

1. Light vehicle movements have been conservatively assumed to be incoming during morning peak and outgoing during evening peak hours.

The expected distribution of light and heavy vehicle traffic accessing the development footprint during month 37 is shown in Figure 6.14. No shuttle bus route is shown as shuttle buses will use internal access tracks to transport workers from the accommodation facility to their active work areas and will not use the local road network.



Figure 6.14 Road network and site access traffic distribution – month 37

The peak hour construction traffic volumes for month 37 have been combined with baseline traffic volumes to estimate the total traffic volumes, see Figure 4.6 of Appendix E.6.

The impacts of these traffic volumes are described below.

c Construction oversize overmass vehicle movements

The origins of heavy and OSOM vehicles will be confirmed during detailed design; however, it is anticipated that major WTG components and power transformers will come from Port of Newcastle. Two potential OSOM vehicle routes from Port of Newcastle to the project area have been assessed:

- Option 1 – suitable for OSOM vehicles with a loaded height of up to 5 m and load length of up to 100 m (Figure 6.15)
- Option 2 – suitable for OSOM vehicles with a loaded height of up to 5.9 m and load length of up to 55 m (Figure 6.16).

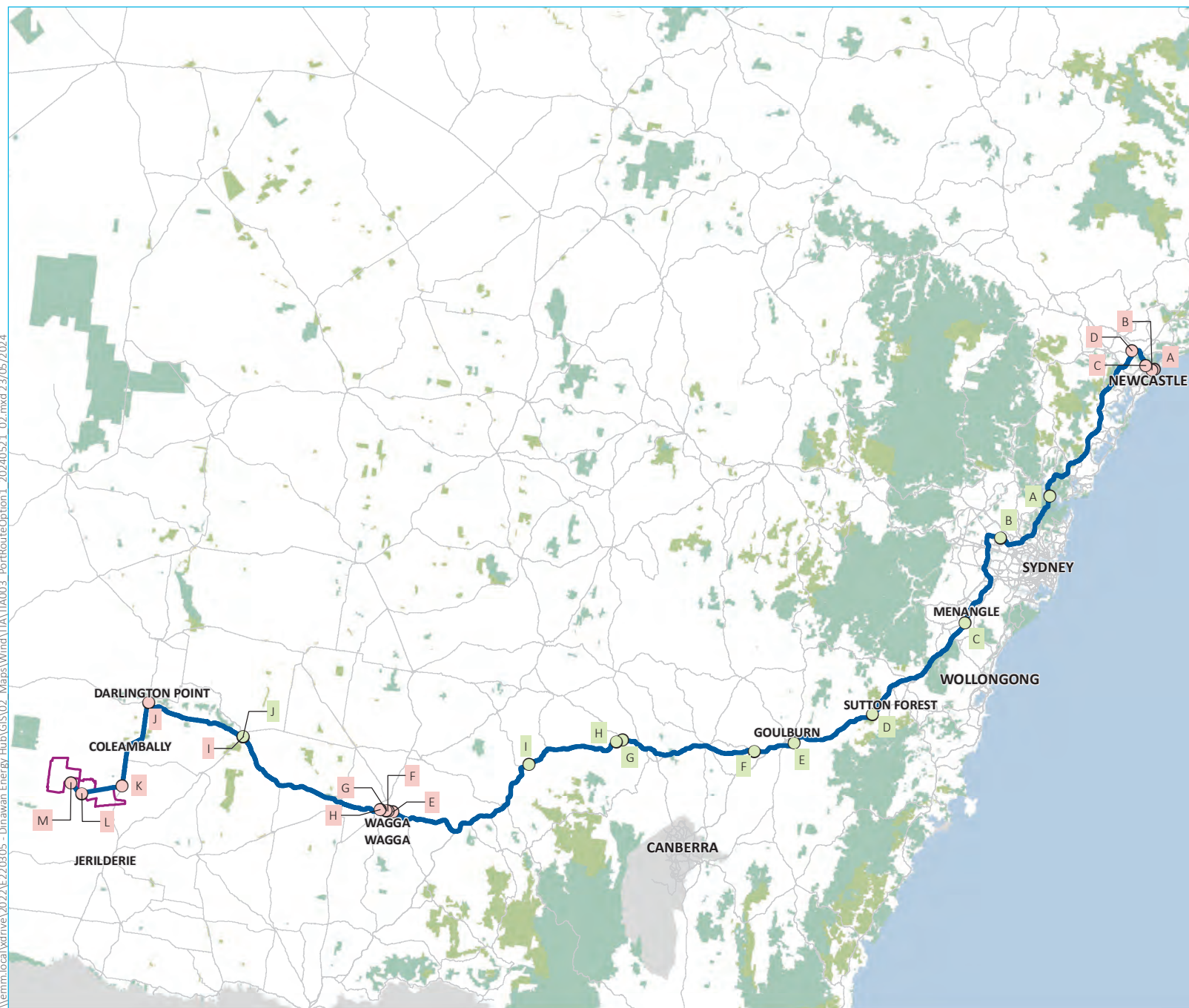
Parking areas that can accommodate OSOM vehicles have been identified along the assessed routes and are labelled on Figure 6.15 (Option 1) and Figure 6.16 (Option 2).

The OSOM vehicle route assessment (Attachment E of Appendix E.6) identified deficiencies in the existing road network that would need to be addressed prior to being used by the project's OSOM vehicles. These deficiencies are labelled on Figure 6.15 (Option 1) and Figure 6.16 (Option 2). Works in the immediate vicinity of the project that are proposed to be completed as part of the project are identified in Table 6.23. Other works will be subject to further consultation with DPHI, EnergyCo and TfNSW.

It is estimated that there will be a total of 2,884 OSOM loads over the life of the project.

During the peak construction months, it is anticipated that there will be approximately 104 OSOM loads.

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OSOM route from Port of Newcastle to the project area - Option 1

OSOM route from Port of Newcastle to the project area - Option 1

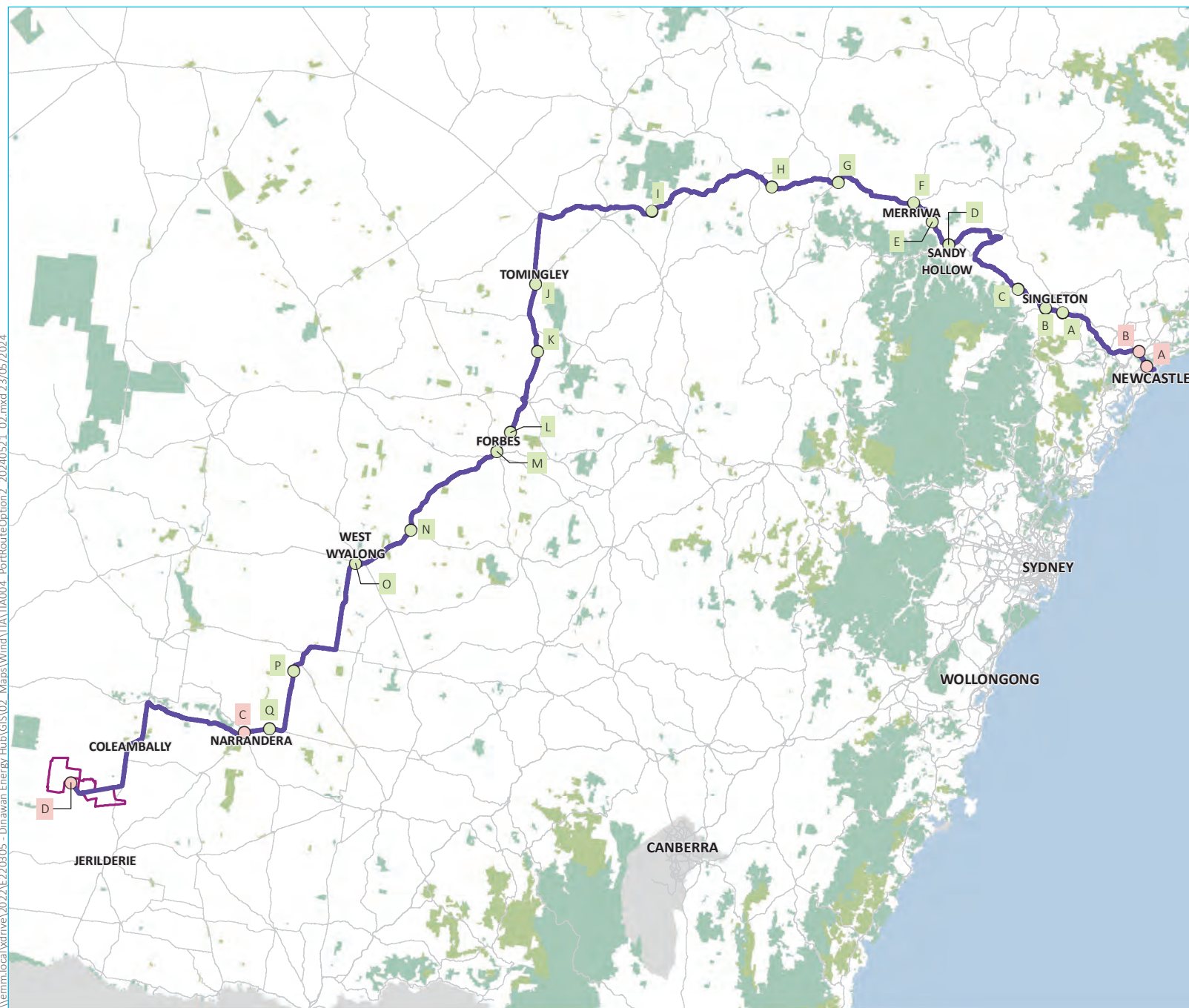
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Figure 6.15



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021)



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- KEY**
- Project area
 - OSOM route from Port of Newcastle to the project area - option 2
 - Potential parking area
 - Existing road network deficiencies
- Existing environment**
- Major road
 - NPWS reserve
 - State forest

OSOM route from Port of Newcastle to the project area - Option 2

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.16



Source: EMM (2024); Spark Renewables (2024); DFSI (2020, 2021)

0 50 100 km
GDA2020 MGA Zone 55

d Operation and decommissioning

During operation, it is expected that there will be 102 inbound and 102 outbound movements per day, comprising:

- approximately 50 light vehicles per day (each undertaking two inbound and two outbound movements)
- approximately two heavy vehicles per day on an as-needed-basis (each undertaking one inbound and one outbound movement).

Additional heavy vehicle movements may be required during maintenance activities.

The majority of traffic will utilise the site access points on McLennons Bore Road, Fernbank Road and Goolgumbra Road; however, access may be required via Kidman Way for maintenance activities.

During decommissioning, traffic generation is predicted to be less than half of the peak daily traffic volumes generated by construction. These vehicles will be used to transport equipment away from site.

As operational and decommissioning traffic volumes will be significantly less than the project's construction traffic, the impacts on the road network are expected to be lower than during construction.

iii Intersection performance

The Kidman Way/McLennons Bore Road intersection, the Kidman Way/Cadell Road (south) intersection and the proposed new site access intersection on Kidman Way have been modelled using the SIDRA Intersection 9.1 software.

Intersections west of Kidman Way that will be utilised by project-related traffic have not been modelled due to the low volumes of baseline traffic recorded during intersection surveys.

The key intersection performance indicator is Level of service (LOS), a categorisation of average delay, intended for simple reference. For a priority-controlled intersection, the LOS is based on the delay experienced on the worst approach and turning movement. The LOS is categorised from A to F, with A representing the best operating conditions and F the worst.

The SIDRA modelling assessed intersection performance in the peak AM and PM periods. The modelling analysed scenarios including baseline traffic volumes, baseline plus construction traffic volumes, and a combination of baseline plus construction traffic as well as cumulative traffic volumes from surrounding developments. The scenarios are described in the traffic impact assessment (Appendix E.6).

The modelling predicts that all intersections will continue to perform satisfactorily, with LOS A or B for all scenarios, including when the project and cumulative traffic volumes are added.

Any queues from right turning traffic from Kidman Way onto McLennons Bore Road will not impede through traffic on Kidman Way. Overall, all intersections will have significant spare capacity to accommodate the additional traffic volumes from the project and cumulative projects.

iv Mid-block capacity analysis

Mid-block capacity is a measure of the quality of traffic service along a section of road, as opposed to at an intersection. At low traffic volumes and under ideal conditions, drivers are able to travel at their desired speed within the speed limit without interference. As traffic volumes increase, and as roadway, terrain and traffic conditions become less than ideal, drivers are affected by the presence of other vehicles on the road and bunches form in the traffic stream.

The mid-block capacities of Kidman Way and McLennons Bore Road were assessed as these roads are part of the access route for all vehicles travelling to and from the development footprint. The assessment was based on peak hour traffic volumes. Other local roads that will be used to access the project were not assessed due to the low baseline traffic volumes.

For the peak construction periods (month 15 and month 37), the mid-block capacity of Kidman Way and McLennons Bore Road are expected to operate at either LOS A or B, an acceptable level of service.

v Road design and intersection standards

Road width design standards for low volume roads are defined by the *Guide to Road Design Part 3: Geometric Design* (Austroads 2016) for sealed roads and *Unsealed Roads Best Practice Guide* (ARRB 2020) for unsealed roads. Road width standards ensure safety and consistency for road users. The standards are based on daily traffic volumes.

The road widths of key roads listed in Section 6.6.2i were compared to road design standards for baseline traffic volumes and future traffic volumes. This found that parts of the proposed access route do not meet the minimum compliance criteria from Austroads and ARRB guidelines for the current traffic volumes.

Kidman Way is currently an 8 m wide sealed road with 1 m wide unsealed shoulder on both sides. Based on existing traffic volumes, Kidman Way requires upgrading to a 9 m wide sealed road with a 1 m wide unsealed shoulder on both sides to comply with the Austroads (2021) standard.

Given the project's construction activity is temporary, the current configuration of Kidman Way is considered to be satisfactory. Where intersections are proposed to be upgraded along Kidman Way, road width will be provided in accordance with relevant Austroads standards.

With the addition of the project's construction traffic, Cadell Road requires upgrading to a 7.2 m wide sealed road with a 1 m wide unsealed shoulder on both sides to comply with the Austroads (2021) standard. Only light vehicles (including shuttle buses) will use the southern portion of Cadell Road, south of McLennons Bore Road. No heavy vehicle movements are proposed on Cadell Road. Combined with the temporary nature of the project's construction, the existing road width is considered satisfactory.

The sections of McLennons Bore Road, Fernbank Road, Wilson Road and Goolgumbra Road that will be used by project-related traffic will be upgraded to meet the minimum 7 m unsealed road width requirements in the *Unsealed Roads Best Practice Guide* (ARRB 2020).

vi Oversize overmass and heavy vehicle swept paths

Swept paths for the longest heavy vehicle and longest OSOM vehicle that will use the access points along McLennons Bore Road and Fernbank Road have been assessed (Attachment D of Appendix E.6). Swept paths have also been assessed for OSOM vehicles travelling through the intersections of Kidman Way/McLennons Bore Road, McLennons Bore Road/Fernbank Road and McLennons Bore Road/Wilson Road (Attachment E of Appendix E.6). Swept paths for vehicles travelling via the new site access intersection on Kidman Way have been assessed as part of the Dinawan Solar Farm (SSD- 50725959) and will be considered as part of the preparation of the design for this intersection.

The swept paths were used to identify the road and intersection upgrades required to facilitate heavy and OSOM vehicle access to the development footprint.

Sight lines, the distance a driver can see along a length of road, at intersections are a prime road safety consideration. The *Guide to Road Design Part 4A (Unsignalised and Signalised Intersections)* (Austroads 2017b) outlines the minimum sight line distances for intersections to ensure road users have adequate awareness of other road users. For a road with a 110 km/h design speed (10 km/h faster than the posted speed limit), the minimum safe intersection sight distance required for a general 2.5 second driver reaction time is 300 m.

Sight lines were assessed at the existing intersections between Kidman Way and the site access points that will be used by project traffic. This determined the following:

- Sight line distances meet the minimum requirement of 300 m at the intersections of Kidman Way/McLennons Bore Road, Kidman Way/Cadell Road (south), McLennons Bore Road/Fernbank Road and the new site access intersection on Kidman Way.
- Sight line distances at the Cadell Road/McLennons Bore Road intersection do not meet the minimum sight distance requirement due to the geometry of Cadell Road and density of roadside vegetation along Cadell Road. The sight line distance could be improved by trimming vegetation that is obscuring sight lines. Alternatively, truck warning signage could be installed on both approaches to the intersection.

McLennons Bore Road has a straight and flat alignment, so there are not anticipated to be any sight distance issues for vehicles waiting to turn left or right onto McLennons Bore Road or continue straight through the intersection on Cadell Road. Therefore as an alternative to trimming the vegetation or installing truck warning signage, traffic on McLennons Bore Road could be given priority at the intersection, with Cadell Road traffic required to give way to vehicles on McLennons Bore Road. Spark Renewables is consulting with Murrumbidgee Council about potential modifications at this intersection to improve road safety for all road users.

- Sight line distances at the intersection of Wilson Road/McLennons Bore Road do not meet the minimum sight distance requirements due to the geometry of Wilson Road and density of roadside vegetation. Truck entry warning signage will be provided on Wilson Road in both directions from the Wilson Road/McLennons Bore Road intersection to address the potential hazard created by insufficient sight distance at this intersection.

viii Public transport, school zones, school buses, pedestrians and cyclists

No impacts to public transport, school zones, school buses, pedestrian or cycling routes are predicted.

Car parking and accommodation will be provided on-site during construction. Shuttle buses will transport workers from the accommodation facility to their active work area during construction.

ix Cumulative construction traffic impacts

Cumulative construction traffic impacts with surrounding development are discussed in Section 6.15.

6.6.4 Mitigation measures

The proposed intersection and road upgrades for the project are provided in Table 6.23. Road upgrades will be completed as part of early works for Stage 1 and for Stage 2 as listed in Table 6.23 (i.e. upgrades for Stage 2 only will not be completed until commencement of early works for Stage 2).

The WTG model selected will determine the exact dimensions of components requiring transport and the design of the road upgrades needed between the Port of Newcastle and the site access points. A decision on the project's OSOM route is subject to further consultation with relevant road authorities (including TfNSW and local councils) and with EnergyCo. Applications for OSOM transport will be made to the National Heavy Vehicle Regulator (NHVR) based on the finalised routes.

Table 6.23 **Schedule of road upgrades**

Road	Proposed upgrade	Relevant stage(s)	Description
Kidman Way/site access intersection	New intersection	Stage 1	- A dedicated turning bay for left turning vehicles from Kidman Way. - Intersection upgrades to accommodate a 26 m long truck and to allow the passage of the largest OSOM vehicle.
Kidman Way/McLennons Bore Road intersection	Upgrade of existing intersection	Stage 1 Stage 2	- A widened shoulder for left turning vehicles and a dedicated turning bay for right turning vehicles from Kidman Way. - Intersection upgrades to accommodate a 36.5 m long truck and to allow the passage of the largest OSOM vehicle.
Kidman Way/Cadell Road (south) intersection	Upgrade of existing intersection	Stage 1 Stage 2	- A dedicated turning bay for left turning vehicles and a widened shoulder for right turning vehicles from Kidman Way. - Subject to outcomes of engagement with TfNSW and Murrumbidgee Council, an application to prohibit the right-turn from Kidman Way into Cadell Road (south) may be submitted.
McLennons Bore Road/Cadell Road intersection	Upgrade of existing intersection	Stage 1 Stage 2	- Intersection upgrades to accommodate a 36.5 m long truck and to allow the passage of the largest OSOM vehicle. - Subject to outcomes of engagement with Murrumbidgee Council, the major road priority at this intersection may change from Cadell Road to McLennons Bore Road. Give-way signage would be installed on Cadell Road on both the north and south approaches.
McLennons Bore Road	Road upgrade and widening	Stage 1 Stage 2	- Upgrade of dry weather road from Cadell Road to Kidman Way to an all-weather road and removal of existing signage relating to the use of this road during dry weather only. - Widening of unsealed road (where necessary) to cater for construction traffic (8 m trafficable width and 1 m unsealed shoulder on both sides, totalling 10 m wide unsealed carriageway or as otherwise agreed with Murrumbidgee Council).
McLennons Bore Road/site access intersections	New site access intersections	Stage 1	Construct intersection to suit 36.5 m long truck and to allow the passage of the largest OSOM vehicle.
McLennons Bore Road/Fernbank Road intersection	Upgrade of existing intersection	Stage 1	Intersection upgrades to accommodate a 36.5 m long truck and to allow the passage of the largest OSOM vehicle.
Fernbank Road	Road widening	Stage 1	Widening of the unsealed road between McLennons Bore Road and the site access points to cater for construction traffic (8 m trafficable width and 1 m unsealed shoulder on both sides, totalling 10 m wide unsealed carriageway or as otherwise agreed with Murrumbidgee Council).
Fernbank Road/site access intersections	New site access intersections	Stage 1	Construct intersection to suit 36.5 m long truck and to allow the passage of the largest OSOM vehicle.

Table 6.23 **Schedule of road upgrades**

Road	Proposed upgrade	Relevant stage(s)	Description
McLennons Bore Road/Wilson Road intersection	Upgrade of existing intersection	Stage 2	Intersection upgrades to accommodate a 36.5 m long truck and to allow the passage of the largest OSOM vehicle.
Wilson Road	Road widening	Stage 2	Widening of the unsealed road between McLennons Bore Road and Goolgumbra Road to cater for construction traffic (8 m trafficable width and 1 m unsealed shoulder on both sides, totalling 10 m wide unsealed carriageway or as otherwise agreed with Murrumbidgee Council).
Goolgumbra Road	Road widening	Stage 2	Widening of the unsealed road between Wilson Road and the site access points to cater for construction traffic (8 m trafficable width and 1 m unsealed shoulder on both sides, totalling 10 m wide unsealed carriageway or as otherwise agreed with Edward River Council).
Goolgumbra Road/site access intersections	New site access intersections	Stage 2	Construct intersection to suit 36.5 m long truck and to allow the passage of the largest OSOM vehicle.

A summary of traffic management and mitigation measures for construction are outlined in Table 6.24. These will be included in the Construction Traffic Management Plan (CTMP).

Table 6.24 **Transport mitigation measures – construction**

ID	Mitigation measure
T1	A detailed CTMP will be developed in consultation with TfNSW, Edward River Council and Murrumbidgee Council prior to the commencement of works.
T2	Roads and intersections will be constructed/upgraded in accordance with the schedule of road upgrades in Table 6.23.
T3	Upgrades and new intersections will be designed in consultation with the relevant road authority.
T4	Site access intersections on McLennons Bore Road, Fernbank Road and Goolgumbra Road will be constructed in accordance with the relevant council's Rural Property Access standard to the satisfaction of the road authority.
T5	Permits will be obtained from NHVR to allow 36.5 m long trucks and OSOM vehicles to use the road network as part of construction. Approval will be requested from Edward River Council and Murrumbidgee Council for 36.5 m long trucks to access McLennons Bore Road, Fernbank Road, Wilson Road and Goolgumbra Road (currently heavy vehicles up to 19 m long can use these roads throughout the year).
T6	Subject to agreement with Murrumbidgee Council, the major road priority at the McLennons Bore Road/Cadell Road intersection will change from Cadell Road to McLennons Bore Road. Give-way signage will be removed from McLennons Bore Road and installed on the north and south approaches on Cadell Road. Alternatively, if the major road priority cannot be changed, truck warning signage will be placed on Cadell Road to warn drivers of trucks passing through the McLennons Bore Road/Cadell Road intersection.
T7	Truck warning signage will be placed on Wilson Road to warn drivers of trucks turning at Wilson Road/McLennons Bore Road intersection.
T8	A dilapidation survey will be commissioned prior to the start of construction to assess the existing condition of the sections of McLennons Bore Road, Cadell Road (south), Fernbank Road, Wilson Road and Goolgumbra Road that will be used by vehicles associated with the project.
T9	A road maintenance strategy will be developed in consultation with Murrumbidgee Council and Edward River Council.

No specific traffic mitigation measures are proposed during operation as any material impacts will be addressed through the construction phase mitigation measures.

A decommissioning plan will be prepared prior to decommissioning to address transport issues at the time of decommissioning and will include road and traffic management measures.

6.6.5 Conclusion

The development footprint will be accessed from Kidman Way, McLennons Bore Road, Fernbank Road and Goolgumbra Road.

Construction vehicles will include light vehicles and shuttle buses transporting workers, and heavy vehicles delivering materials, project components and equipment.

At the peak of construction, 638 estimated daily and 249 peak hour vehicle movements are anticipated. Approximately 104 OSOM vehicles will be required per month, predominantly to deliver WTG components from the Port of Newcastle.

The level of service of key intersections and mid-block capacity on Kidman Way and McLennons Bore Road will not be adversely impacted. With the implementation of the proposed mitigation measures, no significant impacts to traffic flow or road safety are expected.

Road and intersection upgrades are proposed to accommodate construction traffic using the local road network. The new intersections at the site access points will be designed for the largest heavy vehicles and OSOM vehicles that will be accessing the development footprint.

During operation it is expected that there will be 102 inbound and 102 outbound vehicles movements per day. These will result in negligible transport impacts.

With the implementation of the proposed road upgrades and traffic management measures, no significant transport impacts are predicted during construction, operation or decommissioning.

6.7 Water

6.7.1 Introduction

A water resources assessment was prepared for the project by EMM and is provided in Appendix E.7. The water resources assessment considers potential impacts to both surface water and groundwater from the project in general accordance with relevant guidelines and legislation. A flood study was prepared as part of the water resources assessment and is provided in Attachment A of the water resources assessment (Appendix E.7). The relevant SEARs and how they are addressed are summarised in Section 1.2.2 of the water resources assessment (Appendix E.7).

6.7.2 Existing environment

i Surface water

The project is within the lower Murrumbidgee River catchment. The Murrumbidgee River flows in a south-westerly direction from its headwaters in Kosciuszko National Park to the Murray River and floodplains at the western end of the catchment, draining a total area of around 84,000 km².

The regional climate is characterised by hot dry summers and cold winters with annual potential evapotranspiration generally exceeding annual rainfall. This results in generally low surface water availability and watercourses that are typically ephemeral.

The project area is on a floodplain with minor drainage depressions that temporarily holding rainfall, with the water draining to the south-west. Several minor topographic depressions on the floodplain hold water for longer, creating scattered swamp environments.

The project area is north of Yanco Creek, a major perennial waterway with regulated offtake from the Murrumbidgee River. The major watercourses in the project area are Coleambally Irrigation Channel, Delta Creek and Coleambally Outfall Drain. Minor segments of Bublebundie Creek and Blind Creek traverse a portion of the western area of the project area. There are several ephemeral first and second order watercourses within the project area; in the eastern area these drain to Delta Creek, while in the western area they tend not to be permanently connected to a downstream channel.

The Coleambally Irrigation Channel and Coleambally Outfall Drain are within the project area (Figure 6.17). The project area also includes smaller scale irrigation infrastructure, owned and managed by landowners (e.g. channels and dams).

The Coleambally Irrigation Channel and Coleambally Outfall Drain are important water resources for agriculture in the region, servicing the Coleambally Irrigation Area that is located to the north-east of the project area. The Coleambally Irrigation Channel and Coleambally Outfall Drain are owned and operated by CICL as part of the system of open channels providing irrigation and drainage services to nearly 500 farms in the region.

Water quality in the region varies greatly across the catchment, with poor water quality mostly caused by alteration to natural flow regimes and land use. While there are no available water quality monitoring datasets for natural watercourses local to the project area, water quality is monitored in irrigation channels managed by CICL, including in Coleambally Outfall Drain. There are monitoring locations upstream and downstream of the project area.

CICL's public water quality data (2019–2022) for Coleambally Outfall Drain upstream of the project indicates that the channel is an ephemeral freshwater system with neutral pH, elevated turbidity/high total suspended solids concentrations, and elevated total nitrogen concentrations during flow events.

It is expected that Delta Creek and its tributaries are likely to exhibit poor water quality relative to default guideline values, reflective of farming and land management practices in the area and the substantial changes to natural flow regimes.

The project is within the Murray Darling Basin and subject to water resource plans (WRPs) that provide sustainable water diversion limits. Surface water resources for the project are within the Murrumbidgee Surface WRP area.

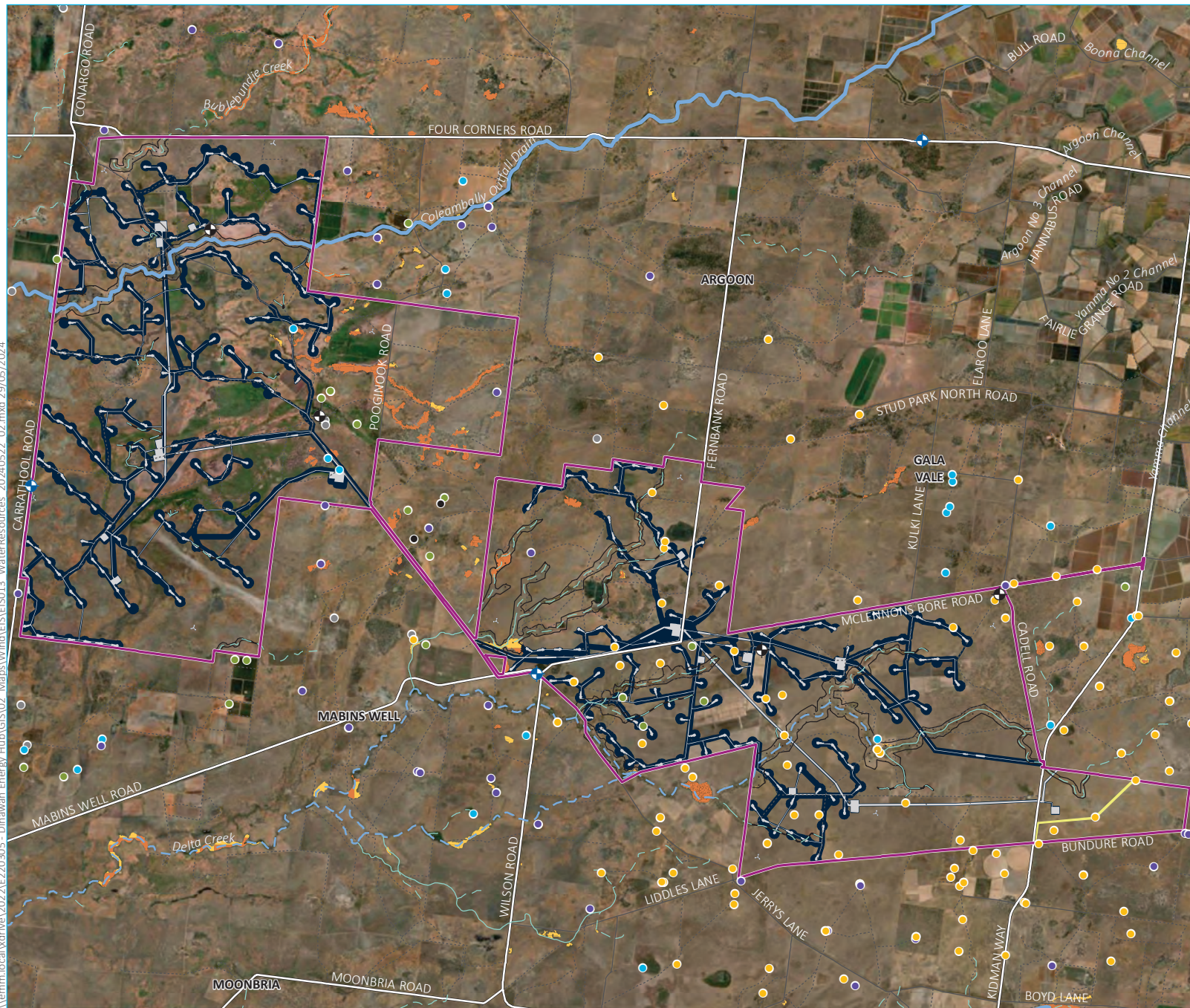
ii Flooding

A flood study by EMM (Attachment A of the water resources assessment in Appendix E.7) modelled the existing flooding conditions for the project area and surrounds. The flood modelling considered:

- annual exceedance probability (AEP) – the likely flood depth for a flood with a certain percentage chance of occurring in a year
- probable maximum flood (PMF) – the largest flood that could conceivably be expected to occur at a particular location, usually estimated from probable maximum precipitation.

Model results are provided in Figure 6.18.

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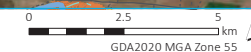
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - ⬮ Groundwater supply location for construction
 - ⬮ Registered telemetry bore
 - Registered groundwater bore
 - Exploration
 - Water supply
 - Irrigation
 - Monitoring
 - Stock and domestic
 - Unknown
 - Groundwater dependent ecosystem (GDE)
 - High value GDE
 - Medium value GDE
 - Strahler stream order
 - 1st order
 - 2nd order
 - 3rd order
 - 9th order
 - Existing environment**
 - Major road
 - Minor road
 - Vehicular track
 - Coleambally irrigation channel
 - Vegetated riparian zone (VRZ)

Water resources in the vicinity of the project

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.17



Source: EMM (2024); DFSI (2020, 2021); ESRI (2024); GA (2011); DPI (2013)



The project area is primarily affected by two flooding mechanisms:

- mainstream flooding sourced from the Murrumbidgee River (north of the project area) which may occur following heavy rainfall far upstream in the catchment or along river tributaries and not necessarily local to the project area
- local catchment flooding following heavy rainfall in the vicinity of the project area.

Modelled flood extents were larger when driven by local catchment mechanisms. Flood extents within the project area generally follow the alignment of watercourses, irrigation channels and minor depressions for events up to 0.5% AEP. For the PMF event, inundation occurs over much of the landscape.

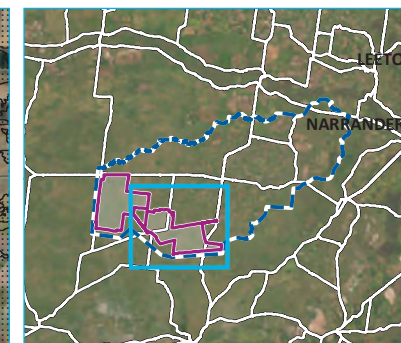
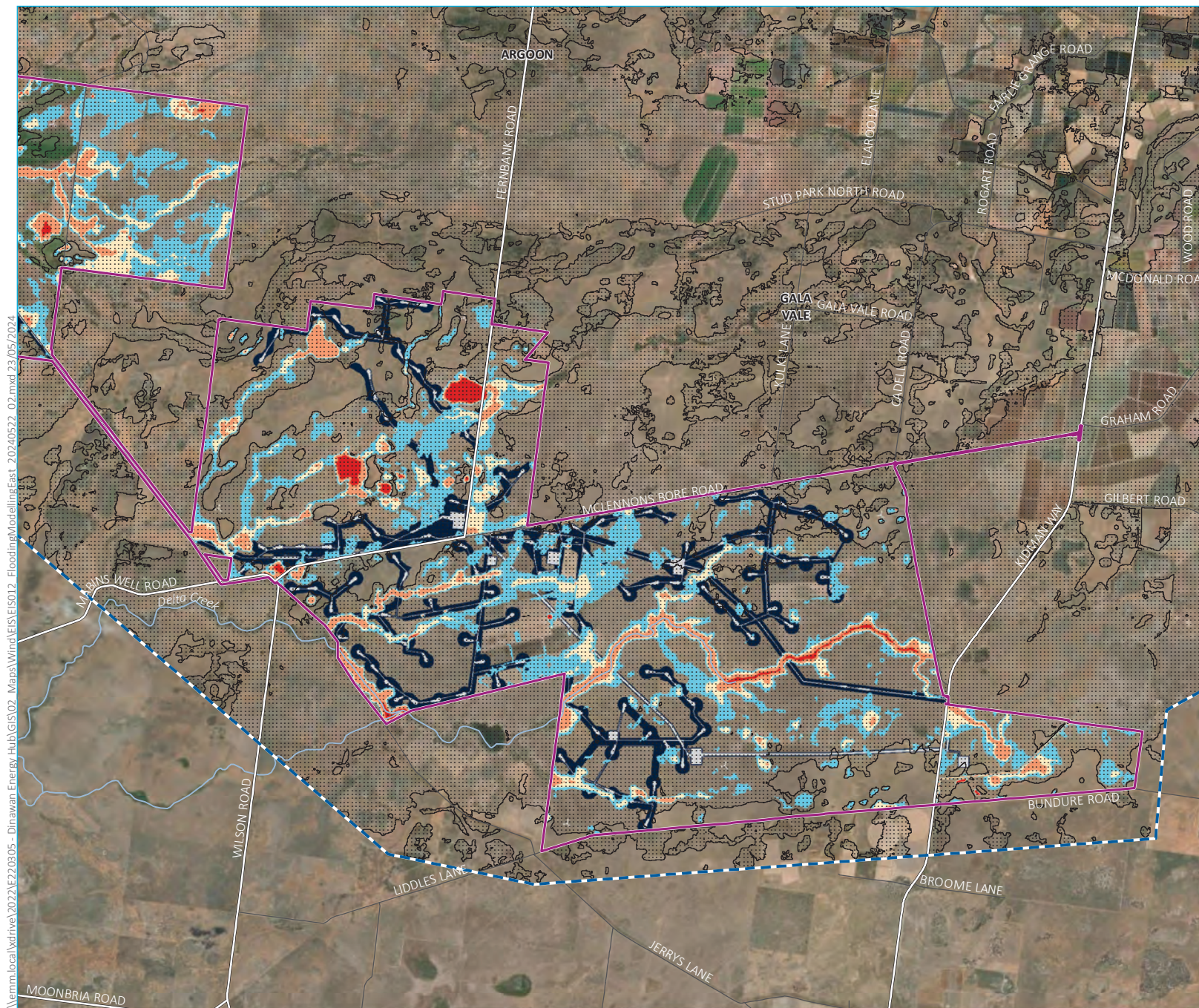
iii Groundwater

The project area is within the Murrumbidgee Alluvium WRP area. A total of 226 groundwater bores are registered in the Bureau of Meteorology's National Groundwater Information System within the project area or within 5 km of the project area boundary (Figure 6.17). Bores are registered for a variety of uses including irrigation (25 bores), water supply (24 bores), monitoring (118 bores), stock and domestic (40 bores) and exploration (2 bores). The use of 17 bores is unknown. Bores target a range of water bearing zones within both shallow and deep aquifers, with bore depths highly variable, ranging from 9–363 m below ground level.

Within the development corridor, there are 13 registered groundwater bores nominated as water supply (3 bores), irrigation (2 bores), and monitoring (8 bores). Of these, only one monitoring bore is within the development footprint.

