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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
QMS Certification Services

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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.

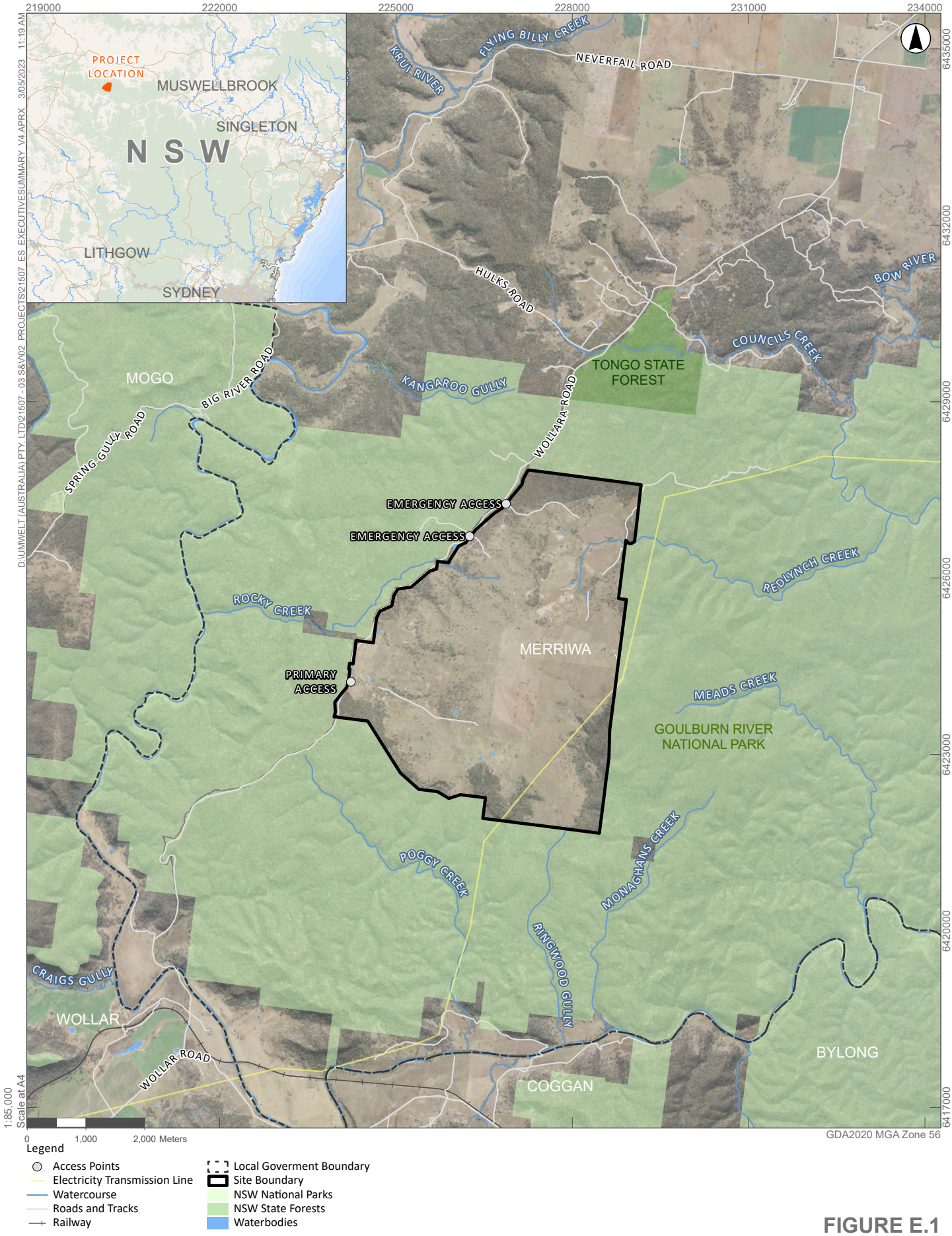


FIGURE E.1

Locality and Regional Context

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

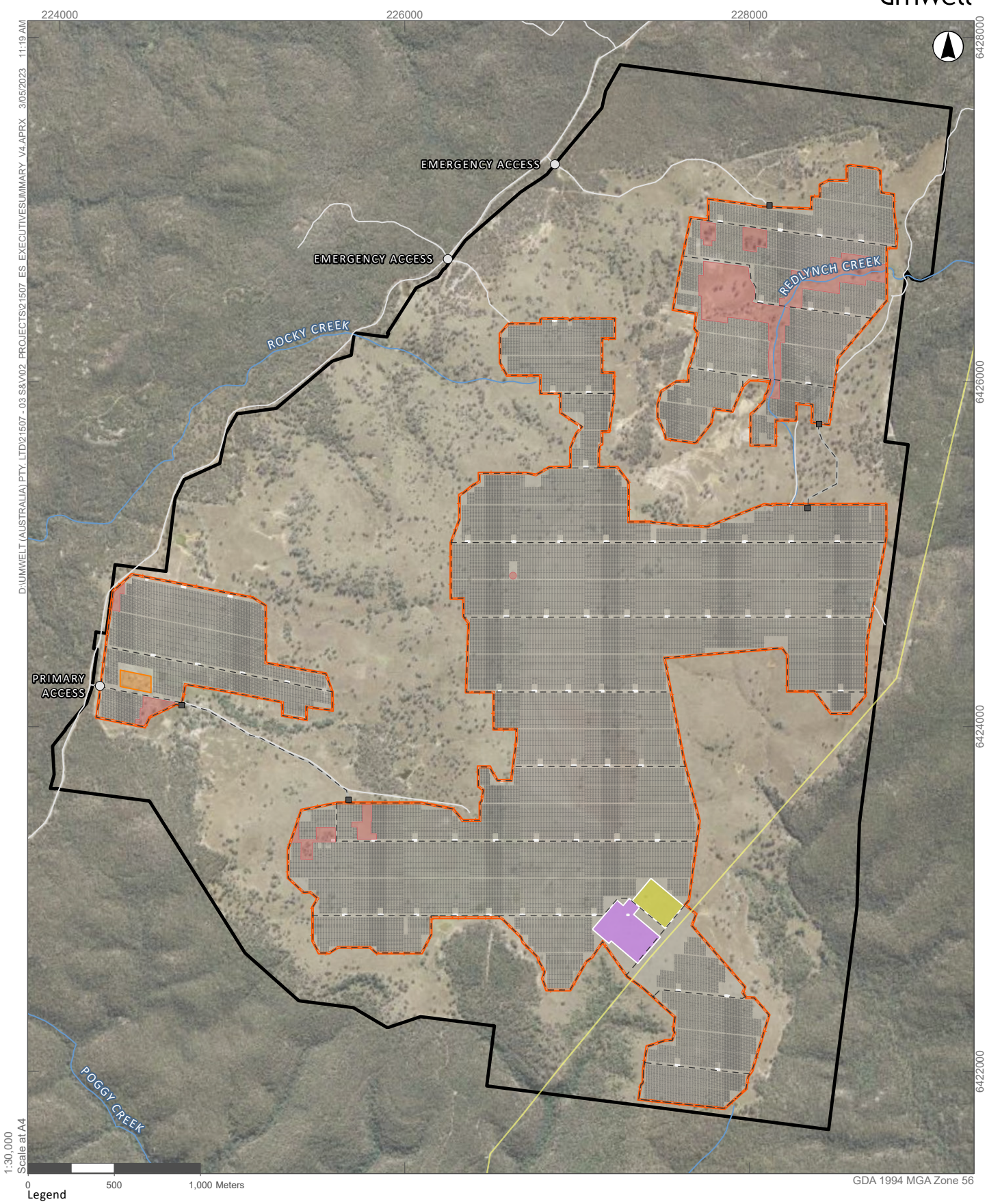


FIGURE E.2

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
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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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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.

