

Dinawan Solar Farm

Amendment Report

Prepared for Spark Renewables Pty Limited

September 2024

Dinawan Solar Farm

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Spark Renewables Pty Limited

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September 2024

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Approved by



Kate Cox

Associate Director

13 September 2024

Ground floor 20 Chandos Street

St Leonards NSW 2065

ABN: 28 141 736 558

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Executive Summary

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Solar Farm, a large-scale solar photovoltaic (PV) generation facility and battery energy storage system (BESS), supported by associated infrastructure (the project). 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 regional context of the project is within the Murrumbidgee local government area (LGA) in New South Wales (NSW).

The main objective of the project is to generate and dispatch energy 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 800 megawatts (MW) (AC), equivalent to the demand of more than 300,000 NSW households, along with a storage capacity of up to 300 MW for 2 hours (600 MWh).

The key components of the project as described in the EIS, for which Spark Renewables seeks development consent, include:

- A network of approximately 2 million solar PV panels and associated mounting infrastructure.
- A BESS with a capacity of up to 300 MW (AC coupled) and a storage duration of up to 2 hours (600 MWh).
- Electrical collection system, substations and control rooms.
- Operations and maintenance (O&M) infrastructure, including site offices and amenities, buildings, equipment and maintenance sheds, laydown, storage and parking areas.
- Electricity transmission line infrastructure connecting the project substations to the Dinawan Substation.
- Site access from Kidman Way and Bundure Road.
- Temporary construction facilities, including workforce accommodation, construction compounds, site offices and amenities, laydown areas, construction materials storage and parking areas.

The development application (DA) and environmental impact statement (EIS) for the project were submitted to the NSW Department of Planning, Housing and Infrastructure (DPHI) and publicly exhibited from 17 November 2023 to 18 December 2023. In response to matters raised in submissions received on the project, and outcomes of ongoing engagement with the local community, government agencies and other stakeholders, Spark Renewables has made amendments to the project. The amendments described in this report are:

- reduction in the project area from 4,222 ha to 3,257 ha, containing 48 land parcels that overlap with the amended development footprint
- reduction in the development footprint from 2,499 ha to 1,792 ha
- amendments to the project layout, including the removal of one construction compound, and removal of the westernmost BESS, substation and switchyard location
- other minor amendments in response to advice from regulatory agencies during EIS exhibition including:
 - amendments to the new site access intersection at Kidman Way from a four-way intersection to two staggered T-intersections in response to submission from Transport for NSW
 - minor changes to the project area and development footprint at the Liddles Lane/Bundure Road/Kidman Way intersection to accommodate the strategic intersection design

- optimisation of biodiversity offset staging from five to three stages.

This amendment report provides an assessment of the potential impacts associated with the amended project. The amendments have resulted in further avoidance and reduction of impacts including:

- avoidance of a further 651.4 ha of a State listed threatened ecological community (TEC) (41% reduction) and 146.6 ha of two Commonwealth listed TECs (99% reduction)
- avoidance of a further three additional Aboriginal heritage sites (DEHS-2023-IF3, DEHS-2023-AS3 and DEHS-2023-AS8)
- avoidance of a further 707 ha of agricultural land
- increased buffer distance between the development footprint and nearby private and public receptors (including R036, R049, Liddles Lane and Kidman Way) to further minimise visual impacts of the project.

The proposed amendments are consistent with the relevant objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the principles of ecologically sustainable development (ESD) and do not significantly change the nature of the project originally proposed.

The justification of the project, as described in the EIS remains valid. The project is consistent with relevant Commonwealth, State, regional and local strategic plans and policies, in particular the *NSW Electricity Infrastructure Roadmap* (DPIE 2020a), which sets out the plan to deliver REZs in NSW. The project will contribute to the energy generation and storage targets for the South West REZ, enhancing the security of the State's electricity supply.

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1 Introduction

1.1 Background

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Solar Farm, a large-scale solar photovoltaic (PV) generation facility and battery energy storage system (BESS), supported by associated infrastructure (the project). 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 regional context of the project is within the Murrumbidgee local government area (LGA) in New South Wales (NSW) as 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 energy generation and regional development.

The project will connect to the Dinawan Substation, currently under construction as part of the Project EnergyConnect interconnector that will run 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 to generate and dispatch electricity generated 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 800 megawatts (MW) (AC), equivalent to the demand of more than 300,000 NSW households. The BESS will have a capacity of up to 300 MW (AC coupled) and a storage duration of up to 2 hours (600 MWh). The project will contribute to the government's 3.98 gigawatt (GW) generation target for the South West REZ. It will assist in meeting NSW and Australian Government emissions reduction targets and will abate approximately 1.5 million tonnes of greenhouse gases (GHG) annually.

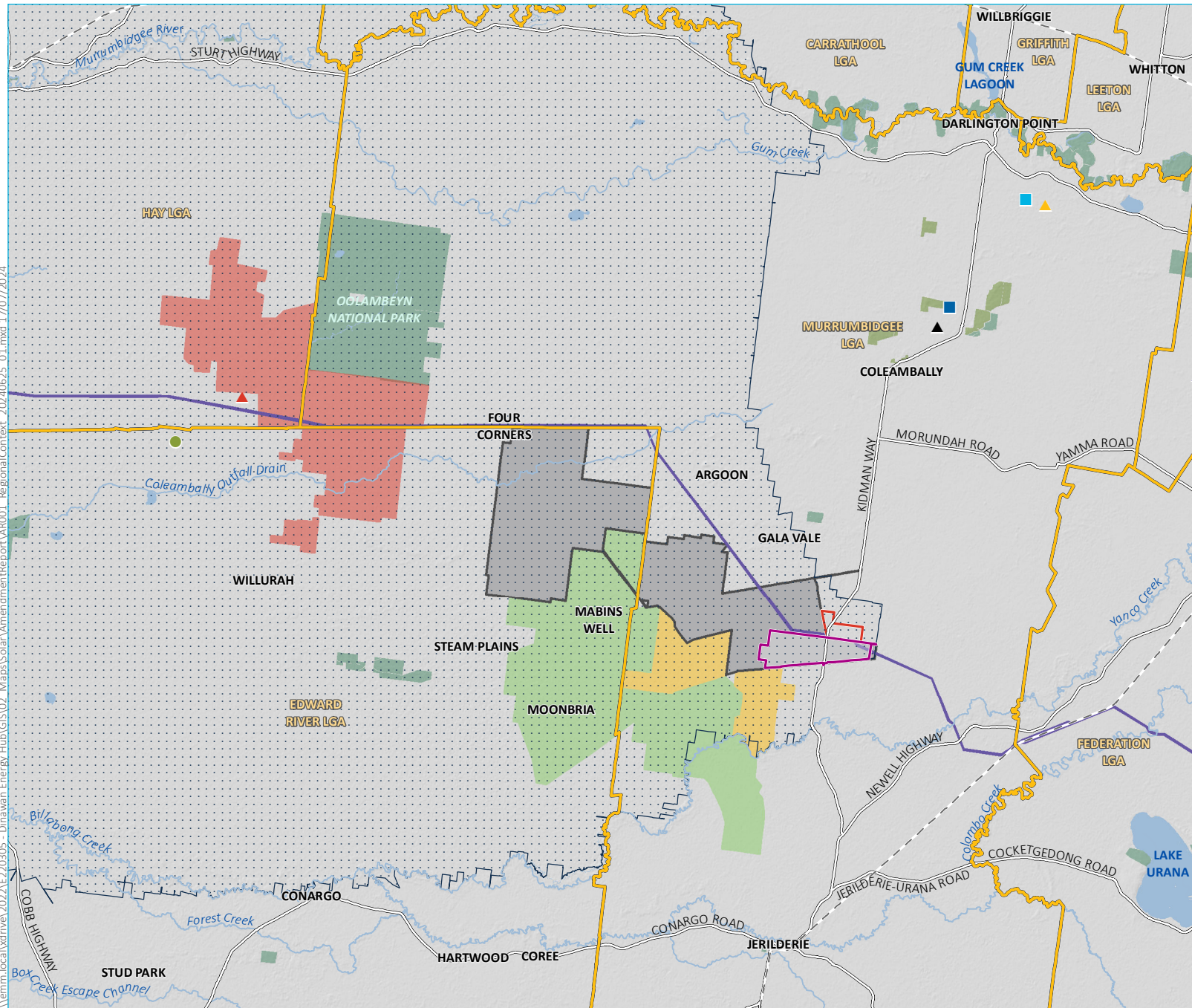
The project is a State significant development (SSD) pursuant to schedule 1 of State Environmental Planning Policy (Planning Systems) 2021. Accordingly, a development application (DA) and environmental impact statement (EIS) was submitted to the NSW Department of Planning, Housing and Infrastructure (DPHI) under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The EIS was publicly exhibited from 17 November 2023 to 18 December 2023.

During public exhibition of the EIS, a total of 82 submissions objecting to the project were received by DPHI from the public (including 79 individuals and 3 organisations). Additionally, 11 regulatory agencies provided advice on the project. A submissions report has been prepared to respond to matters raised in these submissions and agency advice, in conjunction with this amendment report.

Following the exhibition of the EIS, further review of the design has been completed to refine the development footprint. As a result of this detailed design as well as ongoing engagement with the local community, project landholders and other stakeholders, Spark Renewables has amended the project. The primary change involves a reduction in the development footprint, from 2,499 hectares (ha) to 1,792 ha (a 28% reduction), which incorporated opportunities for further avoidance of environmental impacts.

This amendment report has been prepared by EMM Consulting Pty Limited (EMM) on behalf of Spark Renewables in accordance with the *State significant development guidelines – preparing an amendment report* (DPE 2022a). This report describes the amendments and assesses the impacts associated with the amended project, compared to those presented in the EIS.

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Source: EMM (2024); Spark Renewables (2024); ABS (2021); DFSI (2020, 2021); GA (2011)



KEY

- Dinawan Solar Farm project area
- Dinawan Wind 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 (approved)
- Named waterbody
- Yanco Delta Wind Farm (approved)
- Argoon Wind Farm (proposed)
- Bullawah Wind Farm (proposed)

Existing environment

- Rail line
- Major road
- Named watercourse
- NPWS reserve
- State forest
- Local government area

Regional context

Dinawan Solar Farm
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Figure 1.1

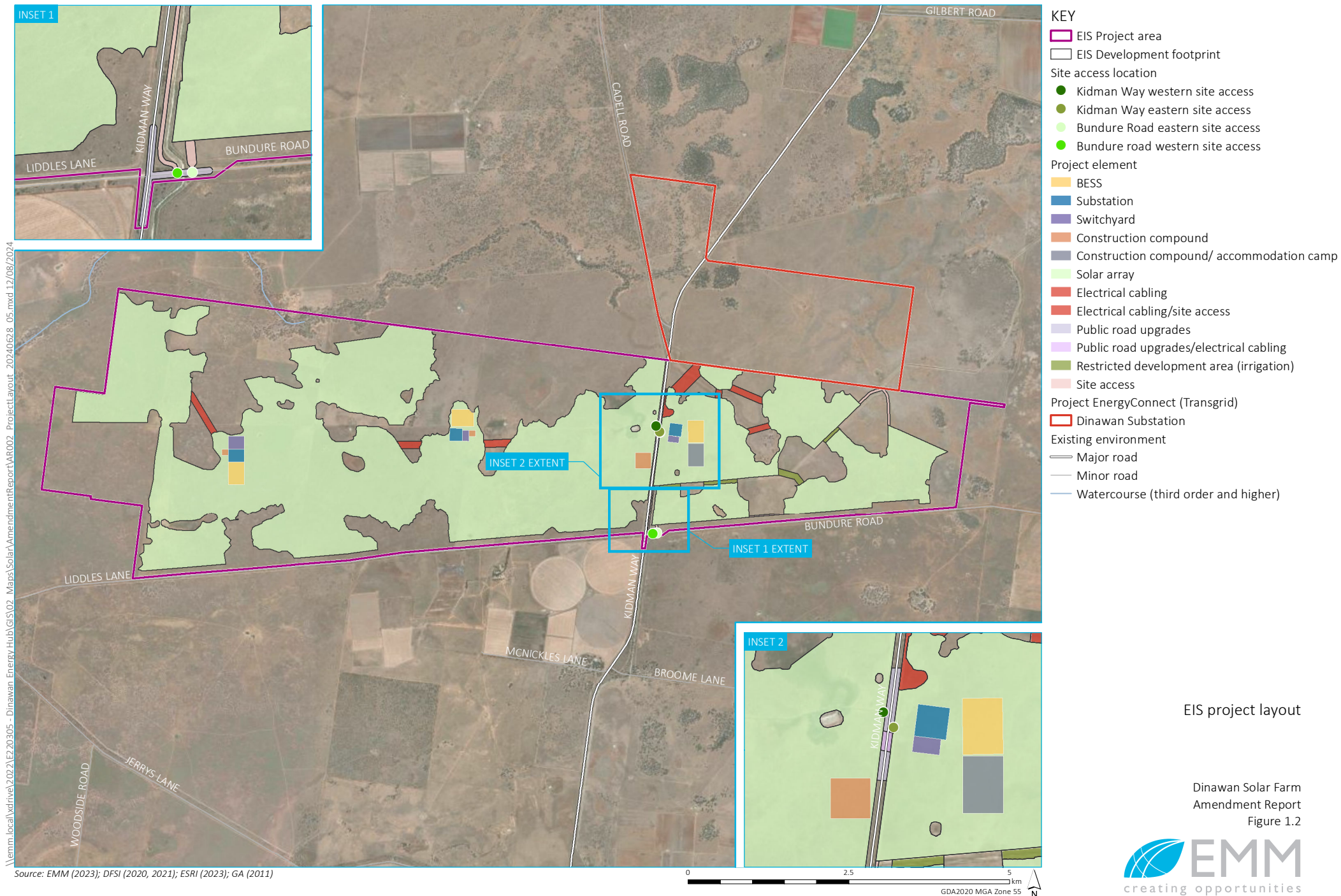
1.2 Original project summary

The project area presented in the EIS was approximately 4,222 hectares (ha). The exact land area proposed to be covered by project components in the EIS (i.e. the EIS development footprint) was approximately 2,499 ha. The EIS development footprint was refined throughout the assessment process to avoid impacts where possible and to minimise unavoidable impacts. It was informed by the outcomes of community and stakeholder engagement and the findings of the environmental, social and economic assessments.

The project, as presented in the EIS, comprises the following key components:

- A network of approximately 2 million solar PV panels and associated mounting infrastructure.
- A BESS with a capacity of up to 300 MW (AC coupled) and a storage duration of up to 2 hours (600 MWh).
- Electrical collection system, substations and control rooms.
- Operations and maintenance (O&M) infrastructure, including site offices and amenities, buildings, equipment and maintenance sheds, laydown, storage and parking areas.
- Electricity transmission line infrastructure connecting the project substations to the Dinawan Substation.
- Site access from Kidman Way and Bundure Road.
- Temporary construction facilities, including workforce accommodation, construction compounds, site offices and amenities, laydown areas, construction materials storage and parking areas.

The EIS project layout is provided in Figure 1.2.



EIS project layout

Dinawan Solar Farm
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Figure 1.2

1.3 Overview of amendments

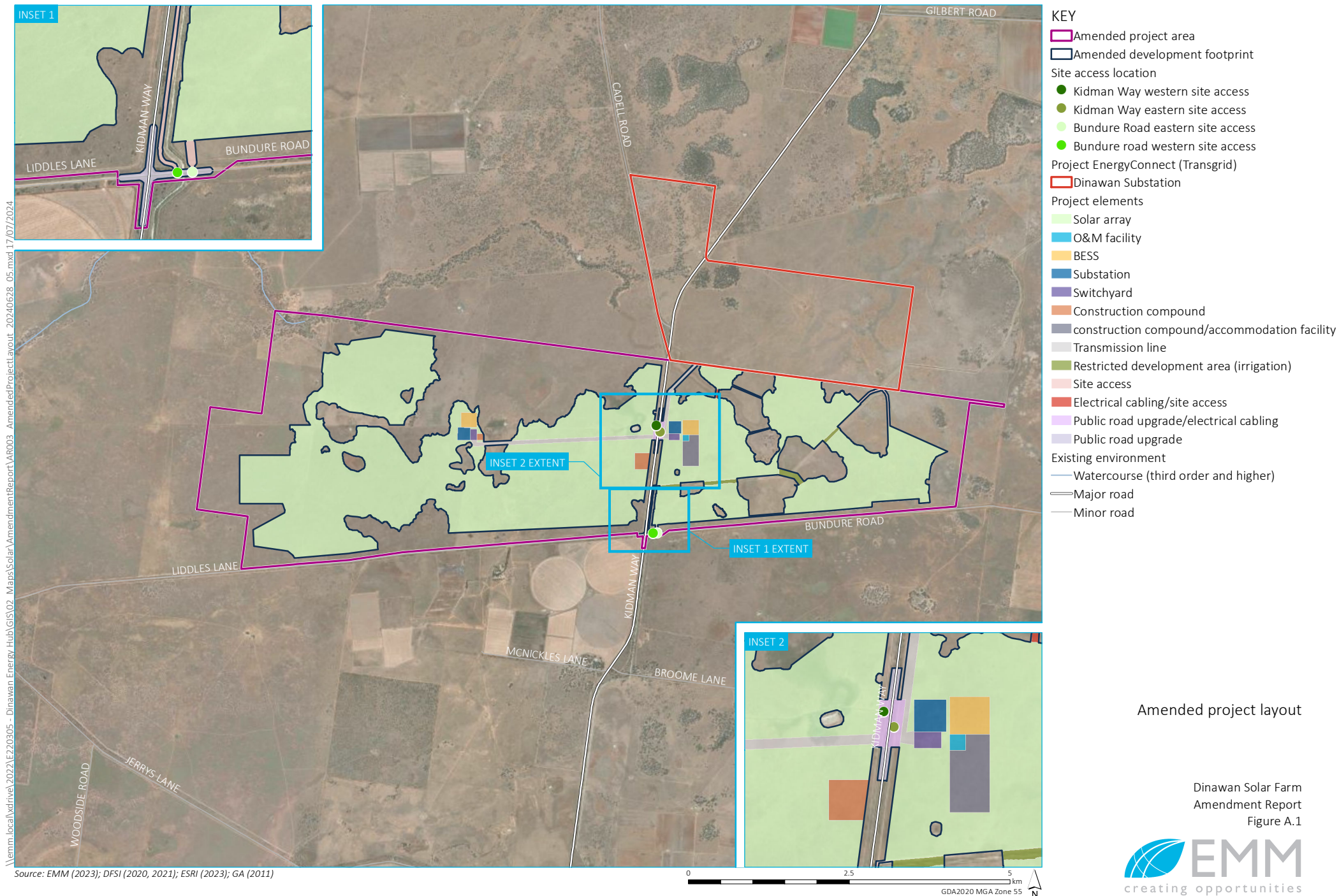
As a result of ongoing engagement with the local community, government agencies, project landholders, and other stakeholders, the project's development footprint has been refined to further minimise environmental impacts. The amendments involve:

- reduction in the project area from 4,222 ha to 3,257 ha, containing 48 land parcels that overlap with the amended development footprint
- reduction in the development footprint from 2,499 ha to 1,792 ha
- amendments to the project layout, including the removal of one construction compound, and removal of the westernmost BESS, substation and switchyard location
- other minor amendments in response to advice from regulatory agencies during EIS exhibition including:
 - amendments to the new site access intersection at Kidman Way from a four-way intersection to two staggered T-intersections in response to submission from Transport for NSW
 - minor changes to the project area and development footprint at the Liddles Lane/Bundure Road/Kidman Way intersection to accommodate the strategic intersection design
 - optimisation of biodiversity offset staging from five to three stages.

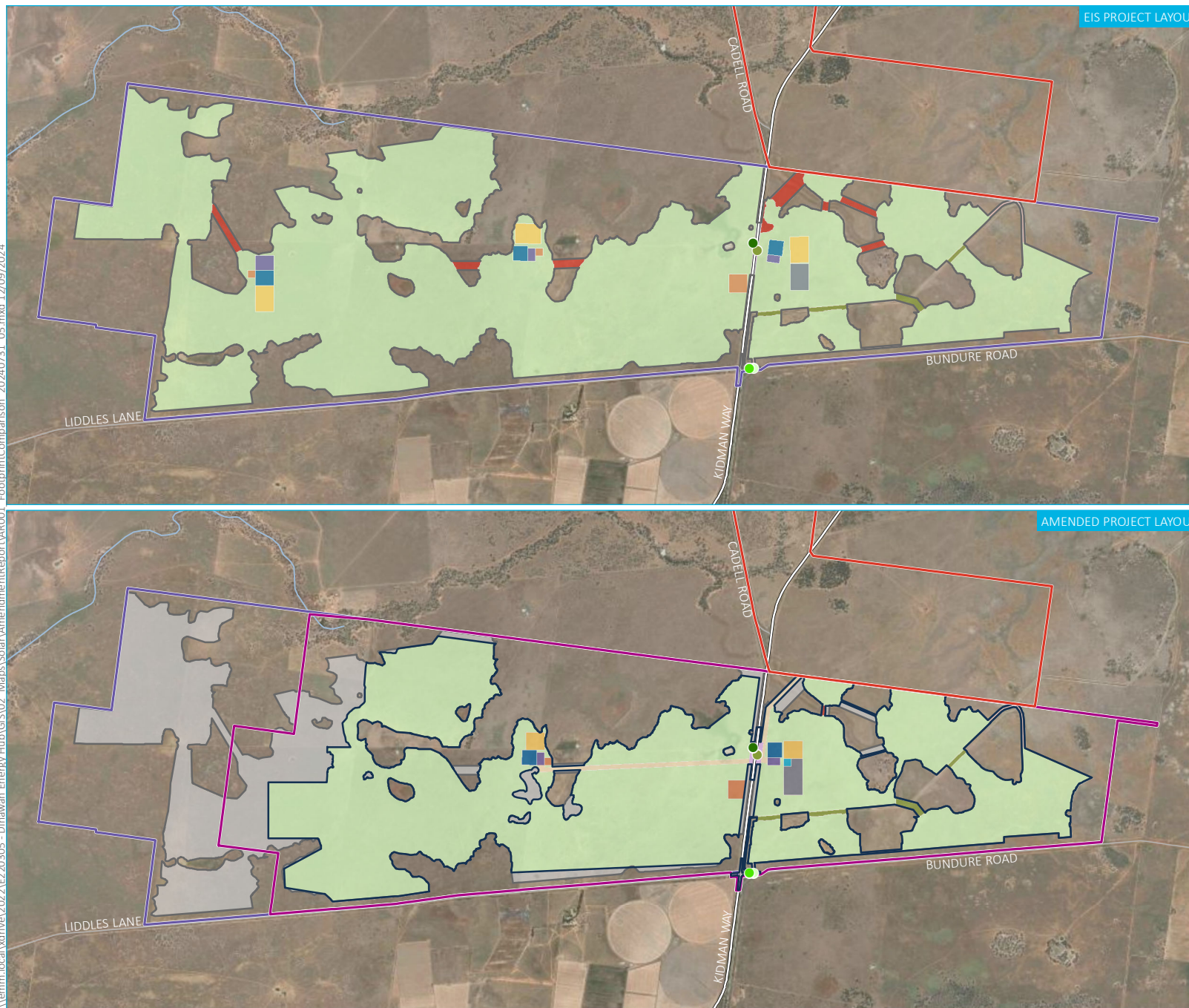
No amendments are proposed to the:

- generation or storage capacity
- number of solar PV panels
- construction workforce size
- construction timeline
- planned operating life
- intended activities within the development footprint.

The amended project layout is shown in Figure 1.3 and described in detail in Chapter 3. A comparison between the EIS project layout and amended project layout is shown on Figure 1.4.



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- KEY**
- EIS project area
 - EIS development footprint
 - Amended project area
 - Amended development footprint
 - Area excised from the development footprint
- Site access**
- Kidman Way western site access
 - Kidman Way eastern site access
 - Bundure Road eastern site access
 - Bundure Road western site access
- Project elements**
- Solar array
 - O & M facility
 - BESS
 - Substation
 - Switchyard
 - Construction compound
 - Construction compound/accommodation camp
 - Transmission line
 - Restricted development area (irrigation)
 - Site access
 - Electrical cabling/site access
 - Public road upgrade/electrical cabling
 - Public road upgrade
- Project EnergyConnect (Transgrid)**
- Dinawan Substation
- Existing environment**
- Major road
 - Minor road
 - Watercourse (third order and higher)

Comparison between EIS
and amended project layouts

Dinawan Solar Farm
Amendment Report
Figure 1.4

1.4 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

1.5 Terminology

The following terms are used throughout this report:

- **Project area:** References to the project area generally refer to the amended project area, unless stated otherwise. The project area is the maximum area considered for the amended project based on the extent of land to be developed. The project area contains the entirety of 48 land parcels (Table A.3 and Figure A.2) that overlap with the development footprint and is approximately 3,257 ha. The project area also includes parts of Kidman Way, Bundure Road and Liddles Lane (including the road easements) and Coleambally Irrigation Channel where site access, upgrades and/or electrical cabling may be required. The project area has reduced in size as part of this amendment report.
- **Development footprint:** References to the development footprint generally refer to the amended development footprint, unless stated otherwise. The development footprint is wholly within the project area and is the maximum extent of ground disturbing works associated with the construction and operation of the amended project. The development footprint has been reduced from approximately 2,499 ha to approximately 1,792 ha. The reduction in size has been optimised to avoid and minimise impacts where possible based on the outcomes of the technical assessments and stakeholder engagement. Approval is sought to disturb anywhere within the development footprint.

- **Restricted development area (irrigation):** Land within the development footprint where disturbance will be avoided wherever possible, with the exception of that required for the provision of electrical reticulation.
- **Site access points:** The proposed locations where all construction and operations traffic will access the development footprint. 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.

2 Strategic context

2.1 Project need and objectives

The project would have the ability to generate up to 800 MW (AC) of renewable electricity, 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 amendments will not change the need for the project or its objectives, and therefore, the strategic context presented within the EIS remains valid.

The following sections provide a brief summary of the objectives relevant to the strategic objectives of the project. Additional detail can be found in the EIS.

2.2 Ecologically sustainable development

2.2.1 National electricity demand

Significant growth in energy demand is anticipated as Australia progresses towards becoming a decarbonised society, largely driven by the electrification of industries which have traditionally relied on other sources of energy. This is made clear in both the Australian Energy Market Operator's (AEMO) *2022 Integrated System Plan* (AEMO 2022) and the draft *2024 Integrated System Plan* (AEMO 2023), the latter of which forecasts that energy consumption from the NEM will rise by approximately 108% by 2050.

The project will connect to the NEM via the Dinawan Substation, part of the EnergyConnect transmission program. This will allow it to contribute low-cost generation through the solar farm, and to flexibility to meet a variable demand profile through the BESS. Construction of the project could alleviate the need for additional infrastructure in the South West REZ to bolster system strength and resilience.

2.2.2 Climate change policy

The Commonwealth and all NEM state governments have committed to a net zero emission economy by 2050 or sooner (AEMO 2022). The project will support this transition by contributing to the target of 82% of NEM generation supplied from renewables by 2030–2031.

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

The project will provide economic opportunities, including the following:

- ongoing economic benefits for both the local economy within the Murrumbidgee LGA, 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 through a Voluntary Planning Agreement (VPA) (refer Section 5.3)
 - community initiatives funded by the project's South West REZ Access fee

- employment opportunities during construction and operations.

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 provided in Chapter 2 of the EIS. The project's strategic planning framework is largely unchanged by the amendments, and as such, the summary included in the EIS remains applicable to the amended project.

2.3 Site selection and justification

The project area is ideally located for the development of a solar farm and BESS 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 energy generation, storage and transmission projects.
- **Proximity to approved transmission infrastructure** – the project area is adjacent to Project EnergyConnect's Dinawan Substation, which can export the electricity generated by the project directly into the grid.
- **Proximity to major transport networks** – the project area can be accessed from Kidman Way, an approved B-Double route, with access to the Sturt and Newell highways, with further access from Bundure Road.
- **Few surrounding receptors** – the land surrounding the project area is sparsely populated with only one non-associated residence within 5 km (R049 on Figure 2.1).
- **Strong solar resource** – the project area is relatively flat and has a very good solar resource that complements the generation profile from the available wind resource. 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.
- **Compatible surrounding land use** – the existing agricultural land use within and surrounding the project area is compatible with large-scale solar energy generation and storage and sheep grazing is intended to continue throughout operations.
- **Preliminary investigations and constraints analysis indicated a high potential to avoid and minimise impacts** – the construction and operation of a solar farm and BESS 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, including the amendments described in this report. Project refinement is discussed further in Section 2.5.

2.4 Key features of the project area and surrounds

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

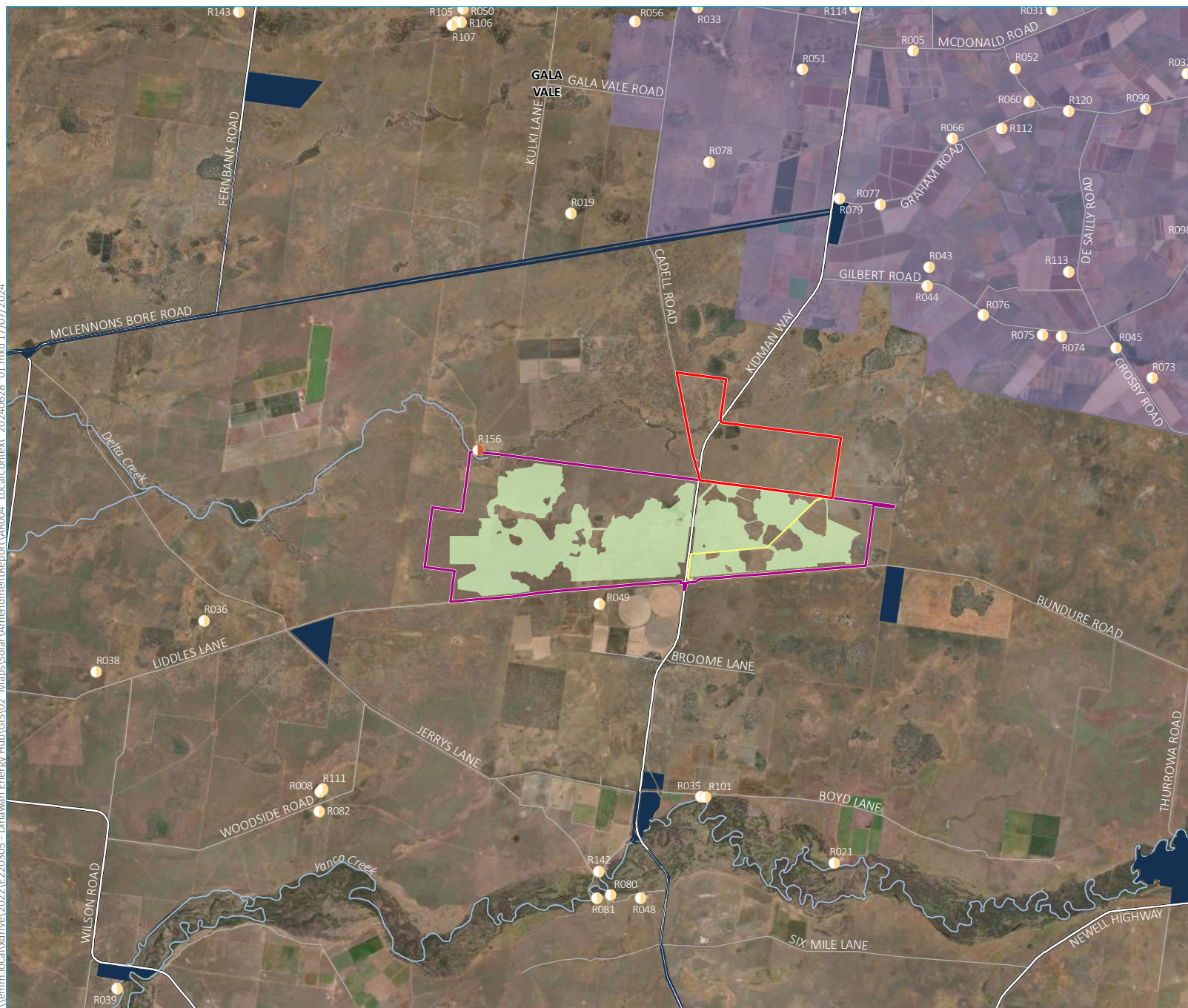
Table 2.1 **Key features of the project area and surrounds**

Aspect	Description
Local government area	The project area is within the Murrumbidgee LGA.
Land zoning	The project area is zoned RU1 Primary Production under the <i>Jerilderie Local Environmental Plan 2012</i> (Jerilderie LEP) (Figure 2.2 in EIS). Kidman Way is zoned SP2 – Infrastructure (Classified Road) under the Jerilderie LEP. 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.
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 Goolgumbra property.
Land ownership	There are four 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 • Murrumbidgee Council who is the owner of the public road network land (i.e. Kidman Way and Bundure Road).
Residences	There is one non-associated residence within 5 km of the project area, R049, approximately 656 m from the development footprint (Figure 2.1).
Nearby natural features	The largest nearby watercourse is Yanco Creek, approximately 6 km south of the project area, which flows south-west toward the Murray River. The nearest national parks, nature reserves and state forest areas are: • Oolambeyan National Park approximately 46 km north-west • South-West Woodland Nature Reserves, comprising of: – Edgar and Puckawidgee precincts approximately 38 km west – Kulki precinct approximately 12 km north • Murrumbidgee Valley National Park, approximately 54 km north-east • Bretts State Forest, approximately 31 km north.

