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lightsource bp

Goulburn River Solar Farm

Environmental Impact Statement

Final

May 2023

lightsource bp

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Environmental Impact Statement

Final

Prepared by Umwelt (Australia) Pty Ltd
on behalf of Lightsource bp

Project Director:	Malinda Facey
Project Manager	Jessica Henderson-Wilson
Report No.:	21507/R09
Date:	May 2023

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APPROVED COMPANY ISO 9001
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Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Document Status

Rev. No.	Reviewer Name	Review Date	Approved for Issue Name	Approved for Issue Date
V1	Jessica Henderson-Wilson	22/11/2022	Malinda Facey	22/11/2022
V2	Jessica Henderson-Wilson	03/05/2023	Malinda Facey	03/05/2023

Summary

Lightsource bp is proposing to develop the Goulburn River Solar Farm (the Project) to generate solar renewable energy to supply New South Wales (NSW). The Project is located within the Upper Hunter Local Government Area (LGA) of NSW, approximately 28 kilometres (km) south-west of the township of Merriwa. The Project's location and regional context is shown in **Figure E.1**. The Project is located on an agricultural property which is surrounded by the Goulburn River National Park.

The Project will involve the construction, operation and decommissioning of approximately 550-megawatt peak (MWp) of solar photovoltaic (PV) generation as well as a Battery Energy Storage System (BESS) with 280 MWp / 570 megawatt hour (MWh) capacity. The Project will also include a substation and connection to an existing 500 kilovolt (kV) transmission line. The Project will include various associated infrastructure, including road repairs and upgrades to Ringwood Road, temporary construction facilities, operation and maintenance buildings, internal access roads, civil works and electrical infrastructure to connect the Project to the existing transmission line which passes through the Project Area. The Project's conceptual layout is provided in **Figure E.2**.

The Project Area is in close proximity to the Central West Orana Renewable Energy Zone (REZ); however, it is not related to the REZ, nor is it dependent on the REZ.

The Project Area comprises two freehold properties that span across multiple lots, covering an area of approximately 2,000 ha, with the Development Footprint occupying approximately 799.5 ha.

Project Objectives

The key objectives of the Project include:

- Deliver affordable and sustainable renewable energy to businesses and communities within NSW.
- Provide renewable energy that would contribute to the reduction of greenhouse gases across NSW, avoiding up to 705,000 tonnes per annum of carbon dioxide.
- Support the local regional economy by preferencing local workers and businesses in the development, construction, and operation of the Project.
- Facilitate community engagement and participation in the design, development, and operation of the Project.
- Minimise environmental and heritage impacts to the Project Area through adaptive design.

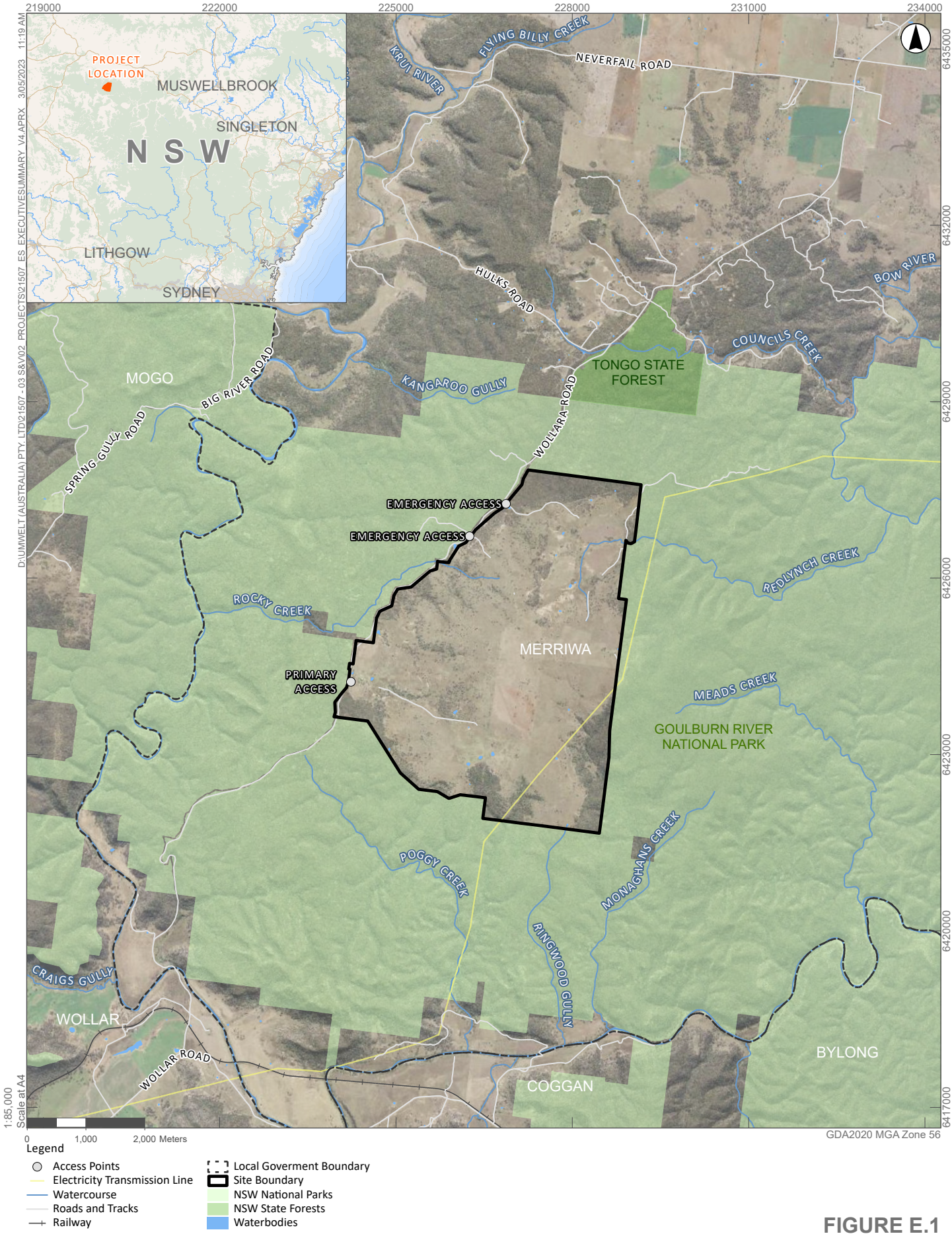

FIGURE E.1

Locality and Regional Context

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

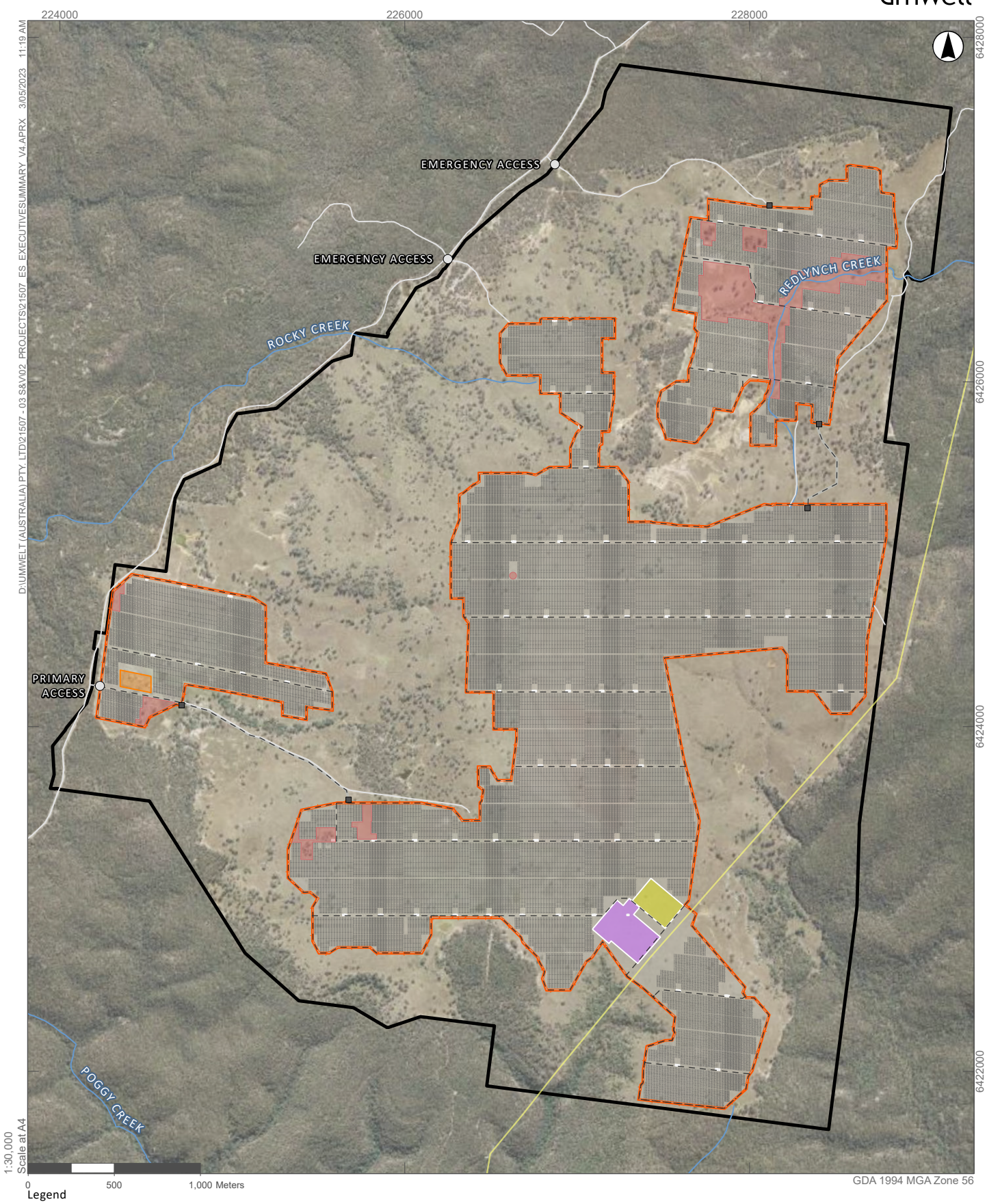

FIGURE E.2

Project Overview

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

Environmental Approval Process

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and the Environmental Planning and Assessment Regulation 2021 (EPA Regulation) establishes the planning and approvals process in NSW. The EP&A Act provides for the making of Environmental Planning Instruments (EPI), including Local Environmental Plans (LEPs) and State Environmental Planning Policies (SEPPs), which set out requirements for localities and/or particular types of development.

The Project is a State Significant Development (SSD) under the *State Environmental Planning Policy (Planning Systems) 2021*, being a development for the purposes of electricity generating works and with a capital investment value of over $30 million. A Development Application (DA) for the Project is required to be submitted under Part 4 of the EP&A Act.

A Scoping Report was prepared in 2021 that provided a preliminary review of the Project including key environmental, social, economic and cultural constraints and opportunities as well as initial community views. The Scoping Report was submitted to the Department of Planning and Environment (DPE) in December 2021, who, after engagement with the relevant government agencies, issued the Secretary's Environmental Assessment Requirements (SEARs) on 1 February 2022 with Supplementary SEARs issued 2 February 2022 by the Commonwealth.

The SEARs and supporting documentation set out the matters of consideration and assessment required in the Environmental Impact Statement (EIS). This includes a full description of the Project, justification for the Project, relevant approvals required, and an assessment of the likely potential impacts of the Project and mitigation on the environment including consideration of the following key issues:

- Biodiversity.
- Heritage.
- Land.
- Visual including Glint and Glare.
- Noise.
- Transport.
- Water.
- Hazards.
- Social Impact.
- Economic.
- Waste.

The SEARs also require that consultation be undertaken with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, and affected landowners.

The EIS has been prepared in accordance with the requirements of the EP&A Act and the form and content requirements specified in Division 5, Section 190 of the EPA Regulation, including SEARs for the Project.

Assessment of Environmental and Social Impacts

The EIS includes a detailed assessment of the potential environmental, social and economic outcomes of the Project and identifies the management and mitigation measures that will be implemented. A summary of the key findings of the EIS is provided in **Table E.1** below.

Table E.1 Summary of Environmental and Social Findings

Environmental/Social Issue	Overview of Key Findings
Terrestrial Biodiversity	• Construction of the Project will result in some removal of vegetation and associated fauna habitat and part of an ecological community (only impacting areas of scattered trees and derived native grassland condition zones). The conceptual layout has been developed to avoid or minimise impact on identified biodiversity values and maximise the use of areas which historically have been cleared. • Impacts to biodiversity have also been minimised by the nature of the Project with the solar array panels being installed by pile driving and minimal ground disturbance. • The Project will directly impact critically endangered White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Specifically 699.63 ha listed under the BC Act and 496.11 ha under the EPBC Act. The Project will also impact 73.98 ha of mapped important habitat for Regent Honeyeater (*Anthochaera Phrygia*) a critically endangered species. These species were assessed further as they are considered at risk of Serious and Irreversible Impacts (SAII). • Lightsource bp has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to minimise the unavoidable direct and indirect impacts to biodiversity associated with the Project. Where areas cannot be avoided appropriate mitigation and management measures will be implemented by means of a Biodiversity Management Plan. • Lightsource bp is committed to delivering a biodiversity offset strategy that appropriately compensates for residual significant ecological impacts as a result of the Project. • A Biodiversity Development Assessment Report (BDAR) was completed for the Project and provides the details of the assessment (refer to **Appendix 6** and **Appendix 7**). • A referral was submitted to the Commonwealth Department of Climate Change, Energy and Environment and Water on the 4 January 2022 to confirm whether the Project requires assessment and approval under EPBC Act. The Project was determined to be a 'controlled action' under the EPBC Act on the 2 February 2022. The controlling provisions was listed threatened species and communities. The Project will be assessed under bilateral agreement between the Commonwealth and NSW Governments Supplementary SEARs were issued on 2 February 2022 and have been addressed in this EIS.

Environmental/Social Issue	Overview of Key Findings
Aquatic Biodiversity	• Within the Project Area, there are 90 mapped hydrolines including 69 first order watercourses, 18 second order watercourses and three third order watercourses which eventually flow into the Goulburn River. Five watercourses within the Project Area have been mapped as key fish habitat, except for Redlynch Creek and all are highly ephemeral. • First and second order drainage lines were dry and most riparian zones were significantly modified by agricultural land practices. • It is considered that the overall potential impacts both direct and indirect from the construction, operation and decommissioning phases are low or negligible. The direct impacts may include removal of riparian vegetation, barriers to fish passage and potential mortality to aquatic flora and fauna due to poor water quality. With the indirect impacts may involve mobilisation of poor-quality stormwater runoff from construction activities. • An exclusion zone around the third order section of Redlynch Creek has been established, with impacts limited to designated crossing points. • The Aquatic assessment concluded that the impacts of the Project would not significantly compromise the functionality of these watercourses, nor their long-term connectivity or viable habitats, or ecological processes. • Potential impacts are associated with indirect impacts on water quality and would therefore be temporary and managed through the adoption of appropriate erosion and sediment control measures in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (NSW DPIE, 2004) "The Blue Book".
Aboriginal Cultural Heritage	• An Aboriginal Cultural Heritage Assessment (ACHA) has been prepared for the Project in collaboration with the Registered Aboriginal Parties (RAPs) to assess the Aboriginal heritage values (cultural and archaeological) of the Project Area and surrounds. • The survey program identified one grinding groove site, four artefact scatter sites and six isolated find sites within the Project Area. In addition to this, seven trees with scars were inspected during the survey. The ACHA reports that the scars on the trees do not display sufficient attributes to be considered to have cultural origins and are not recorded as Aboriginal objects or registered in the Aboriginal Heritage Information Management System (AHIMS). However, the RAPs present during the survey indicated that these trees were of cultural importance and believe that the scarring was potentially Aboriginal in origin. Five of these trees are within the Development Footprint. • The ACHA determined that the sites recorded during the survey generally have a low scientific significance as they are either isolated finds or low-density artefact scatters, often in disturbed contexts. • Lightsource bp will prepare and implement an Aboriginal Cultural Heritage Management Plan which is to be agreed with RAPs and DPE (with input from Heritage NSW). This plan will include an unanticipated finds protocol. • Eight Aboriginal sites within the Development Footprint will be salvaged by a surface collection of visible artefacts. Three of the seven trees of community interest will be retained. The other four trees are located within the Development Footprint and will be removed in accordance with procedures set out in an ACHMP, in consultation with the RAPs.

Environmental/Social Issue	Overview of Key Findings

Historic Heritage	• There are no listed heritage items in the Project Area, however Goulburn River National Park surrounds the Project Area, which is a locally listed landscape heritage item under the Mid-Western Regional Local Environmental Plan 2012.
	• The Project Area contains three residential structures identified during the visual and historical research.
	  ○ C.1900 house (abandoned) (which will be demolished as part of the Project).
	  ○ Original slab hut (O'Brien Homestead).
	  ○ Post-war house currently used as the primary residence for the Project Area, including ancillary structures and sheds of varying ages and conditions associated with the agricultural use of the land.
	• The Project Area has been assessed as having potential to contain historical archaeological remains associated with the early pastoral land use and O'Brien family, who have owned and operated the pastoral property since at least the 1880s. In particular, there is potential to encounter archaeological remains in the location of the original slab hut located near the centre of the Project Area.
	• The slab hut remains will be excluded from the Development Footprint with a 20 m buffer to avoid impacts.

Land	• The Project Area consists of agricultural land, the majority of which has been subject to land clearing, a long history of grazing, and cropping pasture. • Soil types within the Project Area are classified as Ferrosols, Kurosols, Vertosols Dermosols and Tenosols with moderate to high soil fertility. • Following a soil field survey and laboratory analysis, the Project Areas are mapped as Class 4 and Class 6 for Land and Soil Capability. • The Project is unlikely to impact surrounding land uses and impact on agricultural productivity for the area. The Project has been designed to facilitate Agrisolar operations which allows for sheep grazing to occur underneath the solar panels. Agrisolar will allow for both agricultural activities and the project to co-exist for the Project operational lifetime, should sheep be grazed within the Project Area. • Lightsource bp will develop a Construction Environmental Management Plan (CEMP) which will include relevant erosion and sediment control measures in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (NSW DPIE, 2004) "The Blue Book". • A trial of sheep grazing is proposed for the operational phase of the Project. • If sheep grazing occurs the Operational Environmental Management Plan (OEMP) will incorporate a Sheep Grazing Vegetation Management Plan (SGVMP) that will outline measures for solar grazing in line with the *Agrisolar Guide 2021* and other animal and welfare standards and guidelines.

Environmental/Social Issue	Overview of Key Findings
Visual Amenity	• The Project is located within a rural setting with the visual character of the local landscape comprising of agricultural and native forest characteristics. The Project Area and agricultural areas in the vicinity are characterised by mostly cleared, undulating to hilly landscapes with crops, pasture grasses and scattered timber. Goulburn River National Park completely surrounds the Project Area and provides a deep green, vegetated backdrop to the agricultural character. The park is characterised by a dense forest of native trees, shrubs and grasses. • A total of 6 viewpoints were assessed as part of the Visual Impact Assessment, taken from various locations surrounding the Project Area. This included five private viewpoints and a single public viewpoint. Two of these viewpoints were eliminated during field inspections. • The overall assessed impact of the Project on landscape character is low. • Glint and glare assessment for the Project considered worst case scenarios and illustrated the project could output approximately 11 hours of yellow glare per year. • Screening vegetation on the north eastern boundary of the Project Area will likely filter potential glare impacts to surrounding receptors. • Night lighting from the Project is considered unlikely to result in a noticeable impact on the existing night-time landscape.
Noise and Vibration	• The Project is located within a rural environment with typically low background noise levels, surrounded by Goulburn River National Park (zoned C1) and rural residential land (zoned RU1 Primary). • Construction noise levels associated with the Solar Farm Site are predicted to comply with daytime noise management levels at all sensitive receivers not involved with the Project. Nevertheless, reasonable and feasible noise mitigation and management strategies will be implemented. • Construction noise levels for the Ringwood road upgrades are predicted to exceed the established Noise Management Levels at some receivers, as such appropriate noise mitigation and management strategies will be implemented. • Construction-related road traffic has been assessed and was found to comply at the nearest most potentially affected dwelling. • The operational noise levels are predicted to comply with the day, evening and night-time noise limits at all non-involved dwellings. • Given the distance of the Project to non-involved dwellings vibration impacts are anticipated to be negligible. • Lightsource bp will implement all feasible and reasonable noise control strategies to manage noise associated with construction activities such as scheduling of construction activities and implementation of a noise management plan. Additionally, neighbouring residents will be informed regarding proposed construction work.

Environmental/Social Issue	Overview of Key Findings
Traffic and Transport	• The Project will have primary access from Wollara Road, which runs along the western boundary of the Project Area. • During the construction phase of the Project there will be an increase in traffic movements to the Project Area associated with the workforce mobilisation and delivery of materials and equipment. • Major solar and battery components would be delivered to the site by truck via the Hunter Expressway, New England Highway, Golden Highway, Ringwood Road and Wollara Road. • The causeways at Bow River and Killoe Creek require upgrades to facilitate heavy vehicle movements to the Project Area. • Resheeting, regrading and widening works will occur along Ringwood Road to facilitate heavy vehicle movement to the Project Area. Traffic and transport impacts associated with the Project would primarily occur during the construction phase as a result of the increase in traffic movement with workforce mobilisation and delivery of materials and equipment. • Impacts during the operational phase would be minimal due to the low volume of traffic generated and the provision of parking on-site. • Lightsource bp will implement a range of measures to appropriately manage and mitigate traffic impacts. This includes the development of a Construction Traffic Management Plan (CTMP) prepared in consultation with TfNSW, Upper Hunter Shire Council, National Parks and Wildlife Service and any other relevant stakeholders.
Water Resources	• The Project is within the Hunter River catchment, within the Goulburn River sub catchment. The majority of watercourses in the Project Area are first and second order streams. • Groundwater within the Project Area is managed under the Water Sharing Plan for the Hunter Unregulated and Alluvial Water sources (DPE, 2022). • Flood modelling showed that the Project Area is of low flood risk with minimal risk for both existing and climate change conditions. The Project Area is outside areas of major flood hazard. Peak stormwater discharges from the Project Area for impervious areas may increase slightly. However, potential impacts to drainage features and downstream watercourses are considered likely to be minimal due to the relative size of the Project Area in relation to the size of the receiving catchments, and the distributed nature of minor impacts. • A Construction Soil and Water Management Plan (CSWMP) will be prepared to outline measures to manage soil and water impacts associated with the construction works. This will also include an Erosion and Sediment Control Plans (ESCP). • A OEMP will be developed for the Project to address potentially adverse impacts on the receiving environmental surface water quality during the operational phase.

Environmental/Social Issue	Overview of Key Findings
Hazard, Risk and Bushfire Threat	• The Electromagnetic Fields (EMF) levels produced by the Project will comply with the relevant international and Australian standards for generation of and exposure to EMF. With the implementation of management measures, it is considered that the EMF exposure risk. • Preliminary hazard analysis shows that appropriate risk management measures can be applied to the Project to meet HIPAP4 risk criteria for individual fatality, injury and propagation. • Through the development and implementation of relevant bushfire management measures and identified hazard safeguards and controls, it is considered that potential hazards associated with the Project including bushfire, can be appropriately managed.
Social Amenity	• Engagement with the community and key stakeholders regarding the Project commenced in 2021 and has been ongoing. Outcomes from the community consultation activities undertaken by Lightsource bp have been reviewed and consolidated to inform the Social Impact Assessment (SIA) and understanding the range of community views, concerns, interests and feedback provided on the Project to date. • Stakeholder feedback indicates road safety and amenity, social impacts associated with natural environment and agriculture and impacts to livelihoods in the community were of particular concern. Key community views are summarised in **Table E.2**. • To minimise potential impacts and enhance social benefits for the community, there have been a number of Project design changes and a range of mitigation and management measure implemented, these include: ○ Designing the Project to seek to avoid and minimise impacts on environmental values and the surrounding community where practicable. Multiple design changes have been made to reduce impacts including through consideration of the findings of preliminary environmental studies and stakeholder feedback. ○ A Social Impact Management Plan (SIMP) will be prepared for the Project to manage and enhance social impacts through each stage of the Project. ○ A Community Engagement Strategy will be prepared for the Project to include consistent, transparent and proactive information provision and consultation with stakeholders throughout Project development. ○ A Community Benefit Sharing Strategy will be developed in consultation with local stakeholders to target investment to local needs and priorities and cognisant of activities/efforts of adjacent projects. ○ Accommodation, Employment and Procurement Strategy (AEPS) will be developed in collaboration with local councils and stakeholders. The AEPS will include targeted and proactive initiatives to maximise local employment and sourcing from local communities such as training, up-skilling and capacity building support, in collaboration and with local stakeholders and training providers. ○ Collectively these measures provide a robust social impact mitigation and management plan for the Project that aims to enhance the positive social impacts and mitigate the potential negative impacts.