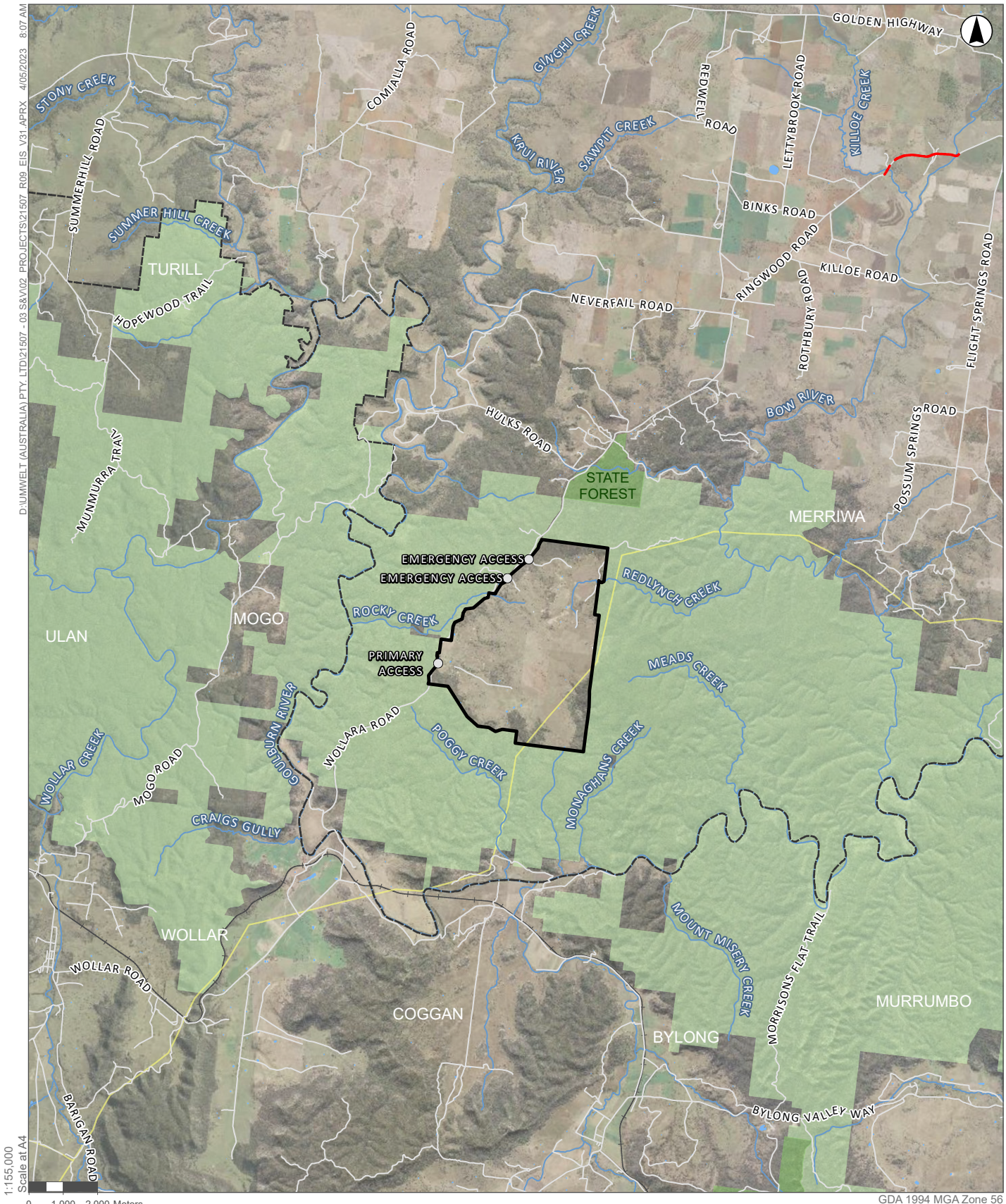


FIGURE 1.1

Location and Regional Context

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

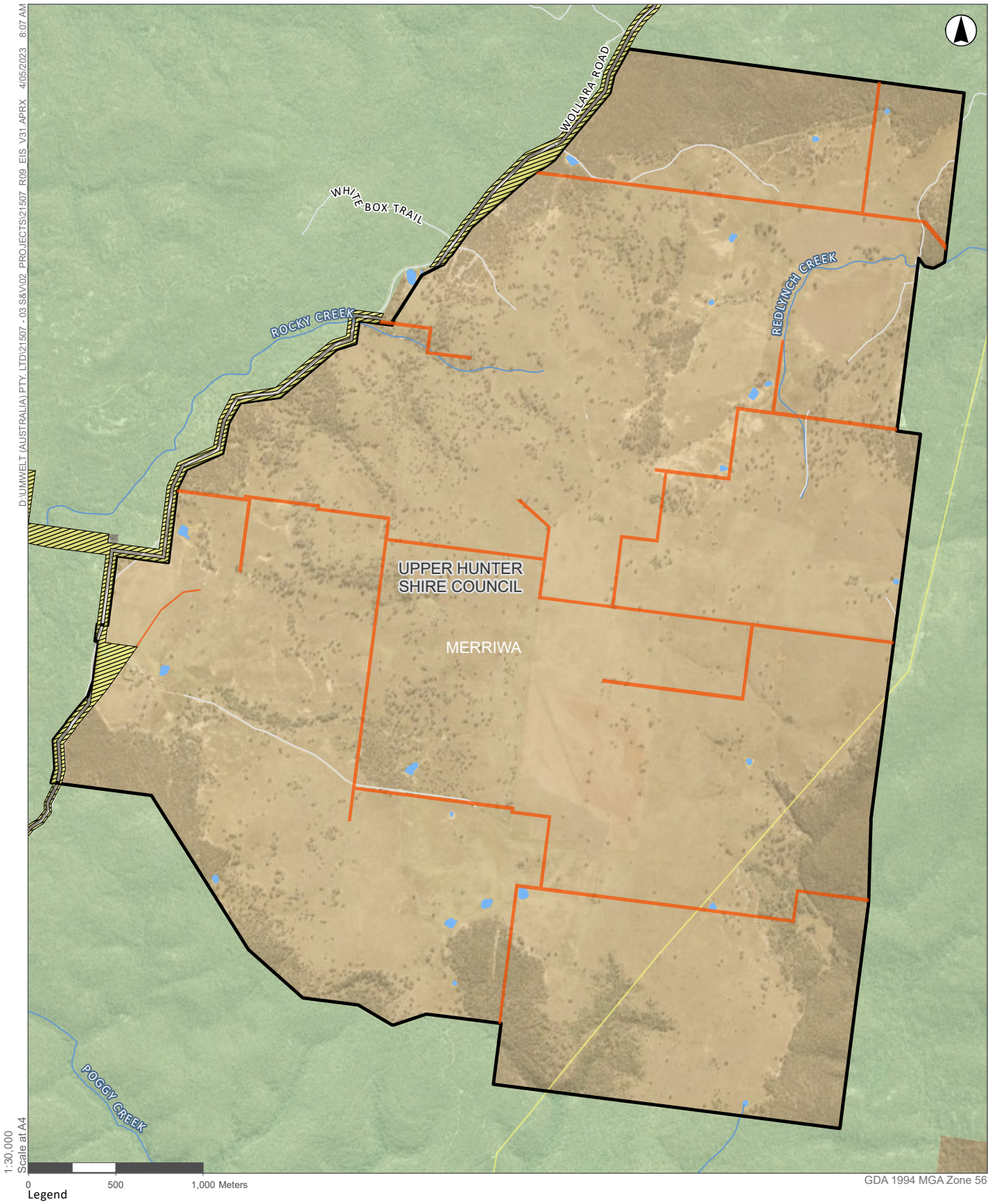