Regional groundwater depths generally range from 15–40 m below ground level. Both broadscale data, and local data from groundwater monitoring bores in the vicinity of the project, generally indicate stable or reduced groundwater levels for the region, with seasonal variability closer to irrigation districts. Groundwater quality is generally considered to be good, with salinity values less than 1,000 milligrams per litre for many of the registered bores where data are available. Surface and groundwater connectivity data show that it is likely that surface water features are draining into the groundwater environment during wetter periods, and that local groundwater systems are unlikely to reach an elevation near ground level where they would be able to discharge back into surface water features.

GDEs are ecosystems which require access to groundwater on a permanent or intermittent basis. There are multiple GDEs with medium to high value within the project area, the majority of which have been avoided by the development corridor (Figure 6.17). The small number of mapped GDEs intersecting the development corridor are typically associated with River Red Gum, Lignum wetland and Canegrass wetland vegetation communities, and are generally located in the centre of the project area (Figure 6.17).



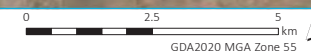
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Model boundary
 - PMF flood extent
- 1% AEP flood depth (m)**
- 0.1-0.3
 - 0.3 - 0.5
 - 0.5 - 1
 - >1
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

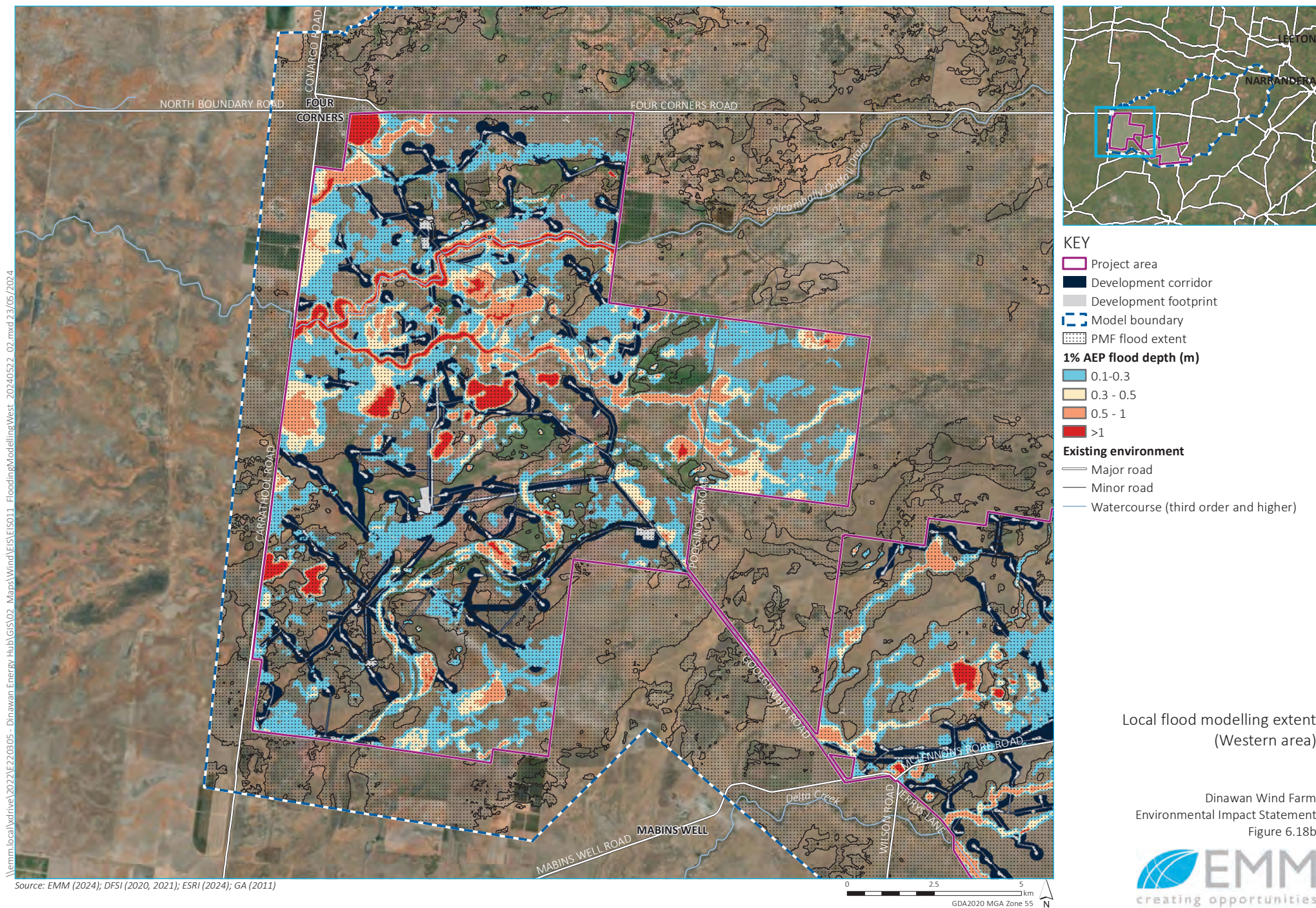
Local flood modelling extent
(Eastern area)

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.18a



Source: EMM (2024); DFSI (2020, 2021); ESRI (2024); GA (2011)





6.7.3 Avoidance and minimisation through design

The development corridor and development footprint have been refined to avoid and minimise impacts to water resources based on the results of EIS investigations. Avoidance strategies have included:

- limiting disturbance of existing minor watercourses and associated riparian corridors where possible with a preference for siting project components in areas where there is limited ecological value and/or surface degradation due to existing land uses
- minimising the requirement for new watercourse crossings through the use of existing access tracks or roads with existing crossing structures
- minimising the demand for groundwater during construction by opportunistic use of water from roof rainwater tanks, reuse of water captured by construction sediment basins and extraction from existing dams in accordance with harvestable rights
- generally avoiding development and earthworks within flood-prone areas (defined by depths exceeding of 0.5 m in the 1% AEP event) and locating sensitive infrastructure (e.g. substations) in locations compatible with flood risk and incorporating suitable mitigation measures
- avoiding disturbance of groundwater receptors (third-party users and higher value GDEs).

6.7.4 Water demand and management

i Construction

A conceptual approach to water management for the project has been developed to inform this EIS, which will be subject to further development as part of detailed design.

It is estimated that approximately 176 ML of non-potable water will be needed for construction, over up to five years. Most of this water will be required for dust suppression. This water will also be required for site amenities, fire protection and washing of construction equipment and plant. It will be sourced from up to four existing extraction bores within the project area, owned by associated landholders, shown on Figure 6.17 (see Section 6.7.2). The nominated works purpose for these bores is currently irrigation and/or stock and domestic use and will need to be modified to enable use of groundwater for construction purposes.

It is estimated that approximately 188 ML of potable water will be needed for construction. This water will be used by the construction workforce accommodation facilities, construction offices and in the concrete batching plant (groundwater quality may not be suitable for use in concrete batching). Potable water will be sourced primarily from a commercial water provider and trucked to site. The assumptions used to estimate the potable water demand are outlined in Table 6.25 below.

Table 6.25 Potable water demand and wastewater loads during construction

Aspect	Assumptions	Estimated water requirement
Construction workforce accommodation facility	Water demand and wastewater load of 205 L/day/person, 7 days a week for 450 people over 5 years (includes kitchen, laundry and accommodation amenities).	166 ML (average 92 kilolitres/day)
Construction offices	Water demand and wastewater load of 45 L/day/person, 6 days a week for 10 people over 5 years (includes office kitchen, toilet, urinal and hand basin).	702 kilolitres (average 0.39 kilolitres/day)

Table 6.25 Potable water demand and wastewater loads during construction

Aspect	Assumptions	Estimated water requirement
Concrete batching	Water demand over five years for concrete batching activities. If the quality of available groundwater meets the specifications for concrete batching activities, it will be used instead.	21 ML
Total		188 ML

Wastewater for the construction workforce accommodation facilities and construction offices will be managed using on-site treatment systems based on wastewater load estimates in Table 6.25. System sizing will be refined during detailed design. The system will collect wastewater (blackwater and greywater) from kitchens, laundries, showers, toilets and basins for treatment.

The treatment system is anticipated to include mechanical screening, biological and chemical treatment, filtration and disinfection. The waste solids produced by the treatment system will be emptied by a licensed contractor and disposed of at an appropriately licensed facility.

Treated effluent suitable for reuse for construction purposes (anticipated to include dust suppression and earthworks conditioning) will be stored in sealed tanks or lined basins to avoid potential interaction with groundwater.

Following completion of construction activities, all temporary wastewater management infrastructure will be decommissioned and removed from the development footprint, and disturbed areas will be stabilised and rehabilitated.

ii Operation

The estimated ongoing operational water usage for the project is 5 ML/year for ongoing maintenance, dust suppression, permanent site amenities and fire protection. During operation, water will continue to be sourced from groundwater sources via existing landowner bores. Water demand will be supplemented by other sources such as potable water trucked into site under commercial agreement and stored in tanks where higher water quality is required. Water also may be sourced opportunistically from rainwater tanks and existing landholder dams, in accordance with harvestable rights.

On-site treatment infrastructure will be used to treat sewage from O&M facilities and will produce:

- treated effluent (i.e. water) suitable for reuse on-site, which will be stored in sealed tanks or lined basins
- waste solids, which will be emptied by a licensed contractor and disposed of at an appropriately licensed facility.

6.7.5 Potential impacts

i Surface water quality and quantity

Potential impacts to surface water quality, in the absence of appropriate controls, include soil erosion and sediment transport into watercourses; transport of other contaminants (e.g. fuel) into watercourses following spills or leaks; release of wastewater and inundation of plant or materials in floodwaters.

Potential impacts to surface water quantity include temporary increases in site runoff. This may occur during construction as a result of clearing, earthworks, compaction of soils and installation of impervious surfaces. Increased runoff could increase flows in watercourses that could impact downstream properties and receptors.

These potential impacts are common to greenfield construction projects and will be managed through the implementation of environmental management measures such as stabilisation and revegetation (see Sections 6.7.6 and 6.9.4). With the implementation of these measures, impacts to water quality and quantity are expected to be negligible to minor. Erosion and sedimentation is further discussed in Section 6.9.3.

ii Watercourses, riparian zones and irrigation infrastructure

The primary risk to watercourses will be from direct physical disturbance during construction and operation. Accordingly, the number of watercourse crossings (particularly of higher order watercourses) has been minimised through the utilisation of existing access roads, tracks and crossings.

Project components, primarily access tracks and electrical infrastructure, will cross watercourses or be developed within the riparian zone at approximately 29 locations. These include 25 first or second order watercourses and 4 higher order (third order or greater) watercourses. Many of the first and second order mapped watercourses have no definable bed or banks and/or negligible riparian zone and hence have not been considered further, as there will be negligible impacts from siting project components in these areas.

Ten locations were identified as needing further evaluation based on a combination of predicted flood extents (using 5% AEP flood model outputs) and stream order. The interaction between project components and predicted flood extents at these locations has the potential to result in localised changes in flow paths and instream velocity. The interaction between project components with select watercourses was evaluated against the specific project component and the condition of the watercourse. The identified watercourse interactions are considered in Table 6.26 and Figure 6.19.

Table 6.26 Areas of development corridor within or adjacent to vegetated riparian zones

Area	Interaction identifier ¹	Stream order	Project component	Condition assessment
Stage 1 (eastern area)	1 – EAST	1st order	Transmission line	Modified and degraded riparian vegetation associated with historical land use practices.
	2 – EAST	2nd order	Transmission line	
	3 – EAST	1st order	WTG and associated infrastructure	
	4 – EAST	1st order	WTG and associated infrastructure	
	5 – EAST	1st order	WTG and associated infrastructure	
	6 – EAST	3rd order	Site access and electrical cabling	Partially within riparian zone; however, outside remnant vegetation.
	7 – EAST	3rd order	Transmission line	Modified and degraded riparian vegetation associated with historical land use practices
Stage 2 (western area)	1 – WEST	2nd order	WTG and associated infrastructure	Modified and degraded riparian vegetation associated with historical land use practices.
	2 – WEST	Greater than 3rd order	Site access and electrical cabling	Coleambally Outfall Drain is a man-made structure. The watercourse has its margin controlled with earthen batters and bunding. Due to its man-made nature, the watercourse is expected to provide limited environment value.
	3 – WEST		Site access and electrical cabling	

Notes: 1. Interaction identifier aligns with labels shown on Figure 6.19.

The placement of WTGs and ancillary infrastructure within third order and higher (i.e. non-minor) watercourses, and crossings of these watercourses for internal access tracks and electrical cabling, have been minimised to the extent practicable. Based on the evaluation of watercourse interactions in Table 6.26, project components are unlikely to create a significant impact on instream condition or riparian corridors at these locations.

During detailed design, micro-siting of project components within the development corridor that interact with watercourses will be in accordance with the fact sheet *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPE 2022a). Project components can be located within the outer 50% vegetated riparian corridor, where the average width of the vegetated riparian zone can be achieved for each watercourse, and provided an equivalent area connected to each riparian corridor is offset. The project's potential use of the outer portion of the riparian corridor will be determined as required considering the detailed siting of project components within the development corridor.

Where in-stream works are proposed (e.g. construction or upgrade of watercourse crossings), these works will be designed and constructed with consideration of local hydraulic conditions, local flooding impacts, and relevant guidelines including *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (DPI Fisheries 2003) and *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI 2013).

Electrical infrastructure may cross irrigation infrastructure overhead or underground (installed by horizontal directional drill methodology), with overhead crossings preferred. Spark Renewables has commenced consultation with CICL regarding crossing irrigation infrastructure, especially the two bridges at 2-WEST and 3-WEST, in the northern section of the western area (Figure 6.19).

Mitigation and management measures (see Section 6.7.6) will be implemented to manage stormwater, erosion and sedimentation, and flooding risks, to minimise impacts to watercourses.

iii Flooding

The development footprint, including sensitive infrastructure (e.g. substations), has been refined to generally avoid 1% AEP flood extents.

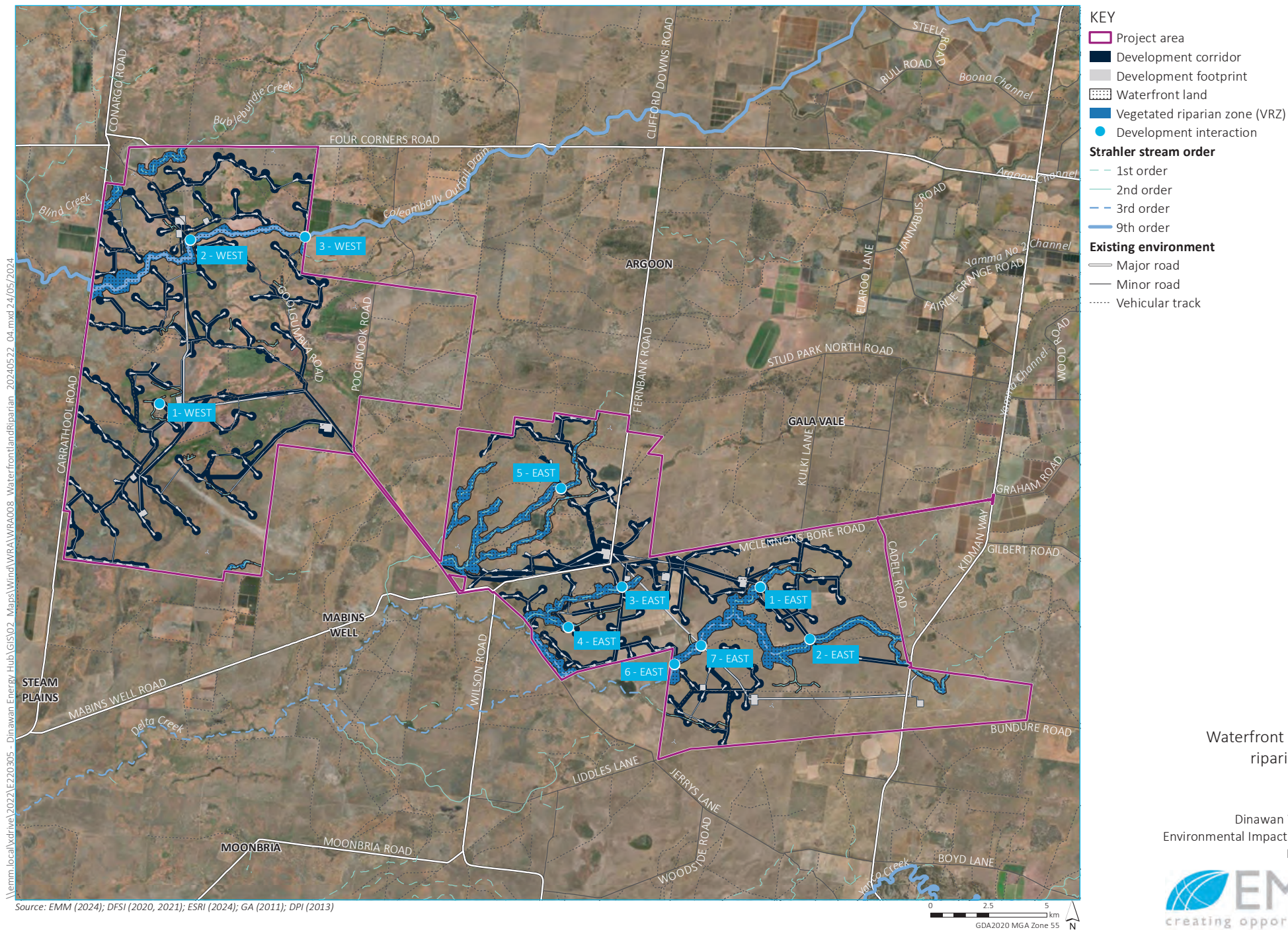
A number of services and access tracks cross predicted flooding flow paths. However, flood inundation in these areas typically will be shallow (in the order of 0.1–0.3 m) and low hazard, meaning flood depth and velocity is generally safe for people, vehicles and buildings (AEMI 2014).

Where project components are located in flood-prone areas, they are expected to present minimal obstruction to floodwaters. Therefore, shallow inundation of parts of the development corridor is expected to have negligible impact on broader flooding. On this basis, there is low potential for adverse flooding impacts either within or downstream of the development footprint for events up to 1% AEP.

Residual flood risks and the potential for adverse flooding impacts including for events larger than 1% AEP can be adequately managed during construction by suitable construction planning.

The development footprint has been refined based on existing flooding constraints of the area. The project is compatible with the flood hazard; the majority of infrastructure has been located in areas that are either free of flooding or subject to low flood hazard that is generally safe for people, vehicles and buildings for events up to and including the 1% AEP.

Management of long-term flooding risks will be considered as part of detailed design, and through the implementation of the proposed water management approach provided in Section 5.3 of the water resources assessment (Appendix E.7).



Project construction will include excavation for foundations and for underground services. Excavations will be relatively shallow (approximately 3–5 m below ground level) compared to groundwater levels in the project area, which are anticipated to be approximately 15–40 m below ground level.

Impervious surfaces for site infrastructure will lead to a very small reduction in the infiltration of stormwater runoff to the underlying soils and recharge of groundwater. This will have a negligible impact on groundwater levels or availability to existing users (including GDEs) due to the very small impervious areas compared to the overall recharge area.

In the absence of appropriate controls, groundwater quality has the potential be impacted during construction and operation as a result of wastewater, fuel or other hazardous materials spills that may infiltrate through soils to groundwater.

This will be managed through the implementation of standard management measures (see Section 6.7.6). With the implementation of these measures, no impacts to groundwater quality are expected.

v Groundwater sources

The project will use groundwater from existing bores to meet both construction and operational non-potable water demands (Section 6.7.4). The predicted non-potable construction and usage volumes are 176 ML over five years, and 5 ML/year during operation.

During construction and operation, it is proposed to use non-potable water from a total of 3,691 unit shares of water entitlement, linked to four existing bores within the project area under three water supply works and water use approvals (Table 6.27). Therefore, there are sufficient existing licenced access to groundwater to meet non-potable demands.

Table 6.27 Groundwater works proposed to be used by the project

Approval number	Documented works description	Location of works	Nominated works purpose	Licence expiry	Bore ID	Bore yield recorded at construction (litres per second (L/s))	Water access license number	Entitlement (units)
50CA503 992	Extraction groundwater works 1 x bore (no size nominated)	Delta Park Lot 144 of DP756418	Irrigation	30/9/2029	GW401211	265	11874	1,091
50CA503 997	Extraction groundwater works 1 x bore (408 millimetres (mm))	Hawks Nest Lot 1 of DP593484	Irrigation	26/2/2031	GW062049	157	11876	743
50CA504 004	Extraction groundwater works 3 x bores (457 mm, 130 mm, 460 mm)	Goolgumbra Merino Stud Lot 13 of DP756299 Lot 14 of DP756257	Irrigation, Stock and Domestic	14/5/2028	GW065059	227.5	11879	1,857
					GW414356	160		

The extraction volumes (and associated impacts) predicted for the project are consistent with the current approved use and entitlements linked to the bores. The risk to the groundwater environment from the proposed supply of water to the project is low, as the likely demands for the project will fall within the available water entitlements and the documented individual groundwater yields of each of the individual bores.

The record of water taken (via metering and data logger installation) through the existing groundwater bores will be required by all users in accordance with the water supply works and licence conditions and the *NSW Non-Urban Water Metering Policy* (DPIE 2020d).

Groundwater availability for existing users in the vicinity of the project (e.g. registered bores and GDEs) would not be impacted as project construction activities are not anticipated to intersect the regional water table.

6.7.6 Mitigation measures

A summary of the proposed measures to manage potential water impacts is provided in Table 6.28.

Table 6.28 Water management and mitigation measures

ID	Management or mitigation measure
Stormwater management	
W1	Management measures to address potential impacts to surface water and groundwater during construction will include: • appropriate siting of proposed infrastructure within the development footprint to minimise disturbance to existing drainage lines and overland flow paths • designing earthworks to maintain the prevailing surface gradients and fall towards existing drainage lines, to minimise changes to existing flow paths • providing general surface drainage infrastructure comprising: – diversion of upslope runoff around infrastructure – surface drainage measures to control runoff generated within the development footprint, minimise soil erosion and direct runoff towards receiving drainage lines – sheet flow conditions will be maximised, and construction of diversion drains, channels and table drains will be minimised to the extent practicable – treatments to armour earthwork batters and site drainage where needed for scour protection, where flow concentrations cannot be avoided – retention of existing flow paths where possible and minimise catchment diversions, with the objective of minimising changes to flow regimes in receiving watercourses • stabilising disturbed areas and progressively rehabilitating soils as early as practicable • maintaining drainage, erosion and sediment control measures, including monitoring and adjustment protocols to achieve the desired performance standard • capturing stormwater runoff from buildings in rainwater tanks for use on-site, to minimise demand for imported water • storing hazardous material in accordance with Australian Standards • maintaining spill kits on-site at all times during construction and operation • considering weather preparedness and response planning.
W2	Specific stormwater management measures for the substation and switchyard areas will include: • diverting clean runoff away from potentially oil-contaminated areas • bunding potentially oil-contaminated areas • providing stormwater treatment device(s) to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to the downstream drainage system.
W3	Specific stormwater management measures for the concrete batching plants during construction will include: • diverting clean runoff away from cement and concrete handling areas and stockpiles

Table 6.28 **Water management and mitigation measures**

ID	Management or mitigation measure
	• maximising recycling of process wastewater, with dedicated storages for excess wastewater that will be manually emptied via vacuum truck and disposed of off-site • bunded areas for refuelling.
Erosion and sediment control	
W4	Management measures to address ongoing site-specific risks to surface water and groundwater during operation will include: • rehabilitating temporary works and construction disturbance areas not being utilised for operation • maintaining stabilised and vegetated surfaces, drainage and sediment and erosion control measures throughout operation.
W5	Erosion and sediment control measures and site rehabilitation and revegetation will be implemented in accordance with best practice comprising <i>Managing Urban Stormwater: Soils and Construction – Volume 1</i> (Landcom 2004) and <i>Volume 2A</i> (DECC 2008) and <i>Best Practice Erosion and Sediment Control</i> (IECA 2008). Measures and principles will include: • minimising the extent and duration of land disturbance • controlling water movement through the development footprint • minimising soil erosion • promptly stabilising disturbed areas • maximising sediment retention on-site • maintain drainage, erosion and sediment control measures • monitor and adjust drainage, erosion and sediment control practices to achieve the desired performance standard • construction of suitable watercourse crossings • consideration of the erosion hazard specifically posed by the dispersive subsoils.
W6	Progressive erosion and sediment control plans will be developed for all discrete disturbance areas.
Flood risk management	
W7	Flood management protocols will be developed and implemented in the event of flood events that could impact construction sites or access, including: • suitable early warning/prediction measures and communication protocols • site preparedness activities and procedures • triggers for closure, evacuation and recovery • emergency response and support.
W8	Temporary construction infrastructure will be designed and constructed to: • consider flood risk, including overland flow paths and mainstream flood risk, in the placement of temporary works, plant, materials and workforce facilities • ensure that temporary works minimise off-site flooding impacts as far as practical.

Table 6.28 **Water management and mitigation measures**

ID	Management or mitigation measure
W9	Permanent infrastructure will be designed and constructed to: - locate sensitive infrastructure (e.g. substations) on high ground above 1% AEP event flood levels (or other suitable level of flood immunity as determined during detailed design) and to avoid or otherwise divert local overland flow paths around infrastructure - ensure finished ground levels are constructed at-grade and not materially higher than existing levels in areas subject to existing mainstream flooding, in order to minimise potential off-site flooding impacts as far as practical. Where a change in ground level is proposed in areas, as part of future design stages or refinements, assessment of the change should be quantified to confirm off-site flooding impacts do not occur. If changes in the project layout or changes in the landform are required and there is a risk of flooding, then flood modelling will be conducted to confirm the flood behaviour due to the project.
W10	Flood management protocols will be developed and implemented for operations.
Watercourse crossings and stormwater outlets	
W11	Watercourse crossings and stormwater outlets will be designed and constructed to: - consider the appropriate level of serviceability and flood immunity required for the project - consider local hydraulic conditions and minimise scour potential - minimise local flooding impacts - be consistent with: <i>Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings</i> (DPI Fisheries 2003) <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (DPI 2013).
Interactions with existing irrigation infrastructure	
W12	Removal of any private irrigation infrastructure (i.e. not owned by CICL) within the development footprint will be in agreement with relevant landowners. If infrastructure is removed for the project, it will be reinstated following the project, or as otherwise agreed with landowners.
W13	Spark Renewables will continue to consult with CICL regarding cable crossings of irrigation infrastructure during detailed design. Designs, construction methods and timing will be agreed with CICL prior to implementation.
Water supply	
W14	All relevant water licensing and approvals will be obtained to support water supply arrangements for construction and operation if alternative sources are required.
Wastewater management and effluent reuse	
W15	Temporary and permanent on-site wastewater management and effluent reuse systems will: - be appropriate for each site based on consideration of the project layout, site conditions and relevant environmental constraints (e.g. sensitive surface or groundwater water features) - be designed, constructed, operated, maintained and decommissioned in accordance with best practise and relevant guidelines and standards and in consultation with the relevant Council.

6.7.7 Conclusion

The project design has minimised impacts to water resources by avoiding watercourses, infrastructure associated with CICL, flood-prone areas and groundwater receptors to the maximum extent practicable.

Project activities are not anticipated to intersect the regional water table as excavations will be relatively shallow (approximately 3–5 m below ground level) compared to groundwater levels in the project area (approximately 15–40 m below ground level). Extraction volumes (and associated impacts) predicted for the project are consistent with the current approved use and entitlements linked to the bores. Therefore, groundwater availability for existing users is not expected to be impacted.

Potential construction phase impacts, including degradation of surface water quality, physical impacts to watercourses, and altered water quantity from increased site runoff, will be avoided or minimised through the implementation of proposed mitigation measures.

Residual flood risks will be managed through construction phase planning. The majority of project infrastructure has been sited to avoid flooding (for events up to a 1% AEP) or subject to low flood hazard that is generally safe for people, vehicles and buildings.

6.8 Air quality

6.8.1 Introduction

This section provides an assessment of the impacts of the project to air quality. It is anticipated that operational emissions will be negligible and therefore only dust impacts associated with the construction of the project have been assessed. This assessment takes into account the general guidance provided in the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2022). The relevant SEARs and how they are addressed are summarised in Appendix A.

6.8.2 Existing environment

Air quality in the vicinity of the project is influenced largely by rural and agricultural activities with land around the project area primarily used for sheep and cattle grazing.

There are two residential properties within 1 km of the project's development corridor, with the closest residential property (R079) located 186 m of an intersection upgrade on Kidman Way proposed as part of the project (See Figure 2.1 in Section 2.4).

Two temporary meteorological monitoring masts have been previously installed in the project area. The masts record parameters including wind speed, wind direction, humidity, and temperature in 10-minute intervals at multiple heights.

Wind speed and wind direction at 70 m (1 April 2021 to 20 February 2024) have been used to characterise existing meteorological conditions. The prevailing winds, on an annual basis, are predominantly from the north-east and south-west.

Ambient air quality data is collected at the NSW DCCEEW air quality monitoring stations at Wagga Wagga North (approximately 138 km east of the project area) and Albury (approximately 148 km south-east of the project area). There are no major sources of air pollution in the vicinity of the project. Annual average PM₁₀ concentrations ranged from 13.1 micrograms per cubic metre (µg/m³) to 23.2 µg/m³ at Wagga Wagga North and 11.7 µg/m³ to 20.1 µg/m³ at Albury between 2020 and 2023, noting that these air quality monitoring stations are located within urban environments and are likely to be influenced by air quality sources not present in the project area (e.g. wood fire heaters). Data from 2019 were excluded in this analysis as PM₁₀ measurements were significantly affected by the Black Summer bushfires.

6.8.3 Potential impacts

The main air pollution and amenity issues typically associated within construction sites are:

- annoyance due to dust deposition (dust settling on surfaces) and visible dust plumes
- elevated concentrations of airborne particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM₁₀) due to dust-generating activities
- exhaust emissions from diesel-powered construction equipment.

There is a range of mitigation measures which are routinely employed as 'good practice' on construction sites to manage emissions. Any changes to air quality at a given location will be short-lived as construction at any location will temporary.

Dust emissions in the development corridor may occur during excavation works, material handling, and as a result of vehicle movements on unsealed tracks/areas. Dust generation from these activities will vary day-to-day depending on the level of activity, the specific operations being undertaken, and the preceding and current weather conditions.

Given the distance between the development corridor and surrounding non-associated residences (mostly greater than 1 km), significant construction air quality impacts are unlikely.

Intersection upgrades along Kidman Way within 200 m of R079 are not expected to result in significant air quality impacts as dust emissions will be managed through the implementation of standard management measures to reduce the potential of dust impacts at R079 and other residences.

6.8.4 Mitigation measures

A summary of the proposed measures to manage potential air quality impacts is provided in Table 6.29.

Table 6.29 Air quality mitigation measures

ID	Mitigation measure
AQ1	A CEMP will be prepared and will include measures to manage off-site air quality impacts including: • monitoring and modifying working practices by limiting activity during periods of adverse weather (hot, dry and windy conditions) • applying dust suppression measures to active work areas where necessary • revegetating earthworks and disturbed areas to stabilise surfaces as soon as practicable • imposing vehicle speed limits along internal roads and work areas during construction • ensuring vehicle loads entering and leaving the project area are covered to prevent escape of materials during transport.

6.8.5 Conclusion

Management measures will be implemented during construction to minimise dust emissions.

Dust emissions from construction of the project are not anticipated to have significant impacts on nearby residences, and operational emissions from the project are expected to be negligible.

6.9 Land

6.9.1 Introduction

A land and rehabilitation assessment was prepared for the project by EMM and is provided in Appendix E.8. This assesses potential impacts to land, soils and agriculture from the project. The relevant SEARs and how they are addressed are summarised in Section 1.2.1 of the land and rehabilitation assessment (Appendix E.8).

6.9.2 Existing environment

i Land and soil capability

The land and soil capability (LSC) assessment evaluated the capability of the land to sustain a given land use under specific land management practices, in a manner that minimises soil and land degradation and adverse impacts on receiving environments. *The Land and Soil Capability Assessment Scheme* (NSW LSC Scheme) (OEH 2012) provides eight LSC classes, from extremely high land capability land (Class 1) to extremely low capability land (Class 8). The LSC assessment for the project reviewed regional climate, geology and soils data, and included a detailed soil survey.

At a State-scale, the development corridor is mapped as LSC Class 4 (moderate-low capability land) and Class 6 (low capability land) (DPIE 2020e and DPIE 2020f). State-wide soil mapping using *The Australian Soil Classification* (ASC) (Isbell & NCST 2021) identifies that the project area primarily contains, or is close to, areas of Vertosols. There are small areas of Rudosols and Chromosols.

The Jerilderie (jex) soil landscape is therefore the likely dominant landscape in the project area based on the modelled presence of Vertosols within the project area. The Jerilderie soil landscape is associated with erosion hazards, wind erosion leading to scalding when underlain by sodic soils, the high-clay soil's poor trafficability when wet, and the soils hardsetting nature.

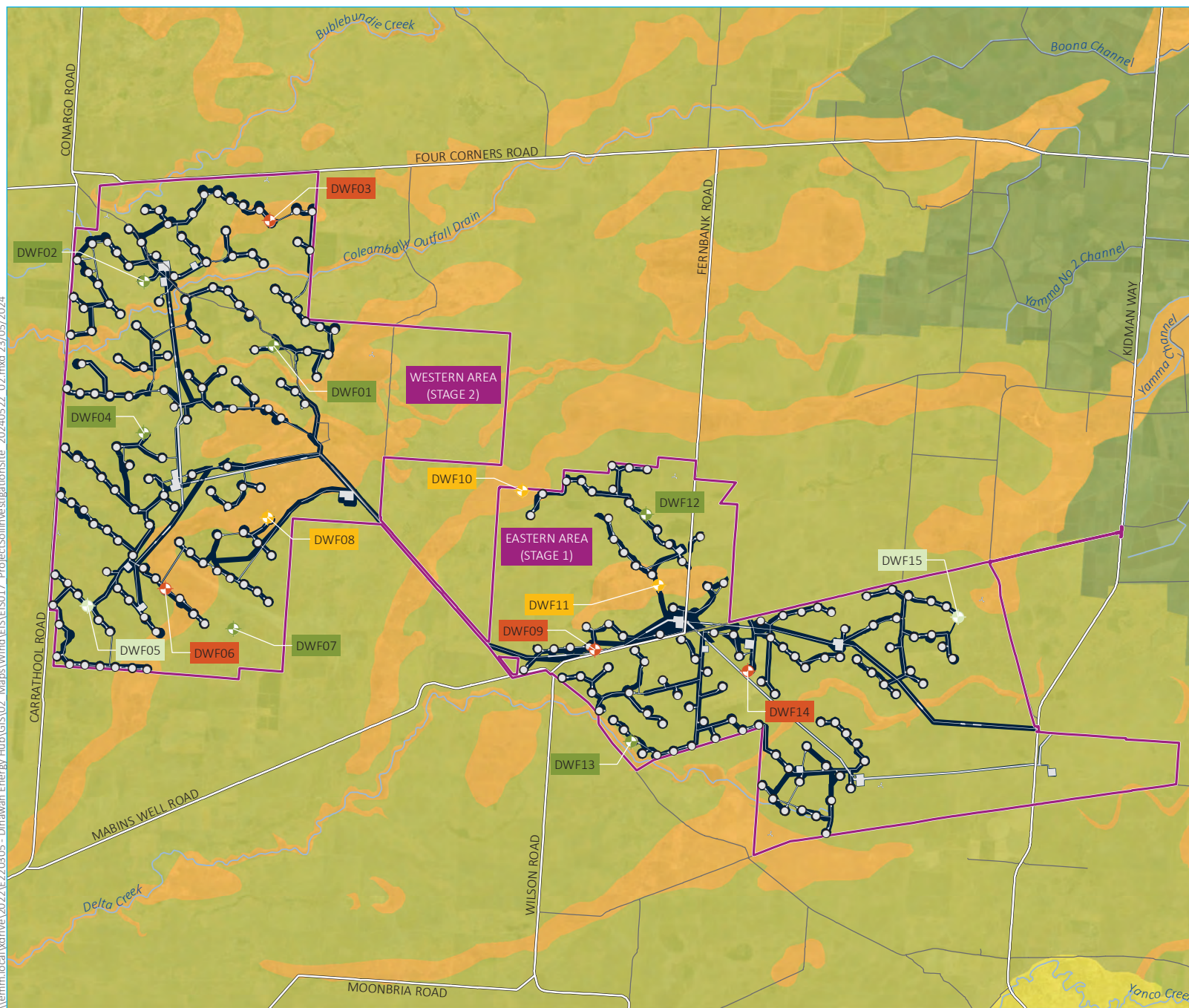
A soil survey at 15 investigation sites within the project area included:

- classification of ASC soil orders
- description of soil characteristics
- assessment of LSC in accordance with the NSW LSC Scheme.

The survey found that soils in the project area are consistent with the mapped regional soil landscapes, with similar hazards observed in the project area including erosion hazard, poor drainage and subsoil constraints of sodicity (when sodium concentration affects the soil structure) and likely dispersion (the separation of soil into single particles).

The soil survey found the LSC classes in the project area are generally consistent with regional mapping, with LSC Class 3, 4, 5, and 6 present within the development corridor (Figure 6.20).

\\emm.local\drive\2022\20305 - Dinawan Energy Hub\GIS\02 Maps\Wind\GIS\02 ProjectSoilInvestigationSite_20240522_02.mxd 23/05/2024



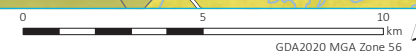
- KEY**
- Project area
 - Development corridor
 - Development footprint
 - Wind turbine generator (WTG)
- Soil sample location**
- Verified land and soil capability
- ◆ LSC 3
 - LSC 4
 - ◆ LSC 5
 - ◆ LSC 6
- Mapped land and and soil capability**
- 3 - Moderate limitations
 - 4 - Moderate to severe limitations
 - 5 - Severe limitations
 - 6 - Very severe limitations
- Exsting environment**
- Major road
 - Minor road
 - Named watercourse

Land and soil capability
within the project area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.20



Source: EMM (2024); DCSSS (2023); ESRI (2024); GA (2009)



ii Agriculture

Strategic agricultural land in NSW is protected through two primary measures, classification as Biophysical Strategic Agricultural Land (BSAL) and the implementation of Critical Industry Clusters (CICs). No mapped BSAL or CIC are located within the project area.