Environmental/Social Issue	Overview of Key Findings
Economic	• The Project will have a capacity to supply clean energy to power the equivalent of approximately 156,000 on average NSW homes per annum. • Overall, the Project will involve approximately $880 million in capital investment. • The Project will generate an average of 250 jobs, with 35% of these sourced locally, during the construction peak 350 employment opportunities will be generated. During the operational phase up to 10 jobs will be generated. • Once operational the Project has been designed to facilitate ongoing agricultural activity through sheep grazing. No loss of employment associated with the existing agricultural land use of the Project Area. It is anticipated as a result of the Project and the new mixed-use arrangement is likely to require a similar number of employees as the present set up. • The total economic stimulus associated with the operation of the Project is estimated at approximately $250 million (over 40 years, Consumer Price Index (CPI) adjusted) relating to, operational wage stimulus, Community Benefits Fund and net land tax revenue to Council.
Waste Management	• The majority of waste generated by the Project will be during the construction and decommissioning stages with minor quantities of waste to be generated by the day-to-day operation of the Project. A Waste Management Plan will be prepared during the detailed design and construction phase, which would include a breakdown of the waste types and quantities in accordance with relevant legislation and guidelines. • A Decommissioning and Rehabilitation Management Framework (DRMF) has been developed for the Project. This framework will ensure appropriate environmental management is undertaken during the decommissioning and rehabilitation phase of the Project in accordance with legislative requirements, conditions of consent, stakeholder interest and industry best practice.
Air Quality	• Air emissions from the Project Area would be predominately associated with the proposed construction activity which are temporary (27 months). The construction activities that may generate dust will be localised and small at any one time in the context of the overall scale of the Project Area. • The CEMP, OEMP and Decommissioning and Rehabilitation Environmental Management Plan (DREMP) will include relevant air quality management measures to avoid dust impacts outside the Project Area.
Cumulative	• The Project is located near the boundary of the Central West Orana REZ and is also likely to be in proximity (or potentially within) the proposed Hunter-Central Coast REZ, and as a result, there are currently a large number of approved and proposed renewable energy projects within the region. • Cumulative impacts related to biodiversity, heritage, traffic, air quality, water quality, noise, visual amenity and waste management were also considered in the assessment, however the isolated nature of the Project Area and the minor nature of such impacts did not warrant additional assessment from a cumulative perspective. • Environmental management measures for key issues will be implemented to minimise the cumulative impacts of the Project. These measures are considered adequate to address both the individual Project impacts and any cumulative.

Consultation

Lightsource bp has undertaken a program of community and stakeholder engagement suitable for the type and location of the Project. Specific activities have included:

- Establishment of a Project website, community information line and Project email address, including a mechanism for stakeholders to provide feedback regarding the Project.
- Local media release distributed in October 2021 to target information provision for the broader community with local media advertisement published in August 2022.
- Formal briefings with relevant government agencies.
- Formal briefings with key stakeholders including Local Government agencies, and community, industry, and environmental groups or organisations, as well as traditional owners.
- Distribution of three separate project information sheets during the course of the SIA process via mail drop and email distribution to provide updates on the Project to proximal residents and community members.
- Consultation with interested Aboriginal Parties in accordance with the applicable laws and government guidelines.
- Two structured online information sessions following the issuance of SEARs to provide Project information and preliminary results of technical studies, and an opportunity for members of the community to pose questions to the Project team and provide feedback.
- Two informal drop-in sessions and one online semi-structured information session to provide feedback regarding the technical assessments of the Project, as well as articulate the proposed mitigation and enhancement measures under consideration to minimise negative and enhance positive impacts of the Project.
- Additional drop-in session on 6 December 2022 to provide feedback regarding various Project updates since last drop-in session and consultation opportunities.
- Provision of a newsletter in April 2023 to provide the community updates on the progression of the Project.

A stakeholder identification process was undertaken for the Project to support the planning and delivery of community and stakeholder consultation to inform the SIA and the Environmental Impact Statement (EIS). Issues raised during the engagement process have been recorded and have informed investigations undertaken as part of the EIS and the ongoing development of the Project. Key community issues raised are summarised in **Table E.2**.

Table E.2 Key Community Issues

Category	Issue	Response/Assessment outcome
Changes to community surroundings	Road safety and amenity	The Project will provide notice for the community regarding timeframes proposed for road repairs, upgrades and transport network changes through appropriate media and other forms of community liaison.
Changes to community surroundings	Site disturbance and impacts on environmental values	The Project has been designed to avoid impacts to areas of high ecological value, to retain areas of wildlife corridors, and will be constructed with prevention of entrapping fauna within the site infrastructure fencing.
Changes to community surroundings	Dust and noise amenity issues	• Implementation of a road safety management plan and CTMP. • Prepare a roads repair/upgrade and maintenance plan ahead of construction and communicate it to the community. • Limited Construction activities to standard working daylight hours. • Keep the local community informed around the construction hours and any subsequent changes.
Way of Life	Community sentiment and cohesion	• Proactive, thorough and transparent consultation process throughout Project planning, assessment and development. • Proactive and ongoing information sharing about the benefits of renewable energy in the area and Agrisolar initiatives. • Community Benefit Sharing Strategy to consider initiatives that focus on increasing social wellbeing and community participation.
Engagement and Decision-making systems	Trust in the planning process	• Proactive, thorough and transparent consultation process throughout Project planning, assessment and development. • Preparation and implementation of the CEMP, OEMP and DREMP and landscape management plan. • Provide community with information of the complaint procedure during construction (through CEMP) and operations (through OEMP).
Accessibility	Strain on local services	• Accommodation, Employment and Procurement Strategy to be in place ahead of construction and to be developed in collaboration with local Council and stakeholders. • Consideration given to workforce volunteering commitment, providing training and site tours for local and new emergency service workers to familiarise them with the access points and procedures. • Proactive, thorough, and transparent consultation process throughout Project planning, assessment and development.
Health & Wellbeing	Impacts to Health and Wellbeing	• Proactive, thorough, and transparent consultation process throughout Project planning, assessment and development. • Accommodation, Employment and Procurement Strategy to be in place ahead of construction. • Community Benefit Sharing Strategy to consider initiatives that focus on increasing social wellbeing and cohesion in local communities. • Clear communication and information sharing with the workforce regarding the area and incentivise a respectful day to day behaviour in accordance with the local community way of living.

Changes to Design

Given the environmental, social, community and cultural constraints, the impacts of the Project have been minimised through refinement of the Project design and layout, including:

- Reducing the Project's Development Footprint:
    - The first reduction occurred subsequent to the lodgement of the Scoping Report from 1,249 ha to 882 ha to avoid impacts to biodiversity and maintain connectivity between the Project Area and surrounding Goulburn River National Park.
- Designing the Project to minimise impacts on areas of mapped Regent Honeyeater important habitat.
- Altering the Project to reduce impacts to suitable breeding habitat for the Barking Owl (*Ninox connivens*).
- Altering the Project to avoid impact to habitat for the Large-eared Pied bat (*Chalinolobus dwyeri*) and the Eastern Cave Bat (*Vespadelus troughtoni*).
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area, and the Slab Hut remains.
- Reducing the area occupied by the Project to avoid areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community observed to be in moderate-good condition, resulting in only impacts to areas of scattered trees and derived native grassland condition zones.

Further Avoidance Following Consultation with Stakeholders Included

- The second reduction occurred following completion of additional biodiversity assessment following consultation with DPE from 882 ha to 779.5 ha to avoid impacts to biodiversity.
- Additional avoidance of areas with high biodiversity value.
- Adoption of different solar PV technology in order to reduce impacts but optimise the MW capacity, at a financial cost to the Project.
- Extension of riparian buffer around Redlynch Creek.

Project Justification and Need

The development of renewable energy generation aligns with both Federal and NSW commitments to increase renewable energy generation and reduce carbon emissions across the NSW and Australia.

The Project will contribute to the implementation of the NSW Electricity Strategy, which seeks to establish a reliable, affordable and sustainable electricity future for NSW. The location of the Project including the design, technology, layout and size of the Project has been developed through consideration of a number of alternatives by the Lightsource bp to ensure the Project would result in maximum benefits for the locality and region in the long term, whilst minimising impacts to the environment and to cultural heritage during all phases of the Project.

The Project is considered to be justified and in the public interest because:

- It is suitably located in a region with ideal climatic and physical conditions for large-scale solar energy generation where co-located use for livestock grazing is anticipated.
- Contains suitable terrain and topography to support large-scale solar energy infrastructure.
- The Project Area has access to existing transmission line infrastructure that has capacity to transport the electricity to the grid. This minimises the need for construction works and disturbance associated with additional infrastructure often required to connect large-scale renewable energy projects to the electricity market.
- It would not result in significant biophysical, social, cultural or economic impacts.
- Minimal visual impacts associated with the Project as the Project Area is screened by the Goulburn River National Park.
- The large, isolated Project Area (2000 ha) provides flexibility in design to prioritise avoidance of high value biodiversity areas. This includes the possibility of the remaining areas as an offset site (currently being investigated).
- Potential to create employment opportunities and benefits to the local and regional economy.

Lightsource bp is committed to the long-term environmental management of the land within the Development Footprint. At the end of the Project's investment and operational life, the Development Footprint would be returned to its pre-existing agricultural land use or another land use as agreed by the host landholders at that time and in accordance with any legislative requirements or restrictions.

The consequences of not proceeding with the Project would result in:

- Loss of additional renewable energy supply to assist Australia in reaching the Large-scale Renewable Energy Target.
- Loss of opportunity to reduce greenhouse gas emissions and move towards cleaner electricity generation.
- Loss of increased energy security and supply into the Australian grid.
- Loss of significant social and economic benefits created through capital investment and provision of direct and indirect employment opportunities during the construction and operation of the Project.
- Lost opportunity in maximising existing infrastructure.

Conclusion

Lightsource bp has applied an iterative approach through the development of this EIS responding to environmental, social and cultural heritage constraints and community concerns through refinement of the layout and the overall Project approach. Lightsource bp have been responsive to feedback from community and government stakeholders, which has led to several stages of refinements to further avoid impact as a result of the Project, particularly reduction of impact to biodiversity with additional surveys to support refinements.

Through the implementation of best practice, the potential environmental and cultural heritage impacts associated with the Project can be appropriately avoided or managed, which will also address the community concerns and associated social impacts identified during the stakeholder engagement process. Given the net benefit and commitment from Lightsource bp to appropriately manage the potential environmental impacts associated with the Project, it is considered the Project would result in a net benefit to the region and broader NSW community.

EIS Declaration

Project Details

Project Name	Goulburn River Solar Farm
Application Number	SSD-33964533
Address of the land in respect of which the development application is made	Wollara Road, Merriwa NSW

Applicant Details

Applicant Name	Lightsource Development Services Australia Pty Ltd (Lightsource bp) (ABN 26 623 301 799)
Applicant Address	Level 29/240 George St, Sydney NSW

Details of Person by Whom this EIS was Prepared

Name	Malinda Facey
Address	Level 11, 213 Miller St, North Sydney, NSW
Professional Qualifications	Bachelor of Applied Science, Graduate Diploma of Land Rehabilitation, CEnvP.

Declaration by Registered Environmental Assessment Practitioner

Name	Amanda Antcliff
Registration Number	42151
Organisation registered with	Planning Institute of Australia (PIA)
Declaration	The undersigned declares that this EIS: • has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021; • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates; • does not contain information that is false or misleading; • addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project; • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments; • has been prepared having regard to the Department's State Significant Development Guidelines - Preparing an Environmental Impact Statement;

	• contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development; • contains a consolidated description of the project in a single chapter of the EIS; • contains an accurate summary of the findings of any community engagement; and • contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.
Signature	
Date	4 May 2023

Abbreviations & Glossary

Term/Abbreviation	Definition
°C	Degrees Celsius
AC	Alternating Current
ACT	Australian Capital Territory
AEP	Annual Exceedance Probability
APZ	Asset Protection Zones
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
AQI	Air Quality Index
BAM	Biodiversity Assessment Methodology
BC Act	NSW *Biodiversity Conservation Act 2016*
BCF	Biodiversity Conservation Fund
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BOS	Biodiversity Offset Strategy
BSAL	Biophysical Strategic Agricultural Land
CASA	Civil Aviation Safety Authority
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CPA	Connection Processes Agreement
CSBS	Community Shared Benefit Strategy
CSES	Community and Stakeholder Engagement Strategy
CSWMP	Construction Soil and Water Management Plan
CTMP	Construction Traffic Management Plan
DA	Development Application
DC	Direct current
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DECCW	NSW Department of Environment, Climate Change and Water (former)
DPE	NSW Department of Planning and Environment (current)
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment (former)
DREMP	Decommissioning and Rehabilitation Environmental Management Plan
EIA	Economic Impact Assessment
EIS	Environmental impact statement

Term/Abbreviation	Definition
ELF	Extremely Low Frequency
EMF	Electromagnetic field
EP	Emergency Plan
EPA	NSW Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2021
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically sustainable development
FTE	Full Time Equivalent
GW	Gigawatt (unit of power equivalent to 1 billion watts)
GWh	Gigawatt-hour (unit of energy)
ha	hectare
HHA	Historic Heritage Assessment
IAP2	International Association of Public Participation
ICNG	Interim Construction Noise Guidelines
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPC	Independent Planning Commission
KFH	Key Fish Habitat
km	kilometres
kV	kilovolt
LEMC	Local Emergency Management Committee
LEP	Local Environmental Plan
LGA	Local Government Area
Lightsource bp	Lightsource Development Services Australia Pty Ltd
LIBs	Lithium ion Batteries
LLS	Local Land Services
LUCRA	Land Use Conflict Risk Analysis
LSC	Land and Soil Capability
LSC Guidelines	Land and Soil Capability Assessment Scheme; Second approximation (DPIE, 2012)
m	metres
MCA	Merriwa-Cassilis Alliance
ML	Megalitres
MW	Megawatt (unit of power equivalent to 1 million watts)
MWh	Megawatt-hour (unit of energy)

Term/Abbreviation	Definition
MWp	Megawatt-peak (solar farm output at theoretical optimal performance)
MNES	Matter of National Environmental Significance
NEM	National Electricity Market
NDC	Nationally Determined Contribution
NPI	National Pollution Index
NPWS	NSW National Parks and Wildlife Service
NM	Noise Management Levels
NRAR	NSW Natural Resources Access Regulator
NSW	New South Wales
NVIA	Noise and Vibration Impact Assessment
NEM	National Electricity Market
NML	Noise Management Levels
NOW	NSW Office of Water (former)
NPW Act	NSW *National Parks and Wildlife Act 1974*
OEMP	Operational Environmental Management Plan
O&M	Operation and Maintenance Facility
OSOM	Oversize Overmass
PAD	Potential Archaeological Deposits
PBP 2019	Planning for Bushfire Protection
PCTs	Plant community type
PHA	Preliminary hazard analysis
Planning Systems SEPP	NSW State Environmental Planning Policy (Planning Systems) 2021
PNTL	Project Noise Trigger Level
PINL	Project Intrusiveness Noise Levels
POEO Act	NSW *Protection of the Environment Operations Act 1997*
PMF	Probably Maximum Flood
PV	Photovoltaic
REAP	Renewable Energy Action Plan
RET	Renewable Energy Target
REZ	Renewable Energy Zone
RFS	NSW Rural Fire Service
RNP	NSW Road Noise Policy
ROL	Road Occupancy License
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements

Term/Abbreviation	Definition
SIA	Social Impact Assessment
SISD	Safe Intersection Sight Distance
SGVMP	Sheep Grazing Vegetation Management Plan
Solar Guidelines	Large-scale Solar Energy guidelines 2018
SRD SEPP	NSW State Environmental Planning Policy (State and Regional Development) 2011
SRLUP	Strategic Regional Land Use Plan
SSD	State Significant Development
TECs	Threatened ecological community
TfNSW	Transport for NSW
t	tonnes
TSR	Travelling Stock Route
TTIA	Traffic and Transport Impact Assessment
Turnbull	Turnbull Engineering Pty Ltd
Upper Hunter LEP	Upper Hunter Local Environmental Plan 2013
VIA	Visual Impact Assessment
VP	Viewpoint
VPA	Voluntary Benefit Agreement
WARR Act	NSW Waste Avoidance & Resource Recovery
WRIA	Water Resources Impact Assessment
WSP	Water Sharing Plan
WM Act	NSW *Water Management Act 2000*
ZTV	Zone of Theoretical Visibility

Project-Specific Glossary of Terms

Project-Specific Term	Description
Access points	Access points proposed along Wollara Road are to facilitate emergency vehicle access and stock (sheep) movement, these access points would not be utilised for the construction of the Project.
Access route	The proposed route for transporting material and equipment via Wollara road to the Project Area during construction.
Battery Energy Storage System (BESS)	The entire battery system comprising of a power conversion system (battery storage units and inverters) distributed throughout the solar farm site. The BESS has 280 MWp and 570 MWh capacity, housed in a series of outdoor containers, aggregated in one central location adjacent to the substation infrastructure (including the switchyard).
Development footprint	The maximum extent of ground disturbance associated with construction and operation of the Goulburn River Solar Farm i.e. approximately 799.5 ha.
Involved dwelling	Dwelling located on land owned by landholders involved in the Project.
Host landholder	[redacted]. These landholders' property would have the Project infrastructure located on it. While they are included in the assessment (i.e. noise, vibration, visual, traffic and other impacts) they are clearly denoted given their association with the Project. These landholders will have an agreement in place with Lightsource bp for hosting the solar farm infrastructure on their properties as well as address the Project related impacts on these land holdings and residences.
Non-involved dwelling	A landholder whose property is not located within the Project Area but is located within proximity of the Project and may be impacted either directly or indirectly by the Project. Potential impacts to non-involved dwellings are investigated in this EIS.
Primary access	The Project's main access from Wollara Road located on the southern portion of the Project Area.
Project Area	The total area investigated during various specialist studies and the broader property the Development Footprint will be located on. The Project Area covers approximately 2,000 ha and includes the solar farm site, the BESS development area, ancillary infrastructure. This includes the 10 m set back from the perimeter of the Project for security fencing
Proponent	Lightsource Development Services Australia Pty Ltd (Lightsource bp).
The Project	The proposed Goulburn River Solar Farm. The Project includes the construction, operation and decommissioning of a solar farm with capacity of up to 550 MW, a 280 MWp and 570 MWh BESS and associated infrastructure. Including the various road repairs and upgrades to Ringwood Road.
Road Repairs and Upgrades	Road repairs including resealing, regrading and re-sheeting various sections along Ringwood Road. In total, 1.8 km of road will be widened and resealed and two culverts will be upgraded.
Road Repairs and Upgrades Area	The total area which forms the road repairs and culvert upgrades along Ringwood Road.

Project-Specific Term	Description
Sensitive receiver	Non-host landholders' dwellings in proximity to the Project Area that may be sensitive to noise, vibration, visual, traffic and other impacts. Potential impacts to sensitive receivers are investigated in the EIS.
Site	The property in which the Project Area is located.
Solar Farm Site	The part of the Project Area where the solar farm and associated infrastructure are located on two freehold properties.
Transmission line	The 500 kV overhead transmission line located in the south eastern corner of the Project Area that would connect the solar farm to the grid connection point into the National Energy Market network.

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Appendices

1.0 Introduction

Lightsource Development Services Australia Pty Ltd (Lightsource bp) proposes to develop a solar farm in the Upper Hunter region of New South Wales (NSW), approximately 28 kilometres (km) south-west of the township of Merriwa within the Upper Hunter Local Government Area (LGA).

The proposed Goulburn River Solar Farm (the Project) includes the construction, operation, maintenance and decommissioning of approximately 550 megawatt peak (MWp) of solar photovoltaic (PV) generation with a Battery Energy Storage System (BESS) with 280 MWp and 570 megawatt hour (MWh) capacity. The Project will also include supporting infrastructure, a substation and connection to an existing 500 kilovolt (kV) transmission line. Parts of Ringwood Road will be upgraded including two culverts at Bow River and Killoe Creek.

The Project location and regional context are shown in **Figure 1.1**.

1.1 Background

The Project Area is located between Merriwa (to the north-east) and Coggan (to the south-east) NSW, surrounded by the Goulburn River National Park as shown in **Figure 1.1**. The main Project Area is located on freehold land, while parts of Wollara Road which provides access to the site, are located on Crown land (refer to **Figure 1.2**). The Road Repairs and Upgrades proposed works will be located within the road reserve (refer to **Figure 1.3**). The Solar Farm Site comprises two freehold properties that span across multiple lots, covering an area of approximately 2,000 ha with the Development Footprint occupying approximately 799.5 ha, refer to **Figure 1.4**.

The Project Area is approximately 15 km from the Central West Orana Renewable Energy Zone (REZ) however it is not related to the REZ, nor is it dependent on the REZ. The REZ location was selected because of the benefits of relatively low transmission build costs due to its proximity to the existing transmission network structures. This Project benefits from utilising the existing 500 kV transmission line crossing the south-east portion of the site, allowing connection to the national electricity grid and eliminating the need for the Project to construct a transmission line to connect to the grid.

The Project will support State and Federal targets for establishing renewable energy generation within NSW, reducing greenhouse gas emissions, and provide similar economic and social benefits to the regional community. As part of the Upper Hunter region, the Project Area is 45 km from the boundary of the Hunter-Central Coast REZ which was declared in December 2022 declared by the NSW Government (Energy Corporation, 2023).

The Project is a State Significant Development (SSD) under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) as the Project is development for the purposes of electricity generating works and the capital investment value of the Project is over $30 million. A development application (DA) for the Project is required to be submitted under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Environmental Impact Statement (EIS) has been prepared in line with the State Significant Development Guidelines – Preparing an Environmental Impact Statement (DPIE, 2021) and assesses the potential impacts associated with the Project in accordance with the Secretary's Environmental Assessment Requirements (SEARs), issued on 1 February 2022. **Appendix 1** provides an outline of the SEARs and where these have been addressed in the EIS.

On 2 February 2022, the Project was also determined to be a 'Controlled Action', requiring approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to its potential impact on listed threatened species and ecological communities. The Project will therefore be assessed under the bilateral agreement between the Commonwealth and NSW Government.
The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly the Department of Agriculture, Water, and the Environment) has issued the assessment requirements which have been incorporated into the SEARs for the Project.