FIGURE 1.2

Land Ownership for Solar Farm

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

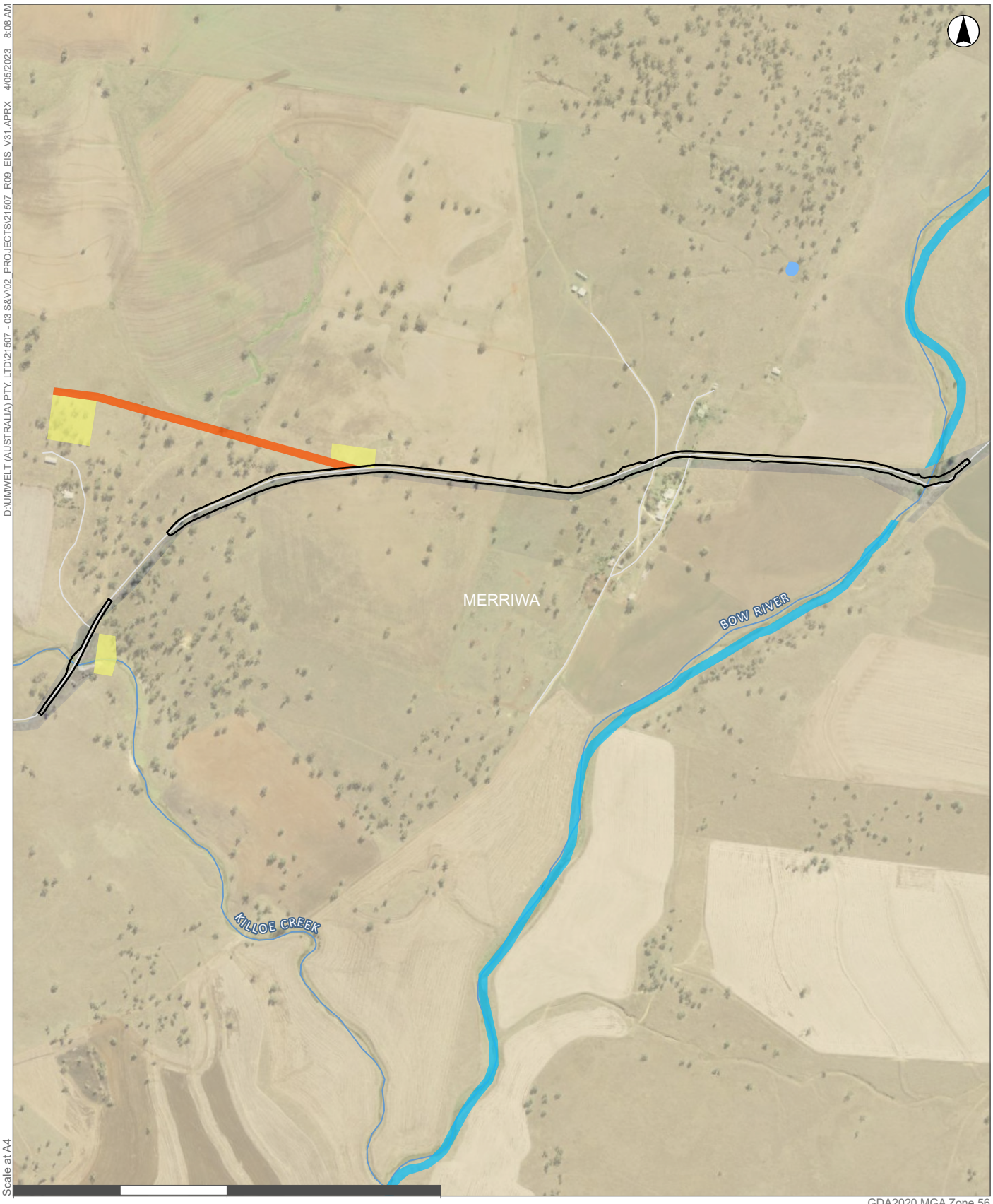


FIGURE 1.3