Table 2.1 **Key features of the project area and surrounds**

Aspect	Description
Nearby infrastructure	Key transport infrastructure includes: • Kidman Way, a sealed regional road that bisects the project area. It runs from the Newell Highway at its southern extent, north towards Coleambally. • 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 55 km north of the project area, and connects the region to major population centres in NSW, Victoria and South Australia. • Local roads, including Liddles Lane and Bundure Road, which intersect at a four-way intersection with Kidman Way at the southern extent of the project area. Liddles Lane provides access to the west of Kidman Way, and Bundure Road provides access to the east of Kidman Way. Both roads are unsealed and service local traffic only. Coleambally Irrigation Channel runs through the project area, east of Kidman Way, and delivers 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 shown in Figure 1.1.
Planning context	The project area is not within any land identified as: • biophysical strategic agricultural land (BSAL) • flood planning area • 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 LEP. There are no travelling stock reserves within the project area. There is no Crown land within the project area.
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.
Key risks or hazards for the project	Key risks and hazards considered include: • Flooding – a flooding assessment has been completed (Section 6.8 and Appendix E.8 of the EIS) to inform project design refinement to ensure that flood risks including frequency of occurrence, flood depth and flow velocity within and surrounding the development footprint are adequately considered in project design. • Hazards – no hazards were identified within the development footprint, including mapped bushfire prone land, contaminated land, steep slopes, land subject to mine subsidence or other hazards. A preliminary hazard analysis (PHA) has been completed for the project (Section 6.9 and Appendix E.9 of the EIS).

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- KEY**
- Amended project area
 - Amended development footprint
 - Project EnergyConnect (Transgrid)**
 - Dinawan Substation
 - Residence**
 - Associated residence
 - Non-associated residence
 - Existing environment**
 - Watercourse (third order and higher)
 - Major road
 - Minor road
 - Coleambally irrigation area
 - Travelling stock reserves
 - Coleambally irrigation channel

Local context

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Figure 2.1

2.5 Project refinement

The development footprint and project layout have been the subject of an iterative design process informed by the outcomes of technical assessments (including biodiversity, Aboriginal cultural heritage, water, visual amenity and noise) and outcomes of engagement with community and regulatory stakeholders. Throughout the refinement process, the following key principles have been adopted:

- Minimise vegetation clearing and prioritise avoidance of significant biodiversity values – multiple biodiversity surveys over several seasons (2021–2024) have enabled the progressive refinement of the development footprint, with avoidance of areas of higher conservation value, identified threatened species habitat and/or native vegetation maximised to the extent possible.
- Maximise use of previously disturbed land – the development footprint has been selected to maximise the use of land previously modified by agricultural operations, including cleared areas, established access tracks and local roads.
- Minimise disturbance within the development footprint – footprints for project infrastructure will be limited to the minimum area required.
- 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 footprint to the extent practicable.
- Minimise direct and indirect impacts on neighbouring landholders – setbacks to nearby residences and adjoining properties have been introduced and key infrastructure (including BESS, substations and the accommodation facility) has been located a minimum of 2 km from the closest residence.
- An ongoing flexible approach to design, enabling continual refinement of the development footprint during the preparation of the EIS and this report, responding to identified environmental impacts and constraints.

The evolution of the project from a much broader investigation area through to the proposed development footprint is described in Table 2.2 and shown on Figure 2.2.

Table 2.2 Key steps in project refinement

Footprint	Area (ha)	Key reasons for selection
Investigation area	4,500	• Proximity to Project EnergyConnect’s Dinawan Substation. • High solar irradiance. • Favourable topography and compatible surrounding land use. • Access to local and regional road network. • Minimise visibility of project infrastructure from receptors. • Avoidance of higher order watercourses (third order and above).

Table 2.2 **Key steps in project refinement**

Footprint	Area (ha)	Key reasons for selection
Preliminary study area	2,540	• Avoids areas of high archaeological sensitivity identified during preliminary archaeological investigations. • Avoids areas of higher biodiversity value, including higher condition plant community types (PCT) (PCT 26 and 45 – refer to Section 6.1) and mapped important habitat for Plains Wanderer (<i>Pedionomus torquatus</i>). • Avoids areas directly adjacent to Liddles Lane and Bundure Road. • Avoids agricultural land mapped as land and soil capability (LSC) class 1, 2 or 3.
Refined study area	2,596	• Avoids higher condition PCTs (PCTs 13, 26 and 45). • Avoids connected areas and large patches of PCT 45. • Avoids Slender Darling Pea (<i>Swainsona Murrayana</i>) records to the extent practicable. • Avoids mapped important habitat for Plains Wanderer. • Avoids Southern Bell Frog habitat (<i>Litoria raniformis</i>) to the extent practicable.
EIS development footprint	2,499	• Avoids Slender Darling Pea and Silky Swainson-pea (<i>Swainsona sericea</i>) records to the extent practicable. • Avoids Aboriginal cultural heritage sites to the extent practicable. • Avoids areas likely to be inundated by flood waters. • Excludes PV module placement within 100 m of Kidman Way to reduce visibility of project infrastructure from passing motorists.
Amended development footprint	1,792	• Facilitates construction and operations access across development footprint. • Increases setback distances of the development footprint from nearby non-associated residences (656 m from R049; 6,748 m from R036). • Avoids impacts to an additional 694 ha of native vegetation, including 651 ha of a BC Act listed TEC and 147 ha of two EPBC Act listed TECs. • Avoids an additional three Aboriginal cultural heritage sites. • Reduces impacts to agricultural land, with a further 707 ha available for continued agricultural uses.



KEY

- EIS Project area
- Amended development footprint
- Amended project area
- EIS Development footprint
- Preliminary study area
- Refined study area
- Investigation area
- Amended Development footprint
- Existing environment
- Major road
- Minor road
- Watercourse (third order and higher)

Key steps in project refinement

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Figure 2.2

A summary of the key environmental constraints considered as part of the project refinement process is provided in Table 2.3 and shown on Figure 2.3.

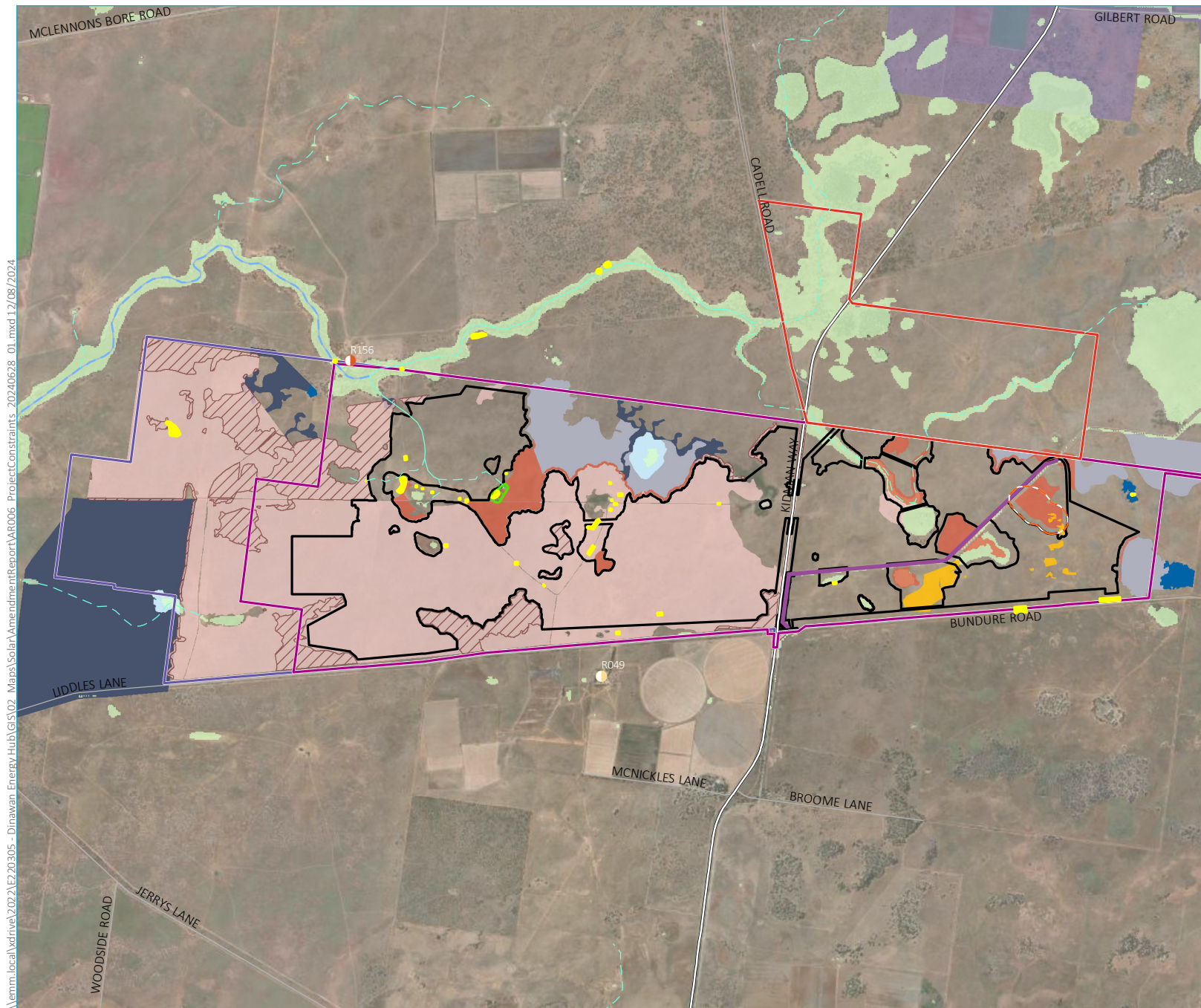
Table 2.3 **Matters considered during project refinement**

Aspect	Matters considered during project refinement
Biodiversity	Measures to avoid and minimise impacts to vegetation were considered during the project refinement process, resulting in avoidance of significant biodiversity values. The investigation area for the project encompassed approximately 4,500 ha. The final area of the amended development footprint has been reduced by approximately 2,708 ha, including avoidance of approximately 2,628 ha of native vegetation and threatened species habitat (refer Table 6.4). ‘Avoid and minimise’ has been a key consideration in refining the development footprint, with consideration given to avoiding impacts to: • higher condition PCT 13, 26 and 45 • connected areas and large patches of PCT 45 • Slender Darling Pea and Silky Swainson-pea records • mapped important habitat for Plains Wanderer • hollow bearing trees. Avoidance of impacts to the majority of PCT 26 (intact) has been a priority as this condition class has the highest vegetation integrity score and is a threatened ecological community (TEC) listed under NSW and Commonwealth legislation.
Aboriginal cultural heritage	Avoidance of Aboriginal Heritage Information Management Information System (AHIMS) listed sites. Establishment of significant setbacks from higher order watercourses or water bodies which have high levels of archaeological and cultural significance. Avoidance of impacts to 19 cultural heritage sites (including three sites considered of high cultural value), comprising six hearths, three hearths with artefacts, five artefact scatters, three isolated artefacts, one hearth with isolated artefacts, and the women’s tree with an isolated artefact. The amendments will reduce the number of cultural heritage sites impacted by the project from 12 sites to nine sites.
Historical heritage	Avoidance of impacts to sites identified during field assessments as part of the preparation of the historical heritage assessment. The amendments will not alter impacts to historical heritage.
Visual	A key consideration of the project design refinement process has been the potential visibility of project infrastructure from the closest rural dwelling, R049. A setback of 100 m from Liddles Lane was incorporated into the development footprint. The amendments have increased the setback of the development footprint from Liddles Lane closest to R049 to approximately 200 m, increasing the distance from the dwelling to the nearest infrastructure to approximately 656 m. Positioning of project infrastructure including the on-site substations and BESS within the development footprint with a view to minimising or avoiding visual impacts on the closest rural dwelling. The closest substation or BESS area within the development footprint is at least 2 km north of R049. A setback of up to 100 m from the Kidman Way road corridor (subject to the selected module configuration) to the closest PV module has been established to minimise visibility of project infrastructure. The amendments will reduce visual impacts through the reduction in footprint and increased setbacks to the nearest non-associated residences and sections of Kidman Way and Liddles Lane, reducing the visibility of the project from these locations.
Traffic and transport	Consideration of proximity to, and capacity of, the local and regional road network and ability to transport the necessary infrastructure to the array areas and resource the workforce demand during construction. Design of construction traffic routes to avoid potential conflict with road users on Liddles Lane and minimise vehicle movements on the public road network to the extent practicable.

Table 2.3 **Matters considered during project refinement**

Aspect	Matters considered during project refinement
Water	The development footprint has been designed to minimise impacts on watercourses, where possible. The development footprint provides appropriate setbacks from all third order streams and higher. 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 >50 cm under the 1% annual exceedance probability (AEP) event. The amendments will avoid impacts to an ephemeral first order watercourse west of the project area.
Hazards and risks	Positioning of potentially hazardous infrastructure within the development footprint to reduce proximity to nearby residences, where practicable. The BESS has been designed so that the separation distance/clearance between the BESS sub-units meets the requirements of <i>Standard for the Installation of Stationary Energy Storage Systems</i> (National Fire Protection Agency 855 2020). The amendments will reduce the number of potential BESS locations from three to two; while this will not alter the findings of the PHA, the removal of one BESS location will reduce the number of potential hazard sources within the development footprint.
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. The development footprint avoids agricultural land mapped as LSC class 1, 2 or 3. The amendments will reduce impacts to agricultural land, including a reduction of 688 ha of mapped LSC class 4.
Noise	As part of the detailed design process, potential noise-generating infrastructure (including the on-site substations and BESS) will be positioned within the development footprint with a view to maximising distance between this infrastructure and the closest rural dwelling. The closest substation or BESS area within the development footprint is at least 2 km north of R049. The amendments will increase the setback distance to the closest non-associated residence, R049, and reduce the number of BESS locations from three to two, reducing noise sources during operation.
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. The amendments will not materially alter the social and economic impacts of the project.

Where potential impacts cannot be avoided, Spark Renewables' design principles have sought to minimise environmental impacts and/or implement mitigation measures to manage the extent and severity of any residual environmental impacts.



- KEY**
- Amended project area
 - EIS project area
 - Amended development footprint
 - Identified constraints
 - Historical heritage site
 - Aboriginal heritage site
 - Threatened ecological communities
 - Natural Grasslands (EPBC Act)
 - Myall Woodland (BC Act)
 - Weeping Myall Woodland (EPBC Act)
 - Areas of high biodiversity value (avoided)
 - Natural grassland
 - Weeping Myall (intact)
 - Wetland (Lignum swamp)
 - Woodland habitat
 - Plains Wanderer Mapped Important Habitat (including 100 m buffer)
 - Silky Swainsona-pea and Slender Darling Pea habitat
 - 1% AEP flood depth >0.5 m
 - Residence
 - Associated residence
 - Non-associated residence
 - Project EnergyConnect (Transgrid)
 - Dinawan Substation
 - Existing environment
 - Major road
 - Minor road
 - Coleambally irrigation area
 - Coleambally irrigation channel
 - Strahler stream order
 - 1st order
 - 2nd order
 - 3rd order

Project constraints

Dinawan Solar Farm
Amendment Report
Figure 2.3

3 Description of amendments

3.1 Overview

A summary of the amendments is provided in this chapter. A comparison between the project proposed in the EIS and the amended project is provided in Table 3.1. The amendments are also shown on Figure 1.3.

A consolidated description of the amended project is provided in Appendix A.

Table 3.1 **Overview of amended project**

Aspect	Proposed in the EIS	Amended project
Project area	Approximately 4,222 ha comprised of 56 land parcels (Table 3.3 and Figure 3.2 in the EIS).	Approximately 3,257 ha comprised of 48 land parcels (Table A.3 and Figure A.2 in Appendix A). The project area has been reduced to exclude land parcels that no longer overlap with the development footprint.
Development footprint	Up to 2,499 ha.	Approximately 1,792 ha, a reduction of approximately 28% (refer Figure 1). The development footprint has been optimised for the generation capacity of 800 MW (AC), and has reduced impacts, particularly biodiversity and visual impacts.
Generation capacity	Up to 800 MW (AC).	No change.
Storage capacity	300 MW (AC coupled), up to 2 hours of storage (600 MWh).	No change.
Key infrastructure	• up to approximately 2 million PV modules and associated infrastructure • power conversion units (PCUs) (comprising inverters, medium voltage transformers and switchgear) • BESS and associated infrastructure • electrical collection system, up to three substations and control rooms • transmission line infrastructure connecting the project substations to the Dinawan Substation • operations and maintenance (O&M) infrastructure, including: – site offices and amenities – equipment and maintenance sheds – water tanks – laydown, storage and parking areas • temporary construction facilities, including: – worker accommodation facility – construction compounds – site offices and amenities – laydown areas – construction materials storage – water tanks	No change, with the exception of: • removal of one construction compound • removal of one BESS, substation and switchyard • reduction of the nominated footprint for select project infrastructure • increase in the maximum footprint of the worker accommodation facility from 8.9 ha to 12.1 ha. The footprint of the worker accommodation facility has been increased to align with the location of the accommodation facility for the proposed Dinawan Wind Farm (which is subject to a separate development application). No increase to the project's construction workforce is proposed; if the full extent of the footprint is not required for the accommodation facility, it will be used for solar array infrastructure for Dinawan Solar Farm.

Table 3.1 **Overview of amended project**

Aspect	Proposed in the EIS	Amended project
	storage and parking areas.	
Workforce	Approximately 400 personnel during peak construction. Up to 10 full-time employees and varying numbers of contractors during operations.	No change.
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.	No change.
Project life	Construction: approximately 18–36 months. Operations: 25–35 years with potential to extend.	No change.
Roads	Site access points will be on Kidman Way and Bundure Road. Upgrades to the local road network: - a new four-way intersection on Kidman Way to provide access to the development footprint - upgrades to the existing intersection of Kidman Way and Bundure Road. An internal network of access tracks within the development footprint: - access to the eastern and western sections of the development footprint from Kidman Way - access to the eastern sections of the project from Bundure Road.	No change is proposed to the location of site access points on Kidman Way and Bundure Road. Upgrades to the local road network (amended in response to advice from Transport for NSW): - new access point from Kidman Way via two new staggered T-intersections on Kidman Way to provide access to the eastern and western sections of the development footprint (intersection design has been altered from the original four-way intersection) - upgrades to the existing intersection of Kidman Way, Bundure Road and Liddles Lane (design has been updated following completion of the strategic design for this intersection). While no vehicles from Dinawan Solar Farm are proposed to use Liddles Lane, minimum upgrade requirements for turn treatments from Kidman Way onto Liddles Lane have been included in the strategic design to meet relevant design guidelines. The project area and development footprint have been amended to include these changes.

Table 3.1 **Overview of amended project**

Aspect	Proposed in the EIS	Amended project
Transport	Maximum daily heavy vehicle movements (construction, upgrading and decommissioning): 334 Maximum daily light vehicle movements (construction, upgrading and decommissioning): 284 Total over-dimensional vehicle movements (construction, upgrading and decommissioning): 17 Movements account for one vehicle entering the site and one vehicle leaving the site. Light vehicle movements include predicted shuttle bus movements associated with the transfer of workers from the accommodation facility to their active work areas.	No change.
Subdivision	Subdivision of the following lots may be required to create new allotments for the substations: • Lot 6 of DP 594041 • Lot 125 of DP 756444 • Lot 22A of DP 756444 • Lot 28 of DP 756444.	Subdivision is no longer required at Lot 28 of DP 756444 due to the removal of this substation and switchyard from the project. Subdivision may be required for Lot 1 of DP 113903 and Lot 112 of DP 756444 for the substation and switchyard west of Kidman Way. In summary, subdivision of the following lots may be required to create new allotments for the substations and/or switchyards: • Lot 6 of DP 594041 • Lot 125 of DP 756444 • Lot 22A of DP 756444 • Lot 1 of DP 113903 • Lot 112 of DP 756444.

Table 3.1 **Overview of amended project**

Aspect	Proposed in the EIS	Amended project
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. During decommissioning of project infrastructure, a temporary accommodation facility may be re-instated on the land previously used for the project's construction accommodation facility. If the project is decommissioned, all aboveground project structures will be removed and the site rehabilitated generally to its pre-existing land use. 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.	No change.
Offset staging	Within the Biodiversity Development Assessment Report (BDAR) (Appendix E.1 of the EIS), the development footprint has been broken up into six areas to facilitate the staged retirement of the project's biodiversity credit liability, should it be required.	Due to the reduction in the development footprint, offset staging has been optimised and reduced to three stages, and includes an early works stage.

3.2 Reduction of the development footprint

The amended project has reduced the overall development footprint from 2,499 ha to 1,792 ha, a 28% reduction. The amendments have optimised the development footprint for the proposed generation capacity of 800 MW (AC). During refinement of the development footprint, Spark Renewables have considered opportunities for further avoidance of impacts in the revised design. The amended project avoids and minimises the following impacts:

- avoidance of a further 651 ha of BC Act listed TEC (41% reduction) and 146 ha of EPBC Act listed TECs (99% reduction)
- biodiversity offsets required for the project have been further reduced from 40,229 to 20,985 for ecosystem credits and from 14,462 to 1,799 for species credits
- removal of important mapped habitat for Plains Wanderer from the development footprint
- avoidance of a further three additional Aboriginal heritage sites (DEHS-2023-IF3, DEHS-2023-AS3 and DEHS-2023-AS8)
- avoidance of a further 707 ha of agricultural land
- increased buffer distance between the development footprint and nearby private and public receptors (including R036, R049, Liddles Lane and Kidman Way) to further minimise visual impacts of the project.

3.3 Changes to project layout

Minor changes have been made to other project components and layout. This includes:

- removal of one construction compound from the layout, no longer required due to the reduced development footprint
- removal of the westernmost BESS, substation and switchyard due to the reduction in the development footprint
- minor changes to the project area and development footprint at the Liddles Lane/Bundure Road/Kidman Way intersection to accommodate the strategic design
- an increase in the footprint of the worker accommodation facility from 8.9 ha to 12.1 ha (noting this is within the overall development footprint and will be optimised during detailed design).

4 Statutory context

4.1 Introduction

The relevant statutory requirements under which the project will be assessed and determined are outlined in Chapter 4 of the EIS. No additional statutory requirements have been identified.

An updated statutory compliance table for the amended project is provided in Appendix B. It lists all relevant statutory requirements for the amended project and indicates where they have been addressed (either in this report or the EIS).

4.2 Approval pathway

As the project is classified as SSD, approval for the project is sought under Division 4.7 of the EP&A Act. Spark Renewables seeks to amend the application in accordance with Section 37 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation), which states that a development application may be amended by the applicant at any time before the application is determined.

The consent authority for the project has been transferred from the NSW Minister for Planning to the NSW Independent Planning Commission (IPC), as per section 2.7(1) of the State Environmental Planning Policy (Planning Systems) 2021, as more than 50 submissions were made in objection to the project (total of 82 objections). A submissions report has been submitted to DPHI in response to the matters raised in the submissions in conjunction with this amendment report.

4.3 Relevant approvals and pre-conditions to granting approval

The nature of the project will not be substantially altered by the amendment. Hence, the proposed amendments will not result in changes to the licences, approvals, pre-conditions and permits that are likely to be required for the project. These are listed in full in Chapter 4 of the EIS.

5 Engagement

Stakeholder engagement for the project commenced in 2021 and has been comprehensive to date. A summary of engagement carried out during the preparation of the EIS is provided in Chapter 5 of the EIS.

Since the lodgement of the EIS, Spark Renewables has continued to engage with stakeholders including local authorities, government agencies, the local community and neighbouring landholders. An overview of the engagement activities carried out during and after the public exhibition of the EIS is provided in the following sections.

5.1 Community engagement

A summary of the community engagement undertaken post-submission of the EIS on the project is provided in Table 5.1.

Table 5.1 Summary of engagement post-EIS submission – community

Stakeholder	Summary
Local community	Spark Renewables set up temporary offices in Coleambally and Jerilderie for four weeks during the public exhibition of the EIS (November and December 2023) to share project information and answer any questions about the project and EIS. The temporary exhibition offices raised community awareness of the project and facilitated greater connection of the Spark Renewables team with the local community. The Spark Renewables team discussed the project with a range of community members during the exhibition period including project neighbours, local residents, local businesses, community groups and clubs, local government and First Nations stakeholders. Both positive and negative feedback was received during the exhibition with key matters discussed including opportunities for local employment, management of bushfire risks and visual amenity impacts. Spark Renewables also conducted targeted consultation with the local community in February, April, May, June and July 2024, including a meeting with the Bundure landowner group and Argoon Fire Brigade (many of whom are neighbouring landholders), to review their feedback on the EIS. Spark Renewables have incorporated feedback from Argoon Fire Brigade into the amended bushfire assessment report, including additional mitigation measures to address bushfire risk (Appendix D.7). Further consultation with the local community was completed during public exhibition of Dinawan Wind Farm EIS, which included providing updates on the status of Dinawan Solar Farm. Meetings with local community members during this period raised the management of bushfire risk and the potential for contamination to occur as key issues of discussion. As mentioned, feedback from community members including the Argoon Fire Brigade has informed the amended bushfire assessment report (Appendix D.7). A detailed response to community concerns regarding contamination impacts is provided in Section 5.3.7 of the Submissions Report.
R049	Spark Renewables has maintained regular consultation with R049. The landholder visited Spark Renewables' temporary offices during public exhibition of the EIS. Additional face-to-face meetings were held in February and May 2024. Key concerns related to visual amenity and bushfire have been addressed as part of the amendment, including through increasing the setback distance of the development footprint from R049. Additionally, Spark Renewables has conducted further engagement with Argoon Fire Brigade and feedback has been incorporated into the amended bushfire assessment report (Appendix D.7).
First Nations groups	A summary of the amended Aboriginal cultural heritage assessment (ACHA) was presented to the registered Aboriginal parties (RAPs) for the project at two focus group meetings in May 2024. This included discussion around comments from Heritage NSW on the ACHA and the significant reduction in the development footprint that will maximise the preservation of cultural materials. No concerns with the amendments or changes to the ACHA were raised.

5.2 Agency engagement

Engagement with regulatory stakeholders continued post-submission of the EIS and is summarised in Table 5.2.

Table 5.2 Summary of engagement post-EIS submission – agencies

Stakeholder	Summary
DPHI	Spark Renewables continued to engage with DPHI during the public exhibition of the EIS and as part of the preparation of this submissions report and the amendment report. A letter was provided in April 2024 to inform DPHI of the proposed amendments to the project and included a summary of the proposed assessment approach. A meeting was held in June 2024 to discuss the status of the submissions report and the amendment report with a focus on the amended development footprint and reductions to the project's biodiversity impacts.
Murrumbidgee Council	Spark Renewables and Murrumbidgee Council have agreed upon a Voluntary Planning Agreement (VPA) that in total meets the recommended \$1,050/MW per annum for wind and \$850/MW per annum for solar. Spark Renewables continue to liaise with Murrumbidgee Council and provide regular updates on the project. This included discussions with traffic engineers at Murrumbidgee Council to discuss the vehicle access requirements and proposed road upgrade associated with the project and Dinawan Wind Farm and discussions regarding telecommunications reliability in the region.
NSW Rural Fire Service (including Argoon Fire Brigade)	Spark Renewables met with RFS in April 2024 to discuss the project and outcomes of the bushfire assessment report. In response to feedback from RFS, a safe refuge will be incorporated into the accommodation facility. Spark Renewables met with representatives from Argoon Fire Brigade in May and July 2024 to discuss their concerns around bushfire risk from the project. Spark Renewables have incorporated feedback from these meetings into the amended bushfire assessment report, including additional mitigation measures to address bushfire risk (Appendix D.7).
NSW Department of Primary Industries (DPI) – Agriculture	Spark Renewables met with DPI Agriculture in April 2024 to discuss the project and outcomes of the land and rehabilitation assessment. Spark Renewables addressed questions from DPI Agriculture on the extent of earthworks proposed as part of the project, opportunities for agrivoltaics, potential impacts on irrigation infrastructure and biosecurity management.
Transport for NSW (TfNSW)	Spark Renewables met with TfNSW in March 2024 to discuss the project and TfNSW's submission on the EIS. In addition to clarification of matters raised during review of the TIA, design requirements for the new site access intersection off Kidman Way and the proposed upgrades for the intersection of Kidman Way/Bundure Road/Liddles Lane were discussed. Strategic concept designs for road upgrades are provided in Appendix D.5.

5.3 Voluntary planning agreement

Spark Renewables is committed to delivering a project that provides a positive legacy for the local community. Since the exhibition of the EIS, Spark Renewables and Murrumbidgee Council have agreed on a community benefit sharing program that is predominantly delivered in partnership with the council through a VPA. The key terms of the community benefit sharing program and VPA which have been agreed with Murrumbidgee Council are:

1. Spark Renewables will provide funding for benefit sharing initiatives associated with Dinawan Solar Farm.
2. The total fund amount (TFA) will be an annual payment of \$850 per megawatt (MW) of capacity based on Dinawan Solar Farm's maximum export capacity. This may vary depending on construction/operational status within the 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 allocated as follows:
 - a) 70% of the funding (\$595 per MW) will be provided for projects identified in Council's approved Development Contributions Plan or Community Strategic Plan.
 - b) 15% of the funding (\$127.50 per MW) will go to a Community Benefit Fund to be administered by a committee of 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 (\$127.50 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.
6. The Community Benefit Fund will:
 - a) be administered by a committee of Council, which will include representatives from the local community, Spark Renewables (or the project owner) and 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.

6 Assessment of impacts

A summary of the potential impacts of the amended project is provided in this chapter. Technical assessments have been amended for biodiversity, Aboriginal heritage, traffic and bushfire are provided in Appendix D. Technical memos have also been provided for visual, noise, water and hazards in Appendix D. Where outcomes of technical assessments prepared for the EIS have not been substantially altered by the amendment, this has been noted.

6.1 Biodiversity

A biodiversity development assessment report (BDAR) was prepared by Biosis for the EIS in accordance the NSW *Biodiversity Conservation Act 2016* (BC Act), the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity assessment method* (DPIE 2020b) (BAM), provided in Appendix E.1 of the EIS.

The amendments to the project have reduced the extent of the development footprint. An amended BDAR has been prepared by Biosis and is provided in Appendix D.1 of this report. The amended BDAR provides a complete and updated assessment of the amended project in accordance with the relevant legislative requirements and guidelines and addresses issues raised in submissions from NSW Department of Climate Change, Energy, the Environment and Water – Biodiversity and Conservation Science Group (BCS) and the public.

The term ‘subject land’ is used in this section, consistent with the amended BDAR and BAM. The subject land for the amended project is approximately 3,395 ha and includes the amended development footprint that will be directly impacted by the project, and additional areas where indirect and prescribed impacts have been assessed in accordance with the BAM (DPIE 2020b).

6.1.1 Existing environment

i Landscape context

The landscape context of the subject land remains the same. 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 due to agricultural land use. This land use has contributed to historical overstorey removal and livestock grazing, resulting in large areas of remnant derived native grasslands (DNG), 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 hold water for longer, creating scattered swamp or wetland environments within the subject land. The Coleambally Irrigation Channel is a perennial channel; however, the aquatic habitat that it provides is in low condition with limited vegetation present. Ephemeral first and second order tributaries of Delta Creek provide transient aquatic habitat corridors across the subject land during more optimal environmental conditions, such as significant rainfall and flooding events.

There is approximately 32 ha of Category 1 exempt land within the subject land, which is associated with Coleambally Irrigation Channel and former quarry/borrow pits.

The subject land does not contain areas identified as having outstanding biodiversity value, or significant geographical features such as karst, caves, crevices and cliffs.

ii Native vegetation

Approximately 8,513 ha of native vegetation occurs within a 1,500 m buffer of the subject land. The percentage native vegetation cover within the subject land and buffer area is approximately 90%. A total of 3,362.93 ha of native vegetation is within the subject land.

a Plant community types

Vegetation zones have been used to identify the different condition states of plant community types (PCTs) within the subject land. Six PCTs in varying condition have been identified within the subject land, summarised in Table 6.1 and shown in Figure 6.1. The amendments have reduced the extent of all PCTs within the amended development footprint.

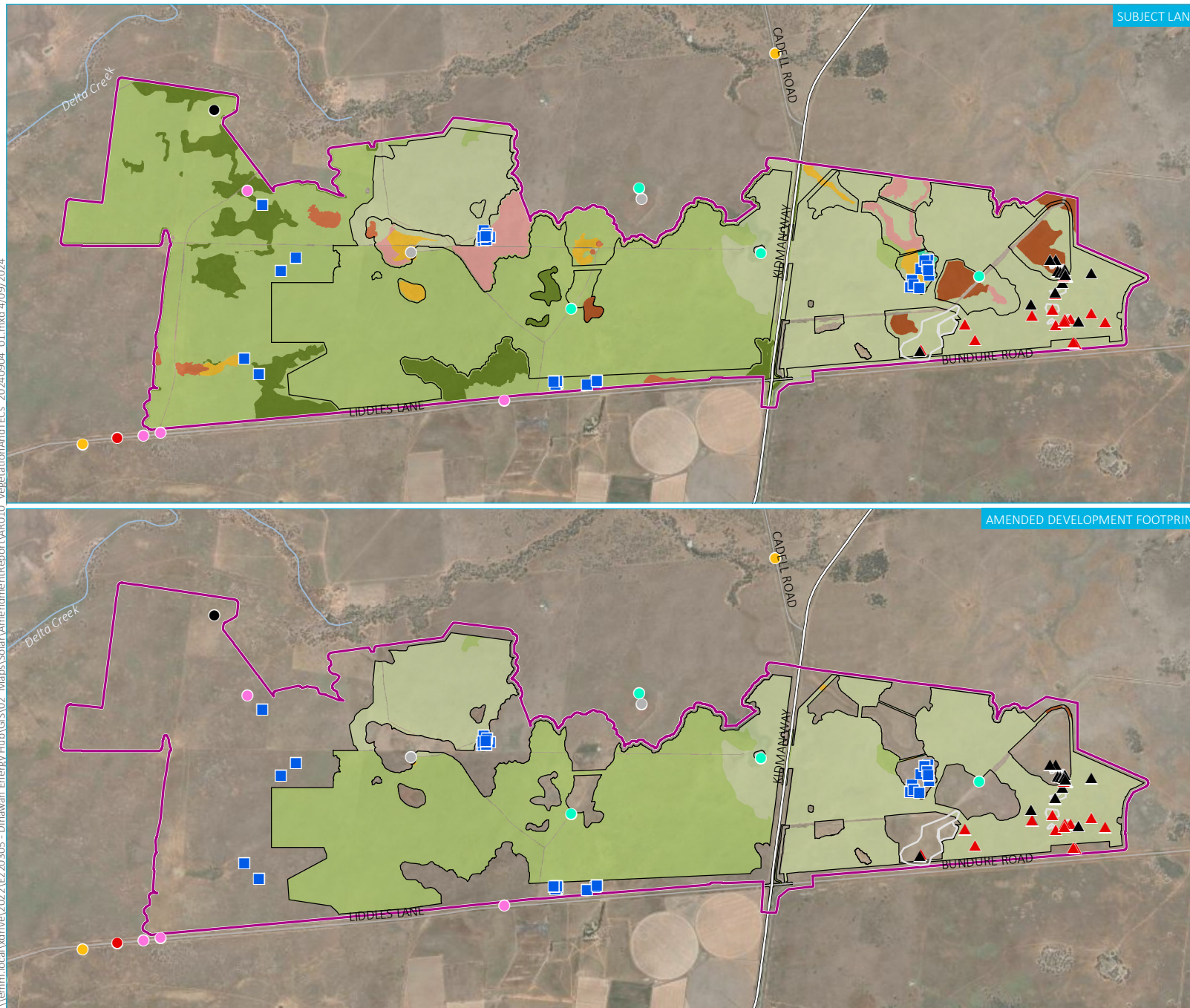
Detailed descriptions of each PCT are provided in Section 3.1.7 of the Amended BDAR (Appendix D.1).