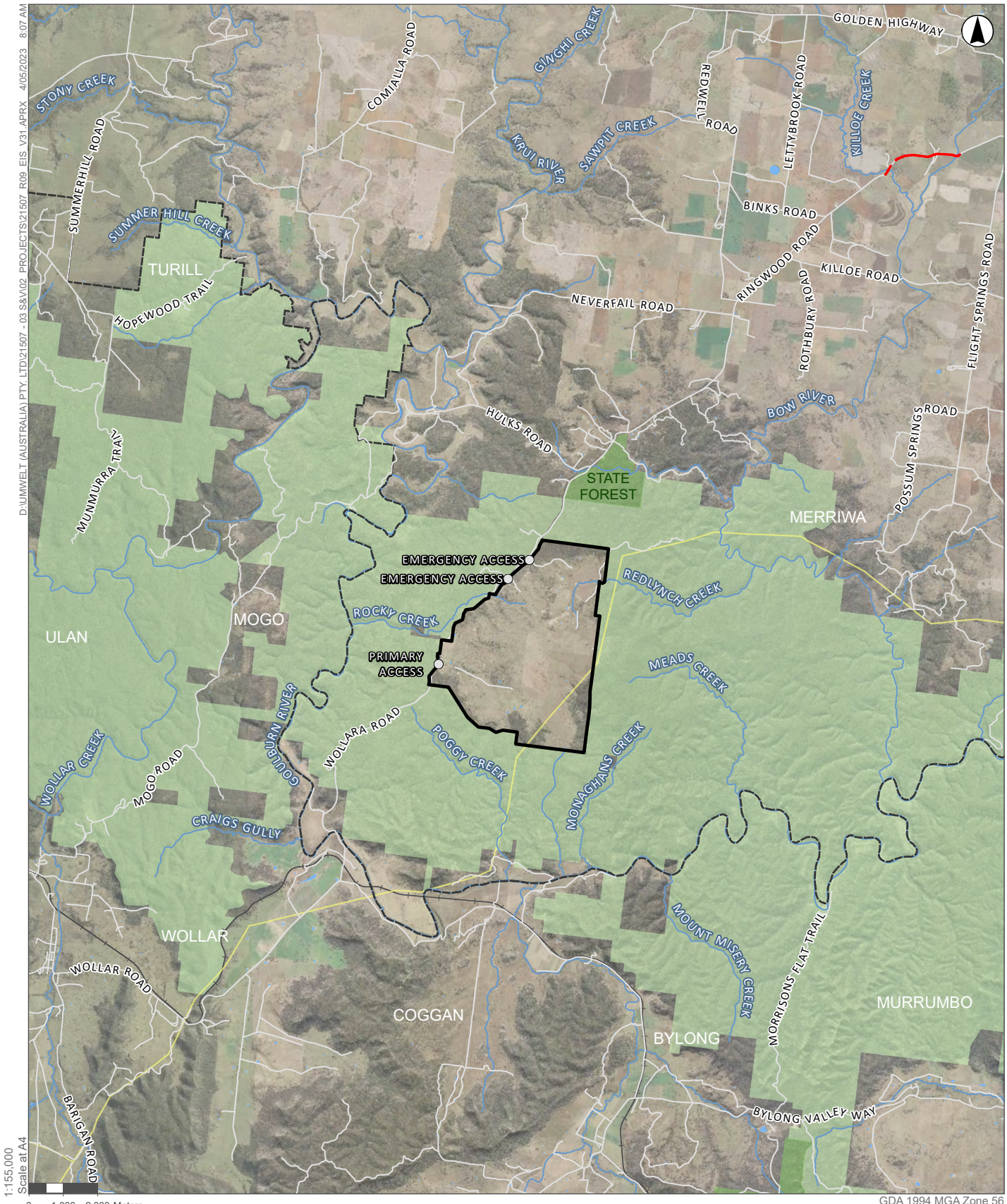


FIGURE 1.1

Location and Regional Context

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

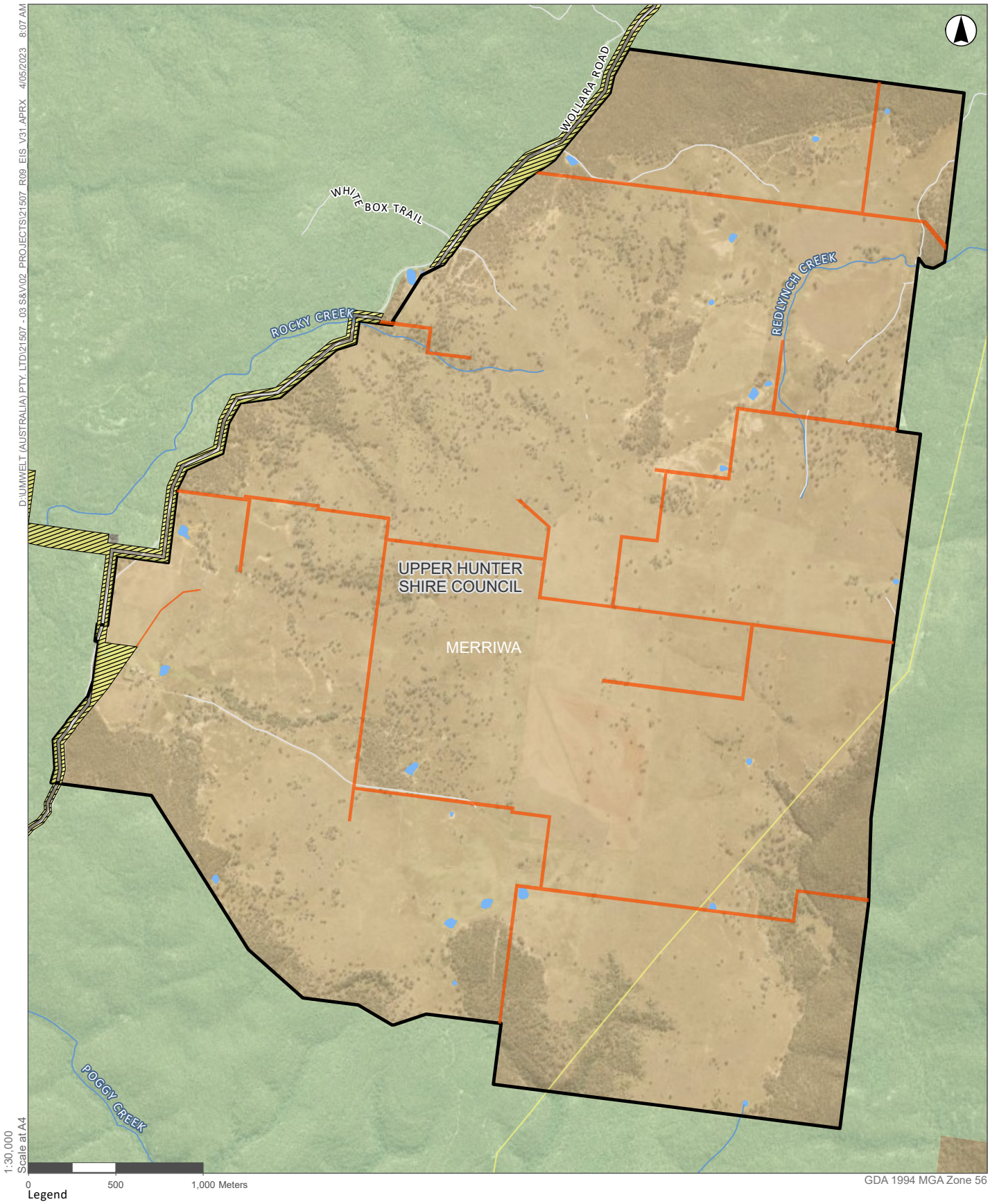


FIGURE 1.2

Land Ownership for Solar Farm

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

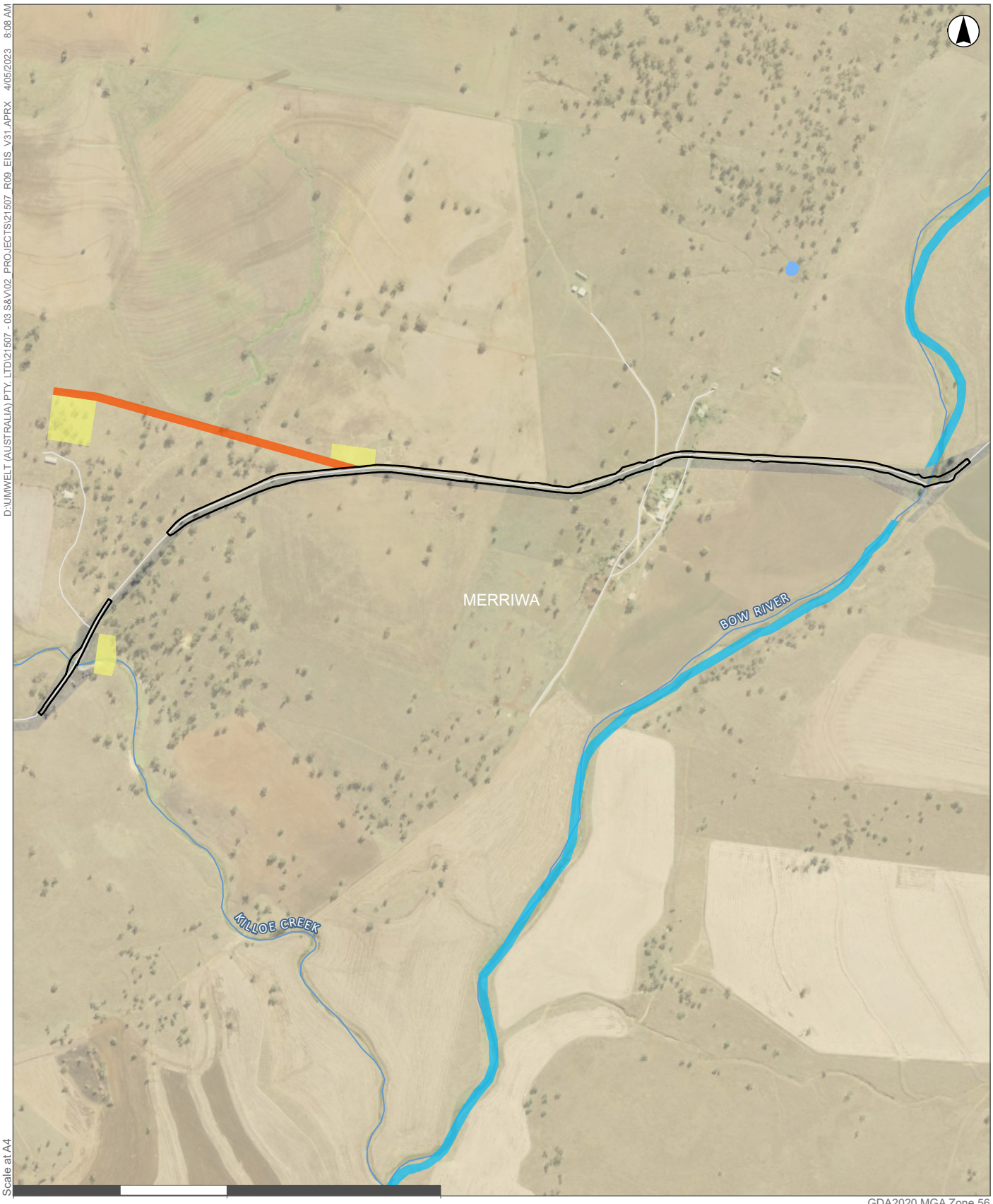


FIGURE 1.3

Land Ownership for Road Repairs and Upgrades

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

1.2 Proponent

The Proponent for the Project is Lightsource Developmental Services Australia (ABN 26 623 301 799, Level 29, 420 George Street, Sydney New South Wales 2000), herein referred to as Lightsource bp. Lightsource bp was formed in 2017 as a partnership between the European solar farm developer Lightsource and global energy company, bp. Lightsource bp is a global leader in the development and management of utility scale solar projects, with a successful track record of progressing projects from early-stage development through to operation.

Lightsource bp has developed over 300 solar projects across the globe to date, equating to over 8.8 gigawatts (GW), and currently has a 25+ GW development pipeline across 19 countries. Lightsource bp entered the Australian market in 2018 and currently has over 1 GW of projects in operation and under construction.

Several more solar projects are currently under development and construction across Australia, including, but not limited to, those listed in **Table 1.1** below.

Table 1.1 Lightsource bp Solar Project Pipeline

Site Name	Region	MWdc	Stage
Wellington	NSW	200	Operation
Wellington North	NSW	425	Construction
West Wyalong	NSW	107	Operation
Woolooga	QLD	210	Commissioning
Sandy Creek	NSW	840	Planning application
West Mokoan	VIC	364	Planning application
Mokoan	VIC	51	Approved
Wunghnu	VIC	90	Construction
Gundary	NSW	400	Preliminary assessment and design

1.3 Project Overview

The Project includes the construction, operation, maintenance, and decommissioning of a PV solar farm with a capacity of approximately 550 MWp, which will supply electricity to the national electricity grid. The Project will also include a BESS with a proposed capacity of 570 MWh and an electrical substation to connect the solar farm to the existing 500 kV transmission line that runs through the Project Area. In addition to this the Project will include road repair and upgrades along Ringwood Road.

Subject to the final design process, the key components of the Project are shown in **Figure 1.4** and include:

- Approximately 1 million bifacial solar PV modules in an east-west single-axis tracking arrangement with an approximate height of 3 metres (m) with a maximum of 4 m to accommodate undulating topography above ground level.

- A BESS with an approximate 280 MWp and 570 MWh capacity, housed in a series of outdoor containers, aggregated in one central location adjacent to the substation and switchyard.
- Onsite 550 kV switchyard and substation, with underground electrical conduits and cabling leading into the yard and overhead lines reaching above to the existing transmission line.
- Telecommunications tower, up to 30 m high, providing communications, radio and cellular services to the site and the wider region.
- Internal and perimeter gravel access roads allowing for site maintenance.
- Temporary construction facilities.
- Permanent site office and operations and maintenance building with parking for the operations team.
- Primary access point from existing driveway off Wollara Road, with two additional access points proposed along the north-western boundary of the Project Area.
- Upgrades to culverts at Bow River and Killoe Creek located on Ringwood Road.
- Widening and resealing of 1.8 km of Ringwood Road between Bow River and Killoe Creek. Repairs will include 8 m bitumen-sealed formation with a minimum of 500 mm unsealed shoulders.
- Drainage line crossings (two within the part of Redlynch Creek that is in the Project Area), if and where required, to manage existing surface water flows.
- Project Area perimeter security fencing as well as across the Development Footprint (for potential grazing control), crossing gates, water tanks and/or dams, and internal access points around the project boundary to facilitate grazing.

Detailed descriptions of Project components are contained in **Section 3.0**.

The Project is expected to operate for 40 years or more. After the initial 40-year operating period, the solar farm would either be decommissioned, removing all above ground infrastructure, and returning the site to its existing land capability, or repurposed with new PV equipment subject to technical feasibility and planning consents.

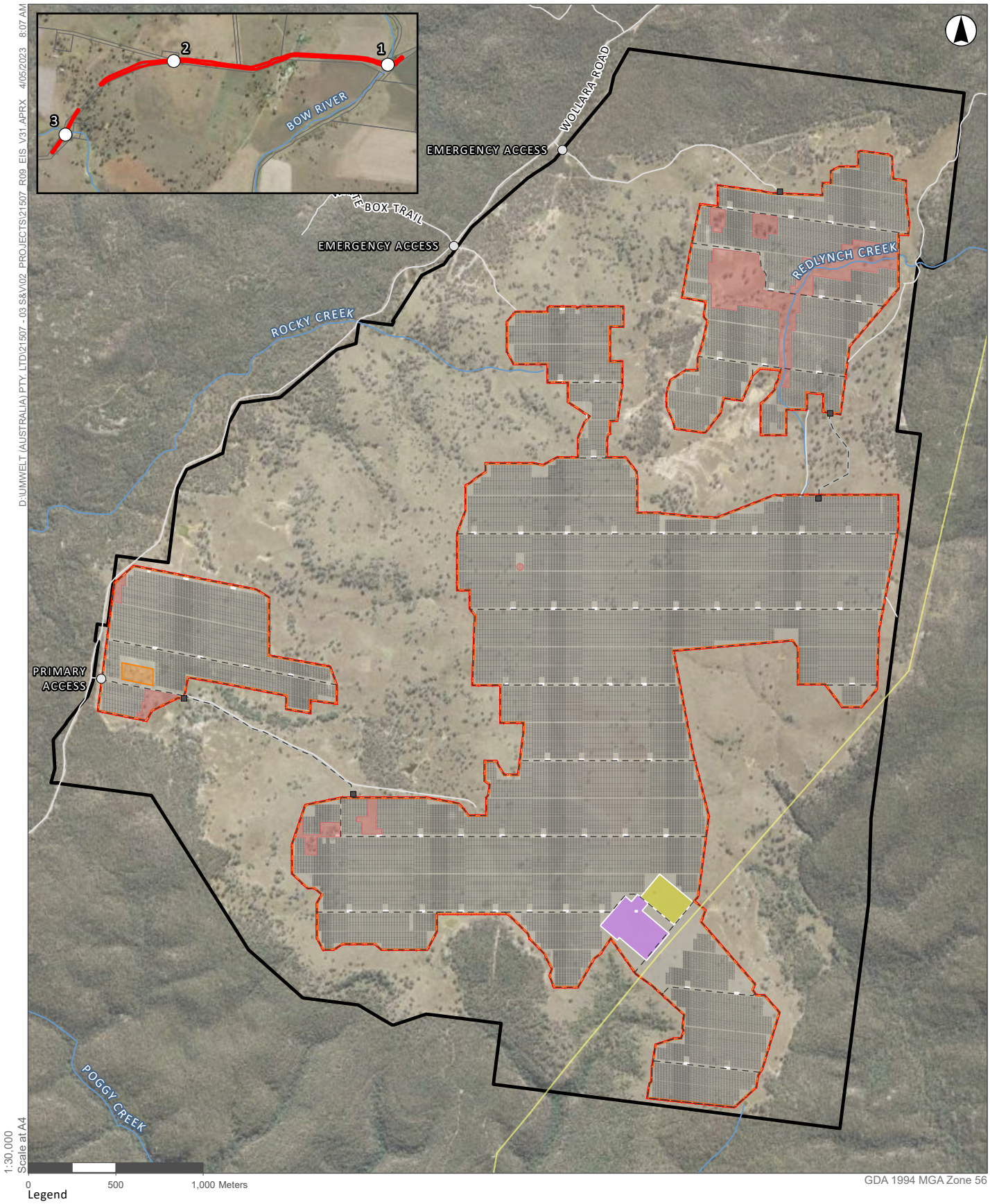


FIGURE 1.4

Project Overview

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

1.4 Impact Avoidance and Mitigation

The Project has been through several design phases, from initial site selection to concept design to consideration of the environmental, economic, social, engineering and cultural opportunities and constraints of the Project. Avoiding impacts of significant environmental (mostly biodiversity) and cultural elements has been the focus through the design iteration process, followed by implementation of mitigation measures. The different iterations of the Development Footprint across the EIS process are shown in **Appendix 23** and **Figure 2.4**, the various constraints associated with the Project Area are provided in **Figure 3.2**.

1.4.1 Site Selection

The Project Area has been selected due to its isolated location (surrounded by Goulburn River National Park) and proximity to existing transmission line infrastructure. Due to its location the Project has minimal impacts on neighbouring residents, visual amenity, aquatic biodiversity, hazards including bushfire and agricultural land use. In particular the vegetation in Goulburn River National Park screens the Project minimising potential visual impacts.

The existing 500 kV transmission line on site allows for access to the National electricity market with no new electrical infrastructure required to be built to facilitate the Project.

The site selection process was the first and arguably most successful attempt at impact avoidance and mitigation, avoiding visual impacts to residents and agricultural impacts by selecting low value farmland, as well as avoiding the need for a new transmission line. Other candidate sites surveyed along the 500 kV line (from Bayswater to Mt Piper) exhibit significantly higher impacts in these categories.

The Project Area has suitable terrain as it is generally flat, with some minor undulation in the landscape. In addition to this the Project location supports high quality solar irradiance and ideal climatic conditions to maximise the benefits of a large-scale solar farm.

The Project Area is 2,000 ha which provides flexibility in the design to prioritise avoidance of high value biodiversity areas. The Project Area has also undergone historic and widespread clearing for ongoing agricultural use.

1.4.2 Design Refinements

Design refinements have been implemented as an outcome of the environmental impact assessment process. Lightsource bp have actively refined the design and incorporated environmental and social constraints into the design and layout of the Project to avoid and/or minimise impacts to sensitive environmental features and neighbouring landholders. These refinements have been implemented as an outcome of:

- Ongoing consultation with landholders.
- Targeted ecological surveys conducted across the Project Area.
- The findings of the detailed environmental and cultural heritage assessments for the EIS.
- In response to community and stakeholder feedback during the preparation of the EIS.

Three key design revisions are outlined below to demonstrate the ongoing consideration of environmental and social impacts in the progression of the Project design and environmental impact assessment process.

1.4.2.1 Design Revision A

Following site selection, Lightsource bp developed Design Revision A (April, 2021), taking the Development Footprint from 2000 ha to a more modest 1249 ha development footprint which was developed in consideration of the preliminary environmental and social constraint assessments undertaken (refer to **Appendix 23**) at that time including:

- Preliminary mapping of areas of Biodiversity Conservation Act (BC Act) listed White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland with a high and moderate likelihood of conforming to this ecological community, were avoided where possible.
- Preliminary design sought to avoid impacts on mapped important Regent Honeyeater habitat. A total of 108.9 ha of mapped important habitat for Regent Honeyeater is present in the indicative impact footprint.
- Preliminary vegetation mapping to prioritise impacts within areas of exotic vegetation.
- Preliminary Category 1 land mapping for the Project Area was used to inform the indicative Development Footprint, utilising these areas first.

1.4.2.2 Design Revision B

Following lodgement of the Scoping Report and further progression of environmental and social impact assessments and community consultation activities, Lightsource bp developed Design Revision B (November, 2022), a 882 ha development footprint (refer to **Appendix 23**). Key changes between Design Revision A and B included:

- Reducing the Project's Development Footprint from 1,249 ha to 882 ha (avoiding 30% of the considered area) in order to avoid and minimise impacts to biodiversity and maintain connectivity between the Project Area and the surrounding Goulburn River National Park.
- Altering the layout to:
    - Reduce impacts on areas of mapped Regent Honeyeater important habitat, avoiding a further 34.92 ha of habitat.
    - Reduce impacts to suitable breeding habitat for the Barking Owl (*Ninox connivens*) including the incorporation of exclusions zones.
    - Avoid impact to habitat for the Large-eared Pied bat (*Chalinolobus dwyeri*) and the Eastern Cave Bat (*Vespadelus troughtoni*).
- Reduction in the area occupied by the Project to avoid areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community observed to be in moderate-good condition, resulting in only impacts to areas of scattered trees and derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid parts of Redlynch Creek which cross the Project Area and heritage values associated with the Slab Hut.

1.4.2.3 Design Revision C

Following the submission of the draft EIS for review by DPE in November 2022, further design refinements and reconfiguration of the Development Footprint was undertaken (refer to **Appendix 23**). Lightsource bp developed Design Revision C (February, 2023), a 799.5 ha footprint. Key changes between Design Revision B and Design Revision C include:

- Reduction of the development footprint by 10% from 882 ha to 799.5 ha.
- Further biodiversity avoidance focussing on Plant Community Types (PCTs) with moderate or higher conditions classes including:
    - Avoidance of additional Regent Honeyeater –important habitat avoiding a further 23.89 ha of habitat.
    - Avoidance of areas with overlapping habitat for Serious and Irreversible Impact Entities (SAII), including Regent Honeyeater and area of both scattered tree and derived native grassland condition zone.
    - Avoidance of a clustered area of PCT 483 with scattered tree condition zones, particularly on the outer boundaries of the Project Area.
    - Avoidance of a number of small areas such as PCT 1607, and alignment of new roads and existing tracks and roads.
- Extension of the riparian buffer around Redlynch Creek.
- Adoption of higher cost, higher efficiency PV panel technology to maintain the MW capacity while enabling a reduction in the Development Footprint.
- Lightsource bp has sought to maintain a balance between maintaining a viable capacity of the Project while avoiding and minimising impacts where possible. Standard environmental mitigation measures are also included in the Project design and are further detailed in **Section 6.0** to **Section 8.0**.

1.5 Project Objectives

The objectives of the Project and how these will be achieved are outlined in **Table 1.2**.

Table 1.2 Objectives of Goulburn River Solar Farm

Objective	How will the proposal achieve this objective?
Deliver affordable and sustainable renewable energy to businesses and communities within NSW.	The selected site has favourable solar irradiation and will deliver clean, reliable, and affordable energy. The Project is well aligned with the objectives of the current Federal and State commitments to combat climate change and to provide affordable renewable energy to the community and businesses.
Provide renewable energy that would contribute to the reduction of greenhouse gases across NSW, avoiding up to 705,000 tonnes per annum of carbon dioxide.	The Project would provide enough clean, renewable energy for about 156,000 average NSW homes while displacing approximately 705,000 metric tonnes of carbon dioxide.