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.

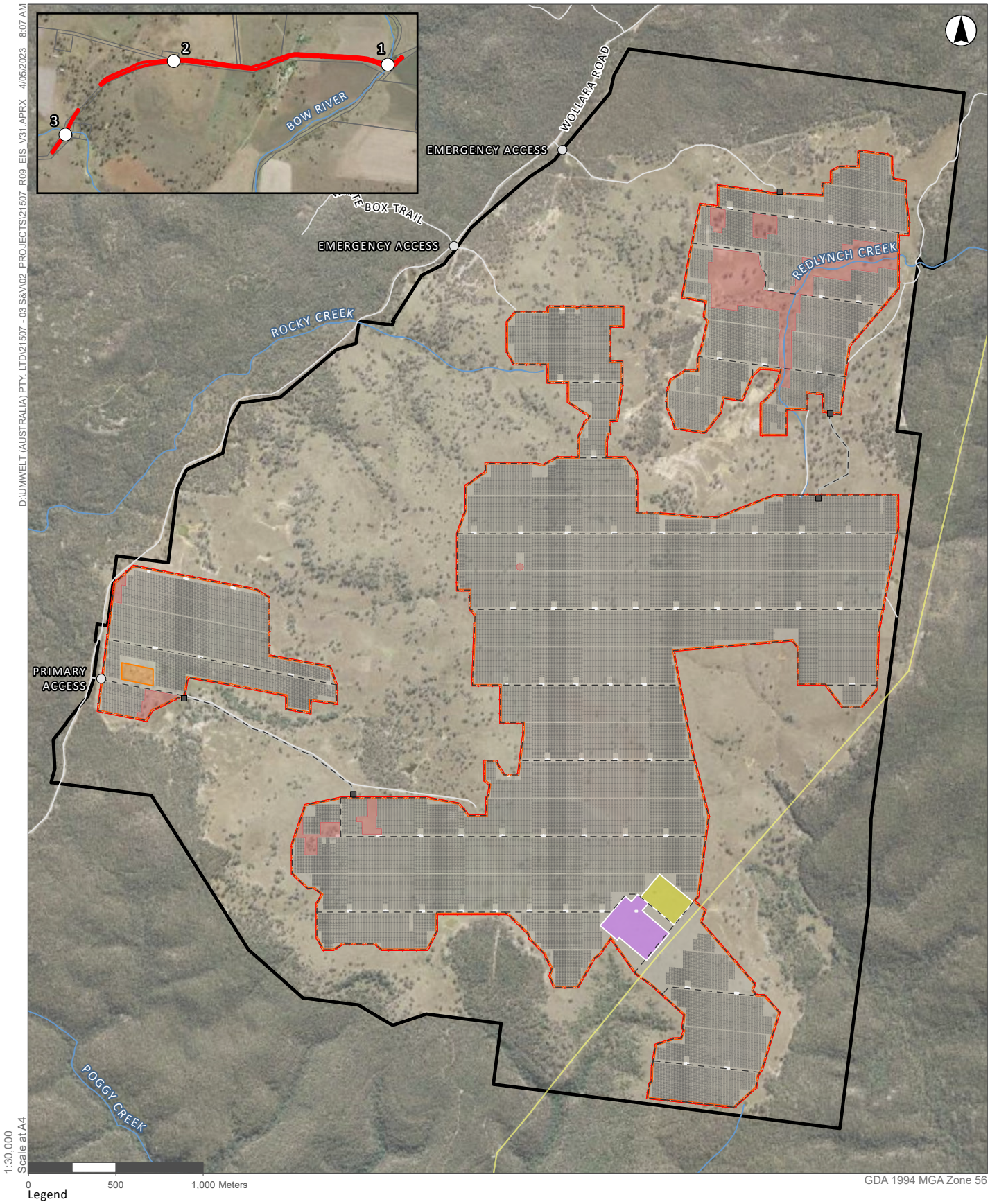


FIGURE 1.4

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.