Table 6.1 Vegetation zones within the subject land

Plant community type	Condition	Subject land (ha)	EIS development footprint (ha)	Amended development footprint (ha)	Reduction (%)	Vegetation integrity (VI) score
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	8.14	0.16	0.12	25	70.8
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	1.04	0.77	0	100	58.2
	Moderate good	1.43	0.17	0.16	6	70
PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate	21.30	6.16	0.08	99	41
	Moderate good	42.79	2.96	1.06	64	77.3
PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Intact	248.51	20.15	0.42	98	48.4
	DNG	1,110.59	884.33	860.04	3	27.4
	Sparse canopy	1,775.03	1,550.83	919.19	41	33.4
PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate good	86.55	5.20	0.05	99	91.1
PCT 46 Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam grass the Hay Plain, Riverina Bioregion	Moderate	67.55	6.30	1.68	73	88.6

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

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SUBJECT LAND

KEY

- Subject land
- Amended development footprint
- Hollow bearing trees
- Threatened species - Fauna
 - Black Falcon
 - Dusky Woodswallow
 - Grey-crowned Babbler
 - Southern Bell Frog
 - Southern Whiteface
 - Spotted Harrier
 - Superb Parrot
 - White-fronted Chat
- Threatened species - Flora
 - ▲ Slender Darling Pea
 - ▲ Silky Swainsona-pea
 - Patches of Slender Darling Pea & Silky Swainsona-pea
- Vegetation zone
 - PCT 13 (Moderate)
 - PCT 15 (Moderate)
 - PCT 15 (Moderate Good)
 - PCT 17 (Moderate)
 - PCT 17 (Moderate Good)
 - PCT 26 (Intact)
 - PCT 26 (DNG)
 - PCT 26 (Sparse Canopy)
 - PCT 45 (Moderate)
 - PCT 46 (Moderate)
- Existing environment
 - Watercourse (third order and higher)
 - Major road
 - Minor road

Vegetation and threatened species
within the subject land and
amended development footprint

Dinawan Solar Farm
Amendment Report
Figure 6.1

The majority of native vegetation within the subject land (93%) and amended development footprint (99%) aligns with PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion and occurs in three condition states:

- intact (Photograph 6.1)
- DNG (Photograph 6.2)
- sparse canopy (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 canopy) within the subject land**

b Threatened ecological communities

Vegetation within the subject land aligns with two TECs listed under the Commonwealth EPBC Act and one TEC listed under the NSW BC Act, as summarised in Table 6.2 and shown on Figure 6.2. The amendments have reduced the extent of all TECs within the amended development footprint. Further descriptions of these TECs are provided in Section 3.1.8 of the Amended BDAR (Appendix D.1).

Table 6.2 Threatened ecological communities within the subject land

Threatened ecological community	Listing status	Alignment with PCTs within the subject land	Subject land (ha)	EIS development footprint (ha)	Amended development footprint (ha)
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, 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. All 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.	2,024	1,571	919.62
Weeping Myall Woodlands	Endangered (EPBC Act)	All intact patches of PCT 26 and select sparse patches of PCT 26 (approximately 4%) were determined to meet the criteria for this TEC.	387.45	137.30	0.48
Natural Grasslands of the Murray Valley Plains	Critically Endangered (EPBC Act)	As a precautionary measure, all PCT 45 and PCT 46 were determined to meet the criteria for this TEC.	154.11	11.50	1.73

iii Threatened species

a Ecosystem credit species

The amendments have not altered the ecosystem credit species predicted to occur within the subject land. Of the 34 species predicted to occur, 10 were recorded during field surveys within or in proximity to the subject land:

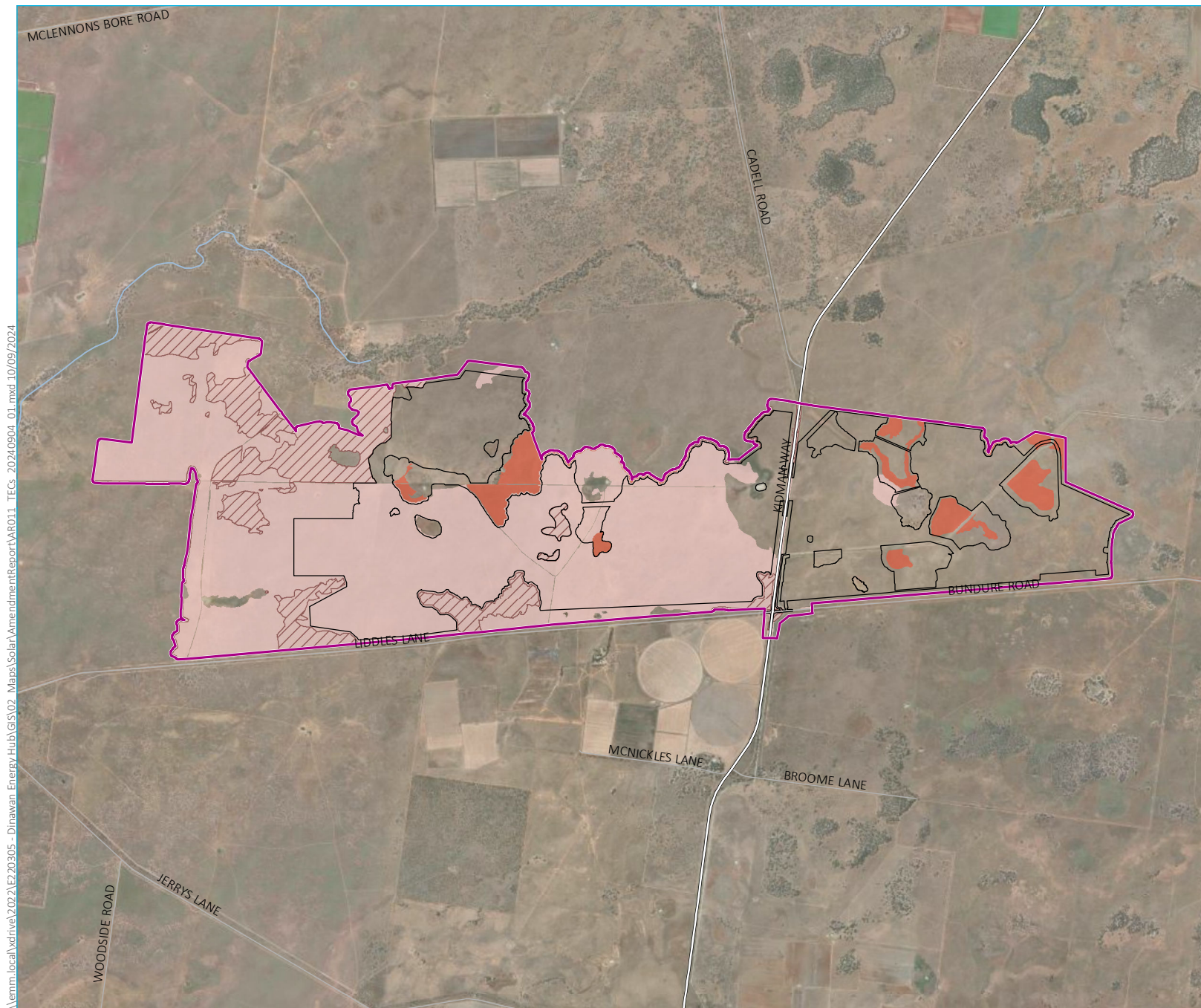
- Black Falcon (*Falco subniger*) – listed as ‘vulnerable’ under the BC Act
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) – listed as ‘vulnerable’ under the BC Act
- Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) – listed as ‘vulnerable’ under the BC Act
- Painted Honeyeater (*Grantiella picta*) – listed as ‘vulnerable’ under the BC Act and EPBC Act
- 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 are 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.

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 to occur within the subject land are listed in Table 6.3. 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 Appendix D.1. Survey outcomes for A spear-grass (*Austrostipa wakoolica*) and Austral Pillwort (*Pilularia novae-hollandiae*) have been updated from ‘assumed present’ to ‘not recorded’ due to further targeted survey (refer to Table 25 of Appendix D.1).



- KEY**
- Subject land
 - Amended development footprint
 - Threatened ecological communities
 - Natural Grasslands (EPBC Act)
 - Myall Woodland (BC Act)
 - Weeping Myall Woodland (EPBC Act)
 - Existing environment
 - Major road
 - Minor road
 - Watercourse (third order and higher)

Threatened ecological communities
within the subject land

Dinawan Solar Farm
Amendment Report
Figure 6.2

Table 6.3 Species credit species with potential to occur within the subject land

Name	Listing	Survey outcome	Potential for impact	Species polygon required ¹
Silky Swainsona-pea (<i>Swainsona sericea</i>)	Vulnerable – BC Act	Recorded during targeted survey (Figure 6.1)	High	Yes – refer Figure 11 of Appendix D.1
Slender Darling Pea (<i>Swainsona murrayana</i>)	Vulnerable – BC Act and EPBC Act	Recorded during targeted survey (Figure 6.1)	High	Yes – refer Figure 11 of Appendix D.1
A spear-grass (<i>Austrostipa wakoolica</i>)	Endangered – BC Act and EPBC Act	Not recorded	Low	Not required
Austral Pillwort (<i>Pilularia novae-hollandiae</i>)	Endangered – BC Act	Not recorded	Low	Not required
Plains Wanderer	Endangered – BC Act; critically endangered – EPBC Act	Not recorded	Medium	Not required
Southern Bell Frog (<i>Litoria raniformis</i>)	Endangered – BC Act; vulnerable – EPBC Act	Recorded during targeted survey (Figure 6.1)	High	Yes – refer Figure 11 of Appendix D.1
Chariot Wheels (<i>Maireana cheelii</i>)	Vulnerable – BC Act and EPBC Act	Not recorded	Low	Not required
Claypan Daisy (<i>Brachyscome muelleroides</i>)	Vulnerable – BC Act and EPBC Act	Not recorded	Low	Not required
Mossgiel Daisy (<i>Brachyscome papillosa</i>)	Vulnerable – BC Act and EPBC Act	Not recorded	Low	Not required
Bindweed (<i>Convolvulus tedmoorei</i>)	Endangered – BC Act	Not recorded	Low	Not required
Lanky Buttons (<i>Leptorhynchos orientalis</i>)	Endangered – BC Act	Not recorded	Medium	Not required
Red Darling Pea (<i>Swainsona plagiotropis</i>)	Vulnerable – BC Act and EPBC Act	Not recorded	Low	Not required
Turnip Copperburr (<i>Sclerolaena napiformis</i>)	Endangered – BC Act and EPBC Act	Not recorded	Low	Not required
Winged Peppercress (<i>Lepidium monoplacoides</i>)	Endangered – BC Act and EPBC Act	Not recorded	Low	Not required
Yellow Gum (<i>Eucalyptus leucoxylon</i> subsp. <i>Pruinosa</i>)	Vulnerable – BC Act	Not recorded	Low	Not required
Australian Bustard (<i>Ardeotis australis</i>)	Endangered – BC Act	Not recorded	Low	Not required
Latham's Snipe (<i>Gallinago hardwickii</i>)	Migratory – EPBC Act	Not recorded	Low	Not required

Table 6.3 Species credit species with potential to occur within the subject land

Name	Listing	Survey outcome	Potential for impact	Species polygon required ¹
Painted Honeyeater	Vulnerable – BC Act and EPBC Act	Recorded during incidental survey	High	Not required
Little Eagle (<i>Hieraaetus morphnoides</i>)	Vulnerable – BC Act	Not recorded	Medium	Not required
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Vulnerable – EPBC Act	Not recorded	Negligible	Not required
Major Mitchell's Cockatoo (<i>Lophochroa leadbeateri</i>)	Vulnerable – BC Act and EPBC Act	Not recorded	Low	Not required
Square-tailed Kite (<i>Lophoictinia isura</i>)	Vulnerable – BC Act	Not recorded	Medium	Not required
Rainbow Bee-eater (<i>Merops ornatus</i>)	Migratory – EPBC Act	Not recorded	High	Not required
Barking Owl (<i>Ninox connivens</i>)	Vulnerable – BC Act	Not recorded	Low	Not required
Superb Parrot	Vulnerable – BC Act and EPBC Act	Recorded during incidental survey (Figure 6.1)	High	Not required
Masked Owl (<i>Tyto novaehollandiae</i>)	Vulnerable – BC Act	Not recorded	Medium	Not required
Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>)	Vulnerable – BC Act and EPBC Act	Not recorded	Low	Not required

Notes: 1. Polygon attributes are defined in Table 36 of Appendix D.1.

6.1.2 Avoidance and minimisation through design

As described in the EIS, a key constraint considered during the site selection and design refinement process has been avoidance and minimisation of impacts on biodiversity.

Due to the extent of native vegetation within the broader region, South West REZ and subject land, complete avoidance of impacts wasn't possible. Although impacts to native vegetation, threatened species habitat and TECs will occur, project refinements, including the amendments, have avoided or minimised impacts to the areas with the highest biodiversity values. Key avoidance and minimisation of measures include:

- avoidance of impacts to the majority of PCT 26 (intact), which has the highest vegetation integrity score and is an EPBC Act listed TEC
- avoidance of impacts to the majority of PCT 45 and PCT 46, which have high vegetation integrity scores and are more likely to support Plains Wanderer habitat
- avoidance of direct impacts to important mapped habitat areas for the Plains Wanderer (refer Figure 2.3)
- avoidance of impacts to the majority of PCT 13 and PCT 15 where higher fauna activity was observed, with impacts in these PCTs restricted to smaller isolated patches of low condition woody vegetation
- avoidance of approximately 97% of hollow-bearing trees recorded within the subject land, with 38 trees retained within larger patches of PCT 13 and PCT 15, including those with active hollows and large nests (refer Figure 6.1)
- avoidance and minimisation of impacts to large patches of Silky Swainsona-pea and Slender Darling Pea (refer Figure 6.1).

A summary of avoidance of impacts to vegetation zones within the development footprint is provided in Table 6.4.

Table 6.4 Avoidance of impacts to vegetation zones

Vegetation zone	EIS development footprint (ha)	Amended development footprint (ha)	Area avoided by amendments (ha)	Percentage reduction of direct impacts
PCT 13 (moderate)	0.16	0.12	0.04	25%
PCT 15 (moderate)	0.77	0	0.77	100%
PCT 15 (moderate good)	0.17	0.16	0.01	6%
PCT 17 (moderate)	6.16	0.08	6.08	99%
PCT 17 (moderate good)	2.96	1.06	1.9	64%
PCT 26 (intact)	20.15	0.42	19.73	98%
PCT 26 (DNG)	884.33	860.04	24.29	3%
PCT 26 (sparse canopy)	1,550.83	919.19	631.64	41%
PCT 45 (moderate good)	5.20	0.05	5.15	99%
PCT 46 (moderate)	6.30	1.68	4.62	73%

As outlined in the EIS, with the exception of the Coleambally Irrigation Area (a significant network of irrigated farming north-west of the project) and areas of modified agricultural land, 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. The prevalence of native vegetation in this region is due to land use practices and patterns of agricultural development implemented, which are dominated by grazing. Where grazing is implemented, native vegetation persists in variable condition states.

It is not possible to develop a viable large-scale solar farm within the region/REZ without some impacts to native vegetation. Locally, the extent of native vegetation in the project area 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. Instead land previously disturbed by low intensity agriculture, which contains DNG and lower condition vegetation, has been retained in the development footprint to the extent possible.

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 directly adjoining 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, should a location further from the substation have been selected. The project area is, on balance, considered to be in an optimal location.

Avoidance and minimisation of impacts through the refinement process is demonstrated through:

- selection of the investigation area (Figure 2.2) proximate to the Dinawan Substation, which was informed by an initial biodiversity constraints mapping exercise which prioritised avoidance of the critically endangered Natural Grasslands of the Murray Valley Plains
- iterative refinements to the study area, which were informed by extensive field surveys to better understand vegetation integrity and alignment with TECs (Figure 2.2)
- the irregular shape of the development footprint, which is not economically optimal for development, but has sought to avoid direct impacts to TECs (with particular focus on woody vegetation and highest quality grasslands) to the extent practicable (Figure 6.2).

6.1.3 Potential impacts

i Direct impacts

The project's direct impacts on biodiversity within the amended development footprint and associated credit requirements are listed in Table 6.5. The amendments and further survey have reduced the total ecosystem credit requirements from 40,229 to 20,985 and the total species credit requirements from 14,462 to 1,799. This has included:

- exclusion of PCT 15 (moderate) from the development footprint
- further targeted survey for two threatened species, *Austrostipa wakoolica* (Spear Grass) and *Pilularia novae-hollandiae* (Austral Pillwort) (assumed present in EIS, but not detected during additional targeted survey)
- removal of important mapped habitat for Plains Wanderer from the development footprint.

Additionally, the project will further reduce biodiversity impacts through the retention of native groundcover within the solar array areas. The project will take the following steps to further minimise impacts to native ground cover within PCT 26:

- adoption of practical construction methods to minimise removal of native groundcover
- a monitoring program post construction to confirm that vegetation integrity predictions are met
- a groundcover management plan that details actions that will be taken to maintain integrity of native groundcover within the solar array areas.

A reduced credit requirement has been calculated for impacts to PCT 26 (DNG) and PCT 26 (sparse canopy), reflecting a portion of this PCT as subject to a partial loss of biodiversity values within the solar array areas of the development footprint. This is described in Section 6.4 of the amended BDAR (Appendix D.1). This approach is reflective of the potential for the solar arrays to continue to support biodiversity values as a result of the retention of native groundcover below and between rows of PV modules, and incentivises the retention of native vegetation groundcover within the solar array areas. The proportions of the solar array areas nominated for complete loss versus partial loss for areas of PCT 26 (DNG) and PCT 26 (sparse canopy) are:

- complete loss: 40% (direct impacts)
- partial loss: 60% (indirect impacts).

The total offset requirements are presented in Table 6.5.

Table 6.5 Direct and indirect impacts and offsets required

Vegetation zone/species	Type of impact	Area of impact (ha)	Credit requirement
PCT 13 (moderate)	Direct	0.12	4
PCT 15 (moderate good)	Direct	0.16	5
PCT 17 (moderate)	Direct	0.08	1
PCT 17 (moderate good)	Direct	1.06	36
PCT 26 (intact)	Direct	0.42	10
PCT 26 (DNG)	Direct – complete loss (40%)	381.44	4,784
	Indirect – partial loss (60%)	478.6	3,692
PCT 26 (sparse canopy)	Direct – complete loss (40%)	386.09	6,271
	Indirect – partial loss (60%)	533.10	6,086
PCT 45 (moderate good)	Direct	0.05	3
PCT 46 (moderate)	Direct	1.68	93
Total ecosystem credits			20,985
Slender Darling Pea	Direct	5.5	76
Silky Swainsona-pea	Direct	5.5	76

Table 6.5 **Direct and indirect impacts and offsets required**

Vegetation zone/species	Type of impact	Area of impact (ha)	Credit requirement
Southern Bell Frog	Direct/prescribed	122.16	1,647
Total species credits			1,799

Measures that will be implemented to promote the retention of native groundcover will be developed within a groundcover management plan (a component of the biodiversity management plan) following detailed design and contractor/infrastructure procurement. Adoption of practical construction methods to minimise removal of native groundcover will be a key feature. The Groundcover Management Plan will be developed in consultation with BCS and will include an adaptive management framework, including specific targets and triggers to ensure intervention would occur if the areas nominated as partial loss fall below specific key indicators during ongoing management. A draft partial loss monitoring and adaptive management plan is provided in Table 56 of Appendix D.1, which has been developed with reference to the BAM and the NSW Biodiversity Conservation Trust's *Ecological Management Module* (BCT 2022). It includes measures that will promote the successful retention of biodiversity values within the solar arrays during construction, operation and decommissioning, and will be further developed in the preparation of the project's groundcover management plan.

Of the 39 hollow-bearing trees recorded within the subject land, the project will result in the loss of one hollow-bearing tree, which contains medium and large hollows. The amendments have further avoided impacts to 14 hollow-bearing trees.

The amended project will have a direct impact on 919.62 ha of a BC Act listed TEC (41% reduction) and 2.21 ha of EPBC Act listed TECs (99% reduction):

- 919.62 ha of Weeping Myall Woodland TEC listed under the BC Act (i.e. areas mapped as PCT 26 (sparse) and PCT 26 (intact))
- 0.48 ha of 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))
- 1.73 ha of the Natural Grasslands of the Murray Valley TEC listed under the EPBC Act (i.e. areas identified as PCT 45 and PCT 46).

The amended project will impact the following areas containing species credit habitat or individuals:

- 5.5 ha containing individuals of Slender Darling Pea and Silky Swainsona-pea.
- 122.16 ha of dispersal habitat for Southern Bell Frog.

ii Indirect impacts

Indirect impacts on biodiversity may occur in areas outside the development footprint, but within the subject land. Potential indirect impacts arising from the project are detailed in Table 44 of Appendix D.1 and are unchanged by the amendment.

iii Prescribed impacts

Prescribed impacts are additional biodiversity impacts identified under clause 6.1 of the NSW Biodiversity Conservation Regulation 2017 and listed in the BAM. Prescribed impacts relevant to the project are discussed in detail in Section 6.3 of Appendix D.1 and are unchanged by the amendment.

iv Serious and irreversible impacts

An impact is to be regarded as serious and irreversible (SAII) 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 are considered to meet these principles, Plains Wanderer, Austral Pillwort, Claypan Daisy and Bindweed, however the amendments and further survey have determined that the project will not impact Austral Pillwort, Claypan Daisy and Bindweed. A detailed SAI assessment for Plains Wanderer is provided in Appendix 5 of Appendix D.1 and a summary is provided in Table 6.6.

Table 6.6 Summary of serious and irreversible impacts

Species	Summary of assessment
Plains Wanderer	As part of site selection and project refinement, a key consideration has been the avoidance of impacts to Plains Wanderer habitat including complete avoidance of areas of mapped important habitat. Approximately 0.9 ha of the development footprint is within a 100-m buffer of mapped important habitat; however, this section of the development footprint is separated from the mapped important habitat area by Coleambally Irrigation Channel. Project fencing will align with the southern and western portions of the important mapped habitat buffer. The portion of the development footprint north of the buffer area is for vehicle access only, following an existing access track and bridge that crosses the Coleambally Irrigation Channel. 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 within the development footprint as far as practicable. Targeted surveys did not detect this species within the subject land. Indirect impacts associated with disruption or abiotic process, the loss of functionally important species, and/or exacerbation of fragmentation and isolation are considered unlikely to be substantial as a result of the project. Potential indirect impacts will be managed through the implementation of the BMP.

v Matters of National Environmental Significance

A summary of the MNES identified by DCCEEW in the SEARs as being likely to be significantly impacted or possibly at risk is provided in Table 6.7. The amendments have reduced impacts to Weeping Myall woodlands and Natural Grasslands of the Murray Valley Plains.

Appendix 6 of Appendix D.1 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 6.7 EPBC Act listed threatened species and ecological communities identified in DCCEEW's assessment requirements

Threatened species or ecological community	Assessment summary
Weeping Myall woodlands	Potential for significant impact Weeping Myall woodlands is the dominant vegetation community within the development footprint and broader region, occurring in different conditions zones including intact, sparse canopy and DNG. The majority of high condition or intact Weeping Myall woodland has been avoided by the amended development footprint, with the removal of approximately 0.48 ha (reduced from 137 ha in the EIS) of vegetation known or likely to meet the criteria for this TEC (Figure 6.2). However, as this community as a whole is subject to the largest impact from the project, it is still considered there would be a reduced area of occupancy for other areas within the sparse zone to meet the criteria in the future, even with existing land management practices, and in conjunction with cumulative impacts within the region, there is potential for significant impacts on the TEC.

Table 6.7 EPBC Act listed threatened species and ecological communities identified in DCCEEW's assessment requirements

Threatened species or ecological community	Assessment summary
Slender Darling Pea	Potential for significant impact This species has been identified during targeted surveys with all records and suitable habitat found east of Kidman Way and south of the Coleambally Irrigation Channel (Figure 6.1). Approximately 2,000 individuals were recorded and 30 ha of optimal habitat identified. The development footprint has been refined to avoid and minimise impacts to large patches of this species to ensure a viable local population can be maintained. There is still potential for the project to significantly impact this species as a result of direct impacts to approximately 5.5 ha of suitable habitat that is known to host isolated individuals and small patches. This represents approximately 18% of the local population recorded within the subject land. Potential indirect impacts will be managed through the implementation of the BMP, which will include pre-clearance surveys, adaptive management and unexpected finds procedures.
Plains Wanderer	Significant impact possible due to reduced occupancy Avoidance of suitable habitat and mapped important areas (including additional buffers) has been a key consideration during site selection and project refinement. Approximately 0.94 ha of potential habitat that falls within a 100-m buffer of the mapped important habitat will be impacted by the project, as well as isolated patches and fringing areas of PCT 46, which may provide habitat in the future due to the dynamic nature of grassland communities in the Riverina. Direct impacts equate to approximately 0.01% of the total available habitat within 10 km of the subject land and 0.001% of total available habitat within 50 km of the subject land. Plains Wanderer has not been identified as part of targeted surveys (which included nocturnal transects and acoustic detection) within the subject land. The presence of woodland and scattered trees is likely to reduce the extent of possible habitat for this species as it tends to avoid wooded areas, but open areas of native grassland (natural and derived) may support this species at some time, due to the dynamic nature of the Riverina natural and derived grasslands systems.
Natural Grasslands of the Murray Valley Plains	Significant impact unlikely Impacts to known areas of this TEC have been avoided and restricted to 1.73 ha (reduced from 11.5 ha in the EIS) of small, isolated patches or fringing areas of larger more connected patches (Figure 6.2). Potential areas of vegetation commensurate with this TEC within 50 km of the subject land encompass approximately 103,912 ha, whilst it is estimated that approximately 61,000 ha remains within the Riverina region. The removal of 1.73 ha of this TEC equates to <0.1% of the expected extent of this TEC within the Riverina region. It is therefore unlikely that significant impacts will occur to this TEC as a result of the project.
Southern Bell Frog	Significant impact unlikely This species has been recorded within the subject land during targeted surveys. Records occurred following above average rainfall and flooding conditions that likely washed individuals from a stronghold area in the Coleambally Irrigation Area (Figure 6.3) or via flooding events in Delta Creek and Coleambally Irrigation Channel. 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 to areas around Coleambally Irrigation Channel 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 therefore unlikely that significant impacts will occur to this species as a result of the project.
A spear-grass	Significant impact unlikely Targeted surveys for this species have been completed and it has not been identified within the subject land. Most likely habitat for this species has been avoided as much as possible. 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 therefore unlikely that significant impacts will occur to this species as a result of the project.

Table 6.7 EPBC Act listed threatened species and ecological communities identified in DCCEE's assessment requirements

Threatened species or ecological community	Assessment summary
Claypan Daisy Winged Peppergrass Turnip Copperburr Chariot Wheels Red Darling Pea	Significant impact unlikely Targeted surveys for these species have been completed and they have not been identified within the subject land. It is therefore unlikely that significant impacts will occur to these species as a result of the project.
Eastern Major Mitchell's Cockatoo Hooded Robin (southeastern) (<i>Melanodryas cucullata cucullata</i>) Australasian Bittern (<i>Botaurus poiciloptilus</i>) Superb Parrot Southern Whiteface Painted Honeyeater Diamond Firetail (<i>Stagonopleura guttata</i>) Blue-winged Parrot (<i>Neophema chrysostoma</i>) Koala (<i>Phascolarctos cinereus</i>)	Significant impact unlikely Of these species, Superb Parrot, Southern Whiteface and Painted Honeyeater have been recorded opportunistically within or adjacent to the subject land (Figure 6.1). All other species 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, which will include pre-clearance surveys, adaptive management and unexpected finds procedures. It is therefore unlikely that significant impacts will occur to these species as a result of the project.

vi Aquatic species, populations and ecological communities

There is no predicted habitat for threatened aquatic species mapped on NSW Department of Primary Industries spatial data portal and no records of threatened aquatic species within 10 km of the subject land on the BioNet Atlas of NSW (refer Section 10.8 of Appendix D.1). As there is no key fish habitat mapped within 10 km of the subject land and waterways within the subject land do not support aquatic ecological communities, the project is unlikely to result in impacts to fish passage. This is unchanged by the amended project. Potential indirect impacts on aquatic species will be managed through the implementation of the BMP, which will include adaptive management and unexpected finds procedures.

6.1.4 Biodiversity offset strategy

There are three main options to offset 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 for offsetting the project specifically.

As outlined in the EIS, Spark Renewables has commenced investigations into the establishment of local biodiversity stewardship sites. Five properties with a total 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 assessment. Field investigations have confirmed the presence of nine different PCTs across the five properties, including four of the six PCTs that require offsetting as part of the project (refer Table 67 of Appendix D.1). Threatened species habitat has also been assessed and habitat has been recorded for species expected to require offsets as a result of the project. Further investigations will be undertaken during appropriate seasons to determine the presence of threatened species at the subject properties. The stewardship site investigations completed and resulting biodiversity credit estimates prepared demonstrate that the subject properties could satisfy the majority of offsets required for the project (refer Section 9.3 of Appendix D.1).

Management actions that would be required to be undertaken 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 the feasibility of establishing biodiversity stewardship sites during the assessment process.

Within the BDAR, the development footprint has been broken up into three areas (early works area, stage 1 and stage 2) to facilitate the staged retirement of the project’s biodiversity credit liability, should it be required (refer Section 9.4 of Appendix D.1). The amendments have consolidated offset staging from six to three areas. Prior to works commencing in each area, the biodiversity offset associated with that area will be secured. Spark Renewables will confirm the offset staging plan with DPHI prior to the commencement of construction.

6.1.5 Mitigation measures

The measures proposed to mitigate residual impacts to biodiversity are provided in Table 6.8, which have been amended to include additional detail to address advice from BCS. Mitigation measures include the development of a biodiversity management plan (BMP) to provide the framework for biodiversity management during the construction and operation of the project. New mitigation measures are shown in **bold**.

Table 6.8 Biodiversity mitigation measures

ID	Mitigation measure
B1	Detailed design of the project will: • avoid and minimise the loss of native vegetation and habitat (including the hollow-bearing tree and trees supporting nests) • avoid and minimise impacts to breeding habitat for fauna, including threatened species to the extent possible.

Table 6.8 **Biodiversity mitigation measures**

ID	Mitigation measure
B2	A BMP will be prepared by a qualified ecologist in consultation with BCS. The BMP will include: • a plan for adaptive management and implementing, evaluating and reporting on the effectiveness of all mitigation measures • figures showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features (particularly important mapped areas of Plains Wanderer), revegetation areas and retained tree hollows • pre-clearing survey requirements and clearing protocols (e.g. occupation surveys for 'no go' threatened flora areas, application of exclusion measures/deterrents prior to vegetation clearing/earthworks and works undertaken in presence of spotter/catcher) • procedures for dewatering of farm dams and construction within waterbodies • procedures for unexpected threatened species finds (including stop work requirements and strategies to minimise, mitigate and potentially offset unexpected impacts to threatened species) • procedures for monitoring of retained vegetation areas, including collection of plots prior to construction (if no baseline data is applicable) and at year 1, 3 and 5 post construction • procedures for fauna handling, monitoring and management, including identification and reporting of fauna mortalities • 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 operations – ongoing consultation with Local Land Services and relevant stakeholders on fox and other pest animal control and baiting programs • opportunities for nature positive measures to promote habitat clusters and connectivity within the development footprint • 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 the Coleambally Irrigation Channel given the confirmed presence of Southern Bell Frog within this feature. • performance targets, monitoring criteria, corrective actions, timing and responsibilities • annual reporting and consultation requirements.
B3	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 and allow for effective and quick responses.
B4	Noise during construction will be managed as part of the construction noise management plan.
B5	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.
B6	Remnant vegetation and fauna habitat within or surrounding the subject land but outside the development footprint will be managed toward a benchmark state using improve and maintain principles.

Table 6.8 **Biodiversity mitigation measures**

ID	Mitigation measure
B7	• A groundcover management plan will be prepared as part of the BMP and will: – include locations of baseline and control AM plots used for ongoing monitoring – list procedures to ensure that no more than 40% of the solar array areas within PCT 26 (sparse) and PCT 26 (DNG) are subject to complete loss of groundcover during construction – targeted weed management measures to control and prevent the spread of noxious weeds – describe the biannual (spring and summer) monitoring program to assess the condition of PCT26 within the solar array areas for the first three years following commencement of operations – list performance targets for PCT26 vegetation integrity within the solar array areas – include a trigger, action, response plan (TARP) that identifies steps to be taken in response to a deterioration in vegetation integrity of PCT26 within the solar array areas (including reference to adaptive management, such as adjustment of weed treatment, slashing regimes and direct seeding). The plan will be subject to an independent audit following the completion of three years of monitoring. If set targets are not achieved, the full credit liability will be required to be retired for the relevant zones (i.e. up to an additional 6,164 ecosystem credits).
B8	Suitable habitat for the relocation of Southern Bell Frog detected within the development footprint will be determined prior to clearing taking place.
B9	Perimeter fencing will include 'fauna friendly' components at select points (including egress points).
B10	Dust suppression will be undertaken as required.
B11	A vehicle strike protocol will be prepared and fauna species susceptible to vehicle strike will be included in project inductions to increase knowledge of on-site wildlife.