Land use within the development corridor is predominantly agricultural with approximately 6,631 ha is utilised for grazing livestock and 574 ha is used for cropping. The remaining 51.2 ha is unavailable for agriculture, due to the presence of marsh and wetlands, irrigation channels, dams, residential and farm infrastructure, managed resource protection areas, and small areas used for quarrying and operation of an aerodrome. There is approximately 68.7 ha of travelling stock reserve (which is Crown land) within the project area, shown in Figure 2.3, which supports grazing and the movement of livestock in the locality.

To provide an estimate of the value of agriculture, the typical gross annual productivity for livestock grazing was estimated for the development footprint (1,339 ha). The estimate was based on the calculated agricultural values for the Murrumbidgee LGA and Edward River LGA for an equivalent sized area. If fully developed for agricultural use, the development footprint would be valued at approximately \$368,483 with an upper estimate of \$574,784 based on the gross productivity estimates from the NSW Murray Region.

Coleambally Irrigation Area is north-east of the project area and is operated by CICL to supply irrigation and drainage services to nearly 500 farms. The irrigation area spans over 400,000 ha, of which 300,000 ha is serviced by the Coleambally Outfall Drain, which passes through the project area. The water supply is from the regulated Murrumbidgee River and access to water is based on the Murrumbidgee Regulated River Water Sharing Plan 2016 (CICL 2021).

iii Erosion

Erosion hazard was assessed in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004). The development footprint predominantly has a low erosion hazard based on average slope, with only localised areas of steep slopes (approximately less than 0.05% of the project area) presenting a high erosion hazard, primarily associated with the constructed irrigation channels present within the project area.

iv Other land uses

There are no other significant land uses in the project area, such as mining, quarries, mineral or petroleum rights. No mining tenements within the project area were identified in a search of MinView, with the closest being Exploration Lease (EL) 9366, approximately 25 km east of the project area. Minor quarrying activities are undertaken by associated landowners within the project area.

Land use in the project area has historically consisted of pastoral and agricultural uses. Agricultural activities can be a source of contamination. Historic land uses do not suggest a history of other contaminating activities. A review of the following registers was completed:

- NSW EPA contamination land record of notices – Edward River and Murrumbidgee LGAs
- EPA PFAS (per- and poly-fluoroalkyl substances) Investigation Program
- NSW EPA contaminated land list of notified sites.

No sources of potential contamination were identified within the project area from the register search.

6.9.3 Potential impacts

i Soil and land capability

Soil disturbance has the potential to result in the following impacts:

- reduction in soil stability and increased susceptibility to erosion due to vegetation removal, soil exposure or inversion (when topsoil is buried under subsoil), especially as the subsoil is sodic and dispersive
- erosion of soil due to exposing soils, disturbing dispersive subsoils and concentration of water flows
- reduction of soil quality, quantity and associated LSC and agricultural productivity
- loss or degradation of topsoil material viable for use in rehabilitation
- introduction of salinity, sodicity or other constraints into the topsoil material if soil is inadequately managed.

Any impacts will occur within the development corridor. The development footprint is a very small portion of land within the South West REZ (less than 0.05%), predominantly in LSC Class 4 (Table 6.27).

Table 6.30 LSC impacts for the project in the context of the South West REZ

Area	LSC class								Total
	1	2	3	4	5	6	7	8	
South West REZ (ha)	0	0	1,739	988,411	1,129,856	341,583	249,807	71,436	2,782,832
Development footprint (ha)	0	0	5	1,209	0	124	0	0	1338
Reduction	0	0	0.31%	0.12%	0	0.04%	0	0	0.048%

ii Agriculture

The land within the development footprint will be temporarily unavailable for the current land use (i.e. sheep and cattle grazing with some cropping) during construction, removing up to \$574,784 in annual agricultural productivity based on estimates on livestock and cropping land use and regional productivity information. Impacts to agricultural productivity during operation will be reduced and mitigated by the proposed continued use of the land for compatible agricultural enterprises.

The development corridor and development footprint are within two large agricultural landholdings. It is unlikely that the project will result in any permanent segmentation of the existing land uses.

Approximately 20.6 ha of travelling stock reserve is within the development corridor. Spark Renewables has engaged with NSW Crown Lands (see Chapter 5) regarding impacts to travelling stock reserves. Some project infrastructure, primarily transmission infrastructure, as well as road upgrades along McLennons Bore Road and Fernbank Road, will cross travelling stock reserves (see Figure 2.3). Works within and/or occupation of travelling stock reserves will be subject to licencing from Crown Lands and will be undertaken in a manner that will allow the reserve to continue to be used for stock movements where possible, and in accordance with licence conditions issued by Crown Lands.

Existing agricultural land uses will continue adjacent to the development footprint during construction and operation.

Project construction and operation have the potential to increase biosecurity risks through increased weeds and pests through contaminated vehicles, plant and equipment, and importation of materials such as soil and gravel. Mitigation and management measures are described in Section 6.9.4 to manage impacts associated with weeds, pathogens and pest species.

The project will not impact the supply of water to the Coleambally Irrigation Area.

iii Erosion and sedimentation

In the absence of suitable controls, soil disturbance associated with construction and operation, as well as ongoing land management practices, have the potential to result in erosion and sediment control impacts, including:

- off-site discharge of sediment and turbid run-off from the erosion of exposed soils, particularly dispersive subsoils, which can degrade stock drinking waters and natural waterways, infill waterway pools and divert waterway flow due to sediment deposition and associated bed and bank erosion
- mud tracking from vehicles and machinery on to public roads
- increased potential for rill and gully erosion due to modification of flow conditions from sheet flow to concentrated flow from constructed landforms (roads, tracks, hardstands and drains)
- increased erosion and subsequent sedimentation due to pavement rutting and pavement degradation from increased light and heavy vehicles traffic on unsealed access roads
- tunnel erosion under or beside foundations for built infrastructure and along pipe and cable trenches due to dispersive soils
- dust emissions from unsealed roads, hardstands and exposed soils
- off-site discharge of sediment and turbid run-off from ongoing erosion from drainage, landform and infrastructure design not cognisant of dispersive subsoils
- increased maintenance costs for ongoing stabilisation of landforms, roads, drains and cable trenches
- operation and maintenance of sediment control structures due to ongoing erosion.

Mitigation measures to manage erosion impacts are described in Section 6.9.4.

iv Land use conflict

A land use conflict risk assessment (LUCRA) has been prepared for the project using the *Land Use Conflict Risk Assessment Guideline* (DPI 2011) (see Attachment E of the land and resources assessment in Appendix E.8 of this report). The NSW Department of Primary Industries defines the LUCRA as a system to identify and assess the potential for land use conflict to occur between neighbouring land uses. A risk ranking from 1–25 is used with a score of 1 representative of the lowest risk and a score of 25 representative of the highest risk, with scores greater than 10 considered ‘high risk’. Risk rankings are calculated by determining the probability and scale of consequences of the potential conflict.

The LUCRA has identified 30 potential land use conflicts as a result of:

- changes to the spread and distribution of weeds and increased presence of pest animals
- removal of agricultural land and subsequent reduction in productivity

- impacts to neighbouring agricultural operations, property values and local infrastructure and services
- amenity impacts during construction and operation (e.g. noise, dust, visual and traffic)
- increased soil erosion and impacts to surface water resources
- risks associated with the project (e.g. security, safety, health and fire).

Potential conflicts were assessed and relevant mitigation measures were applied to determine a revised risk ranking for each conflict. Through the implementation of the proposed management strategies, the number of high-risk conflicts reduced from 14 to 5, which reflects a reduction of approximately 36%. Risks of greater than 10 were limited to removal of agricultural land and subsequent reduction in productivity, visual amenity impacts during operation and risks associated with the project (namely in relation to fire). It should be noted that although the probability of potential conflicts in relation to fire are considered unlikely, the major consequence that correlated with the associated events maintained the revised risk ranking score at 14.

v Contamination

There is potential for project-related activities to introduce contamination to the receiving environment. Risks include:

- accidental spillage of fuel or other hazardous materials such as fuels or hazardous chemicals, such as hydraulic fluids or herbicides and potential spills at storage locations, use locations, or during transport
- accidental discharge of stormwater contaminated with hydrocarbons from the substation and switchyard sites
- accidental discharge of untreated sewage from amenities
- inappropriate handling, storage and management of waste generated during construction, operation and decommissioning.

Mitigation measures to manage potential contamination associated with spills, stormwater and sewage are described in Section 6.7.6. Mitigation measures to manage handling, storage and management of waste are described in Section 6.14.4. Mitigation measures will be implemented to manage the risk of existing, unknown sources of contamination as described in Section 6.7.6.

vi Decommissioning and rehabilitation

Once the project reaches the end of its operational life, a decision will be made to either decommission or re-power the facility, subject to approval requirements.

If the project is decommissioned, all aboveground structures will be removed (unless otherwise agreed with landowners and regulators) and the site rehabilitated generally to its pre-existing land use, as far as practicable. Project infrastructure will be managed in accordance with the waste management hierarchy and contemporary waste management legislation.

Stripping and preservation of topsoil resources is a key component of rehabilitation planning. Suitable soil stripping management practices will guide the stripping and management of soil resources. During rehabilitation, management measures for soil handling and erosion prevention will be implemented to ensure soil and erosion is suitably managed. Species for rehabilitation will be cover crops, legumes and pasture species as agreed with the landowners.

6.9.4 Mitigation measures

A summary of the proposed measures to manage and mitigate potential impacts to soil and land capability, agriculture, erosion and biosecurity is provided in Table 6.31.

Table 6.31 Land, soil and erosion mitigation measures

ID	Mitigation measure
L1	Soil management measures to preserve soil resources will include: • avoiding and minimising soil disturbance to the extent practical • assessing topsoil depths to be stripped prior to stripping to minimise the mixing of topsoil and subsoil • preserving as much topsoil as possible • aiming to strip and manage different soils orders or mapping units separately • avoiding mixing topsoil with subsoil during soil handling operation • managing subsoils in separate layers to minimise introduction of constraints higher into the soil profile where subsoils exhibit variance of constraints with depth • avoiding stripping, handling or compacting soil following heavy rain periods that leaves the soil structure saturated • avoiding compaction of soil during stripping and stockpiling operation • applying ameliorants to topsoil and, where necessary, subsoil during stripping operation in accordance with a soil scientists' recommendations, with ameliorants applied prior to stripping each soil layer, to maximise mixing of the ameliorants during the stripping process • stockpiling topsoil separately from subsoil (where it is necessary to strip subsoil) • reinstating soil horizons in the correct order and depths, where possible • locating subsoils and topsoils so that stockpiled material is placed on the same underlying soil unit where practical • protecting stockpiles from erosion using soil stabilising polymers, cover crops or other forms of stabilisation • stabilising long-term topsoil stockpiles to minimise stockpile waterlogging, the generation of anaerobic conditions, help maintain topsoil biological viability and nutrient cycling and to create a seed store • testing stockpiled subsoil and topsoil to determine amelioration requirements prior to reinstatement • testing any imported soil materials to characterise and determine suitable usage and amelioration requirements prior to reinstatement.
L2	Undertake agricultural mitigation activities during the life of the project, including: • maintaining existing internal livestock fencing and other required infrastructure within the development footprint • avoiding interference with the operation of irrigation channels.
L3	The following will be implemented to manage impacts associated with weeds, pathogens and pest species: • implementing hygiene and washdown protocols, including washdown and inspection of vehicles, plant and machinery when moving from areas with known populations of weed and pest species • removing identified weeds through methods such as herbicide spraying, scalping and hand-pulling • managing importation of gravel, crushed rock or soil to ensure that the material is free from noxious weed seed • implementing measures to manage pest fauna species within the development footprint.
L4	The following erosion and sediment control measures, site rehabilitation and revegetation will be implemented in accordance with industry standard practice: • minimising the extent and duration of land disturbance • controlling water movement through the development footprint • minimising soil erosion • stabilising disturbed areas promptly • maximising sediment retention on site • maintaining drainage, erosion and sediment control measures • monitoring and adjusting drainage, erosion and sediment control practices to achieve the desired performance standard

Table 6.31 Land, soil and erosion mitigation measures

ID	Mitigation measure
	- constructing suitable watercourse crossings - considering the erosion hazards posed by the dispersive subsoils while installing driven piles, excavation of cable and pipe trenches, construction of roads, tracks and ancillary facilities.
L5	An unexpected finds protocol will be developed for construction, operation and decommissioning. It will include procedures to identify potentially contaminated land, such as: - the observation of discolouration or staining of soils - visible signs of plant stress, presence of drums or other waste material - stockpiles, fill material or odours. If a potential source of contamination is identified, work within the affected area will cease until an assessment is completed to advise the need for further investigation or remediation.

6.9.5 Conclusion

The significance of the removal of LSC Class 4, 5 and 6 land is minor, with the project removing approximately 0.12% of LSC Class 4 land mapped within the South West REZ.

The application of the proposed land, soil and erosion mitigation measures will prevent significant impacts on soil quality and quantity; erosion and sedimentation; and the introduction of weeds, pathogens and pest species.

Impacts to agriculture will be mitigated by continuing grazing activities. Residual impacts to agriculture will be minor and temporary.

With the implementation of effective land management procedures during construction and operation, and effective decommissioning and rehabilitation at the end of project life, the project will have no permanent impacts on agricultural resources or enterprises.

6.10 Bushfire

A bushfire assessment report was prepared by Waratah Bushfire in accordance with *Planning for Bushfire Protection* (NSW RFS 2019) and is provided in Appendix E.12. The relevant SEARs and how they have been addressed are listed in Section 1.1 of the bushfire assessment report (Appendix E.10).

6.10.1 Existing environment

The climate of the region is warm temperate with predominately winter rainfall. The bushfire danger period is from October to April, depending on seasonal conditions. Fire weather conditions are usually associated with winds from the west, around to the north, accompanied by high daytime temperatures and low relative humidity.

The eastern area, within Murrumbidgee LGA, is not mapped as bushfire-prone land; however, the western area within Edward River LGA is mapped as bushfire-prone land (Category 3).

Bushfires within the region are typically started by lightning (with dry lightning storms occurring frequently during the bushfire season), unattended campfires, power lines, machinery, traffic, escapes from agricultural burns and use of cutting and welding equipment.

Grassland (subject to grazing and cropping), woodland, forested and freshwater wetland communities (within drainage depressions) occur throughout the project and surrounding area, and make up the predominant fuel for bushfires. There are bushfire fuel corridors of more than 20 km, of predominately grassland communities, to the north-west, west, south and east of the project area. The fire risk of adjoining grazing and cropping lands is dependent on climatic conditions, agricultural practices and seasonal process. Typically during summer, grassland and woodland areas are cured (dried out) and become highly flammable. This is typically followed by an increase in moisture content during winter, which reduces fire risk.

Land surrounding the project area, particularly to the south and south-east may be subject to further renewable energy development (including Dinawan Solar Farm, Yanco Delta Wind Farm and Argoon Wind Farm). Vegetation clearing and operational maintenance from these projects could reduce the potential fire run from these directions.

The local area is serviced by fire response services with the nearest volunteer fire brigade, Argoon Rural Fire Brigade, approximately 7 km south of the project area. Local government controls include the declaration and management of burning restrictions such as total fire bans, restricted burning times, prohibited burning times, and harvest and vehicle movement bans to reduce ignition risk. There are no additional specific bushfire management controls relevant to the project area.

6.10.2 Potential impacts

Bushfire risks are associated with bushfires igniting, spreading and causing damage to assets.

i Construction and decommissioning

Potential sources of bushfire ignition or risk, during construction and decommissioning include:

- construction equipment including bulldozers, excavators and vegetation removal machinery using slashers and mulchers
- motor vehicle exhaust systems and diesel-powered trucks with pollution control devices
- hot works such as welding and grinding
- electrical faults
- lightning
- landscape hazards, such as bushfire/grass fire ignition from fire within project facilities, or external ignition of construction equipment/infrastructure from embers, radiant heat and flame contact
- inappropriate storage of chemicals/failure to clean up a spill
- arson.

The impact of a bushfire during construction and decommissioning will be dependent on factors such as fuel loads, weather and the size of the fire. With the implementation of the management measures outlined in Section 6.10.3 and Section 5 of the bushfire assessment report (Appendix E.12), the bushfire risk from the project during construction and decommissioning will be significantly reduced.

ii Operation

Potential sources of bushfire ignition or risk during operation include:

- WTGs (fires within the nacelle, including turbine oil fires)
- electrical faults, such as WTG electrical faults, power surges, hot surfaces, lightning strike to electrical equipment or falling blades
- impacts from downwind air turbulence from WTGs on fire behaviour
- lightning
- landscape hazards, such as bushfire/grass fire ignition from fire within the facility, or external ignition of site infrastructure from embers, radiant heat and flame contact
- inappropriate storage of chemicals/spills/leakage/failure to clean up a spill.

The project has the potential to inhibit aerial fire-fighting support, as WTGs, power transmission infrastructure, meteorological monitoring masts and guy wires can obstruct aircraft operations. As outlined in Section 6.11.6, Spark Renewables will consult with aerial firefighting operators to develop procedures for the safe operation of emergency aircraft in the vicinity of the project.

With the implementation of the mitigation measures outlined in Section 6.10.3 and Section 5 of the bushfire assessment report (Appendix E.12), the bushfire risk from the project during operation will be reduced significantly.

6.10.3 Mitigation measures

The mitigation measures outlined in Section 5 of the bushfire assessment report (Appendix E.10) will be implemented to reduce and manage risks from bushfire. These measures are summarised below in Table 6.32.

Table 6.32 Bushfire mitigation measures

ID	Mitigation measure
BF1	A Fire Management Plan will be prepared that includes: • bushfire fuel management • site infrastructure plan • site access and internal road plan • APZs and their ongoing maintenance • location of hazards that may impact firefighting operations • activities that may be exempt on periods of total fire ban days • consideration of the Grain Harvesting and Fire Safety Guide (Appendix 1 of Appendix E.10) • recording of meteorological monitoring masts in the tall structures database maintained by Airservices Australia (Civil Aviation Safety Authority 2018) • warning lights or visible markers (such as orange balls) on meteorological monitoring masts to minimise risks during aerial firefighting operations • protocols for the rapid shut down of turbines in emergency situations ensuring acknowledgement of who has the authority to direct turbine shut-down procedures. The Fire Management Plan will be prepared in consultation with the Argoon Rural Fire Brigade, NSW RFS District Office for the Mid Murray Zone and Fire Rescue NSW.

Table 6.32 Bushfire mitigation measures

ID	Mitigation measure
BF2	A bushfire emergency management and evacuation plan will be prepared in consultation with NSW RFS in accordance with Table 6.8d of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019). It will be consistent with <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i> (RFS 2014). A copy of the bushfire emergency management and evacuation plan will be provided to the local emergency management committee prior to the start of construction.
BF3	The development footprint will be maintained to the standard of an inner protection area (IPA) in accordance with the requirements of Appendix 4 of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019) including: • a minimum 10 m wide APZ around WTGs • a minimum 14 m wide APZ between workers accommodation facilities and grassland hazards • a minimum 16 m wide APZ between workers accommodation facilities and woodland hazards • a minimum 36 m wide APZ between safe refuge buildings (radiant heat exposure equivalent to less than 10 kW/m²) and grassland hazards • a minimum 42 m wide APZ between safe refuge buildings (radiant heat exposure equivalent to less than 10 kW/m²) and woodland hazards
BF4	Landscape screening (if required) will consider the potential increase in fire risk due to the type (species), density, height, location and overall width of the vegetation screening. Where landscaping is proposed to provide a visual screen: • landscaping will be located more than 100 m from workers accommodation facilities, or • landscaping within 100 m from workers accommodation facilities will be designed in accordance with Section A1.10 low threat vegetation–exclusions, or Appendix 4 of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF5	Buildings within the workers accommodation facilities, if constructed within 100 m of bushfire prone vegetation, will comply with Australian Standard <i>AS3959-2018 Construction of Buildings in Bushfire-prone Areas</i> or the relevant requirements of the <i>NASH Standard – Steel framed construction in bushfire areas</i> (incorporating amendment A – 2015). All new buildings constructed for the project will comply with the construction requirements in Section 7.5 of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF6	Internal access roads will provide access for local emergency service vehicles to WTGs, switchyards, substations, construction compounds and O&M buildings to support property protection activities. The design of worker accommodation facility access roads will comply with the property access road requirements outlined in Table 7.4a of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF7	An adequate static water supply will be provided for firefighting purposes in accordance with Table 7.4a of <i>Planning for Bush Fire Protection</i>. Water supply for firefighting purposes will be located at the primary vehicle access points to the project area as well as at the worker accommodation facilities, construction compounds, O&M building, substations and grid connections and elsewhere as determined at the detailed design phase in consultation with Argoon Rural Fire Brigade, NSW RFS District Office for the Mid Murray Zone, and Fire and Rescue NSW. In addition to static water supply requirements, two mobile water supplies with a minimum capacity of 500 L each (e.g. vehicle-mounted tanks or standalone tankers) will be available on-site during construction and operation.
BF8	The provision of gas will comply with <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF9	Spark Renewables will continue to consult with Argoon Rural Fire Brigade around specific weather conditions that may require works to temporarily cease during construction.
BF10	Spark Renewables will investigate options for firefighting training for construction and operational personnel, as well as opportunities to incentivise workforce participation in Argoon Rural Fire Brigade.
BF11	Spark Renewables will continue to engage with local aerial firefighting operators to develop procedures for their safe operation within the project area.

6.10.4 Conclusion

A portion of the project area is on designated bushfire-prone land. Bushfire risks will be managed through design and management measures in accordance with *Planning for Bushfire Protection* (NSW RFS 2019), *a Guide to Developing a Bush Fire Emergency Management and Evacuation Plan* (NSW RFS 2014) and applicable standards.

Mitigation measures will be implemented to reduce and manage risks from bushfire and will include provision of on-site static water supply as well as a fire management plan and a bushfire emergency management and evacuation plan prepared in consultation with RFS (including Argoon Rural Fire Brigade).

With the implementation and maintenance of the mitigation measures outlined in Section 6.10.3, the bushfire risk associated with the project will comply to the objectives and specific performance criteria of *Planning for Bushfire Protection* (NSW RFS 2019).

6.11 Hazards and risks

6.11.1 Introduction

The following hazards and risks have been assessed in accordance with the SEARs: telecommunications, health, dangerous goods, blade throw and aviation safety.

The SEARs require a preliminary hazard analysis to be prepared for a battery energy storage system. It is no longer proposed to construct a battery energy storage system as part of the project.

6.11.2 Telecommunications

A telecommunications impact assessment was prepared for the project by Middleton Group Engineering and is provided in Appendix E.10. The relevant requirements of the SEARs and how they are addressed, are summarised Section 3 of the telecommunications impact assessment (Appendix E.10).

The telecommunications impact assessment identifies telecommunication services within proximity of the project area and assesses the impacts that the project may have on these services including:

- point-to-point microwave links
- meteorological radar
- mobile voice-based communications
- wireless and satellite services
- broadcast and digital radio and television
- trigonometry stations and global positioning services (GPS).

Potential impacts to telecommunication services are summarised in Table 6.33.

Table 6.33 **Summary of potential impacts to telecommunication services**

Service	Existing environment	Potential impacts	Consultation
Point-to-point microwave links	There are six point-to-point microwave links that pass through the project area, within 2 km of WTGs. These are direct communication links registered with Australian Communications and Media Authority (ACMA). Licences are held by NSW Electricity Networks Operations Pty Limited (one link), NSW RFS (four links) and Essential Energy (one link). There are no registered ACMA point sites within 2 km of a WTG.	Initial three-dimensional analysis has identified potential for diffraction effects (i.e. an object obstructing the path of travel of a wave) from three WTG rotors for one link licenced by NSW Electricity Networks Operations Pty Limited (Link 2 on Figure 2 in Appendix E.10). Impacts to the performance of the link are not expected to be significant as the WTG rotor diameters do not extend beyond 60% of the first Fresnel zone (envelope of influence along the length of the link). Representative profile and cross-sectional views of interactions between Link 2 and the project are provided in Section 5.3 of Appendix E.10. The project is not expected to cause interference for any other point-to-point links or ACMA point sites.	Stakeholder engagement has commenced with NSW Electricity Networks Operations Pty Limited to confirm that any impacts to the link are manageable. Consultation with NSW RFS and Essential Energy has confirmed that the project will not impact links licenced by these organisations. Detailed correspondence is provided in Appendix E.10.
Meteorological radar	There are three meteorological radar stations owned by the Bureau of Meteorology located between 100 and 160 km from the nearest WTG.	The project complies with the setback recommendations from the World Meteorological Organisation of a minimum of 5 km, with a setback preference of more than 20 km so impacts on meteorological radar stations are unlikely.	Consultation with the Bureau of Meteorology has determined that any impacts on meteorological radar operations will be manageable (detailed correspondence is provided in Appendix E.10).
Mobile voice-based communications	Telstra and Optus provide mobile coverage in the project area. There are no mobile phone base stations located within the project area, with the closest towers greater than 1 km from WTGs.	No significant impacts to mobile voice-based coverage are expected outside the project area or to mobile phone base stations, as signal is not typically impacted where mobile phone base stations are located more than 1 km from WTGs. There may be some reduction in signal in the immediate vicinity of WTGs. However, this can be mitigated by relocating the mobile phone receiver in the order of tens of metres. It's acknowledged that during construction, the use of the mobile network by the project's construction workforce may impact network availability for neighbouring landowners.	Consultation with Optus has determined that the project will not have any impact on services. Consultation with Telstra is ongoing; however, the project is not predicted to have any impact on services. Detailed correspondence is provided in Appendix E.10.
Wireless and satellite internet services	There are four associated residences (R042, R156, R084 and R093), two of which are dilapidated, and no non-associated residences within 2 km of a WTG.	Satellite services for R042, R156, R084 and R093 may be impacted as their proximity to turbines may impede satellite views of the sky. No impacts are expected to non-associated residences.	Should impacts to wireless or satellite services at associated residences occur, Spark Renewables will engage with the landholders to identify a suitable alternative.

Table 6.33 Summary of potential impacts to telecommunication services

Service	Existing environment	Potential impacts	Consultation
Broadcast and digital radio and television	No broadcast or digital radio or television service transmitters are located within 5 km of a proposed WTG.	No impacts are expected.	No consultation is required.
Trigonometry stations	There are eight survey marks (observation marks used for surveying or distance measuring) within 2 km of a proposed WTG.	No impacts are expected as survey markers are 233–1,970 m from WTG locations. If during detailed design, construction of the project is expected to impact survey marks, Spark Renewables will seek assistance from a registered surveyor to move or remove the survey marks in consultation with the NSW Government.	Consultation with Geoscience Australia has determined that the project will not impact survey marks or trigonometrical infrastructure (detailed correspondence is provided in Appendix B.5 in Appendix E.10 of this EIS).
GPS	There are no global navigation satellite system stations within approximately 20 km of a proposed WTG.	The project is located a significant distance from the closest global navigation satellite system stations so impacts to GPS are highly unlikely.	Consultation with Geoscience Australia has confirmed that the project will not impact global navigation satellite system stations (detailed correspondence is provided in Appendix B.5 in Appendix E.10 of this EIS).

In summary, impacts to telecommunication services are not expected to be significant.

6.11.3 Health

A human health assessment considering electric and magnetic fields (EMF) has been prepared for the project by Middleton Group Engineering and is provided in Appendix E.11. The human health assessment has estimated the strength of EMF emitted by transmission lines and assessed the potential impact on human health. The relevant requirements of the SEARs and how they are addressed, are summarised in Section 1 of the human health assessment (Appendix E.11).

The proposed electrical powerlines, including underground and overhead single-circuit 33 kV powerlines and 330 kV overhead transmission lines, will emit EMF. The EMF strength was calculated and compared against the International Commission on Non-Ionising Radiation Protection's (ICNIRP) recommended public exposure limit of 200 microTesla (μT) for magnetic fields and 5 kV/m for electric fields (ICNIRP 2010).

The results of the human health assessment against the *Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* (ICNIRP 2010) are provided in Table 6.34.

Table 6.34 EMF compliance with ICNIRP's recommended exposure limits

Installation method	Observation location	Magnetic field strength (μT)	Electric field strength (kV/m)	Compliance with ICNIRP exposure limits
Underground 33 kV cable (800 mm underground)	1.8 m above ground (standard height)	Less than 5	-	Pass
	1 m above ground (lowest height of impact when standing)	Less than 5	-	Pass
	Ground level (person lying on the ground)	Less than 20	-	Pass

Table 6.34 EMF compliance with ICNIRP's recommended exposure limits

Installation method	Observation location	Magnetic field strength (μT)	Electric field strength (kV/m)	Compliance with ICNIRP exposure limits
Overhead 33 kV power line – single circuit (at a height of 6.7 m)	4 m above ground (person sitting in heavy vehicle)	Less than 20	-	Pass
	1.8 m above ground (standing height)	Less than 10	-	Pass
Overhead 330 kV transmission line – single circuit (at a height of 8 m)	4 m above ground (person sitting in heavy vehicle)	Less than 100	Less than 4	Pass
	1.8 m above ground (standing height)	Less than 40	Less than 1	Pass
Overhead 330 kV transmission line – double circuit (at a height of 8 m)	4 m above ground (person sitting in heavy vehicle)	Less than 30	Less than 4	Pass
	1.8 m above ground (standing height)	Less than 20	Less than 2	Pass

The project complies with ICNIRP guidelines for safe public and occupational exposure limits to EMF and no risks to human health due to emitted EMF have been identified.

The *NHMRC Statement: Evidence on Wind Farms and Human Health* (NHMRC 2015) concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans.

6.11.4 Dangerous goods

A hazard and risk assessment has been prepared for the project by Sherpa Consulting and is provided in Section 3 of Appendix E.13. The hazard and risk assessment includes a preliminary risk screening which considers storage, handling, and transport of dangerous goods. The relevant requirements of the SEARs and how they are addressed, are summarised in Section 1.2 of the hazards and risks assessment (Appendix E.9).

The objective of a preliminary risk screening is to determine whether a development proposal is considered 'potentially hazardous' under State Environmental Planning Policy (Resilience and Hazards) 2021. Development proposals that are classified as 'potentially hazardous' industry must complete a preliminary hazards analysis as set out in the Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 *Guidelines for Hazard Analysis* (DoP 2011a) and *Applying SEPP 33* (DoP 2011b) to determine the risks to people, property and the environment.

Liquefied petroleum gas, gasoline and diesel are classified as hazardous materials and are expected to be transported to, stored and handled on site during construction. The quantities of these materials are not expected to exceed storage and transport thresholds outlined in the *Applying SEPP 33* (DoP 2011b), as summarised in Table 3.1 of the hazards and risks assessment (Appendix E.13).

The project will not involve any other hazards identified in Appendix 2 of *Applying SEPP 33* (DoP 2011b). It is not an industry identified as potentially hazardous in Appendix 3 of *Applying SEPP 33* (DoP 2011b). Therefore, the project is not considered to be 'potentially hazardous' and does not require a preliminary hazard analysis.

6.11.5 Blade throw

A blade throw risk assessment was prepared for the project by Sherpa Consulting as part of a hazards and risks assessment and is provided in Section 4 of Appendix E.13. The relevant requirements of the SEARs and how they are addressed, are summarised in Section 1.2 of the hazards and risks assessment (Appendix E.9).

Blade throw is a structural failure incident involving the detachment of a blade (tip, portion or full blade) from a WTG. This may be caused by physical damage from environmental factors, e.g. lightning or extreme wind, or may be caused over time, by mechanical stress, corrosion or improper design and installation.

The purpose of the blade throw risk assessment is to assess the blade throw risks with respect to associated and non-associated residences and BESS locations in surrounding areas against the risk criterion outlined in HIPAP No. 4: *Risk Criteria for Land Use Safety Planning* (DoP 2011c).

i Blade throw distance

Blade throw distances were calculated based on a formula developed by Rogers, Slegers & Costello (2012). Conservative assumptions were applied to determine the theoretical maximum lateral blade throw distance for a blade tip, blade fragment (20% of blade length) and for the entire blade under maximum operating speed and overspeed conditions (Table 6.35).

Calculated blade throw distances were compared to blade throw simulation results published by Sarlak & Sorensen (2016) (Table 6.35).

Table 6.35 Blade throw distances

Operating conditions	Blade tip fragment	Blade fragment (20% of blade length)	Entire blade
Maximum operating speed (10 revolutions per minute) - calculated			
Blade throw distance (m)	1,218	1,010	385
Throw velocity (m/s)	105	94	52
Overspeed conditions (15 revolutions per minute) - calculated			
Blade throw distance (m)	2,620	2,148	750
Throw velocity (m/s)	157	141	79
Simulated conditions (Sarlak & Sorensen 2016)			
Blade throw distance (m)	-	920	260
Throw velocity (m/s)	100	-	-

Calculated blade throw distances were greater (i.e. more conservative) than the simulated results, and have therefore been used for the assessment.

ii Residences

The potential for all or part of a blade to be thrown the distance required to reach a residence is summarised in Table 6.36.

Table 6.36 Blade throw impact potential at surrounding residences

ID	Type	Closest WTG ¹	Distance to closest WTG (m)	Blade throw impact (maximum operating speed)			Blade throw impact (overspeed conditions)		
				Blade tip fragment	Fragment 20% of entire blade	Entire blade	Blade tip fragment	Fragment 20% of entire blade	Entire blade
Eastern area									
R042 ¹	Associated	T105	1176	Yes	No	No	Yes	Yes	No
R156	Associated	T113	1177	Yes	No	No	Yes	Yes	No
R019	Non-associated	T122	2041	No	No	No	Yes	Yes	No
R143	Non-associated	T39	2494	No	No	No	Yes	No	No
Western area									
R084 ¹	Associated	T154	1675	No	No	No	Yes	Yes	No
R093	Associated	T154	1771	No	No	No	Yes	Yes	No

Notes: 1. Residences are dilapidated.

There are no residences within predicted impact distances (up to 750 m) for an entire blade. The throw distance for blade tip fragment for maximum operating speed (1,010 m) may potentially impact two associated residences (R042 and R156), while blade tip throw distances (2,602 m) for the overspeed conditions may potentially impact four associated residences (R042, R156, R084 and R093) and two non-associated residences (R019 and R143). It is noted that R042 and R084 are dilapidated residences.

The risk from blade throw to residences is discussed in Section 6.11.5iv.

iii Nearest BESS locations

The potential for all or part of a blade to be thrown the distance required to reach a BESS is summarised in Table 6.37.

Table 6.37 Blade impact potential to surrounding BESS locations

BESS	Closest WTG ²	Distance to closest WTG (m) ³	Blade throw impact (maximum operating speed)			Blade throw impact (overspeed conditions)		
			Blade tip fragment	Fragment 20% of entire blade	Entire blade	Blade tip fragment	Fragment 20% of entire blade	Entire blade
Yanco Delta Wind Farm	T105	1176	No	No	No	Yes	Yes	No
Dinawan Solar Farm	T113	1177	No	No	No	No	No	No

Notes:

- Both WTGs are within the eastern area
- BESS locations have been estimated for Yanco Delta Wind Farm from the Yanco Delta Wind Farm DPHI Assessment Report and for Dinawan Solar Farm from spatial data provided by Spark Renewables.

Based on calculated blade throw distances, there is potential for the Yanco Delta Wind Farm BESS locations to be impacted under overspeed conditions for a blade tip and fragment (20% of blade) (Table 6.37). The BESS locations for Argoon Wind Farm are not available in the public domain so have not been considered.

iv Risk assessment

The Netherlands's *Wind Turbine Risk Zoning Handbook* (Rijksdienst voor Ondernemend Nederland 2014) provides guidance on the Location Specific Individual Risk (LSIR), for blade throw, that is, the frequency per year at which an individual, who stays unprotected for 24 hours per day and 365 days per year at specific location, is expected to sustain fatal harm due to exposure to hazards induced by blade throw. The 'rule of thumb' provided is:

1. The LSIR of 1×10^{-5} per year (i.e. ten in a million per year) contour for distance is equal to half the rotor diameter.
2. The LSIR of 1×10^{-6} per year (i.e. one in a million per year) contour for distance is equal to either the (1) hub height plus half the rotor diameter (i.e. tip height) or (2) maximum throw distance at nominal rotor speed for an entire blade, whichever is greater.

For this assessment, the risk area has been defined conservatively as 750 m from WTGs (maximum throw distance of entire blade for overspeed conditions).

For blade throw impact to residences, the acceptable risk for individual fatality in areas of residential land use is defined in HIPAP No. 4 as 1×10^{-6} per year. As there are no residences within 750 m of a WTG, the HIPAP No. 4 individual fatality risk criterion for residential land use is met and societal risk from blade throw is expected to be negligible.

For blade throw impact to BESS locations, the acceptable risk for accident propagation is defined in HIPAP No. 4 as 50×10^{-6} per year (i.e. 50 in a million per year). As the nearest BESS is located at least 1,600 m from the nearest WTG (T105 in the eastern area), the risk criterion for accident propagation is met.

6.11.6 Aviation safety

An aviation impact assessment was prepared by Aviation Projects for the project and is provided in Appendix E.9. The aviation impact assessment assesses potential aviation impacts of the project, provides aviation safety advice based on relevant requirements of air safety regulations and procedures, and informs and documents consultation with relevant aviation agencies. The relevant SEARs and how they are addressed is summarised in Section 3.1 of the aviation impact assessment (Appendix E.9).

The following legislation and guidelines are relevant to the assessment and are referenced in the following sections:

- Civil Aviation Safety Regulations 1998 (CASR)
- *National Airports Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* (NASAG 2012) (NASF Guideline D)
- *Procedures for Air Navigation Services – Aircraft Operations* (ICAO 2018) (PANS OPS).

i Nearby aerodromes

Aerodromes are either certified, or uncertified in accordance with Part 139 of CASR. The project is located within proximity to the following certified aerodromes, shown in Figure 6.21:

- Deniliquin Airport (YDLQ) – 72.8 km (39.2 nautical miles (nm)) south-west of a WTG.

- Hay Airport (YHAY) – 65.8 km (35.5 nm) north-west of a WTG.
- Narrandera Airport (YNAR) – 76.7 km (41.4 nm) north-east of a WTG.

The area within 56 km (30 nm) of a certified aerodrome is used to identify possible constraints, in accordance with CASR and PAN OPS. As the nearest certified aerodrome is 65.8 km from the project area, no impacts from the project are expected on certified aerodromes. As a result, no impacts are expected to any protected airspaces that surround certified aerodromes (airspace used to fly in and out of an airport). This includes obstacle limitation surfaces (safeguards a pilot flying by sight) and PAN OPS surfaces (generally above obstacle limitation surfaces; safeguards aircraft guided solely by instruments).