Objective	How will the proposal achieve this objective?
Support the local regional economy by preferencing local workers and businesses in the development, construction, and operation of the Project.	Employment generation creating approximately 350 direct jobs during the peak of the construction phase with up to 10 direct jobs during the operational phase. The Project has been designed to be compatible with approximately 2,000 sheep to graze the maximum Development Footprint (secured by security fencing and managed through a Sheep Grazing Management Plan and Wild Dog Management Plan). A trial of sheep grazing is proposed. If deemed suitable long term it would support ongoing agricultural use of the Project Area and will assist in limiting biomass and bushfire risk.
Facilitate community engagement and participation in the design, development, and operation of the Project.	Community engagement activities have been undertaken to consult the community and capture feedback to assist in developing the most appropriate Project. The feedback received to date has been included within this EIS.
Minimise environmental and heritage impacts to the Project Area through adaptive design.	The Development Footprint presented has been considered in relation to the site's key environmental constraints: • biodiversity • heritage • waterways.

1.6 Related Development

Lightsource bp has consulted with Transgrid to develop the Project connection to the existing transmission line through the Transgrid network. It has been confirmed that there is sufficient capacity to support the Project. The connection agreement will occur through a Connection Processes Agreement (CPA), which will allow for the Project to connect to the National Electricity Market (NEM). The CPA is expected to be finalised in 2023.

Additional cabling may also be required along the existing transmission line, connecting the site to the substation in Wollar. This would involve access along the existing easement and potential aerial cable instalment via helicopter. If any works to the existing transmission line between Wollar and the Project Area are required, this would be undertaken by Transgrid and is separate to this EIS.

As discussed in **Section 1.1**, the Project is in proximity to the Central West Orana REZ and there are several other existing, approved and proposed renewable energy projects within the region.

Based on available information at the time of writing this EIS, there are a total of 15 renewable energy projects within 100 km of the Project Area, a large majority of which are part of the nearby REZ. These Projects are in various stages of the development process. The cumulative impacts associated with these projects and the proposed Goulburn River Solar Farm are discussed further in **Section 2.4**, throughout **Section 6.0** and **Appendix 20**.

1.7 Restrictions

There are several Crown Roads ('paper roads') and a Crown Tenure (enclosure permit) within the Project Area. Lightsource bp has consulted with DPE - Crown Lands and has commenced the process for closure of these roads. Crown Roads are located throughout the Project Area which intersect with the Development Footprint, refer to **Figure 1.2**. Consent from Crown Lands and Crown Roads has been obtained by Lightsource bp and provided in **Appendix 4**. There are no Crown Reserves located within the Project Area. Ongoing access by National Parks and Wildlife Services (NPWS) and emergency services would be retained through the Project Area.

[redacted] are the landholders for the Project Area, their consent for the Project is provided in **Appendix 4**. These landholders' property would have the Project infrastructure located on it. While they are included in the assessment (i.e. noise, vibration, visual, traffic and other impacts) they are clearly denoted given their association with the Project. These landholders will have an agreement in place with Lightsource bp for hosting the solar farm infrastructure on their properties as well as to address the Project related impacts on these land holdings and residences.

A Travelling Stock Route (TSR 4481) vested in Local Land Services (LLS) also exists along Wollara Road. The Project intends to exercise its right of access over the TSR as an adjoining occupier, in accordance with Section 75 of the *Local Land Services Act 2013*. Lightsource bp intends to close the TSR within the Project Area, retaining the TSR aling Wollara and Ringwood Road. It is not expected that the closing of the TSR will impact any users, as the Project will own all parcels of land parcels in the area and therefore avoiding the need for the TSR. Lightsource bp will have a lease of the areas which are a part of the TSR, this will be conducted through Crown Lands.

An existing 500 kV transmission line easement is also present in the south-eastern corner of the Project Area. Additional cabling work will be required within this easement, this is a part of Transgrid's connection works to connect the Project to the national electricity network and within Transgrid's rights to install infrastructure within the transmission line easement. This will include 33 kV underground cabling works within the Development Footprint and across the easement.

Other permit or licence considerations are provided in **Section 4.0**.

2.0 Strategic Context

2.1 Justification

The development of solar energy projects aligns with both Commonwealth and NSW commitments to increase renewable energy generation and reduce carbon emissions across the NSW and Australian economies.

The State's five existing coal fired power stations will progressively close from 2023, withdrawing faster than anticipated. These power stations currently provide around three quarters of NSW's electricity supply and two thirds of the firm capacity required during summer heat waves. In the face of cheap renewable energy generation coal-fired power stations are struggling to compete with operating dynamics, plant conditions, maintenance and remediation costs, changes in government policy and regulation and wishes of the local community (AEMO, 2022). The NSW Government is taking action to lead investment in new renewable energy generation to ensure an orderly transition away from coal while reducing the emissions intensity of the electricity generation sector (Energy Corporation, 2022). This transition is critical to provide the essential service of electricity at an affordable price to the consumer at a time when fossil-based commodity prices are experiencing record high prices and reliability from fossil-based generation is at an all-time low.

NSW currently has a strong pipeline of renewable energy projects which will contribute to achieving the current transition targets. This, however, requires significant investment from the private sector to achieve sufficient renewable energy supply to support NSW's transition to renewable energy and the retirement of the existing fossil fuel supply. The Project is consistent with the current strategic direction of NSW and Australian energy generation market and assist in achieving the planned transition to an increased contribution of renewable energy to Australia's energy needs. The Project provides for cleaner, more reliable electricity generation while reducing greenhouse gas emissions and the impacts of climate change.

Further, the Project will contribute regional capital investment, diversify local economies, generate jobs during construction and operational phases, provide indirect benefits to local services throughout the life of the Project, deliver additional income to associated landowners, and provide benefits to the local community through the implementation of a proposed community benefit fund.

2.1.1 Commonwealth Policy

Australia is one of 192 countries worldwide signed to the international climate change agreement (the Paris Agreement). The Paris Agreement aims to:

- Hold the increase in the global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- Increase the ability [of nations] to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production.
- Make finance flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development.

The Paris Agreement seeks to meet its objectives by developing programs and mechanisms that:

- Require participating Parties to prepare and communicate greenhouse gas mitigation contributions.
- Promote climate change resilience and adaptation.
- Provide mitigation and adaptation funding to developing countries.
- Foster mitigation and adaptation technology transfer between Parties.
- Require participating Parties to report progress towards their mitigation contributions on an annual basis.

Australia signed the Paris Agreement on 22 April 2016. Obligations under the Paris Agreement are driving national greenhouse gas policy and Australia's commitments to the Paris Agreement include reducing greenhouse gas emissions by 43% below 2005 levels, by 2030 (Australian Government, 2022). Australia's Nationally Determined Contribution (NDC) prescribes an unconditional economy-wide target to reduce greenhouse gas emissions, and states that future policies will target emissions generated from energy use, industrial processes, agriculture, land-use, land-use change and forestry and waste (UNFCCC, 2022).

The Conference of Parties (COP) in 2021 established the Glasgow Climate Pact with 153 countries reaffirmed to the Paris Agreement the goal of limiting the increase in global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit it to 1.5°C. In addition to support this broader goal the Glasgow agreement called for the phase-down of coal power and a phase out of 'inefficient fossil fuel subsidies' (United Nations, 2023). Australia is a country signed onto the Paris Agreement and Glasgow Pact and thus the transition away from coal to renewables, to which the Project supports.

To reduce the emissions of greenhouse gases generated by the electricity sector, and to encourage additional generation of electricity from suitable and renewable resources, the Australian Government introduced the Renewable Energy Target (RET) in 2009. The RET has been a successful initiative, with the current target of 33,000 gigawatt-hours (GWh) being met in September 2019, more than one year ahead of schedule.

The Project, as a large-scale renewable energy project, will contribute to achieving Australia's greenhouse gas emission reduction targets through avoiding up to 705,000 tonnes per annum of carbon dioxide emissions from energy production in NSW.

2.1.2 NSW Policy

The NSW Government has developed its NSW Climate Change Policy Framework, which aims to deliver net zero emissions by 2050 and make the State more resilient and responsive to climate change (NSW Government, 2016). Under the NSW Climate Change Policy Framework, NSW has committed to both follow the Paris Agreement and to work to complement national action.

The policy framework is being delivered through:

- The Climate Change Fund.
- Developing an economic appraisal methodology to value greenhouse gas emissions mitigation.
- Embedding climate change mitigation and adaptation across government operations.
- Building on NSW's expansion of renewable energy.
- Developing action plans and strategies.

2.1.2.1 Renewable Energy Action Plan

In 2013 the NSW Government released the Renewable Energy Action Plan (REAP) which aimed to increase the generation, storage, and use of renewable energy in NSW, at minimum cost to customers and with maximum benefit to NSW. The three core goals of the REAP were to attract renewable energy investment, build community support for renewable energy and attract and grow expertise in renewable energy. Based on the implementation of the REAP, renewable energy is now well-placed to play a leading role in meeting NSW's energy needs into the future and has resulted in solar and wind generated electricity tripling during the five years since the REAP was implemented.

The Project Area is mapped as having 17 megajoules per square metre of average daily solar exposure under the NSW REAP mapping (refer to **Figure 2.1**). This is considered a moderate solar exposure according to the NSW REAP mapping, relative to industry standard this is considered high exposure. The available solar resources, combined with proximity to the transmission line and the current land use make the location suitable for a productive solar farm.

2.1.2.2 Electricity Strategy and Electricity Infrastructure Roadmap

Current and future electricity development in NSW is supported though the NSW Government's Electricity Strategy and the NSW Electricity Infrastructure Roadmap which builds on the framework set out in the Electricity Strategy taking an integrated approach to all demand and supply options, including action by households and small businesses, demand management and investment in large-scale, affordable, and reliable generation. The Project is consistent with the objectives of the Electricity Strategy and Infrastructure Roadmap, in aiming to provide large-scale renewable electricity generation that is affordable and reliable.

The NSW Government's Electricity Strategy and Electricity Infrastructure Roadmap set out a plan to deliver the state's first five REZs in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions to combine renewable energy generation and high-voltage transmission infrastructure in the same location to deliver affordable, reliable clean energy. While the Project is not considered to be a part of the Central-West Orana REZ or Hunter-Central Coast REZ, it is in close proximity and as such the Project is expected to support the local uptake and use of renewable energy. While there are clear benefits to this approach, the cumulative effects of the volume of developments proposed within the region, particularly during the construction phase, require careful assessment and consideration in project planning (refer to **Section 2.4** for additional detail).

2.1.2.3 Large-Scale Solar Energy Guidelines

The Large-Scale Solar Energy Guidelines for State Significant Development (Solar Energy Guidelines)(2022) provide the community, industry, applicants, and regulators with information on the planning framework for the assessment and approval of State significant large-scale solar energy projects. The Solar Energy Guidelines were developed to assist with delivering the NSW Government's commitment outlined in the NSW Renewable Energy Action Plan (2013). Although not specified in the SEARs, this EIS has been prepared in accordance with the Solar Energy Guidelines 2022.

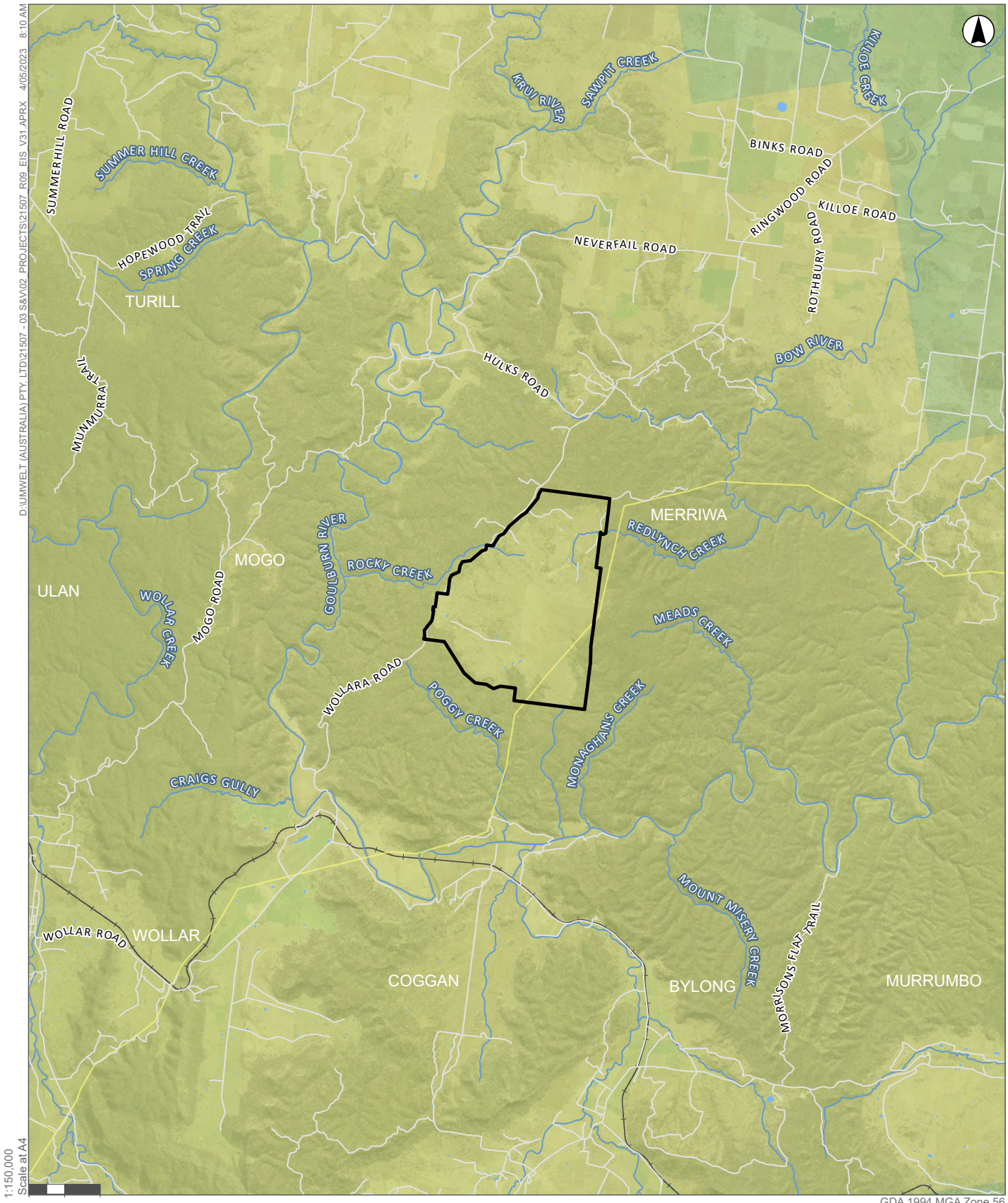


FIGURE 2.1

Average Daily Solar Exposure

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

2.2 Regional Planning Context

2.2.1 Hunter Regional Plan 2036

The Hunter Regional Plan 2036 provides an overarching framework to guide land use planning priorities. It recognises the potential of the Hunter region to become a major hub for next-generation power and aims to diversify and grow the energy sector by enabling opportunities for renewable energy industries and promoting new opportunities arising from the closure of coal-fired power stations. Support for the diversification of the energy sector is also noted as a priority for the Upper Hunter LGA.

2.2.2 Upper Hunter Strategic Regional Land Use Plan

The Upper Hunter Strategic Regional Land Use Plan (SRLUP) provides a framework to support the protection of valuable agricultural land and the sustainable management of the region's natural resources. The purpose of the SRLUP is to facilitate balanced land use policy decisions for the region and to provide initiatives to address land use conflict in regional areas. The SRLUP recognises that developing new industries, such as renewable energy projects, assists with regional economic diversification and improved resilience. The SRLUP also highlights the need to ensure compatibility of land uses in areas with good renewable energy resources.

The Project is consistent with both these aims by proposing solar energy generation that is compatible with agricultural use in the form of grazing across parts of the Project Area. In a livestock grazing context, anecdotal evidence suggests that solar panels and solar farm fences can improve animal welfare by providing protection from the elements and from predators, while supporting concentrated pasture growth, even during drought (Clean Energy Council, 2021). The local area is also expected to benefit from an average of 250 jobs, with 35% of these sourced locally, with up to 350 peak construction jobs. Up to 10 operational jobs will be generated. The potential economic benefits of the Project are further discussed in **Section 6.13** of this EIS.

2.3 Environmental and Social Context

2.3.1 Local and Regional Community

The Project Area is located between the towns of Merriwa (to the north-east) and Coggan (to the south-west) NSW, within the Upper Hunter LGA as shown in **Figure 1.1**. The Project Area has no direct neighbours as it is surrounded by at least 1.5 km of the Goulburn River National Park. Several rural properties are located north of the Project Area past the National Park. The closest non-involved dwellings are approximately 6 km away and there is one residence located within the Project Area which belongs to the host landowner (refer to **Figure 2.2**). The town of Wollar is located approximately 14 km to the south-west, in the neighbouring Mid-Western Regional Council LGA.

The Project Area is primarily located on freehold land, while parts of Wollara Road, which provides access to the site, are located on Crown land (refer to **Figure 1.2**). The Project Area comprises two freehold properties that span across multiple lots, covering an area of approximately 2,000 ha with the Development Footprint occupying approximately 799.5 ha. The two freehold properties which form the Project Area (comprising multiple lots as listed in the Schedule of Lands in **Appendix 4**) have provided landholder consent for the Project. The Road Repairs and Upgrades are located within Council land, spanning 1.8 km along Ringwood Road between Bow River and Killoe Creek.

The Project Area has previously been subject to extensive vegetation clearing, grazing, cropping and pasture improvement associated with historic agricultural land uses. Currently the Project Area is primarily used for agriculture (grazing and some cropping) and is zoned RU1 Primary Production under the *Upper Hunter Local Environmental Plan 2013* (Upper Hunter LEP) (refer to **Figure 2.3**).

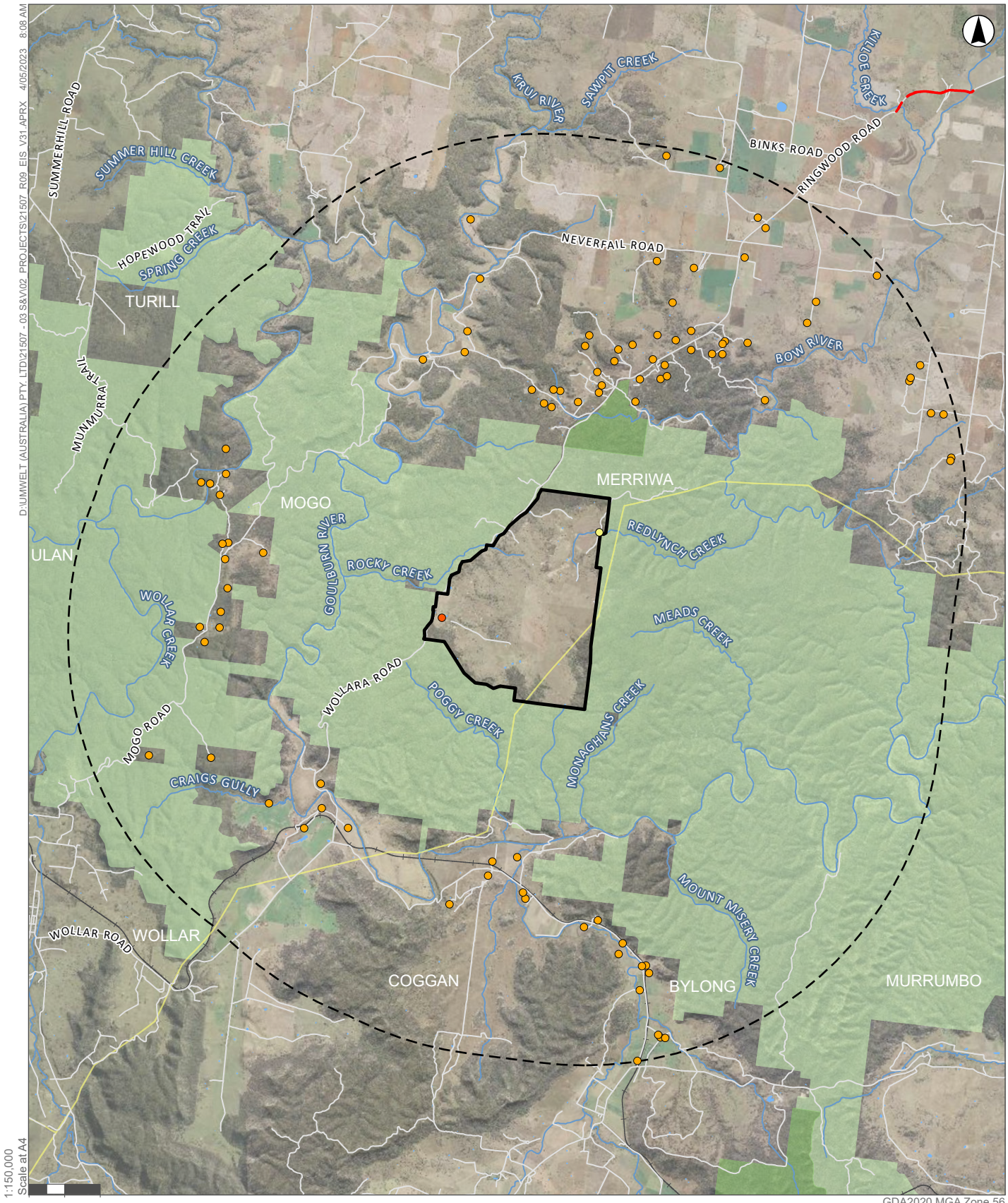
2.3.2 Natural and Built Features

The Project Area is in proximity to the Central West Orana REZ and Hunter-Central Coast REZ; however, it is not related to the REZ, nor is it dependent on the REZ. The REZ location was selected because of the benefits of relatively low transmission build costs due to its proximity to the existing transmission network structures. Similarly, the Project Area benefits from the existing 500 kV transmission line crossing the south-east portion of the site, allowing connection to the national electricity grid.

The Project is physically and visually isolated from nearby residential receivers by the surrounding Goulburn River National Park, which covers approximately 70,161 ha of dissected sandstone country and provides numerous biodiversity, cultural, education, and recreational values for the region. The Tongo State Forest also lies approximately 1 km to the north of the Project Area. To the south-west along the Ulan-Wollar Road, large areas of land are occupied by coal mining operations associated with the Wilpinjong, Moolarben and Ulan coal mines.

The Project Area is part of the Hunter River catchment and the Goulburn River sub-catchment. The Goulburn River flows approximately 3 km from the western and southern boundaries of the Project Area, through the Goulburn River National Park in an easterly direction towards its confluence with the Hunter River near Denman. Redlynch Creek, which flows across the north-eastern section of the Project Area, is a tributary of the Bow River which joins the Goulburn River to the south-east. To the west of the Project Area water flows into Rocky Creek which is also a tributary of the Goulburn River (refer to **Figure 1.1**).

Access to the Project Area is provided by Ringwood Road and Wollara Road from the north via the Golden Highway. Light vehicles may also access the Project Area via Wollara Road from the south, coming from Gulgong and Mudgee.