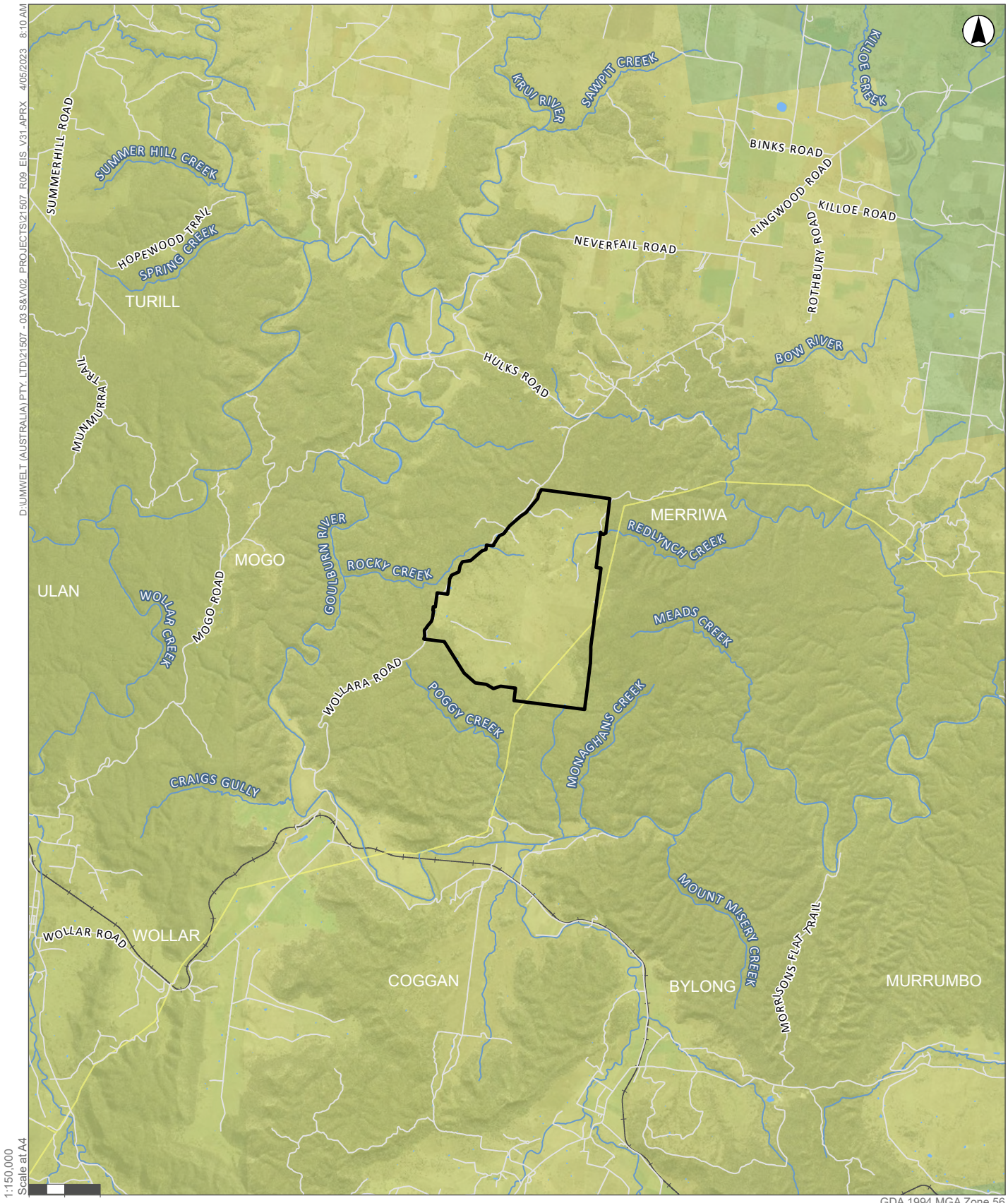


FIGURE 2.1

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**).