The project is also located within proximity of the following uncertified aerodromes (also referred to as aircraft landing areas) shown in Figure 6.21:

- Goolgumbbla Aerodrome – within the project area, less than approximately 5.6 km (3 nm) from a WTG. Goolgumbbla Aerodrome is owned and operated by one of the project's landowners.
- Steam Plains Aerodrome – 7.2 km (3.9 nm) south of the project.
- Jerilderie Airport (YJER) – 31.2 km (16.9 nm) south-east of the project.

The area within 5.6 km (3 nm) of an uncertified aerodrome is the area in which aircrafts will descend or ascend between ground level, circuit height (normally about 300 m above ground level) and cruising altitude. Obstacles within this area are likely to have an adverse impact upon flight operation at the aerodrome.

More than 50 WTGs are located with 5.6 km (3 nm) of Goolgumbbla Aerodrome, with seven located within the typical 1-nm (1.85 km) circuit area where aircraft prepare for landing. This is a potential hazard for flight safety, take-off and landing operations. Spark Renewables will continue to consult with the owner and operator of Goolgumbbla Aerodrome (an associated landowner).

No impacts are expected to other nearby uncertified aerodromes as they are greater than 5.6 km (3 nm) from the project.

ii Turbulence

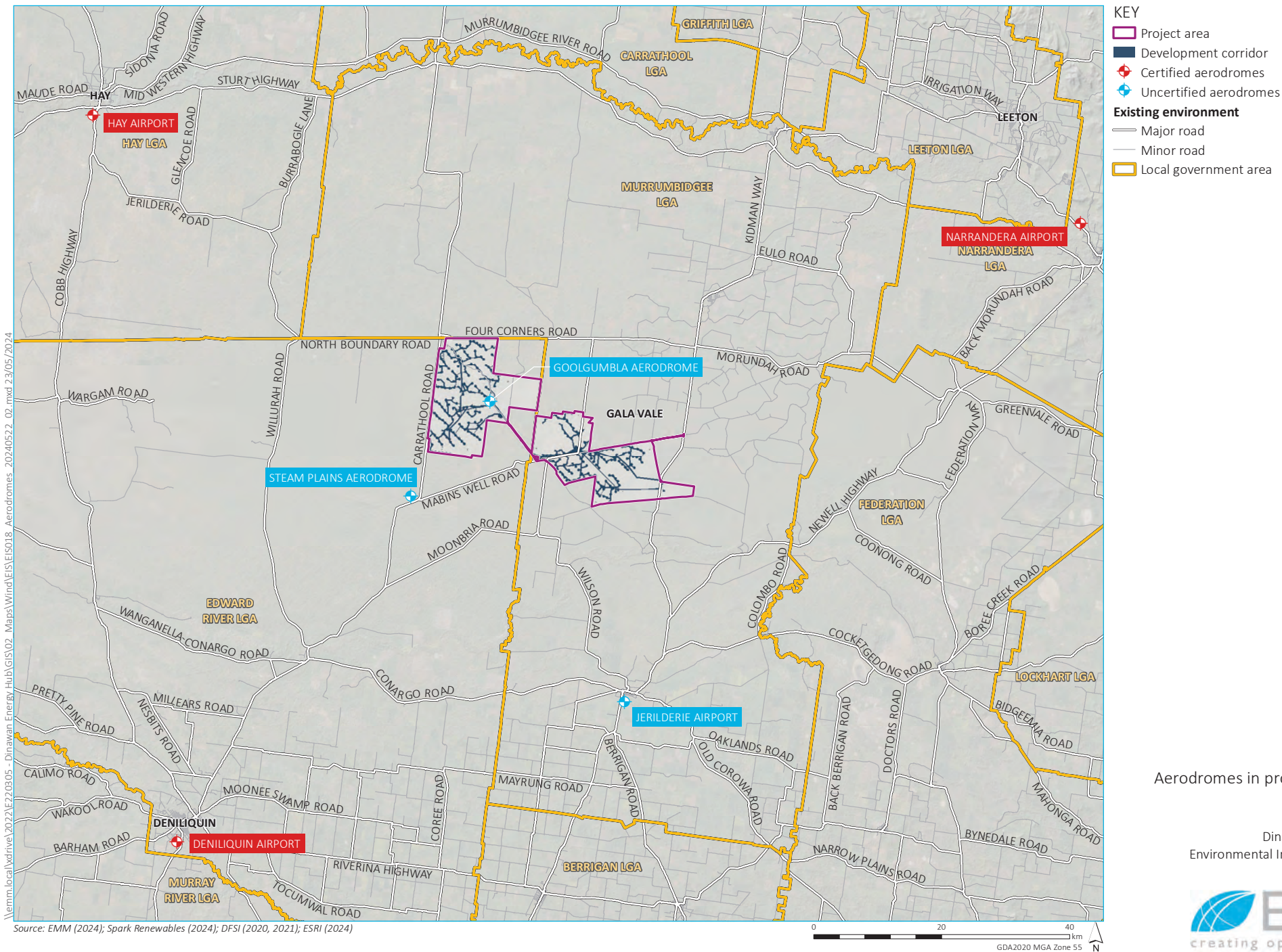
The operation of WTGs, specifically the movement of the rotors through the air, can create air turbulence, which may impact aircraft in the vicinity. The aviation impact assessment has determined that any adverse turbulence would most likely be within 1.4 km of a WTG, but considers a conservative area of 2 km from a WTG is likely to be the maximum area where turbulence from WTGs would be felt by pilots operating downwind of a WTG.

Goolgumbbla Aerodrome is located within this area and has potential to be impacted by downwind turbulence from WTGs. Further consultation with the Goolgumbbla Aerodrome owner (one of the project landholders) will be undertaken regarding operational impacts.

iii Lowest safest altitude

The project infrastructure will form aerial obstacles that will be taller than the tallest obstacle currently in the area. The location and height above mean sea level (AMSL) for each WTG is provided in Appendix G. The maximum blade tip height of the proposed WTGs will be 280 m above ground level. The tallest WTG for the project is T124 in the eastern area with an elevation of approximately 112.89 m above the Australian height datum (AHD), resulting in an overall blade tip height of approximately 392.9 m AMSL.

Given the relatively flat nature of the terrain (average 108 m AHD, maximum elevation of 115 m AHD), the micro siting of the WTGs is not likely to result in a significant change in the maximum overall blade tip height of the project.



Aerodromes in proximity of the project area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.21

CASA regulates how low aircraft can fly in a given area, to prevent collisions with obstacles, through definition of a lowest safe altitude (LSALT). This is defined for designated routes (route LSALT) and for general areas based on a grid of 1 degree latitude and 1 degree longitude (grid LSALT). CASR Part 173 requires that the published route LSALT and grid LSALT provide a minimum of 1,000 ft (approximately 304.8 m) clearance above the tallest obstacle within the relevant airspace grid or air route. The project area is located within two grid LSALT areas and there are five air routes within 13 km (7 nm) of the project area. The project will require the LSALT to be raised for one route and two grid areas, as assessed in Table 6.38.

Table 6.38 **LSALT impact analysis**

Air route	Waypoint pair	Route LSALT (ft AMSL)	Protection Surface (ft AMSL)	Height of highest WTG (ft AMSL)	Impact on LSALT
H247	TOB-B - CULIN	4,500	3,500	1,290.8	Nil
W264	YAN-O - YGTH	3,000	2,000	1,290.8	Nil
W310	YD-Q - YGTH	2,300	1,300	1,290.8	Nil
W419	YDLQ - YNAR	2,100	1,100	1,290.8	Raise LSALT to 2,300 ft
W612	CAN-Y - YGTH	2,900	1,900	1,290.8	Nil
Grid	N/A	2,200	1,200	1,290.8	Raise LSALT to 2,300 ft

As outlined in Section 6.11.7, Spark Renewables will continue to consult with Airservices Australia and CASA to amend the LSALT and will consult with aviation authorities, local aerodrome owners/operators and local aerial agricultural operators regarding any changes to the LSALT as a result of the project.

iv **Air space and air traffic controller surveillance**

Australian airspace is categorised into five different classes, each with specific controls applied to aviation activities according to altitude and proximity to airports. The project area is located wholly within Class G airspace, which is uncontrolled airspace, meaning no clearance is required from an air traffic controller to operate in the airspace.

Airservices Australia requires an assessment of the potential for the WTGs to affect radar line of sight for air traffic controllers. The nearest air traffic controller surveillance radar is located at Mt Bobbara, near Binalong in NSW, approximately 280 km east of the project area. Due to the distance between Mt Bobbara and the project area, no impacts to radar line of sight are predicted.

v **Aerial firefighting, emergency and agricultural application operations**

Aerial firefighting is conducted within the region. The Australasian Fire and Emergency Services Authorities Council's *Wind Farms and Bushfire Operations* (AFAC 2018) provides guidance on bushfire response in proximity to wind farms. As outlined in Section 6.11.7, Spark Renewables will consult with aerial firefighting operators to develop procedures for the safe operation of emergency aircraft in the vicinity of the project.

Similarly, Spark Renewables will consult with other medical emergency service providers (such as NSW Ambulance Aeromedical Operations) regarding emergency aircraft access in the project area.

Aerial agricultural operations, such as for the application of fertilisers and pesticides, are conducted in the area. Consultation with Aerial Applications Association of Australia and with local aerial application operators has determined that safe aerial application operations will be possible within the project area and on surrounding properties with the implementation of mitigation measures outlined in Section 6.11.7.

An aviation risk assessment was completed for the project based on a review of accident statistic data and stakeholder consultation (see Section 9 of Appendix E.9). With the introduction of mitigation measures outlined in Section 6.11.7, all residual risks are considered tolerable.

The risk assessment determined that aviation hazard lighting is required during daylight hours for meteorological monitoring masts that are installed prior to WTGs and WMTs that are not in close proximity to a WTG. Hazard lighting will be in accordance CASA's *Manual of Standards*.

Hazard lighting is not required for WTGs, or permanent meteorological monitoring masts close to WTGs.

While there is no legislative requirement to install hazard lighting on overhead transmission lines, local aerial application operators will be consulted prior to construction to determine if a risk assessment is required.

Implementation of aviation hazard lighting will be subject to ongoing consultation with CASA and Airservices Australia and will be confirmed during detailed design.

6.11.7 Mitigation measures

A summary of the proposed measures to manage potential hazards and risks is provided in Table 6.39.

Table 6.39 Hazards and risks mitigation measures

ID	Mitigation measure
AV01	Spark Renewables will report the WTGs and meteorological monitoring masts to CASA in accordance with CASR 139.165 following detailed design and prior to construction.
AV02	'As constructed' details of WTG and meteorological monitoring masts coordinates and elevation will be provided to Airservices Australia.
AV03	Any obstacles that will be above 100 m above ground level (including temporary construction equipment) will be reported to Airservices Australia (Notice to Airmen offices) until they are incorporated in published operational documents. For example, a notification regarding crane operations may include: - the planned operational timeframe - the maximum height of the crane - the general area/route within which the crane will operate.
AV04	Project details, including the 'as constructed' location and height information of WTGs, meteorological monitoring masts and overhead transmission lines, will be provided to local and regional aircraft operators prior to construction, including nearby landowners to facilitate aerial application operations planning.
AV05	Spark Renewables will engage with local aerial agricultural operators and aerial firefighting operators emergency services providers regarding aircraft operations in the vicinity of the project.
AV06	Overhead transmission lines and/or supporting poles that could adversely affect aerial application operations will be identified in consultation with local aerial application operators and marked in accordance with Part 139 MOS 2019 Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8).
AV07	Spark Renewables will consult with Airservices Australia and CASA regarding changes to the LSALT and will consult with aviation authorities, local aerodrome owners/operators and local aerial agricultural operators regarding any changes to the LSALT from the project.

Table 6.39 Hazards and risks mitigation measures

ID	Mitigation measure
AV08	If required following consultation with CASA and Airservices Australia, temporary and permanent meteorological monitoring masts will be marked according to the requirements set out in MOS 139 Section 8.10 (as modified by the guidance in NASF Guideline D). Specifically: • marker balls, high visibility flags or high visibility sleeves will be placed on the outside guy wires • paint markings will be applied in alternating contrasting bands of colour to at least the top 1/3 of the mast • guy wire ground attachment points will have contrasting colours to the surrounding ground/vegetation.
AV09	Consultation with CASA and Airservices Australia will be completed to determine whether meteorological monitoring masts present an unacceptable risk to aviation safety. If a meteorological monitoring mast is assessed as likely to present an unacceptable risk to aviation safety, lighting will be installed. Characteristics of obstacle lighting will be in accordance with CASA's <i>Manual of Standards</i>.
AV10	The rotor blades, nacelle and the mast supporting the WTGs will be painted predominantly white. No additional marking measures will be installed for WTGs.
DG1	If diesel is stored with other flammable liquids (e.g. gasoline), a separation distance of at least 10 m to the nearest development footprint boundary will be maintained to ensure that the SEPP screening threshold is not exceeded.
TEL1	Should impacts to wireless or satellite services at associated residences occur, Spark Renewables will engage with the landholders to identify a suitable alternative.

6.11.8 Conclusion

No significant risks and hazards have been identified for the project. The aviation impact assessment determined that risks associated with the project are tolerable with the implementation of mitigation measures outlined in Section 6.11.7, which include consultation with CASA, Airservices Australia and other relevant stakeholders.

The telecommunications impact assessment, human health assessment, preliminary risk screening and blade throw assessment found hazards and risks to be acceptable/negligible and no further mitigation is required.

6.12 Social

6.12.1 Introduction

A social impact assessment (SIA) was prepared for the project by EMM and is provided in Appendix E.14. The SIA was prepared in accordance with the *Social Impact Assessment Guideline for State Significant Projects* (SIA Guideline) (DPE 2023b) and the *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects* (SIA Technical Supplement) (DPE 2023c). The relevant SEARs and how they are addressed is summarised in Section 1.2 of the SIA (Appendix E.14).

6.12.2 Existing environment

The project is located within the Murrumbidgee and Edward River LGAs on the traditional lands of the Wiradjuri people and several smaller nations of the Murrumbidgee plains. It is about halfway between the towns of Coleambally and Jerilderie.

Social impacts and opportunities have been considered at three spatial scales: a local study area, a regional study area, and nearby regional communities.

i Local study area

The local study area (Figure 6.22) consists of the communities closest to the development corridor, including Jerilderie township, that may experience direct social impacts from the project associated with amenity, traffic and the presence of the construction workforce.

Key socio-economic characteristics of the local study area are:

- a population of 407
- 5.2% identify as Aboriginal and/or Torres Strait Islander
- very sparse population (five non-associated residences within 4 km of area WTG location)
- predominantly agricultural land use, primarily of cattle and sheep grazing
- low unemployment rates (1.2%) and high labour force participation (76.3%).

ii Regional study area

The regional study area (Figure 6.22) is comprised of the Murrumbidgee LGA and Edward River LGA, with a total area of 15,761 km². The regional study area is likely to experience fewer direct social impacts but more indirect social impacts from the project.

There are a number of renewable energy developments in the regional study area as it is in the South West REZ.

Key socio-economic characteristics of the regional study area are:

- population of 11,809 (combined population of Murrumbidgee and Edward River LGAs)
- 8.6% (290 people) identify as Aboriginal and/or Torres Strait Islander
- a declining population (decreasing 4.9% between 2011 and 2021)
- a high median age, indicating an ageing population
- a higher proportion of Aboriginal and/or Torres Strait Islander people, compared to the wider Murray region
- an economy built on irrigated agriculture (as opposed to grazing, as in the project area), where the low economic diversity indicates a high degree of dependence on this sector
- a very low unemployment rate in Murrumbidgee LGA (2.2%), with a higher rate in Edward River LGA (4.3%), compared to the NSW unemployment rate (4.9%)
- the most common occupation within the regional study area is manager (22.5%), which includes farm managers
- low housing vacancy rates, low housing stock, and increasing house prices, indicating challenges with housing accessibility
- a small number of short-stay accommodation options
- low health services capacity, including general practitioners, hospitals and Aboriginal health services.

Key challenges for the regional study area include maintaining and upgrading infrastructure (such as roads, water systems and community facilities); and telecommunication connectivity, where slow internet speeds and lack of mobile coverage is considered to impact business productivity and agricultural practices. This creates a barrier to attracting investment to the area and impacts safety during emergencies (Helen Dalton MP 2021). The project has the potential to contribute to overcoming some of these challenges, as discussed in Section 6.12.4.

iii Nearby regional communities

Nearby regional communities including Coleambally, Jerilderie, Wagga Wagga, Griffith and Deniliquin (Figure 6.22) townships may experience social impacts related to social infrastructure and services, employment, business and industry, and accommodation. These may be impacts from single projects or cumulative impacts from multiple projects.

Key socio-economic characteristics of the nearby regional communities are:

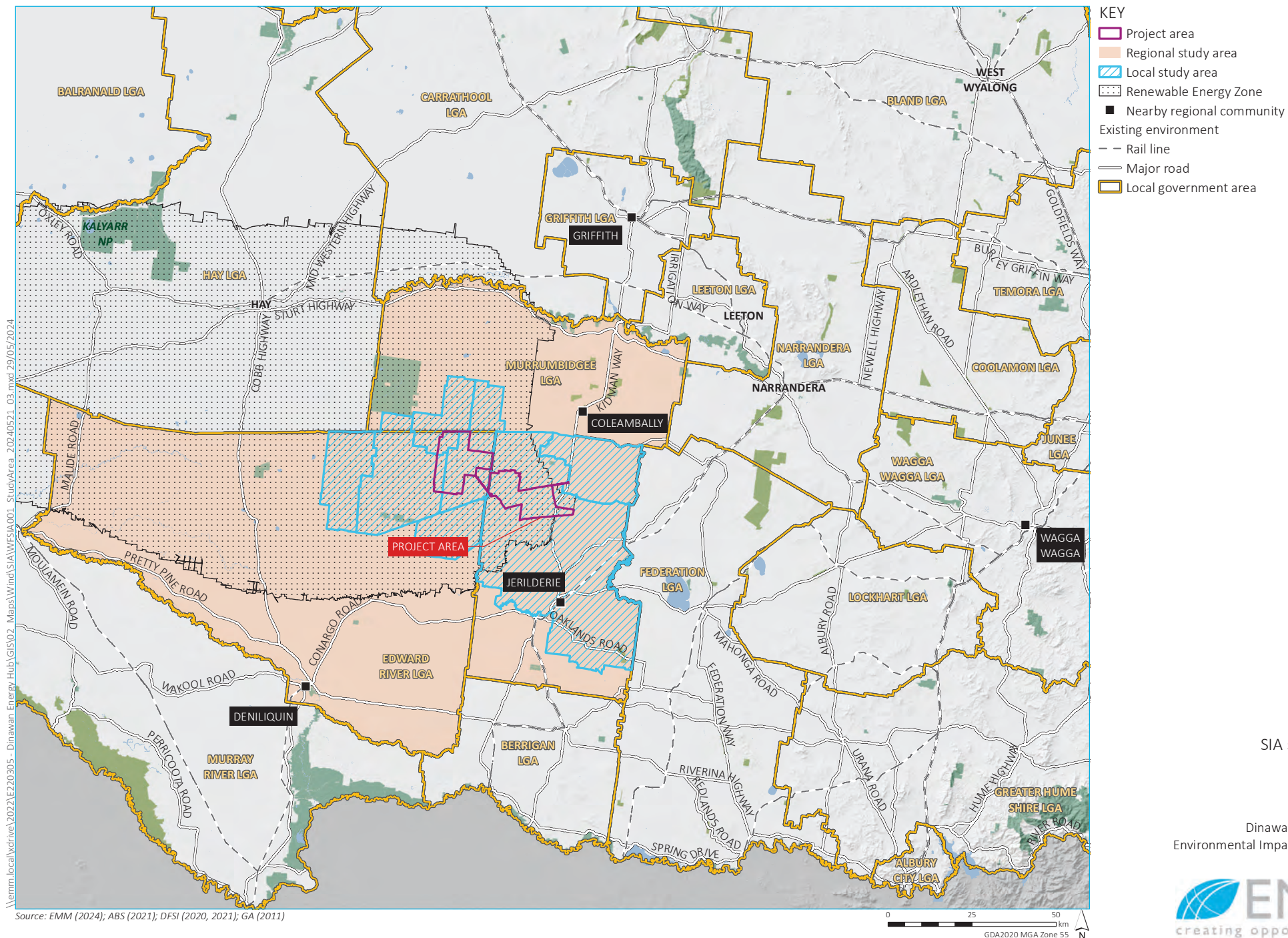
- population of over 86,000 people
- Wagga Wagga is the largest community, with over 57,000 residents
- 5,652 people identified as Aboriginal and/or Torres Strait Islander, representing 6.4% of residents.
- larger, growing populations in Wagga Wagga and Griffith in comparison to smaller, declining populations in Coleambally, Jerilderie, and Deniliquin
- younger populations and high levels of labour force participation in Coleambally, Wagga Wagga and Griffith and older populations and fewer people active in the labour force in Jerilderie and Deniliquin
- key social infrastructure for the region, including for health services, located in Wagga Wagga and Griffith, with far fewer services and facilities in Coleambally, Jerilderie, and Deniliquin
- very low unemployment rates in Coleambally (2%) and Griffith (3.3%).

The wider region has experienced a number of natural disasters and other significant events within the last decade, including a prolonged period of drought, a mouse plague and severe flooding. These events have impacted the environment and regional economy, particularly for irrigated agriculture in the Murrumbidgee LGA. The COVID-19 pandemic posed further challenges for the region, particularly for local businesses. Between 2018 and 2022, the region faced three disaster declarations and received \$8.09 million in funding through disaster recovery grants to support recovery efforts (Department of Regional NSW 2023).

6.12.3 Avoidance and minimisation through design

The findings of project scoping and stakeholder engagement (including SIA-specific engagement) informed refinements to the project, including the following:

- Significant refinements to the development corridor to reduce impacts of the project on biodiversity and Aboriginal cultural heritage which were raised as concerns by the broader community, First Nations stakeholders and nearby landowners during EIS and SIA engagement (see Section 6.3 and Section 6.4).
- Inclusion of construction workforce accommodation facilities as part of the project with capacity for 75% of the project's workforce at the peak of construction. This was in response to the shortage of local housing and accommodation supply identified in the SIA and concerns raised by the community regarding the impact the project workforce would have on the availability of short-term accommodation and local housing (see Section 3.3.5ia).



SIA study area

Dinawan Wind Farm
Environmental Impact Statement
Figure 6.22

- Reductions in the visibility of WTGs infrastructure through setback of WTGs from non-associated residences (minimum 2 km), Kidman Way (3.3 km) and Oolambeyan National Park (11 km), in response to the findings of the LVIA and concerns raised by stakeholders regarding potential visual impacts (see Section 6.1).
- The ongoing use of the development footprint for agriculture during operation to mitigate potential impacts on agricultural productivity, in response to stakeholders queries regarding the impact of the project on agricultural productivity, as well as on neighbouring properties (see Section 6.9).

6.12.4 Potential impacts

The social impacts and benefits of the project have been categorised under key social themes and assessed using a risk-based framework as outlined in Section 2.3 of the SIA Technical Supplement (DPE 2023c). This method determines the significance of project impacts based on ratings of likelihood and magnitude of change. Technical reports and stakeholder engagement were used to inform the assessment. Mitigation and enhancement strategies for each impact/benefit are outlined in Section 6.12.5.

i Energy transition

The project will have benefits for NSW, Australia and globally, by contributing to the transition to low GHG-emitting electricity generation.

Project benefits related to energy transition include:

- Positive influence on intergenerational equity – the project will contribute to a reduction in carbon emissions which will benefit future generations by slowing the impacts of climate change. Stakeholders interviewed for the SIA acknowledged the project will provide a cleaner electricity production, thereby potentially reducing climate change impacts.
- Enhanced project outcomes through participation in decision-making processes – Spark Renewables' engagement with stakeholders during EIS preparation, including as part of the SIA, has contributed to identifying key project constraints and managing local impacts, leading to better project outcomes. Many stakeholders, particularly Murrumbidgee Council, Edward River Council and CICL, want to be consulted as the project progresses into operation and decommissioning. During SIA consultation, some adjacent and nearby landowners expressed their frustration regarding the time and effort required to consult with multiple renewable energy applicants. However, it was acknowledged that Spark Renewables had been professional and responsive to matters raised, including adapting project design elements.

The SIA assessed the significance of the social benefits to the energy transition to be medium. With the application of mitigation measures (see Section 6.12.5), the significance will be medium-high.

ii Employment, training, and business

Project related benefits and impacts relating to employment, training, and business include the following:

- Increased opportunities for employment and training – the project will provide opportunities for local employment which will benefit the local and wider economy. SIA engagement participants highlighted that vulnerable groups would benefit most from project employment opportunities, particularly through capacity building and training. Stakeholders regarded ongoing work or building transferable skills to be key to meaningful employment. For many First Nations stakeholders, building cultural heritage knowledge within the local area was an important aspect of meaningful employment.

- Generation of income through procurement opportunities for local and regional businesses – there will be opportunities for the project to support local and regional businesses by procuring regional goods and services such as: transportation; vegetation management; construction services and materials; and accommodation facility services. Economic benefits to the region have been estimated in the economic assessment (Appendix E.13 and Section 6.13).
- Generation of income through increased trade for retailers and hospitality businesses – workers from outside the regional study area residing at the worker accommodation facilities may increase patronage at local businesses, particularly in Coleambally and Jerilderie. SIA engagement identified increased patronage and the associated injection of wealth into local and regional economies as a key project benefit.
- Increased competition for labour and services – while employment and business opportunities generated by the project were broadly considered by stakeholders to be a positive project outcome, it was also noted that there is an existing worker shortage in the Murrumbidgee LGA, which is impacting local agribusinesses. Without mitigation and management, the project's demand for workers and goods and services are expected to magnify competition in the regional market. Higher competition, while beneficial to workers and some supply chain businesses, may price-out smaller businesses also seeking these resources. This may impact the commercial viability of such businesses or reduce profitability.
- Land use impacts to agribusinesses – current agricultural land uses in the development footprint will temporarily cease during construction. The project has been developed in consultation with associated landholders to avoid fragmentation of existing agricultural landholdings and enterprises. The existing agricultural land uses will continue on land adjacent to the development footprint during construction, and will resume in the development footprint during operation. During EIS and SIA engagement, concerns were raised by some stakeholders regarding potential impacts of the project on agricultural productivity on neighbouring properties. With no planned disturbance to areas outside of the development footprint, no impacts to soil quality or LSC on adjacent lands are anticipated (see Section 6.9 and Appendix E.9).

The SIA assessed the significance of the benefits to the local economy to be medium. With the application of enhancement measures (see Section 6.12.5), the significance will be medium–high. The significance of the impacts to the local economy were assessed to be medium. With the application of mitigation measures (see Section 6.12.5), the significance will be low–medium.

iii Access to services, housing and accommodation

Construction workers temporarily residing in the project's worker accommodation facilities will increase demand for some community services and facilities, particularly in the nearest towns of Coleambally and Jerilderie.

Project related impacts relating to access to services, housing and accommodation include:

- Reduced access to health services for residents due to increased demand – health services are currently constrained in the area, which was identified by local stakeholders during SIA engagement as an existing vulnerability. The project has the potential to exacerbate these issues. Measures will be implemented to alleviate potential impacts on health services, such as the inclusion of on-site medical facilities during construction staffed by personnel with suitable training, and identification of telehealth providers to reduce competition for local GP services.

- Reduced capacity of local waste management facilities – Murrumbidgee Council stated during SIA engagement that local waste facilities in Murrumbidgee LGA do not have the capacity to manage waste volumes associated with the construction of solar farms. Murrumbidgee Council has experienced challenges managing waste generated from the construction of other solar farm projects in the area. Waste from construction of the project will need to be managed through commercial arrangements with waste management facilities and relevant local councils.
- Reduced availability of housing and accommodation – the inclusion of the workers accommodation facilities as part of the project largely avoids impacts to the availability of rental housing and short-term accommodation. However, it is likely there will still be some personnel associated with the project who will choose to stay in nearby towns. This will impact the availability of short-term accommodation for seasonal workers, tourists and local residents, where short-term accommodation is required in emergencies and for those experiencing housing insecurity.

The SIA assessed the significance of the impact of reduced access to services, housing and accommodation by the project as low–medium. With the application of mitigation measures (see Section 6.12.5), the significance will remain low–medium.

iv Local amenity

The project will contribute to changing the visual landscape of the area, including from the WTGs and heavy vehicles on local roads during construction. Noise and dust will be emitted during construction. These may impact the value the community places on the surrounding rural landscape and the way of life.

Impacts related to local amenity include:

- Loss of amenity due to changes to the visual landscape – visual impacts have been assessed in Section 6.1 and Appendix E.1. Interviews conducted as part of SIA engagement found that some nearby landowners placed a high value on the local environment and scenic quality of the landscape and were concerned about potential changes to local visual amenity. Visual impacts to the local landscape may cause stress and anxiety for nearby residents and the broader community and landscape changes may result in reduced enjoyment of surrounds and reduced sense of community.
- Loss of amenity due to increased noise from construction activities and traffic – project construction will generate noise during construction. Noise impacts have been assessed in Section 6.2 and Appendix E.2. The noise impact assessment predicts that while three non-associated residences (R019, R077 and R088) may experience exceedances of applicable noise criteria at stages during construction, impacts will be temporary and will only occur under specific construction scenarios for a small portion of the construction program. The noise impact assessment predicted that traffic noise criteria will be achieved at residences close to local roads that will be used by project-related construction traffic.
- Loss of amenity due to increased dust from construction activities and traffic – dust generation from earthworks and vehicle movements along unsealed access roads within the development footprint can temporarily change air quality, which has the potential to reduce amenity. Mitigation measures will be implemented to minimise dust generation.
- Ecological changes affecting cultural and community values – some participants expressed concern that the project may change the natural environment and affect existing ecological values, impacting how individuals experience their surrounds. Biodiversity values have been assessed in Section 6.3 and Appendix E.3. Iterative project design has avoided direct impacts to many threatened species where possible, and as such has reduced impacts. However, some impacts cannot be avoided by the project, as summarised in in Section 6.3 and Appendix E.3.

The SIA assessed the significance of the impact on local amenity to be medium–high. With the application of mitigation measures (see Section 6.12.5), the significance will be medium–low.

v Cultural heritage

Project related benefits and impacts related to cultural heritage include:

- Increased opportunities for connection to Country – in recent history the project site has been privately held and access to land for cultural sustenance has been unavailable. The project has resulted in opportunities for members of the local First Nations community to access Country, during fieldwork completed for the ACHA (Appendix E.4). Procurement targets will be implemented for First Nations people and businesses during construction. There will also be jobs associated with the project’s cultural heritage management programme including monitoring, salvage and management any incidental finds. During operation, there will be opportunities for other skilled and unskilled positions, including in general and environmental management. These opportunities may provide First Nations employees time on Country, fostering connection to Country, and caring for Country.
- Potential impacts to both identified, and unknown sites or items of Aboriginal cultural significance – the ACHA has identified and assessed 17 Aboriginal sites as being directly impacted by the project. The project also has potential to disturb culturally important places, sites, or artefacts that have not been identified during the preparation of the ACHA. Aboriginal people often experience grief and loss due to the loss of cultural artefacts or sites. During SIA engagement, First Nations stakeholders highlighted the importance of identifying and managing Aboriginal heritage items and value building and passing on cultural heritage knowledge. An Aboriginal Cultural Heritage Management Plan will provide the framework for Aboriginal heritage management during construction and operation.

The SIA assessed the significance of the benefits to cultural heritage to be medium. The significance of the impacts to cultural heritage were also assessed to be medium. With the application of mitigation and enhancement measures (see Section 6.12.5), the significance of impacts and benefits remain medium.

vi Community safety and wellbeing

The project impacts to safety and wellbeing include:

- Changes local population dynamics due to the influx of workforces – the worker accommodation facilities may introduce changes to social cohesion and sense of safety in the local study area. Impacts can include perceived changes in safety and security within townships, increased occurrence of antisocial behaviour in public places, overcrowded living conditions with streets heavily utilised by parked vehicles, and increases in traffic on the local road network. SIA engagement found that nearby landholders and the broader community are familiar with sudden and temporary increases in population (e.g. other construction projects and seasonal agricultural workers). Overall, the presence of non-resident workers was not a strong concern amongst stakeholders interviewed as part of the SIA.
- Perceived impact on safety due to project-related traffic generation – additional vehicles on the road network associated with project construction may reduce public road safety. Road condition concerns were raised during SIA interviews, with stakeholders reporting that poor road conditions and flood damage were reported as ongoing issues in the local and regional study areas. Nearby landowners, business stakeholders, and Murrumbidgee Council expressed concerns about additional traffic utilising the road network without appropriate upgrades and maintenance. Road and intersection upgrades are proposed as part of the project to address road safety matters identified in the traffic impact assessment (Appendix E.6). A construction traffic management plan will be developed in consultation with Transport for NSW, Murrumbidgee Council and Edward River Council.

- Perceived impact on safety due to increased bushfire risk – during SIA engagement, stakeholders emphasised concerns about fire risk, which related to experiences with other nearby developments. Landowners noted that the local fire brigade is staffed by volunteers from the local study area and that there were concerns that the presence of project infrastructure may impede emergency response. The project will incorporate the required APZs and on-site water storage to support firefighting.
- Potential concerns for health and wellbeing ('wind turbine syndrome') due to exposure to operational noise and vibration – stakeholders raised concerns regarding noise and vibration from the WTGs in relation to ear health and comfort. This concern predominantly relates to perceived risk of short and long term physical and mental health impacts on people, and may extend to effects on livestock and native fauna. Operational noise from the project will comply with the relevant assessment criteria and no vibration impacts are anticipated due to the separation distances between the development footprint and the closest residences. Noise impacts to native fauna and livestock are expected to be negligible/low. Further, the NHMRC Statement *Evidence on Wind Farms and Human Health* (NHMRC 2015) concludes that there is currently no consistent evidence that wind farms cause adverse health effects in humans.
- Social cohesion and resilience arising from community benefit and investment – the project has the potential to provide benefits from the workforce and economic stimulus, workforce integration strategies and social impact management (including assured continuity of bushfire relief services), and community benefit sharing arrangements and social investment, for example, community health and childcare contributions, upgrades to community infrastructure, funding for First Nations services and initiatives, reducing community electricity costs.

The SIA assessed the significance of the benefits to social cohesion to be low. The significance of the impact on safety and wellbeing was assessed to be medium. With the application of mitigation measures and enhancement measures (see Section 6.12.5), the significance of impacts and benefits will be medium–low.

6.12.5 Mitigation measures

Proposed measures to manage and mitigate potential social impacts are outlined in Table 6.40.

Table 6.40 Social mitigation and management measures

ID	Mitigation measure
S1	A Social Impact Management Plan (SIMP) will be implemented prior to construction. The SIMP will aim to: • describe desired project social outcomes • outline post-approval engagement activities, including timing and purpose • describe a feedback procedure that will allow feedback and timely response throughout construction and operation • define targets to monitor performance over time, identify monitoring responsibilities, and methods to share outcomes. The SIMP will include methods for engaging stakeholders on their key interests to: manage impacts, enhance benefits, and provide suitable mechanisms for project feedback. Key stakeholders include Murrumbidgee and Edward River Councils, landowners, broader community, First Nations stakeholders, services and utilities, local businesses, and local workforces. An adaptive management approach to the implementation the SIMP is proposed, allowing Spark Renewables to manage and respond to changing circumstances and new information through ongoing monitoring and periodic review of mitigation strategies allowing for modification if required.

Table 6.40 Social mitigation and management measures

ID	Mitigation measure
S2	An industry participation plan (IPP) will be implemented. The IPP will identify: • opportunities for supply of goods and services, employment and training, including Aboriginal participation, as well as sustainable procurement • metrics to track goals and requirements for each identified opportunity • engagement with Murrumbidgee and Edward River Councils, local businesses and the Coleambally Chamber of Commerce to inform an understanding of opportunities and limitations for procuring local goods and services, as well as aspirations amongst local businesses • online and offline methods to share and register interest in project opportunities.
S3	An Aboriginal participation plan (APP) will be implemented in consultation with First Nations stakeholders to optimise local capacity and aspirations through targeted participation initiatives within the regional area. This will include setting targets for First Nations participation in the project workforce and procurement. Commitments will be measurable, and a report of progress to the local First Nations community will contribute to the measurement of outcomes.
S4	Regular engagement (to be defined in the SIMP) with local businesses will advise of construction periods and the potential increase in trade or patronage. This will allow businesses with planning to maximise benefits of increased demand, and associated revenue.
S5	The project workforce will be encouraged, particularly during the construction phase, to support and contribute to the local and regional community through local spending. This may be done through initiatives such as provision of vouchers for use at local businesses, or promoting local business offerings, such as on notice boards at the accommodation facilities.
S6	Murrumbidgee and Edward River councils will be engaged to identify potential service constraints. Measures such as provision of on-site medical facilities and identification of preferred telehealth providers will be implemented to prevent excessive demand on GP services closest to the site.
S7	Temporary worker accommodation facilities will be used in preference to local short-term and rental accommodation. Local residents will be recruited for the construction workforce as far as possible.
S8	A Community Engagement Plan and Worker Code of Conduct (as part of the SIMP) will be developed and implemented to address perceived public safety risks. The plan will include engaging with community services, such as police and emergency services, so that they are familiar with the project in case of an incident.

6.12.6 Conclusion

Social impacts to the local and regional areas will be largely associated with the demand for labour and the influx of the construction workforce, which may affect access to services, perceptions of safety and local community dynamics. Key social benefits will be predominantly associated with project employment, training, and business opportunities relating to direct and indirect economic activity. The proposed mitigation and management measures will minimise negative consequences and maximise the social benefits of the project to the local community.

An adaptive management approach to the implementation of the SIMP will allow Spark Renewables to manage and respond to changing circumstances and new information through ongoing monitoring and periodic review of mitigation strategies allowing for modification if required.

6.13 Economic

6.13.1 Introduction

An economic assessment was prepared by Gillespie Economics (refer Appendix E.15). It provides an assessment of the economic impacts and benefits of the project. The relevant SEARs and how they have been addressed are summarised in Section 1.3 of the economic assessment (Appendix E.15).

The regional economy for the economic assessment is defined as the LGAs that are likely to experience economic impacts and benefits from the project (generally within approximately a one-hour drive of the project area), comprising the Murrumbidgee, Edward River, Griffith, Leeton and Narrandera LGAs (see Figure 6.22). While the region is the focus of the economic assessment, impacts and benefits on the NSW State economy are also assessed.