6.1.6 Conclusion

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

The iterative project design process, including the amendments, have avoided the highest quality PCTs and threatened species habitat within the subject land to the extent possible, resulting in the irregular shape of the development footprint. As part of the amendment, actions to further reduce the project's biodiversity impacts include:

- optimisation of the development footprint resulting in an overall reduction of 28%, from 2,499 ha to 1,792 ha
- prioritisation of further avoidance of higher value biodiversity TECs, resulting in a 41% reduction of impacts to a State listed TEC and a 99% reduction in impacts to two Commonwealth listed TECs
- targeted species surveys for certain threatened flora species which confirmed these species are not present
- retention of native groundcover within the solar array areas through further avoidance and minimisation of impacts to native groundcover within PCT 26.

The amended project has avoided impacts to:

- 694.2 ha of native vegetation requiring offsets (28% reduction), including:

- 651.4 ha of BC Act listed TEC (41% reduction)
- 146.6 ha of EPBC Act listed TEC (99% reduction)
- 210.1 ha of confirmed threatened species habitat requiring offsets (62% reduction)
- 14 hollow bearing trees (93% reduction).

Direct impacts to biodiversity will include removal of:

- 1,782.8 ha of native vegetation requiring offsets (approximately 99% of which is Weeping Myall woodland in various condition states), including:
 - 919.6 ha of BC Act listed TEC
 - 2.2 ha of EPBC Act listed TEC
- confirmed threatened species habitat requiring offsets, including:
 - 5.5 ha containing individuals of Slender Darling Pea and Silky Swainsona-pea.
 - 122.16 ha of dispersal habitat for Southern Bell Frog
- one hollow bearing tree.

Indirect impacts to biodiversity will be further mitigated through the implementation of a BMP.

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 one TEC, Weeping Myall woodland, and two threatened species, Slender Darling Pea and Plains Wanderer.

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 amended project requires 20,985 ecosystem credits (reduced from 40,229) to compensate for impacts to native PCTs and ecosystem credit species. The amended project also requires 1,799 species credits (reduced from 14,462) for impacts to threatened species.

6.2 Aboriginal cultural heritage

6.2.1 Introduction

An Aboriginal cultural heritage assessment (ACHA) was prepared for the EIS by EMM in accordance with the *Code of Practice for Archaeological Investigation in NSW* (DECCW 2010a), and informed by the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011) (Appendix E.2 of the EIS).

The amendments to the project have reduced the extent of the development footprint.

An amended ACHA has been prepared by EMM and is provided in Appendix D.2 of this report. The amended ACHA provides a complete and updated assessment of the amended project in accordance with the relevant legislation requirements and guidelines; and address issues raised in submissions from Heritage NSW.

6.2.2 Consultation

Consultation for the ACHA was conducted in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b), as documented in Section 6.2.1 of the EIS and Chapter 2 of the ACHA, consisting of the following stages:

- Stage 1 – Notification of project proposal and registration of interest:
 - six Aboriginal parties registered their interest in the project (referred to as registered Aboriginal parties (RAPs))
- Stage 2 – Presentation of information about the proposed project
- Stage 3 – Gathering information about cultural significance including:
 - five Aboriginal focus group meetings
 - participation in an 11-day field survey of the project area
 - participation in a 7-day archaeological test excavation program within the project area
- Stage 4 – Review of draft ACHA.

6.2.3 Existing environment

The environmental and Aboriginal cultural heritage context provided within Chapter 3 and Chapter 4 of the ACHA (Appendix E.2 of the EIS) remains accurate for the amended development footprint.

The results of the field investigations remain unchanged, comprising a total of 35 Aboriginal objects/sites identified within and adjacent to the project area.

6.2.4 Avoidance and minimisation through design

Areas of higher archaeological potential were identified during initial archaeological constraints modelling and avoided as part of preliminary project design, including higher order watercourses, the aeolian sand sheet and paleochannel (see Figure 6.4 of the EIS).

The refinement of the project's development footprint has been iterative and has been informed by the ACHA surveys and test excavation findings as they became available.

Project refinements during the preparation of the EIS resulted in the avoidance of impacts to 16 sites (including two sites considered of high cultural value) comprising six hearths, three hearths with artefacts, three artefact scatters, two isolated artefacts, one hearth with isolated artefacts, and the women's tree with an isolated artefact.

The amended development footprint avoids a further three sites of moderate significance, comprising two artefact scatters (DEHS-2023-AS3 and DEHS-2023-AS8) and one isolated find (DEHS-2023-IF3).

Of the 35 Aboriginal objects/sites identified within and adjacent to the project area, 27 sites will be avoided.

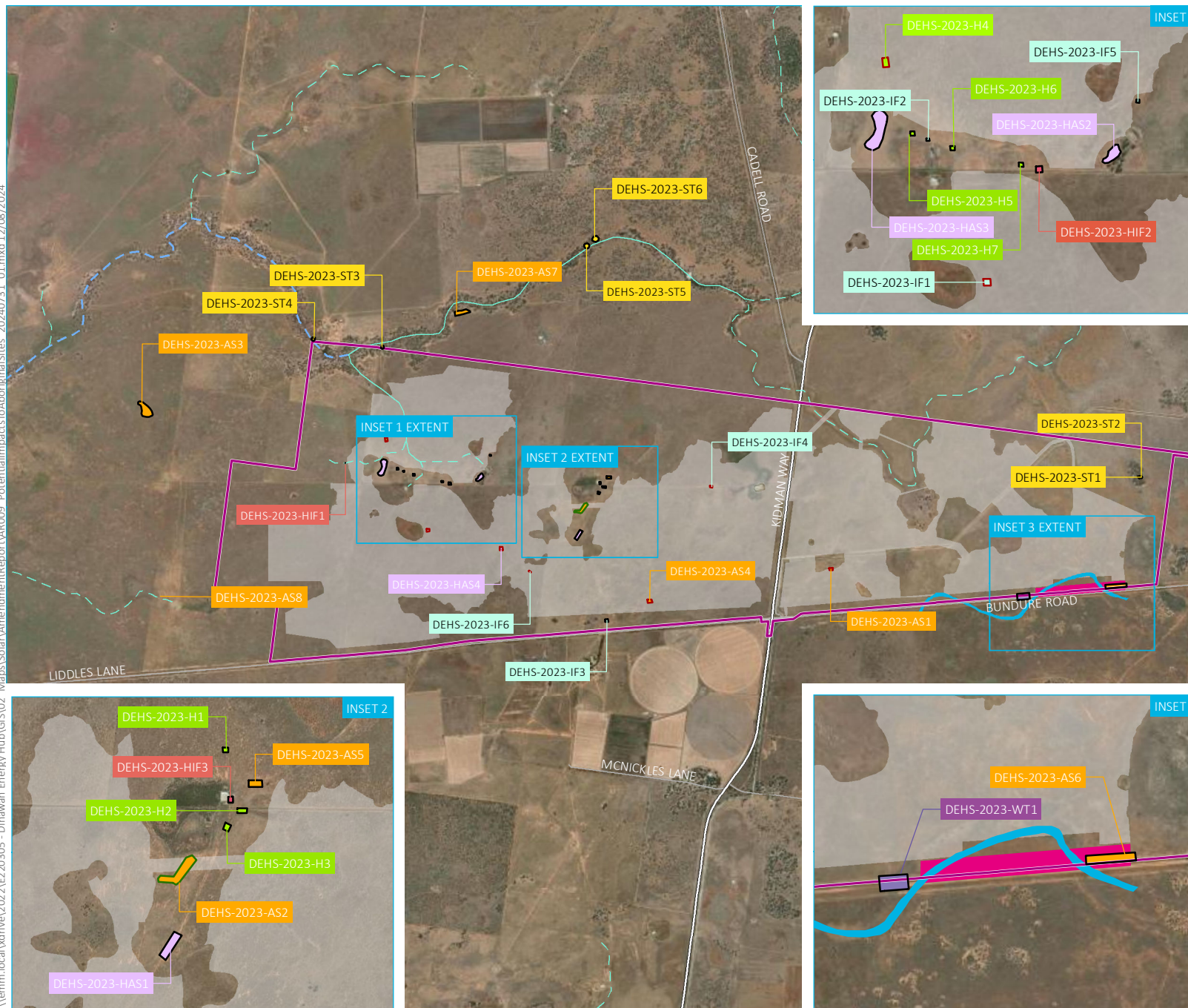
6.2.5 Potential impacts

A revised total of eight sites within the development footprint (see Figure 6.3) will be impacted by the project. The amended project has avoided impacts to a further three sites that were previously assessed as impacted, resulting in an overall reduction of impacts to Aboriginal cultural heritage values.

Of the eight sites impacted, one is considered of high cultural value. Potential impacts to the eight Aboriginal sites range from partial to complete loss of value, summarised in Table 6.9. It is noted that some sites require further investigation and/or validation, so their status is tentative.

While the project will result in intergenerational/cumulative loss to cultural materials, it is considered that there will be some cultural heritage benefits. These include the long-term curation of cultural material that may be submitted to future academic research and study; a greater understanding of the past and contemporary values in the region; and opportunities for heritage interpretation and public outreach. Measures to mitigate impacts are provided in Appendix C.

\\emm.local\drive\2022\E2 20305 - Dinawan Energy Hub\GIS\02 Maps\Solar\AmendmentReport\AR009 PotentialImpactsToAboriginalSites 20240731_01.mxd 12/08/2024



- KEY**
- Amended project area
 - Amended development footprint
- Field survey results**
- Artefact scatter
 - Culturally modified tree
 - Hearth
 - Hearth, artefact scatter
 - Hearth, isolated artefact
 - Isolated artefact
 - Women's tree, isolated artefact
- Potential impact**
- Direct impact
 - Direct impact (partial)
 - No impact
- Environmental features**
- Aeolian sand sheet
 - Paleochannel
- Strahler stream order**
- 1
 - 2
 - 3
- Existing environment**
- Major road
 - Minor road

Potential impacts to identified
Aboriginal sites

Dinawan Solar Farm
Amendment Report
Figure 6.3

Table 6.9 **Summary of potential impacts to Aboriginal objects and/or sites**

Site	AHIMS #	Site type	Status ¹	Significance	Avoided	Consequence of harm ²
DEHS-2023-AS1	55-1-0083	Artefact scatter	Valid	Moderate	No	Complete loss of value
DEHS-2023-AS2	55-1-0084	Artefact scatter	Valid	Moderate	No	Partial loss of value
DEHS-2023-AS3	55-1-0085	Artefact scatter	Partially destroyed	Moderate	Yes	Avoided – no impact
DEHS-2023-AS4	55-1-0086	Artefact scatter	Valid	Moderate	No	Complete loss of value
DEHS-2023-AS5	55-1-0096	Artefact scatter	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-AS6	55-1-0095	Artefact scatter	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-AS7	55-1-0094	Artefact scatter	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-AS8	55-1-0099	Artefact scatter	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-IF1	55-1-0082	Isolated find	Valid	Moderate	No	Complete loss of value
DEHS-2023-IF2	55-1-0080	Isolated find	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-IF3	55-1-0074	Isolated find	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-IF4	55-1-0075	Isolated find	Valid	Moderate	No	Complete loss of value
DEHS-2023-IF5	55-1-0073	Isolated find	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-IF6	55-1-0072	Isolated find	Valid	Moderate	No	Complete loss of value
DEHS-2023-H1	55-1-0093	Hearth	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-H2	55-1-0092	Hearth	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-H3	55-1-0091	Hearth	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-H4	55-1-0090	Hearth	Tentative	Moderate	No	Complete loss of value
DEHS-2023-H5	55-1-0089	Hearth	Partially destroyed	High	Yes	Avoided – no impact

Table 6.9 **Summary of potential impacts to Aboriginal objects and/or sites**

Site	AHIMS #	Site type	Status ¹	Significance	Avoided	Consequence of harm ²
DEHS-2023-H6	55-1-0088	Hearth	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-H7	55-1-0087	Hearth	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-HIF1	55-1-0102	Isolated find	Valid – the associated hearth was excavated and considered to be nonanthropogenic (natural) and this component of the site has been removed from the registration. The isolated stone artefact could not be relocated during the test excavations.	Low	Yes	Avoided – no impact
DEHS-2023-HIF2	55-1-0103	Hearth, isolated find	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-HIF3	55-1-0081	Hearth, isolated find	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-HAS1	55-1-0076	Hearth, artefact scatter	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-HAS2	55-1-0077	Hearth, artefact scatter	Tentative	High	Yes	Avoided – no impact
DEHS-2023-HAS3	55-1-0078	Hearth, artefact scatter	Valid	Moderate	Yes	Avoided – no impact
DEHS-2023-HAS4	55-1-0079	Hearth, artefact scatter	Valid	High	No	Complete loss of value
DEHS-2023-WT1	55-1-0101	Women's tree, isolated find	Tentative	High	Yes	Avoided – no impact
DEHS-2023-ST1	55-1-0069	Culturally modified tree	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-ST2	55-1-0070	Culturally modified tree	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-ST3	55-1-0071	Culturally modified tree	Tentative	Moderate	Yes	Avoided – no impact

Table 6.9 **Summary of potential impacts to Aboriginal objects and/or sites**

Site	AHIMS #	Site type	Status ¹	Significance	Avoided	Consequence of harm ²
DEHS-2023-ST4	55-1-0068	Culturally modified tree	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-ST5	55-1-0097	Culturally modified tree	Tentative	Moderate	Yes	Avoided – no impact
DEHS-2023-ST6	55-1-0098	Culturally modified tree	Tentative	Moderate	Yes	Avoided – no impact

Notes:

1. Sites requiring further investigation and/or validation have been given a 'tentative' status. The significance of these sites has been ranked based on the assumption that the site proves valid. However, their significance should be revisited when further analysis and classification occurs.
2. The consequence of harm definition is based on *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010).

6.2.6 Mitigation measures

The measures proposed in the EIS to mitigate residual impacts to cultural materials and values and to guide post-approval requirements for Aboriginal heritage remain relevant and unchanged for the amended project and are provided in Appendix C. These include the development of an Aboriginal Cultural Heritage Management Plan to provide the framework for Aboriginal heritage management during the construction and operation of the project.

6.2.7 Conclusion

Field surveys completed as part of the ACHA identified 35 previously unrecorded sites within the project area and surrounds. Of these, 27 will be avoided, including 16 avoided as part of project refinement during the EIS and three additional sites avoided by the amended project, with residual impacts to eight sites.

An Aboriginal Cultural Heritage Management Plan will be developed for the project in consultation with DPHI, RAPs and Heritage NSW. The Aboriginal Cultural Heritage Management Plan will detail the management of known Aboriginal sites and mitigation measures to further avoid impacts to Aboriginal heritage values in the project area, along with unanticipated finds procedures and training and reporting protocols.

6.3 Historical heritage

6.3.1 Overview

A statement of heritage impact was prepared for the EIS by EMM and is provided in Appendix E.3 of the EIS. The statement of heritage impact was prepared in accordance with the *NSW Heritage Manual* (NSW Heritage Office and NSW Department of Urban Affairs and Planning 1996) and documents archaeological potential, including built heritage items of historical heritage significance, and includes desktop and field investigations of the project area.

An extensive search of national, State and local heritage registers found there are no listed heritage sites within 5 km of the project area. A historical heritage survey of the project area conducted by EMM archaeologists in July 2023 identified one historical site (DEHS001) within the project area. The site is located outside of the development footprint and contains a scatter of artefacts containing glass and ceramic vessel fragments, scrap metal, sandstock bricks, cast iron and nails and draft horseshoes.

6.3.2 Potential impacts

The amendments to the project are not anticipated to alter impacts on historical heritage assessed in the original statement of heritage impact and EIS. Therefore, the findings of the statement of heritage impact remain applicable to the amended project.

As outlined in the statement of heritage impact, direct impacts to the historical site (DEHS001) will be avoided as it is situated outside of the development footprint. There remains potential for indirect impacts, however these can be managed through the implementation of mitigation measures. No additional risks to DEHS001 or any other known historical heritage sites will occur as a result of the amendments.

The construction of the project has the potential to cause impacts to unidentified relics that are related to the early colonial uses of the project area which may be present. The impacts of potential unexpected finds will be managed through the implementation of mitigation measures.

6.3.3 Mitigation measures

The amendments do not warrant additional mitigation or management measures in relation to historical heritage impacts. As such, the proposed measures remain unchanged from the EIS and are listed in full in Appendix C.

6.3.4 Conclusion

The amendments will not change the predicted impacts to historical heritage assessed in the original statement of heritage impact and EIS. There is one identified heritage site (DEHS001) adjacent to the development footprint. Indirect impacts to DEHS001 will be managed through the establishment of a no-go zone, and impacts arising from unexpected finds will be managed through the implementation of an unexpected finds protocol.

6.4 Land, soil and erosion

6.4.1 Overview

A land and rehabilitation assessment was prepared by EMM for the EIS in general accordance with the *Large-Scale Solar Energy Guideline* (DPE 2022b) (the Solar Guideline) and is provided in Appendix E.4 of the EIS.

The amendments to the project have reduced the extent of the development footprint. As the project activities are unchanged and the amended development footprint is generally within the EIS development footprint, no additional land needs to be investigated. An assessment of the reduced impacts to land, soil and agriculture is provided in this section.

6.4.2 Existing environment

i Land and soil capability

As part of the EIS, land and soil capability (LSC) ‘classes’ were identified for the development footprint to show the capacity of the land to sustain certain land use practices while minimising soil and land degradation. At a state-scale, the development footprint is mapped as per *The Australian Soil Classification* (ASC) (Isbell & NCST 2021) as LSC Class 4 (moderate–low capability land) and Class 6 (low capability land), with Jerilderie (jex) and Coleambally variant A (cloa) soil landscapes being the two dominant soil landscapes mapped in proximity to the project area. The soil survey found the LSC classes in the development footprint are generally consistent with regional mapping, with LSC Class 4, 5, and 6 present within the development footprint. The soil characteristics of the development footprint have not been materially changed by the amendments.

ii Agriculture

Land use in the development footprint is predominantly agricultural. The majority of the amended development footprint (99.4%) is mapped as Australian Land Use and Management (ALUM) classification 2.1.0 Grazing native vegetation, and is used for grazing sheep and cattle. The draft Stage Significant Agricultural Land (SSAL) map shows no mapped Biophysical Strategic Agricultural Land, Critical Industry Clusters or SSAL within the development footprint. There are areas mapped as SSAL adjacent to the project to the south and west, however these will not be impacted by the project.

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 (0.27% of the development footprint) presenting a high erosion hazard, primarily associated with the constructed irrigation channels present on-site.

6.4.3 Potential impacts

i Land and soil capability

As outlined in the EIS, 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.

The amendments have reduced the extent of the development footprint, therefore reducing the extent of soil disturbance for the project, as shown in Table 6.10.

Table 6.10 LSC impacts for the development footprint

Area	LSC class			Total
	4	5	6	
EIS development footprint (ha)	2,317	173	9	2,499
Amended development footprint (ha)	1,629	154	9	1,792
Reduction	30%	11%	0%	28%

Overall, the development footprint represents a very small portion of land within the South West REZ (less than 0.05%) that will be impacted for the project.

ii Agriculture

The land within the development footprint will be temporarily unavailable for the current land use of sheep and cattle grazing during construction. The amendments have reduced the area of land that will be unavailable for the current land use. The amended development footprint will remove approximately \$67,606–\$79,190 in annual agricultural productivity, based on estimates informed by landholder land use and productivity information.

Impacts to agricultural productivity during operations will be mitigated where practical by utilising the land within the development footprint for sheep enterprises (e.g. grazing), often referred to as ‘agrisolar’ practices. The estimated productivity of the amended development footprint when utilising agrisolar practices ranges from \$38,115–\$42,095 per annum, based on the NSW DPI (2019) *Gross Margin Budgets* and landholder stocking rates. This represents the maintenance of more than 50% of the land’s pre-development annual agricultural productivity.

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 Appendix C to manage impacts associated with weeds, pathogens and pest species.

iii Erosion and sedimentation

As outlined in the EIS, in the absence of appropriate 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.

These potential impacts are unchanged by the proposed amendments. Mitigation and management measures addressing these impacts are listed in Appendix C.

iv Land use

A land use conflict risk assessment (LUCRA) was prepared for the EIS using the *Land Use Conflict Risk Assessment Guideline* (DPI 2011) and is provided in Appendix E of the land and resources assessment (Appendix E.4 of the EIS). The amendment to the project has not changed the outcomes of the assessment.

The LUCRA 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. 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 Decommissioning and rehabilitation

At the end of the project life, the development footprint will be rehabilitated to a condition as near as practicable to the condition that existed prior to construction of the project, in consultation with the landowners. This process will not be impacted by the amendments.

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.

6.4.4 Mitigation measures

The amendments do not warrant additional mitigation or management measures in relation to land, soil and erosion impacts. As such, the proposed measures remain unchanged from the EIS and are listed in full in Appendix C.

6.4.5 Conclusion

The amendments to the development footprint have reduced the extent of land that will be directly impacted by the project, and as such the amended project is anticipated to reduce agriculture, soil and erosion-related impacts.

The significance of the removal of LSC Class 4, 5 and 6 land is minor, with the project removing less than 0.05% of 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 may also be mitigated by the utilisation of agrisolar practices. Residual impacts to agriculture as a result of the project are determined to be minor, temporary, and limited to the development footprint.

It is anticipated that by implementing effective land management procedures during construction and operation and implementing effective decommissioning and rehabilitation at the end of project life, the project will have no permanent negative impacts on agricultural resources or enterprises.

6.5 Landscape and visual (including glint and glare)

6.5.1 Introduction

A landscape and visual impact assessment (LVIA) was prepared by Moir Landscape Architecture for the EIS and is provided in Appendix E.5 of the EIS. The LVIA was prepared in accordance with methods outlined in the Solar Guideline (DPE 2022b) and the *Technical Supplement – Landscape and Visual Impact Assessment* (Technical Supplement) (DPE 2022c).

The amendments to the project have reduced the extent of the development footprint.

A technical letter has been prepared by Moir Landscape Architecture to assess the amended project against the outcomes of the LVIA and is provided in Appendix D.3 of this report.

The term 'study area' used in this section corresponds to an approximate 5 km radius around the development footprint, in accordance the Technical Supplement.

6.5.2 Existing environment

Features of the landscape context of the study area remain the same as the LVIA, consisting of the following:

- the topography is generally flat, with minor undulations across the project area
- vegetation is dominated by low shrublands and native grasslands
- vegetation has been cleared to support the agricultural activities leaving a landscape that is generally open, with patchy to dense vegetation located along creek lines, shallow depressions and associated with residences
- key waterways within the study area are Delta Creek and the Coleambally Irrigation Channel, with Yanco Creek located outside of the study area (6.5 km from the project area). Yanco Creek was identified by stakeholders as a key landscape feature during preliminary community consultation
- swamp and floodplain areas are characterised by gentle flat depressions covered with grasses and saltbush varieties, which generally remain dry through the year and carry surplus water from the watercourses during rainy periods
- roads within the study area are Kidman Way, which provides important transport connections in the area, Cadell Road, Bundure Road, Liddles Lane and Jerrys Lane which are low-use roads that provide access to farms and rural residences.

6.5.3 Potential impacts

i Landscape character assessment

In accordance with Solar Guideline, the study area was divided into different landscape character zones (LCZs) based on common distinguishing visual characteristics (Figure 6.8 of the EIS). The landscape character impacts from the project on each LCZ are provided in Table 6.13 of the EIS. As outlined in the EIS, the overall impact of the project on the landscape character of the region is expected to be low.

The amended project has reduced the overall development footprint, and has not altered impacts to the landscape character assessed in the LVIA.

ii Visual impact assessment

The visual impact assessment in Chapters 7–10 of the LVIA considers the day-to-day visual effects of the project on people's views. Visual impacts of PV modules were considered from the private domain (dwellings) and the public domain (roads), including preliminary assessment and a detailed viewpoint assessment in accordance with the Technical Supplement. Of the 13 viewpoints assessed in the preliminary assessment, five public viewpoints, all from the public road network (VP02, VP03, VP05a and VP05b, VP06 and VP11) and two private viewpoints (R049 and R036) required a detailed assessment (refer Figure 6.8 of the EIS). The detailed visual impact assessment found that the project is likely to have a low visual impact on all assessed viewpoints. This is due to existing vegetation screening at R036 and R049 and the low visual sensitivity of viewpoints from low-use public roads surrounding the development footprint.

Visual impacts of the other project infrastructure were also assessed. It is likely that temporary construction infrastructure (worker accommodation facility, construction compound, substation, BESS and switchyard), security fencing and overhead transmission lines are likely to be visible areas adjoining the development footprint due to lack of intervening elements. The appearance of other project infrastructure, for example O&M buildings, site access and laydown area, will be similar to existing farm structures within the landscape therefore the potential visual impacts are likely to be low.

The reduction in the development footprint has increased the setback distances of project infrastructure to the closest non-associated residences, R049 (656 m south) and R036 (6.7 km south-west). The increased setback distance is likely to reduce the visibility of the project from R049 and R036.

iii Glint and glare assessment

The glint and glare from the solar arrays and project infrastructure was assessed in Appendix D of the LVIA (Appendix E.5 of the EIS) in accordance with the Solar Guideline. Yellow glare is the potential for temporary after-image (i.e. similar to how flash from a camera may "stick" in one's vision temporarily). The yellow glare assessment found that there is no potential for yellow glare for non-associated residences, low potential for yellow glare for Cadell Road and Kidman Way, moderate potential for yellow glare on Bundure Road (approximately 26.2 hours per year) and high potential for yellow glare on Liddles Lane (approximately 35.9 hours per year).

Mitigation measures are required to manage glint and glare impacts on sections of Bundure Road and Liddles Lane. Mitigation measures (refer to Appendix C) will include operational management techniques such as altering normal tracking operations, that is adjusting the angles at which PV modules follow the sun's movement through the day to minimise the reflection of sunlight off the panels that could create glare and disrupt nearby receptors. Glare modelling found that with the implementation of mitigation measures, there is no potential for yellow glare along Bundure Road and Liddles Lane.

The reduction in the development footprint will further reduce the potential for 'yellow' glare along Liddles Lane. There is no change to the mitigation measures proposed to mitigate glare impacts.

iv Night-time lighting assessment

As outlined in the EIS, due to the relatively isolated location of the project, there are few existing sources of lighting in the night-time landscape. During operation, night lighting of ancillary infrastructure will only be required for security lighting at the substations, the BESS and within the O&M facility. It is unlikely that the proposed night lighting will create a noticeable impact on the existing night-time landscape due to light sources being limited to a low brightness and siting of infrastructure to minimise visibility from existing residences and accessible viewpoints.

The amendments have removed one construction compound, and the westernmost BESS, substation and switchyard location, and therefore, has removed the potential for night-time lighting impacts from this infrastructure.

6.5.4 Mitigation measures

The amendments do not warrant additional mitigation or management measures in relation to landscape and visual impacts. As such, the proposed measures remain unchanged from the EIS and are listed in full in Appendix C.

6.5.5 Conclusion

The LVIA found that the project is likely to have a low visual impact on all assessed viewpoints.

With the application of a setback distance of up to 100 m from Kidman Way to the closest PV module, the project will be compliant with the performance objectives of the Technical Supplement.

The glint and glare assessment concluded that in the absence of appropriate controls, yellow glare is likely to be experienced along Cadell Road, Bundure Road, Liddles Lane and Kidman Way. However, these impacts will be minimised by the proposed mitigation measures. The amendments may further reduce the potential for glare from Liddles Lane.

The amendments have reduced the overall extent of the development footprint, and have increased setbacks to the nearest non-associated residences R049 and R036, as well as sections of Kidman Way and Liddles Lane. The amended project is anticipated to reduce the visibility of the project from these locations.

6.6 Noise

6.6.1 Introduction

A noise impact assessment was prepared by Echo Acoustics for the EIS in accordance with the *Interim Construction Noise Guideline* (DECC 2009) and *Noise Policy for Industry* (EPA 2017) (NPfI) and is provided in Appendix E.6 of the EIS.

The amendments to the project have increased setback distances between the development footprint and the nearest non-associated residences, and removed potential noise sources during construction and operation.

A technical letter has been prepared by Echo Acoustics to assess how the amendments will impact the outcomes of the noise impact assessment (Appendix D.4 of this report).

6.6.2 Potential impacts

Noise impacts at the closest assessment location for the project, non-associated residence R049, were the focus of the noise impact assessment. All other non-associated residences have significantly greater separation distances to the project's potential noise sources. Where noise criteria are satisfied at R049, it is expected that noise criteria will be satisfied at the more distant assessment locations.

As outlined in the EIS, the noise impact assessment predicted that project construction typically will not adversely impact non-associated residences. It was found that there is potential for the closest non-associated residence, R049, to be within a noise affected area, as defined by the *Interim Construction Noise Guideline* (DECC 2009), during some construction stages under specific meteorological conditions. However, where this is the case, construction noise management measures will be implemented to minimise noise impacts.

The noise impact assessment predicted that project operation will comply with operational noise criteria at all assessment locations.

The amendments have increased setback distances to R049 from approximately 530 m to 656 m (see Figure 2.1).

As a result, noise levels are predicted to be reduced at R049. As predicted noise levels are the cumulative effect of multiple noise sources, any reduction in overall noise levels will be minor. Predicted noise levels at other assessment locations will be reduced or maintained. Therefore, the noise impacts of the amended project will be substantially the same as assessed in the noise impact assessment. The amended project will not adversely impact non-associated residences.

6.6.3 Mitigation measures

The amendments do not warrant additional mitigation or management measures in relation to noise impacts.

A draft construction noise management plan is provided in the noise impact assessment (Appendix E.6 of the EIS). As outlined in the EIS, this will be updated prior to the commencement of construction and will be based on the noise mitigation measures outlined in Appendix C.

6.6.4 Conclusion

The amendments will not substantially alter the noise impacts of the project.

Project construction typically will not adversely impact non-associated residences. There is potential for the closest receiver, R049, to be within a noise affected area, as defined by the *Interim Construction Noise Guideline* (DECC 2009), during some construction stages under specific meteorological conditions. However, where this is the case, construction noise management measures will be implemented to minimise noise impacts. A draft construction noise management plan has been prepared in accordance with the *Interim Construction Noise Guideline* (DECC 2009) and will be updated prior to construction.

Project operation is predicted to comply with operational noise criteria at all assessment locations.

6.7 Transport

6.7.1 Introduction

A traffic impact assessment was prepared by EMM for the EIS and is provided in Appendix E.8 of the EIS.

Following the exhibition of the EIS, advice was received from TfNSW and Murrumbidgee Council on the traffic impact assessment, including requirements to realign the new four-way intersection at Kidman Way to a staggered T-intersection configuration, assess the works required along the State road network to facilitate OSOM movements, and provide strategic concept designs.

The traffic impact assessment has been amended to address these submissions and is provided in Appendix D.5 of this report. A full list of TfNSW and Murrumbidgee Council comments and where they have been addressed is provided in Chapter 2 of the amended traffic impact assessment (Appendix D.5).

6.7.2 Existing environment

The local road network and site access points are shown on Figure 6.4. All traffic associated with the project is expected to travel along Kidman Way and to a lesser extent, along a small section of Bundure Road. No site access will occur via Liddles Lane.

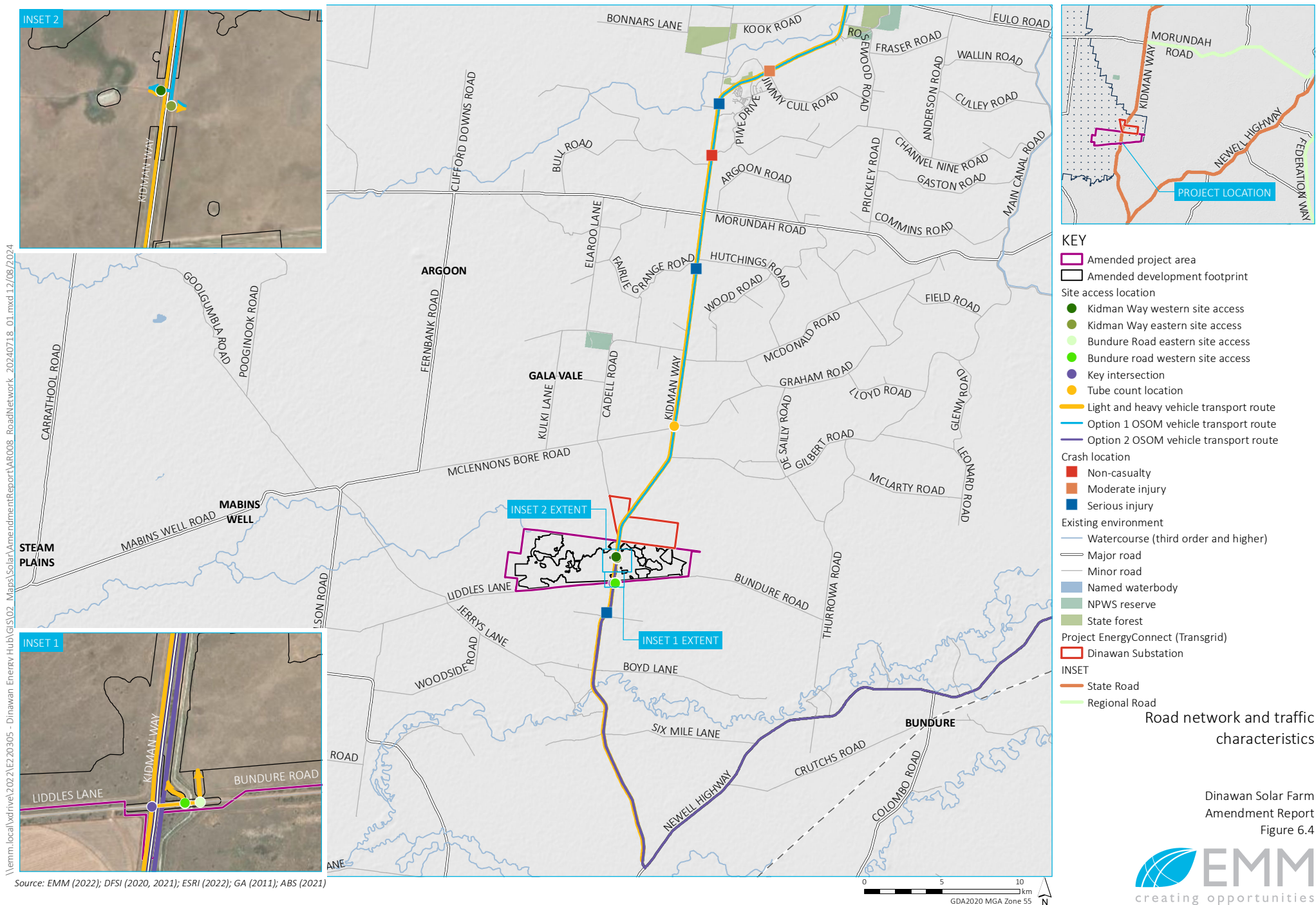
Traffic surveys were undertaken in 2022 to determine existing traffic volumes for the EIS. Following the exhibition of the EIS, additional survey was undertaken to address TfNSW comments. A tube count traffic survey was undertaken on Kidman Way, north of McLennons Bore Road, for a seven-day period between 14 February 2024 and 21 February 2024. The intersection at Kidman Way/Liddles Lane/Bundure Road intersection was surveyed for 24 hours on Thursday 15 February 2024 during a non-school holiday period.