Legend

- Non-involved Receiver (92)
- Host Receiver (1)
- Dwelling (abandoned)
- Electricity Transmission Line
- Watercourse
- Roads and Tracks
- Railway
- Project Area (10km buffer)
- Project Area
- Road Repairs and Upgrades Area
- NSW National Parks
- NSW State Forests
- Waterbodies

FIGURE 2.2A

Nearby Residences

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

FIGURE 2.2B

Sensitive Receivers – Solar Farm and BESS Road Traffic Noise Assessment

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

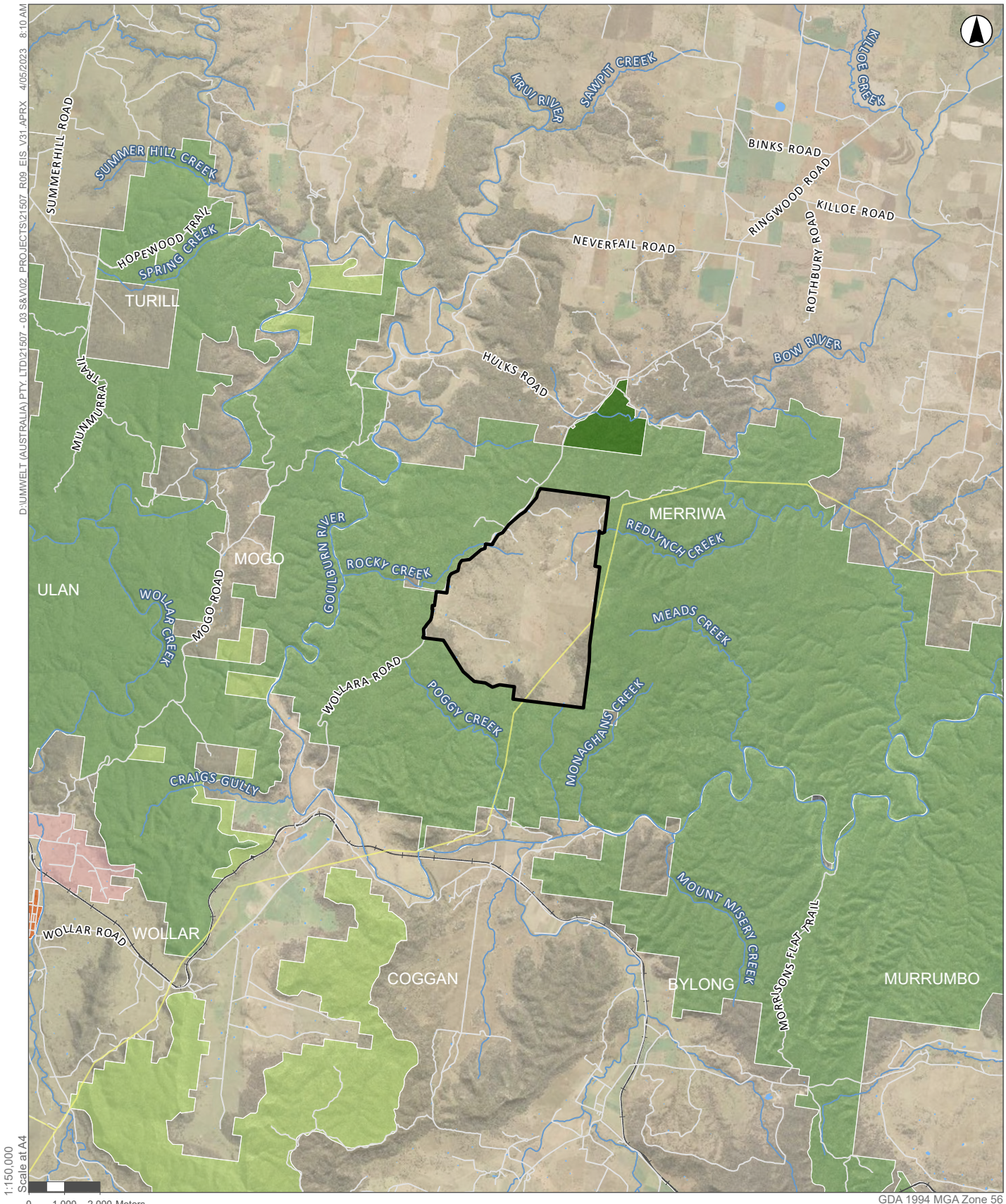


FIGURE 2.3

Land Zoning

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

2.3.3 Key Constraints

While much of the Project Area consists of agricultural land, the whole of the landscape would have previously supported open woodlands and forests like those of the surrounding Goulburn River National Park. The Project Area currently supports a mosaic of exotic vegetation where cropping and pasture improvement has taken place, along with derived native grasslands in a range of conditions, isolated paddock trees, areas of thinned woodland and forest, and areas of intact woodland and forest, parts of which are consistent with the definitions of Threatened Ecological Communities and provide habitat for threatened fauna species.

The constraints imposed by the presence of these biodiversity features has driven the design of the Development Footprint and proposed layout to avoid and/or minimise impacts as described in **Section 1.4.2** (refer also to **Section 6.2** for further detail on biodiversity). Other key constraints considered in the design of the Project are the known presence of historic and Aboriginal heritage (refer to **Section 6.4**) and several waterways and small dams currently used to support the agricultural land use of the Project Area (refer to **Section 6.10**).

The Project Area is also located within a bushfire prone area. Although the site has been subject to extensive clearing it contains remnant patches of vegetation, and the proximity of the Goulburn River National Park may provide fuel loads and present spreading risks (refer to **Section 6.11.3**).

Access to the Project Area is limited to one primary access route from the Golden Highway, being Ringwood Road and Wollara Road. While traffic levels are relatively low, parts of this access route require repairs to ensure safe accessibility (refer **Section 3.4.2**. Lightsource bp will implement the mitigation and management measures outlined in **Section 8.2** to reduce potential impacts. This is further discussed in **Section 6.9**.

2.4 Cumulative Impacts

The Project Area is located within 15 km of the Central-West Orana REZ and approximately 45 km from the Hunter-Central Coast REZ, and as a result many renewable energy projects are currently under development or are proposed to be developed in the region. The Project Area is also located near several coal and other mineral mining projects. An assessment of potential cumulative impacts has been conducted for the Project and is provided in **Appendix 22** and summarised throughout **Section 6.0**.

2.5 Project Related Agreements and Benefits Sharing

Through the Project design and stakeholder engagement process, Lightsource bp has proposed and developed several Project related agreements. While no Voluntary Planning Agreements (VPA) or landowner agreements have been entered into by the Proponent at this stage they will be finalised prior to the commencement of construction. A draft VPA is currently underway in consultation with the Upper Hunter Shire Council and other relevant stakeholders for the Project.

2.5.1 Host Landholder Agreements

Lightsource bp has signed options to purchase for both privately held parcels of land included within the Development Footprint owned by [redacted]. The options to purchase are valid through 2026.

2.5.2 Community Benefit Sharing Initiatives

Lightsource bp is currently developing a Community Benefit Sharing Strategy for the Project. This is proposed to include:

- Annual financial contributions throughout the life of the Project via a Voluntary Planning Agreement (VPA) with the Upper Hunter Shire Council. Note: the VPA has been submitted to the Upper Hunter Shire Council and following further discussions is currently progressing through final review and approval processes within Council.
- Partnerships with the Clontarf Foundation (working to improve education, discipline, life skills, self-esteem and employment prospects of young Aboriginal and Torres Strait Islander men0 and other educational organisations.

Various infrastructure installed as part of the Project will provide benefit to the community through shared use including:

- Road repairs and upgrades that the community will be able to utilise and benefit from the improvement to road safety.
- A telecommunication tower which will facilitate improvements to connectivity for nearby stakeholders. This tower will provide radio communications coverage to the Project Area and wider region, allowing for the local community to utilise this infrastructure.
- The community raise concerns regarding sheep grazing and wild dogs within the local area. Lightsource bp will implement a Wild Dog Management Plan for the Project.

2.6 Alternatives

Lightsource bp has considered a range of alternative options for the Project throughout the design process to date, with the aim of minimising environmental and social impacts while maximising the potential for electricity generation. As the Project design and environment assessment progresses, the Project will continue to be delivered to meet these goals.

2.6.1 'Do Nothing' Option

The Project Area is currently used for livestock grazing and limited fodder cropping. The 'do nothing option' would allow for the continued use of the Project Area solely for agricultural purposes. The 'do nothing option' would also imply that the Project is not developed and would therefore forego the Project's identified benefits, namely:

- The provision of additional renewable energy supply to assist in reaching State and Commonwealth renewable energy targets.
- Assistance in the transition towards cleaner electricity generation and a reduction in greenhouse gas emissions.
- Increased energy security and supply into the Australian grid.
- Significant social and economic benefits created through capital investment and provision of direct and indirect employment opportunities during the construction and operation of the Project.

Further, the 'do nothing option' would also result in a lost opportunity for landholders to diversify their revenue streams.

The 'do nothing option' would avoid the environmental and social impacts associated with the construction, operation, and decommissioning of the Project, such as biodiversity impacts, construction noise, traffic and dust, social amenity impacts and visual impacts. However, these impacts are manageable through the implementation of the management and mitigation measures outlined in **Section 8.0** and would not result in a significant impact to the environment and local communities.

The 'do nothing option' also risks a smooth transition away from coal-based generation sources as generators such as Liddell, Eraring and Bayswater reduce their output and close over the coming years. Projects like the Goulburn River Solar Farm Project will inject large quantities of renewable energy into the National Electricity Market (NEM) within the timeframe of these large generator downscaling and closures, further alleviating the stability of the power system and the need for State intervention such as propping up.

Considering the benefits of the Project, the 'do nothing option' is not considered to be a preferred option.

2.6.2 Alternative Locations

Throughout the site selection and design process, Lightsource bp has considered alternative site locations based on proximity to the NSW electricity grid (existing and proposed) and the solar generation potential of the region. This included a broad site exploration activity across the State, as well as investigation of alternative site locations within the local area. Managing environmental constraints and social aspects, improving infrastructure efficiency and matching localised energy demands were major considerations in the evaluation of alternatives. The proposed Project Area was shown to be the most suitable as it provides the optimal combination of:

- Availability of land of a suitable scale for a viable commercial-scale solar farm.
- Access to the existing high voltage transmission network and avoids the need for overhead transmission lines.
- High quality solar irradiance and ideal climatic conditions for a commercial-scale solar farm.
- Compatible land use zoning within the Project Area.
- Reduced environmental constraints because of historic widespread clearing within the Project Area and ongoing use for agriculture, with potential environmental impacts that can be managed with appropriate mitigation and management.
- Access to the major transport network, namely the Golden Highway.
- Only one adjacent landholder, being the Goulburn River National Park, resulting in appropriate visual screening and negligible impacts to any sensitive receivers in the area.
- Agreements with host landholders.

For these reasons, the Project Area was considered for the proposed solar farm development.

2.6.3 Alternative Technologies

Alternative Project layouts based on different solar farm designs using mature technology with a proven track record of large-scale implementation, have been investigated including:

- Fixed versus tracking options for PV module mounting: A single axis tracking system was chosen for the Project as it allows for more efficient electricity generation than fixed tilt options, leading to more efficient land use. Tracking systems also have a lower visual impact as they minimise glare from the sun, which can occur when the sun is at low angles in the sky and the PV modules are not facing the sun.
- Mono-facial versus bifacial PV modules: Bifacial PV modules were selected for the Project as they allow for more efficient electricity generation than traditional single-sided PV modules, leading to more efficient land use. The distance between the rows of modules is also larger for bifacial modules, which helps to minimise environmental and visual impacts of the Project and facilitate grazing.
- Higher efficiency solar panels in order to minimise the Development Footprint while maintaining the minimum Project capacity required to connect to the onsite transmission line and deliver a commercially viable Project.

2.6.4 Alternative Project Layouts

During the early design stages of the development, Lightsource bp considered the environmental, cultural, and social constraints of the locality to minimise the potential impacts of the Project. Stakeholder consultation indicated that design refinements identified through specialist studies aligned with concerns raised about the Project. Further details regarding the alternative Project layouts are provided in **Section 1.4.2**. These alternative Project Layouts have been designed to avoid and minimise environmental and social impacts throughout the EIS process.

The design refinements that have been incorporated into the Project are apparent in **Figure 2.4** below.

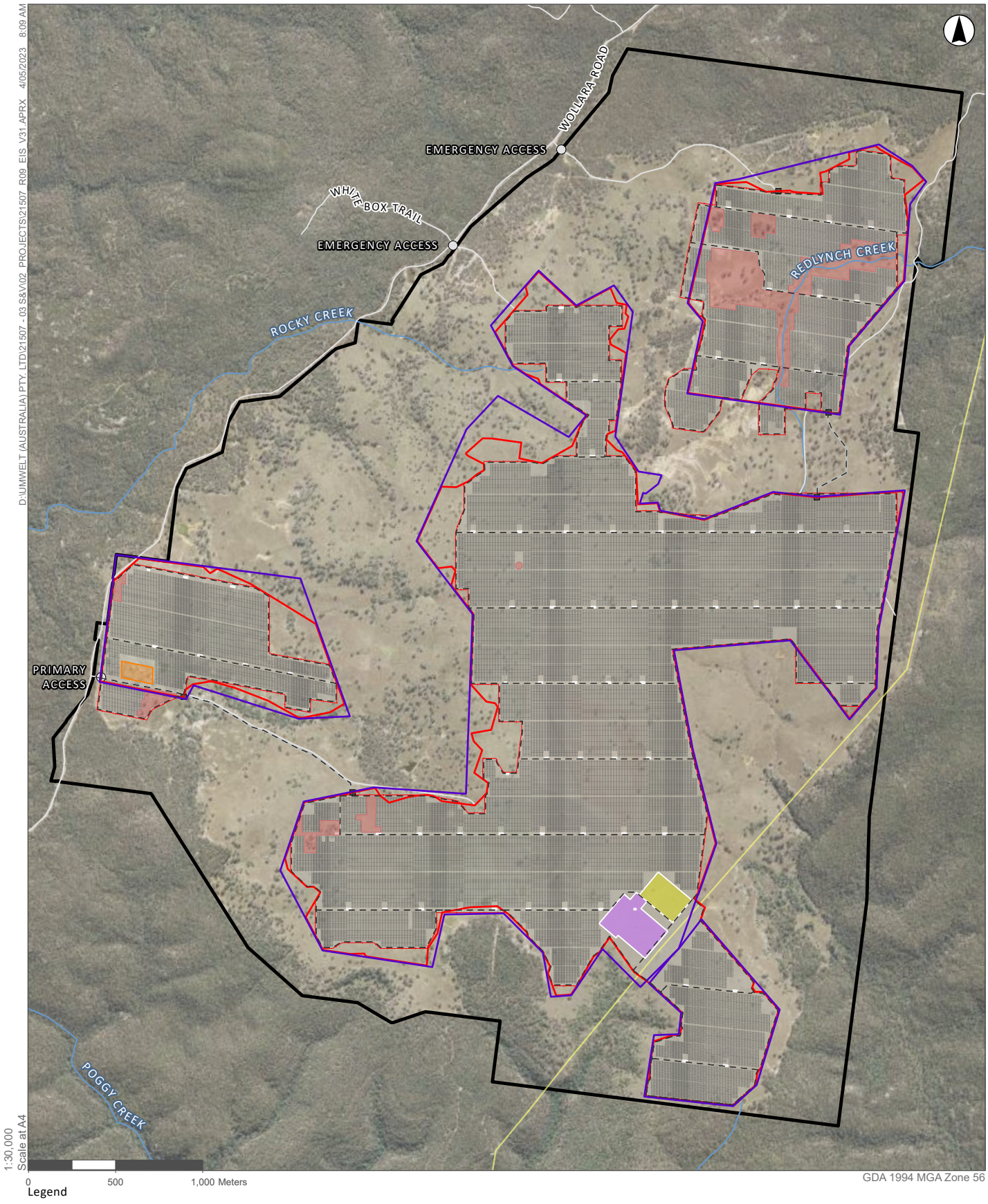


FIGURE 2.4

Design Refinements

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

3.0 Project Description

3.1 Project Overview

The Project involves the construction, operation and decommissioning of approximately 550-megawatt peak (MWp) of solar photovoltaic (PV) generation as well as a Battery Energy Storage System (BESS) with 280 MWp / 570 megawatt hour (MWh) capacity. The Project will also include a substation and connection to an existing 500 kilovolt (kV) transmission line. The Project will include various associated infrastructure, including road repairs and upgrades to Ringwood Road, temporary construction facilities, operation and maintenance buildings, internal access roads, civil works and electrical infrastructure to connect the Project to the existing transmission line which passes through the Project Area.

The conceptual layout of the solar arrays (refer to **Figure 3.1**) has been designed to maximise solar efficiency while also considering ecological, heritage and other site constraints.

Table 3.1 provides a summary of the key components of the Project.

Table 3.1 Project Summary

Project Element	Summary of the Project
Project Application Number	SSD-33964533
Project Description	The Project includes the construction, operation, and decommissioning of the proposed 550 MWp solar farm, 280 MWp / 570 MWh BESS, road repairs and upgrades and associated infrastructure (such as operations and maintenance buildings, temporary construction compound, security fencing), civil works (such as regrading, re-sheeting and culvert upgrades) and electrical infrastructure (including a new onsite substation and underground and overhead cabling) required to connect to the electricity transmission network. A 30 m telecommunications tower is also proposed. No subdivision of land is proposed as part of the Project. The Project's conceptual layout is provided in **Figure 3.1**.
Project Location	2335 Wollara Road, Merriwa NSW, approximately 28 km south-west of Merriwa, within the Upper Hunter Local Government Area.
Project Area – Solar Farm Area	Approximately 2,000 ha.
Development Footprint	Approximately 799.5 ha and 1.8 km of road repairs and upgrades.
Schedule of Lands	Refer to **Appendix 4**.
Solar Arrays	Approximately 1 million bifacial solar panels on ground-mounted single axis tracking framework. Row spacing: Maximum of 5 m apart. Height: Average height approximately 3.1 m at full tilt, with a maximum of 4 m in some areas due to undulating site topography.
Battery Storage	AC Battery Storage Facility of 570 MWh and a discharge duration of two hours. 50 m APZ surrounding the BESS facility security fencing.

Project Element	Summary of the Project
Electrical Reticulation	Connection to existing 500 kV transmission line in south-eastern corner of Project Area. Additional cabling to be installed to existing transmission line. This would require small vehicle access along the existing transmission line easement, as well as potentially aerial installation work (via helicopter). This is not part of this EIS. Power conversion units consisting of approximately 67 inverters. On-site substation covering approximately 4 ha enclosed by security fencing.
Telecommunications Tower	Up to 30 m high, providing a secondary communications channel between the Project and Wollar and Bayswater substation. This will be capable of radio communications, located in the substation compound area.
Temporary Construction Facilities	Main construction site compound to include office amenities, parking, storage, and associated facilities. Laydown areas suitable for storing plant and equipment, solar panels and cable drums, and areas to support waste management activities. A temporary helipad for emergency response purposes during construction.
Permanent Operational Facilities	This would include the system control building, switch room and storage facilities, and car parking.
Security Fencing, Lighting and CCTV	Perimeter security fencing around the Development Footprint to a height of approximately 2.3 m plus CCTV and security lighting.
Road repairs and Upgrades	• Upgrades to culverts at the existing road crossings of Bow River and Killoe Creek located on Ringwood Road. • Widening and resealing of 1.8 km of Ringwood Road between Bow River and Killoe Creek. Repairs will include 8 m bitumen-sealed formation with a minimum of 500 mm unsealed shoulders.
Project Access	Major solar components would be delivered via the Port of Newcastle, New England Highway, Golden Highway, Ringwood Road and Wollara Road from the north. Light vehicle access would also occur from the south via Gulgong and Mudgee. Three access points to be provided along the western boundary of the Project Area, off Wollara Road, one point will be a permanent site access and the remaining two are emergency access points.
Internal Access Tracks	Approximately 49 km of unsealed access tracks of approximately 4 m width. A single main access road will be 6 m wide leading up to the substation.
Workforce	Construction: Up to 350 direct jobs at the peak of construction with an average 250 jobs, aspirational target of 35% sourced locally. Operation: Approximately 10 direct jobs. Aspirational target of all permanent roles based locally.
Construction Hours	Construction hours: • Monday to Friday 6:00 am to 6:00 pm. • Saturday 6:00 am to 6:00 pm. • No works on Sundays or Public Holidays. Approval is also sought to undertake activities which are inaudible at non-involved dwellings, emergency work, and deliveries and dispatches (where required by authorities for safety reasons) outside of standard construction hours.

Project Element	Summary of the Project
	Road upgrades on Ringwood Road are proposed to be undertaken within standard construction hours.
Operational Hours	24/7.
Construction Period	27 months.
Operational Period	40 years.
Capital Investment Value	Estimated $880 million.

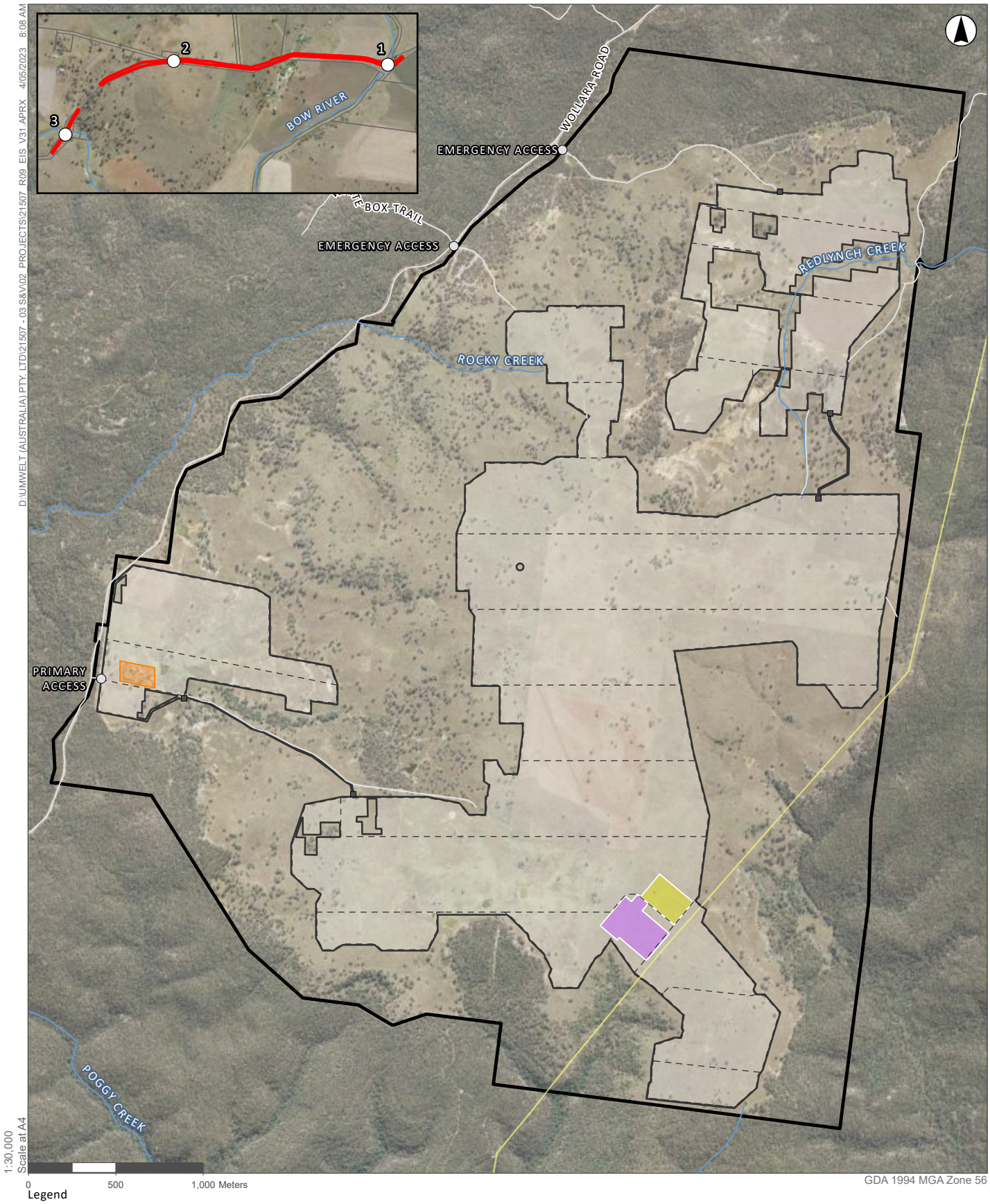


FIGURE 3.1

Conceptual Project Layout

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2023)

3.2 Project Area

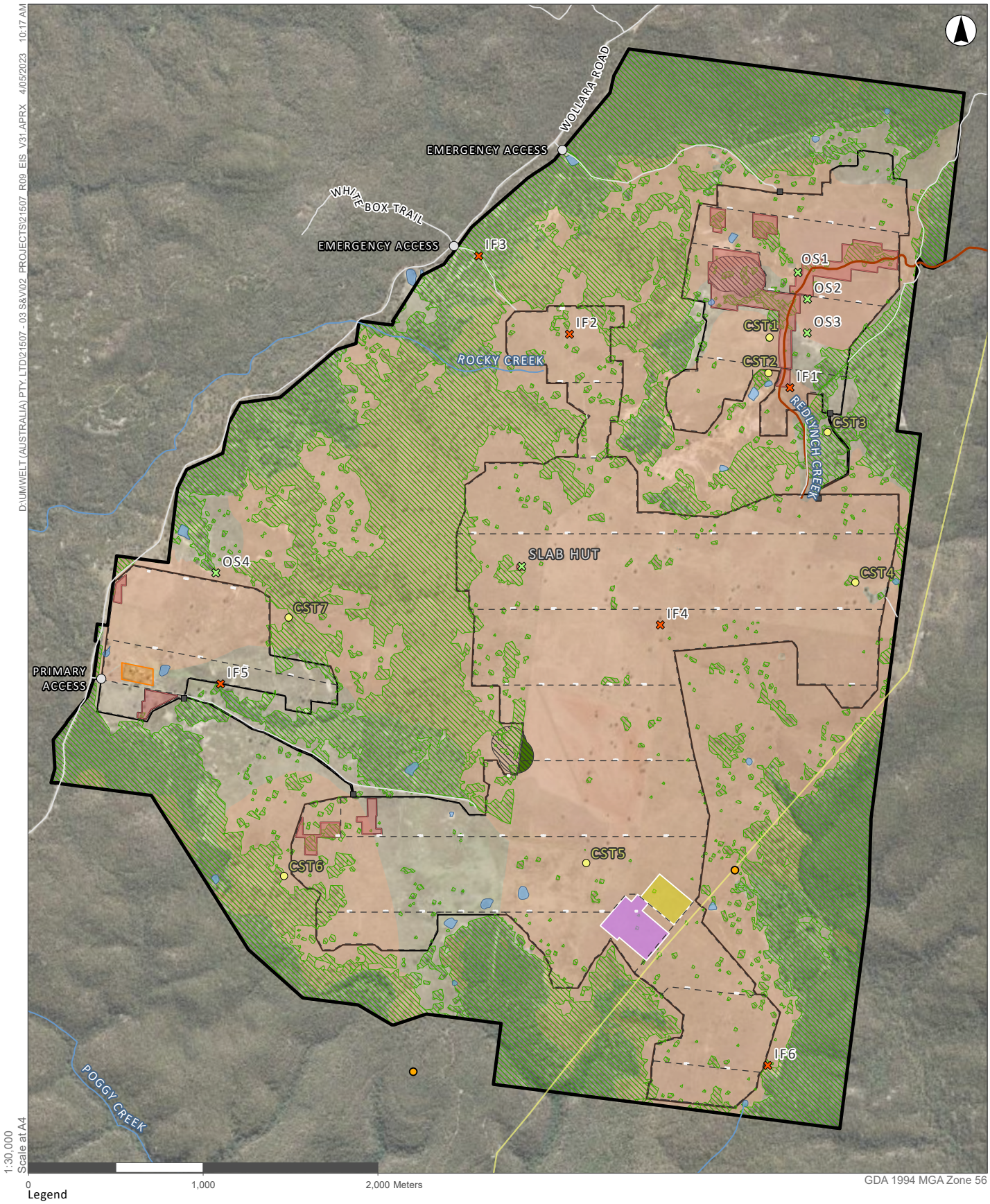
The Project Area covers approximately 2,000 ha with a Development Footprint of approximately 799.5 ha as shown in **Figure 3.1**. Access will be achieved via the existing driveway towards the southern end of the property's western boundary, off Wollara Road. Two secondary access points will be available towards the north of the property's western boundary also off Wollara Road for emergency purposes.