Potential economic impacts and benefits have been assessed quantitatively using input-output analysis, as well as qualitatively. Input-output analysis identifies the economic effect of a project on regional and State economies using four main indicators:

- Gross regional output – the gross value of business turnover (i.e. gross revenue) in a region. This includes direct outputs (e.g. manufacturing of equipment, and expenditure across the construction services sector) and indirect outputs (e.g. the flow-on effects of direct expenditure associated with firms and workers buying goods and services).
- Value-added – the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought to produce the gross regional output. These costs exclude wage costs.
- Income – the wages paid to employees, including attributed wages for self-employed and business owners.
- Employment – the number of people employed (including self-employed, full-time, and part-time).

Further details regarding the input-output analysis methodology are provided in Section 2 of the economic assessment (Appendix E.15).

6.13.2 Existing environment

In 2021 (the last Australian Census), the regional economy had a population of 56,045 and a labour force of 27,467. The Griffith LGA accounted for 48% of the total population and 51% of the total labour force. The population in the regional economy has been growing at an average annual rate of 0.09% since 2006, compared to 1.34% across the State as a whole. The regional population growth is driven by the Griffith LGA, with the population of the other LGAs declining since 2006. The predicted population growth for the region (0.3% per annum) is driven by projected growth in the Griffith LGA, with the population of the other four LGAs forecast to remain constant or decline (DPE 2022e).

The main occupations of employed people aged 15 years and over in the region were labourers (17.7%) and managers (which includes farm managers) (17.5%). The main employment industry in the region varied between LGAs: manufacturing in Griffith and Leeton; agriculture, forestry and fishing in Murrumbidgee and Narrandera; and health care and social assistance in Edward River. Few people who work in the region live outside the region (3.2%), mainly in the adjoining Murray River and Carrathool LGAs.

The gross regional product (total value of goods and services produced in a region) was estimated at \$3.4 billion for 2021, dominated by the export industries of manufacturing (\$1.7 billion), utilities (\$0.3 billion), construction (\$0.2 billion), education and training (\$0.2 billion), and agriculture, forestry and fishing (\$0.1 billion).

The manufacturing, agriculture, forestry and fishing; rental, hiring and real estate services; health care and social assistance; and utilities sectors, had the highest total value-added, equal to approximately 52% of the regional economy and 46% of regional employment.

6.13.3 Potential impacts

The project will generate economic activity during construction, operation and decommissioning within the regional and NSW economy. It will also result in a minor contraction in agricultural economic activity, due to foregone agricultural activity within the development footprint. The assessment of these potential economic impacts has been undertaken using input-output analysis (as defined in Section 6.13.1), with other potential impacts discussed qualitatively.

Construction of the project will create demand for production (goods and services) and regional labour resources. Construction expenditure will be associated with manufacturing of equipment and expenditure across three construction sectors: heavy and civil engineering construction; construction services; and non-residential building construction (based on input-output analysis classifications). Over the five-year construction phase, employment is estimated to peak at 600 workers during peak construction activities, with an annual average employment of 328 workers.

Where there is excess capacity in the regional economy (i.e. available labour resources), or the region has access to labour and other resources from outside the region, a project's economic demand will increase economic activity in the region. However, if the demand is not met, there is potential for the following impacts to occur:

- labour shortages in other areas of the economy
- rising inflation as firms pass increased wage costs on to consumers
- shortages in associated goods and services for other uses
- rising costs of construction materials.

The extent of these impacts will depend on the balance of labour supply and inputs to production from both inside and outside the region, as well as the ability of the overall labour market to respond to increased demand, for example via increased labour force participation.

It is estimated that approximately 25% of the construction workforce will be sourced from the region. Onsite worker accommodation facilities are proposed to accommodate the other 75% of the project's workforce, that are expected to reside outside the region. It is anticipated that the construction workforce demand will be met, so no, or only modest, observable price effects are anticipated.

Project operation will create a very small demand for regional labour resources (50 direct jobs in a labour market of about 27,467) and regional inputs to production (0.5% of transactions in the region). Consequently, project operation will not impact economic activity in other sectors within the region.

A summary of the estimated average annual economic impact of the construction and operation of the project is provided in Table 6.41.

Table 6.41 **Estimated average annual economic impact (direct and indirect) of the project**

Economic indicator ¹	Construction		Operation	
	Region	State	Region	State
Gross output (million dollars, \$M)	198	351	340	380
Value-added (\$M)	71	148	305	325
Income (\$M)	38	97	4	17
Employment (number of direct and indirect jobs) ²	486	967	87	195

1. Definitions for economic indicators are provided in Section 6.13.1.

2. Employment numbers include indirect employment resulting from flow-on effects and therefore do not align with the nominated project workforce.

Indirect impacts of the project have been estimated to allow the total impact of the project on all industries in the regional and State economy. Economic effects that are production-induced (firms buying goods and services from each other) occur in a near-proportional way within a region. However, the consumption-induced (employing people who subsequently buy goods and services as households) economic effects only occur in a proportional way if workers and their families are in the region. If workers commute from outside the region, some of the flow-on effects occur outside of the region. Due to the high proportion of anticipated non-regional workers who will reside in the worker accommodation facilities, economic benefits are anticipated both within the region and more broadly across NSW.

The project will result in a reduction in regional economic activity from foregone agricultural activity within the development footprint. The five-year construction phase of the project will result in a temporary reduction in up to 1,339 ha of land available for agricultural activity (sheep and cattle (beef) grazing and cropping). The economic activity impacts associated with foregone agricultural activities will be negligible (about 0.002% of regional agricultural economic activity). Accordingly, the regional economic benefits of the project will significantly outweigh the economic impacts of foregone agricultural activity. Further, the project landholders that will be directly affected by loss of revenue will be compensated through lease payments as part of the project.

The economic assessment conservatively assumed that none of the development footprint will be available for agricultural activities during operation. On this basis, foregone revenue from agricultural production will be up to \$537,511 per annum. However, the foregone revenue is expected to be lower than this as livestock will be able to graze across a significant portion of the development footprint. As for construction, loss of revenue will be compensated through lease payments as part of the project.

If the project is decommissioned, the project infrastructure will be decommissioned and the development footprint returned to its pre-existing land use, sheep and cattle grazing and cropping, as far as practicable. Accordingly, agricultural production revenue will return to a similar level as for land surrounding the development footprint.

6.13.4 Mitigation measures

The proposed measures to manage and mitigate potential economic impacts of the project are outlined in Table 6.42.

Table 6.42 **Economic impact mitigation measures**

ID	Mitigation measure
ECON1	Employment of regional residents will be prioritised where they have the required skills and experience.
ECON2	Spark Renewables will participate in business groups, events and programs in the regional community.
ECON3	Non-labour inputs to production will be sourced locally where local producers can be cost and quality competitive.
ECON4	A Community Benefit Fund will be established and managed through VPAs with Murrumbidgee Council and Edward River Council.
ECON5	Lease payments will be paid to project landowners to provide an alternative drought-proof income with potential flow-on benefits to the regional economy.
ECON6	Agricultural activities will continue during project operation, where consistent with the landholders' requirements.

6.13.5 Conclusion

The construction and operation of the project will have an overall positive impact on economic activity in the region and State, contributing to an annual average of:

- \$351 million gross output and 967 jobs across the State during construction
- \$380 million gross output and 195 jobs across the State during operation.

Spark Renewables will engage with Murrumbidgee Council, Edward River Council and the local community to minimise potential economic impacts and maximise benefits to the regional economy.

6.14 Waste

6.14.1 Introduction

Waste produced by the project will be managed in accordance with the objectives of the *Waste Avoidance and Resource Recovery Act 2001* including the waste hierarchy, in order of preference:

- avoid and reduce waste
- recover resources
- dispose of waste.

The following sections identify existing facilities that manage waste in the region and management strategies for waste generated during the construction, operation and decommissioning phases of the project.

6.14.2 Existing waste management facilities

The project area is currently used for agriculture and generates farming-related waste streams. Waste facilities within the Murrumbidgee LGA comprise facilities at Coleambally (32 km north of the project area), Darlington Point (60 km north of the project area) and Jerilderie (30 km south of the project area). Engagement with Murrumbidgee Council has identified there is no capacity within the Murrumbidgee LGA to manage waste associated with the project.

Waste facilities in the Edward River LGA comprise facilities at Deniliquin (66 km south-west of the project area), Blighty (65 km south-west of the project area), Conargo (37 km south-west of the project area), Pretty Pine (66 km south-west of the project area) and Wanganella (57 km south-west of the project area). Recycling services in the region are limited; there are several community recycling facilities such as the Blighty Waste Disposal Depot and Deniliquin Landfill Depot which accept recyclable materials. The capacity of these facilities to accept each waste stream from the project will depend on the volume generated and how it is segregated.

6.14.3 Waste generation and management

Waste will be generated during each phase of the project, with minimal waste generated during construction, less during operation, and the greatest amount during decommissioning.

It is anticipated that the volumes of construction and decommissioning waste may exceed the capacity of the waste management facilities within the Edward River LGA, noting that Murrumbidgee LGA has indicated there is no available capacity at present.

Waste is expected to be managed through commercial agreements with contractors during construction of the project, licensed waste management contractors and local councils. These agreements will also be required at the time of project decommissioning.

All waste produced by the project will be classified, stored and handled in accordance with the *Waste Classification Guidelines – Part 1: Classifying Waste* (EPA 2014), with waste classifications for each waste type identified in the following sections.

i Construction

Waste streams likely to be generated during the construction of the project are outlined in Table 6.43.

Table 6.43 Indicative construction waste

Waste type	Description	Classification	Indicative quantity	Management details
Paper and cardboard	Packaging materials and general office waste.	General Solid Waste (non-putrescible)	1,300 m ³	Separated for recycling at a licenced facility.
Wood	Pallets, cable drums and timber offcuts.	General Solid Waste (non-putrescible)	2,200 m ³	Separated for reuse or recycling at a licenced facility.
Plastic	Packaging materials, ties, straps and excess building materials such as safety fencing and barriers.	General Solid Waste (non-putrescible)	<1,000 m ³	Hard and soft plastics separated for recycling, where possible, or disposal at a licenced facility.
Concrete and aggregate	Waste from turbine foundations, concrete overspill, and access roads	General Solid Waste (non-putrescible)	8,000 t	Separated for re-use, or collection by a contractor and recycled or disposed at a licensed facility.
General mixed waste	Miscellaneous mixed waste	General Solid Waste (non-putrescible)	1,000 t	Collection by a contractor and disposed of to a licensed facility.
Metals	Excess building materials such as safety fencing, barriers, retired equipment, cable drum fasteners and framing for transporting turbines.	General Solid Waste (non-putrescible)	1,000 t	Separated for reuse or recycling at a licenced facility.

Table 6.43 **Indicative construction waste**

Waste type	Description	Classification	Indicative quantity	Management details
Green waste	Vegetation waste from clearing activities.	General Solid Waste (non-putrescible)	Minor quantities	Beneficial on-site or off-site reuse or recovery at a green waste facility.
Soil	Surplus spoil from excavations and earthworks that is not suitable for onsite re-use.	General Solid Waste (non-putrescible)	Minor quantities	Off-site reuse or disposal at a licensed facility.
Electrical	Excess building materials or retired equipment.	E-waste	Minor quantities	Separated for reuse or recycling at a licensed facility.
Liquid waste	Oils and fuels, contaminated water from equipment washing.	Liquid waste	Minor quantities	Collection in drums or tanks for disposal at a licensed facility.
Sewage	Biological waste from on-site treatment systems (including from accommodation facilities).	Liquid waste and General Solid Waste (non-putrescible)	167 ML (waste demand and wastewater load for accommodation and construction amenities over 5-year construction period)	On-site treatment infrastructure will be used to treat sewage and will produce: - treated effluent (i.e. water) suitable for reuse for construction purposes, which will be stored in sealed tanks or lined basins. - waste solids, which will be emptied by a licensed contractor and disposed of at an appropriately licensed facility.
General domestic	Food scraps aluminium cans, glass bottles, plastics and paper containers.	General Solid Waste (putrescible and non-putrescible)	Minor quantities	Separation on site and collection by a contractor and recycled or disposal at a licensed facility.
Commercial waste	Oily rags, filters and drums (non-volatile).	General Solid Waste (non-putrescible)	Minor quantities	Collection by a contractor and disposal at a licensed facility.
Waste batteries	Retired batteries used in construction appliances and equipment.	Hazardous waste	Minor quantities	Collection by a contractor and disposal at a licensed facility.

ii Operation

Minor waste quantities are expected to be produced during operation. Waste generated during operation will be typically associated with maintenance activities and staff amenities (Table 6.44). Waste quantities are expected to be highly variable and dependent on the on-site activities and the maintenance required.

Recycling and reuse will be maximised as far as possible to avoid disposal of wastes to landfill.

Table 6.44 **Indicative operation waste**

Waste type	Description	Classification	Management details
General domestic	Food scraps, aluminium cans, glass bottles, plastics and paper containers from the operation maintenance buildings.	General Solid Waste (putrescible and non-putrescible)	Separation on-site and collection for recycling or disposal at a licensed facility.
Liquid waste	Oils and fuels, contaminated water from equipment washing.	Liquid waste	Collection in tanks for disposal at a licensed facility.
Commercial waste	Oily rags, filters and drums (non-volatile).	General Solid Waste (non-putrescible)	Collection for disposal at a licensed facility.
Waste batteries	Retired batteries used in operation appliances and equipment.	Hazardous waste	Collection for disposal at a licensed facility.
Sewage	Biological waste from onsite septic systems	Liquid waste and General Solid Waste (non-putrescible)	On-site treatment infrastructure will be used to treat sewage and will produce: - treated effluent (i.e. water) suitable for reuse on-site, which will be stored in sealed tanks or lined basins. - waste solids, which will be emptied by a licensed contractor for disposal at a licensed facility.
Green waste	Waste from vegetation and weed management	General Solid Waste (non-putrescible)	Beneficial on-site or off-site reuse or recovery at a green waste facility.
Electrical	Damaged or faulty components.	E-waste	Separated for reuse or recycling at a licenced facility.
Metals	Damaged or faulty components.	General Solid Waste (non-putrescible)	Separated for reuse or recycling at a licenced facility.

iii Decommissioning

Waste streams likely to be generated during decommissioning are outlined in Table 6.45. Recycling or reuse of WTGs and associated equipment will be maximised as far as possible to avoid landfill.

Table 6.45 **Indicative decommissioning waste**

Waste type	Description	Classification	Indicative quantity	Management details
WTGs	WTG tower, nacelle and blades, associated electrical infrastructure	General Solid Waste (non-putrescible) and e-waste	200 WTGs	Electrical and metal waste streams separated where possible for recycling at a licenced facility, with remaining waste disposed at a licenced facility.

Table 6.45 **Indicative decommissioning waste**

Waste type	Description	Classification	Indicative quantity	Management details
Substations, switchyards and associated infrastructure	Inverters, transformers and steel enclosures	Hazardous waste General Solid Waste (non-putrescible)	Up to 5 substations, switchyards and associated infrastructure	Collection by a specialised contractor for reuse, recycling or disposal at licenced facility.
Foundations	Reinforced concrete for WTG foundations and hardstand pad for substations and switchyards	General Solid Waste (non-putrescible)	Approximately 410 (i.e. 2 per WTG and 1 per substation and switchyard, respectively)	Decommissioning of foundations and hardstands will be in consultation with the landholders and regulatory authorities, and may be kept in place. Removed components will be separated and collected by contractor for recycling or disposal at a licenced facility.
Ancillary infrastructure	Cables and fencing	General Solid Waste (non-putrescible)	To be confirmed during decommissioning	Collection by a specialised contractor for recycling or disposal at a licenced facility.

iv Waste management

As described in Section 6.14.2, there are waste management facilities in the Edward River LGA with some capacity to accept waste from the project, with no capacity identified by Murrumbidgee Council within the Murrumbidgee LGA. The suitability of waste management facilities will depend on the types and volumes generated during each phase.

Licensed waste facilities outside the two LGAs will be identified during each project phase. Waste will be managed through commercial agreements with contractors and/or licensed waste management companies and local councils.

6.14.4 Mitigation measures

Details of the waste types, classification, management methods, and estimated annual quantities generated during construction, operation and decommissioning will be developed as part of detailed design.

A waste management plan will be prepared prior to each project phase in consultation with DPHI, Murrumbidgee Council and Edward River Council. A key objective of the plan will be to ensure that any use of local waste management facilities does not disadvantage local businesses or the local community by exhausting available capacity at these facilities.

The measures proposed to manage waste are provided in Table 6.46.

Table 6.46 **Waste mitigation measures**

ID	Mitigation measures
WAS1	All waste will be managed in accordance with the requirements of the <i>NSW Protection of the Environment Operations Act 1997</i> and the <i>NSW Waste Avoidance and Resource Recovery Act 2001</i> .
WAS2	All wastes will be classified, stored and handled in accordance with the <i>Waste Classification Guidelines – Part 1: Classifying Waste</i> (EPA 2014), with appropriate segregation of waste streams to maximise reuse and recycling of suitable waste streams.

Table 6.46 **Waste mitigation measures**

ID	Mitigation measures
WAS3	Waste will be managed in accordance with the waste hierarchy, in order of preference: • avoid/reduce waste production • recover resources for reuse • recycle or dispose of waste at licenced facilities.
WAS4	A detailed waste management plan will be prepared prior to each project phase identifying the type, quantity, classification and management of waste.
WAS5	As part of decommissioning, Spark Renewables will maximise opportunities to recover/recycle decommissioned infrastructure and equipment.

6.14.5 Conclusion

Waste will be generated during each phase of the project, with minimal waste generated during construction, less during operation, and the greatest amount during decommissioning.

All waste produced by the project will be managed in accordance with the waste hierarchy, and will be classified, stored and handled in accordance with the *Waste Classification Guidelines – Part 1: Classifying Waste* (EPA 2014). A waste management plan will be prepared prior to each project phase.

It is anticipated that the volumes of construction and decommissioning waste may exceed the capacity of the waste management facilities locally. Waste will be managed through commercial agreements with contractors and local councils. The implementation of the waste management plan will ensure that waste is suitably segregated, handled, and managed so local businesses and the local community are not disadvantaged by exhausting available capacity at local waste facilities.

6.15 Cumulative impacts

6.15.1 Overview

There are a range of renewable electricity generation and transmission developments proposed in the South West REZ in the vicinity of the project (see Figure 1.1). The potential for the project to result in cumulative impacts with known projects has been assessed based on the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE 2022c).

6.15.2 Other State significant projects

Recently approved, and proposed SSD and SSI projects within a radius of approximately 50 km from the project area were identified through DPHI's Major Projects Planning Portal at the time of writing this EIS. These projects are listed in Table 6.47, with the relevant cumulative impacts with the Dinawan Wind Farm identified.

Table 6.47 Cumulative impacts with future projects

Project	Distance from project	Project status	Indicative timing	Local government area	Relevant cumulative impacts
Dinawan Solar Farm – includes construction and operation of 800 MW solar farm and BESS.	Within project area	Proposed – responding to submissions.	18–24-month construction period from 2025 (overlap possible). 25–35-year operational life. Operation expected to overlap.	Murrumbidgee Edward River	• visual • biodiversity • traffic • amenity (noise, air quality) • economic • social • land
Project EnergyConnect – includes construction and operation of 330 kV and 500 kV transmission line and Dinawan Substation.	Adjacent (north)	Approved – under construction	Construction from 2022 (overlap unlikely). Operation expected to overlap.	Murrumbidgee Edward River Hay Federation	• visual • biodiversity • amenity (noise, air quality) • economic • social • land
Argoon Wind Farm – includes the construction and operation of 477 MW wind farm and BESS.	Adjacent (south)	Proposed – EIS in preparation	36-month construction period (overlap possible). Operation expected to overlap.	Murrumbidgee	• visual • biodiversity • traffic • amenity (noise, air quality) • social • economic • land
Victoria to New South Wales Interconnector West (VNI West)	Exact location to be confirmed; likely to intersect the project area	Proposed – pre-scoping phase	24-month construction (overlap possible). Operation expected to overlap.	Murrumbidgee Edward River Murray	• visual • biodiversity • traffic • amenity (noise, air quality) • social • economic
Yanco Delta Wind Farm – includes construction and operation of 1.5-GW wind farm.	Adjacent (south)	Approved – not yet constructed	36-month construction from 2024–2025 (overlap possible). Operation expected to overlap.	Murrumbidgee Edward River	• visual • biodiversity • traffic • amenity (noise, air quality) • social • land
Bullawah Wind Farm – includes construction and operation of 1-GW wind farm and 500 MW BESS.	10 km (west)	Proposed – EIS in preparation	24-month construction from 2025 (overlap possible). Operation expected to overlap.	Murrumbidgee Edward River Hay	• visual • biodiversity • traffic • social • land

Table 6.47 Cumulative impacts with future projects

Project	Distance from project	Project status	Indicative timing	Local government area	Relevant cumulative impacts
Pottinger Wind Farm – includes the construction and operation of 750 MW wind farm and a 500 MW BESS.	25 km (west)	Proposed – EIS in preparation	24-month construction from 2026 (overlap possible). Operation expected to overlap.	Edward River Hay	• biodiversity • social • land
Pottinger Solar Farm – includes construction and operation of 300 MW solar farm and 500 MW BESS.	25 km (west)	Proposed – EIS in preparation	24-month construction from 2026 (overlap possible). Operation expected to overlap.	Hay	• biodiversity • social • land
Coleambally BESS – includes construction and operation of 100 MW BESS.	30 km (north)	Approved – not constructed	8–10-month construction from 2024 (overlap unlikely). Operation expected to overlap.	Murrumbidgee	• biodiversity • land
Conargo Wind Farm – includes construction and operation of 300 MW wind farm and 150 MW BESS.	33 km (south)	Proposed – requesting SEARs	24-month construction from 2027 (overlap possible). Operation expected to overlap.	Edward River	• biodiversity • social • land
Booroorban (Saltbush) Wind Farm – includes construction and operation of 400 MW wind farm and 600 MW BESS	43 km (west)	Proposed – requesting SEARs	30-month construction from 2028 (overlap possible). Operation expected to overlap.	Edward River	• biodiversity • social • land
Woodland BESS – includes construction and operation of 200 MW BESS.	45 km (north)	Proposed – under assessment	12-month construction from 2024 (overlap possible). Operation expected to overlap.	Murrumbidgee	• biodiversity • social • land
Yarrabee Solar Farm – includes construction and operation of 900 MW solar farm and 35 MW BESS.	45 km (north-east)	Approved – not constructed	Proposed to be constructed in stages (overlap possible). 30–50-year operational life (overlap).	Narrandera	• biodiversity • social • land

The projects in Table 6.47 that will proceed, and their construction timing, will depend on a range of factors, including the outcomes of the competitive South West REZ access scheme. The capacity of the projects in Table 6.47, combined with the Dinawan Wind Farm (greater than 7 GW in total), is well in excess of the current intended capacity of the South West REZ of 3.98 GW; therefore it is unlikely that all projects will be constructed.

Transmission infrastructure to support the distribution of electricity generated in the South West REZ is currently either proposed (HumeLink and VNI West) or under construction (Project EnergyConnect). The approval and successful construction of this infrastructure, along with the outcomes of the competitive South West REZ access scheme, will influence the timing of construction within the South West REZ. As it is unlikely that all these projects will be approved and built, this assessment of cumulative impacts is considered conservative.

6.15.3 Assessment of cumulative impacts

i Social and economic

a Employment and workforce

The cumulative peak construction workforce demand could be in the order of 2,500–3,000 workers based on the approved/proposed projects that are close to the Dinawan Wind Farm project area, for which construction workforce estimates are available (Dinawan Solar Farm, Yanco Delta Wind Farm, Pottinger Wind Farm, Pottinger Solar Farm, Bullawah Wind Farm and Yarrabee Solar Farm).

Cumulative workforce demand will benefit those seeking employment in the region and may offset job growth imbalances between cities and regions in Australia. This could promote lasting socio-economic benefits for the region if investments are made in training and skills development at an early stage to build job skills and experience.

However, the cumulative workforce demand could also affect the viability of existing businesses in the local and regional area by drawing labour from businesses and industries who are dependent on construction labour and skills.

b Housing and short-term accommodation

The cumulative construction workforce will increase the demand for short-term and long-term accommodation. This may increase housing prices and rents and cause shortages of short-term accommodation. Price rises may impact lower income households who may get squeezed out of the housing/rental market. The extent of housing price impacts will depend on the number of projects that proceed; construction timing; labour supply from inside the region and outside the region; the provision of construction workforce accommodation facilities by other projects within the region; other accommodation options; and potential increases to the overall housing supply in response to increased demand. Early provision of additional accommodation by projects will reduce short-term rental and housing price impacts.

The inclusion of the worker accommodation facilities as part of the project mitigates potential impacts from the Dinawan Wind Farm on the availability of rental housing and short-term accommodation.

c Regional economy

Development in the region will provide a substantial direct and indirect boost to the regional economy. Businesses that provide the goods and services required for project construction and operation will benefit from the cumulative economic activity generated by the South West REZ.

In the short term, excess demand for construction workers can lead to increased wages and attraction of workers from other relevant sectors of the economy, which may lead to labour and goods/services shortages in these other areas of the economy and rising inflation as firms pass wage costs onto consumers. The magnitude and duration of cumulative wage, price and supply shortages will largely depend on the ability of the labour, housing, and other markets to make supply adjustments.

Use of fly in/fly out and drive in/drive out workers and construction worker accommodation facilities will mitigate impacts on the regional labour market (wage increases and labour shortages) and accommodation market (price/rent increases). However, this may also reduce regional economic activity benefits, as fly in/fly out and drive in/drive out workers will repatriate most of their income back to their home region.

d Agricultural production

The South West REZ has avoided land mapped as LSC Class 1 and 2 within the NSW in its entirety and contains only 1,739 ha (<1%) of land mapped as LSC Class 3. Therefore, cumulative impacts on higher capability LSC classes within the South West REZ will be negligible. The project will not impact any land verified as LSC Class 1 or 2, and will only impact a small area (5 ha) of land verified as Class 3. During operation, sheep and cattle will continue to graze within the project area, supporting continued agricultural production and land use.

In the absence of suitable controls, cumulative projects could result in reduced soil availability and increased sediment migration to watercourses that pass through or occur downstream of construction sites. However, all SSD projects are required to operate under stringent environment management plans to prevent or minimise erosion and sedimentation, as will be the case with the project.

Cumulative economic impacts on agricultural production from the change in land use during construction and operation are expected to be very small in comparison to the economic benefits realised by renewable energy generation and transmission developments.

e Population change

The region is likely to experience significant population growth from the concurrent construction of surrounding projects. The estimated influx of construction works to service multiple projects could represent an increase of around 24% in the combined population of the Murrumbidgee and Edward River LGAs, although the increase is expected to be lower as some workers will already be residents of these LGAs.

Population growth is an important driver of the health of regional economies and can create increased demand for goods and services and thus more jobs. This growth leads to increasing local multiplier effects (indirect economic benefits), scale economies, innovation and capital availability. Population growth also contributes to preventing the closure of services associated with population decline. However, population growth is also expected to have impacts on the local population composition and may have implications to the general feeling of safety, wellbeing and local identity among residents of the LGAs.

f Demand for services

Temporary population growth associated with the proposed project workforces may increase demand for health services, including specialists. Coleambally, Jerilderie, Griffith and Deniliquin are likely to experience an increase in demand for health services during concurrent construction of the project and other developments. To address the project's potential increase to demand for health services, an on-site first aid room will be established at the accommodation facility and will be staffed by personnel with suitable first-aid/medical training.

ii Amenity

Potential amenity impacts from construction dust has been assessed in Section 6.8. No significant cumulative dust impacts are expected due to large distances to non-associated residences and implementation of standard dust suppression measures.

Potential cumulative noise impacts have been assessed for both construction and operation of the project. Construction noise from the project at nearby non-associated residences will be significantly less than the ICNG highly noise affected category, with exception of localised and limited road works close to R079, near the intersection of Kidman Way and McLennons Bore Road. Impacts at this residence will occur during intersection upgrade works at Kidman Way and McLennons Bore Road. This residence is not close to other projects, so no cumulative noise impacts are predicted.

Cumulative noise from the operation of the approved Yanco Delta Wind Farm and the Dinawan Wind Farm has been modelled as 33 dB(A) or less at all nearby non-associated residences, complying with the *Wind Energy: Noise Assessment Bulletin* (DPE 2016c) base equivalent noise level of 35 dB(A). Cumulative noise impacts for Argoon Wind Farm have not been assessed as there is no publicly available noise impact assessment for that project.

As operational noise from ancillary infrastructure is expected to be localised, there will be no cumulative operational noise impacts at nearby non-associated residences.

iii Visual

Cumulative visual impacts may occur from combined projects which may have a low impact individually, but when viewed together, have a significant visual impact on the landscape. Cumulative visual impacts were noted as a key concern by landholders and the community during community engagement have been assessed in Section 13 of Appendix E.1.

Infrastructure, notably WTGs, from the Yanco Delta Wind Farm, Argoon Wind Farm and Bullawah Wind Farm will be visible in combination with the project from eight non-associated residences within 8 km of WTG locations (see Figure 31 in Appendix E.1). Of these, seven of the residences are associated with other projects (either Yanco Delta Wind Farm or Argoon Wind Farm).

An assessment of cumulative impacts with other projects was completed in accordance with the Visual Bulletin (see Section 13 of Appendix E.1). Views from an associated residence to the project with which they are associated, were excluded from the cumulative assessment for that residence. Based on topography only (i.e. not considering landscaping and vegetation screening):

- two non-associated residences (R087 and R090) are likely to have views in one 60-degree sector
- four non-associated residences (R049, R082, R008 and R111) are likely to have views in up to three 60-degree sectors
- two non-associated residences (R088 and R036) are likely to have views in up to four 60-degree sectors.

Further assessment was completed for residences with views in three or more 60-degree sectors in accordance with the Visual Bulletin, including preparation of a LiDAR wireframe and photomontages. Existing landscape screening will reduce views of surrounding projects to up to two 60-degree sectors for all non-associated residences, which is acceptable in accordance with the performance objectives in the Visual Bulletin (see Table 19 in Appendix E.1).

Cumulative visual impacts from the project and Dinawan Solar Farm are considered low, due to vegetation screening at non-associated residences and low viewpoint sensitivity from surrounding rural roads (Kidman Way, Liddles Lane and Jerry Lane).

The landscape character is likely to be altered by the visibility of the project and surrounding wind farms, with simultaneous views likely from Kidman Way and surrounding roads.

Other developments in the vicinity of the project have the potential to generate cumulative traffic impacts with the project. Cumulative traffic impacts are assessed in the traffic impact assessment in Appendix E.6. The greatest potential for cumulative traffic impacts with the Dinawan Wind Farm will occur during construction of Stage 1 in the eastern area. Traffic impacts during Stage 1 have been assessed assuming that construction coincides with construction of the Dinawan Solar Farm, Yanco Delta Wind Farm and VNI West. Cumulative traffic impacts during construction of Stage 2 have been assessed assuming that construction coincides with construction of Argoon Wind Farm. Peak cumulative traffic volumes will occur in Stage 1.

Peak cumulative traffic volumes on Kidman Way have been calculated in the traffic impact assessment (Appendix E.6) and are expected to be 2,241 daily movements. This includes baseline traffic, the project's peak construction traffic (month 15) and construction traffic associated with Dinawan Solar Farm, Yanco Delta Wind Farm and VNI West.

The traffic impact assessment (Appendix E.6) found that cumulative traffic on Kidman Way will not result in significant impacts for existing motorists. Kidman Way is expected to operate at LOS B during the AM and PM peaks and will be able to perform at an acceptable level with the additional cumulative traffic volumes. Proposed intersection upgrades will be sufficient to accommodate cumulative traffic volumes.

v Biodiversity

The BDAR (Appendix E.3) found that similar PCTs, TECs and threatened species may be impacted by the other projects within the South West REZ, particularly those within 50 km of the project area. Consequently, biodiversity impacts from the project will be similar to the predicted impacts from other renewable energy generation and transmission projects. Key biodiversity values that may be affected by cumulative impacts of nearby projects include Weeping Myall TEC, Natural Grasslands of the Murray Valley Plains TEC, Plains Wanderer habitat and species at risk of collision (23 species of birds and 7 species of bats, as listed in Table 64 of Appendix E.3). Potential cumulative biodiversity impacts are summarised in Table 82 of the BDAR.

As discussed in Section 6.3.4, the TECs that will be impacted by the project have been mapped extensively within the south-eastern extent of the South West REZ and surrounds (Figure 6.5). The project refinement process has focused on avoiding higher quality woodland and forested areas, as well as areas of TEC and habitat of highest value that are likely to contain, or have recorded, threatened species.

Impacts on native vegetation and TECs for projects listed in Table 6.47 that are early in the planning process cannot be quantified. The biodiversity impacts of Dinawan Solar Farm, Project EnergyConnect, Yanco Delta Wind Farm, Coleambally BESS and Coleambally Solar Farm have been assessed (Table 46 of Appendix E.1). If all of these projects proceeded to their full extent, based on currently available information, cumulative native vegetation clearance is estimated to be 4,717 ha, including approximately 1,222 ha of TECs. All projects would have biodiversity offsetting requirements to compensate for these impacts. Extensive efforts have been made during refinement of the Dinawan Wind Farm to avoid and minimise impacts to biodiversity values present within the project area. The residual impacts to biodiversity values will be minimised, mitigated and offset through the retirement of biodiversity credits.

6.15.4 Mitigation measures

Project contributions towards cumulative impacts have been minimised where possible. A summary of mitigation measures proposed for the project is provided in Appendix D.

6.15.5 Conclusion

There are a range of renewable energy generation and transmission developments proposed in the South West REZ in the vicinity of the project, including transmission infrastructure to support the distribution of the electricity generated. The approval and successful construction of the transmission infrastructure, along with the outcomes of the competitive South West REZ access process, will be significant factors in determining which projects are built.

The cumulative impacts of employment and workforce; housing and short-term accommodation; regional economy; agricultural production; population change; services; amenity; traffic; and biodiversity have been assessed. There is the potential for cumulative social benefits and impacts from the simultaneous construction of multiple renewable energy projects, primarily due to the influx of workers and increased economic activity associated. The project's proposed construction accommodation facilities will minimise the contribution of the project to the negative cumulative impacts of projects in the region by ameliorating increased demand for labour and accommodation. The low population density and traffic volumes around the project area will minimise the potential for cumulative amenity and traffic impacts. The cumulative impact of projects within the South West REZ will result in a reduction in the extent of native vegetation and TECs within the region which will be offset through the retirement of biodiversity credits.

7 Justification of the project

This chapter provides a justification and evaluation of the project, having regard to the economic, environmental, and social impacts and benefits of the project and the principles of ecologically sustainable development.

7.1 Summary

The project is consistent with relevant Commonwealth, State, regional and local strategic plans and policies, in particular the *NSW Electricity Infrastructure Investment Roadmap* (DPIE 2020a), which sets out the plan to deliver REZs in NSW. The project, with an indicative capacity of around 1,200 MW, will contribute to the electricity generation and storage targets for the South West REZ.

The South West REZ was selected by the NSW Government following a detailed state-wide geospatial mapping exercise to identify optimal locations to host renewable electricity generation, including areas with strong renewable energy resource potential, proximity to the existing electricity network, and consideration of potential interactions with existing land uses, including agricultural lands and biodiversity conservation (EnergyCo 2023b).

The project area is favourable for the construction and operation of a wind farm due to the available wind resource, physical conditions (relatively flat topography and predominantly cleared, agricultural land), absence of biophysical strategic agricultural land and relatively few residences within close proximity. The project area adjoins the site of the Dinawan Substation, part of Project EnergyConnect, making it an optimal location for the export of electricity to the grid.

Were this project not to proceed, the project's benefits, including contributions to the generation of renewable energy and increased energy security, would not be realised. As renewable electricity generation and storage projects are needed in NSW, not proceeding with the project in its proposed location may encourage development in a less favourable location, resulting in undesired outcomes, such as greater requirements for grid connection infrastructure and greater environmental and social impacts.

The project will have both impacts and benefits on the surrounding natural and built environments. The impacts have been assessed and can be adequately managed through the proposed design, mitigation, and management during construction and operation. On balance, it is therefore considered that the project is in the public interest.

7.2 Design development

The development of the project since its inception has been flexible and iterative. This has allowed the design to be efficiently revised in response to environmental and social constraints as they were identified.

Spark Renewables has maximised the avoidance of potential environmental impacts throughout the project refinement process (refer to Section 2.7). This followed the principles of avoiding vegetation clearance where practicable, maximising use of previously disturbed land, limiting the footprint for project infrastructure to the minimum required, protecting significant heritage values and minimising impacts on neighbouring landholders.

The proposed development corridor and development footprint have been optimised for the project's infrastructure based on inputs provided during consultation with regulatory and community stakeholders (refer to Chapter 5), environmental assessments (refer to Chapter 5) and the functional requirements of project infrastructure. The irregular shape of the development footprint is a result of avoiding identified impacts (particularly higher quality native vegetation and threatened species habitat).

Where potential impacts cannot be avoided, Spark Renewables has minimised environmental impacts and implemented mitigation measures, as summarised in Appendix D, to manage the extent and significance of residual impacts. Residual biodiversity impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits. Payments into the Biodiversity Conservation Fund may also be made.

7.3 Strategic context

The project is supported by Commonwealth, State, regional and local plans and policies (as described in Section 2.2.4) and will support meeting the Commonwealth and State governments' renewable electricity generation targets and GHG emission reduction targets. Importantly, the project will contribute to the continued growth of renewable electricity generation and storage capacity in the South West REZ.

7.4 Objects of the EP&A Act

An assessment of the consistency of the project with the objects in section 1.3 of the EP&A Act is provided in Table 7.1.