Existing traffic volumes on Kidman Way (bi-directionally) are approximately 860 vehicles per day.

The peak hours at the Kidman Way/Liddles Lane/Bundure Road intersection were found to be:

- AM: 10:30 am to 11:30 am
- PM: 1:15 pm to 2:15 pm.

Baseline traffic volumes have been calculated for peak construction months in 2026 (month 10) and 2027 (month 21) by applying a linear annual growth rate of 1.6% per annum to the 2024 survey traffic volumes, as advised by TfNSW. Baseline traffic volumes are shown in Figure 6.5 for 2026 and Figure 6.6 for 2027. The proposed eastern and western site access from Kidman Way are shown in Figure 6.5 and Figure 6.6 but, as the site access roads have not been constructed, there is no baseline traffic on these intersection legs.



Source: EMM (2022); DFSI (2020, 2021); ESRI (2022); GA (2011); ABS (2021)

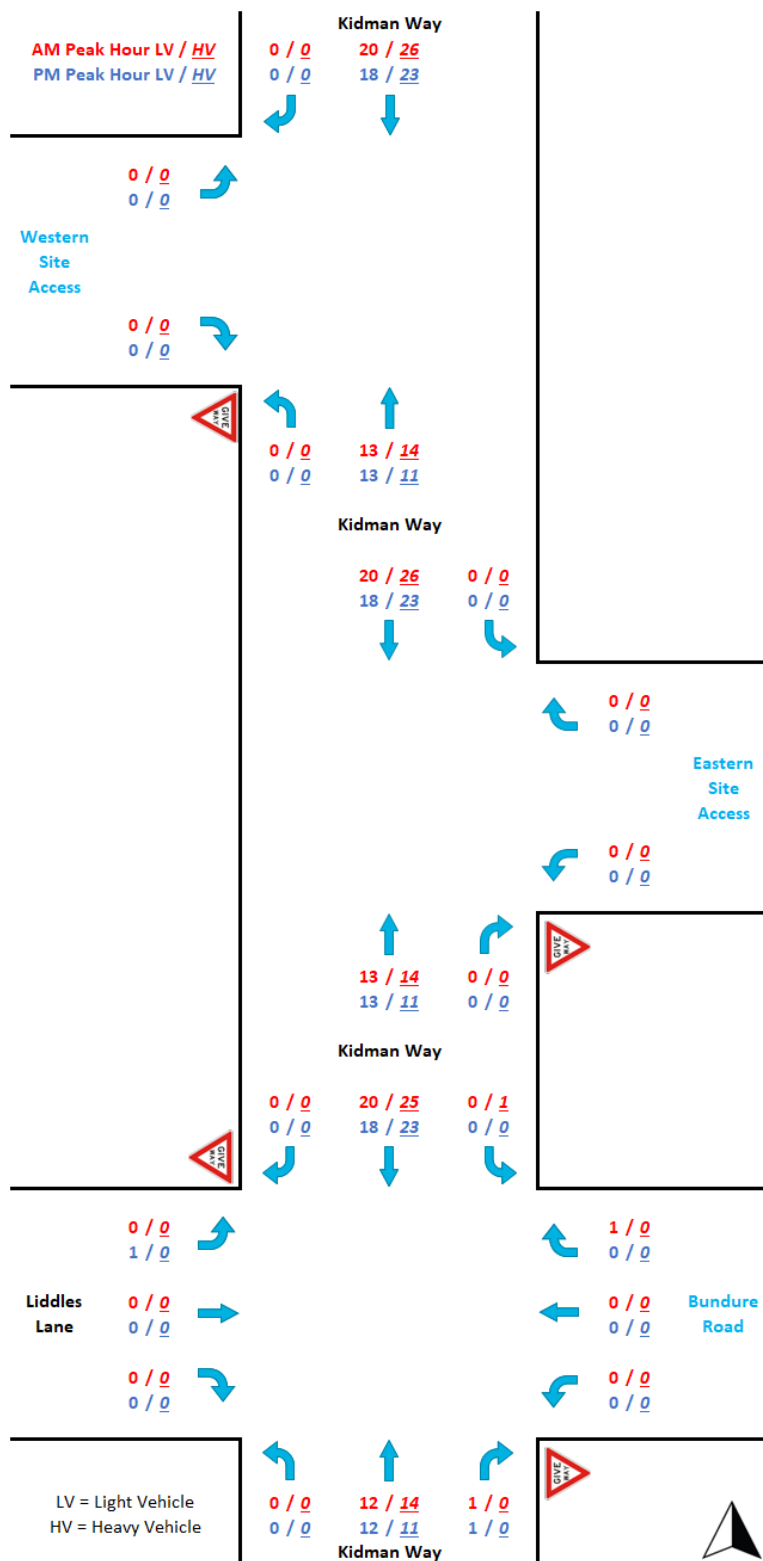


Figure 6.5 Baseline intersection traffic volumes – 2026

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

6.7.3 Potential impacts

i Site access points

Four site access points from public roads are proposed to provide access to the project area during construction and operation (refer to Figure 6.4):

- **Kidman Way** – two site access points are proposed from Kidman Way, approximately 1.6 km north of Bundure Road, with one access point on each side of Kidman Way (Kidman Way Eastern Site Access and Kidman Way Western Site Access). As Kidman Way bisects development footprint, access is required on each side of the road. Cross movements between east to west and vice versa will mostly be limited to shuttle buses transporting workers from the accommodation facility to their active work site. In the EIS, this site access was proposed as a four-way intersection, however intersection designs have been amended to a staggered intersection in response to comments from TfNSW.
- **Bundure Road** – two site access points are proposed from Bundure Road east of its intersection with Kidman Way (Bundure Road Eastern Site Access and Bundure Road Western Site Access). The Coleambally Irrigation Channel is approximately 120 m east of Kidman Way with a 6.7-m wide bridge crossing – an access point will be constructed either side of the channel.

ii Traffic generation and distribution

As outlined in the EIS, construction traffic for the project will consist of:

- light vehicles and shuttle buses transporting construction staff
- heavy vehicles for various construction activities and transport of plant and equipment to the development footprint
- oversize overmass (OSOM) vehicles for deliveries of power transformers and other major equipment (including components of the accommodation facility).

Traffic distribution for light and heavy vehicles going to/from the development footprint during construction are unchanged from the EIS and likely to comprise:

- Traffic from a local workforce not staying in the accommodation facility – 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-west on Newell Highway will turn north on Kidman Way. Travel times for both options are similar.

The origins of OSOM vehicles will be confirmed during detailed design; however, it is anticipated that materials will come from Port of Newcastle and/or Port Kembla. OSOM vehicles will access the development footprint from the north or south via Kidman Way, Sturt Highway and/or Newell Highway.

Overall, a traffic distribution of 50% to/from the north, and 50% to/from the south, on Kidman Way has been assessed.

Two peak construction traffic scenarios have been assessed:

- Month 10 – initial peak construction, with construction activities occurring on the eastern and western sides of Kidman Way.

- Month 21 – a second peak of construction, with construction activity primarily occurring on the western side of Kidman Way only (with the exception of vehicles to and from the accommodation facility).

Cumulative construction traffic impacts with surrounding development are discussed in Section 6.14.

a Construction month 10

During month 10, it has been assumed that 75% of the peak construction workforce of 400 people will reside in the accommodation facility and that shuttle buses will be used to transport 300 workers residing in the accommodation facility to and from their active work areas, with the remaining 100 workers driving to and from the development footprint from other locations in the region. Of the 300 residing in the accommodation facility, it is assumed that 200 workers will stay east of Kidman Way and will not cross Kidman Way to access their work area; and 100 workers will work on the western side of Kidman Way and will travel in shuttle buses to cross Kidman Way from the east to the west in the AM peak, and vice versa in the PM peak.

The estimated daily traffic movements and peak hour movements for month 10 are shown in Table 6.11. It is noted that the light vehicle and shuttle bus assumptions for both month 10 (and month 21) 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 (refer to Table 3.1).

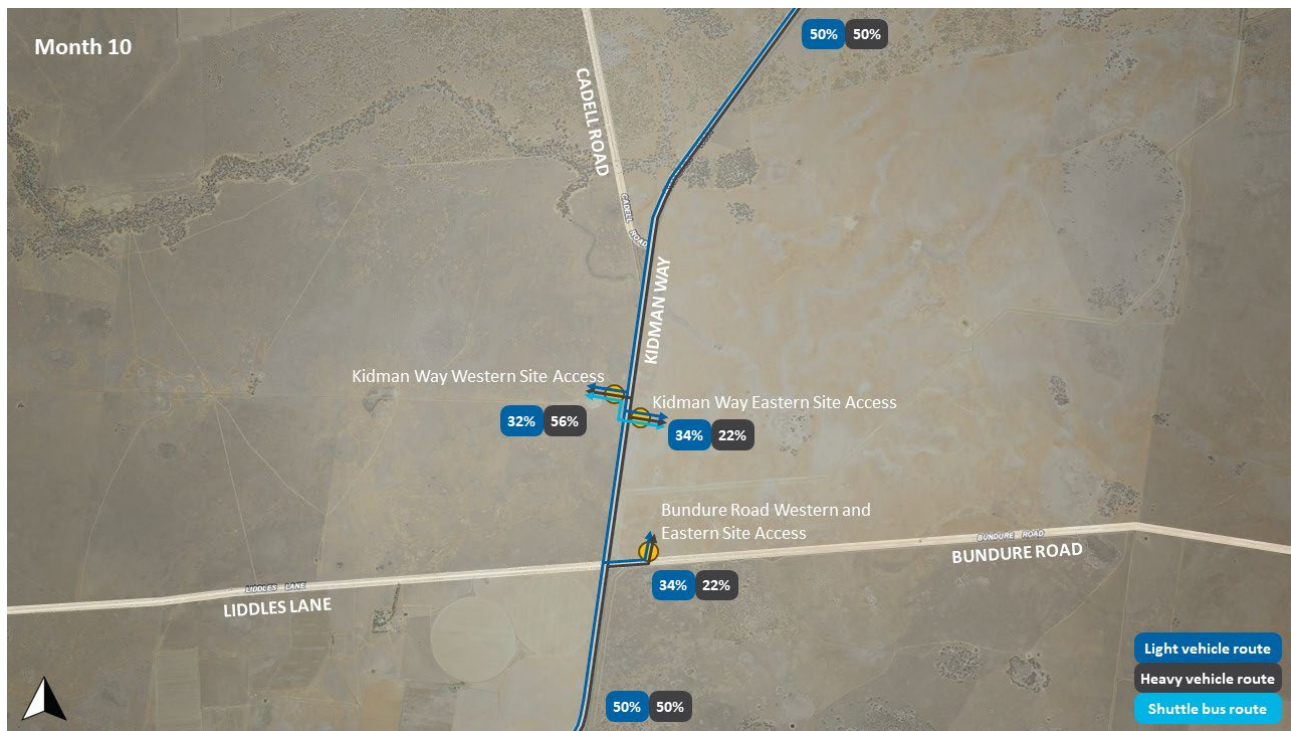
Table 6.11 Estimated daily and peak hourly construction trips (month 10)

Peak construction stage	Daily		Peak hour ²			
	Trips ¹	Movements	AM inbound movements	AM outbound movements	PM inbound movements	PM outbound movements
Light vehicles	100	200	100	0	0	100
Heavy vehicles	167	334	18	18	18	18
Shuttle bus (12-seater) ³	18	36	9	9	9	9
Total	285	570	127	27	27	127

Note:

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. Inbound refers to westbound movements crossing Kidman Way, while outbound refers to eastbound movements crossing Kidman Way.

The expected distribution of light and heavy vehicle traffic accessing the development footprint during month 10 of construction, including the shuttle bus route, is shown in Figure 6.7. No site access will be provided via Liddles Lane.



Source: SIX Maps

Figure 6.7 Road network and site access traffic distribution – month 10

The peak hour construction traffic volumes for month 10 have been combined with baseline traffic volumes to show the estimated traffic scenario created by the project for month 10 and are shown in Figure 6.8.

accommodation facility with the balance driving to the project. The estimated daily traffic movements and peak hour movements for month 21 are shown in Table 6.12.

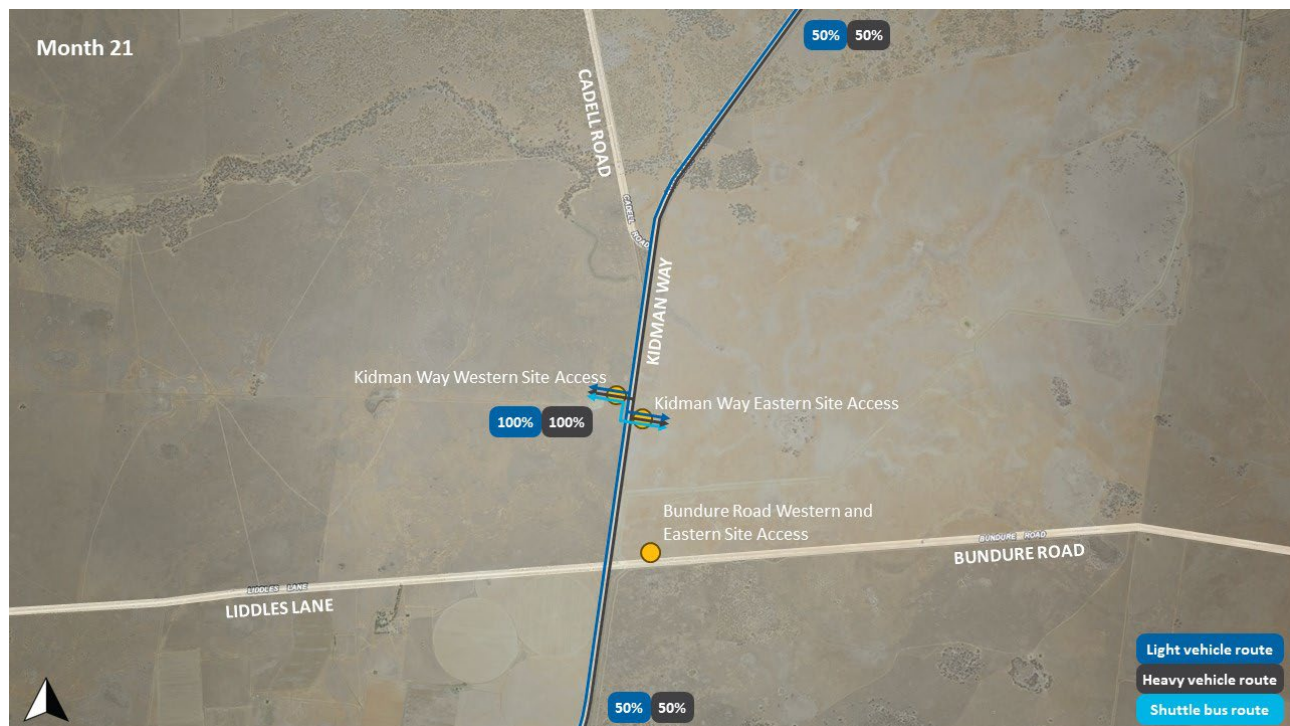
Table 6.12 Estimated daily and peak hourly construction trips (month 21)

Peak construction stage	Daily		Peak hour ²			
	Trips ¹	Movements	AM inbound movements	AM outbound movements	PM inbound movements	PM outbound movements
Light vehicles	94	188	94	0	0	94
Heavy vehicles	151	302	16	16	16	16
Shuttle buses ³	48	96	24	24	24	24
Total	293	586	134	40	40	134

Note:

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. Inbound refers to westbound movements crossing Kidman Way, while outbound refers to eastbound movements crossing Kidman Way.

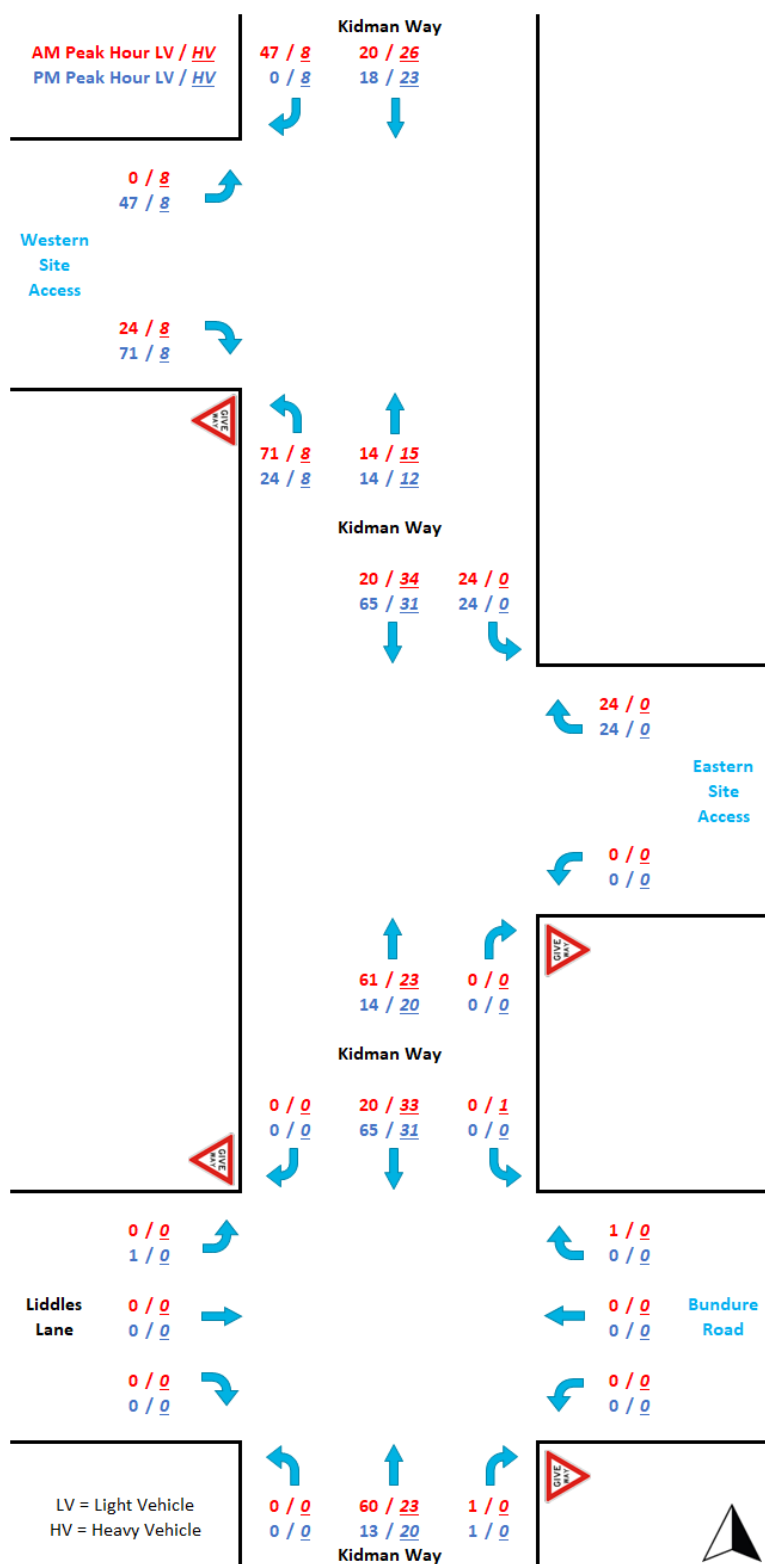
The expected distribution of light and heavy vehicle traffic accessing the project during month 21 of construction, including the shuttle bus route, is shown in Figure 6.9. The Bundure Road site access points are not expected to be used during month 21.



Source: SIX Maps

Figure 6.9 Road network and site access traffic distribution - month 21

The peak hour construction traffic volumes for month 21 have been combined with baseline traffic volumes to show the estimated traffic scenario created by the project in month 21 and are shown in Figure 6.10.



c Construction oversized overmass vehicle movements

- 300 megavolt ampere (MVA) power transformers
- high voltage switch gears

- control room
- accommodation facility components.

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

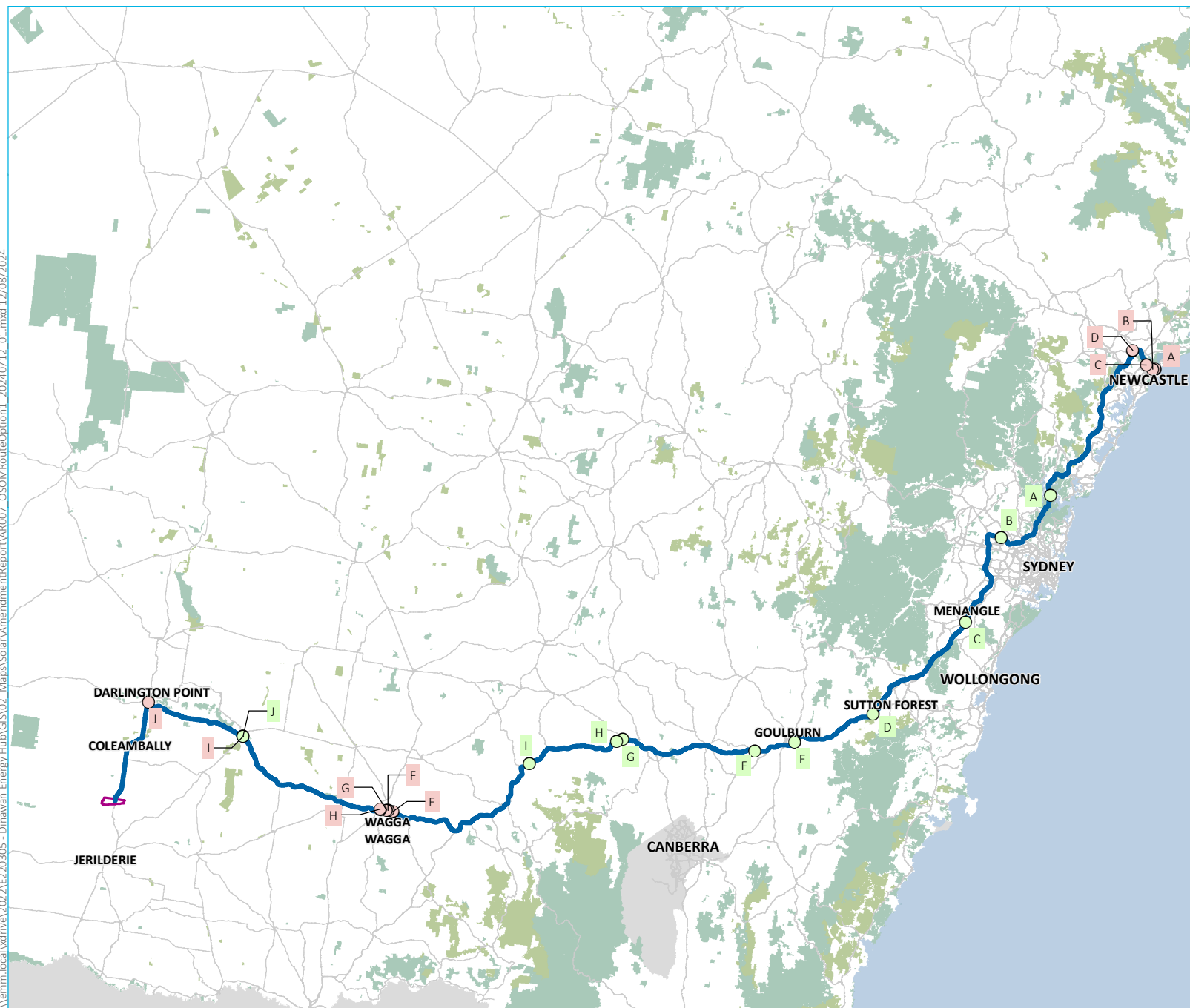
- Option 1 – from Port of Newcastle, suitable for OSOM vehicles with a loaded height of up to 5 m (Figure 6.11)
- Option 2 – from Port Kembla, suitable for OSOM vehicles with a loaded height of up to 4.9 m (Figure 6.12).

Parking areas that can accommodate OSOM vehicles have been identified along the assessed routes and are labelled on Figure 6.11 (Option 1) and Figure 6.12 (Option 2).

The OSOM vehicle route assessment (Attachment F of Appendix D.5) 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 6.11 (Option 1) and Figure 6.12 (Option 2). Works are not proposed to be completed as part of the project and will be subject to further consultation with DPHI, EnergyCo and TfNSW. Prior to the use of OSOM vehicles on the public road network, all relevant approvals will be obtained and implemented.

There are expected to be a total of 17 OSOM loads over the two stages of the project.

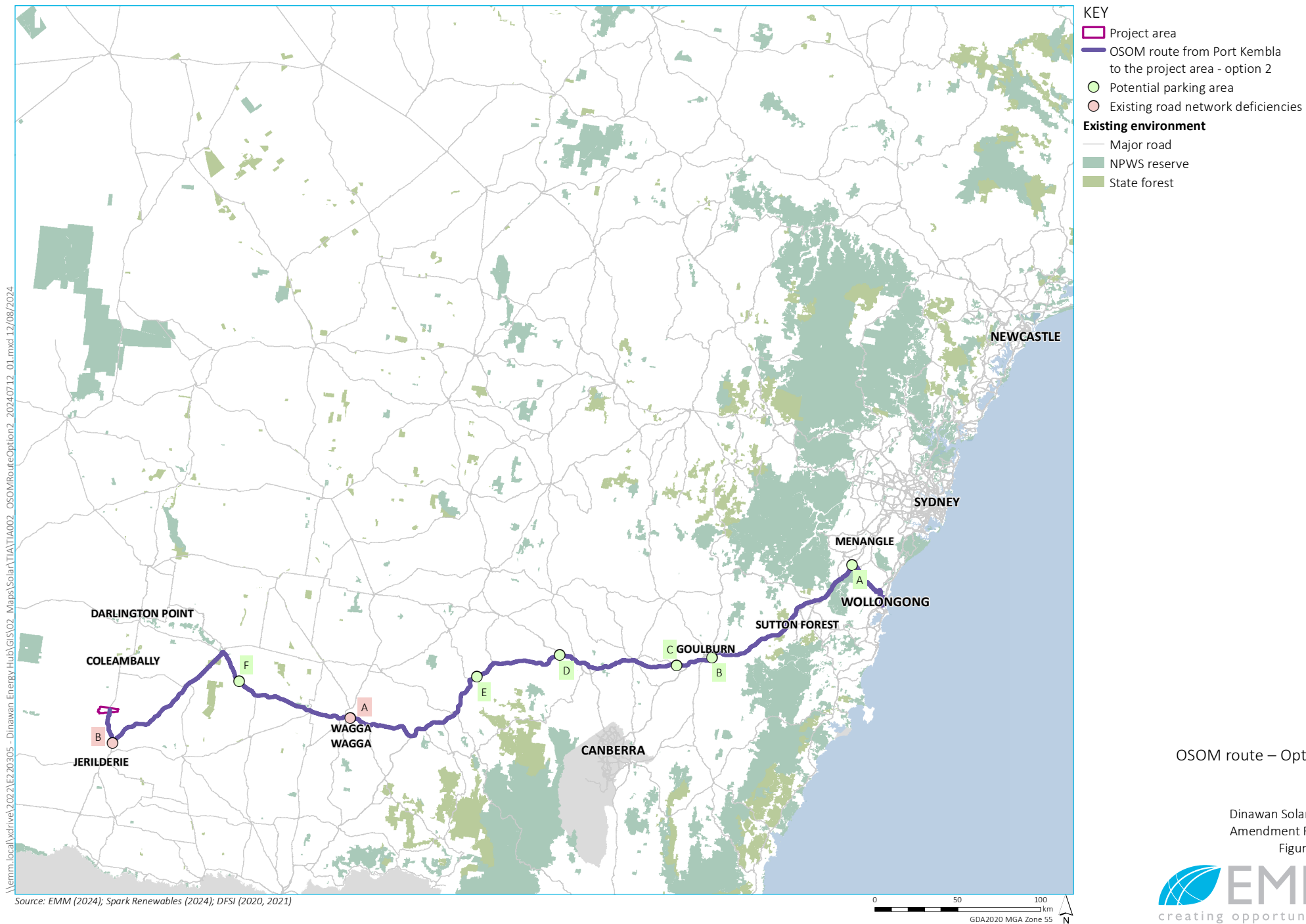
\\emm.local\drive\2021\20305 - Dinawan Energy Hub\GIS\02 Maps\Solar\AmendmentReport\AR007 OSOMRouteOption1_20240712_01.mxd 12/08/2024



- KEY**
- Project area
 - OSOM route from Port of Newcastle to the project area - option 1
 - Potential parking area
 - Existing road network deficiencies
- Existing environment**
- Major road
 - NPWS reserve
 - State forest

OSOM route – Option 1

Dinawan Solar Farm
Amendment Report
Figure 6.11



d Operation and decommissioning

Traffic generation and distribution assumptions during operation and decommissioning remain unchanged.

During operation it is expected that there will be 11 inbound and 11 outbound trips (22 movements) per day, comprising:

- up to 10 light vehicles per day
- up to one heavy vehicle per day on an as-needed-basis.

During decommissioning, traffic generation is predicted to be approximately 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, they have not been considered further.

iii Intersection performance

The existing intersection of Kidman Way/Bundure Road/Liddles Lane and the proposed new eastern and western site access intersections on Kidman Way have been modelled using the SIDRA Intersection 9.1 software. The key intersection performance indicator is level of service (LOS), a categorisation of average delay, intended for simple reference. For a priority-controlled intersection, this is the categorisation of the average delay experienced by the worst approach and turning movement. LOS is categorised with a letter grade from A to F, with A representing the best operating conditions and F representing the worst.

The SIDRA modelling analysed several 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 development. The scenarios are described in the traffic impact assessment (Appendix D.5). Modelling assessed intersection performance in the peak AM and PM periods.

Modelling of the existing Kidman Way/Bundure Road/Liddles Lane intersection and the proposed eastern and western site access intersections on Kidman Way predicted that in the AM and PM periods, both intersections perform satisfactorily within capacity with LOS A (good operation), with only minor queuing of traffic. Therefore, both intersections will adequately accommodate the project construction and cumulative traffic volumes.

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 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 capacity of Kidman Way has been assessed, as this is the main haulage route for all vehicles travelling to and from the development footprint. The assessment is based on peak hour traffic volumes.

For the peak construction periods (month 10 and month 21), the mid-block capacity of Kidman Way is 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 2021) for sealed roads and *Unsealed Roads Best Practice Guide* (ARRB 2020) for unsealed roads. Road width standards ensure safety and consistency for road users and are based on daily traffic volumes.

Existing road widths at Kidman Way and Bundure Road were compared to road design standards for baseline traffic volumes and future traffic volumes. Both Kidman Way and Bundure Road do not currently meet the minimum compliance criteria from Austroads and ARRB guidelines.

Given the project's construction activity is temporary, the current 8-m wide sealed road with 1-m wide unsealed shoulder on both sides of Kidman Way is considered to be satisfactory. Where the intersections are proposed to be upgraded along Kidman Way, adequate road width will be provided in accordance with relevant Austroads standard, as shown in the strategic concept designs for the intersections that are provided in Attachment D of the traffic impact assessment (Appendix D.5). The designs have been prepared in accordance with *Guide to Road Design Part 4: Intersections and Crossings General* (Austroads 2017) and *Strategic design requirements for DAs* (TfNSW 2022).

Bundure Road will require localised upgrade works to accommodate the project's construction traffic to enable construction vehicles to safely pass each other and other local traffic.

vi Road safety assessment

A sight line is the distance a driver can see along a length of road. *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads 2023) 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.

The sight line assessment determined that:

- sight line distances for traffic entering and exiting the development footprint via the new site access points on Kidman Way will be adequate
- sight line distances for traffic exiting the development footprint via Bundure Road site access points will not meet the minimum sight distance requirements due to visibility being impacted by existing fencing. Measures will be implemented to address the sight distance requirements (see Section 6.7.4).

vii Public transport, pedestrians and cyclists

There are not expected to be any impacts to public transport, pedestrian or cycling routes. Car parking and accommodation will be provided on-site during construction. The accommodation facility will replace the majority of private vehicle trips and contribute to a lower increase in traffic volumes on the road network during construction. Shuttle buses will transport workers from the accommodation facility to their active work area during construction.

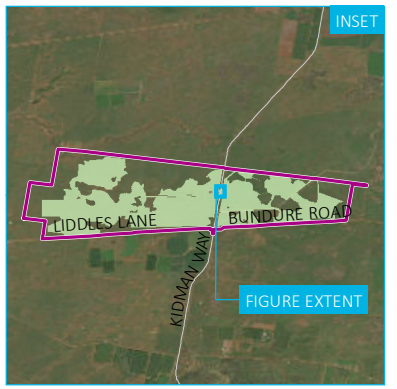
6.7.4 Mitigation measures

The proposed intersection and road upgrades for the amendment are provided in Table 6.13. The proposed intersection designs for Kidman Way and Kidman Way/Bundure Road/Liddles Lane are shown in Figure 6.13 and Figure 6.14.