Emergency services and NPWS access will be maintained through the Project Area, to be used for emergencies only.

The layout of the solar arrays and associated infrastructure would be entirely contained within the Development Footprint. It is noted that additional access tracks and underground cabling may be required outside of the Development Footprint. The Project also includes repairs to parts of Ringwood Road, which are located outside the Project Area, to support the safe and efficient transportation of construction components and personnel. The works on Ringwood Road are contained to the road reserve and landowners consent from Upper Hunter Shire Council has been obtained, refer to **Appendix 4**.

The Project Area subject to land clearing, grazing, cropping and pasture improvement, as such it supports a mosaic of exotic vegetation where cropping and pasture improvement has taken place. The Project Area still supports some derived native grasslands in a range of conditions, isolated paddock trees, areas of thinned woodland and forest, and areas of intact woodland and forest, providing some habitat for threatened communities and species. The constraints imposed by the presence of these biodiversity features has driven the design of the Development Footprint and proposed layout to avoid and/or minimise impacts (refer to **Section 6.2** for further detail on biodiversity). The presence of one Aboriginal heritage item, seven potentially culturally significant trees (four outside of the Development Footprint) and several small waterways and dams have constrained and driven the design of the current Development Footprint. As well as the historical 1900 House and remains of the Slab Hut. Key heritage constraints are shown in **Figure 3.2**.

The Project has been designed through a comprehensive process that incorporates community and other stakeholder feedback to maximise positive social, economic and environmental outcomes while minimising environmental and social impacts.



Legend

- Gate
- Access Points
- Proposed Access Tracks
- Electricity Transmission Line
- Watercourse
- Roads and Tracks
- Project Area
- Battery Energy Storage System
- Substation
- Inverters
- Compound Area
- Exclusion Zones - Environmentally Sensitive Areas
- Development Footprint

Aboriginal Heritage Sites

- Artefact Site
- Trees of Community Interest
- Artefact Scatter Centroid
- Isolated Find

Hydrological Constraints

- Redlynch Creek

Biodiversity Constraints

- Regent Honeyeater Species Polygon
- Barking Owl Potential Next Tree Buffer (100m)
- Barking Owl Species Polygon
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

FIGURE 3.2

Constraints

3.3 Physical Layout and Design

3.3.1 Solar Arrays

The Project would involve the installation of approximately one million bifacial PV solar panels across the Project Area providing an estimated 550 MWp capacity. The panels would be arranged in a series of rows positioned to maximise the solar resources available. The solar arrays would be installed through pile driving on ground-mounted single axis tracking framing, in rows configured in a north-south direction. The panels would move throughout the day from east to west, tracking the sun. The tracking system is estimated to have a tracking range of 120 degrees, or ≤ 60 degrees from the horizontal position.

The standard dimensions of PV solar panels are up to 2.4 m tall by 1.3 m wide, which provides a surface area of approximately 3 m^2 per PV solar panel. PV solar panels are designed for maximum light absorptivity and constructed of solar glass with anti-reflective surface treatment. The PV modules would have a height of approximately 3.1 m, with a maximum of 4 m in some areas due to undulating topography throughout the Project Area.

Photo 3.1 Example of Solar Panels (Umwelt, 2021)

Photo 3.2 Example of Typical Single Axis Tracking System

3.3.2 Onsite Electrical Reticulation and Substation

The solar array would be connected to the onsite substation via a network of underground cables which are buried in trenches (up to one metre deep and 0.3 m wide). The electricity generated by the Project would be directed via these cables to the inverters. The number of inverters would be dependent on the final detailed design; however, it is estimated that approximately 140 inverters grouped in blocks of two would be required. The inverters change the direct current (DC) electricity generated into alternating current (AC), so that it is in a useable form to transport across the grid. In addition to this, power transformers would be required to step up voltage to the solar farm reticulation voltage, medium voltage switchgear and communication and ancillary equipment.

The Project would include an onsite substation, to be in the south-eastern corner of the Project Area (refer to **Figure 3.1**). The substation would include a range of electrical equipment to manage and control the supply of electricity (up to 10 m in height) and a lightning rod up to 18 m in height. The substation would include an elevated busbar, switch room, lightning protection system, circuit breakers, disconnectors, current transformers, voltage transformers, and a 500 kV transformer. The anticipated footprint of the substation is approximately 4 ha.

The substation would connect via overhead lines to the existing 500 kV transmission line that passes through the south-eastern corner of the Project Area. This transmission line is owned and operated by Transgrid, and the Project will connect directly to the national grid through this transmission line.

An additional tower may be required on the current line to accommodate the grid connection, if this is required it will be undertaken by TransGrid separate to this EIS.

3.3.3 Battery Energy Storage System (BESS)

The Project would include a BESS with a capacity of up to 280 MWp and 570 MWh. The BESS would most likely comprise of a lithium phosphate iron battery system, to be housed in a series of outdoor containers, aggregated in one central location. The BESS would be located adjacent the substation in the south eastern corner of the Project Area.

3.3.4 Access, Parking and Security Fencing

Three access points are to be provided along the western boundary of the Project Area, off Wollara Road as shown in **Figure 3.1**. The two northern-most access points would be provided for emergency access only, with primary access provided through the southernmost point (the existing access point for the property).

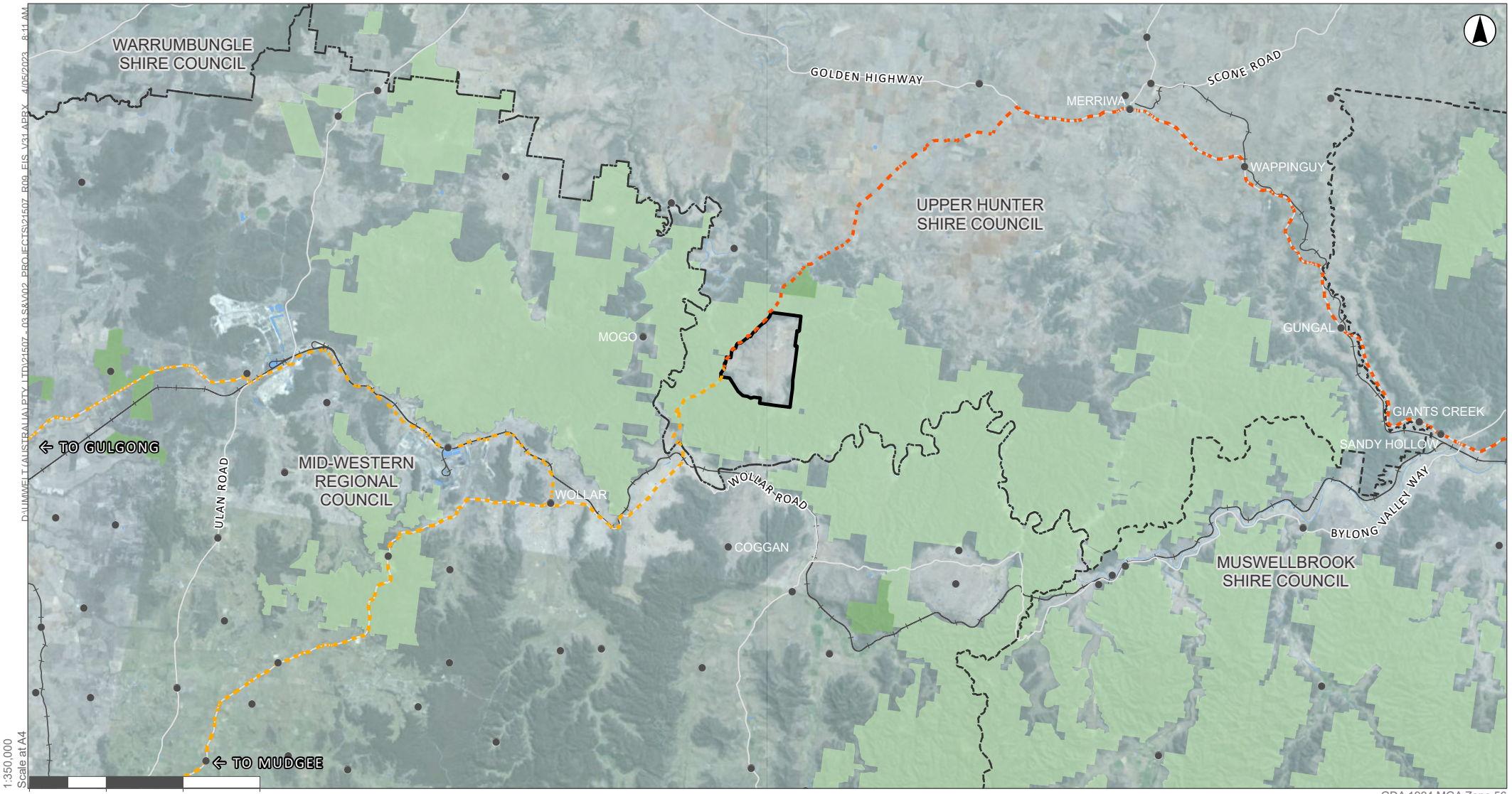
Major solar components would be delivered to the Port of Newcastle and transported to the Project Area by truck via the New England Highway and through to the Golden Highway, Ringwood Road and Wollara Road. These materials and vehicles would access the Project Area via the southern entrance off Wollara Road. Light vehicles would also access the Project Area from the southern end of the Project Area from Mudgee and Gulgong (refer to **Figure 3.3**) accessing the Project Area through the primary access point.

Approximately 49 km of internal wet weather access roads would be constructed to provide access to the various areas of the site for construction as well as on-going operations and maintenance. The layout of the proposed internal access roads is shown in **Figure 3.1**.

Internal access roads would be constructed of compacted gravel. Access tracks would be 4 m wide with a main access track of 6 m wide (to accommodate transformer delivery to the substation)to allow for the safe delivery, unloading and installation of key components.

During construction, a suitable number of parking spaces will be available within the temporary laydown areas. The indicative location of laydown areas is illustrated in **Figure 3.1**.

The perimeter of the Development Footprint would be enclosed by security fencing (no security fencing is proposed around the Project Area boundary), approximately 2.3 m high, subject to final design.
The security fencing would involve casting concrete footings for posts and installing fencing mesh. Fencing will restrict public access to the Development Footprint and is required under *Australian Standard (AS) 1725.2010 Parts 1-5.* CCTV cameras and security lighting would also be provided around the onsite substation, maintenance buildings and offices and the full length of the perimeter of the Development Footprint.



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1:350,000
Scale at A4

GDA 1994 MGA Zone 56

FIGURE 3.3

Material Transportation Route

Image Source: ESRI Basemap (2022) **Data source:** NSW DFSI (2022)

3.3.5 Operations and Maintenance Facility

A permanent operations monitoring and maintenance facility would be constructed to support the ongoing operation of the solar farm, located within the Development Footprint of the substation. The operation and maintenance facility would be used on an ongoing basis to support maintenance and repair activities. This would include an office with staff amenities (kitchenette, toilets, showers), car park, workshop/shed and laydown/temporary storage area. The facility would have a footprint of approximately 10 ha (refer to **Figure 3.1**).

3.4 Construction

3.4.1 Construction Workforce

The Project would generate approximately 350 jobs during the peak months of the construction period. Onsite workforce numbers would vary from month to month, depending on the intensity of the proposed works at the time. The workforce would include licensed electrical trade personnel, mechanical and electrical trades assistants, machinery operators, riggers, and labourers.

Lightsource bp aims to hire 35% local labour for construction, and source local sub-contractors and suppliers. It is envisaged that the majority of the local workforce would be residing in towns within one hour's drive from the site (i.e. Merriwa, Mudgee, Gulgong and Rylstone). This is also the likely accommodation locations for non-local labour required for the Project.

3.4.2 Road Repairs and Upgrades

The Project would require road repairs and upgrades on Ringwood Road which would be completed prior to the commencement of construction of the solar farm. The location of these road repairs and upgrades are provided in **Figure 3.4** and the detailed designs are provided in **Appendix 2**.

- Upgrades to culverts at existing road crossings of Bow River and Killoe Creek located on Ringwood Road. The culvert upgrades will include:
    - Installing culverts designed to accommodate two-way heavy vehicles, including B doubles and various farm machinery.
    - Culvert width 7 m (3.5 m lane width) sealed carriageway with suitable guardrail and signage and associated drainage works.
    - Stockpile site to be located on disturbed land within the road reserve in consultation with the Upper Hunter Shire Council.
    - Temporary side track at both locations to facilitate access during construction (also within road reserve).

- Widening and resealing of 1.8 km of Ringwood Road between Bow River and Killoe Creek.
    - This will include an 8 m bitumen-sealed formation with a minimum of 500 mm unsealed shoulders with all works contained within the existing road corridor. The horizontal and vertical alignment of the proposed road will ensure safe sight distance, safe movement of longer vehicles, and an improved road network for the users.
    - Additional signage may also be included in accordance with Ausroads requirements, *Guide to Traffic Management Part 10: Transport Control – Types of Devices (2020)*.

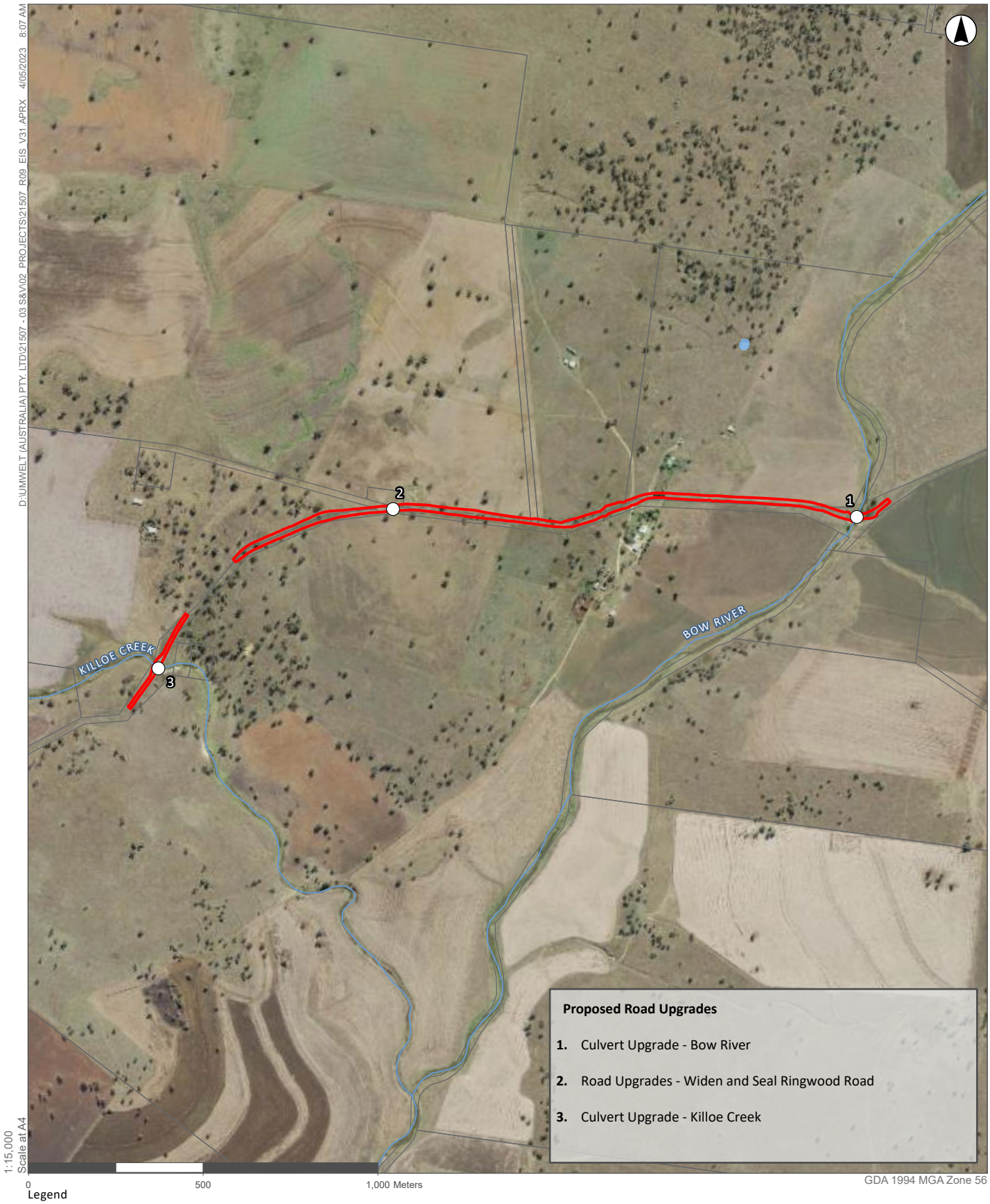

FIGURE 3.4

Road Repairs and Upgrades

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

3.4.3 Site Preparation and Earthworks

The first stages of construction within the Development Footprint would include:

- Site survey, based on initial geotechnical investigations and LIDAR data, to confirm infrastructure positioning and placement.
- Ongoing geotechnical investigations to confirm the ground conditions.
- Biosecurity controls (e.g. weed spraying) prior to ground disturbance commencing.
- Construction of internal access tracks for accessing the site from the local road network and car parking, including creek crossings (i.e. small culverts and bed level crossings).
- Installation of temporary construction fencing around work areas and boundary fencing.
- Establishment of temporary construction compounds, site facilities and laydown areas for construction materials and equipment (refer to **Section 3.4.4**).
- Preliminary earthworks and installation of environmental controls including erosion and sediment control structures.
- Identification and establishment of no-go zones around sensitive biodiversity and heritage features as required.

The need for heavy earthworks and compaction will be minimised as much as practicable although some grading and levelling is likely to be required for the substation and BESS.

3.4.4 Temporary Construction Facilities

To facilitate construction of the Project, a range of temporary buildings and facilities will be required within the compound area. Temporary staff amenities would be designed to accommodate the number of workers at the peak of the construction period, and include:

- Car parking.
- Staff offices.
- Control room.
- Lunchroom and first aid room.
- Toilet and shower facilities.
- Water tanks.
- Covered walkways.
- Covered storage area.
- Associated data, water, and electrical reticulation.
- Emergency helipad (as part of site compound).

3.4.5 Infrastructure Installation

The construction and commissioning phase of the Project is anticipated to involve the following works:

- Installation of steel posts and framing system to support the solar panels, which would be driven or screwed into the ground to a depth of approximately 1.5 to 2.4 m depending on geotechnical conditions.
- Installation of PV panels.
- Installation of permanent fencing and security.
- Preparation of foundations for the permanent buildings, BESS and on-site substation.
- Installation of underground cabling (trenching and installation of power conversion stations).
- Construction of site operations and maintenance facility.
- Establishment of the BESS.
- Construction of the onsite substation and associated grid connection infrastructure.
- Testing and commissioning of infrastructure.
- Removal of temporary construction facilities.
- Revegetation of disturbed areas.

It is expected that some of these construction tasks would occur concurrently. It is noted that the solar array would be sited above the ground and existing ground cover would be maintained underneath, to facilitate potential sheep grazing across the site.

3.4.6 Construction Hours

The construction phase is expected to be undertaken over approximately 27 months from the commencement of site establishment works. It is anticipated that construction works would commence in early 2024.

3.4.6.1 Solar Farm Site Construction Hours

It is anticipated that construction works would be undertaken both during and outside standard construction hours (as defined by the Interim Construction Noise Guideline (ICNG) (Department of Environment and Climate Change, 2009). Proposed construction hours are:

- 6:00 am to 6:00 pm – Monday to Friday.
- 6:00 am to 6:00 pm – Saturday.
- Sunday and Public Holidays – no works to be completed.

Exceptions to these hours may occur, however would be limited to activities with low noise generation, where practicable, which would be assessed on a case-by-case basis prior to commencement of those activities.

An indicative timeline for the Project phases is outlined in **Table 3.2**.

Table 3.2 Indicative Timing

Phase	Approximate Commencement	Approximate Duration
Construction & Commissioning	2024	27 months
Operation	2025	40 years
Decommissioning[1]	2064	8 months

3.4.6.2 Road Repairs and Upgrades Construction Hours

Construction hours for the road repairs and upgrades will be undertaken within the ICNG standard hours as there are sensitive receivers closer to these works than that of the solar farm site. Proposed construction hours are:

- 7:00 am to 6:00 pm – Monday to Friday.
- 8:00 am to 1:00 pm – Saturday.
- Sunday and Public Holidays – no works to be completed.

The construction of the road repairs and upgrades package is estimated to require 3 months to be delivered for the Project, these are anticipated to occur in 2024 and are accommodated within the 27 months of the construction period.

3.4.7 Construction Traffic

During the peak of the construction period, it is anticipated that approximately 80% of personnel would travel to the Project Area on a daily basis via shuttle buses to be provided from nearby population centres, requiring 15 two-way shuttle bus trips per day. Assuming some of the other personnel would carpool (at a rate of 1.2 people per private vehicle) there would also be approximately 60 two-way light vehicle trips per day. Although many of the shuttle buses and light vehicle traffic would travel to the site from the north, some movement of personnel via light vehicles from the south is also anticipated.

Heavy vehicle transportation would be restricted to accessing the site from the north. It is anticipated that 55 two-way heavy vehicle trips per day would be required during the peak construction period.

[1] After the operational period the solar farm would either be decommissioned, removing all infrastructure, and returning the site to its existing pre-solar agricultural land capability, or repurposed with new PV equipment subject to additional technical feasibility and planning consents.