Table 7.1 Consistency with the objects of the EP&A Act

Object	Consistency with the project
To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The project will promote the social and economic welfare of the community, and contribute to a better environment through the provision of electricity through the use of a renewable energy source. It will have far lower GHG emissions compared to fossil-fuel electricity generation, so will contribute to reducing climate change impacts to the community and the environment. The project will also promote the social and economic welfare of the local community through the provision of jobs and business opportunities. Resources within the development corridor include land that is being used for grazing and land which has biodiversity and Aboriginal cultural heritage values. This constitutes the 'natural resources' which must be properly managed, developed or conserved. The project will reduce agricultural utilisation within the development footprint during construction, primarily due to reduced land access – as opposed to reduced land capability. Sheep will be grazed within the development footprint during operation, where practical and subject to suitable conditions. The development footprint can be returned to agricultural land use at the completion of the project's operations. Land management practices will avoid or minimise potential impacts to neighbouring agricultural operations that have been identified during engagement with the local community and as part of the LUCRA. The project design refinements have reduced impacts on biodiversity values and Aboriginal cultural heritage resources. The implementation of management and mitigation measures will further reduce potential impacts and the residual biodiversity values that will be impacted by the project will be offset, while impacted Aboriginal sites will be subject to archival recording, recovery or relocation in consultation with the Aboriginal community.
To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	This EIS describes the economic, environmental and social context of the project and the potential impacts (as summarised in Section 7.6) to allow informed consideration of these aspects in determining the development application. The project will contribute to the continued growth of electricity generation from renewable sources, as well as providing electricity security and reliability.
To promote the orderly and economic use and development of land.	The orderly and economic use of land is best served by development that is permissible under the relevant planning regime and predominantly in accordance with the prevailing planning instruments. The project is permissible with consent, is consistent with statutory and strategic planning instruments and is adjacent to significant proposed energy transmission infrastructure. As detailed in this EIS, the project will result in positive economic impacts. The proposed mitigation measures and management measures will avoid or minimise adverse environmental and social impacts.

Table 7.1 Consistency with the objects of the EP&A Act

Object	Consistency with the project
To promote the delivery and maintenance of affordable housing.	There would be the potential for the large construction workforce to indirectly affect affordable housing in the region by increasing demand. To mitigate this, on-site accommodation will be provided to accommodate the non-local construction workforce.
To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Measures to avoid and minimise impacts to native vegetation and threatened species habitat were considered throughout the design development of the project, resulting in avoidance of biodiversity values where possible, and minimisation of impacts on other native vegetation to the extent practicable. Residual impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits. Payments into the Biodiversity Conservation Fund may also be made. Establishing offsets will enhance biodiversity values in the medium to long-term. The project will contribute to reducing GHG emissions as part of Australia's measures to reduce the impacts of climate change, including on threatened and other species of native animals and plants, ecological communities and their habitats.
To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	Avoidance of Aboriginal cultural heritage values has been a key aspect of the project design refinement process. Areas of higher archaeological potential were avoided from commencement of the project and the development corridor and development footprint have been refined throughout the EIS process in response to survey findings. Sites that are not able to be avoided will be subject to suitable archival recording, recovery or relocation in consultation with the RAPs. The project will not directly impact any historical heritage sites. Any indirect impacts will be managed through mitigation measures.
To promote good design and amenity of the built environment.	Project components will not be within a built environment and will not be accessible to the public and therefore the design and amenity is not directly applicable. However, the visual impact of the project components has been considered and minimised as part of the design.
To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Separation distances between project infrastructure and non-associated residences has been carefully planned to minimise potential hazards and risks. Project infrastructure will be maintained or upgraded over the project's life to ensure it's safe and efficient operations. Project construction will be compliant with the Building Code of Australia and all relevant statutory requirements.
To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	This is a matter for the different levels of government in the State. As summarised in Chapter 5, a wide range of government agencies have been consulted regarding the project, including Murrumbidgee Council, Edward River Council and DPHI.
To provide increased opportunity for community participation in environmental planning and assessment.	As described in Chapter 5, extensive engagement with the community has informed community members about the project and has sought community and other stakeholder feedback. This EIS provides detailed information regarding the project and its potential impacts. It will be placed on public exhibition by DPHI. Community members will be able to make formal submissions. Spark Renewables will prepare a submissions report responding to these submissions.

7.5 Consideration of community views

Feedback from the community included both positive and negative views on a range of topics.

Some stakeholders recognised the benefits of the project. In particular, stakeholders acknowledged the project as a source of local economic benefits including opportunities for procurement and employment. The community was also interested in understanding the project's role in the energy transition and the South West REZ. Some stakeholders expressed concerns regarding the potential cumulative impacts of multiple renewables and transmission projects proposed to occur concurrently in the region. Community benefit sharing has been discussed with the community, who has provided valuable feedback regarding the community's needs. Bushfire risks were identified as a key concern by several community members, while some recognised positives for fire management including improved monitoring and additional accessible water storage for firefighting.

Some concerns were raised by community stakeholders regarding the loss of native flora and fauna, groundwater drawdown and associated water availability, visual amenity impacts. Other matters raised included the potential for the construction workforce to affect housing supply and how decommissioning and rehabilitation of the area would be managed at the end of the project life.

Community views and responses identified as part of targeted engagement and the SIA are provided in Chapter 5, Appendix C and Appendix E.14.

7.6 Summary of project impacts

This EIS considers the potential impacts associated with the project, as well as the need for the project and alternative development options. This section summarises the potential impacts and provides a justification for the project on environmental, economic and social grounds.

7.6.1 Environmental

Potential impacts to the biophysical and social environment are:

- Landscape and visual – the project will have a low to negligible visual impact on non-associated residences within 8 km of a WTG location, due to a combination of distance, existing intervening vegetation and low visual sensitivity of the landscape. Vegetation screening is proposed at one residence, R019, to ensure that the visual impact at this location will be low. There are no key public viewpoint locations within 8 km of a WTG location. Key viewpoints greater than 8 km from the project area were assessed. Views towards the project will be screened by existing vegetation at each location.
- Noise and vibration – noise and vibration from the project are not predicted to adversely impact non-associated residences. Three non-associated residences (R019, R079 and R088) will temporarily be within a noise affected area during the construction phase. Noise during operations is predicted to comply with operational noise criteria at all non-associated residences.
- Biodiversity – avoidance and minimisation of biodiversity impacts has enabled the progressive refinement of the development corridor and development footprint, with avoidance of areas of higher conservation value, identified threatened species habitat and/or native vegetation maximised to the extent possible. Residual impacts to biodiversity include: removal of 1,145 ha of native vegetation (including impacts to listed TECs); impacts to 14 species credit species (impacts to either habitat or individuals); and impacts to 15 hollow-bearing trees and 29 scattered trees. Residual impacts that are not able to be avoided will be offset through the biodiversity offset strategy.
- Aboriginal cultural heritage – avoidance of Aboriginal cultural heritage values has been a key aspect of the project design and refinement process, with areas of higher archaeological potential avoided from commencement of the project. Following field surveys and project refinement, 15 identified sites were avoided, with residual impacts to 17 sites. Impacts to Aboriginal heritage values will be managed through the implementation of an Aboriginal Cultural Heritage Management Plan prepared in consultation with the RAPs.

- Historical heritage – there are eight identified historical heritage sites within the project area, of which five sites are intersected by the development corridor, but which are outside the development footprint. Direct impacts to all identified heritage sites within the development corridor will be avoided through mitigation measures. Indirect impacts are predicted to be low to negligible.
- Transport – traffic modelling identified that key intersections and roads have sufficient additional capacity to absorb construction vehicle movements. Road upgrades are proposed to enhance road condition and safety, including widening sections of McLennons Bore Road, Fernbank Road, Wilson Road and Goolgumbula Road, constructing a new site access intersection on Kidman Way and upgrading existing intersections at Kidman Way/McLennons Bore Road and Kidman Way/Cadell Road (south).
- Water – the project design has minimised impacts to water resources by avoiding watercourses, infrastructure associated with CICL, flood prone areas and groundwater receptors as far as practicable. Project activities are not anticipated to intersect the regional water table and, therefore, groundwater availability for existing users is not expected to be impacted. Potential construction phase impacts, including degradation of surface water quality, physical impacts to watercourses, and altered water quantity from increased site runoff, will be avoided or minimised through the implementation of the proposed mitigation measures.
- Flooding – residual flood risks will be managed through construction phase planning. The majority of the infrastructure areas have been sited so that they are either free of flooding (for events up to a 1% AEP) or subject to low flood hazard that is generally safe for people, vehicles and buildings.
- Air quality – dust emissions from construction of the project are not anticipated to have significant impacts on nearby residences, and operational emissions from the project are expected to be negligible.
- Land – project construction will result in a temporary change of land use within the development footprint. Impacts to agricultural productivity during operations will be reduced and mitigated by the proposed continued use of the land for compatible agricultural enterprises. Land management practices will avoid or minimise potential impacts to neighbouring agricultural operations and ensure that the development footprint can be returned to a productive agricultural use at the end of operations. The application of the proposed land and rehabilitation mitigation measures will prevent significant impacts on soil quality and quantity; erosion and sedimentation; and the introduction of weeds, pathogens and pest species.
- Hazards and risks – no significant hazards and risks have been identified for the project. Aviation risks associated with the project are tolerable with the implementation of mitigation measures, which include consultation with CASA, Airservices Australia and other relevant stakeholders.

7.6.2 Economic

The construction and operation of the project will have net positive impacts on the level of economic activity in the regional and NSW economy contributing an annual average of:

- \$351 million and 967 direct and indirect jobs across the State during construction
- \$380 million and 195 direct and indirect jobs across the State during operation.

Construction of the project will create demand for production (goods and services) and regional labour resources, which has potential to cause labour shortages and rising inflation due to increased wage costs. The provision of an on-site accommodation facility will allow the construction workforce demand to be met from outside of the region and therefore no, or only modest, observable price effects from labour shortages are anticipated.

Spark Renewables will work in partnership with Murrumbidgee Council, Edward River Council and the local community to minimise potential impacts and maximise benefits to the regional economy.

Spark Renewables, Murrumbidgee Council and Edward River Council have agreed on a community benefit sharing program that is predominantly delivered in partnership with the respective councils through VPAs. Indicative terms for the VPAs are outlined in Section 5.7.

7.6.3 Social

The project is justified on social grounds as:

- the main issues raised by the local community have been addressed and mitigated
- it will contribute to the local and regional economy
- it will provide direct and indirect benefits through the use of services and facilities both locally and regionally.

It will also generate energy from a renewable energy source, reducing the amount of electricity that needs to be generated using fossil fuels, reducing the climate change impacts of electricity generation, and meeting the need for replacement power as ageing coal-fired power stations are progressively closed.

Mitigation and management measures have been proposed for each of the identified potential negative social impacts to minimise negative consequences and to maximise social benefits for the local community.

Public safety risks, including bushfire, will be mitigated through design of buildings, construction areas and other assets to include appropriate fire protection measures (e.g. APZs) and emergency access and evacuation protocols.

7.7 Ecologically sustainable development

The principles of ecologically sustainable development are outlined in part 8, division 5, section 193 of the EP&A Regulation and are addressed in Table 7.2.

Table 7.2 Consideration of principles of ecologically sustainable development

Principle	Ecologically sustainable development principle	Evaluation of project impact against principle
Precautionary principle	The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by— i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and ii) an assessment of the risk-weighted consequences of various options.	During the project planning phase and preparation of this EIS, experts in their respective fields have carefully assessed the potential environmental impacts of the project through quantitative technical assessments, providing a high degree of certainty around project impacts. The project has been designed with regard to the precautionary principle, and in response to legislation, policies, and guidelines, to ensure that it does not pose an unacceptable risk to human health or the environment. Management measures have been proposed to avoid or minimise the threat of serious or irreversible damage to the environment to the extent practicable. Therefore, the project is consistent with the precautionary principle.

Table 7.2 **Consideration of principles of ecologically sustainable development**

Principle	Ecologically sustainable development principle	Evaluation of project impact against principle
Social equity including inter-generational equity	Inter-generational equity , namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	The project will contribute to the sustainable transition of electricity generation in NSW to a more reliable, more affordable and cleaner energy future and contribute to a net reduction in GHG emissions. Residual impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits. Payments into the Biodiversity Conservation Fund may also be made. Once decommissioned, the land within the development corridor can be rehabilitated to its current use if required, enabling a return to agricultural production, which would provide benefits for future generations. Therefore, the project is consistent with inter-generational equity.
Conservation of biological diversity and maintenance of ecological integrity	Conservation of biological diversity and ecological integrity , namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.	The conservation of biological diversity and ecological integrity has been a fundamental consideration in the development of the project. The project area has a long history of agricultural use. The development corridor has been sited to minimise impacts to biodiversity values where possible. Specifically, the development corridor was refined to avoid areas of high biodiversity value once these areas were identified by extensive vegetation mapping and targeted surveys as part of the BDAR. Residual impacts that are not able to be avoided will be offset through a biodiversity offset strategy, with a preference for the establishment of stewardship sites near the project and generation of like-for-like credits. Payments into the Biodiversity Conservation Fund may also be made. The proposed management measures will avoid, minimise or mitigate impacts on biodiversity during construction and operations (Appendix D).
Improved valuation and pricing of environmental resources	Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as— i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste, and iii) established environmental goals should be pursued in the most cost effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	The purpose of the project is to generate renewable electricity, which supports the transition away from fossil fuel (coal and gas) electricity generation, thereby contributing to a net reduction in the generation of pollution and the use of non-renewable natural resources. Spark Renewables accepts the financial costs associated with the measures required for the project to avoid, minimise, mitigate and manage potential environmental and social impacts and for the appropriate decommissioning required for project infrastructure. Therefore, the project is consistent with improved valuation, pricing and incentive mechanisms.

7.8 How compliance will be ensured

A monitoring and management framework will be developed to enable the potential positive and negative impacts of the project to be monitored. The monitoring and management framework will:

- track progress of mitigation and management strategies
- assess actual project impacts against predicted impacts
- identify how information on progress and achievements will be captured for reporting to impacted stakeholders, including neighbouring landholders, communities and government
- include key performance indicators, targets and outcomes
- nominate responsible parties
- describe mechanisms for adaption of management measures when required.

A continuous improvement approach will be adopted. This will review positive and negative impacts, and management measures to identify opportunities to improve the effectiveness of the management measures.

7.9 Key uncertainties and proposed measures

Key uncertainties associated with the impact assessment and the measures proposed to address these are as follows:

- Collision risks with bird and bat species associated with turbine strike during operation of the project. The BDAR (Appendix E.3) identifies that the level at which turbine strike is likely to occur is difficult to accurately predict prior to commissioning of turbines, and as such impacts are considered uncertain. A monitoring and adaptive management approach has been developed to ensure any that impacts that occur are identified as early as possible, management measures are implemented to minimise the potential for the impact to reoccur (where possible) and, if relevant, offsets are calculated and provided.
- The project's generation capacity and connection to the electricity grid is dependent on the outcomes of the South West REZ Access Scheme and the construction of electricity grid infrastructure (including Dinawan Substation). For the purposes of this EIS, it has been assumed that the project will connect to the Dinawan Substation site.
- Potential cumulative impacts associated with the project have been assessed (refer to Section 6.1.4). However, significant uncertainty remains as to which other projects in the region will proceed, and the timing of the projects that do proceed. Project monitoring will consider cumulative impacts.

7.10 Conclusion

The project involves the development and operation of a large-scale wind electricity generation facility with associated infrastructure. The project will be within the NSW Government declared South West REZ and will play an important part in achieving the objectives of the REZ. It will also provide significant economic stimulus to the region through construction jobs and associated flow-on benefits.

The project will provide the following overall benefits:

- contribution to energy security and reliability in NSW by diversifying the State's electricity generation mix in preparation for the retirement of the remaining large-scale coal-fired power generation
- contribution to reducing GHG emissions from electricity generation, reducing the impacts of climate change and the community and the environment
- alignment with Commonwealth and NSW Government electricity policies and strategies and regional plans
- provision of ongoing economic benefits for both the local economy within the Murrumbidgee LGA, Edward River LGA and more broadly, the regional economy
- provision of significant employment and business opportunities during construction.

Spark Renewables is committed to delivering a project that provides a positive legacy for the local community. The residual environmental and social impacts identified throughout the EIS will be managed through the mitigation, management and offsetting measures.

Abbreviations

µg/m ³	micrograms per cubic metre
µT	microTesla
AC	alternating current
ACHA	Aboriginal cultural heritage assessment
ACMA	Australian Communications and Media Authority
AEMO	Australian Energy Market Operator
AEP	annual exceedance probability
AHD	Australian height datum
AHIMS	Aboriginal Heritage Information Management System
AMSL	above mean sea level
APZ	asset protection zone
ASC	Australian Soil Classification
BAM	<i>Biodiversity assessment method</i> (DPIE 2020c)
BBAMP	bird and bat adaptive management plan
BBUS	bird and bat utilisation surveys
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BC Regulation	Biodiversity Conservation Regulation 2017
BCS	NSW DCCEEW's Biodiversity, Conservation and Science Division
BDAR	biodiversity development assessment report
BESS	battery energy storage system
BMP	biodiversity management plan
BSAL	biophysical strategic agricultural land
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations 1998
CEMP	construction environmental management plan
CIC	critical industry clusters
CICL	Coleambally Irrigation Co-operative Limited
dB	decibels
dB(A)	decibels on the A-weighted scale
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water
DNG	derived native grasslands
DPE	NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure (formally DPE)
EII Act	<i>NSW Electricity Infrastructure Investment Act 2020</i>

EIS	environmental impact statement
EMF	electric and magnetic fields
EMM	EMM Consulting Pty Limited
EnergyCo	Energy Corporation of NSW
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2021
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	environmental protection license
ft	feet
GDE	groundwater dependent ecosystems
GHG	greenhouse gas
GPS	global positioning services
GW	gigawatts
ha	hectares
HIPAP	Hazardous Industry Planning Advisory Paper
IBRA	Interim Biogeographic Regionalisation of Australia
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISP	Integrated System Plan
kL	kilolitres
km	kilometres
kV	kilovolts
L/s	litres per second
LEP	local environmental plan
LGA	local government area
LRET	Large-scale Renewable Energy Target
LSALT	lowest safest altitude
LSC	land and soil capability
LSC	land and soil capability
LSIR	Location Specific Individual Risk
LUCRA	land use conflict risk assessment
m/s	metres per second
ML	megalitres
mm	millimetres
MNES	matters of national environmental significance
MW	megawatts

NASF Guideline D	National Airports Safeguarding Framework Guideline D: Managing the risk to aviation safety of wind turbine installations (wind farms)/wind monitoring towers
NEM	National Electricity Market
nm	nautical miles (1 nm = 1.852 km)
Npfi	<i>Noise Policy for Industry</i> (EPA 2017)
NSW LSC Scheme	<i>The land and soil capability assessment scheme</i> (OEH 2012)
NSW	New South Wales
O&M	operation and maintenance
OSOM	oversize and overmass
PANS OPS	International Civil Aviation Organisation Doc 8168 – Procedures for Air Navigation – Operations
PCT	plant community type
PHA	preliminary hazard analysis
PM ₁₀	airborne particulate matter less than 10 micrometres in aerodynamic diameter
PMF	probable maximum flood
POEO Act	<i>NSW Protection of the Environment Operations Act 1997</i>
RAP	registered Aboriginal party
RAV	restricted access vehicle
RBL	rated background noise level
REZ	Renewable Energy Zone
RFS	NSW Rural Fire Service
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SIA	social impact assessment
SSD	State significant development
SSI	State significant infrastructure
TEC	threatened ecological community
TfNSW	Transport for NSW
TNB	Tenaga Nasional Berhad
VNI	Victoria to NSW Interconnector
VPA	Voluntary Planning Agreement
WRP	water resource plan
WTG	wind turbine generator
µm	micrometres

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Appendix A

SEARs table

A.1 SEARs table

Table A.1 SEARs compliance table

SEARs Requirement	Reference
General requirements	
The environmental impact statement (EIS) must meet the minimum form and content requirements as prescribed by Part 8, Division 5 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) and must have regard to the State Significant Development Guidelines and the NSW Wind Energy Framework.	Chapter 4
The EIS must include:	
• a stand-alone executive summary;	Executive Summary
• a full description of the development, including:	Chapter 3
- details of construction, operation and decommissioning, including any proposed staging of the development or refurbishing of turbines over time;	Section 3.4 Section 3.5
- all infrastructure and facilities, such as substations, transmission lines, battery energy storage system, construction compounds, concrete batching plants, internal access roads, and road upgrades (including any infrastructure that would be required for the development, but the subject of a separate approvals process);	Section 3.3
- plans for any buildings;	Chapter 3
- high-quality site plans and maps at an adequate scale with dimensions showing:	Figure 3.1
• the location and dimensions of all project components including coordinates in latitude / longitude and maximum AHD heights of the turbines;	Appendix G
• existing infrastructure, land use, and environmental features in the vicinity of the development, including nearby residences and approved residential developments or subdivisions within 6 km of a proposed turbine, and any other existing, approved or proposed wind farms in the region;	Figure 1.1 Figure 2.1 Figure 2.2
• the development corridor that has been assessed, including any allowance for micro-siting of turbines and identification of the key environmental constraints that have been considered in the design of the development;	Figure 2.6
• consolidated list and GIS data of coordinates of wind turbines, project infrastructure and relevant receivers and distances to potentially impacted receivers; and	Appendix G
• details of the progressive rehabilitation of the site;	Section 3.4.4
• a list of any approvals that must be obtained before the development may commence;	Table 4.1
• the terms of any proposed voluntary planning agreement with the relevant local council;	Section 5.7
• an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:	Chapter 5
- a description of the existing environment likely to be affected by the development using sufficient baseline data;	Section 2.4
- an assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region, in accordance with the Cumulative Impact Assessment Guideline (DPIE, 2021), taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice and including the NSW Wind Energy Guidelines for State Significant Wind Energy Development (2016);	Chapter 5

Table A.1 **SEARs compliance table**

SEARs Requirement	Reference
- a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development, including details of consultation with any affected non-associated landowners in relation to the development of mitigation measures and any negotiated agreements with these landowners), and draft management plans for specific issues as identified below; and	Chapter 5 Appendix D
- a description of the measures that would be implemented to monitor and report on the environmental performance of the development, including adaptive management strategies and contingency measures to address residual impact;	Chapter 5 Appendix D
• a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; and	Appendix D
• a detailed evaluation of the merits of the project as a whole having regard to:	Chapter 7
- the requirements in Section 4.15 of the Environmental Planning and Assessment Act 1979 (EP&A Act), and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development;	Section 7.4 Section 7.7
- the environmental, economic and social costs and benefits of the development, having regard to the predicted electricity demand in NSW and the National Electricity Market, NSW's Climate Change Policy Framework, NSW's Net Zero Plan Stage 1: 2020 - 2030 and the greenhouse gas savings of the development;	Section 7.6
- feasible alternatives to the development and its key components (including opportunities for shared infrastructure with proposed developments in the region), including the consequences of not carrying out the development; and	Section 2.7
- the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses, including rural villages, rural dwellings, subdivisions, land of high scenic value, conservation areas (including National Parks, State Parks and Reserves), state forests, mineral and coal resources, triangulation stations, irrigation areas, tourism facilities, existing or proposed wind farms, and the capacity of the existing electricity transmission network to accommodate the development; and	Section 2.3 Section 2.4 Section 2.5 Section 6.9.3 Section 6.11.2 Section 7.4
- a detailed consideration of the capability of the project to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter.	Section 2.2 Section 2.6
Capital Investment Value and Employment	
• Provide a detailed calculation of the capital investment value (CIV) of the development, prepared by an AIQS Certified Quantity Surveyor or RICS Chartered Quantity Surveyor in accordance with Planning Circular PS 21-020: Calculation of Capital Investment Value. The calculation of the estimated CIV is to be accurate at the date of application and include details of all components and assumptions from which it is derived.	Provided separately to the EIS
• Provide an estimate of the retained and new jobs that would be created during the construction and operational phases of the development, including details of the methodology to determine the figures provided.	Section 3.4.2v Section 3.4.3ii
The development application must be accompanied by:	
• the consent of the owner/s of the land (as required in Section 23(1) of the Regulation); and	Provided separately to the EIS
• a declaration from a Registered Environmental Assessment Practitioner that the EIS includes the information specified in the Department's Registered Environmental Assessment Practitioner Guidelines.	Certification page

Table A.1 **SEARs compliance table**

SEARs Requirement	Reference
Key issues	
The EIS must address the following specific issues for the wind farm and associated infrastructure:	
Landscape and Visual – including a detailed assessment of the visual impacts of all components of the project (including turbines, transmission lines, substations, battery energy storage system, and any other ancillary infrastructure in accordance with the NSW Wind Energy: Visual Assessment Bulletin (DPE, 2016), including detailed consideration of potential visual impacts on local residences (including approved developments, lodged development applications and dwelling entitlements), scenic or significant vistas and road corridors in the public domain.	Section 6.1 Appendix E.1
Noise and Vibration – including:	
• an assessment of the wind turbine noise in accordance with the NSW Wind Energy: Noise Assessment Bulletin (EPA/DPE, 2016);	Section 6.2 Appendix E.2
• an assessment of the noise generated by ancillary infrastructure in accordance with the NSW Noise Policy for Industry (EPA, 2017);	Section 6.2 Appendix E.2
• assessment of the construction noise under the Interim Construction Noise Guideline (DECC, 2009) and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria);	Section 6.2 Appendix E.2
• assessment of the traffic noise under the NSW Road Noise Policy (DECCW, 2011);	Section 6.2 Appendix E.2
• an assessment of vibration under the Assessing Vibration: A Technical Guideline (DECC, 2006); and	Section 6.2 Appendix E.2
• assessment of the cumulative noise impacts (considering other developments in the area).	Section 6.15 Appendix E.2
Biodiversity – including:	
• an assessment of the biodiversity values and the likely biodiversity impacts of the project, including impacts associated with transport route road upgrades in accordance the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), including a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts (including on grasslands) of the development over time, and a strategy to offset any residual impacts of the development in accordance with the BC Act;	Section 6.3 Appendix E.3
• an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts, including impacts to Coleambally Outfall Drain, Delta Creek and Yanco Creek;	Section 6.3 Appendix E.3
• an assessment of the impacts of the development on birds and bats, including blade strike, low air pressure zones at the blade tips (barotrauma), alteration to movement patterns, and cumulative impacts of other wind farms in the vicinity;	Section 6.3 Appendix E.3
• a cumulative impact assessment of biodiversity values in the region from nearby developments; and	Section 6.15 Appendix E.3
• if an offset is required, include details of the measures proposed to address the offset obligation.	Section 6.3.5 Appendix E.3

Table A.1 SEARs compliance table

SEARs Requirement	Reference
Heritage – including:	
an assessment of the impact to Aboriginal cultural heritage items (archaeological and cultural) in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010), including results of archaeological test excavations (if required);	Section 6.4 Appendix E.4
provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010); and	Section 6.4.2 Appendix E.4
an assessment of the impacts to historic heritage having regard to the NSW Heritage Manual.	Section 6.5 Appendix E.5
Transport – including:	
an assessment of the construction, operational and decommissioning traffic impacts of the development on the local and State road network;	Section 6.6 Appendix E.6
provide details of the peak and average traffic volumes (including light, heavy and over-mass and over-dimensional vehicles / heavy vehicles requiring escort and construction worker transportation) and transport and haulage routes during construction, operation and decommissioning, including traffic associated with sourcing raw materials (water, sand and gravel);	Section 6.6 Appendix E.6
an assessment of the potential traffic impacts of the project on road network function including intersection performance, site access arrangements, site access and haulage routes, and road safety, including school bus routes and school zones;	Section 6.6 Appendix E.6
an assessment of the capacity of the existing road network to accommodate the type and volume of traffic generated by the project (including over-mass / over-dimensional traffic haulage routes from port) during construction, operation and decommissioning;	Section 6.6 Appendix E.6
an assessment of the likely transport impacts to the site access and haulage routes, site access point, any rail safety issues, any Crown Land (including existing Travelling Stock Route network) particularly in relation to the capacity and conditions of the roads and use of rail level crossings (and rail safety assessment if required), and impacts to rail underbridges and overbridges;	Section 6.6 Appendix E.6
a cumulative impact assessment of traffic from nearby developments; and	Section 6.15 Appendix E.6
provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road and / or rail authority.	Section 6.6 Appendix E.6
Water and Soils – including:	
a site water balance for the development, quantify water demand, identify water sources (surface and groundwater), including any licensing requirements, and determine whether an adequate and secure water supply is available for the development;	Section 6.7 Appendix E.7
an assessment of the likely impacts of the development (including flooding and flood modelling) on surface water and groundwater resources traversing the site and surrounding watercourses (including their Strahler Stream Order), irrigation and drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils, related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts;	Section 6.7 Appendix E.7

Table A.1 **SEARs compliance table**

SEARs Requirement	Reference
where the project involves works within 40 metres of the high bank of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI Guidelines for Controlled Activities on Waterfront Land (2018) and (if necessary) Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI 2003); and Policy & Guidelines for Fish Habitat Conservation & Management (DPI, 2013); and	Section 6.7.5ii Appendix E.7
a description of the measures to minimise surface and groundwater impacts, including how works on erodible soil types would be managed and any contingency requirements to address residual impacts in accordance with the Managing Urban Stormwater: Soils and Construction series of guidelines.	Section 6.7.6 Appendix E.7
Air quality – including an assessment of risks of dust generation and propose mitigation measures designed in accordance with the Approved Methods and Guidelines for the Modelling and Assessment of Air Pollutants in New South Wales (DECC, 2005).	Section 6.8
Land – including:	
a detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, permissibility, strategic context and existing site constraints;	Section 2.3
- an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: - consideration of agricultural land, biosecurity, travelling stock routes, flood prone land, Crown lands, irrigation areas, mining, quarries, mineral or petroleum rights; - a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and - a cumulative impact assessment of nearby developments;	Section 6.9 Appendix E.8
- an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including: - consideration of the zoning provisions applying to the land, including subdivision (if required); - completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and - assessment of impact on agricultural resources and agricultural production on the site and region.	Section 6.9.2 Appendix E.8
Hazards and Risks – including:	Section 6.15 Appendix E.8
<i>Aviation Safety:</i> - assess the impact of the development under the National Airports Safeguarding Framework Guideline D: Managing Wind Turbine Risk to Aircraft; - provide associated height and co-ordinates for each turbine assessed;	Section 2.3 Section 2.4 LUCRA in Appendix E.8
	Table 2.2 (zoning) Section 3.3.3 (subdivision)
	Appendix E.8
	Section 6.9 Appendix E.8
	Section 6.11.6 Appendix E.9
	Appendix G

Table A.1 **SEARs compliance table**

SEARs Requirement	Reference
- assess potential impacts on aviation safety, including cumulative effects of wind farms in the vicinity, potential wake / turbulence issues, the need for aviation hazard lighting and marking, including of wind monitoring masts, considering defined air traffic routes, aircraft operating heights, approach / departure procedures, radar interference, communication systems, navigation aids, and use of emergency helicopter access;	Section 6.11.6 Appendix E.9
- identify aerodromes within 30 km of the turbines and consider the impact to nearby aerodromes and aircraft landing areas;	Section 6.11.6 Appendix E.9
- address impacts on obstacle limitation surfaces; and	Section 6.11.6 Appendix E.9
- assess the impact of the turbines on the safe and efficient aerial application of agricultural fertilisers and pesticides in the vicinity of the turbines and transmission line;	Section 6.11.6 Appendix E.9
• <i>Telecommunications</i> – identify possible effects on telecommunications systems, assess impacts and mitigation measures including undertaking a detailed assessment to examine the potential impacts as well as analysis and agreement on the implementation of suitable options to avoid potential disruptions to radio communication services, which may include the installation and maintenance of alternative sites;	Section 6.11.2 Appendix E.10
• <i>Health</i> – consider and document any health issues having regard to the latest advice of the National Health and Medical Research Council, and identify potential hazards and risks associated with electric and magnetic fields (EMF) and demonstrate the application of the principles of prudent avoidance, including an assessment against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields;	Section 6.11.3 Appendix E.11
• <i>Bushfire</i> – identify potential hazards and risks associated with bushfires / use of bushfire prone land, including the risks that a wind farm would cause bush fire and any potential impacts on the aerial fighting of bushfires and demonstrate compliance with Planning for Bush Fire Protection 2019;	Section 6.10 Appendix E.12
• <i>Dangerous Goods</i> – a preliminary risk screening completed in accordance with the State Environmental Planning Policy (Resilience and Hazards) 2021;	Section 6.11.4 Appendix E.13
• <i>Battery Energy Storage System</i> - a Preliminary Hazard Analysis (PHA), prepared in accordance with the Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-level Risk Assessment (DoP, 2011). The PHA must consider all recent standards and codes and verify separation distances to on-site and off-site receptors to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning (DoP, 2011); and	It is no longer proposed to construct a battery energy storage system as part of the project.
• <i>Blade Throw</i> – assess blade throw risks.	Section 6.11.5 Appendix E.13
Social Impact – including an assessment of the social impacts in accordance with the Social Impact Assessment Guideline (DPIE, 2021) and consideration of construction workforce accommodation.	Section 6.12 Appendix E.14
Economic – including any benefits of the economic impacts or benefits of the project for the region and the State as a whole, including consideration of any increase in demand for community infrastructure services, and details of how the construction workforce will be managed to minimise local impacts, including a consideration of the construction workforce accommodation.	Section 6.13 Appendix E.15
Waste – identify, quantify and classify the likely waste streams to be generated throughout all stages of the project, and describe the measures to be implemented to reduce waste generation, manage, reuse, recycle and safely dispose of this waste.	Section 6.14

Table A.1 **SEARs compliance table**

SEARs Requirement	Reference
Plans and documents	
The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Part 3 of the Regulation. Provide these as part of the EIS rather than as separate documents.	Figures throughout EIS
In addition, the EIS must include high quality files of maps and figures of the subject site, proposal, and proposed road upgrades.	Figures throughout EIS
Legislation, policies, and guidelines	
The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified.	Throughout EIS
Engagement	
During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.	Chapter 5
The EIS must:	
• detail how engagement undertaken was consistent with the Undertaking Engagement Guide: Guidance for State Significant Projects (DPIE, 2021); and	Section 5.9
• describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	Chapter 5 Appendix C
In particular you must consult with:	
• the relevant local, State or Commonwealth Government authorities, service providers, community groups, affected landowners, exploration licence holders, quarry operators and mineral title holders; and	Chapter 5
• carry out detailed consultation with the following:	Section 5.4
- Murrumbidgee Council	
- Edward River Council	
- NSW Aboriginal Land Council	
- DPE's Biodiversity, Conservation and Science Directorate	
- NSW National Parks and Wildlife Service	
- Heritage NSW	
- Murray Local Land Services	
- DPE Water Group	
- WaterNSW	
- Environment Protection Authority	
- Crown Lands	
- Regional NSW – Mining, Exploration & Geoscience	
- Department of Primary Industries – Agriculture and Fisheries divisions	

Table A.1 **SEARs compliance table**

SEARs Requirement	Reference
- Transport for New South Wales	
- Transgrid	
- Department of Customer Service – NSW Telco Authority	
- Fire & Rescue NSW	
- NSW Rural Fire Service	
- Commonwealth Department of Defence	
- Civil Aviation Safety Authority	
- Airservices Australia	

A.2 Supplementary SEARs table

Table A.2 Commonwealth Department of Climate Change, Energy, the Environment and Water assessment requirements – compliance table

Requirements	Location in the EIS
General requirements	
Relevant regulations	
The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the EPBC Regulations and all matters outlined below in relation to the controlling provisions.	-
1.01 The background of the action including: a) the title of the action b) the full name and postal address of the designated proponent c) a clear outline of the objective of the action d) the location of the action e) the background to the development of the action f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action g) the current status of the action h) the consequences of not proceeding with the action.	Chapter 1 (background, current status, applicant details and related development) Chapter 2 (project objectives and alternatives considered including 'do nothing') Chapter 3 (project location)
2.01 A description of the action, including: a) all the components of the action b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts d) relevant impacts of the action e) proposed safeguards and mitigation measures to deal with relevant impacts of the action f) any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action g) to the extent reasonably practicable, any feasible alternatives to the action, including: i. if relevant, the alternative of taking no action ii. a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action iii. sufficient detail to make clear why any alternative is preferred to another h) any consultation about the action, including: i. any consultation that has already taken place ii. proposed consultation about relevant impacts of the action iii. if there has been consultation about the proposed action-any documented response to, or result of, the consultation i) identification of affected parties, including a statement mentioning any communities that may be affected and describing their views."	Chapter 2 (project objectives and alternatives considered including 'do nothing') Chapter 3 (project description and project location) Chapter 4 (statutory context) Chapter 5 (engagement overview and summary of community views) Chapter 6 (impact assessment) Appendix B (mandatory matters for approval consideration) Appendix D (summary of management and mitigation measures)

Table A.2 Commonwealth Department of Climate Change, Energy, the Environment and Water assessment requirements – compliance table

Requirements	Location in the EIS
3.01 Information given under paragraph 2.01(d) must include: a) a description of the relevant impacts of the action b) a detailed assessment of the nature and extent of the likely short term and long term relevant impacts c) a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible d) analysis of the significance of the relevant impacts e) any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	Chapter 6 (impact assessment) Appendix E (technical assessments)
4.01 Information given under paragraph 2.01(e) must include: a) a description, and an assessment of the expected or predicted effectiveness of, the mitigation measures b) any statutory or policy basis for the mitigation measures c) the cost of the mitigation measures d) an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing e) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program f) a consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action, including mitigation measures proposed to be taken by State governments, local governments or the proponent.	Chapter 6 (impact assessment) Appendix D (summary of management and mitigation measures) Appendix E (technical assessments) Note: Costs associated with mitigation measures have not been calculated at this stage of the assessment process.
5.01 Information given under paragraph 2.01(f) must include: a) details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including: i. what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy ii. how the scheme provides for the prevention, minimisation and management of any relevant impacts b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action c) a statement identifying any additional approval that is required d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.	Chapter 4 (statutory context) Appendix B (mandatory matters for approval consideration) Appendix D (summary of management and mitigation measures)
6.01 Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against: a) the person proposing to take the action; and b) for an action for which a person has applied for a permit, the person making the application.	No relevant proceedings declared by Spark Renewables.
6.02 If the person proposing to take the action is a corporation--details of the corporation's environmental policy and planning framework.	Spark Renewables is committed to maintaining responsible environmental management practices that meet or exceed industry best practice.