Table 6.13 **Proposed intersection and road upgrades**

Road/intersection	Proposed upgrade	Description
Kidman Way	Intersection – new staggered intersections for site access points	• Left turn bays and right turn bays on both approaches on Kidman Way. • Seal access roads within 50 m of Kidman Way. • Signposting and line marking as described in Attachment D of the traffic impact assessment. • Intersection upgrades to accommodate 26 m long B-double truck and to allow the passage of the largest OSOM vehicle.
Kidman Way/Bundure Road/Liddles Lane ¹	Intersection – upgrade of existing intersection	• Right turn bay on both approaches on Kidman Way. • Widened shoulder for left-turning vehicles on both approaches on Kidman Way. • Signposting and line marking as described in Attachment D of the traffic impact assessment. • Intersection upgrades to accommodate 26-m long B-double truck turning into Bundure Road only.
Bundure Road	Road upgrade – between Kidman Way and site access points	• Sealing of Bundure Road from Kidman Way to the Bundure Road Eastern Site Access. • Widening of Bundure Road from Kidman Way to Bundure Road Eastern Site Access according to the relevant ARRB rural road design guidelines.
Bundure Road	New intersections – site access points	• Access upgrades to suit 26 m long B-double truck.

Notes: 1. If the construction of the project overlaps with Yanco Delta Wind Farm, there may be an opportunity to design and coordinate the proposed upgrades to the Kidman Way/Bundure Road/Liddles Lane intersection to suit the construction requirements of both projects. Any requirement to seal Liddles Lane will also be subject to impacts associated with Yanco Delta Wind Farm.



Source: EMM (2022); ABS (2021); DFSI (2020, 2021); ESRI (2022); GA (2011); Metromap (2022)

KEY

- Development footprint
- Cadastral boundary
- Approximate road pavement edge
- Give Way signage (R1-2)
- Truck crossing or entering signage (W5-22)
- Painted median

Proposed intersection design - Kidman Way
Way site access points

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Figure 6.13



Source: EMM (2022); ABS (2021); DFSI (2020, 2021); ESRI (2022); GA (2011); Metromap (2022)

KEY

- Development footprint
- Cadastral boundary
- Approximate road pavement edge
- Give Way signage (R1-2)
- Cross road signage (W2-1)
- Truck crossing or entering signage (W5-22)
- Painted median

Proposed intersection design - Kidman
Way/Bundure Road/Liddles Lane
intersection

Dinawan Solar Farm
Amendment Report
Figure 6.14

The amended transport management and mitigation measures for the construction phase of the project are outlined in Table 6.14, with new mitigation measures shown in bold. These will be included in the construction traffic management plan (CTMP).

Consistent with the EIS, no specific traffic mitigation measures are proposed for the operations and decommissioning phases as any material impacts can be managed by construction phase mitigation measures.

Table 6.14 **Transport mitigation measures**

ID	Mitigation measure
T1	A detailed CTMP will be developed in consultation with TfNSW and Murrumbidgee Council prior to the commencement of works.
T2	The Kidman Way site access point intersections will include: • dedicated turning bays for left-turning and right-turning vehicles from Kidman Way • upgrades on both the north and south approaches • upgrades designed for a 26m long B-double truck and to allow the passage of the largest OSOM vehicle.
T3	The Kidman Way/Bundure Road/Liddles Lane intersection will include: • a widened shoulder for left turning vehicles and dedicated turning bay for right turning vehicles from Kidman Way • upgrades to be applied on both the north and south approaches • upgrades designed for a 26 m long B-double truck turning into Bundure Road.
T4	Relevant permits will be obtained from the National Heavy Vehicle Regulator (NHVR) to allow OSOM vehicles to use the road network as part of construction. Conditional approval will be requested for 26-m long trucks to access Bundure Road between Kidman Way and the eastern site access point (currently only approved for 19 m long heavy vehicles).
T5	Bundure Road will be widened between Kidman Way and the Bundure Road eastern site access point. The road widening will comply with the relevant ARRB rural roads design guidelines.
T6	Site access points will be constructed as per council's Rural Property Access standard to the satisfaction of TfNSW (Kidman Way) or Council (Bundure Road).
T7	As part of detailed design, measures will be considered to improve visibility on either side of the Bundure Road bridge where it crosses the Coleambally Irrigation Channel, such as: • raising the access road height to ensure driver's line of sight is above fencing/bridge parapet • adoption of safety measures in a Driver's Code of Conduct • implementing construction stage traffic management measures such as warning signs for trucks entering (sign no. T2-25, to be confirmed in the CTMP).
T8	A traffic management system will be implemented to allow trucks to cross the Bundure Road bridge in a single direction at any given time (e.g. "No overtaking or passing" signage (sign no. R6-1)). Westbound vehicles on Bundure Road will be required to give way to eastbound traffic to avoid queuing on Kidman Way.

6.7.5 Conclusion

The development footprint will be accessed via both Kidman Way and Bundure Road. The configuration of the new intersections proposed at Kidman Way have been updated to address TfNSW's submission on the EIS. Construction vehicles will include light vehicles and shuttle buses transporting workers, along with heavy vehicles for deliveries. During the first peak construction in month 10, up to 570 peak daily and 154 peak hourly vehicle movements are anticipated. During the second peak construction in month 21, up to 586 peak daily and 174 peak hourly vehicle movements are anticipated.

The level of service of key intersections and mid-block capacity on Kidman Way and Kidman Way/Bundure Road will not be adversely impacted. No significant impacts to either traffic flow or road safety are expected.

Road upgrades are proposed to accommodate the construction traffic movements and intersection upgrades to accommodate turning traffic at site access points.

With approximately 11 daily vehicle trips (22 movements), 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.

6.8 Water

6.8.1 Overview

A water resources assessment (WRA) was prepared for the EIS and is included as Appendix E.8 of the EIS. The WRA considers potential impacts to surface water, groundwater and flooding in general accordance with relevant guidelines and legislation.

The amendments to the project have reduced the extent of the development footprint, which will reduce water-related impacts. This section provides an update to the description of the surface water, flooding, and groundwater environment presented in the EIS. The key findings presented in the WRA remain applicable to the amended project due to the minor nature of the changes to the project's impact on water resources.

6.8.2 Potential impacts

i Surface water

As outlined in the EIS, potential impacts to surface water include:

- impacts to water quality due to soil erosion and sediment transport and/or other contaminants (e.g. fuel) into receiving watercourses, ineffective wastewater management practices and entrainment of plant or materials in floodwaters
- impacts to water quantity due to increased site runoff due to clearing, earthworks and increased impervious surfaces (including runoff from PV panels) affecting downstream properties and receiving waters, surface water use from dams, harvesting and reuse of collected rainwater and extraction and reuse of water from construction sediment basins
- direct physical impacts to watercourses and riparian corridors and other water management infrastructure (e.g. Coleambally Irrigation Channel) due to the construction of project infrastructure and access roads.

Significant changes to flow regimes and water quality will be avoided through the implementation of mitigation and measures described in Appendix C.

Direct physical disturbance of watercourse crossings has been minimised through project refinement during the preparation of the EIS. Adverse impacts to riparian corridors will be avoided because:

- the development footprint avoids third order watercourses
- where instream works (i.e. activities within the mapped corridor) are proposed, these works will be designed and constructed to consider local hydraulic conditions, minimise local flooding impacts, and consistent with relevant guidelines.

Several short sections or 'reaches' of mapped first and second order watercourses are proposed to be developed over and incorporated into the project's stormwater drainage system. These mapped reaches are assessed to have no definable bed or banks and/or negligible riparian zone.

The reduction in extent of the development footprint has avoided impacts to a mapped first order watercourse that now lies outside the western extent of the amended development footprint. Watercourse crossings and project component placement within watercourses will be minimised to the extent practicable.

Irrigation infrastructure associated with CICL will be retained and no adverse impacts to operation or maintenance of this infrastructure are anticipated. Any necessary works within a nominated easement of the infrastructure will be undertaken in consultation with CICL as the asset owner. Existing irrigation infrastructure within the development footprint associated with agriculture will be assessed for benefit to the project during detailed design. Where infrastructure is removed for the project, it would be reinstated at the completion of the project in consultation with the landowner.

ii Flooding

As outlined in the EIS, there is potential during construction for inundation of site works, compounds, storage areas and plant/equipment if these are located within flood prone areas. This could lead to undesirable flooding impacts either off-site or within the project area.

The local flood modelling context for the project is shown in Figure 6.17 of the EIS. The reduction in the extent of the development footprint results in the avoidance of several areas west of the amended project area that are forecast to be inundated by in a 1% annual exceedance probability (AEP) flood.

The amended project is considered to be compatible with the flood hazard, in that the majority of the PV array and infrastructure areas are either free of flooding or subject to low flood hazard that is generally safe for people, vehicles and buildings for events up to 1% AEP.

iii Groundwater

The amendments to the project will not alter the potential impacts to groundwater. Potential impacts to groundwater quality will be managed through the implementation of mitigation and management measures (see Appendix C).

iv Water supply

The amendments have not changed the estimated water demand for the project.

The estimated water demand for construction of the project is approximately 230 megalitres (ML) of non-potable water over the anticipated 36-month construction period. A further 110 ML of potable water over 36 months is estimated to be required for the construction workforce accommodation facility and offices. The estimated ongoing operational water usage for the project is 5 ML/year, for an excess of 25–35 years.

The project will use groundwater available from existing landowner bores to meet both construction and operational non-potable water demands. Water for potable use will be trucked in by a commercial water provider and stored in tanks within the development footprint. Wastewater from the construction workforce accommodation facility and construction offices will be managed using an onsite treatment system.

Additional information regarding the water supply for the project has been prepared in response to the submission on the EIS from the Water Group in the NSW Department of Climate Change, Energy, the Environment and Water. Groundwater resources for the project are proposed to be sourced from bores on two properties held by the primary landholder in the project area: Delta Park and Hawks Nest. The water supply infrastructure available at Delta Park and Hawks Nest is summarised in Table 6.15. Groundwater bores associated with the Delta Park and Hawks Nest properties are shown on Figure 6.15 and will serve as the primary source of non-potable water for Dinawan Solar Farm given the proximity of the nominated bores to the project area. Water will be trucked from the boreholes to the development footprint via the local road network.

Table 6.15 Water supply infrastructure at Delta Park and Hawks Nest

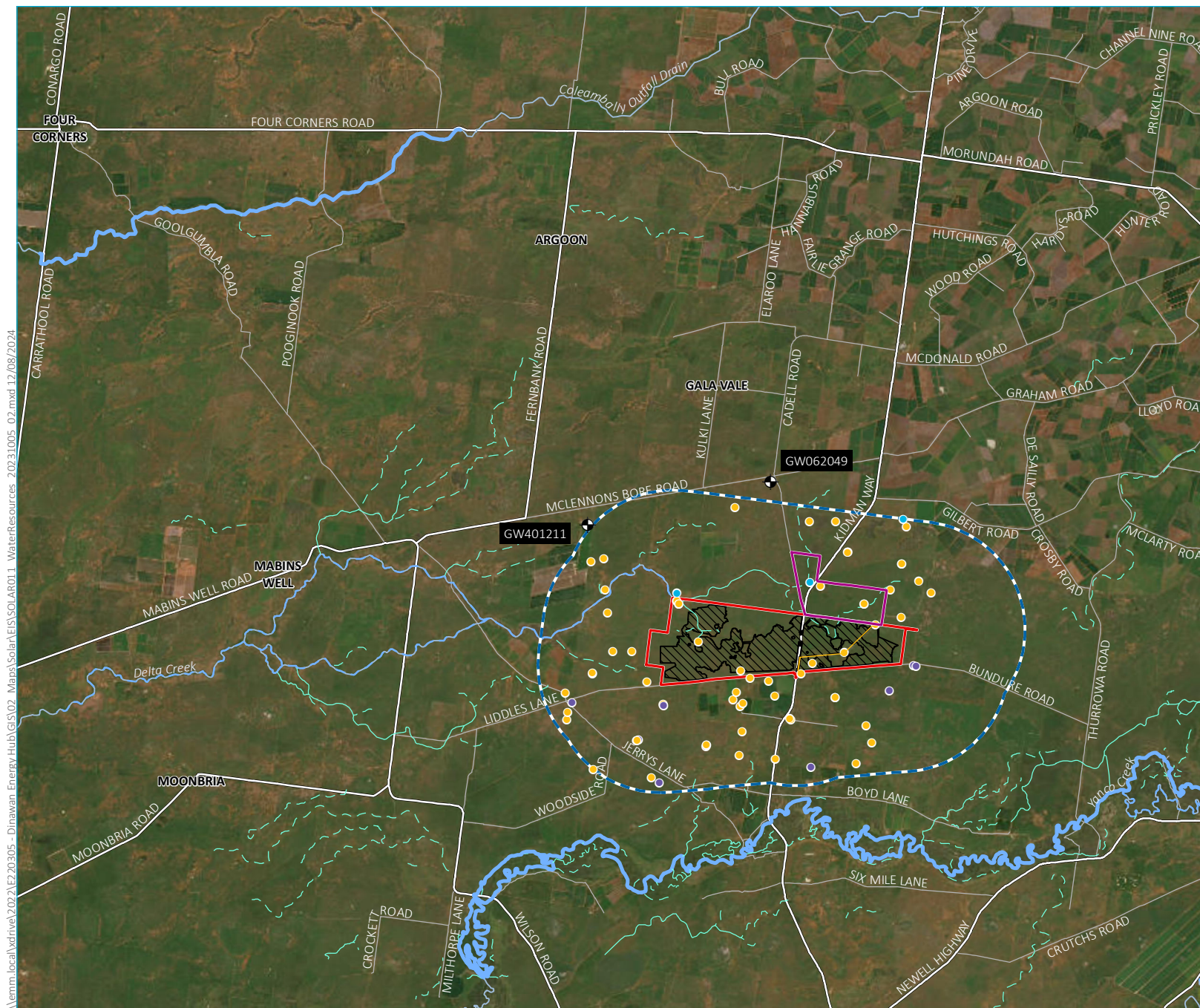
Infrastructure	License information	Operational plan for project supply	Considerations	Water quality information	System priority / project supply
Delta Park					
Borehole 440 mm	GW401211 – WaterNSW bore ID 50CA503992 – Water supply water use approval WAL11874	Operate bore to fill dam.	Bore operation needs to be optimised to meet the needs of construction. On restart of the bore, sediment has the potential to impact on pump impeller – therefore continuous on-off cycles must be avoided.	Total dissolved solids - 400 mg/L	Primary source for Dinawan Solar Farm
Dam	No licence required (Turkeys nest farm dam)	To be maintained as full by the landholder during periods of construction demand.	Water volumes required during construction should be forecast and communicated to the landholder on a weekly basis.		
Nominated truck fill point	No licence required	Truck fill location at the existing dam. Fill method to be confirmed in detailed design.	Truck fill locations can be modified if water is directed into the existing irrigation channel network.		
Hawks Nest					
Borehole 160 mm	GW062049 - WaterNSW bore ID 50CA503997 – Water supply water use approval WAL11876	Operated only when truck fill is required.		Total dissolved solids - 800 mg/L	Secondary source for Dinawan Solar Farm
Nominated truck fill point	No licence required	Truck fill location at borehole. Fill method to be confirmed in detailed design			

The water access licences (WALs) and entitlements connected with the above works are listed in Table 6.16.

Table 6.16 **Groundwater allocation proposed to be used by the project**

Nominated works approval	Water access licence number	Licence category	Water source	Entitlement (units)
50CA503992	WAL11874	Aquifer	Lower Murrumbidgee Deep Groundwater Source	1,091
50CA503997	WAL11876	Aquifer	Lower Murrumbidgee Deep Groundwater Source	743
Total				1,834 unit shares

The use of the nominated groundwater bores for the project's water supply will be well within the respective existing maximum extraction limits under the Works Approvals listed in Table 6.16 and therefore will operate within their existing approvals.



- KEY**
- Project area
 - Development footprint
 - Coleambally irrigation channel
 - 5km buffer
 - Groundwater supply bore
 - Project EnergyConnect (Transgrid)
 - Dinawan substation
 - Registered groundwater bore
 - Water supply
 - Monitoring
 - Stock and domestic
 - Existing environment
 - Major road
 - Minor road
 - Strahler stream order
 - 1st order
 - 2nd order
 - 3rd order
 - 9th order

Water resources in the vicinity of the project

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Figure 6.15

6.8.3 Mitigation measures

The amendments do not warrant additional mitigation or management measures in relation to water impacts. As such, the proposed measures remain unchanged from the EIS and are listed in full in Appendix C.

6.8.4 Conclusion

The reduction of the development footprint will avoid impacts to an ephemeral first order watercourse west of the project area. The project's impacts on surface water and groundwater resources are anticipated to be substantially the same as outlined in the EIS.

6.9 Hazards

6.9.1 Introduction

A preliminary hazard analysis (PHA) was prepared by Sherpa Consulting for the EIS and is provided in Appendix E.9 of the EIS. The PHA summarises potential hazards and risks associated with the project and details management controls which, when implemented, will reduce these hazards and risks to acceptable levels.

The amendments to the project has removed the westernmost BESS location and revised the location and size of infrastructure footprints within the project layout.

A technical memo has been prepared by Sherpa Consulting assessing impacts from the amendments on the outcomes of the PHA and is provided in Appendix D.6 of this report.

6.9.2 Potential impacts

The amendments have reduced the number of BESS locations proposed from three to two, with the westernmost BESS removed from the development footprint. Two BESS locations are now proposed. The indicative footprints have also been slightly reduced. The footprints are adequate to accommodate the proposed BESS units and there is no change to the findings of the PHA.

The amended layout has reduced separation distances between the BESS footprint and some project infrastructure. Based on the propagation characteristics determined in the PHA and in combination with the asset protection zone (APZ) requirements identified in the bushfire assessment, in the event of thermal runaway and/or fire, propagation is not expected to affect other onsite receptors.

The amendments have slightly increased separation distances to non-associated residences, with the closest non-associated residence (R049) 2.3 km south of the BESS west of Kidman Way. There is no change to the findings of the PHA.

6.9.3 Mitigation measures

The amendments do not warrant additional mitigation or management measures in relation to hazards. As such, the proposed measures remain unchanged from the EIS and are listed in full in Appendix C.

6.9.4 Conclusion

The PHA identified the hazards and assessed the risks associated with the project and determined the risk acceptability from a land use safety planning perspective. The amendments do not substantially alter the outcomes of the PHA. With the implementation of the proposed controls, the consequences of identified events associated with project operations are predicted to not have significant off-site impacts. The project meets the *Hazardous industry planning advisory paper No 4 – risk criteria for land use safety planning* (DoP 2011) qualitative risk criteria.

6.10 Bushfire

6.10.1 Introduction

A bushfire assessment report was prepared by Waratah Bushfire as part of the EIS in accordance with *Planning for bushfire protection* (NSW RFS 2019) and is provided in Appendix E.10 of the EIS. The bushfire assessment report has been amended to incorporate the amendments and the recommended conditions of consent included in submissions from NSW Rural Fire Service and Murrumbidgee Council to assist the consent authority in reviewing and assessing the project. It is provided in Appendix D.7 of this report.

6.10.2 Potential impacts

The amended project will reduce the extent of the development footprint, but will not alter bushfire risks that require management during the construction and operation of the project. These risks are assessed in Chapter 5 of the bushfire assessment report (Appendix D of this report), and are relevant to the amended project.

6.10.3 Mitigation measures

Bushfire risks will be reduced and managed by mitigation measures outlined in Chapter 6 of the bushfire assessment report (Appendix D.7 of this report) and summarised below in Table 6.17. Mitigation measures have been amended from the EIS in response to submissions from NSW Rural Fire Service and Murrumbidgee Council. New or amended mitigation measures are shown in **bold**.

Table 6.17 Bushfire mitigation measures

ID	Mitigation measure
BF1	A 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 that addresses the following: • ongoing bushfire fuel management within the development footprint • site infrastructure plan • site access and internal road plan • water supply for firefighting • APZs and their continued maintenance • location of hazards that may impact firefighting operations • activities that may be exempt on periods of Total Fire Ban days • the Grain Harvesting and Fire Safety guide (refer Appendix 3 of Appendix D.7) • any such additional matters as may be required by the NSW RFS District Office for the Mid Murray Zone.
BF2	An Emergency Management Plan will be prepared in consultation with NSW RFS in accordance with Table 6.8d of <i>Planning for bushfire protection</i> (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 Emergency Management 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 2019</i> . A 10-m APZ will be maintained between the solar arrays and the perimeter fence.
BF4	Buildings 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). New construction must also comply with the construction requirements in Section 7.5 of <i>Planning for Bush Fire Protection 2019</i> .

Table 6.17 Bushfire mitigation measures

ID	Mitigation measure
BF5	Access roads will comply with the property access road requirements as outlined in Table 7.4a of <i>Planning for bush fire protection</i> , with additional considerations as outlined in Section 6.2.3 of the bushfire assessment report.
BF6	The provision of water, electricity and gas will comply with <i>Planning for bush fire protection</i> (NSW RFS 2019). An adequate static water supply will be provided for firefighting purposes, with the capacity to be determined as part of a Fire Safety Study. Static water tanks will be located at the primary vehicle access point to the facility. Other water supply requirements will be determined in consultation with the Argoon Rural Fire Brigade, NSW RFS District Office for the Mid Murray Zone, and Fire and Rescue NSW at the detailed design stage. In addition to static water supply requirements, two mobile water supplies with a minimum capacity of 500 L each (e.g. tanks on utes or standalone tankers) will be available on-site during construction and operations.
BF7	Spark Renewables will continue to consult with Argoon Rural Fire Brigade around specific weather conditions that may require works to temporarily cease during construction.
BF8	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.

6.10.4 Conclusion

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.

The amendment to the project will not alter bushfire risks. Bushfire risks will be managed through the implementation of mitigation measures outlined in Chapter 6 of the bushfire assessment report (Appendix D.7 of this report) and summarised in Table 6.17.

With the implementation and maintenance of the mitigation measures outlined in Section 6.10.3, the bushfire risk associated with the project remains low to moderate and the project design and operation will comply to the objectives and specific performance criteria of *Planning for bushfire protection* (NSW RFS 2019).

6.11 Social

6.11.1 Overview

A social impact assessment (SIA) was prepared by EMM as part of the EIS and is provided in Appendix E.11 of the EIS. The SIA was prepared in accordance with the *Social impact assessment guideline for State significant projects* (SIA Guideline) (DPE 2023a) and the *Technical supplement: social impact assessment guideline for State significant projects* (SIA Technical Supplement) (DPE 2023b).

The amendments to the project will reduce the overall footprint, but will not materially alter the aspects of the project which affect social impacts from the project, such as the construction workforce size and construction timing and duration. The assessment of the project's social impacts presented in the EIS remains applicable to the amended project.

6.11.2 Potential impacts

The SIA found that 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 will affect access to services, perceptions of safety and local community dynamics. There are no changes to the construction workforce, timing or duration.

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, listed in full in Appendix C.

The reduced extent of the development footprint is anticipated to reduce the likelihood of the following impacts identified in the SIA:

- impacts to unknown sites or items of Aboriginal significance
- land use impacts to agribusinesses
- loss of amenity due to changes to the visual landscape
- changes to the natural environment impacting on enjoyment of ecological values.

Further detail relating to these potential impacts are provided in Section 6.1 (biodiversity), Section 6.2 (Aboriginal cultural heritage), Section 6.4 (land) and Section 6.5 (landscape and visual).

6.11.3 Mitigation measures

The social management and mitigation measures have been amended to include the preparation of an accommodation facility management plan in response to advice received from Murrumbidgee Council. The amended social management and mitigation measures are provided in Table 6.18, with new mitigation measures shown in **bold**.

Table 6.18 Social mitigation and management measures

ID	Mitigation measures
S1	Develop and implement a post-approvals Social Impact Management Plan (SIMP). The SIMP would be adaptive and proportionate to project impacts. The SIMP would aim to: Describe desired outcomes in social terms 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 would include methods for engaging various 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. A publicly available complaints and grievance procedure will be included as part of the SIMP.
S2	Develop and implement an industry participation plan (IPP), which will identify: the approach to 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 will be used to share and register interest in project opportunities.
S3	Develop and implement an Aboriginal participation plan (APP) in consultation with First Nations stakeholders to optimise local capacity and aspirations through targeted participation initiatives within the regional area. This would 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 6.18 Social mitigation and management measures

ID	Mitigation measures
S4	Undertake regular engagement (to be defined in the SIMP) with local businesses to advise of construction periods and the potential increase in trade or patronage. This will provide these businesses with an opportunity to plan as required to maximise benefits of increased demand, and its associated revenue.
S5	Identify measures in the SIMP to encourage the project workforce, particularly during the construction phase, to support and contribute to the local and regional community through local spending. This may be done through project provided vouchers at local businesses, and promoting the local offering, such as on notice boards at the accommodation facility.
S6	Engage with Murrumbidgee and Edward River Councils to identify potential service limitations and implement measures such as provision of on-site medical facilities and identification of preferred telehealth providers to reduce competition for GP services closest to the site.
S7	Prioritise use of the temporary worker accommodation facility and maximise recruitment of local residents for the construction workforce where possible.
S8	Develop and implement an accommodation facility management plan in consultation with Murrumbidgee Council prior to commencement of construction to ensure the accommodation facility complies with relevant standards and requirements.
S9	Develop and implement a comprehensive Community Engagement Plan and Worker Code of Conduct (as part of the SIMP) to address perceived privacy and public safety risk, including engagement with community services such as police and emergency services to familiarise relevant services with the project in case of an incident.

6.11.4 Conclusion

The reduced extent of development footprint will reduce the likelihood of some social impacts, including impacts to biodiversity, Aboriginal cultural heritage and the visual landscape. All other social impacts and benefits identified in the SIA are not affected by the amendment.

As outlined in the EIS, 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 ensure the effective management of the social impacts identified in this SIA and the enhancement of social benefits experienced by the community.

6.12 Economic

6.12.1 Overview

An economic assessment was prepared by Gillespie Economics as part of the EIS and is provided in Appendix E.12 of the EIS. The economic impacts and benefits of the project were assessed for the NSW State economy and the LGAs that are likely to experience economic impacts or benefits from the project, comprising Murrumbidgee, Edward River, Griffith, Leeton and Narrandera LGAs.

The amendments to the project will reduce the overall footprint, but will not materially alter the aspects of the project which affect economic impacts from the project, such as the size of the workforce for construction or operation, the duration of construction and operation, and the estimated development cost for the project. The assessment of the project's economic impacts presented in the EIS remains applicable to the amended project.

6.12.2 Potential impacts

The economic assessment (Appendix E.12 of the EIS) found that regionally, the project will contribute:

- up to \$191 million and 489 direct and indirect jobs during the peak 12 months of construction
- up to \$29 million and 34 direct and indirect jobs annually during operations.

Across the State, the project will contribute:

- up to up to \$339 million and 973 direct and indirect jobs during the peak 12 months of construction
- up to \$49 million and 92 direct and indirect jobs annually during operations.

While the project will provide economic activity to the regional and NSW economy, it will also result in some reduction in regional economic activity from forgone agricultural activity. The reduction in extent of the development footprint will reduce the amount of land removed from agricultural production.

The construction phase of the project will result in a temporary reduction in up to 1,792 ha of land available for agricultural activity – sheep and cattle (beef) grazing. The economic activity impacts associated with this are assessed as negligible, and the regional economic benefits of the project significantly outweigh the economic impacts of foregone agricultural activity. Further, the project landholders that are directly affected by loss of revenue will be compensated through lease payments as part of the project.

During operation of the project, there will be opportunities for sheep to graze parts of the development footprint. The economic assessment found that the impact of reduced agricultural production during operation of the project will be negligible. The amendment has removed 707 ha from the development footprint, further reducing impacts agricultural production during operations.

6.12.3 Mitigation measures

The proposed amendments do not warrant additional mitigation or management measures in relation to economic impacts. As such, the proposed measures to manage and mitigate potential economic impacts remain unchanged from the EIS and are listed in full in Appendix C.

6.12.4 Conclusion

The construction and operation of the project will have net positive impacts on the level of economic activity in the regional and NSW economy.

The amended project has reduced the extent of the development footprint, and therefore there is a reduction in the total area within the Murrumbidgee LGA that will be temporarily removed from agricultural production during construction and operation of the project. Spark Renewables will work in partnership with Murrumbidgee Council and the local community to minimise potential impacts and maximise benefits to the regional economy.

6.13 Waste

As noted within Section 6.13 of the EIS, the project will produce waste streams during the construction and decommissioning. Minor quantities of waste will also continue to be generated during operations. The amendment will not alter the waste streams, quantities and management details presented in the EIS.

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

The conceptual waste management plan provided in Appendix F of the EIS will be updated during detailed design to form the project's waste management plan, which will be reviewed throughout the life of the project in consultation with DPHI and Murrumbidgee Council. The proposed measures to manage and mitigate potential waste impacts remain unchanged from the EIS and are listed in full in Appendix C.

6.14 Cumulative

6.14.1 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). An assessment of the potential of known projects to generate cumulative impacts with the project was completed based on the *Cumulative impact assessment guidelines for State significant projects* (DPE 2022d). As outlined in the EIS, there are nine recently approved or proposed SSD and SSI projects approximately 50 km from the project area, as identified through DPHI's Major Projects Planning Portal at the time of writing the EIS. Of these, five projects are adjacent to or within 1 km of the project area:

- Dinawan Wind Farm (proposed – responding to submissions) – includes construction and operation of 1.2-GW wind farm.
- Project EnergyConnect (approved – under construction) – includes construction and operation of 330-kV and 500-kV transmission line and Dinawan Substation.
- Argoon Wind Farm (proposed – preparing EIS) – includes the construction and operation of 477-MW wind farm and BESS.
- Victoria to New South Wales Interconnector West (VNI West) (proposed – preparing SEARs) – includes construction and operation of 500-kV transmission line.
- Yanco Delta Wind Farm (approved – not yet constructed) – includes construction and operation of 1.5-GW wind farm.

No additional SSD and SSI projects have been identified beyond those identified in the EIS.

6.14.2 Assessment of cumulative impacts

Transmission infrastructure to support the distribution of electricity generated by renewable energy developments 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 process, will dictate which of the projects listed in Table 6.34 of the EIS will be built. It is highly unlikely that all of the projects will be approved and built and therefore, this assessment of cumulative impacts is considered conservative.

The cumulative impacts of employment and workforce, housing and short-term accommodation, regional economy, agricultural production, population change, services, amenity, traffic, and biodiversity were assessed in the EIS.

The amendment has reduced the cumulative impacts to biodiversity, particularly impacts to the State and Commonwealth listed Weeping Myall TEC and the Commonwealth listed Natural Grasslands of the Murray Valley Plains TEC.

All other cumulative impacts are not materially altered due to the amendment.

6.14.3 Mitigation measures

Project influences on cumulative impacts with other developments have been considered and minimised where possible. A summary of mitigation measures proposed for the project is provided in Appendix C.

6.14.4 Conclusion

There are a range of renewable energy generation and transmission developments proposed 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 dictate 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 proposed construction accommodation facility will minimise the contribution of the Dinawan Solar 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.

7 Justification of amended project

This chapter provides a justification and evaluation of the amended 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 justification of the project, as described in the EIS, remains valid. The project is consistent with relevant Commonwealth, State, regional and local strategic plans and policies, in particular the *NSW Electricity Infrastructure Investment Roadmap*, which sets out the plan to deliver REZs in NSW. The project will contribute to the energy generation and storage targets for the South West REZ, with an indicative capacity of around 800 MW and storage of up to 300 MW for a duration of up to two hours (600 MWh).

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 energy 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 solar and battery project due to the available solar 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.

The amended development footprint further avoids environmental and social impacts, including avoidance of a further 651 ha of BC Act listed TEC (41% reduction) and 147 ha of EPBC Act listed TECs (99% reduction), avoidance of a further three additional Aboriginal heritage sites, avoidance of a further 707 ha of agricultural land and increased buffer distance between the development footprint and nearby private and public receptors to further minimise visual impacts of the project.

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 energy 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's 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 2.5). 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 amendments have reduced the EIS development footprint by 28%, further avoiding and minimising environmental impacts, particularly biodiversity impacts. The amended development footprint avoids a further 651 ha of a BC Act listed TEC (41% reduction) and 147 ha of two EPBC Act listed TECs (99% reduction).

The amended development footprint is the most appropriate area for the project infrastructure based on inputs provided during consultation activities with regulatory and community stakeholders, environmental assessments 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 have minimised environmental impacts and/or implement mitigation measures, as summarised in Appendix C, to manage the extent and significance of residual impacts. Residual biodiversity impacts will be offset by establishing local biodiversity stewardship sites and payment into the Biodiversity Conservation Fund.

The placement of infrastructure and the extent of construction activities will be refined during detailed design prior to the commencement of construction to further maximise avoidance, consistent with the project's avoidance and minimisation objectives.

7.3 Strategic context

The project is supported by Commonwealth, State, regional and local plans and policies and will support meeting the Commonwealth and State governments' renewable energy generation targets and GHG emission reduction targets. Importantly, the project will contribute to the continued growth of renewable energy generation and storage capacity in the South West REZ.

7.4 Objects of the EP&A Act

An assessment of the consistency of the amended 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 footprint include land that is being used for sheep and cattle 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, 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, and 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 in the EIS and amendment report, have significantly 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 suitable recovery or relocation and documentation and analysis 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 report describes the economic, environmental and social context of the amended 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 renewable energy generation and storage capacity, as well as providing energy 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 controls. The project is permissible with consent, is consistent with statutory and strategic planning controls and is adjacent to significant proposed energy transmission infrastructure. As detailed in this report, the project will result in positive economic impacts, with appropriate mitigation measures and management strategies being proposed to reduce any adverse environmental and social impacts.
To promote the delivery and maintenance of affordable housing.	Whilst this is not directly applicable to the project, there is 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.

Table 7.1 Consistency with the objects of the EP&A Act

Object	Consistency with the project
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 in the EIS and amendment report, resulting in avoidance of significant biodiversity values and minimisation of impacts on other areas of native vegetation to the extent practicable. All unavoidable impacts will be offset in accordance with NSW Government policy and will include the establishment of stewardship sites near the project with generation of like-for-like credits. 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 footprint has been refined throughout the EIS and amendment report 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 impact any historical heritage sites.
To promote good design and amenity of the built environment.	The built environment of the project will not be accessible to the public and therefore the design and amenity is not directly applicable. However, the visual impact of the built components has been considered and minimised as part of design development.
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 receptors has been carefully planned to minimise potential hazards and risks. These will be refined during detailed design. 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 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 amended project and has sought community (and other stakeholder) feedback. The EIS and this amendment report provide further detailed information regarding the amended project and its potential impacts. The EIS was placed on public exhibition by DPHI, with community members able to make formal submissions. A submissions report has been prepared responding to matters raised in these submissions. This amendment report has been prepared to describe the amendments to the project, including to address matters raised in the public exhibition period.