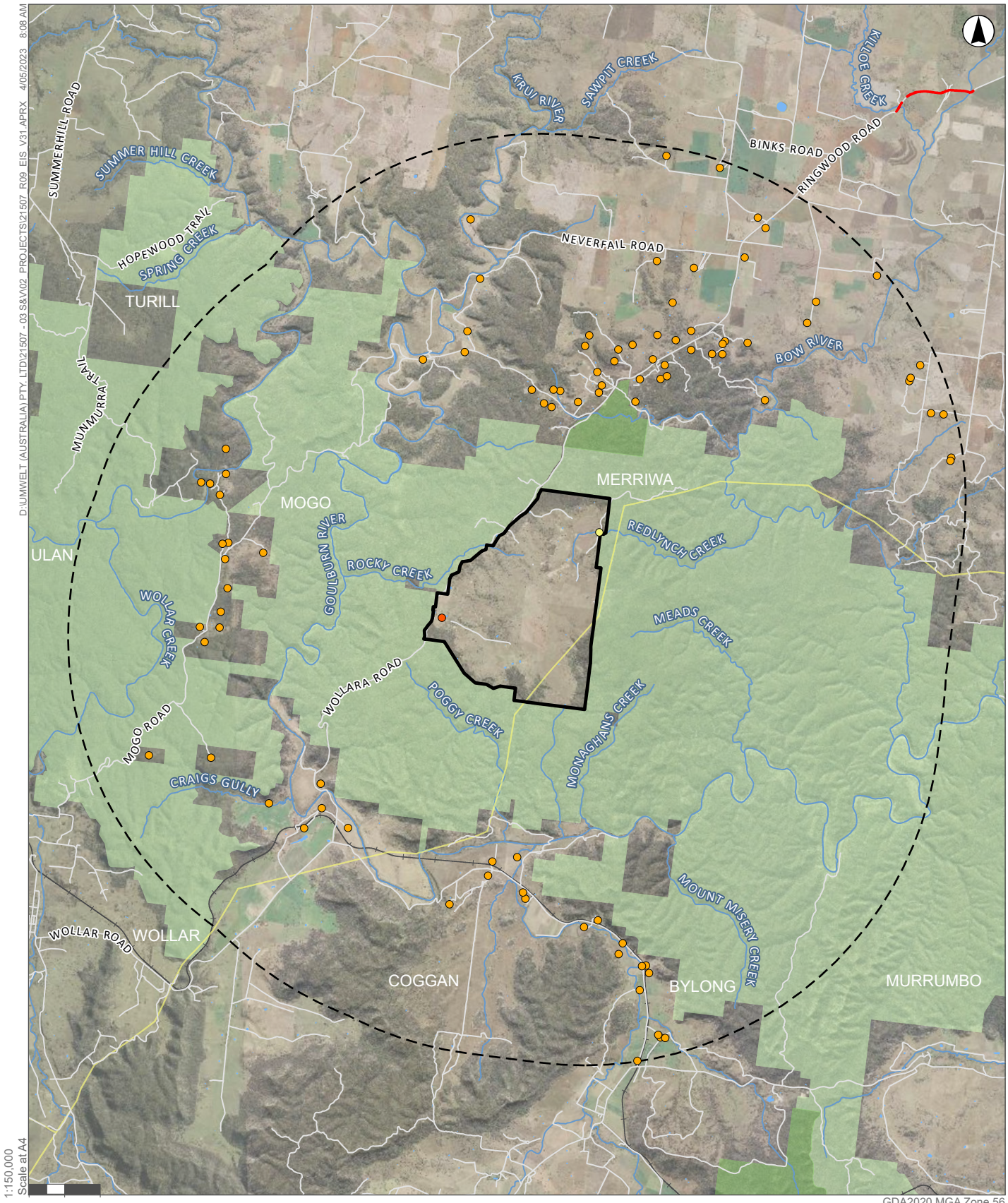
2.3.2 Natural and Built Features

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)

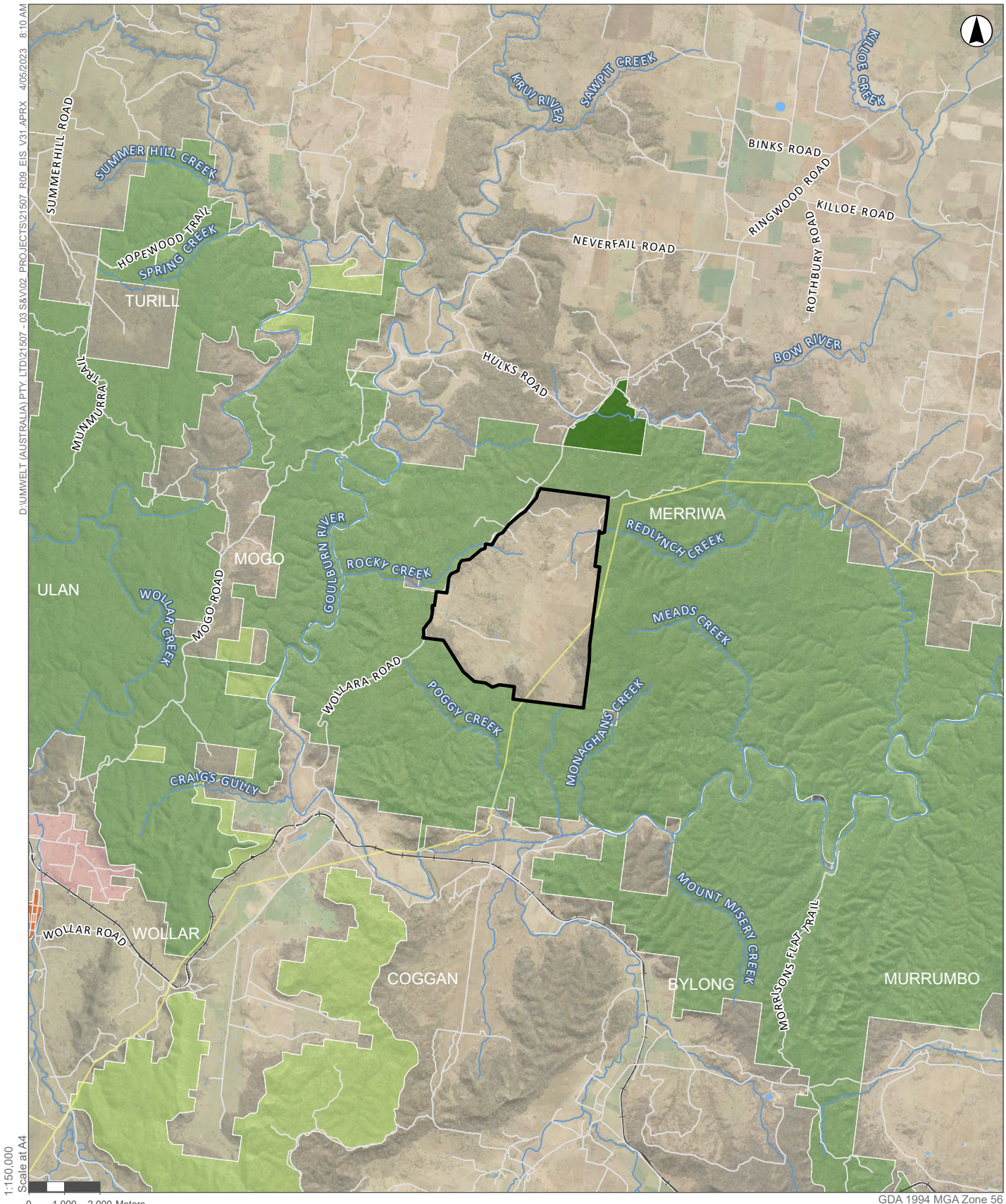


FIGURE 2.3

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.