Table A.2 Commonwealth Department of Climate Change, Energy, the Environment and Water assessment requirements – compliance table

Requirements	Location in the EIS
7.01 For information given in a draft public environment report or environmental impact statement, the draft must state: a) the source of the information; and b) how recent the information is; and c) how the reliability of the information was tested; and d) what uncertainties (if any) are in the information.	References are listed in this EIS and supporting technical assessments (Appendix E) and uncertainties (if any) are described in the relevant assessments.
Project description	
The title of the action, background to the action and current status.	Chapter 1 (background and current status)
The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on Matters of National Environmental Significance (MNES).	Chapter 3 (project description and project location)
How the action relates to any other actions that have been, or are being taken in the region affected by the action.	Chapter 1 (related developments)
How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES	Chapter 3 (project description)
Impacts	
The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: • a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; • a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; • analysis of the significance of the relevant impacts; and • any technical data and other information used or needed to make a detailed assessment of the relevant impacts	Chapter 6 (impact assessment) Chapter 8, Section 12.1 and Appendix 6 of Appendix E.3
Avoidance, mitigation and offsetting	
For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: • a description, and an assessment of the expected or predicted effectiveness of the mitigation measures, • any statutory policy basis for the mitigation measures; • the cost of the mitigation measures; • an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; • the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	Section 6.3 Chapter 7 and Chapter 9 of Appendix E.3
Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	Section 6.3.5 Appendix E.3

Table A.2 Commonwealth Department of Climate Change, Energy, the Environment and Water assessment requirements – compliance table

Requirements	Location in the EIS
For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: - conservation advice or recovery plan for the species or community; - relevant threat abatement plan for the species or community; - wildlife conservation plan for the species; and - any strategic assessment.	Appendix E.3
In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15-17.	See below
Assessment requirements	
The EIS must identify each EPBC Act listed threatened species and community likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	Section 6.3 Section 12.1 and Appendix 6 of Appendix E.3
For each of the EPBC Act listed threatened species and communities likely to be impacted by the action the EIS must provide a separate: - description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; - details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements; - description of the relevant impacts of the action having regard to the full national extent of the species or community's range; - description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; - identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account; - a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established; - details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and - details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites.	Section 6.3 Appendix E.3
Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy.	Not applicable
Other approvals and conditions	
Information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations.	Chapter 4 (statutory context) Appendix B (mandatory matters for approval consideration)

Table A.2 **Commonwealth Department of Climate Change, Energy, the Environment and Water
assessment requirements – compliance table**

Requirements	Location in the EIS
Environmental record of person proposing to take the action	
Information in relation to the environmental record of a person proposing to take the action must include details as prescribed in Schedule 4 Clause 6 of the EPBC Regulations	No relevant proceedings declared by Spark Renewables. Spark Renewables is committed to maintaining responsible environmental management practices that meet or exceed industry best practice.
Information sources	
For information given in an EIS, the EIS must state the source of the information, how recent the information is, how the reliability of the information was tested; and what uncertainties (if any) are in the information.	References are listed in this EIS and supporting technical assessments (Appendix E) and uncertainties (if any) are described in the relevant assessments.

Appendix B

Statutory compliance table

B.1 Statutory compliance table

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
Considerations under the EP&A Act and EP&A Regulation			
<i>Environmental Planning and Assessment Act 1979</i>	Section 1.3	Relevant objects of the Act	Section 7.4
	Section 4.15(1)	Matters for consideration—general In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:	
		(a) the provisions of— (i) any relevant environmental planning instruments, and ... (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), That apply to the land to which the development application relates.	See below
		(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.	Chapter 5
		(c) the suitability of the site for the development.	Section 2.3
		(e) the public interest.	Chapter 7
Environmental Planning and Assessment Regulation 2021	Division 1, section 24	(1) A development application must— (a) be in the approved form, and (b) contain all of the information and documents required by: (i) the approved form, and (ii) the Act of this Regulation, and (c) be submitted on the NSW planning portal.	The EIS will be submitted via the NSW planning portal and has been prepared in the approved form.

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
	Division 5, section 190	(1) An environmental impact statement must contain the following information –	
		(a) the name, address and professional qualifications of the person who prepared the statement,	Certification page
		(b) the name and address of the responsible person,	Section 1.3
		(c) the address of the land— (i) to which the development application relates, or (ii) on which the activity or infrastructure to which the statement relates will be carried out,	Appendix F
		(d) a description of the development, activity or infrastructure,	Chapter 3
		(e) an assessment by the person who prepared the statement of the environmental impact of the development, activity or infrastructure, dealing with the matters referred to in this Division.	This table
		(2) The person preparing the statement must have regard to—	
		(a) for State significant development—the <i>State Significant Development Guidelines</i>	The EIS has been prepared in accordance with the <i>State significant development guidelines – preparing an environmental impact statement</i> (DPE 2022a).
		(3) An environmental impact statement must also contain a declaration by the person who prepared the statement of the following—	
		(a) the statement has been prepared in accordance with this Division, and	Certification page
		(b) the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure, and	
		(c) the information contained in the statement is not false or misleading.	
		(d) for State significant development or State significant infrastructure—the statement contains the information required under the Registered Environmental Assessment Practitioner Guidelines.	Certification page

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
	Division 5, section 192	(1) An environmental impact statement must contain the following –	
		(a) a summary of the environmental impact statement,	Executive summary
		(b) a statement of the objectives of the development, activity or infrastructure,	Section 2.1
		(c) an analysis of feasible alternatives to the carrying out of the development, activity or infrastructure, considering its objectives, including the consequences of not carrying out the development, activity or infrastructure,	Section 2.7
		(d) an analysis of the development, activity or infrastructure, including—	
		(i) a full description of the development, activity or infrastructure, and	Chapter 3
		(ii) a general description of the environment likely to be affected by the development, activity or infrastructure and a detailed description of the aspects of the environment that are likely to be significantly affected, and	Section 2.4 Chapter 5
		(iii) the likely impact on the environment of the development, activity or infrastructure, and	Chapter 5
		(iv) a full description of the measures to mitigate adverse effects of the development, activity or infrastructure on the environment, and	Chapter 5 Appendix D
		(v) a list of the approvals that must be obtained under another Act or law before the development, activity or infrastructure may lawfully be carried out,	Table 4.1
		(e) a compilation, in a single section of the environmental impact statement, of the measures referred to in paragraph (d)(iv),	Appendix D
		(f) the reasons justifying the carrying out of the development, activity or infrastructure, considering biophysical, economic and social factors, including the principles of ecologically sustainable development set out in section 193.	Chapter 7

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
Mandatory relevant considerations under EPIs			
Transport and Infrastructure SEPP	Section 2.48 (other development)	This section applies to a development application for development carried out within 5 m of an exposed overhead electricity power line. (2) Before determining a development application for development to which this section applies, the consent authority must: a) give written notice to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and b) take into consideration any response to the notice that is received within 21 days after the notice is given.	Section 3.3.7
	Section 2.122 (traffic generating development)	(4) Before determining a development application for development to which this section applies, the consent authority must: ... (b) take into consideration: ... (ii) the accessibility of the site concerned, including— (A) the efficiency of movement of people and freight to and from the site and the extent of multi-purpose trips, and (B) the potential to minimise the need for travel by car and to maximise movement of freight in containers or bulk freight by rail, and (iii) any potential traffic safety, road congestion or parking implications of the development.	Section 6.6 and Appendix E.6 (transport)
Resilience and Hazards SEPP	Part 2, Section 3.7	In determining whether a development is— (a) a hazardous storage establishment, hazardous industry or other potentially hazardous industry, or (b) an offensive storage establishment, offensive industry or other potentially offensive industry, consideration must be given to current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development.	Section 6.11

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
Resilience and Hazards SEPP	Part 4, Section 4.6	Contamination and remediation to be considered in determining development application ... (2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subsection (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines. (3) The applicant for development consent must carry out the investigation required by subsection (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.	Section 6.9
Jerilderie LEP, Murrumbidgee LEP, Conargo LEP	Clause 2.3(2)	Zone objectives The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.	Table 2.2
Jerilderie LEP, Murrumbidgee LEP, Conargo LEP	Clause 6.1	Earthworks (3) Before granting development consent for earthworks, the consent authority must consider the following matters— (a) the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality of the development, (b) the effect of the development on the likely future use or redevelopment of the land, (c) the quality of the fill or the soil to be excavated, or both, (d) the effect of the development on the existing and likely amenity of adjoining properties, (e) the source of any fill material and the destination of any excavated material, (f) the likelihood of disturbing relics, (g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area, (h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	Earthworks will be required as part of the construction of the project (Chapter 3). The impact of earthworks within the development corridor has been assessed as part of this EIS (Chapter 6) and appropriate measures to mitigate impacts are proposed (Appendix D).

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
Jerilderie LEP, Murrumbidgee LEP Conargo LEP	Clause 6.4 Clause 6.3 Clause 6.3	Terrestrial biodiversity Before determining a development application for development on land to which this clause applies, the consent authority must consider— (a) whether the development is likely to have— (i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and (ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and (iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and (iv) any adverse impact on the habitat elements providing connectivity on the land, and (b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	Section 6.3 and Appendix E.3 (biodiversity)
Jerilderie LEP	Clause 6.5	Groundwater vulnerability Before determining a development application for development on land to which this clause applies, the consent authority must consider the following— (a) the likelihood of groundwater contamination from the development (including from any on-site storage or disposal of solid or liquid waste and chemicals), (b) any adverse impacts the development may have on groundwater dependent ecosystems, (c) the cumulative impact the development may have on groundwater (including impacts on nearby groundwater extraction for a potable water supply or stock water supply), (d) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	Section 6.7 and Appendix E.7 (water)
Jerilderie LEP Conargo LEP	Clause 6.7 Clause 6.6	Wetlands Before determining a development application for development on land to which this clause applies, the consent authority must consider— (a) whether or not the development is likely to have any significant adverse impact on the following— (i) the condition and significance of the existing native fauna and flora on the land, (ii) the provision and quality of habitats on the land for indigenous and migratory species, (iii) the surface and groundwater characteristics of the land, including water quality, natural water flows and salinity, and (b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	Section 6.3 and Appendix E.3 (biodiversity) Section 6.7 and Appendix E.7 (water)

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS
Considerations under other legislation			
NSW <i>Biodiversity Conservation Act 2016</i>	Section 7.14	(2) The Minister for Planning, when determining in accordance with the <i>Environmental Planning and Assessment Act 1979</i> any such application, is to take into consideration under that Act the likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.	Section 6.3 and Appendix E.3 (biodiversity)

Appendix C

Community engagement table

C.1 Community engagement table

Table C.1 Summary of community views

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Economic, environmental and social impacts of the project					
Biodiversity	Broader community Nearby landholders	Impacts to biodiversity due to loss of native flora and fauna during construction and operation	A detailed BDAR has been prepared for the project which details the biodiversity values present and how the project avoids and minimises impacts to those values to the extent practicable. Where residual impacts remain, Spark Renewables propose to offset impacts by establishing local biodiversity stewardship sites and payment into the Biodiversity Conservation Fund. A biodiversity management plan will be prepared prior to construction to manage direct and indirect impacts on flora and fauna during construction.	As demonstrated in Figure 2.5, significant refinements to the development footprint have been undertaken in response to the project's potential impacts on biodiversity (including TECs and threatened species habitat).	Section 6.3 (biodiversity) Appendix E.3
Bushfire	Members of Argoon RFS Brigade CICL Broader community Nearby landholders Murrumbidgee Council	Potential for the project to be an ignition source for grass fires which are common in the area. Potential for the project to hinder firefighting efforts for grass fires originating off-site. Potential for nearby landholders to be liable for damages if they start a fire that adversely impacts project infrastructure. Some positives for fire management also recognised including improved monitoring and local firefighting water sources being introduced on-site.	A bushfire hazard assessment has been prepared which identifies project fire risks and requirements for control and mitigation of these risks including clearance and maintenance of asset protection zones (APZs) around project infrastructure and on-site water storage to assist with firefighting. Spark Renewables will continue to engage with local aerial agricultural and aerial firefighting operators to develop procedures for their safe operation within the project area. Spark Renewables are committed to ongoing consultation with nearby landholders about bushfire risk management and will investigate options for firefighting training for construction and operational personnel, as well as opportunities to incentivise workforce participation in Argoon Rural Fire Brigade.	The development corridor includes sufficient land to incorporate the required APZs and on-site water storage will be provided to support firefighting. Key infrastructure, including substations, has been setback more than 2 km from the closest non-associated residence.	Section 6.11 (hazards) Section 6.10 (bushfire) Appendix E.9 (aviation) Appendix E.12 (bushfire) Appendix E.13 (hazards)

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Workforce accommodation	Murrumbidgee Council Edward River Council Broader community Community groups	A common theme that came up during community engagement was the long term under supply of housing in the region. Stakeholders were concerned about the potential for the project to make the existing housing supply issue worse.	After listening to community feedback, Spark Renewables amended the project to include an on-site accommodation facility capable of hosting the project's non-local construction workforce. A description of this facility is provided in Section 3.3.5ia. The inclusion of the accommodation facility was a direct response to the issues raised by the local community during engagement undertaken as part of the SIA and will reduce the project's impacts on short-term accommodation and local housing. A Community Engagement Plan and Worker Code of Conduct will be developed and implemented to address perceived public safety risks. The plan will include engaging with community services, such as police and emergency services, so that they are familiar with the project in case of an incident	The project was amended to include a construction workforce accommodation facility within the development footprint with capacity to support up to 450 workers. Murrumbidgee Council has identified critical worker housing as a priority program of works. Funding from the VPA could be directed towards addressing this issue, subject to agreement on the proposed terms.	Section 6.12 (social) Appendix E.14 (SIA)
Limited health services	Murrumbidgee Council Edward River Council First Nations groups Community groups Broader community	Several stakeholders identified limited health facilities and skilled workers in the region as a key issue for consideration by the project.	The proposed workforce accommodation facility will include provision for an on-site first aid facility and staff with medical training so that the project avoids impacting local medical services with additional demand from the construction workforce.	The project was amended to include a construction workforce accommodation facility within the development footprint with capacity to support up to 450 workers and will include first aid facilities.	Section 6.12 (social) Appendix E.14 (SIA)

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Community benefit sharing	Murrumbidgee Council Edward River Council Nearby landholders Broader community Community groups Local business and industry	Stakeholders provided feedback on options for, and the approach to, community benefit sharing. Key themes discussed included: community fund governance, community projects including proposed health and childcare facilities, upgrades to community infrastructure including telecommunications, recreational and accommodation facilities, funding for First Nations services and initiatives, community investment opportunities and opportunities to reduce community power costs by way of subsidising power bills, or low cost installation of solar or batteries. The concept of a community investment opportunity was discussed with community members and a survey was distributed via a newsletter and at the Dinawan Solar Farm temporary office. The survey showed there was little interest in a community investment opportunity. Community benefits will be offered through other avenues as described in Section 5.7.	Spark Renewables has worked with Murrumbidgee Council, Edward River Council and the local community to develop a community benefit sharing program that will address local needs and ensure the benefits of the project are shared through a community benefit fund.	-	Section 5.7

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Local procurement and employment opportunities	Murrumbidgee Council Edward River Council Nearby landholders Broader community First Nations groups Community groups Local business and industry	Community members and stakeholders emphasised that the project should prioritise local procurement and employ local people.	Spark Renewables is committed to developing the project in a way that creates opportunities for local businesses and people. Spark Renewables will continue to engage with stakeholders regarding opportunities for local procurement and employment as the project progresses.	-	-
Visual amenity	Murrumbidgee Council Edward River Council Nearby landholders	Stakeholders were interested in where the project will be visible from and the magnitude of the visual impacts.	A LVIA has been prepared and identified that the open and flat nature of the landscape within and surrounding the project area will afford open views of the project from public locations (including the local road network). However, the existing landscape character is considered to be of low scenic quality due to it being modified and lacking distinct landscape features. With the exception of R019, the project will have minimal visual impacts on surrounding residences due to the presence of existing vegetation around these residences, separation distances between project infrastructure and surrounding residences and the region's flat topography.	Supplementary planting is proposed at R019. Once established, it is anticipated that this will assist in reducing the visibility of the project from a 'high' to a 'low' visual impact rating. This mitigation approach will be discussed with the landowner.	Section 6.1 (landscape and visual) Appendix E.1
Groundwater	Nearby landholders	Some nearby landholders raised concerns that the project could result in groundwater drawdown impacts and affect water availability on nearby properties.	A water resource assessment has been prepared which found that the project is unlikely to result in any groundwater drawdown impacts. The project will source the majority of its non-potable water demand from one of the project landholder's existing bores and is expected to be accommodated within existing water licence allocations.	-	Section 6.7 (water) Appendix E.7

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Agricultural productivity	Murrumbidgee Council Edward River Council Nearby landholders Local business and industry	Some stakeholders queried what impact the project will have on agricultural productivity on land within the development corridor, as well as on neighbouring properties.	The project will not impact the capability of neighbouring properties to support agricultural activities. A LUCRA has been prepared to identify and address the potential for land use conflicts to arise within neighbouring properties during the construction and operation of the project. The host property is expected to continue agricultural production once the project is constructed including ongoing sheep and cattle grazing within the development corridor where practical. The land and rehabilitation and economic assessments considered the impacts of the project to agricultural productivity and found that project impacts will be minimal in the context of the high agricultural productivity of the surrounding region.	Sheep and cattle grazing is proposed within the development corridor during operation to mitigate the project's impacts on regional agricultural productivity.	Section E.8 (land, soil and erosion) Appendix E.8 (land and rehabilitation) Section 6.13 (economic) Appendix E.15 (economic)
Traffic and transport	Murrumbidgee Council Edward River Council Nearby landholders Broader community	Stakeholders expressed interest in the proposed site access points, transport route for construction deliveries and potential for traffic impacts to the local road network during construction. Murrumbidgee Council expressed a preference that transport of large loads would be from the north of the project to avoid interactions with nearby townships to the south.	A traffic impact assessment has been prepared which identified the potential for traffic impacts during construction and has identified road upgrades to mitigate these impacts. Traffic impacts from the project will be minimised through the implementation of a Construction Traffic Management Plan that will limit the off-site operation of project vehicles and include safety measures for all drivers working on the project.	Upgrades to the local road network have been included in the project design. All project traffic will avoid Liddles Lane, Cadell Road (north), Four Corners Road and Carrathool Road to minimise impacts on nearby landholders and other local road users. In addition, the project was amended to include a construction workforce accommodation facility which will significantly reduce the impact of construction traffic on the local road network.	Section 6.6 (transport) Appendix E.6 (transport)

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
First Nations engagement and cultural heritage	First Nations groups Local business and industry	Matters raised by stakeholders included: - the need for meaningful engagement regarding the project's potential impacts on Aboriginal cultural heritage - opportunities for First Nations people to benefit from employment and training during construction - the opportunities for the project's community benefit fund to support the interests of local First Nations people including the need for health services and cultural learning.	Spark Renewables is committed to building strong, positive relationships with the local Aboriginal community which has been demonstrated by employing a local Aboriginal Community Engagement Coordinator be a part of the project team from early in the development process, the meaningful engagement and survey work completed through the ACHA as well as Spark Renewables support of local Aboriginal groups and businesses. As the project progresses towards construction, there will be further consultation with First Nations groups and an Aboriginal Participation Plan will be prepared to identify how the project will maximise opportunities for employment and training of First Nations people. The community benefits fund described in Section 5.7 is intended to also contribute to initiatives that support local First Nations people.	Detailed stakeholder engagement and cultural heritage surveys (including test excavation) with RAPs through the ACHA process has resulted in significant refinements to the development footprint to avoid and minimise impacts. Significant refinements to the development corridor have been undertaken in response to the identification of landscape features with archaeological sensitivity.	Section 5.7 Section 6.4 Appendix E.4

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Cumulative impacts	Murrumbidgee Council Edward River Council Broader community Community groups	Several stakeholders raised concerns about the number of concurrent projects that are proposed in the area and the risk of poorly coordinated construction and operation activities resulting in unexpected impacts on the community.	Spark Renewables acknowledge that the rapid development of the South West REZ places a burden on community members and stakeholders to review and understand detailed information from a multitude of sources. During all engagement activities for the Dinawan Wind Farm, Spark Renewables has sought to provide an explanation of the broader South West REZ development and identify the nearby projects with potential to interact with the Dinawan Wind Farm. The technical studies prepared for this EIS have considered cumulative impacts from nearby developments where relevant and a summary of potential cumulative impacts is provided in Section 6.1.5.	The project was amended to include a construction workforce accommodation facility within the development footprint with capacity to support up to 450 workers.	Section 6.15 (cumulative impacts)
Project design					
Decommissioning and rehabilitation	Murrumbidgee Council Broader community Nearby landholders	Stakeholders wanted to understand what would be done to decommission the project and rehabilitate the area at the end of the project life.	A land and rehabilitation assessment has been completed and outlines Spark Renewables commitments to restore the land within the development corridor to its existing capability and use.	-	Section 6.9 (land, soil and erosion) Appendix E.8 (land and rehabilitation)

Table C.1 **Summary of community views**

Key themes	Stakeholder group raising concern	Matter raised	Response	Impact on project design	Relevant EIS reference
Telecommunications	Murrumbidgee Council Broader community Nearby landholders	Stakeholders identified existing issues with the telecommunications network (including blackspots in the area surrounding the project) and were concerned that the project will make these issues worse by overloading existing network capacity.	Project infrastructures will not have a detrimental effect on local telecommunications services; however, it's acknowledged that during construction, the use of the mobile network by the project's construction workforce may impact network availability for neighbouring landowners. While telecommunications upgrades are not proposed as part of the project, Spark Renewables will work with Murrumbidgee Council, EnergyCo and the broader community to identify any opportunities for project infrastructure or the community benefit fund to help address these local issues.	The WTG layout was informed by potential interactions with, and impacts on, telecommunication services.	Section 6.11 (hazards) Appendix E.10 (telecommunications)

Appendix D

Mitigation measures table

D.1 Mitigation measures table

Table D.1 Summary of mitigation measures

ID	Mitigation measures
Landscape and visual	
LV1	The WTGs will have a predominantly matte white (or other non-reflective) finish.
LV2	Visual screening planting will be undertaken at non-associated residence R019, or as otherwise agreed with the landowner. An indicative example of visual screening is provided in Appendix E of the LVIA (Appendix E.1 of the EIS). The following general guidelines for planning landscaping and visual screening will be adopted: • planting will occur post-construction in consultation with the landowner • planting will remain in keeping with existing landscape character • species selection will be typical of the area, with a preference for locally native species • planting layout will avoid screening views of the broader landscape • landscaping will avoid the clearing of existing vegetation, and where required, reinstate any lost vegetation.
LV3	The following mitigation measures will be considered during detailed design of the project to mitigate the visual impact of transmission lines: • selecting routes for overhead transmission lines to reduce visibility from surrounding areas and minimise vegetation loss • using subtle colours and a low reflectivity surface treatment on power poles to ensure that glint is minimised.
LV4	The following mitigation measures will be adopted to reduce any residual visual impacts from O&M facilities: • siting O&M facilities to ensure minimal screening vegetation loss • using a recessive colour palette to blend structures into the existing landscape • avoiding unnecessary lighting, signage on fences and logos.
LV5	If aviation hazard lighting is required on the WTGs or meteorological monitoring masts, measures to reduce the impact of lighting will be considered in consultation with relevant aviation authorities.
Noise and vibration	
N1	Background noise monitoring will verify existing background noise levels prior to construction.
N2	Noise modelling will be updated prior to construction to confirm that the final WTG layout complies with the noise assessment criteria.
N3	A construction noise management plan will be prepared to manage noise during construction, and will include specific measures to minimise noise at assessment locations that are noise affected (R019, R079, R088).
N4	Construction work activities will be scheduled to minimise noise impacts, including: • with the exception of the categories below, construction will be undertaken during standard construction hours: – Monday to Friday 7 am to 6 pm – Saturday 8 am to 1 pm – no work on Sundays or public holidays • works outside the standard hours listed above will be within the following categories: – deliveries by heavy vehicles and RAVs outside of peak traffic times – concrete batching and pouring – crane movements between WTG sites – activities that are inaudible at non-associated residences – activities for WTG construction hindered by adverse weather conditions..

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
N5	Construction infrastructure, including construction compounds, and plant and equipment will be placed to minimise noise impacts by: • placing fixed plant and equipment as far as practicable from non-associated residences • locating the site access points, construction compounds and parking areas as far as practicable from non-associated residences • maximising acoustic shielding by the use of temporary site buildings and materials stockpiles as noise barriers to R019, R079 and R088, where practicable.
N6	Residents in R019, R079 and R088 (which will be potentially impacted by construction noise) will be consulted to determine appropriate measures to minimise the effects of any impacts.
N7	Construction work practices to manage construction noise on-site and construction-related traffic will be documented in the construction noise management plan and will be implemented to minimise noise impacts.
Biodiversity	
B1	Detailed design of the project will: • avoid and minimise the loss of native vegetation and habitat, including consideration of the results of biodiversity survey in Spring 2024 • avoid and minimise impacts to breeding habitat for fauna, including threatened species to the extent possible.
B2	A BMP will be prepared by a qualified ecologist in consultation with NSW DCCEEW. The BMP will include: • a plan for adaptive management and for implementing, evaluating and reporting on the effectiveness of all mitigation measures • survey requirements prior to micro-siting of infrastructure within the development corridor (including criteria that must be met to ensure there is no increase to biodiversity impacts as a result of micro-siting during detailed design) • figures showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features, revegetation areas and retained tree hollows • pre-clearing survey requirements and clearing protocols (including specific measures for threatened species, nests, construction in waterways and removal of dams) • procedures for unexpected threatened species finds (including relocation requirements) • procedures for monitoring of retained threatened flora species • procedures for fauna handling, monitoring and management, including identification and reporting of fauna mortalities • speed limits for project-related vehicles on local roads and access tracks • sub-plans for weed and biosecurity management, pest animal management and rehabilitation management • measures to reduce the risk of spreading weeds and pathogens, and other biosecurity items into or out of the development footprint, including: – collection of baseline weed and invasive pest data to determine if an increase of key emerging weeds or invasive pests occurs during construction or operation – consultation with Local Land Services and neighbouring landholders on fox control and baiting programs • training and education awareness for all staff on key threatened species, both flora and fauna, relevant to the region and project • monitoring of soil and water controls to prevent indirect impacts associated with water pollution to all waterways • biodiversity performance targets, monitoring criteria, corrective actions, timing and responsibilities • annual reporting and consultation requirements.
B3	Noise during construction will be managed as part of the construction noise management plan (NMP). The NMP will include noise management strategies for construction works adjacent to known breeding habitats.
B4	Shading and artificial light impacts will be minimised where possible through detailed design and lighting will be designed in general accordance with AS/NZS 4282:2019 Control of the Obtrusive Effects of Outdoor Lighting.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
B5	Adaptive management strategies within the BMP will consider any new and relevant data from ongoing assessment and monitoring. This will include measures to monitor predicted and uncertain impacts that will trigger adaptive management actions, allowing effective and quick responses. The strategies will include consideration of impacts on biodiversity that are uncertain such as: • inadvertent impacts to native vegetation adjacent to the development footprint • introduction of pests, pathogens and weeds to native vegetation adjacent to the development footprint and further afield • degradation of downstream habitats via worsening of water quality or alteration to hydrological processes • vehicle strikes.
B6	Measures will be implemented to protect vegetation and fauna habitat outside the development footprint, including minimising indirect impacts, especially to known threatened flora species and potential fauna species.
B7	A BBAMP will be prepared in consultation with DPHI and NSW DCCEE prior to operation and will: • address the prescribed impacts associated with blade strike impacts • include trigger levels to manage impacts during operation (including timing of implementation of additional mitigation measures) – the purpose of these triggers will be to identify unacceptable events and subsequent mitigation measures, providing an ongoing feedback loop and reducing the potential for the project to result in substantial unforeseen operational impacts to bird and bat species • develop the impacts monitoring framework, including baseline and operation monitoring.
Aboriginal heritage	
AH1	The project will avoid impacts to the following identified Aboriginal objects and/or sites within or near the development corridor: • hearths and associated cultural materials: DEHW-2023-HAS13 (#55-1-0162), DEHW-2023-HIF5 (#48-6-0283), PEC-E-47 (#55-1-0057), PEC-E-50 (#55-1-0060), DEHW-2023-HAS1 (#54-3-0071), PEC-E-49 (#55-1-0059), DEHW-2023-ST1 (#48-6-0273), and DEHW-2023-ST8 (#48-6-0253). • occupation area: DEHW-OA3 (#48-6-0308), DEHW-OA6 (#54-3-0076), and DEHW-2023-HAS4 (#54-3-0070) • cultural sites: DEHW-CS1 (AHIMS #48-6-0310) and other significant cultural areas including two potential ring trees (DEHW-2023-STAS2 (#48-6-0250) and DEHW-2023-ST12 (#55-1-0144)), a potential culturally modified tree, DEHW-2023-HH1 (#49-4-0245), and key identified cultural material components within a potential women's area DEHW-2023-STAS1 (#55-1-0143). Site-specific avoidance measures developed to address this commitment will be integrated into AH3.
AH2	The project will investigate the micro-siting of project infrastructure and construction activities in consultation with an Aboriginal heritage specialist to avoid or minimise impacts to: • hearths and associated cultural materials: DEHW-2023-H3 (#48-6-0257), DEHW-2024-HAS8 (#48-6-0267), DEHW-2024-HAS7 (#55-1-0165) and DEHW-2023-HAS12 (#55-1-0163) • a culturally modified tree: DEHW-2023-ST10 (#48-6-0251) • occupation area: DEHW-2023-HASST1 (#48-6-0264), DEHW-OA1 (#55-1-0172), DEHW-OA2 (#49-4-0243), DEHW-OA4 (#49-4-0244), DEHW-OA5 (#48-6-0309), DEHW-OA7 (#55-1-0171), DEHW-OA8 (#55-1-0169), and DEHW-OA9 (#55-1-0170) • areas of higher archaeological potential including identified aeolian, paleochannels, and watercourses features; and the eastern fringes of Gilgai and ephemeral wetlands. These are prevalent in the western project area, where sand dunes and/or sandy soil profiles have been predicted and/or observed. Management and any site-specific mitigation measures developed to address this commitment will be integrated into AH3.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
AH3	An ACHMP will be prepared by a suitably qualified heritage professional in consultation with the RAPs and Heritage NSW. The ACHMP will describe: • processes, timing, communication methods and project involvement for maintaining Aboriginal community consultation and participation through the remainder of the project • content of a cultural heritage induction package for all project staff and contractors • methods for documenting and archival recording of any Aboriginal sites and/or objects that will be impacted by the project • recording and archaeological mitigation requirements for archaeological test/salvage excavations/monitoring of Aboriginal sites and/or objects that will be impacted by the project • methods for surface collection of identified isolated objects and stone artefact scatters that will be impacted by the project • methods for mitigation and/or recovery of culturally modified trees that will be impacted by the project • methods for delineation and protection of Aboriginal sites and/or objects within or in close proximity to the development corridor, including clear marking, appropriate screen for any gender-specific areas and surface protection • procedures for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project • procedures for the curation and long-term management of recovered cultural materials • methods of post-excavation analysis and reporting of the archaeological investigations, including suitable collection and processing of stone artefacts, paleo-environmental, chronological and other soils from archaeological activities • a monitoring regime for implementing the above measures.
AH4	An inspection will be undertaken by a qualified arboriculturist of all tentatively identified culturally modified trees to confirm whether the modifications have formed through anthropogenic or natural processes. The findings of this inspection and the management of confirmed culturally modified trees will be described in the ACHMP (AH3).
AH5	An Aboriginal heritage-interpretation strategy and plan will be developed by an Aboriginal heritage specialist, in consultation with the RAPs. The plan will identify the interpretive Aboriginal heritage values of the project area and provide direction for interpretive installations and devices.
AH6	Consultation regarding cultural heritage management will be maintained with the RAPs.
AH7	A copy of the ACHA and all relevant AHIMS site recording forms and information for the project will be lodged with Heritage NSW and provided to each of the RAPs.
Historical heritage	
HH1	The project's construction environmental management plan (CEMP) will provide the following to mitigate risks to heritage items during construction: • list of identified heritage sites • site-specific management measures outlined in mitigation measure HH2 (including clearly defined responsibilities and actions) • an unexpected finds protocol • heritage awareness and management training as part of the induction process • management measures to be implemented if there will be impacts to heritage items due to changes to the development footprint.
HH2	DEHW003, DEHW005 and DEHW008 will be clearly demarcated with markers and signage. Construction personnel will be informed of any restrictions regarding DEHW003, DEHW005 and DEHW008, before commencing work near these sites.
HH3	If the development footprint is amended in proximity of DEHW001 and impacts to the ram shed and stockyards cannot be avoided, archival recording of the site will be required prior to impacts occurring.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
HH4	If the development footprint is amended in proximity of DEHW003 and impacts cannot be avoided, archival recording of the site will be required prior to impacts occurring. Subject to the easement requirements of the transmission line, Spark Renewables should consult with an arborist to determine whether the tree can be partially removed (i.e. maintained in situ below any height limitations for vegetation within the easement), whilst avoiding impacting the marking on the tree or its longevity.
Transport	
T1	A detailed CTMP will be developed in consultation with TfNSW, Edward River Council and Murrumbidgee Council prior to the commencement of works.
T2	Roads and intersections will be constructed/upgraded in accordance with the schedule of road upgrades in Table 6.23.
T3	Upgrades and new intersections will be designed in consultation with the relevant road authority.
T4	Site access intersections on McLennons Bore Road, Fernbank Road and Goolgumbra Road will be constructed in accordance with the relevant council's Rural Property Access standard to the satisfaction of the road authority.
T5	Permits will be obtained from NHVR to allow 36.5 m long trucks and OSOM vehicles to use the road network as part of construction. Approval will be requested from Edward River Council and Murrumbidgee Council for 36.5 m long trucks to access McLennons Bore Road, Fernbank Road, Wilson Road and Goolgumbra Road (currently heavy vehicles up to 19 m long can use these roads throughout the year).
T6	Subject to agreement with Murrumbidgee Council, the major road priority at the McLennons Bore Road/Cadell Road intersection will change from Cadell Road to McLennons Bore Road. Give-way signage will be removed from McLennons Bore Road and installed on the north and south approaches on Cadell Road. Alternatively, if the major road priority cannot be changed, truck warning signage will be placed on Cadell Road to warn drivers of trucks passing through the McLennons Bore Road/Cadell Road intersection.
T7	Truck warning signage will be placed on Wilson Road to warn drivers of trucks turning at Wilson Road/McLennons Bore Road intersection.
T8	A dilapidation survey will be commissioned prior to the start of construction to assess the existing condition of the sections of McLennons Bore Road, Cadell Road (south), Fernbank Road, Wilson Road and Goolgumbra Road that will be used by vehicles associated with the project.
T9	A road maintenance strategy will be developed in consultation with Murrumbidgee Council and Edward River Council.
Water	
W1	Management measures to address potential impacts to surface water and groundwater during construction will include: • appropriate siting of proposed infrastructure within the development footprint to minimise disturbance to existing drainage lines and overland flow paths • designing earthworks to maintain the prevailing surface gradients and fall towards existing drainage lines, to minimise changes to existing flow paths • providing general surface drainage infrastructure comprising: – diversion of upslope runoff around infrastructure – surface drainage measures to control runoff generated within the development footprint, minimise soil erosion and direct runoff towards receiving drainage lines – sheet flow conditions will be maximised, and construction of diversion drains, channels and table drains will be minimised to the extent practicable – treatments to armour earthwork batters and site drainage where needed for scour protection, where flow concentrations cannot be avoided – retention of existing flow paths where possible and minimise catchment diversions, with the objective of minimising changes to flow regimes in receiving watercourses • stabilising disturbed areas and progressively rehabilitating soils as early as practicable