7.5 Consideration of community views

Consultation conducted for the project is described in Chapter 5 of the EIS and Chapter 5 of this amendment report. 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.

During the public exhibition of the EIS, 82 public submissions objecting to the project were received by DPHI. Of the 82 submissions received, 79 were from individuals and 3 were from organisations. In addition, 11 regulatory agencies provided advice on the project, including Murrumbidgee Council. These have been addressed in a submissions report for the project.

7.6 Summary of project impacts

The EIS and this amendment report 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 have been considered as follows:

- Biodiversity – avoidance and minimisation of biodiversity impacts has enabled the progressive refinement of the development footprint, with avoidance of areas of higher conservation value, identified threatened species habitat and/or native vegetation maximised to the extent possible. The amendments have further reduced the residual impacts to biodiversity which include the removal of 1,783 ha of native vegetation and 128 ha of confirmed threatened species habitat requiring offsets and one hollow-bearing tree. Residual impacts that are not able to be avoided will be offset through a 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 survey, 16 identified sites were avoided, with a further three identified sites avoided by the amendments, with residual impacts to eight sites. Impacted sites will be subject to archival recording, recovery or relocation in consultation with the RAPs.
- Historical heritage – with the establishment of a no-go zone around one area of archaeological sensitivity, the project will not directly impact any historical heritage sites.
- Land resources – the project will result in a temporary change of land use for land within the development footprint, which has been reduced by a further 707 ha as part of the amended project. Land management will include agrisolar practices with sheep grazing within the solar farm, where practical, intended to continue throughout the life of the project. 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.

- Visual – the project will have a low to very low visual impact on most public viewpoints and the closest non-associated residences due to a combination of distance, existing intervening vegetation and low visual sensitivity of the landscape. The amendments have increased buffer distances to nearby private and public receptors (including R036, R049, Liddles Lane and Kidman Way) to further minimise visual impacts of the project. PV modules will be setback from Kidman Way to reduce the visibility of project infrastructure from the road corridor. Operational adjustments to PV module tracking will be implemented to avoid glint and glare impacts along Cadell Road, Bundure Road, Liddles Lane and Kidman Way.
- Noise – Project construction is not predicted to impact non-associated residences, except the closest non-associated residence, R049, when construction activities are occurring within approximately 2 km of the dwelling. The amendments have increased buffer distances to R049 from 530 m to 656 m. Construction noise management measures will be implemented to minimise noise impacts to R049. Noise during operations is predicted to comply with operational noise criteria at all assessment locations.
- 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 and sealing part of Bundure Road, constructing new site access intersections on Kidman Way and upgrading the existing intersection of Kidman Way, Bundure Road and Liddles Lane.
- Water – the project design minimises impacts to water resources by avoiding watercourses, infrastructure associated with CICL, flood prone areas and groundwater receptors. 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.
- Flooding – residual flood risks will be managed through construction phase planning. The majority of the PV array and 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.

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 to:

- up to \$339 million and 973 direct and indirect jobs across the State during the peak 12 months of construction
- up to \$49 million and 92 direct and indirect jobs across the State annually during operations.

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 and the local community to minimise potential impacts and maximise benefits to the regional economy.

Spark Renewables has engaged with Murrumbidgee Council and the local community to identify urgent needs, long-term initiatives and other opportunities to assist in the development of the Community Enhancement Fund (an initiative of Murrumbidgee Council) and other benefit schemes. Since the exhibition of the EIS, Spark Renewables and Murrumbidgee Council have agreed on a community benefit sharing program that is

predominantly delivered in partnership with the council through a VPA. The key terms of the community benefit sharing program and VPA are outlined in Section 5.3.

7.6.3 Social

The project is justified on social grounds for three principal reasons:

- 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 fuel, 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. Additional mitigation measures have been proposed following the exhibition of the EIS, in response to submissions from NSW Rural Fire Service and Murrumbidgee Council and engagement with Argoon Rural Fire Brigade.

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— - careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and - an assessment of the risk-weighted consequences of various options.	During the project planning phase and preparation of the EIS and this amendment report, 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 for all potential environmental impacts. The implementation of these measures will 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. The unavoidable biodiversity impacts will be compensated through the provision of local biodiversity stewardship sites and payment into the Biodiversity Conservation Fund to protect habitats in perpetuity. Once decommissioned, the land within the development footprint can be rehabilitated to its current use if required, allowing continued renewable energy generation or a return to agricultural production, both of 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 was a fundamental consideration in the development of the project. The location of the project on disturbed land, with a long history of agricultural use, means that the biodiversity value of the land is lower than for areas with remnant vegetation. The development footprint has been sited to minimise impacts to biodiversity values where possible. Specifically, the development footprint was refined in the EIS and this amendment report to avoid areas of high biodiversity value once these areas were identified by extensive vegetation mapping and targeted surveys undertaken as part of the BDAR. Residual biodiversity impacts will be offset by establishing local biodiversity stewardship sites and payment into the Biodiversity Conservation Fund. Management and mitigation measure have also been prescribed to minimise and manage impacts on biodiversity during construction and operations (Appendix C). Therefore, the conservation of biological diversity and ecological integrity has been a fundamental consideration in the design of the project and the proposed management measures.

Table 7.2 **Consideration of principles of ecologically sustainable development**

Principle	Ecologically sustainable development principle	Evaluation of project impact against principle
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 energy, which supports the transition away from fossil fuel (coal and gas) energy generation, thereby contributing to a net reduction in the generation of pollution and the use of 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 will be captured for reporting to impacted stakeholders including neighbouring landholders, communities and government on progress and achievements
- include key performance indicators, targets and outcomes
- nominate responsible parties
- describe mechanisms for ongoing 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:

- The project's generation and storage 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 report, it has been assumed that the project will connect to Dinawan Substation and project infrastructure will be housed within the full extent of the development footprint to generate and store energy.
- Potential cumulative impacts associated with the project have been addressed in the relevant specialist assessments; however, there remains significant uncertainty as to which other projects in the region will proceed, and the timing of the projects that do proceed. The cumulative impact assessment assumptions are documented in the EIS and this amendment report and, if required, can be updated in response to additional information during future stages of the assessment process.

7.10 Conclusion

The project involves the development and operation of a large-scale solar PV generation facility along with battery storage and 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 residual environmental and social impacts identified throughout the EIS and this amendment report will be managed through the mitigation, management and offsetting measures described throughout, such that the project will not result in significant residual impacts on the environment or the local community.

The project will provide the following overall benefits:

- contribution to energy security and reliability in NSW by diversifying the State's energy mix and helping to prepare for the retirement of large-scale coal-fired power generation
- it will contribute 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 and more broadly, the regional economy
- provision of significant employment and business opportunities during construction.

The impacts of the Dinawan Solar Farm, as amended in this amendment report, 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.

Abbreviations

AC	alternating current
ACHA	Aboriginal cultural heritage assessment
AEMO	Australian Energy Market Operator
AEP	annual exceedance probability
AEP	annual exceedance probability
ALUM	Australian Land Use and Management
BDAR	biodiversity development assessment report
BESS	battery energy storage system
BSAL	biophysical strategic agricultural land
BSAL	biophysical strategic agricultural land
CICL	Coleambally Irrigation Co-operative Limited
cm	centimetre
CTMP	construction traffic management plan
DA	development application
DPHI	NSW Department of Planning, Housing and Infrastructure
EIS	environmental impact statement
EMM	EMM Consulting Pty Limited
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
GDE	groundwater dependent ecosystems
GHG	greenhouse gas
GW	gigawatt
ha	hectares
IPC	Independent Planning Commission
IPC	Independent Planning Commission
km	kilometres
LCZs	landscape character zones
LGA	local government area
LOS	level of service
LRET	Large Scale Renewable Energy Target
LSC	land and soil capability
LUCRA	land use conflict risk assessment
LVIA	landscape and visual impact assessment
ML	megalitres

MVA	megavolt ampere
MW	megawatts
MWh	megawatt hours
NEM	National Electricity Market
NSW	New South Wales
O&M	operations and maintenance
OSOM	oversize overmass
PCT	plant community type
PCU	power conversion unit
PHA	preliminary hazard analysis
PV	photovoltaic
RAP	registered Aboriginal party
REZ	Renewable Energy Zone
SIA	social impact assessment
Spark Renewables	Spark Renewables Pty Limited
SSAL	Stage Significant Agricultural Land
SSD	state significant development
TEC	threatened ecological community
TfNSW	Transport for NSW
TNB	Tenaga Nasional Berhad
WAL	water access licence
WRA	water resources assessment

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Appendix A

Amended project description

A.1 Overview

The project comprises a large-scale solar PV generation facility, BESS and supporting infrastructure (Figure A.1). The project will have a generation capacity of up to approximately 800 MW (AC). The BESS will have a capacity of up to approximately 300 MW (AC coupled) with the provision for up to 2 hours of storage (600 MWh). The project area, physical layout and design, activities and project timing are detailed in the following sections. A project summary is presented in Table A.1.

Table A.1 **Project summary**

Project element	Summary
Project area	Approximately 3,257 ha, comprised of 48 land parcels (Table A.3 and Figure A.2).
Development footprint	Up to 1,792 ha (Figure A.1).
Generation capacity	Up to 800 MW (AC).
Storage capacity	300 MW (AC coupled), up to 2 hours of storage (600 MWh).
Key infrastructure	• up to approximately 2 million PV modules and associated infrastructure • power conversion units (PCUs) (comprising inverters, medium voltage transformers and switchgear) • two BESS locations and associated infrastructure • electrical collection system, up to two substations and control rooms • transmission line infrastructure connecting the project substations to the Dinawan Substation • operations and maintenance (O&M) infrastructure, including: – site offices and amenities – equipment and maintenance sheds – water tanks – laydown, storage and parking areas • temporary construction facilities, including: – worker accommodation facility – construction compounds – site offices and amenities – laydown areas – construction materials storage – water tanks – storage and parking areas.
Workforce	Approximately 400 personnel during peak construction. Up to 10 full-time employees and varying numbers of contractors during operations.
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 18–36 months. Operations: 25–35 years with potential to extend.

Table A.1 **Project summary**

Project element	Summary
Roads	Site access points will be on Kidman Way and Bundure Road. Upgrades to the local road network: • new staggered T-intersections on Kidman Way to provide access to the eastern and western sections of the development footprint (intersection design has been altered from the original four-way intersection) • upgrades to the existing intersection of Kidman Way, Bundure Road and Liddles Lane (the design has been updated following completion of the strategic design for this intersection) • upgrades to Bundure Road between Kidman Way and the site access points. While no vehicles from Dinawan Solar Farm are proposed to use Liddles Lane, minimum upgrade requirements for turn treatments from Kidman Way onto Liddles Lane have been included to meet relevant design guidelines. An internal network of access tracks within the development footprint: • access to the eastern and western sections of the development footprint from Kidman Way • access to the eastern sections of the project from Bundure Road.
Transport	• Maximum daily heavy vehicle movements (construction, upgrading and decommissioning): 334 • Maximum daily light vehicle movements (construction, upgrading and decommissioning): 284 • Total over-dimensional vehicle movements (construction, upgrading and decommissioning): 17 Movements account for one vehicle entering the site and one vehicle leaving the site. Light vehicle movements include predicted shuttle bus movements associated with the transfer of workers from the accommodation facility to their active work areas.
Subdivision	Subdivision of the following lots may be required to create new allotments for the substations and/or switchyards: • Lot 6 of DP 594041 • Lot 125 of DP 756444 • Lot 22A of DP 756444 • Lot 1 of DP 113903 • Lot 112 of DP 756444.
Decommissioning and rehabilitation	All aboveground project structures will be removed and the land disturbed by the project rehabilitated, generally to its pre-existing land use, as far as practicable.

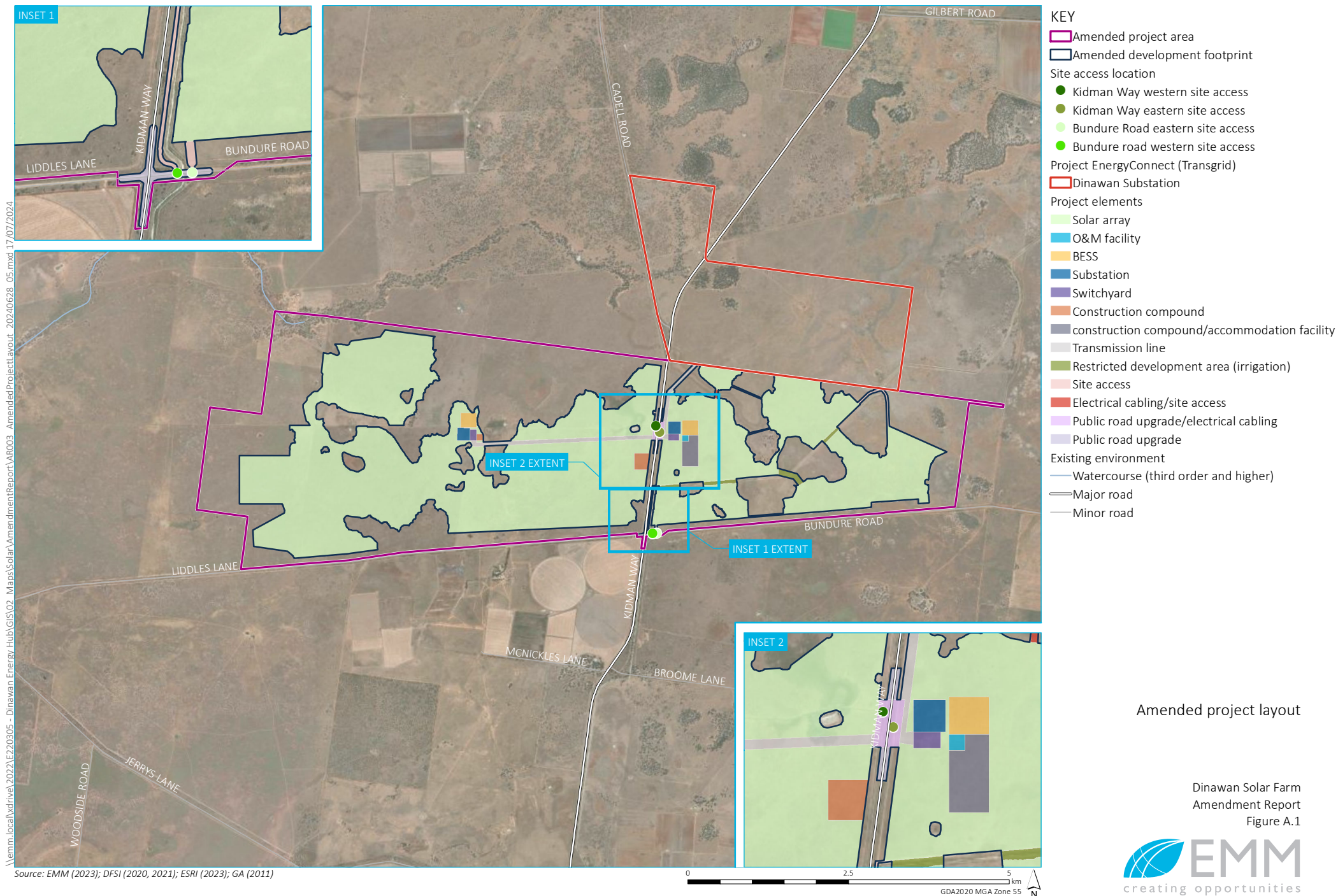
A.2 Project area

The majority of the land within the project area is privately owned, and can be considered as two distinct areas, one to the west of Kidman Way and one to the east. The eastern and western areas will be connected via an overhead or underground line (this is described further in Section A.3.2). The project areas are summarised in Table A.2.

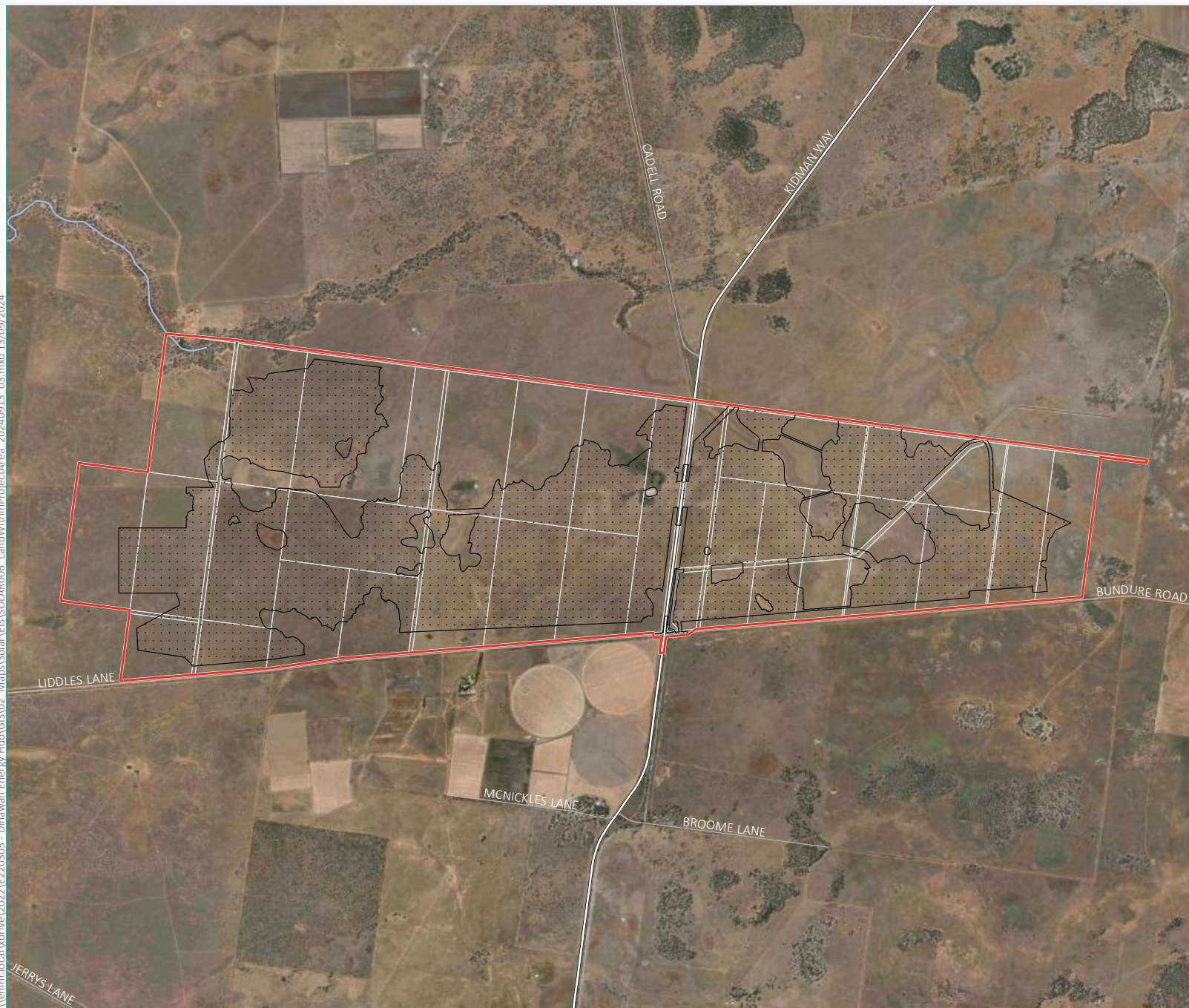
The cadastral boundaries in the project area are shown in Figure A.2 and the schedule of land is provided in Table A.3.

Table A.2 **Project areas**

Area name	Definition	Approximate area (ha)
Project area	The land required for the project (includes public roads and Coleambally Irrigation Channel). The project area contains the entirety of all 48 lots (Table A.3 and Figure A.2) that overlap with the development footprint. The project area includes parts of Kidman Way, Bundure Road and Liddles Lane (including the road easement) and Coleambally Irrigation Channel where site access (via existing bridges) and/or electrical cabling crossings may be required.	3,257
Development footprint	The development footprint is wholly within the project area. The development footprint is the maximum extent of ground disturbing works associated with the construction and operation of the project. The development footprint has been refined to avoid and minimise impacts where possible based on the outcomes of the technical assessments and stakeholder engagement (refer to Table 2.2 of this amendment report). Approval is sought to disturb anywhere within the development footprint.	1,792



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KEY

- Project area
- Development footprint
- Cadastral boundary
- Existing environment
- Watercourse (third order and higher)
- Major road
- Minor road

Cadastral boundaries within the amended project area

Dinawan Solar Farm
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Figure A.2

Table A.3 **Schedule of land within the project area**

Lot	DP	Lot	DP
4	44554	46	756396
1	113903	47	756396
6	113903	48	756396
7	113903	133	756396
8	113903	134	756396
9	113903	22A	756444
10	113903	23	756444
1	532988	24	756444
2	532988	26	756444
3	532988	27	756444
4	532988	28	756444
5	532988	32	756444
6	532988	107	756444
7	532988	108	756444
8	532988	109	756444
5	594041	110	756444
6	594041	111	756444
7	594041	112	756444
40	756396	113	756444
41	756396	114	756444
42	756396	125	756444
43	756396	2	1244278
44	756396	3	1244278
45	756396	3	1274586

Within the development footprint, approximately 466 ha will be required for the rows of PV modules. The remaining development footprint (approximately 1,326 ha) will include power conversion units (PCUs), space between the rows, internal access tracks, associated infrastructure (including substations, switchyards and BESS) and undeveloped areas. These numbers are indicative only and are subject to change during detailed design. The development footprint also includes land required for connection infrastructure between the eastern and western solar farm areas.

This report assumes that the entire development footprint (1,792 ha) will be disturbed. However, this is unlikely to occur. Rather, the development footprint provides flexibility for Spark Renewables to optimise the project layout and respond to any constraints identified during detailed design. For example, detailed geotechnical investigations would inform the suitability of specific areas for the installation of PV modules and other infrastructure during detailed design.

A.3 Physical layout and design

A.3.1 Solar farm

The solar farm generation capacity will be up to approximately 800 MW (AC). The solar farm will include PV modules mounted on single-axis tracking systems, configured in rows positioned to maximise the use of the solar resource. Approximately 2 million PV modules will be installed. However, the final design will depend on a range of factors including module technology, available grid capacity, economics, grid connection and environmental constraints.

The PV modules will be installed in parallel rows, with an indicative spacing of 5–10 m between each row. The rows of PV modules will be aligned in a north-south direction, allowing the modules to rotate from east to west during the day, tracking the sun's movement.

The PV modules will be supported on mounting frames consisting of vertical posts ('piles') and horizontal rails ('tracking tubes'). Rows of piles will be driven or screwed into the ground, depending on the geotechnical conditions, and the supporting racking framework will be mounted on top. Pre-drilling and/or cementing of foundations will be avoided, and will only be used where required by geotechnical conditions.

The PV modules will be up to 2.5 m from ground level when horizontal. The lower edge of each PV module will be at least 0.3 m from ground level, when at the maximum tilt angle. The upper edge of each PV module is expected to be up to 4.7 m from ground level, when at the maximum tilt angle, assuming a '2 in portrait' (2P) configuration (i.e. worst case assumption for visual impact assessment). Should a 1P configuration be selected, the maximum height of the PV modules will be up to 3 m above ground level. Examples of '1 in portrait' (1P) and 2P configurations are shown in Plate A.1 and Plate A.2.



Source: NexTracker (2018)

Plate A.1 **Example of a PV module layout (2 in portrait or 2P configuration)**



Source: NexTracker (2018)

Plate A.2 **Example of a PV module layout (1 in portrait or 1P configuration)**

Cables connecting each module together, will be strung underneath the PV modules, or housed in cable trays or the tracker tubes. Underground cables will then connect a series of modules (an array) to a PCU. The function of a PCU is to convert the electricity generated by the PV modules from ‘direct current’ (or DC) into ‘alternating current’ (or AC) for distribution by the electricity grid. Power conversion units comprise of inverters, medium voltage transformers and switchgear. They are typically containerised (20-foot or 40-foot shipping containers) or skid-mounted (with the cabinets and transformers mounted on either a steel platform or a thin concrete pad) (Plate A.3). The number, dimensions and configuration of PCUs will be determined during detailed design.



Source: Spark Renewables (2023)

Plate A.3 Example of a skid-mounted power conversion unit (PCU)

A.3.2 Electrical collection system

Groups of PV modules will be connected to a PCU, and groups of PCUs will be connected to an on-site substation by underground or aboveground cables. Connections will include power, earthing, and communications cables. Cabling will be underground or aboveground depending on a range of technical factors including distance to the substation, existing landscape features and geotechnical conditions.

The exact routes of overhead and underground lines within the development footprint will be determined as part of detailed design.

Underground cables will be installed at a depth of at least 600 millimetres (mm) below ground level. Power poles carrying 33-kV lines within the development footprint are expected to be between 10–20 m tall. The distance between power poles will be dependent on the type used.

The eastern and western sections of PV module arrays will be connected via an underground or overhead line crossing Kidman Way. The indicative location of this crossing is shown in Figure A.1.

Lines may also need to cross Coleambally Irrigation Channel within the areas labelled 'restricted development area (irrigation)' in Figure A.1. Spark Renewables have consulted with CICL regarding suitable design and construction methods for these crossings. The preferred approach to cable crossings is underground via trenching. Work will be scheduled during times when the Coleambally Irrigation Channel is typically dry. Spark Renewables will continue to consult with CICL regarding cable crossings of the Coleambally Irrigation Channel during detailed design and will agree to designs, construction methods and timing prior to construction.

A.3.3 On-site substations

There will be up to two on-site substations that would convert the electricity generated from 33-kV to either 330-kV or 500-kV for export to the Dinawan Substation. The substations will each contain a 33-kV to 330-kV or 500-kV transformer along, with the necessary switchgear located in an adjacent switchyard.

The on-site substations will be located on both the eastern and western side of Kidman Way as shown in Figure A.1. The substations will have a footprint of up to approximately 4 ha each and switchyards will have a footprint of up to 1.7 ha each. Where the full extent of the indicative footprint for the substation and/or switchyard is not required, PV modules and other ancillary infrastructure may be placed within that area, subject to detailed design.

The substations will have lightning protection extending to a height of up to 20 m.

A.3.4 Subdivision

The on-site substation sites will be within:

- Lot 6 of DP 594041
- Lot 125 of DP 756444
- Lot 22A of DP 756444
- Lot 1 of DP 113903
- Lot 112 of DP 756444.

Subdivision of these lots may be required for the construction, operation and maintenance of the substations.

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.

All land surrounding the development footprint is zoned RU1 Primary Production under the Jerilderie LEP (refer Figure 2.2 of the EIS), with associated minimum lot sizes of 213 ha. The subdivision of the lots will result in lot sizes that are less than the minimum lot size under the Jerilderie LEP. Notwithstanding, in accordance with the provisions of section 4.38 of the EP&A Act, the proposed subdivision would be permissible subject to the approval of the Minister for Planning and Public Spaces or their delegate.

Once the locations of the substations are determined and it is confirmed that subdivision is required, the proposed subdivision will be discussed with Murrumbidgee Council, DPE and the project landholders.

The development footprint will be leased under a private arrangement with the landholders. As the development footprint has been refined to minimise environmental impacts, it does not follow cadastral boundaries. Therefore, subject to detailed design, the project may be required to create a lease subdivision over individual lots. The intent of a lease subdivision is administrative and no actual subdivision would take place to create a new freehold lot.

A.3.5 Battery energy storage system

i Purpose

Solar energy generation is intermittent, with generation dependent on factors including the time of the day, the time of the year and weather conditions. Batteries mitigate these natural fluctuations by storing electricity and dispatching it when required. The BESS will have a capacity of up to approximately 300 MW (AC coupled) and will have provision for up to 2 hours of storage (600 MWh).

The BESS will allow the storage of renewable energy and its export to the grid for use during peak demand.

The BESS will also provide ‘firming capacity’ to the NEM. That is, it will provide electricity to smooth out fluctuating supply to the grid and could also provide frequency control and ancillary services to ensure that the integrity of the electricity grid is maintained through unexpected contingency events.

ii Components

Two locations have been selected for BESS infrastructure as shown in Figure A.1. The locations are adjacent to each of the proposed on-site substations. Each BESS will have a footprint of up to 5.8 ha, which is sufficient to house a BESS of the nominated capacity whilst accounting for necessary separation distances between individual battery units (refer to Section 6.9 and Appendix D.6 of this report). PV modules and ancillary infrastructure may also be placed within the BESS sites.

The major components of each BESS will be:

- batteries to store electricity – likely a lithium-ion technology
- bi-directional inverters to convert DC current to AC current (when exporting electricity) and vice versa (when importing electricity)
- transformers to step up the voltage – skid-mounted transformers will be installed adjacent to each inverter
- heating ventilation air conditioning (HVACs) – to maintain the batteries at a temperature that will optimise their lifetime and performance
- fire protection – the BESS will likely have an active gas-based fire protection system with thermal sensors and smoke/gas detectors connected to a fire control panel.

Battery modules are the key building block in a utility-scale BESS and are capable of both storing and discharging energy at a rapid rate. Battery modules are installed in racks, then the racks are wired together in strings, and strings of batteries are connected to the inverter stations.

The batteries will be housed in self-contained steel enclosures (about 8-m-long, 2-m-wide and up to 3-m-tall) resembling shipping containers.

Due to rapidly evolving technology, the final choice of battery storage technology, capacity and housing will be determined as part of detailed design, to meet the performance standards of the project and Australian Standards and legislated safety requirements.

A.3.6 Network connection

Dinawan Substation is the proposed point of connection to the electricity network. Dinawan Substation will be constructed on land adjacent to the project area (Figure A.1).

An overhead 330-kV or 500-kV transmission line will connect the on-site substations to the Dinawan Substation. The transmission towers are expected to be between 40–80 m tall. The distance between transmission towers will be dependent on the type of structure used. The indicative grid connection corridor is provided on Figure A.1. The design and precise location of the overhead transmission line will be determined as part of detailed design.

The part of the overhead 330-kV or 500-kV transmission line within the development footprint is considered as part of this application. The part 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. The footprint nominated for Dinawan Substation provides sufficient space for renewables connections.

The solar farm and BESS will be registered as separate generating units in the NEM. Electricity generated by the solar farm will be exported to the grid or used to charge the BESS. When discharging, the BESS will export its electricity to the grid. As such, they are independent and distinct, but related, uses of the development footprint.

A.3.7 Supporting infrastructure

Supporting infrastructure required during construction and operations will include:

- temporary construction facilities, including:
 - construction compounds
 - site offices and amenities
 - laydown areas
 - construction materials storage
 - water tanks
 - storage and parking areas
 - worker accommodation facility
- O&M infrastructure, including:
 - site offices and amenities
 - equipment and maintenance sheds
 - water tanks
 - laydown, storage and parking areas.

Indicative locations for temporary construction facilities are shown on Figure A.1.

O&M infrastructure will be co-located with the BESS areas shown on Figure A.1 with their exact location confirmed during detailed design.

Security fencing will be installed around the perimeter of the solar farm (within the development footprint) and around high voltage electrical equipment such as the BESS and on-site substation. Signage will clearly identify hazards within the development footprint.

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 footprint may be landscaped as required.

i Temporary worker accommodation facility

A temporary worker accommodation facility for non-local construction employees (where skills cannot be sourced locally) will be established as part of the early stages of the project's construction. The facility will accommodate up to 400 workers (including carparking).

It is expected that the majority (approximately 75%) of the project's peak construction workforce will stay at the accommodation facility. Approval is sought for a facility to accommodate the project's peak workforce. The facility will principally accommodate employees and long stay contractors. Visitors and short stay contractors may also be accommodated.

The demountable units may be built in stages up to the 400-person capacity as construction of the project progresses. The capacity of the facility will continuously be monitored in relation to construction progression, with enough beds at any given time to accommodate approximately 75% of the construction workforce (based on the assumption that approximately 25% of the workforce will be locally based and therefore will not require accommodation on-site).

A design using modular and relocatable single rooms/quarters will enable the accommodation facility to be 'scaled up' and then 'scaled down' in order to accommodate the requisite number of commuting workers. The accommodation facility may also accommodate a proportion of the construction workforce for Dinawan Wind Farm.

An indicative footprint for the worker accommodation facility is provided on Figure A.1. The nominated footprint is approximately 12.1 ha and includes land required for the accommodation facility, a construction compound and an O&M facility. The exact location of the facility within the nominated footprint will be determined during the detailed design stage of the project; however, all components will sit within the development footprint identified for the accommodation facility.

The nominated footprint for the worker accommodation facility has been selected based on its:

- distance from sensitive receptors (with consideration of matters such as compliance with noise criteria, traffic, transport and accessibility impacts, dust and light spill) – the facility is approximately 3.4 km from the closest residence
- accessibility from Kidman Way – the facility is set back approximately 400 m east of Kidman Way and can be accessed via the site access point.
- proximity to key construction activities.

The facility will include:

- modular and relocatable single rooms/quarters
- office building
- wet 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.

A.3.8 Site access

i Public roads

Vehicles will travel to the site (Figure 1.1 of the amendment report) from the:

- north – travelling south along Kidman Way
- east – travelling west along the Sturt Highway before turning onto Kidman Way
- south – travelling along the Newell Highway before turning onto Kidman Way.

New staggered T-intersections will be constructed on Kidman Way at the site access points (Figure A.1). This will provide access to the eastern and western parts of the development footprint. The intersections will be constructed within the development footprint and Kidman Way road reserve. The location is shown in Figure A.1 and a strategic design is provided in Attachment D of the Traffic Impact Assessment (see Appendix D.5 of this report).