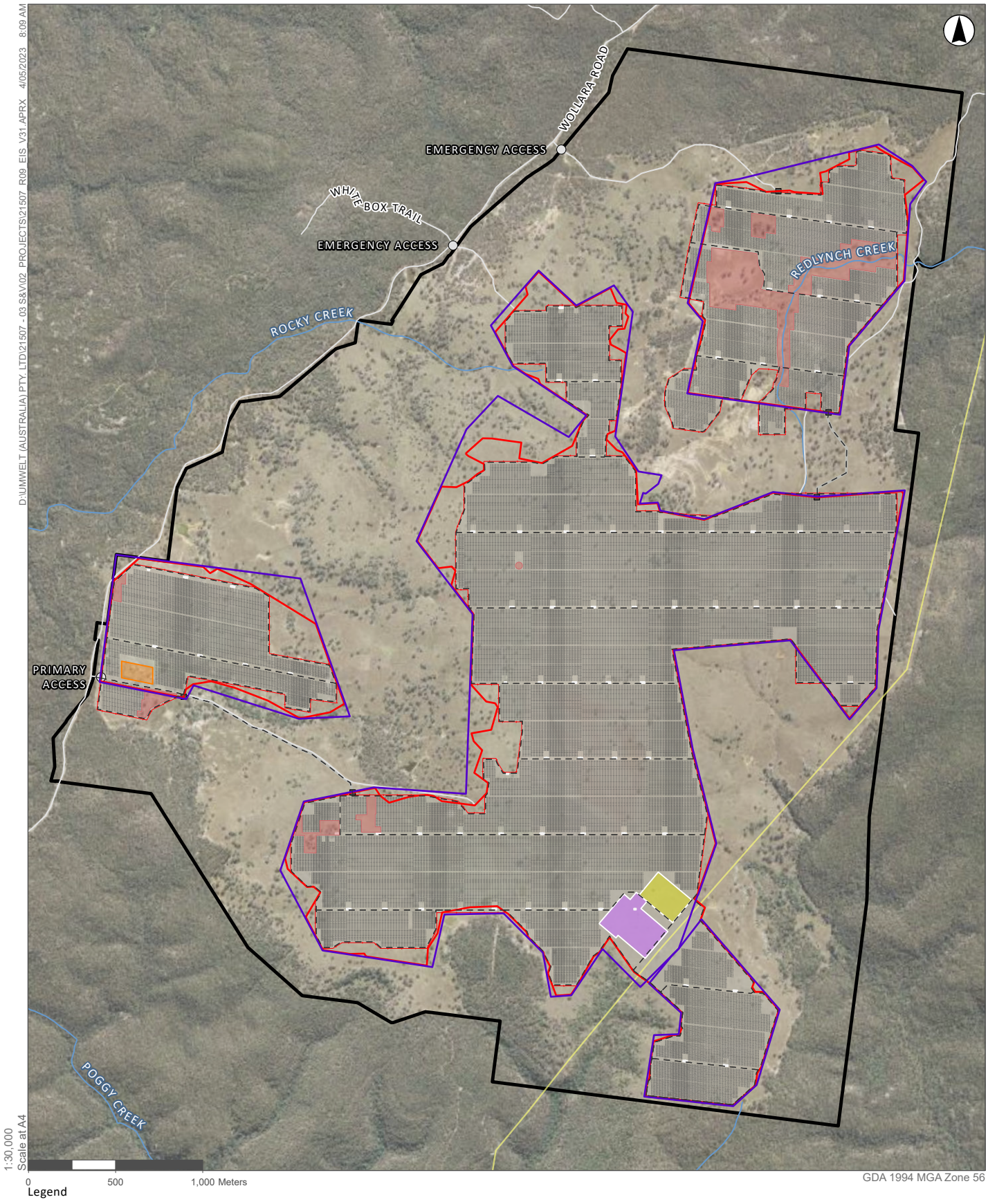


FIGURE 2.4

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.