Mobilisation would be expected to occur for the first three months of the Project delivery timeframe and heavy vehicle movements during this period are anticipated to include:

- Delivery of infrastructure including temporary offices and associated equipment, power generation equipment, ablutions.
- Delivery of equipment and machinery for civil construction, clearing (if required) and general site establishment.
- Delivery of structural components and some PV equipment.

More intense construction would be expected to follow during months 3 to 20 to achieve mechanical completion with the following heavy vehicle movements:

- Delivery of equipment and machinery for structural, electrical, and civil construction activities.
- Ongoing delivery of PV and electrical equipment including deliveries of major equipment such as inverters, switchgear, transformers etc.
- Trucks for removal of waste.

Following mechanical completion, the site will move into a commissioning phase estimated to occur during months 20 to 27 where both equipment deliveries and the workforce would be significantly reduced. During commissioning, most of the traffic would be expected to be light vehicles for personnel movement.

Construction traffic generated during the road repairs and upgrades along Ringwood Road are anticipated to be lower than the number of vehicles generated during the construction of the Solar Farm site. Impacts from these works in general are considered low given the low volume of traffic on this road.

A detailed assessment of traffic movements and transport routes is provided in **Section 6.9**.

3.5 Operations and Maintenance

Once fully operational, activities will include:

- Routine visual inspections, general maintenance and cleaning operations of the solar arrays and substation, as required.
- Vegetation management including potential sheep grazing and the use of seeding or armouring (i.e. jute mesh) to avoid erosion.
- 24-hour site security response.
- Replacement of equipment and infrastructure, as required.
- Pest and vermin control.
- Livestock operations.

During the operational phase of the Project, it is anticipated that a workforce of up to 10 FTE personnel would be required, and traffic movements would be restricted to light vehicles for routine operations and maintenance.

3.6 Decommissioning

The Project is expected to operate for 40 years or more. After the initial 40-year operating period, the solar farm would either be decommissioned, removing all infrastructure, and returning the site to its existing pre-solar agricultural land capability, or repurposed with new PV equipment subject to additional technical feasibility and planning consents.

At the end of the useful life of the asset, decommissioning would involve the mobilisation of a workforce and additional temporary facilities, and the subsequent removal of equipment and infrastructure. At this time, it is expected that significant movements of light vehicles and trucks for transporting waste would occur. The decommissioning phase would be expected to last less than eight months.

During decommissioning, works would include:

- Removal of solar arrays, including the foundation posts, and sorting and packaging of all materials for removal from the site and recycling and/or reuse.
- Removal of all site amenities and equipment, and recycling and/or reuse of materials wherever practicable.
- Removal and recycling of posts and cabling and removal of security fencing including small concrete footings, unless otherwise useable for livestock operations.

3.7 Services and Utility Supply

3.7.1 Water

The Project would require a water supply during the construction, operational and decommissioning phases.

During construction, water would primarily be used for the establishment of hard-stand areas and dust suppression. The associated water demand would likely be in the order of 11.26 megalitres (ML) for the 27-month construction period. Water for construction would be sourced from commercial suppliers in the nearby region (via water trucks) and farm dams located within the Project Area. Water sources would be determined prior to the commencement of construction in consultation with suppliers and landholders. Town water supplies will be generally avoided for use in construction but may be used where appropriate and available. It is anticipated that during construction 3,000 L would be used on site daily at the operations and maintenance facility.

During operations, it is expected that approximately 3 ML of water per year would be required for ongoing maintenance activities such as fire mitigation and for livestock grazing within the Development Footprint. Panel cleaning is expected to require 8 ML per year noting washing of the panels would not require any detergent or cleaning agents. Road maintenance works that require water usage are anticipated to require 2 ML per year.

Potable water supplies would be required for staff amenities. Rainwater would be collected onsite through tanks across the Project Area with supply supplemented by water trucks.

3.7.2 Electricity

Access to electricity during operational activities would be via a dedicated low voltage feeder from the substation, battery backup is provided for essential services at the Operation and Maintenance Facility (O&M Facility). During construction electricity access would be via the local distribution network or alternatively a diesel generator when required.

Electricity requirements during operation would include lighting at ancillary infrastructure (office, workshop, amenities, and parking), power for internal office facilities and appliances, and onsite security systems. Electricity generated by the solar farm would be used for most activities during operations via a dedicated low voltage feeder from the substation, except for maintenance of the inverters during the night which would involve a small amount of auxiliary load being supplied from the grid.

3.7.3 Telecommunications

A telecommunications tower (approximately 30 m in height) would be installed within the Project Area in the substation compound area to support the Project and to facilitate communications between the solar farm site and nearby Transgrid substation. In addition, the telecommunications tower would provide radio communications coverage to the Project Area and wider region.

3.7.4 Sewer

There is no sewer access in the Project Area. Therefore, construction amenity facilities would be pumped out via tanker and delivered to the nearest sewage treatment facility, or as agreed with Upper Hunter Shire Council during construction.

It is likely that a septic system would be installed for the operational amenities. This would be constructed and managed in accordance with the relevant Council requirements. This would be in accordance with the Upper Hunter Shire Council Liquid Trade Waste Regulation Policy 2016.

3.8 Environmental Management

Lightsource bp would develop and implement an Environmental Management Strategy (EMS) as part of the Project to provide the strategic framework for environmental management. The EMS would:

- Incorporate a Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP) and Decommissioning and Rehabilitation Environmental Management Plan (DREMP), including all required sub-plans, protocols, management, and mitigation measures proposed in this EIS.
- Identify all relevant statutory approvals.
- Establish roles, responsibilities, authority, and accountability of all key personnel involved in the environmental management of the Project.

- Establish procedures for consulting with the local community and relevant agencies about the operation and environmental performance of the Project.
- Establish procedures for handling of complaints, disputes, non-compliances, and emergency response.

Appendix 5 provides a consolidated summary of the management measures that would be implemented during the construction and operation of the Project to manage, mitigate and/or monitor potential impacts identified within this EIS.

4.0 Statutory Context

The statutory provisions applying to the Project with respect to environmental assessment and planning approval at Federal, State and local level, as well as the roles that these play in the Project's assessment and determination are outlined in **Table 4.1** below. In addition, details on the relevant statutory requirements for the Project, and where these have been addressed in the EIS, are provided in **Appendix 3**.

Table 4.1 Statutory Provisions Applicable to the Project

Approval Category	Discussion
Power to grant approval *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP)	Section 4.36 of the EP&A Act provides for the declaration of a project as State Significant Development (SSD). Under the EP&A Act, the declaration of a project as SSD can be made by meeting the requirements of a SEPP or by the Minister for Planning and Public Spaces. Clause 20 of Schedule 1 of Planning Systems SEPP prescribes that development for the purpose of 'electricity generating works' that has a capital investment value of more than $30 million is SSD. The Project has a capital investment value of greater than $30 million. Therefore, the Project is declared as SSD and the development application for the Project will be subject to the requirements of Division 4.7 of the EP&A Act. The development application will be lodged with the Planning Secretary of the Department of Planning and Environment (DPE). The Minister for Planning and Public Spaces is the consent authority for SSD projects. Section 4.5 of the EP&A Act also provides that the Independent Planning Commission (IPC) is the consent authority for SSD where it is declared to be the consent authority under an Environmental Planning Instrument (EPI). The Minister for Planning and Public Spaces has issued a general delegation of the consent authority function for SSD projects to the IPC in instances where 50 or more public objections are received on the application, where the applicant has made a reportable political donations disclosure and/or where the Local Council objects to the Project.
Permissibility *Upper Hunter LEP 2013* and *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP)	The Project is located within the Upper Hunter LGA and wholly located within land zoned as RU1 Primary Production as illustrated in **Figure 2.3**. Electricity generating works are not expressly permitted in this zone however the provisions of the Transport and Infrastructure SEPP prevail over the LEP in this instance. Section 2.36(1) of the Transport and Infrastructure SEPP provides that development for the purposes of 'electricity generating works' (which includes battery storage) may be carried out by any person with development consent on a prescribed rural zone, which includes land zoned RU1. The Project Area is also considered suitable for the Project, noting that agricultural land use (sheep grazing) will be compatible with the design of the site after construction. The Project is therefore considered to remain consistent with the objectives of the RU1 Primary Production land use zone.
Consistent approvals (section 4.42 of the EP&A Act)	***Roads Act 1993*** Consent is required under section 138 of the Roads Act for works or structures that disturb the surface of a public road or connect a road to a classified road. However, section 4.42(f) of the EP&A Act applies to SSD projects and requires that consent must not be refused, and is to be substantially consistent with the consent, if the works are necessary for carrying out an approved project. The Project will require repairs and upgrades to Ringwood Road as well as establishment of site access, hence a permit under section 138 of the Roads Act will be required.

Approval Category	Discussion
Other approvals	***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)** On 2 February 2022, the Project was determined to be a Controlled Action requiring approval under the EPBC Act from the Commonwealth Minister for the Environment due to its potential impact on listed threatened species and ecological communities. The assessment path for the Project is under the bilateral agreement between the Commonwealth and NSW Government. DCCEEW has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Appendix 1**). A summary of the assessment findings related to MNES is included in **Section 7.0**. The Road Repairs and Upgrades are not apart of the referral or controlled action decision. An assessment of significance has been conducted for these works and concluded it would not result in a significant impact on any MNES, as such it was not referred. ***Native Title Act 1993*** Searches of the National Native Title Register, the Register of Native Title Claims, and Native Title Applications Registration Decisions and Determinations identified that the Project Area is entirely located within an active registered Native Title Claim (NC2011/006) held by the Gomeroi People. ***Water Management Act 2000* (WM Act)** Any water extractions from water sources (surface and groundwater) regulated by a Water Sharing Plan (WSP) will require licensing under the WM Act. Water licensing requirements have been assessed and are further discussed in **Section 6.10** and **Appendix 14.** ***Crown Land Management Act 2016*** There are some areas of Crown land (i.e. Crown road reserves) within the Project Area and works proposed in these areas may require a section 5.21 licence to authorise the use or occupation of these areas. Lightsource bp has obtained landowner consent for areas which are Crown Land within the Project Area. ***Liquid Trade Waste Regulation Policy 2016 (Upper Hunter Shire Council)*** It is likely that a septic system would be installed for the operational amenities. This will require approval from the Upper Hunter Shire Council in accordance with the Liquid Trade Waste Regulation Policy. ***Local Land Services Act 2013*** A Travelling Stock Route (TSR 4481) vested in LLS also exists along Wollara Road. The Project intends to exercise its right of access over the TSR as an adjoining occupier, in accordance with Section 75 of the *Local Land Services Act 2013*. No infrastructure is proposed to be installed along this TSR. Where required, Lightsource bp will obtain necessary permits from LLS prior to construction activities.
Approvals not required	Section 4.41 of the EP&A Act specifies authorisations which are not required for an approved SSD. Those authorisations that may otherwise apply to the Project but are not required due to section 4.41 are listed below: • *Fisheries Management Act 1994* – A permit under section 201, section 205 or section 219. • *Heritage Act 1977* – An approval under Part 4, or an excavation permit under section 139. • *National Parks and Wildlife Act 1974* – An Aboriginal heritage impact permit under section 90. • *Rural Fires Act 1997* – A bushfire safety authority under section 100B.

Approval Category	Discussion
	• *Water Management Act 2000* – A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91.
Pre-conditions	***State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) – Chapter 3 Koala Habitat Protection** Chapter 3 of the Biodiversity and Conservation SEPP applies to the extent that the Project Area is located within an LGA to which Chapter 3 of the SEPP applies. A consent authority is restricted from granting development consent for proposals on land identified as core Koala habitat without the preparation of a plan of management. Potential impacts on Koala habitat have been assessed in **Section 6.2** and **Appendix 6**. ***State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) – Chapter 3 Hazardous and Offensive Development** Chapter 3 of the Resilience and Hazards SEPP requires a consent authority to consider whether an industrial development is a potentially hazardous or potentially offensive industry. A hazard assessment is completed for potentially hazardous developments to assist the consent authority to determine acceptability. A preliminary hazard analysis has been prepared for the Project (refer to **Section 6.11.2** and **Appendix 15**). **Transport and Infrastructure SEPP – Chapter 2 Infrastructure** Section 2.48 of the Transport and Infrastructure SEPP requires that for a development application which involves certain works related to or near electricity infrastructure, the consent authority must give written notice to the electricity supply authority for the area in which the development is carried out, inviting comments about potential safety risks. Consultation has been undertaken with electricity supply authorities relevant to the Project (refer to **Section 5.0**). ***Biodiversity Conservation Act 2016*** Under the *Biodiversity Conservation Act 2016* (BC Act), biodiversity assessment in accordance with the Biodiversity Assessment Method (BAM) is required for any SSD project. A Biodiversity Development Assessment Report (BDAR) has been prepared for the Project in accordance with the BAM (refer to **Section 6.2** and **Appendix 6**).
Mandatory matters for consideration (refer to **Appendix 3** for details)	Section 1.3 EP&A Act. Section 4.15(1) EP&A Act. Section 192 of the EP&A Regulation.

5.0 Engagement

In recognition of the importance of early and open engagement with the community, Lightsource bp has been liaising with stakeholders since landholder discussions commenced in early 2021. Ongoing consultation has also been undertaken with local, State and Commonwealth government agencies, infrastructure and service providers, local businesses and various community organisations and interest groups, including a comprehensive engagement process undertaken with the Aboriginal community (refer to **Section 5.2**). The stakeholder engagement process has afforded opportunities for Lightsource bp to effectively assess and integrate social outcomes within the detailed Project planning, design, and assessment phases. Should the Project be approved, stakeholder engagement will be ongoing for the life of the Project.

Lightsource bp is a signatory to the Clean Energy Council's Community Engagement Best Practice Charter for Renewable Energy Developments. This involves a voluntary set of commitments that are upheld when developing and operating renewable energy projects, including to engage respectfully with the communities in which they plan and operate projects, to be sensitive to environmental and cultural values, and to make a positive contribution to the regions in which they operate.

This section provides an overview of the stakeholder engagement program including stakeholder identification, engagement undertaken to date, the outcomes of the consultation process and proposed future engagement. Further detail is provided in the SIA (refer to **Appendix 16**) or specific specialist assessments as relevant.

5.1 Stakeholder Identification

Effective engagement involves the participation and collaboration of all stakeholders who have an interest in, or those that are affected by, a project. Stakeholders may be affected groups or individuals that:

- Live, work, or recreate near the Project.
- Have an interest in the proposed action or change.
- Use or value a resource associated with the Project.
- Are affected by the Project e.g., may be required to relocate because of the Project (Burdge, 2004).

A stakeholder identification process was undertaken during the scoping phase of the Project to support the planning and delivery of community consultation and stakeholder engagement. An overview of the stakeholder identification process is presented in **Table 5.1**. This was used to guide engagement planning throughout the EIS Phase as per the 'Level of Engagement' indicated, which was guided by the International Association of Public Participation (IAP2) Public Participation Spectrum.

Table 5.1 Stakeholder Identification

Stakeholder Group	Stakeholders	Level of Engagement (IAP2)	Potential Interest/Concern
Nearby residents/ landholders	Approximately 17 properties along Wollara Road Merriwa residential	Consult	Deterioration of local roads and potential upgrades required. Transportation route – Accessibility impacts from construction workforce. Land use conflict. Cumulative impacts from multiple projects. Conservation and ecological values. Sense of community/sense of place. Commercial stimulus for local economy.
Community and special interest groups	NSW Farmers Association – local branch Hunter Region Landcare Network Scone Landcare Inc Merriwa-Cassilis Alliance (MCA) Incorporated Merriwa Country Women's Association Cassilis Country Women's Association Merriwa District Progress Association Merriwa Healthy Environment Group Inc Merriwa Historical Society Merriwa Railway Society Wollar Progress Association Wild Dog Association	Consult	Conservation and ecological values. Land use conflict. Community values. Site access and deterioration of local roads and potential upgrades required. Cumulative impacts from multiple projects. Accessibility impacts from construction workforce. Sense of community/sense of place. Commercial stimulus for local economy. Local infrastructure and services provision.
Local industry groups, businesses and service providers	Chambers of Commerce (Scone, Mudgee, Gulgong) Service providers (employment, training, health, accommodation, recreation, tourism etc.) Utilities providers; TransGrid, Essential Energy, Telstra Bus companies Emergency services such as RFS, SES, Ambulance and Police	Involve	Increased demand/use of local and regional services by construction workforce. Livelihood impacts. Public safety for other road users (e.g. children and school bus drop off locations). Commercial stimulus for local economy.

Stakeholder Group	Stakeholders	Level of Engagement (IAP2)	Potential Interest/Concern
Local government	Upper Hunter Shire Council	Involve	Cumulative impacts from multiple projects. Development of a Voluntary Planning Agreement (VPA). Accessibility impacts on local and regional services and businesses.
	Mid-Western Regional Council Muswellbrook Shire Council	Consult	Commercial stimulus for local economy. Local infrastructure and services provision (e.g. road repairs). Land use planning. Concerns of community and local stakeholders.
State/ Commonwealth government	DPE Secretary DPE Director – Energy Infrastructure and Zones NSW Biodiversity Conservation Division NSW Energy Corporation NSW National Parks and Wildlife Service NSW Forestry Corporation NSW Environment Protection Authority (EPA) Aboriginal Affairs NSW Transport for NSW Heritage NSW Commonwealth Department Climate Change, Energy, the Environment and Water (DCCEW)	Involve	Regulation and compliance with relevant legislation/regulation. Planning and assessment process. Cumulative impacts from multiple projects. Alignment to NSW Government initiatives. Transport accessibility and potential road repairs.
Traditional owners and Aboriginal stakeholders	Wanaruah Local Aboriginal Land Council Mudgee Local Aboriginal Land Council Wonnarua Nation Aboriginal Corporation	Involve	Impacts on cultural connection to Country or place or on cultural values. Inequity of impacts on Aboriginal community. Cultural heritage surveys.
Broader community	Residents of the Upper Hunter LGA Residents of the Mid-Western LGA Residents of the Muswellbrook LGA	Consult	Cumulative impacts from multiple projects. Accessibility impacts from construction workforce. Land use conflict. Regional economic benefits. Infrastructure and services provision.

Stakeholder Group	Stakeholders	Level of Engagement (IAP2)	Potential Interest/Concern
Local media	The Scone Advocate Muswellbrook Chronicle 2NM radio Hunter Valley/Power FM The Merriwa District Dairy	Inform	Cumulative impacts from multiple projects. Regional economic benefits.

5.2 Stakeholder and Community Engagement

5.2.1 Methodology

Stakeholder and community engagement has been undertaken in accordance with the requirements of NSW Government guidelines and assessment standards including, but not limited to, the *Undertaking Engagement Guidelines for State Significant Projects* (DPIE, 2022) (Engagement Guideline), and the *Social Impact Assessment Guideline for State Significant Projects* (DPIE, 2023) (SIA Guideline), while also addressing the requirements of the SEARs.

The engagement of stakeholders and community groups has included a combination of:

- Consultation and engagement: to facilitate stakeholder involvement in the identification of issues/impacts, areas of interest/concern and strategies to address the issues raised.
- Information provision: to improve knowledge and awareness of Lightsource bp and its activities, the Project, and key issues/impacts as they arise.

Various methods were used to engage with the different stakeholder groups based on the type of information being conveyed, level of feedback required, understanding of the stakeholder needs regarding engagement and identified stakeholder engagement preferences. This included a range of mechanisms and materials such as website content, media releases, project information sheets, community information sessions, Project newsletters, personal interviews and meetings and feedback forms.

Engagement to date has been undertaken in two phases, aligned with the key stages of the assessment process, i.e. during the project scoping phase to allow for the identification of key issues related to the Project and potential impacts, and during the environmental assessment phase to inform the technical studies and the formulation of appropriate strategies to seek to further minimise the environment and community impacts. Details for each phase are provided in **Section 5.2.2** and **Section 5.2.3** below.

5.2.2 Phase 1 – Scoping Phase

A Community and Stakeholder Engagement Strategy (CSES) was prepared in November 2021, prior to the submission of the Scoping Report and the issuing of the SEARs. The CSES outlined the objectives, approach, and implementation program for engaging and consulting with the community and stakeholders during the Project's planning and assessment phase. Engagement and consultation with the community during this period was held online due to limitations and restrictions associated with the COVID-19 pandemic.

The CSES formed part of the Social Impact Scoping Report which was prepared to document the process and outcomes of the scoping phase of the SIA undertaken by Umwelt. Engagement undertaken during the scoping phase is detailed in **Table 5.2** below.

Table 5.2 Engagement – Scoping Phase

Stakeholder Group	Mechanism	Timing	No. Attendees/ Respondents
Information Provision: Broader community	Project website launch	27 August 2021	N/A
Information Provision: Broader community	3 x local media statements	15 October 2021	N/A
Information Provision: Nearby residents and landholders Broader community	Maildrop of Project Information Sheet to localities of Merriwa, Cassilis, Wollar, Coggan and along Wollara Road	15 October 2021	3,226
Information Provision: Broader community	Email correspondence with invitation to Community Information Session	13 October 2021	11
Information Provision: Nearby residents and landholders	Phone call attempts or correspondence	October 2021	27
Consultation: Commonwealth Government – former Department of Agriculture, Water and the Environment (now DCCEW)	Project briefing	10 September 2021	3
Consultation: State Government – DPE	Project briefing	21 September 2021	1
Consultation: State Government – NSW National Parks and Wildlife Service	Project briefing	15 September 2021	1
Consultation: Local Government	Project briefing	21 October 2021	4
Consultation: Nearby residents and proximal landholders	Informal phone discussions	October 2021	8
Consultation: Nearby residents and proximal landholders	Feedback survey	October and November 2021	5
Consultation: Broader community	Community information sessions (2)	28 October 2021 30 October 2021	18
Consultation: Local Government	Personal meeting and site visit	2 November 2021	1
Consultation: Local Government – Councillors	Project briefing	9 November 2021	4

Stakeholder Group	Mechanism	Timing	No. Attendees/ Respondents
Consultation: Host landholders	Personal meeting	2 November 2021	2
Consultation: Community Group	Personal meeting	1 November 2021	1
Consultation: Community Group	Personal meeting	2 November 2021	8
Consultation: Community/Industry Group	Personal meeting	3 November 2021	1
Consultation: Traditional Owners	Personal meeting	26 November 2021	1

Figure 5.1 shows the private properties that were contacted (or where contact was attempted) during the scoping phase consultation.