Upgrades to the intersection of Kidman Way, Bundure Road and Liddles Lane will also be required to reduce impacts on through traffic on Kidman Way and facilitate more frequent light and heavy vehicle movements onto Bundure Road during construction. Bundure Road will provide access to the eastern part of the development footprint. The intersection upgrades will be constructed within the development footprint and Bundure Road, Liddles Lane and Kidman Way road reserves. The location is shown in Figure A.1 and a strategic design is provided in Attachment D of the Traffic Impact Assessment (see Appendix D.5 of this report). No project-related traffic is proposed along Liddles Lane; however the strategic design for the intersection at Kidman Way/Bundure Road/Liddles Lane includes some improvements at the intersection of Kidman Way/Liddles Lane for road safety.

ii Internal tracks

An internal network of access tracks will be established. Subject to detailed design, internal access tracks will include:

- a perimeter track up to 6-m-wide
- internal access tracks between 2- and 6-m-wide, for manoeuvring between the module sections.

All internal access tracks will be unsealed. The internal tracks will provide access during construction, for maintenance during operations, and for emergency response.

Existing bridges across the Coleambally Irrigation Channel will be utilised for site access to the southern part of the development footprint east of Kidman Way (Figure A.1).

A.3.9 Services

There is no existing water, sewerage or electricity infrastructure on-site. The accommodation facility will require water, telecommunications, sewage treatment, electricity, diesel, grease and waste management. This will include:

- Potable water will be delivered to the accommodation facility by truck weekly, 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 or 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. It may also be appropriate to use treated water 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 1997*, and therefore an environment protection licence (EPL) will not be required.
- Telecommunications utilities are not available. As such, the cellular network will be used during construction.
- Electricity may be generated on-site using solar panels and batteries. Electricity may also be sourced via the local distribution network, where available and via diesel generation where access to the grid is unavailable.
- Diesel will be delivered weekly and stored within storage tanks that comply with the relevant standards.
- The kitchen will be equipped with a grease trap that will be pumped out regularly, depending on capacity and grease waste generated.
- The accommodation facility 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 operations.

There is an existing 11 kV overhead transmission line running generally north-south within the road corridor west of Kidman Way. Consultation with Murrumbidgee Council and the asset owner will occur during detailed design if impacts to the ongoing utility of this asset are identified. Temporary adjustments to part of the 11 kV line may be required to enable safe passage of oversize overmass (OSOM) vehicles into the development footprint. This could involve raising the line to an appropriate height at the site access point or burying part of the line.

A.4 Uses and activities

A.4.1 Construction

i Site preparation

Temporary construction infrastructure will include the worker accommodation facility, construction compounds, laydown areas and internal access tracks. Minor earthworks may be required for the preparation of the development footprint, including site levelling, access track formation and drainage works. Due to the flat landscape within the development footprint, site levelling is unlikely to be required over the majority of the site. More extensive earthmoving may be required for cut/fill where a level pad is required for project components (e.g. on-site substations and BESS).

Site preparation works will include:

- public road upgrades
- site survey to confirm infrastructure placement
- construction of access tracks
- installation of boundary fences

- establishment of temporary construction areas, including:
 - construction compound(s)
 - worker accommodation facility
 - laydown and parking areas
 - construction materials storage areas
- installation of temporary construction offices and buildings
- additional geotechnical investigations to confirm ground conditions.

Management measures will be implemented as part of site preparation works to mitigate potential impacts on the environment and receptors. This 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 placed to minimise potential environmental impacts during construction.

ii Accommodation facility

Construction of the worker accommodation facility 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 accommodation facility 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 footprint will provide an asset protection zone (APZ) between bushfire hazards and buildings (including roads) that is compliant with the relevant standards.

The facility itself would be operated by a staff of about 5-10, including administration, cleaning, food preparation, maintenance and security staff. Once operational, the 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 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 construction of the project, the accommodation facility may be maintained for use by the construction workforce associated with other developments in the region (including Dinawan Wind Farm), if this is approved as part of future development applications.

If these options are not pursued, the accommodation facility will be decommissioned when no longer required after the construction peak. 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 the accommodation facility
- installation of PV module piles
- installation of PV mounting structures and tracker tubes
- securing PV modules to tracker tubes
- installing electrical cabling
- installing PCUs
- erecting power poles and transmission towers and stringing lines and/or trenching and line installation
- installation of substations
- installation of BESS
- testing and commissioning project infrastructure.

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

iv Construction plant and equipment

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

- trucks to move material and infrastructure within the development footprint
- earthmoving plant
- cable trenching and laying equipment
- pile-driving equipment
- material handling equipment (forklifts and cranes)
- machinery and equipment for connection infrastructure establishment and installation of battery and energy storage devices
- water trucks for dust suppression
- light vehicles for personnel transport.

v Delivery of construction materials and infrastructure

Construction materials and infrastructure delivered to the development footprint will include:

- infrastructure associated with the worker accommodation facility
- PV modules
- piles

- tracking tubes and associated tracker equipment
- electrical infrastructure including cabling, power poles, PCUs, switching gear and substations
- BESS components
- permanent buildings and associated infrastructure
- earthworks and lifting machinery and equipment.

Construction materials and infrastructure will be transported to the development footprint via road. Heavy vehicles up to 26 m in length will be used. OSOM vehicles will deliver infrastructure associated with the worker accommodation facility and on-site substation transformers and switchgear.

vi Workforce

A peak workforce of approximately 400 personnel will be required on-site during construction.

The construction workforce will be sourced from the local area as far as practicable. Accommodation for non-local construction staff is expected to include a combination of:

- construction of a temporary worker accommodation facility within the development footprint (Section A.3.7i)
- reusing the Project EnergyConnect Dinawan Accommodation Camp (approved as part of SSI-9172452) located adjacent to the Dinawan Solar Farm development footprint, if possible and depending on availability
- use of available off-site accommodation within the local community.

vii Biodiversity offsets

The project's biodiversity offset credit requirement is provided in Section 8.3 of the amended BDAR (Appendix D.1 of the amendment report). The amended project requires 20,985 ecosystem credits (reduced from 40,229) to compensate for impacts to native PCTs and ecosystem credit species. The amended project also requires 1,799 species credits (reduced from 14,462) for impacts to threatened species.

A.4.2 Operations

i Activities

The facility will require regular maintenance throughout its operational life, including:

- vegetation maintenance
- weed and pest management
- fence and access road management
- drainage management
- servicing PV modules, inverters, transformers, the BESS, on-site substation, and other infrastructure, with repair or replacement of components where required.

PV modules may need to be washed periodically, depending on rainfall quantities on-site. Water for panel cleaning will be brought to the site. Washing will not require any detergent or cleaning agents.

Light vehicle access and occasional heavy vehicle access will be required during operations.

Sheep will be grazed on portions of the development footprint following the completion of project construction.

The operational workforce will also be responsible for ongoing security monitoring. Perimeter security cameras may be utilised to assist to monitor project infrastructure.

ii Workforce

Project operations will require up to 10 full-time personnel. Project operations will be supported by contractor roles for vegetation, weed and pest management, annual module cleaning and equipment calibration, internal road maintenance and facility cleaning.

A.4.3 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.

During decommissioning of project infrastructure, a temporary accommodation facility may be re-instated on the land previously used for the project's construction accommodation facility.

If the project is decommissioned, all aboveground project structures will be removed and the site rehabilitated generally to its pre-existing land use. 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.

A.4.4 Water demand

Water will be required during construction and operations. An estimate of water demand is provided in Table A.4.

Table A.4 Indicative water demand

Activity	Water requirement (ML)	Source
Construction (non-potable)	230 ML over 36 months	Water will be sourced primarily from existing extraction bores, located outside the project area, owned by landholders associated to the project, where each bore has an associated 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)	110 ML over 36 months	Trucked to site by commercial water provider.
Operations (non-potable and potable)	5 ML/year	During operations, water will continue to be sourced from groundwater sources via existing landowner bores; however, this will also be supplemented by other sources such as potable water trucked into site under commercial agreement and stored in tanks.

A.5 Timing

A.5.1 Construction

Project construction is expected to commence in 2025, subject to receiving the required approvals. Construction of the project is expected to be completed over approximately 18–36 months. It is anticipated that the project will be constructed in stages.

Construction activities will be undertaken during standard day time 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 be required on limited occasions. Murrumbidgee Shire Council and surrounding landholders will be notified of any work outside of these hours.

A.5.2 Operations

The project is expected to commence commissioning in 2026, likely in stages aligning with construction and subject to the availability of grid access.

The operational lifespan of the project is expected to be in excess of 25–35 years, depending on the solar PV technology implemented and energy market demands. The project will operate continuously, 24 hours per day, 7 days per week.

A.5.3 Staging

It is anticipated that the project will be constructed in stages.

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

1. construction of supporting infrastructure and grid connection works
2. construction of solar farm and associated infrastructure
3. construction of BESS and associated infrastructure.

As a conservative assumption, technical studies prepared for the EIS and this report have assessed the concurrent construction of Dinawan Solar Farm and part of the proposed adjoining Dinawan Wind Farm as it would have the greatest construction workforce demands and vehicle movements.

Subsequent stages of the project will be:

- operation (25–35 years)
- decommissioning (1–2 years).

Within the BDAR (Appendix D.1 of the amendment report), the development footprint has been divided into three areas to facilitate the staged retirement of the project's biodiversity credit liability, should it be required (refer Section 9.4 of Appendix D.1). Prior to works commencing in each area, the biodiversity offset associated with that area will be secured. The nominated offset areas could provide discrete packages for staging of offset obligations. Spark Renewables will confirm the offset staging plan with DPE prior to the commencement of construction.

Appendix B

Amended statutory compliance table

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
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 of the EIS and amendment report
	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 6 of the EIS and amendment report
		(c) the suitability of the site for the development.	Section 2.3 of the EIS and amendment report
		(e) the public interest.	Chapter 7 of the EIS and amendment report
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 and amendment report have been/will be submitted via the NSW planning portal and have been prepared in the approved form.
	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,	EIS Certification page
		(b) the name and address of the responsible person,	Section 1.4 of the amendment report

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
		(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,	Table A.3 in Appendix A of the amendment report
		(d) a description of the development, activity or infrastructure,	Chapter 3 and Appendix A of the amendment report
		(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 was prepared in accordance with the <i>State significant development guidelines – preparing an environmental impact statement</i> (DPE 2022e). This amendment report has been prepared in accordance with <i>State significant development guidelines – preparing an amendment report</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	EIS 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.	EIS Certification page
		(1) An environmental impact statement must contain the following –	

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
	Division 5, section 192	(a) a summary of the environmental impact statement,	Executive summary of the EIS and the amendment report
		(b) a statement of the objectives of the development, activity or infrastructure,	Section 2.1 of the EIS and amendment report
		(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 2.6 of the EIS
		(d) an analysis of the development, activity or infrastructure, including—	
		(i) a full description of the development, activity or infrastructure, and	Chapter 3 of the amendment report
		(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 of the EIS and amendment report Chapter 6 of the EIS and amendment report
		(iii) the likely impact on the environment of the development, activity or infrastructure, and	Chapter 6 of the EIS and amendment report
		(iv) a full description of the measures to mitigate adverse effects of the development, activity or infrastructure on the environment, and	Chapter 6 of the EIS and amendment report Appendix C of the amendment report
		(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 of the EIS
		(e) a compilation, in a single section of the environmental impact statement, of the measures referred to in paragraph (d)(iv),	Appendix C of the amendment report
		(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 of the EIS and amendment report

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
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 3.3.9 of the EIS
	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 6.7 of the EIS and amendment report Appendix D.5 (traffic) of the amendment report
Resilience and Hazards SEPP	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 6.9 of the EIS and amendment report Appendix E.9 (hazards) of the EIS

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
Jerilderie 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. The majority of the development footprint is zoned RU1 Primary Production. 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 will harness a natural resource, namely solar energy. While the development of this project will impact the availability of land for other primary production, it will allow for and encourage diversity in the area's land use and will provide economic stimulus and support to rural communities. The LUCRA has proposed mitigation measures to address identified land use conflicts.
	Clause 6.1	Earthworks (3) Before granting development consent for earthworks, the consent authority must consider the following matters— c) the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality of the development, d) the effect of the development on the likely future use or redevelopment of the land, e) the quality of the fill or the soil to be excavated, or both, f) the effect of the development on the existing and likely amenity of adjoining properties, g) the source of any fill material and the destination of any excavated material, h) the likelihood of disturbing relics, i) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area, j) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
	Clause 6.4	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 6.1 and Appendix D.1 (biodiversity) of the amendment report
	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 6.8 of the amendment report and Appendix E.8 (water) of the EIS

Table B.1 **Mandatory considerations for the project**

Statutory document	Section reference	Mandatory consideration	Section in EIS/amendment report
	Clause 6.7	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 6.1 and Appendix D.1 (biodiversity) of the amendment report Section 6.8 of the amendment report and Appendix E.8 (water) of the 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 6.1 and Appendix D.1 (biodiversity) of the amendment report

Appendix C

Amended mitigations measures

Note: New or updated mitigation measures as a result of the amendments have been **bolded**.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
Biodiversity	
B1	Detailed design of the project will: • avoid and minimise the loss of native vegetation and habitat (including the hollow-bearing tree and trees supporting nests) • 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 BCS. The BMP will include: • a plan for adaptive management and implementing, evaluating and reporting on the effectiveness of all mitigation measures • figures showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features (particularly important mapped areas of Plains Wanderer), revegetation areas and retained tree hollows • pre-clearing survey requirements and clearing protocols (e.g. occupation surveys for ‘no go’ threatened flora areas, application of exclusion measures/deterrents prior to vegetation clearing/earthworks and works undertaken in presence of spotter/catcher) • procedures for dewatering of farm dams and construction within waterbodies • procedures for unexpected threatened species finds (including stop work requirements and strategies to minimise, mitigate and potentially offset unexpected impacts to threatened species) • procedures for monitoring of retained vegetation areas, including collection of plots prior to construction (if no baseline data is applicable) and at year 1, 3 and 5 post construction • procedures for fauna handling, monitoring and management, including identification and reporting of fauna mortalities • 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 operations – ongoing consultation with Local Land Services and relevant stakeholders on fox and other pest animal control and baiting programs • opportunities for nature positive measures to promote habitat clusters and connectivity within the development footprint • 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 the Coleambally Irrigation Channel given the confirmed presence of Southern Bell Frog within this feature • performance targets, monitoring criteria, corrective actions, timing and responsibilities • annual reporting and consultation requirements.
B3	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 and allow for effective and quick responses.
B4	Noise during construction will be managed as part of the construction noise management plan.
B5	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.
B6	Remnant vegetation and fauna habitat within or surrounding the subject land but outside the development footprint will be managed toward a benchmark state using improve and maintain principles.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
B7	A groundcover management plan will be prepared as part of the BMP and will: – include locations of baseline and control AM plots used for ongoing monitoring – list procedures to ensure that no more than 40% of the solar array areas within PCT 26 (sparse) and PCT 26 (DNG) are subject to complete loss of groundcover during construction – targeted weed management measures to control and prevent the spread of noxious weeds – describe the biannual (spring and summer) monitoring program to assess the condition of PCT26 within the solar array areas for the first three years following commencement of operations – list performance targets for PCT26 vegetation integrity within the solar array areas – include a trigger, action, response plan (TARP) that identifies steps to be taken in response to a deterioration in vegetation integrity of PCT26 within the solar array areas (including reference to adaptive management, such as adjustment of weed treatment, slashing regimes and direct seeding). The plan will be subject to an independent audit following the completion of three years of monitoring. If set targets are not achieved, the full credit liability will be required to be retired for the relevant zones (i.e. up to an additional 6,164 ecosystem credits).
B8	Suitable habitat for the relocation of Southern Bell Frog detected within the development footprint will be determined prior to clearing taking place.
B9	Perimeter fencing will include 'fauna friendly' components at select points (including egress points).
B10	Dust suppression will be undertaken as required.
B11	A vehicle strike protocol will be prepared and fauna species susceptible to vehicle strike will be included in project inductions to increase knowledge of on-site wildlife.
Aboriginal Heritage	
AH1	Prior to commencement of construction, an Aboriginal Cultural Heritage Management Plan will be developed by a heritage specialist in consultation with DPE, the RAPs and Heritage NSW. The Aboriginal Cultural Heritage Management Plan will: • Include processes, timing, communication methods and project involvement (e.g. on site activities) for maintaining Aboriginal community consultation and participation during the project. This will include a grievance mechanism that is readily available and designed for use by the local Aboriginal community. • Detail methods for any additional investigative and/or mitigative archaeological actions that may be required prior to construction works commencing or during the project, including: – archival recording of all identified Aboriginal objects, sites and places – suitable recovery or relocation, documentation and analysis of any archaeological sites proposed for direct impacts, with consideration of the guiding principles for management of identified Aboriginal sites provided in the ACHA. • Describe actions to minimise any inadvertent impacts to identified Aboriginal objects and/or sites and areas of archaeological sensitivity outside of the development footprint, including: – cultural inductions for all personnel and subcontractors outlining their location and significance – fencing and clear marking of heritage sites and zones of interest in proximity to proposed works – any additional requirements identified by the Aboriginal community – a monitoring regime, including locations, methods, personnel and timing. • Describe methods for post excavation analysis and reporting of the archaeological investigations and activities implemented. For excavations, these will include suitable collection and processing of stone artefacts, and chronological, soil, and environmental samples. • Describe procedures for managing the unexpected discovery of Aboriginal objects, sites and/or human remains.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
	- Describe procedures for the curation and long-term management of recovered or relocated cultural materials - Describe processes for reviewing, monitoring and updating the Aboriginal Cultural Heritage Management Plan as the project progresses and in response to any changes to the project and development footprint.
AH2	Consultation will be maintained with the RAPs during the finalisation of the assessment process and throughout the project.
AH3	A copy of the ACHA will be lodged with AHIMS and provided to each of the RAPs.
AH4	AHIMS Site Recording Forms for the newly identified Aboriginal objects and/or sites within and in proximity to the project area, including areas of archaeological sensitivity, will be submitted to the AHIMS database.
AH5	If the heritage consultant changes through the project, suitable hand over will be undertaken to minimise loss or mistranslation of the intent of the information, findings and future steps in heritage management.
AH6	A heritage interpretation strategy will be developed through an ongoing consultation process between Spark Renewables and the RAPs.
Historical Heritage	
HH1	Any unexpected finds or human remains discovered during construction will be managed through an unexpected finds protocol.
HH2	Prior to construction works in the vicinity of this site, construction personnel will be made aware of the location of DEHS001 and the western boundary of the site will be clearly demarcated and appropriate markers/signage put in place to create a barrier to entry to prevent any potential indirect impacts.
Land	
L1	Soil management measures to preserve soil resources will include: - 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 operations - 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 operations - applying topsoil ameliorants and, where necessary, subsoil during stripping operations 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 and possible - protecting stockpiles from erosion using soil stabilising polymers, cover crops or other forms of stabilisation - stabilising long-term topsoil stockpiles with native plant community types or suitable cover crops 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.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
L2	Agrisolar activities will continue during the life of the project, including: • constructing and maintaining internal livestock fencing and other required infrastructure • grazing sheep between the panels where practical and subject to suitable conditions on-site. • monitoring agrisolar activities and adjust stocking rates to prevent land degradation.
L3	The following controls 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 • 1080 poison baiting programs and ripping of rabbit warrens and fox dens within the project area and any established offset areas.
L4	The following erosion and sediment control measures and 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 adjust drainage, erosion and sediment control practices to achieve the desired performance standard • constructing suitable watercourse crossings.
Landscape and visual	
LV1	During periods of the day when glint and glare have the potential to occur, backtracking operations will be restricted to 5° or more to reduce glint and glare.
LV2	If a 2P module configuration is constructed, a PV module exclusion zone of up to 100 m from the Kidman Way road corridor will be implemented. If a 1P module configuration is constructed, the PV module exclusion zone will be reduced to up to 50 m.
LV3	The colour and height of ancillary structures will be considered in detailed design to minimise contrast with the surrounding landscape to the extent practicable.
	External lighting associated with the project: • will be installed as low intensity lighting (except where required for safety or emergency purposes)
LV5	• will not shine above the horizontal • will comply with Australian Standard/New Zealand Standard AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
Noise	
N1	Construction work activities will be scheduled to minimise noise impacts, including: • 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 • if works are necessary outside the recommended standard hours, it will be ensured that works fall within the categories provided in Table 4 of the noise impact assessment, and an assessment of these activities will be provided for approval by DPHI. • deliveries will be scheduled to the nominated standard hours to the extent practicable.
N2	Traffic noise will be minimised, including: • amalgamating vehicle loads (including trucks as well as passenger vehicles) to minimise noise and traffic on public roads • designating access routes and making drivers made aware of the requirement to use these routes.
N3	Construction work practices will minimise noise impacts by: • training workers and contractors regularly (such as at toolbox talks) to use equipment in ways to minimise noise • ensuring site managers periodically check for excessive noise generating activities so solutions can be applied quickly • including clauses that require noise to be minimised and compliance with directions from management in tenders, employment contracts, subcontractor agreements and work method statements • informing truck drivers of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes, and not allowing extended periods of engine idling) • carrying out noisy fabrication work off site (for example, within enclosed factory premises) and then transporting these items to site.
N4	Consultation with noise-affected receivers (R049) will include: • providing information on the construction program • providing information on the project website, for example as a regular newsletter with project news, significant project events and timing of different activities, using a site information board at the site access points with the name of the organisation responsible for the site and their contact details, hours of operation and regular information updates • implementing a complaints management protocol • implementing all feasible and reasonable measures to address the noise generating activity that has resulted in the complaint.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
N5	Noise from plant and equipment will be managed by: • using quieter methods, where possible, such as alternatives to diesel and petrol engines and pneumatic units • using quieter equipment by: – examining different types of machines that perform the same function and comparing the noise level data to select the least noisy machine – using super-silenced compressors, silenced jackhammers, and damped bits where possible – for rented equipment, selecting quieter items of plant and equipment where these will be acceptable for performing the required activity – for purchased equipment, selecting the most effective mufflers, enclosures and low-noise tool bits and blades • operating plant in a quiet and efficient manner, such as reducing throttle settings and turning off equipment when not being used to ensure they do not sit idle excessively • maintaining plant and equipment regularly to ensure it is in good working order. • using alternatives to reversing alarms by: – designing the site layout to avoid reversing, such as by including drive through parking and delivery bays – installing where feasible and reasonable less annoying alternatives to the typical ‘beeper’ alarms taking into account the requirements of the occupational health and safety legislation (e.g. smart alarms that adjust their volume depending on the ambient level of noise and multifrequency alarms that emit noise over a wide range of frequencies)
N6	The project has been designed and will be refined to minimise noise impacts by: • managing fixed plant locations by: – placing as much distance as possible between the plant or equipment and receivers – locating the site access points, construction compounds and parking areas away from receivers • maximising shielding by use of temporary site buildings and materials stockpiles as noise barriers to R049.
Transport	
T1	A detailed CTMP will be developed in consultation with TfNSW and Murrumbidgee Council prior to the commencement of works.
T2	The Kidman Way site access point intersections will include: • dedicated turning bays for left-turning and right-turning vehicles from Kidman Way • upgrades on both the north and south approaches • upgrades designed for a 26m long B-double truck and to allow the passage of the largest OSOM vehicle.
T3	The Kidman Way/Bundure Road/Liddles Lane intersection will include: • a widened shoulder for left turning vehicles and dedicated turning bay for right turning vehicles from Kidman Way • upgrades to be applied on both the north and south approaches • upgrades designed for a 26 m long B-double truck turning into Bundure Road.
T4	Relevant permits will be obtained from the National Heavy Vehicle Regulator (NHVR) to allow OSOM vehicles to use the road network as part of construction. Conditional approval will be requested for 26-m long trucks to access Bundure Road between Kidman Way and the eastern site access point (currently only approved for 19 m long heavy vehicles).
T5	Bundure Road will be widened between Kidman Way and the Bundure Road eastern site access point. The road widening will comply with the relevant ARRB rural roads design guidelines.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
T6	Site access points will be constructed as per council's Rural Property Access standard to the satisfaction of TfNSW (Kidman Way) or Council (Bundure Road).
T7	As part of detailed design, measures will be considered to improve visibility on either side of the Bundure Road bridge where it crosses the Coleambally Irrigation Channel, such as: • raising the access road height to ensure driver's line of sight is above fencing/bridge parapet • adoption of safety measures in a Driver's Code of Conduct • implementing construction stage traffic management measures such as warning signs for trucks entering (sign no. T2-25, to be confirmed in the CTMP).
T8	A traffic management system will be implemented to allow trucks to cross the Bundure Road bridge in a single direction at any given time (e.g. "No overtaking or passing" signage (sign no. R6-1)). Westbound vehicles on Bundure Road will be required to give way to eastbound traffic to avoid queuing on Kidman Way.
Water	
W1	Measures to address risks to surface water and groundwater during construction that address key stormwater management principles will include: • siting of 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 (excluding PV modules) – surface drainage measures as required to control runoff generated within the development footprint, minimise soil erosion potential and direct runoff towards receiving drainage lines. Sheet flow conditions will be maximised, and construction of diversion drains channels and table drains to be minimised to the extent practicable – suitable treatments, including rock rip rap where appropriate, will be used to armour earthwork batters and site drainage as needed for scour protection and to achieve stable waterways where flow concentrations cannot be avoided – retention of existing flow paths where possible and minimisation of 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 to achieve the desired performance standard • capturing stormwater runoff from buildings in rainwater tanks for use on-site
	• implementing procedures for hazardous material storage and spill management as defined in applicable guidelines • maintaining spill kits on-site at all times during construction and operation • considering weather preparedness and response planning • monitoring and maintenance of water management and drainage systems.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
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 BESS areas will include: • providing spill containment storage within or immediately downstream of the BESS area's drainage system to manage fire suppression runoff in the event of a fire within the BESS areas.
W4	Measures to address ongoing site-specific risks to surface water and groundwater during operations will include: • rehabilitating temporary works and construction disturbance areas not being utilised for operations • maintaining stabilised and vegetated surfaces, drainage and sediment and erosion control measures throughout operations.
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 Volume 2A (DECC 2008) and <i>Best Practice Erosion and Sediment Control</i> (IECA 2008).
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 • site preparedness activities and procedures • triggers for closure, evacuation and recovery • emergency response and support.
W8	Construction site planning at detailed design stage will consider flood risk and adopt appropriate placement of temporary works, plant, materials and workforce facilities, that gives due consideration to overland flow paths and mainstream flood risk and ensures that temporary works minimise off-site flooding impacts as far as practical.
W9	Permanent infrastructure will be designed and constructed to: • locate sensitive infrastructure (e.g. substations and BESS) on high ground above 1% AEP event flood levels (or other suitable level of flood immunity as may be determined during detailed design), and 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	Develop and implement flood management protocols will be developed and implemented for operations.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
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 relevant guidelines outlined in the WRA (Appendix E.8).
W12	Removal of private irrigation infrastructure within the development footprint will be confirmed with the landowner. If infrastructure is removed for the project, it will be reinstated following the project, or as otherwise agreed with the landowner.
W13	Spark Renewables will continue to consult with CICL regarding cable crossings of the Coleambally Irrigation Channel during detailed design and will agree designs, construction methods and timing prior to their implementation.
W14	All required water licensing and approvals will be obtained for construction and operation water supply.
W15	Link water supply works approvals and water access licences: • apply for modification of nominated usage • operate bores in accordance with the conditions of the approval.
W16	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 Murrumbidgee Council.
Hazards	
HR1	BESS units will be certified to UL 9540A and installed in accordance with the manufacturer's instructions for best practice to prevent fires and mitigate fire propagation if one occurs.
HR2	The design, selection and procurement of electrical equipment will comply with relevant international and Australian standards to ensure that EMF will not exceed the ICNIRP occupational exposure reference level onsite and public exposure reference level offsite.
HR3	Security protocols, fencing, cameras and warning signs will be implemented to prevent members of the public entering the site and being exposed to EMF above occupational exposure reference levels.
HR4	Project design will include design controls to minimise the likelihood of fire events, and to contain fires if they occur, to minimise potential for escalated events.
HR5	The PHA will be reviewed if the BESS design is revised to ensure that the aspects considered (e.g. control measures, clearances between BESS units, separation distance to sensitive receptors) and assessments made remain applicable or the design will be refined accordingly.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
Bushfire	
BF1	A 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 that addresses the following: • ongoing bushfire fuel management within the development footprint • site infrastructure plan • site access and internal road plan • water supply for firefighting • APZs and their continued maintenance • location of hazards that may impact firefighting operations • activities that may be exempt on periods of Total Fire Ban days • the Grain Harvesting and Fire Safety guide (refer Appendix 3 of Appendix D.7) • any such additional matters as may be required by the NSW RFS District Office for the Mid Murray Zone.
BF2	An Emergency Management Plan will be prepared in consultation with NSW RFS in accordance with Table 6.8d of <i>Planning for bushfire protection</i> (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 Emergency Management 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 2019</i>. A 10-m APZ will be maintained between the solar arrays and the perimeter fence.
BF4	Buildings constructed within 100 m of bushfire prone vegetation will comply with Australian Standard AS3959-2018 <i>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). New construction must also comply with the construction requirements in Section 7.5 of <i>Planning for Bush Fire Protection 2019</i>.
BF5	Access roads will comply with the property access road requirements as outlined in Table 7.4a of <i>Planning for bush fire protection</i>, with additional considerations as outlined in Section 6.2.3 of the bushfire assessment report.
BF6	The provision of water, electricity and gas will comply with <i>Planning for bush fire protection</i> (NSW RFS 2019). An adequate static water supply will be provided for firefighting purposes, with the capacity to be determined as part of a Fire Safety Study. Static water tanks will be located at the primary vehicle access point to the facility. Other water supply requirements will be determined in consultation with the Argoon Rural Fire Brigade, NSW RFS District Office for the Mid Murray Zone, and Fire and Rescue NSW at the detailed design stage. In addition to static water supply requirements, two mobile water supplies with a minimum capacity of 500 L each (e.g. tanks on utes or standalone tankers) will be available on-site during construction and operations.
BF7	Spark Renewables will continue to consult with Argoon Rural Fire Brigade around specific weather conditions that may require works to temporarily cease during construction.
BF8	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.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
Social	
S1	Develop and implement a post-approvals Social Impact Management Plan (SIMP). The SIMP would be adaptive and proportionate to project impacts. The SIMP would aim to: • Describe desired outcomes in social terms • 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 would include methods for engaging various 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. A publicly available complaints and grievance procedure will be included as part of the SIMP.
S2	Develop and implement an industry participation plan (IPP), which will identify: • the approach to 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 will be used to share and register interest in project opportunities.
S3	Develop and implement an Aboriginal participation plan (APP) in consultation with First Nations stakeholders to optimise local capacity and aspirations through targeted participation initiatives within the regional area. This would 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	Undertake regular engagement (to be defined in the SIMP) with local businesses to advise of construction periods and the potential increase in trade or patronage. This will provide these businesses with an opportunity to plan as required to maximise benefits of increased demand, and its associated revenue.
S5	Identify measures in the SIMP to encourage the project workforce, particularly during the construction phase, to support and contribute to the local and regional community through local spending. This may be done through project provided vouchers at local businesses, and promoting the local offering, such as on notice boards at the accommodation facility.
S6	Engage with Murrumbidgee and Edward River Councils to identify potential service limitations and implement measures such as provision of on-site medical facilities and identification of preferred telehealth providers to reduce competition for GP services closest to the site.
S7	Prioritise use of the temporary worker accommodation facility and maximise recruitment of local residents for the construction workforce where possible.
S8	Develop and implement an accommodation facility management plan in consultation with Murrumbidgee Council prior to commencement of construction to ensure the accommodation facility complies with relevant standards and requirements.
S9	Develop and implement a comprehensive Community Engagement Plan and Worker Code of Conduct (as part of the SIMP) to address perceived privacy and public safety risk, including engagement with community services such as police and emergency services to familiarise relevant services with the project in case of an incident.

Table C.1 **Summary of mitigation measures**

ID	Mitigation measures
Economic	
ECON1	The employment of regional residents will be prioritised where they have the required skills and experience or training can be provided.
ECON2	Spark Renewables will participate, as appropriate, in business groups, events or 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 will be managed through a VPA with Murrumbidgee Council.
ECON5	Lease payments will be paid to host landowners to provide an alternative drought proof income with potential flow-on benefits to the regional economy.
ECON6	Agricultural activities will continue during project operations and pre-project agricultural production will be reinstated following project decommissioning.
Waste	
WAS1	All waste will be managed in accordance with the requirements of the NSW <i>Protection of the Environment Operations Act 1997</i> and the NSW <i>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)
WAS3	Waste will be managed in accordance with the waste hierarchy, in order of preference: • reduce waste production • recover resources dispose of waste appropriately.
WAS4	The waste management plan will be implemented during construction, operation and decommissioning.
WAS5	As part of decommissioning, Spark Renewables will attempt to recover/recycle all dismantled and decommissioned infrastructure and equipment.
WAS6	General waste bins will be provided for disposal of materials that cannot be cost-effectively recovered/recycled.
WAS7	Manufacturers, distributors and installers of PV modules that are members of product stewardship schemes will be selected where possible.
WAS8	Manufacturers and distributors of PV modules and associated infrastructure will be contracted, where possible, to minimise non-recyclable packaging and maximise recyclable packaging components.
WAS9	Waste will be segregated into individual waste streams on-site, where possible, prior to transportation to waste management facilities.
WAS10	Recyclable materials will be sent to appropriate recycling facilities, where possible, to minimise waste sent to landfill.
WAS11	Local councils will be consulted to ensure impacts on local waste management facilities are minimised as far as practicable.
WAS12	Waste avoidance and reuse will be prioritised when developing and implementing waste management strategies, including 'second-life' options.
WAS13	Waste management providers that specialise in recycling end-of-life PV modules and associated infrastructure will be selected where possible.

Australia

SYDNEY

Ground floor 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE

Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE

Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA

Suite 2.04 Level 2
15 London Circuit
Canberra City ACT 2601

ADELAIDE

Level 4 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE

Suite 9.01 Level 9
454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH

Suite 3.03
111 St Georges Terrace
Perth WA 6000
T 08 6430 4800

Canada

TORONTO

2345 Yonge Street Suite 300
Toronto ON M4P 2E5
T 647 467 1605

VANCOUVER

422 Richards Street Unit 170
Vancouver BC V6B 2Z4
T 604 999 8297

CALGARY

606 4th Street SW 11 Floor
Calgary Alberta T2P 1T1



[linkedin.com/company/emm-consulting-pty-limited](https://www.linkedin.com/company/emm-consulting-pty-limited)



emmconsulting.com.au