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
	• maintaining drainage, erosion and sediment control measures, including monitoring and adjustment protocols to achieve the desired performance standard • capturing stormwater runoff from buildings in rainwater tanks for use on-site, to minimise demand for imported water • storing hazardous material in accordance with Australian Standards • maintaining spill kits on-site at all times during construction and operation • considering weather preparedness and response planning.
W2	Specific stormwater management measures for the substation and switchyard areas will include: • diverting clean runoff away from potentially oil-contaminated areas • bunding potentially oil-contaminated areas • providing stormwater treatment device(s) to remove oil/grease, hydrocarbons and sediment from runoff prior to discharge to the downstream drainage system.
W3	Specific stormwater management measures for the concrete batching plants during construction will include: • diverting clean runoff away from cement and concrete handling areas and stockpiles • maximising recycling of process wastewater, with dedicated storages for excess wastewater that will be manually emptied via vacuum truck and disposed of off-site • bunded areas for refuelling.
W4	Management measures to address ongoing site-specific risks to surface water and groundwater during operation will include: • rehabilitating temporary works and construction disturbance areas not being utilised for operation • maintaining stabilised and vegetated surfaces, drainage and sediment and erosion control measures throughout operation.
W5	Erosion and sediment control measures and site rehabilitation and revegetation will be implemented in accordance with best practice comprising <i>Managing Urban Stormwater: Soils and Construction – Volume 1</i> (Landcom 2004) and <i>Volume 2A</i> (DECC 2008) and <i>Best Practice Erosion and Sediment Control</i> (IECA 2008). Measures and principles will include: • minimising the extent and duration of land disturbance • controlling water movement through the development footprint • minimising soil erosion • promptly stabilising disturbed areas • maximising sediment retention on-site • maintain drainage, erosion and sediment control measures • monitor and adjust drainage, erosion and sediment control practices to achieve the desired performance standard • construction of suitable watercourse crossings • consideration of the erosion hazard specifically posed by the dispersive subsoils.
W6	Progressive erosion and sediment control plans will be developed for all discrete disturbance areas.
W7	Flood management protocols will be developed and implemented in the event of flood events that could impact construction sites or access, including: • suitable early warning/prediction measures and communication protocols • site preparedness activities and procedures • triggers for closure, evacuation and recovery • emergency response and support.
W8	Temporary construction infrastructure will be designed and constructed to: • consider flood risk, including overland flow paths and mainstream flood risk, in the placement of temporary works, plant, materials and workforce facilities • ensure that temporary works minimise off-site flooding impacts as far as practical.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
W9	Permanent infrastructure will be designed and constructed to: - locate sensitive infrastructure (e.g. substations) on high ground above 1% AEP event flood levels (or other suitable level of flood immunity as determined during detailed design) and to avoid or otherwise divert local overland flow paths around infrastructure - ensure finished ground levels are constructed at-grade and not materially higher than existing levels in areas subject to existing mainstream flooding, in order to minimise potential off-site flooding impacts as far as practical. Where a change in ground level is proposed in areas, as part of future design stages or refinements, assessment of the change should be quantified to confirm off-site flooding impacts do not occur. If changes in the project layout or changes in the landform are required and there is a risk of flooding, then flood modelling will be conducted to confirm the flood behaviour due to the project.
W10	Flood management protocols will be developed and implemented for operations.
W11	Watercourse crossings and stormwater outlets will be designed and constructed to: - consider the appropriate level of serviceability and flood immunity required for the project - consider local hydraulic conditions and minimise scour potential - minimise local flooding impacts - be consistent with: <i>Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings</i> (DPI Fisheries 2003) <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (DPI 2013)
W12	Removal of any private irrigation infrastructure (i.e. not owned by CICL) within the development footprint will be in agreement with relevant landowners. If infrastructure is removed for the project, it will be reinstated following the project, or as otherwise agreed with landowners.
W13	Spark Renewables will continue to consult with CICL regarding cable crossings of irrigation infrastructure during detailed design. Designs, construction methods and timing will be agreed with CICL prior to implementation.
W14	All relevant water licensing and approvals will be obtained to support water supply arrangements for construction and operation if alternative sources are required.
W15	Temporary and permanent on-site wastewater management and effluent reuse systems will: - be appropriate for each site based on consideration of the project layout, site conditions and relevant environmental constraints (e.g. sensitive surface or groundwater water features) - be designed, constructed, operated, maintained and decommissioned in accordance with best practise and relevant guidelines and standards and in consultation with the relevant Council.
Air quality	
AQ1	A CEMP will be prepared and will include measures to manage off-site air quality impacts including: - monitoring and modifying working practices by limiting activity during periods of adverse weather (hot, dry and windy conditions) - applying dust suppression measures to active work areas where necessary - revegetating earthworks and disturbed areas to stabilise surfaces as soon as practicable - imposing vehicle speed limits along internal roads and work areas during construction - ensuring vehicle loads entering and leaving the project area are covered to prevent escape of materials during transport.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
Land	
L1	Soil management measures to preserve soil resources will include: • avoiding and minimising soil disturbance to the extent practical • assessing topsoil depths to be stripped prior to stripping to minimise the mixing of topsoil and subsoil • preserving as much topsoil as possible • aiming to strip and manage different soils orders or mapping units separately • avoiding mixing topsoil with subsoil during soil handling operation • managing subsoils in separate layers to minimise introduction of constraints higher into the soil profile where subsoils exhibit variance of constraints with depth • avoiding stripping, handling or compacting soil following heavy rain periods that leaves the soil structure saturated • avoiding compaction of soil during stripping and stockpiling operation • applying ameliorants to topsoil and, where necessary, subsoil during stripping operation in accordance with a soil scientists' recommendations, with ameliorants applied prior to stripping each soil layer, to maximise mixing of the ameliorants during the stripping process • stockpiling topsoil separately from subsoil (where it is necessary to strip subsoil) • reinstating soil horizons in the correct order and depths, where possible • locating subsoils and topsoils so that stockpiled material is placed on the same underlying soil unit where practical • protecting stockpiles from erosion using soil stabilising polymers, cover crops or other forms of stabilisation • stabilising long-term topsoil stockpiles to minimise stockpile waterlogging, the generation of anaerobic conditions, help maintain topsoil biological viability and nutrient cycling and to create a seed store • testing stockpiled subsoil and topsoil to determine amelioration requirements prior to reinstatement • testing any imported soil materials to characterise and determine suitable usage and amelioration requirements prior to reinstatement.
L2	Undertake agricultural mitigation activities during the life of the project, including: • maintaining existing internal livestock fencing and other required infrastructure within the development footprint • avoiding interference with the operation of irrigation channels.
L3	The following will be implemented to manage impacts associated with weeds, pathogens and pest species: • implementing hygiene and washdown protocols, including washdown and inspection of vehicles, plant and machinery when moving from areas with known populations of weed and pest species • removing identified weeds through methods such as herbicide spraying, scalping and hand-pulling • managing importation of gravel, crushed rock or soil to ensure that the material is free from noxious weed seed • implementing measures to manage pest fauna species within the development footprint.
L4	The following erosion and sediment control measures, site rehabilitation and revegetation will be implemented in accordance with industry standard practice: • minimising the extent and duration of land disturbance • controlling water movement through the development footprint • minimising soil erosion • stabilising disturbed areas promptly • maximising sediment retention on site • maintaining drainage, erosion and sediment control measures • monitoring and adjusting drainage, erosion and sediment control practices to achieve the desired performance standard • constructing suitable watercourse crossings • considering the erosion hazards posed by the dispersive subsoils while installing driven piles, excavation of cable and pipe trenches, construction of roads, tracks and ancillary facilities.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
L5	An unexpected finds protocol will be developed for construction, operation and decommissioning. It will include procedures to identify potentially contaminated land, such as: - the observation of discolouration or staining of soils - visible signs of plant stress, presence of drums or other waste material - stockpiles, fill material or odours. If a potential source of contamination is identified, work within the affected area will cease until an assessment is completed to advise the need for further investigation or remediation.
Hazards and risks	
BF1	A Fire Management Plan will be prepared that includes: - bushfire fuel management - site infrastructure plan - site access and internal road plan - APZs and their ongoing maintenance - location of hazards that may impact firefighting operations - activities that may be exempt on periods of total fire ban days - consideration of the Grain Harvesting and Fire Safety Guide (Appendix 1 of Appendix E.10) - recording of meteorological monitoring masts in the tall structures database maintained by Airservices Australia (Civil Aviation Safety Authority 2018) - warning lights or visible markers (such as orange balls) on meteorological monitoring masts to minimise risks during aerial firefighting operations - protocols for the rapid shut down of turbines in emergency situations ensuring acknowledgement of who has the authority to direct turbine shut-down procedures. The Fire Management Plan will be prepared in consultation with the Argoon Rural Fire Brigade, NSW RFS District Office for the Mid Murray Zone and Fire Rescue NSW.
BF2	A bushfire emergency management and evacuation plan will be prepared in consultation with NSW RFS in accordance with Table 6.8d of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019). It will be consistent with <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i> (RFS 2014). A copy of the bushfire emergency management and evacuation plan will be provided to the local emergency management committee prior to the start of construction.
BF3	The development footprint will be maintained to the standard of an inner protection area (IPA) in accordance with the requirements of Appendix 4 of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019) including: - a minimum 10 m wide APZ around WTGs - a minimum 14 m wide APZ between workers accommodation facilities and grassland hazards - a minimum 16 m wide APZ between workers accommodation facilities and woodland hazards - a minimum 36 m wide APZ between safe refuge buildings (radiant heat exposure equivalent to less than 10 kW/m²) and grassland hazards - a minimum 42 m wide APZ between safe refuge buildings (radiant heat exposure equivalent to less than 10 kW/m²) and woodland hazards
BF4	Landscape screening (if required) will consider the potential increase in fire risk due to the type (species), density, height, location and overall width of the vegetation screening. Where landscaping is proposed to provide a visual screen: - landscaping will be located more than 100 m from workers accommodation facilities, or - landscaping within 100 m from workers accommodation facilities will be designed in accordance with Section A1.10 low threat vegetation–exclusions, or Appendix 4 of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
BF5	Buildings within the workers accommodation facilities, if constructed within 100 m of bushfire prone vegetation, will comply with Australian Standard <i>AS3959-2018 Construction of Buildings in Bushfire-prone Areas</i> or the relevant requirements of the <i>NASH Standard – Steel framed construction in bushfire areas</i> (incorporating amendment A – 2015). All new buildings constructed for the project will comply with the construction requirements in Section 7.5 of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF6	Internal access roads will provide access for local emergency service vehicles to WTGs, switchyards, substations, construction compounds and O&M buildings to support property protection activities. The design of worker accommodation facility access roads will comply with the property access road requirements outlined in Table 7.4a of <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF7	An adequate static water supply will be provided for firefighting purposes in accordance with Table 7.4a of <i>Planning for Bush Fire Protection</i> . Water supply for firefighting purposes will be located at the primary vehicle access points to the project area as well as at the worker accommodation facilities, construction compounds, O&M building, substations and grid connections and elsewhere as determined at the detailed design phase in consultation with Argoon Rural Fire Brigade, NSW RFS District Office for the Mid Murray Zone, and Fire and Rescue NSW. In addition to static water supply requirements, two mobile water supplies with a minimum capacity of 500 L each (e.g. vehicle-mounted tanks or standalone tankers) will be available on-site during construction and operation.
BF8	The provision of gas will comply with <i>Planning for Bush Fire Protection</i> (NSW RFS 2019).
BF9	Spark Renewables will continue to consult with Argoon Rural Fire Brigade around specific weather conditions that may require works to temporarily cease during construction.
BF10	Spark Renewables will investigate options for firefighting training for construction and operational personnel, as well as opportunities to incentivise workforce participation in Argoon Rural Fire Brigade.
BF11	Spark Renewables will continue to engage with local aerial firefighting operators to develop procedures for their safe operation within the project area.
Hazards and risks	
AV01	Spark Renewables will report the WTGs and meteorological monitoring masts to CASA in accordance with CASR 139.165 following detailed design and prior to construction.
AV02	‘As constructed’ details of WTG and meteorological monitoring masts coordinates and elevation will be provided to Airservices Australia.
AV03	Any obstacles that will be above 100 m above ground level (including temporary construction equipment) will be reported to Airservices Australia (Notice to Airmen offices) until they are incorporated in published operational documents. For example, a notification regarding crane operations may include: - the planned operational timeframe - the maximum height of the crane - the general area/route within which the crane will operate.
AV04	Project details, including the ‘as constructed’ location and height information of WTGs, meteorological monitoring masts and overhead transmission lines, will be provided to local and regional aircraft operators prior to construction, including nearby landowners to facilitate aerial application operations planning.
AV05	Spark Renewables will engage with local aerial agricultural operators and aerial firefighting operators emergency services providers regarding aircraft operations in the vicinity of the project.
AV06	Overhead transmission lines and/or supporting poles that could adversely affect aerial application operations will be identified in consultation with local aerial application operators and marked in accordance with Part 139 MOS 2019 Chapter 8 Division 10 section 8.110 (7) and section 8.110 (8).

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
AV07	Spark Renewables will consult with Airservices Australia and CASA regarding changes to the LSALT and will consult with aviation authorities, local aerodrome owners/operators and local aerial agricultural operators regarding any changes to the LSALT from the project.
AV08	If required following consultation with CASA and Airservices Australia, temporary and permanent meteorological monitoring masts will be marked according to the requirements set out in MOS 139 Section 8.10 (as modified by the guidance in NASF Guideline D). Specifically: • marker balls, high visibility flags or high visibility sleeves will be placed on the outside guy wires • paint markings will be applied in alternating contrasting bands of colour to at least the top 1/3 of the mast • guy wire ground attachment points will have contrasting colours to the surrounding ground/vegetation.
AV09	Consultation with CASA and Airservices Australia will be completed to determine whether meteorological monitoring masts present an unacceptable risk to aviation safety. If a meteorological monitoring mast is assessed as likely to present an unacceptable risk to aviation safety, lighting will be installed. Characteristics of obstacle lighting will be in accordance with CASA's <i>Manual of Standards</i> .
AV10	The rotor blades, nacelle and the mast supporting the WTGs will be painted predominantly white. No additional marking measures will be installed for WTGs.
DG1	If diesel is stored with other flammable liquids (e.g. gasoline), a separation distance of at least 10 m to the nearest development footprint boundary will be maintained to ensure that the SEPP screening threshold is not exceeded.
TEL1	Should impacts to wireless or satellite services at associated residences occur, Spark Renewables will engage with the landholders to identify a suitable alternative.
Social impact	
S1	A Social Impact Management Plan (SIMP) will be implemented prior to construction. The SIMP will aim to: • describe desired project social outcomes • outline post-approval engagement activities, including timing and purpose • describe a feedback procedure that will allow feedback and timely response throughout construction and operation • define targets to monitor performance over time, identify monitoring responsibilities, and methods to share outcomes. The SIMP will include methods for engaging stakeholders on their key interests to: manage impacts, enhance benefits, and provide suitable mechanisms for project feedback. Key stakeholders include Murrumbidgee and Edward River Councils, landowners, broader community, First Nations stakeholders, services and utilities, local businesses, and local workforces. An adaptive management approach to the implementation the SIMP is proposed, allowing Spark Renewables to manage and respond to changing circumstances and new information through ongoing monitoring and periodic review of mitigation strategies allowing for modification if required.
S2	An industry participation plan (IPP) will be implemented. The IPP will identify: • opportunities for supply of goods and services, employment and training, including Aboriginal participation, as well as sustainable procurement • metrics to track goals and requirements for each identified opportunity • engagement with Murrumbidgee and Edward River Councils, local businesses and the Coleambally Chamber of Commerce to inform an understanding of opportunities and limitations for procuring local goods and services, as well as aspirations amongst local businesses • online and offline methods to share and register interest in project opportunities.
S3	An Aboriginal participation plan (APP) will be implemented in consultation with First Nations stakeholders to optimise local capacity and aspirations through targeted participation initiatives within the regional area. This will include setting targets for First Nations participation in the project workforce and procurement. Commitments will be measurable, and a report of progress to the local First Nations community will contribute to the measurement of outcomes.

Table D.1 **Summary of mitigation measures**

ID	Mitigation measures
S4	Regular engagement (to be defined in the SIMP) with local businesses will advise of construction periods and the potential increase in trade or patronage. This will allow businesses with planning to maximise benefits of increased demand, and associated revenue.
S5	The project workforce will be encouraged, particularly during the construction phase, to support and contribute to the local and regional community through local spending. This may be done through initiatives such as provision of vouchers for use at local businesses, or promoting local business offerings, such as on notice boards at the accommodation facilities.
S6	Murrumbidgee and Edward River councils will be engaged to identify potential service constraints. Measures such as provision of on-site medical facilities and identification of preferred telehealth providers will be implemented to prevent excessive demand on GP services closest to the site.
S7	Temporary worker accommodation facilities will be used in preference to local short-term and rental accommodation. Local residents will be recruited for the construction workforce as far as possible.
S8	A Community Engagement Plan and Worker Code of Conduct (as part of the SIMP) will be developed and implemented to address perceived public safety risks. The plan will include engaging with community services, such as police and emergency services, so that they are familiar with the project in case of an incident.
Economic	
ECON1	Employment of regional residents will be prioritised where they have the required skills and experience.
ECON2	Spark Renewables will participate in business groups, events and programs in the regional community.
ECON3	Non-labour inputs to production will be sourced locally where local producers can be cost and quality competitive.
ECON4	A Community Benefit Fund will be established and managed through VPAs with Murrumbidgee Council and Edward River Council.
ECON5	Lease payments will be paid to project landowners to provide an alternative drought-proof income with potential flow-on benefits to the regional economy.
ECON6	Agricultural activities will continue during project operation, where consistent with the landholders' requirements.
Waste	
WAS1	All waste will be managed in accordance with the requirements of the <i>NSW Protection of the Environment Operations Act 1997</i> and the <i>NSW Waste Avoidance and Resource Recovery Act 2001</i> .
WAS2	All wastes will be classified, stored and handled in accordance with the <i>Waste Classification Guidelines – Part 1: Classifying Waste</i> (EPA 2014), with appropriate segregation of waste streams to maximise reuse and recycling of suitable waste streams.
WAS3	Waste will be managed in accordance with the waste hierarchy, in order of preference: • avoid/reduce waste production • recover resources for reuse • recycle or dispose of waste at licenced facilities.
WAS4	A detailed waste management plan will be prepared prior to each project phase identifying the type, quantity, classification and management of waste.
WAS5	As part of decommissioning, Spark Renewables will maximise opportunities to recover/recycle decommissioned infrastructure and equipment.

Appendix E

Technical assessments

- E.1 Landscape and visual
 - E.2 Noise and vibration
 - E.3 Biodiversity
 - E.4 Aboriginal cultural heritage
 - E.5 Historical heritage
 - E.6 Transport
 - E.7 Water
 - E.8 Land
 - E.9 Aviation
 - E.10 Telecommunications
 - E.11 Health
 - E.12 Bushfire
 - E.13 Hazards
 - E.14 Social
 - E.15 Economic
-

Appendix F

Cadastral lots within project area

F.1 Cadastral lots within project area

Table F.1 Cadastral lots within project area

Lot	DP	Lot	DP	Lot	DP	Lot	DP	Lot	DP
A	DP100260	24	DP756265	46	DP756291	39	DP756396	8	DP756418
B	DP100260	25	DP756265	47	DP756291	40	DP756396	9	DP756418
1	DP113903	26	DP756265	48	DP756291	41	DP756396	100	DP756444
10	DP113903	27	DP756265	49	DP756291	42	DP756396	101	DP756444
6	DP113903	28	DP756265	5	DP756291	43	DP756396	102	DP756444
8	DP113903	29	DP756265	50	DP756291	44	DP756396	103	DP756444
9	DP113903	3	DP756265	51	DP756291	45	DP756396	104	DP756444
1	DP1244278	30	DP756265	52	DP756291	46	DP756396	105	DP756444
2	DP1244278	31	DP756265	53	DP756291	47	DP756396	106	DP756444
3	DP1244278	32	DP756265	54	DP756291	48	DP756396	107	DP756444
1	DP1245394	33	DP756265	55	DP756291	1	DP756418	108	DP756444
2	DP1245394	34	DP756265	56	DP756291	10	DP756418	109	DP756444
3	DP1245394	35	DP756265	57	DP756291	11	DP756418	11	DP756444
4	DP1245394	36	DP756265	58	DP756291	12	DP756418	110	DP756444
1	DP1252143	37	DP756265	59	DP756291	123	DP756418	111	DP756444
2	DP1252143	38	DP756265	6	DP756291	124	DP756418	112	DP756444
5	DP1282091	39	DP756265	60	DP756291	125	DP756418	113	DP756444
6	DP1282091	40	DP756265	61	DP756291	126	DP756418	114	DP756444
1	DP532988	41	DP756265	62	DP756291	127	DP756418	12	DP756444
2	DP532988	42	DP756265	63	DP756291	128	DP756418	125	DP756444
3	DP532988	43	DP756265	64	DP756291	129	DP756418	13	DP756444
4	DP532988	44	DP756265	65	DP756291	13	DP756418	14	DP756444
5	DP532988	45	DP756265	66	DP756291	130	DP756418	15	DP756444
6	DP532988	46	DP756265	67	DP756291	131	DP756418	16	DP756444
7	DP532988	47	DP756265	68	DP756291	132	DP756418	17	DP756444
8	DP532988	48	DP756265	69	DP756291	133	DP756418	18	DP756444
107	DP568083	49	DP756265	7	DP756291	134	DP756418	19	DP756444
3	DP593483	50	DP756265	70	DP756291	135	DP756418	20A	DP756444
1	DP593484	51	DP756265	71	DP756291	136	DP756418	21A	DP756444
5	DP594041	52	DP756265	8	DP756291	137	DP756418	22A	DP756444

Table F.1 Cadastral lots within project area

Lot	DP	Lot	DP	Lot	DP	Lot	DP	Lot	DP
6	DP594041	53	DP756265	9	DP756291	139	DP756418	23	DP756444
7	DP594041	54	DP756265	11	DP756299	14	DP756418	24	DP756444
111	DP739677	55	DP756265	12	DP756299	140	DP756418	26	DP756444
112	DP739677	56	DP756265	13	DP756299	141	DP756418	27	DP756444
113	DP739677	57	DP756265	14	DP756299	142	DP756418	28	DP756444
1	DP756257	58	DP756265	19	DP756299	143	DP756418	29	DP756444
10	DP756257	59	DP756265	20	DP756299	144	DP756418	30	DP756444
11	DP756257	60	DP756265	21	DP756299	146	DP756418	31	DP756444
12	DP756257	61	DP756265	22	DP756299	147	DP756418	32	DP756444
13	DP756257	62	DP756265	23	DP756299	148	DP756418	33	DP756444
14	DP756257	77	DP756265	24	DP756299	15	DP756418	34	DP756444
15	DP756257	1	DP756291	27	DP756299	152	DP756418	35	DP756444
16	DP756257	10	DP756291	28	DP756299	153	DP756418	36	DP756444
17	DP756257	11	DP756291	29	DP756299	154	DP756418	37	DP756444
18	DP756257	14	DP756291	30	DP756299	16	DP756418	38	DP756444
19	DP756257	15	DP756291	31	DP756299	17	DP756418	39	DP756444
2	DP756257	16	DP756291	32	DP756299	18	DP756418	40	DP756444
20	DP756257	17	DP756291	33	DP756299	19	DP756418	41	DP756444
21	DP756257	18	DP756291	34	DP756299	2	DP756418	42	DP756444
22	DP756257	2	DP756291	35	DP756299	20	DP756418	43	DP756444
23	DP756257	22	DP756291	36	DP756299	21	DP756418	44	DP756444
24	DP756257	23	DP756291	37	DP756299	22	DP756418	45	DP756444
3	DP756257	3	DP756291	39	DP756299	23	DP756418	46	DP756444
4	DP756257	30	DP756291	40	DP756299	25	DP756418	47	DP756444
5	DP756257	31	DP756291	41	DP756299	26	DP756418	48	DP756444
6	DP756257	32	DP756291	42	DP756299	27	DP756418	49	DP756444
7	DP756257	33	DP756291	43	DP756299	28	DP756418	41	DP756450
8	DP756257	34	DP756291	66	DP756299	29	DP756418	84	DP756450
9	DP756257	35	DP756291	67	DP756299	3	DP756418	52	DP756459
1	DP756265	36	DP756291	76	DP756299	30	DP756418	53	DP756459
15	DP756265	37	DP756291	1	DP756334	31	DP756418	56	DP756459

Table F.1 Cadastral lots within project area

Lot	DP	Lot	DP	Lot	DP	Lot	DP	Lot	DP
16	DP756265	38	DP756291	2	DP756334	32	DP756418	57	DP756459
17	DP756265	39	DP756291	25	DP756334	33	DP756418	58	DP756459
18	DP756265	4	DP756291	26	DP756334	34	DP756418	59	DP756459
19	DP756265	40	DP756291	3	DP756334	35	DP756418	60	DP756459
2	DP756265	41	DP756291	38	DP756334	36	DP756418	61	DP756459
20	DP756265	42	DP756291	66	DP756334	4	DP756418	62	DP756459
21	DP756265	43	DP756291	67	DP756334	5	DP756418	63	DP756459
22	DP756265	44	DP756291	133	DP756396	6	DP756418	64	DP756459
23	DP756265	45	DP756291	134	DP756396	7	DP756418	-	-

Appendix G

WTG locations

G.1 Wind turbine generator locations – Eastern area (Stage 1)

Table G.1 Wind turbine generator coordinates and elevation – Eastern area (Stage 1)

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T119	385584.78	6121543.23	111.97	R019	5126
T12	373264.76	6121957.01	108.55	R036	7044
T36	375545.23	6119498.44	108.78	R036	3914
T100	382344.95	6124402.24	111.34	R019	4556
T78	379958.77	6119232.61	109.36	R036	4930
T14	373253.49	6123672.19	108.78	R088	6721
T109	383702.36	6122071.70	111.21	R019	5247
T79	380028.46	6123596.36	109.99	R019	6985
T118	385357.97	6123295.85	111.93	R019	3458
T124	386626.59	6124351.74	112.83	R019	2283
T102	382623.05	6119859.39	110.66	R049	5805
T21	374362.19	6120508.14	108.55	R036	5261
T74	379394.65	6120372.68	109.22	R036	5484
T125	386743.37	6122403.24	112.50	R019	4232
T10	372872.35	6122574.76	108.83	R088	7139
T44	376164.96	6119589.86	108.99	R036	3899
T5	371942.66	6123676.41	108.21	R088	5705
T98	382226.79	6120295.94	110.65	R049	6389
T75	379691.31	6124239.96	110.41	R019	7048
T48	376457.63	6127287.51	110.57	R143	4821
T6	371879.47	6129462.52	110.45	R088	4492
T28	374753.31	6127089.51	110.25	R143	5606
T39	375806.85	6130131.62	112.14	R143	2490
T13	373350.24	6129840.21	110.71	R143	4633
T51	376844.12	6119751.20	108.99	R036	4058
T108	383692.97	6124938.56	111.88	R019	3123
T7	372191.97	6122556.90	108.46	R088	6686
T81	380168.84	6117123.67	109.19	R036	3920
T35	375273.94	6121074.13	108.79	R036	5509
T54	377173.88	6122966.59	109.32	R036	7290

Table G.1 **Wind turbine generator coordinates and elevation – Eastern area (Stage 1)**

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T122	386077.10	6124596.44	112.70	R019	2034
T52	376909.45	6126626.16	110.64	R143	5407
T96	381918.76	6117397.32	110.47	R049	5332
T97	382000.70	6122729.09	110.43	R019	5816
T19	373987.87	6120879.03	108.34	R036	5756
T117	385244.13	6124849.23	112.27	R019	2072
T1	370775.36	6122954.57	107.45	R088	5514
T24	374535.70	6123977.25	109.55	R088	7650
T70	378779.02	6120220.92	109.26	R036	5051
T66	378425.69	6120629.22	109.36	R036	5281
T27	374724.35	6120086.40	108.59	R036	4731
T25	374632.62	6121875.87	108.90	R036	6450
T87	380873.64	6122830.46	109.74	R019	6638
T37	375629.57	6128387.83	111.32	R143	4049
T26	374487.77	6129456.97	111.15	R143	3905
T112	384442.87	6122951.44	111.87	R019	4120
T80	380063.72	6121485.01	109.32	R036	6782
T34	375292.74	6122978.52	109.79	R036	7374
T56	377342.97	6120623.39	109.21	R036	4986
T49	376693.77	6123735.99	109.93	R036	8031
T111	384139.67	6121600.26	111.48	R019	5471
T50	376844.52	6121183.18	108.98	R036	5487
T107	383244.67	6118794.80	110.97	R049	4668
T91	381320.81	6116858.24	109.71	R036	4943
T61	377753.63	6119971.57	109.02	R036	4442
T69	378651.20	6123790.81	109.87	R019	8179
T62	377792.38	6125653.86	110.68	R143	6362
T114	384648.79	6125102.20	111.83	R019	2260
T30	374991.18	6119572.22	108.52	R036	4155
T33	375180.28	6126585.43	110.12	R143	5875
T59	377642.07	6127496.79	110.59	R143	4514

Table G.1 **Wind turbine generator coordinates and elevation – Eastern area (Stage 1)**

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T115	384755.84	6124042.61	111.84	R019	3014
T82	380409.31	6118689.53	110.09	R036	4907
T103	382665.03	6117820.06	110.86	R049	4738
T84	380539.76	6124396.05	110.54	R019	6199
T76	379571.01	6121980.13	109.82	R036	6979
T23	374520.22	6130334.95	111.67	R143	3370
T113	384549.92	6121215.01	111.59	R049	5653
T67	378402.26	6125732.66	111.00	R143	6346
T95	381833.06	6124618.30	111.09	R019	4918
T92	381653.42	6116199.21	110.38	R036	5163
T42	375918.33	6122273.70	109.24	R036	6594
T104	382795.35	6123762.40	111.13	R019	4540
T4	371387.13	6128668.01	110.41	R088	3750
T41	375910.22	6123970.52	109.98	R143	8181
T110	383863.51	6123841.10	111.17	R019	3710
T47	376466.11	6124915.87	109.99	R143	7158
T45	376435.20	6121657.81	108.63	R036	5952
T89	381232.37	6124478.01	110.47	R019	5525
T116	385166.00	6122040.19	112.07	R019	4720
T9	372777.15	6129866.59	110.44	R143	5136
T106	383183.92	6122586.35	110.72	R019	5110
T22	374414.69	6127599.72	110.06	R143	5349
T11	373191.06	6124411.13	108.87	R088	6265
T126	387045.01	6123960.46	112.87	R019	2750
T63	377934.41	6123907.86	109.93	R143	8113
T58	377597.49	6122466.88	109.56	R036	6847
T43	376047.25	6127846.13	110.90	R143	4389
T123	386376.43	6122873.49	112.54	R019	3742
T20	374041.98	6124479.49	109.41	R088	6980
T73	379378.99	6118125.29	109.18	R036	3750
T93	381702.26	6120349.38	110.13	R049	6831

Table G.1 **Wind turbine generator coordinates and elevation – Eastern area (Stage 1)**

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T17	374271.24	6128401.66	110.80	R143	4803
T18	373927.94	6122850.23	109.03	R036	7597
T3	371344.24	6123711.28	107.88	R088	5260
T15	373488.36	6121267.55	108.68	R036	6331
T40	375816.86	6120640.95	108.96	R036	4983
T64	378126.95	6121879.45	109.73	R036	6380
T101	382557.16	6122713.04	110.68	R019	5426
T90	381247.52	6122411.07	110.00	R019	6594
T38	375757.54	6126219.42	110.33	R143	6028
T32	375142.36	6130236.63	112.00	R143	2905
T72	379197.14	6122427.81	109.70	R036	7237
T105	382974.17	6119459.52	111.16	R049	5280
T77	379755.32	6117600.69	109.07	R036	3754
T71	378825.49	6122973.65	109.71	R036	7626
T120	386013.03	6123343.49	112.35	R019	3287
T31	375068.49	6128928.48	111.54	R143	3889
T16	373710.58	6129424.63	110.52	R143	4541
T86	380803.17	6117131.23	109.55	R036	4520
T85	380777.36	6118177.77	110.02	R036	4928
T8	372552.65	6123685.99	108.66	R088	6157
T83	380457.37	6123209.23	109.91	R019	6787
T88	381123.25	6119464.42	110.03	R036	5947
T99	382297.78	6118303.28	110.74	R049	5261
T29	374942.64	6123434.17	109.74	R036	7886
T94	381802.41	6118709.34	110.61	R049	5880

Notes: Coordinates provided in GDA2020 MGA Zone 55

G.2 Wind turbine generator locations – Western area (Stage 2)

Table G.2 Wind turbine generator coordinates and elevation – Western area (Stage 2)

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T93	359030.70	6137468.06	106.32	R091	9401
T77	358053.41	6137448.79	106.17	R091	10371
T67	357485.14	6138243.74	105.56	R091	11038
T83	358365.91	6133521.79	105.94	R091	10429
T57	357017.93	6138864.13	105.21	R091	11613
T49	356601.15	6139353.76	104.84	R091	12129
T147	362385.50	6140110.34	108.38	R091	7023
T100	359453.68	6134154.66	106.65	R091	9212
T47	356397.77	6135430.47	105.33	R091	12021
T76	358044.49	6134143.85	105.81	R091	10585
T27	355239.06	6137382.81	104.58	R100	11861
T21	354912.21	6134235.48	105.01	R125	12411
T152	362906.06	6133817.19	107.75	R091	6069
T158	363454.46	6136372.09	107.76	R091	4922
T121	360624.74	6137695.55	106.99	R091	7852
T89	358812.13	6133011.44	106.11	R091	10162
T160	363777.09	6139009.68	108.29	R091	5266
T43	356186.75	6137490.93	105.14	R091	12234
T80	358244.90	6135419.76	106.41	R091	10183
T13	354431.10	6134426.25	104.84	R100	11966
T150	362813.23	6137288.29	107.94	R091	5626
T153	363171.12	6136856.28	108.60	R091	5221
T155	363336.34	6139356.75	108.22	R091	5820
T20	355049.30	6135314.53	104.70	R100	12204
T29	355456.62	6134170.89	105.18	R125	12913
T41	356010.13	6134107.06	105.42	R091	12585
T91	358954.15	6134646.68	105.99	R091	9592
T145	362315.02	6132846.10	108.14	R091	7049
T23	355095.79	6139191.53	104.53	R100	11545
T19	354874.42	6137809.83	104.35	R100	11434

Table G.2 Wind turbine generator coordinates and elevation – Western area (Stage 2)

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T30	355477.92	6136510.92	104.97	R100	12272
T16	354690.40	6136408.95	104.85	R100	11535
T66	357338.49	6135052.07	105.41	R091	11125
T53	356713.43	6133999.15	105.23	R091	11917
T110	360031.23	6133355.47	106.36	R091	8899
T36	355700.43	6139749.24	104.71	R100	12152
T28	355491.74	6138694.81	104.42	R100	11960
T37	355822.21	6138235.56	104.92	R100	12325
T50	356576.90	6137071.59	105.74	R091	11816
T59	357150.09	6136616.17	105.73	R091	11227
T106	359690.35	6135969.61	106.19	R091	8699
T118	360550.94	6133307.75	107.33	R091	8431
T133	361368.55	6133664.38	107.45	R091	7539
T44	356265.10	6139786.40	104.74	R091	12563
T58	357090.63	6140208.77	104.74	R091	11896
T68	357522.70	6139691.78	105.35	R091	11328
T73	357837.39	6135818.93	105.80	R091	10557
T97	359201.71	6136529.27	106.48	R091	9175
T114	360236.95	6134747.07	106.10	R091	8315
T125	360741.99	6134326.98	106.84	R091	7923
T149	362403.21	6134160.27	108.10	R091	6395
T142	361877.87	6133240.51	107.52	R091	7246
T70	357724.93	6140869.91	105.25	R091	11534
T82	358250.49	6140841.25	105.42	R091	11039
T75	358040.67	6139187.01	105.96	R091	10693
T85	358662.86	6138342.88	106.73	R091	9897
T102	359502.90	6139287.88	106.60	R091	9317
T129	361000.30	6137164.18	106.68	R091	7411
T134	361391.80	6136813.17	106.34	R091	6994
T148	362389.51	6137655.96	107.68	R091	6108
T159	363741.29	6134297.72	107.91	R091	5108

Table G.2 **Wind turbine generator coordinates and elevation – Western area (Stage 2)**

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T154	363250.69	6133327.01	108.13	R091	6000
T88	358547.35	6140313.85	105.73	R091	10563
T109	359954.67	6141344.93	106.47	R091	9743
T112	360085.69	6137850.93	106.61	R091	8409
T101	359503.17	6140642.77	106.41	R091	9816
T122	360690.65	6139927.40	107.76	R091	8437
T127	360873.82	6138982.29	107.28	R091	7920
T146	362163.76	6135494.70	107.08	R091	6285
T138	361493.72	6135459.65	106.88	R091	6953
T157	363449.80	6135281.64	107.42	R091	5062
T94	359033.29	6139824.79	105.95	R091	9935
T119	360479.41	6141348.57	106.75	R091	9295
T128	360917.01	6141049.84	107.17	R091	8766
T139	361625.63	6139025.63	107.55	R091	7227
T162	363936.40	6140456.44	108.66	R091	5983
T161	363973.77	6136159.86	107.85	R091	4412
T164	364514.66	6135990.86	108.07	R091	3888
T136	361386.77	6140825.40	107.23	R091	8248
T143	361981.62	6140635.39	107.40	R091	7645
T144	362016.92	6138623.62	107.76	R091	6722
T108	359894.92	6138805.84	107.18	R091	8804
T115	360213.82	6131180.06	107.13	R088	8386
T42	356148.57	6132162.47	105.93	R090	12396
T51	356587.44	6131448.92	106.79	R090	11799
T62	357265.37	6130888.85	106.25	R088	11033
T71	357792.97	6130235.82	105.96	R088	10345
T78	358170.27	6129795.97	105.88	R088	9873
T61	357249.08	6132574.03	105.68	R088	11662
T124	360751.76	6130381.34	107.32	R088	7574
T135	361399.70	6130306.01	107.77	R088	6946
T26	355128.36	6131564.12	105.98	R090	11639

Table G.2 Wind turbine generator coordinates and elevation – Western area (Stage 2)

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T113	360142.19	6129712.82	106.61	R088	7940
T103	359552.08	6130295.66	106.28	R088	8674
T90	358886.19	6130955.75	107.30	R088	9522
T15	354637.78	6131829.95	106.11	R125	11645
T33	355518.53	6131066.01	105.10	R090	11203
T39	355985.95	6130555.62	105.84	R090	10791
T52	356669.26	6129789.94	105.90	R090	10224
T60	357197.93	6129197.05	105.77	R090	9836
T11	354349.74	6130171.71	104.62	R090	10178
T17	354778.60	6129895.61	104.44	R090	9941
T40	355991.21	6128666.68	105.21	R090	8956
T72	357807.43	6131632.86	106.09	R088	10773
T56	356854.89	6127591.38	104.93	R090	8218
T48	356504.72	6128089.61	105.82	R090	8557
T10	354221.45	6132224.17	104.99	R125	11284
T131	361163.83	6128260.46	106.63	R088	6664
T141	361677.29	6129096.90	107.17	R088	6299
T140	361656.07	6127763.90	106.58	R088	6141
T105	359698.41	6128632.89	106.49	R088	8163
T111	360077.74	6127017.52	105.80	R088	7738
T104	359607.55	6127323.52	105.79	R088	8191
T120	360570.85	6126750.00	105.79	R088	7273
T130	361047.28	6126453.81	105.77	R088	6843
T137	361434.09	6126047.47	105.78	R088	6546
T81	358261.35	6128468.28	105.17	R088	9573
T87	358642.54	6128051.81	105.64	R088	9163
T95	359097.86	6127638.62	105.69	R088	8697
T86	358623.21	6125773.48	105.36	R090	7596
T63	357295.94	6127162.21	105.20	R090	8014
T69	357634.50	6126714.88	104.79	R090	7784
T79	358161.49	6126390.47	104.59	R090	7798

Table G.2 **Wind turbine generator coordinates and elevation – Western area (Stage 2)**

WTG ID	Easting	Northing	Elevation (m)	Closest non-associated residence	Distance to non-associated residence (m)
T92	359009.37	6125382.03	104.94	R090	7571
T32	355490.00	6127540.90	104.61	R090	7742
T38	355862.18	6126905.59	104.97	R090	7230
T46	356267.78	6126424.81	104.72	R090	6915
T55	356792.58	6125755.73	104.83	R090	6534
T7	353957.29	6130482.02	104.47	R090	10469
T64	357200.03	6125211.29	104.81	R090	6282
T3	353562.76	6127533.17	103.86	R090	7517
T12	354367.47	6126765.26	104.14	R090	6785
T18	354713.00	6126323.30	104.27	R090	6392
T24	355086.14	6125764.91	104.07	R090	5920
T45	356221.70	6123880.34	103.36	R090	4631
T54	356778.09	6123808.54	104.18	R090	4904
T31	355489.96	6125308.94	104.05	R090	5597
T9	354015.89	6127202.43	104.22	R090	7194
T1	353428.72	6126419.84	103.60	R090	6407
T4	353606.04	6125688.34	103.63	R090	5672
T14	354476.47	6124105.56	103.57	R090	4168
T22	355032.86	6124033.74	103.31	R090	4243
T34	355597.47	6123960.90	103.97	R090	4391
T2	353446.96	6124492.77	103.79	R090	4481
T6	353911.64	6124178.45	103.48	R090	4169
T35	355604.33	6129081.43	105.01	R090	9269
T25	355129.50	6129340.38	104.69	R090	9437
T123	360664.72	6128680.35	106.08	R088	7212
T163	364215.53	6135104.64	108.15	R091	4371
T156	363364.92	6140506.61	108.64	R091	6450

Notes: Coordinates provided in GDA2020 MGA Zone 55