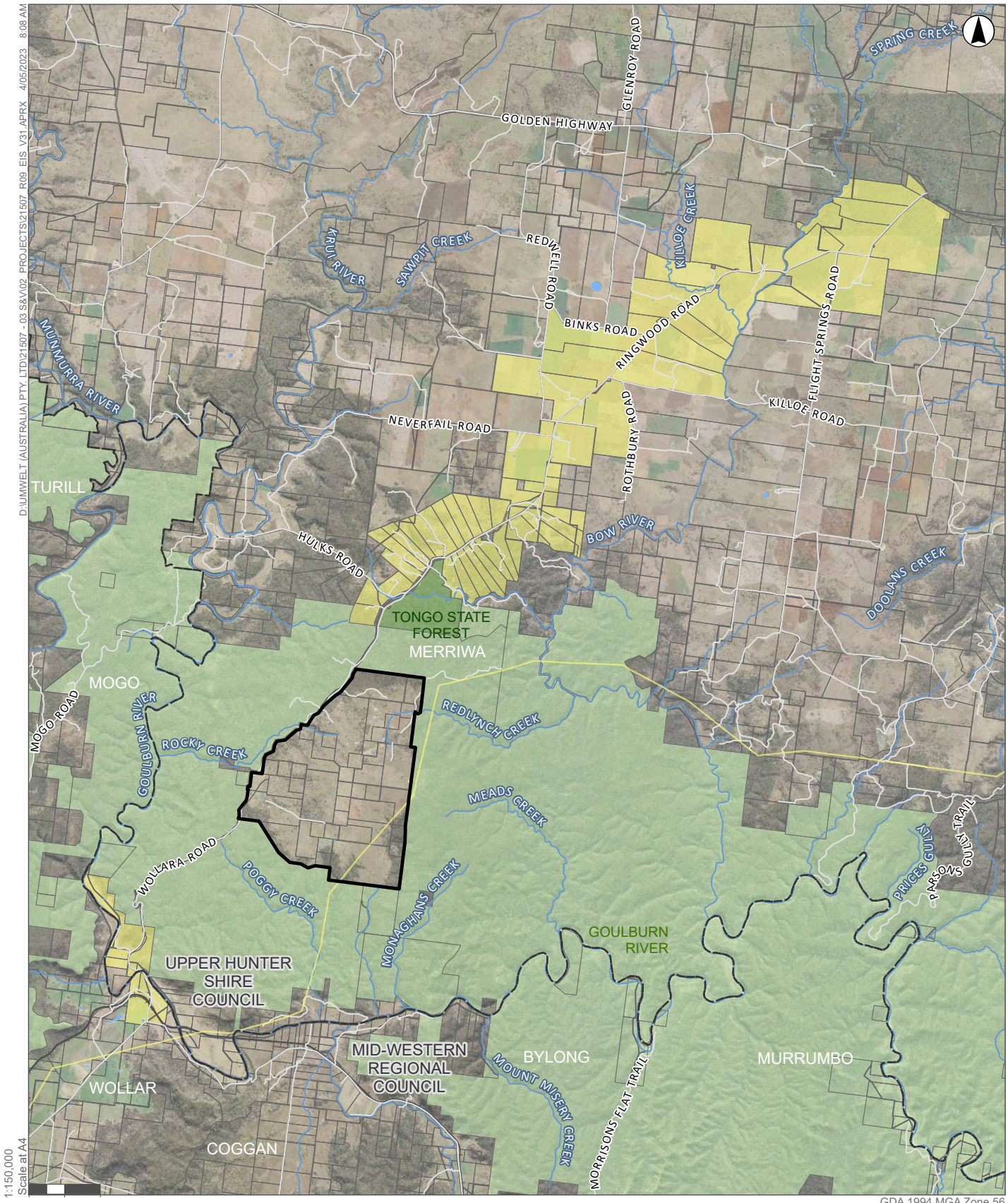

FIGURE 5.1

Private Properties Contacted - Scoping Phase

Image Source: ESRI Basemap (2022) **Data source:** NSW LPI (2022), NSW DSFI (2022); NPWS Estate (2022); Lightsource BP (2022)

5.2.3 Phase 2 – EIS

Engagement activities undertaken during phase 2 focussed on exploring and validating the matters identified during the Scoping Phase. The findings from the various technical studies that comprise the EIS were also provided to the Project stakeholders during this round. This assisted in gathering feedback on the Project impacts and people's perceptions of them.

Engagement focussed on:

- Sharing information and gathering feedback on the proposed design of the Project.
- Assessment of perceived or key social and environmental issues, impacts and opportunities associated with the Project.
- Potential mitigation or enhancement strategies to address and respond to issues, impacts and opportunities.
- Existing capacity of local service provision and projected future demand as relevant to the predicted Project impacts.
- Measures to improve collaboration between Lightsource bp and community or stakeholders, including potential community investment and benefit-sharing opportunities.

A summary of the engagement undertaken during phase two is provided in **Table 5.3**. Engagement outcomes are collated, integrated and documented within the Social Impact Assessment Report (refer to **Appendix 16**). The engagement outcomes were used to scope and finalise assessments as outlined in **Section 6.0** and also in the refinement of the design of the Project as outlined in **Section 2.6**. This included feedback from DPE following soft lodgement in November 2022.

Table 5.3 Engagement – EIS Phase

Stakeholder Group	Mechanism	Timing	No. Attendees/ Respondents
Information Provisions: **Host landholders** **Proximal landholders** **Community groups** **Local businesses**	Online Survey.	September–October 2022	54
Information Provisions: **Host landholders** **Proximal landholders** **Community group members**	Community Information Sessions.	July 2022 December 2022	44
Information Provisions: -	Email correspondence with invitation to community information session.	June 2022 November 2022	242

Stakeholder Group	Mechanism	Timing	No. Attendees/ Respondents
Information Provisions: Broader community	Newspaper advert including invitation to Community Information Session. Radio advertisement for Community Information Session	August 2022 July 2022	-
Information Provisions: Local and broader community	Project information sheet printed and posted.	July 2022 A Project update is proposed to be distributed to coincide with the submission of the EIS.	1,895
Information Provisions: Local and broader community	Website traffic (Phase 2).	August–December 2022	258
Information Provisions: Total	**N/A**	**N/A**	**2,522**
Consultation: Local Government & Community groups	In-person meeting.	July–December 2022	29
Consultation: Local Government – Upper Hunter Shire Council	Project Briefings. VPA negotiations.	6 December 2022 February 2023 March 2023	4–6
Consultation: State Government – DPE	Project Briefing.	23 September 2022 21 October 2022 12 December 2022 30 January 2023 27 March 2023	**4–8**
Consultation: State Government – DPI Agriculture	Project Briefing and preliminary findings.	9 November 2022	**4**
Consultation: State Government - BCD	Emails, survey guideline consultation and land categorisation assessment consultation.	June 2022 29 September 2022 7 November 2022 March 2023	**4–8**
Consultation: State Government – NPWS	Email and draft landscape plan consultation.	2 August 2022 February 2023	**2**
Consultation: State Government – Forestry Corporation	Project Briefing (Phone and Email).	31 March 2023	**2**
Consultation: Total	**N/A**	**N/A**	**49–57**

5.3 Community Views

Quantitative and qualitative information collected through the scoping and EIS phase engagement activities was compiled and analysed to inform the identification of potential perceived social impacts associated with the Project, from the perspectives of affected parties, and to afford the preliminary evaluation of social impacts. The Social Scoping Worksheet (DPIE, 2021) was used as a decision support tool to consider the social impacts of the Project and to demonstrate how issues scoping informed the level of assessment undertaken for each identified impact.

According to the SIA Guideline, and as outlined in **Figure 5.2**, social impacts can be grouped according to a number of different categories and may involve impacts and changes to people's way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods, and decision-making systems.

Figure 5.2 DPE Social Impact Categories

Source: DPIE, 2021.

Community-identified impacts during scoping and assessment phases associated with the Project were most frequently associated with the perceived road safety and amenity impacts that the Project may bring (n=11 of negative sentiment and n=6 of positive sentiment), particularly relating to the low existing quality of Wollara and Ringwood Road, of which the Project would use to access the site. Residents alongside the road raised that road repairs and/or upgrades that could occur as a result of the Project would improve personal use of the road and accessibility around the local area, which would lead to broader improvements to their way of life.

Social impacts relating to the site itself were also raised with regard to how the Project may affect local community values associated with the natural environment and agriculture (n=6 of negative sentiment and n=10 of positive sentiment), with many stakeholders noting that the continued management of wild dogs in the immediate Project Area may become challenging due to the Project's establishment, if it were to include sheep grazing, as well as the changes in land-use from agricultural to solar electricity generation that the Project would cause, resulting in a reduction in land-based livelihoods in the community.

Results are shown graphically in **Figure 5.3** which outlines the unprompted social impacts identified by stakeholders and their alignment with social impact categories. The results shown in **Figure 5.3** are detailed in **Table 5.4**. Impacts raised by the community are notably similar, if not the same, as previously identified impacts in the scoping phase of the Project, which reinforces these as important to the local community and other Project stakeholders. The outcomes and mitigation and management measures for these concerns are addressed in **Section 6.12.5** and were also considered in the refinement of the Project throughout the assessment phase.

Table 5.4 Unprompted Perceived Social Impacts Identified by the Community, aligned to Social Impact Categories

(Social Impact Category) Unprompted Social Impacts	Negative Rating (No. people expressing negative sentiment)	Positive Rating (No. people expressing positive sentiment)
(Surroundings) Road safety and amenity	11	6
(Surroundings) Site disturbance and impacts on environmental values	6	10
(Surroundings) Social amenity impacts	3	0
(Surroundings) Public safety associated with natural disasters	0	1
(Community) Community sentiment and cohesion	6	8
(Decision-making engagement) Trust in planning process	2	9
(Livelihoods) Employment and training for local people	1	9
(Accessibility) Strain on local services	6	0
(Accessibility) Decreased access associated with natural disasters	4	0
(Accessibility) Increased access to telecommunications	0	3
(Health and Wellbeing) Health and wellbeing	1	0
(Culture) Embracing historical Aboriginal culture	0	1

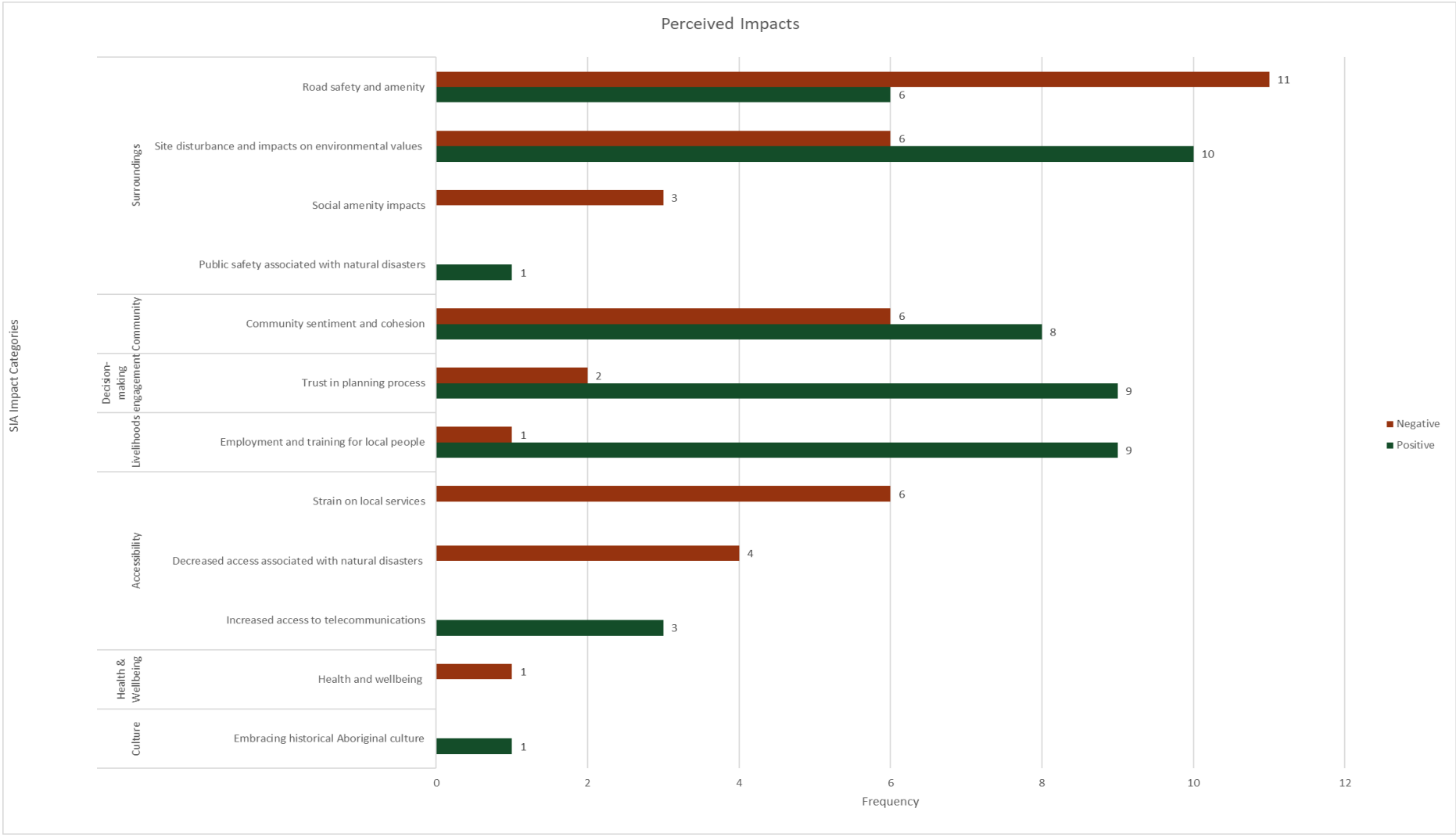

Figure 5.3 Perceived Social Impacts

5.4 Proposed Future Engagement

Throughout the assessment, construction, operation and decommissioning phases of the Project, Lightsource bp will continue to engage with community stakeholders according to the Engagement Guidelines (DPIE, 2021). Stakeholders will include all relevant groups and individuals outlined in **Section 5.1**, plus any additional stakeholders identified during the development process with an interest in the Project.

Engagement activities will include:

- Regular updates to the Project website.
- Distribution of information sheets, fact sheets and/or FAQs to the local community.
- Face-to-face meetings and Project briefings.
- Regular community surveys.
- Operation of a community enquiry line/complaints line and the provision of timely responses to feedback, enquiries and complaints by Lightsource bp.

Community and stakeholder concerns and appropriate mitigation and management measures are addressed in further detail in **Section 6.12.5**.

6.0 Assessment and Mitigation of Impacts

This section provides a description of the key environmental, social, and economic impacts associated with the Project and presents a detailed summary of the results from the specialist assessments. Furthermore, it describes the proposed management and mitigation measures to be implemented as part of the Project to reduce these impacts.

6.1 Preliminary Environmental Risk Assessment

A preliminary environmental risk assessment was undertaken for the Project in the Scoping Report to identify the key issues requiring detailed assessment as part of the EIS process. The outcomes of the preliminary environmental risk analysis are provided in **Table 6.1**. The following sections summarise the detailed assessment of the key issues associated with the Project as provided in the Appendices.

Table 6.1 Preliminary Environmental Risk Assessment

Aspect	Detailed Assessment required?
Terrestrial Biodiversity	Yes, refer to **Section 6.3**
Aquatic Biodiversity	Yes, refer to, **Section 6.3.2**
Aboriginal Cultural Heritage	Yes, refer to **Section 6.4**
Historic Heritage	Yes, refer to **Section 6.5**
Land	Yes, refer to **Section 6.6**
Visual Amenity	Yes, refer to **Section 6.7**
Noise and Vibration	Yes, refer to **Section 6.8**
Traffic and Transport	Yes, refer to **Section 6.9**
Water Resources	Yes, refer to **Section 6.10**
Hazard, Risk and Bushfire Threat	Yes, refer to **Section 6.11**
Social Amenity	Yes, refer to **Section 6.12**
Economics	Yes, refer to **Section 6.13**
Waste Management	No, refer to **Section 6.14**
Air Quality	No, refer to **Section 6.14.5**
Cumulative Impacts	No, refer to **Appendix 22** and throughout **Section 6.0**

6.2 Biodiversity

Lightsource bp has sought to avoid, minimise and mitigate biodiversity impacts during the design process and to preferentially utilise previously cleared/disturbed areas over areas of remnant vegetation. Lightsource bp is committed to managing biodiversity impacts during the construction and operation phase of the Project through implementation of management plans that will include controls to minimise impacts on biodiversity.

A Biodiversity Development Assessment Report (BDAR) has been completed for the Project Area (Solar Farm) and the Road Upgrades Area (Road Upgrades and Repairs).

An Aquatic Assessment has also been prepared to assess the terrestrial and aquatic biodiversity values of the Project Area and Road Repairs and Upgrade Area (**Section 6.3.2**), to document the application of the avoid, minimise and offset framework and to evaluate the potential impacts due to the Project.

The BDARs and Aquatic Assessment address the requirements of the SEARs with respect to biodiversity, as listed below:

- An assessment of the biodiversity values and the likely biodiversity impacts of the Project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a BDAR, unless BCS and DPE determine the proposed development is not likely to have any significant impacts on biodiversity values.
- The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.
- An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, and a description of the measures to minimise and rehabilitate impacts.
- If an offset is required, details of the measures proposed to address the offset obligations.

A copy of the BDARs and Aquatic Assessment are provided in **Appendix 6, Appendix 7** and **Appendix 8** respectively, with the key outcomes summarised in the sections below.

6.3 Terrestrial Biodiversity

For the purposes of the EIS two BDARs have been developed:

- one to describe the terrestrial biodiversity within the Project Area (Solar farm)
- one to describe the terrestrial and aquatic biodiversity within the Road Repairs and Upgrades Area located along Ringwood Road, north of the Solar farm site.

6.3.1 Solar Farm Site

6.3.1.1 Existing Environment

The current vegetation across the Project Area consists of a mosaic of:

- exotic dominated pasture vegetation where cropping and pasture improvement has taken place
- derived native grasslands subject to various degrees of disturbance in various timeframes
- isolated paddock trees
- areas of thinned trees and intact woodland and forest around the periphery of the Project Area.

The site is surrounded by the Goulburn River National Park, which contains an expanse of native vegetation and connects to several other large natural areas managed for conservation along the Great Dividing Range, including Wollemi and Yengo National Parks to the south, Goonoo State Conservation Area to the west and Coolah Tops National Park to the north. The Project Area does not contain any areas of outstanding biodiversity value, as identified under the BC Act.

6.3.1.2 Methodology

The BDAR was prepared in accordance with the BAM and the Biodiversity Assessment Method Operational Manual – Stage 1 (DPIE, 2020). Broadly, the methods undertaken in preparing the BDAR were:

- Landscape features and site context – desktop review of appropriate data sources including relevant mapping products, aerial photography and Geographical Information System (GIS) layers in accordance with Section 3.1 of the BAM.
- Native vegetation, threatened ecological communities and vegetation integrity assessment – including literature and database review, digital aerial photo interpretation, native vegetation and PCT mapping, floristic and vegetation integrity surveys, and meandering transects to inform vegetation mapping, PCT allocation and TEC delineation.
- Threatened species assessment – including literature and database review, flora and fauna field surveys including tree hollow assessments, spotlighting and call playback, and microbat surveys and ecosystem-credit and species-credit species assessments.

Further detail regarding the methodology, including detailed survey information, is included in the BDAR (refer to **Appendix 6**).

6.3.1.3 Assessment Results

Excluded Impacts

Section 6.8 (3) of the BC Act specifies that the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 – Exempt Land (as defined in Part 5A of the NSW *Local Land Services Act 2013*), other than prescribed impacts (as defined in Clause 6.1 of the Biodiversity Conservation Regulation 2017 (BC Regulation)).

A desktop assessment to determine areas of Category 1 Exempt Land within the Project Area found that areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC was represented within areas of Category 1 land within the Development Footprint. These areas were primarily composed of highly degraded grazing paddocks. The LLS Act identifies that Category 1 – Exempt Land excludes land mapped by the Environment Agency Head (EAH) as land containing a CEEC under the BC Act.

For the purposes of this assessment, areas of derived native grassland that meet the final determination of White Box - Yellow Box - Blakeley's Red Gum Woodland and Derived Native Grassland under the BC Act have been considered Category 2 – Sensitive Land as per the recent advice from DPE. Areas of derived native grassland occurring within areas of Category 1 – Exempt Land and which do not conform to a CEEC, have been assessed as Category 1 – Exempt Land, refer to Figure 1.4 of **Appendix 6**.

Native Vegetation Assessment

Surveys of the Development Footprint identified two PCTs which have been split into seven native vegetation zones based on condition types. Details of the vegetation zones and associated PCTs are listed below, summarised in **Table 6.2** and illustrated in **Figure 6.1**. It should be noted that surveys across the Project Area also identified PCT 1655 Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin, however these areas (Zone No. 4) were removed from the Development Footprint following the redesign of the Project to avoid impacts to this PCT.

Plant Community Types and Vegetation Zones

PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley is the dominant PCT across the Project Area. The following condition states of this PCT is described as:

- Condition Zone 1 PCT 483 Scattered Trees:
    - Consists of remnant trees with grazed grassy understorey. This condition zone is a disturbed variant of original woodland condition. Historical aerial imagery provides evidence that these areas were at least partially cleared and managed for grazing since prior to 1958.
- Condition Zone 2 PCT 483 Moderate Condition Derived Native Grassland:
    - Consists of disturbed native grassland associated with basalt influenced soils which have been derived from the clearing of the original grassy woodland tree cover and most of the shrub cover. This condition zone is the dominant PCT and condition state across the Project Area and has been managed for livestock grazing since prior to 1958.
- Condition Zone 3 PCT 483 Moderate to Low Condition Derived Native Grassland:
    - Consists of modified pastures with no trees and low shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low cover and species richness of native ferns and other native plants. These areas have been degraded by agricultural use and invasion of exotic species. This condition zone typically has poor overall function attributes, with some level of native vegetation resilience still present.
- Condition Zone 4 PCT 483 Low Condition Derived Native Grassland:
    - Consists of areas of highly degraded agricultural land, which has been cropped or subject to high levels of pasture improvement and now contains a high cover of exotic flora species. There are no native trees, and the understorey typically has a low cover of native species.

PCT 1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin.

- Condition Zone 1 PCT 1661 Scattered Trees:
    - Consists of a canopy of scattered eucalypts over an understorey composed of derived native grassland.

- Condition Zone 2 PCT 1661 Moderate to Low Condition Derived Native Grassland:
    - Consists of contained grazed native vegetation/modified pastures with no trees and low shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low cover and species richness of native ferns and other native plants. These areas have been degraded to some extent by agricultural use and invasion of exotic species.
- Condition Zone 3 PCT 1661 Low Condition Derived Native Grassland:
    - Consists of areas of highly degraded agricultural land, which have been subject to high levels of pasture improvement and now contain a high level of exotic flora species. There are no native trees, and the understory typically has a low cover of native species.

Table 6.2 provides a summary of the PCT and Vegetation Zones within the Project Area, this is also shown in **Figure 6.1**.

Table 6.2 Plant Community Types within the Development Footprint

Zone No.	PCT ID	PCT Name	Condition	Area (ha)
1	483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Scattered trees	23.64
2	483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Moderate Condition derived native grassland	168.48
3	483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Moderate to low condition derived native grassland	308.37
4	483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Low condition derived native grassland	199.14
1	1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Scattered Trees	6.07
2	1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Moderate to low condition derived native grassland	36.79
3	1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Low condition derived native grassland	53.24
4	Non-PCT	Cleared Land	N/A	2.01
5	Non-PCT	Exotic Vegetation	N/A	0.17
6	Non-PCT	Water	N/A	1.6
N/A	**N/A**	**N/A**	**Total Area (ha)**	**799.5**

PCT 1607 Blakely's Red Gum -Narrow-leaved Ironbark -Rough-bar barked Apple shrubby woodland of the upper Hunter: This PCT occurs in the south-western section of the Project Area along an ephemeral drainage line. This has been avoided through the detailed design stage. It does not correspond to any BC Act or EPBC Act listed TECs.

PCT 1655 Grey Box - Slaty Box shrub - grass woodland in sandstone slopes of the upper Hunter and Sydney Basin. The surveyed areas of this PCT consists of a patch of remnant *Eucalyptus dawsonii* trees, the shrub stratum is sparse to absent and the understorey consists of grazed land dominated by grasses including *Austrostipa verticillata, Microlaena stipoides* and *Chloris truncata*. This patch will be retained within the northern part of the Development Footprint.

Further details of each PCT and further details on the number of BAM plots (floristic and vegetation integrity survey plots) required and completed for each vegetation condition zone, in accordance with Table 3 of the BAM, are provided in the BDAR (refer to **Appendix 6**) along with vegetation integrity scores.

The four condition zones associated with PCT 483 within the Development Footprint were found to conform to State and/or Commonwealth-listed TECs as detailed in **Table 6.3** below and illustrated in **Figure 6.2**. EPBC listed White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands is located within the bigger BC Act TEC listed area not in addition to.

Table 6.3 Threatened Ecological Communities within the Development Footprint

Threatened Ecological Community	Listing	Corresponding Vegetation Zone	Area (ha)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	Critically Endangered Ecological Community (CEEC) (NSW BC Act)	PCT 483 Condition Zone 1 – Scattered Trees (23.64 ha) PCT 483 Condition Zone 2 – Moderate Condition derived native grassland (168.48 ha) PCT 483 Condition Zone 3 – Moderate to low condition derived native grassland (308.37 ha) PCT 483 Condition Zone 4 – low condition derived native grassland (199.14 ha)	699.63
White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands	CEEC (Commonwealth EPBC Act)	PCT 483 Condition Zone 1 – Scattered Trees (excluding areas surrounded by PCT 483 Condition Zone 4) (19.26 ha) PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland (168.48 ha) PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland (308.37 ha)	496.11 (located within 699.63 ha of BC Act listed area)