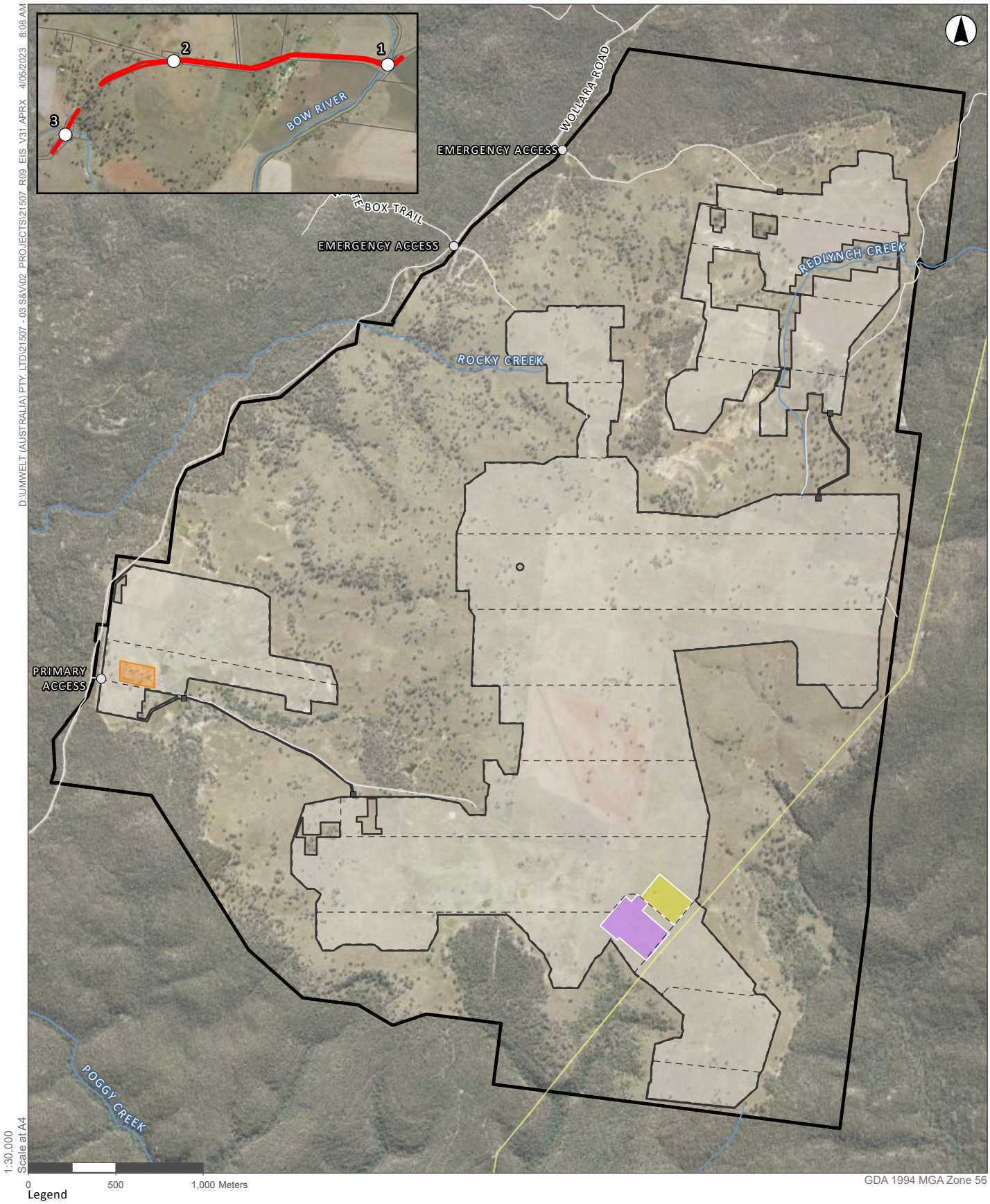


FIGURE 3.1

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

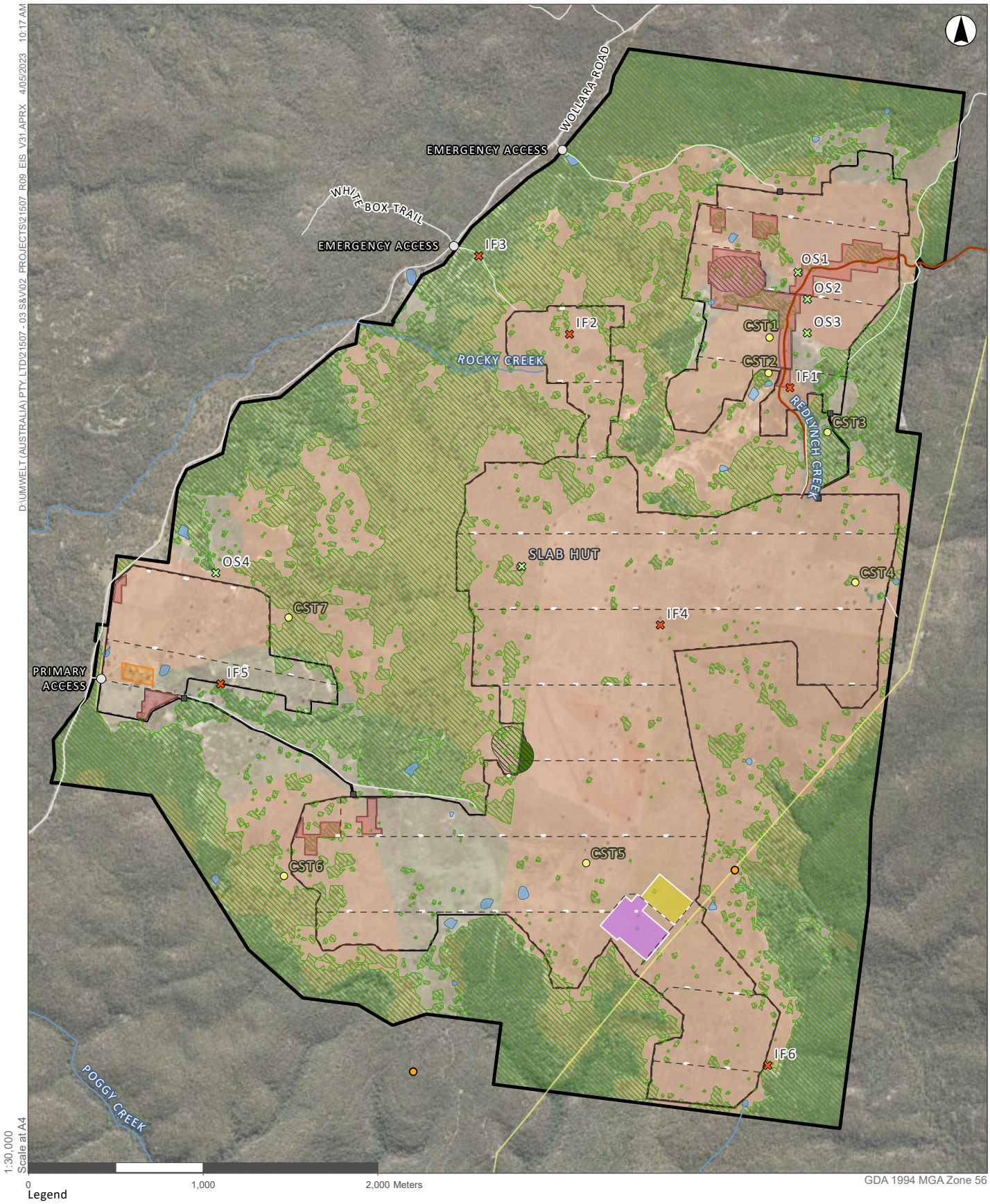
The Project Area covers approximately 2,000 ha with a Development Footprint of approximately 799.5 ha as shown in **Figure 3.1**. Access will be achieved via the existing driveway towards the southern end of the property's western boundary, off Wollara Road. Two secondary access points will be available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

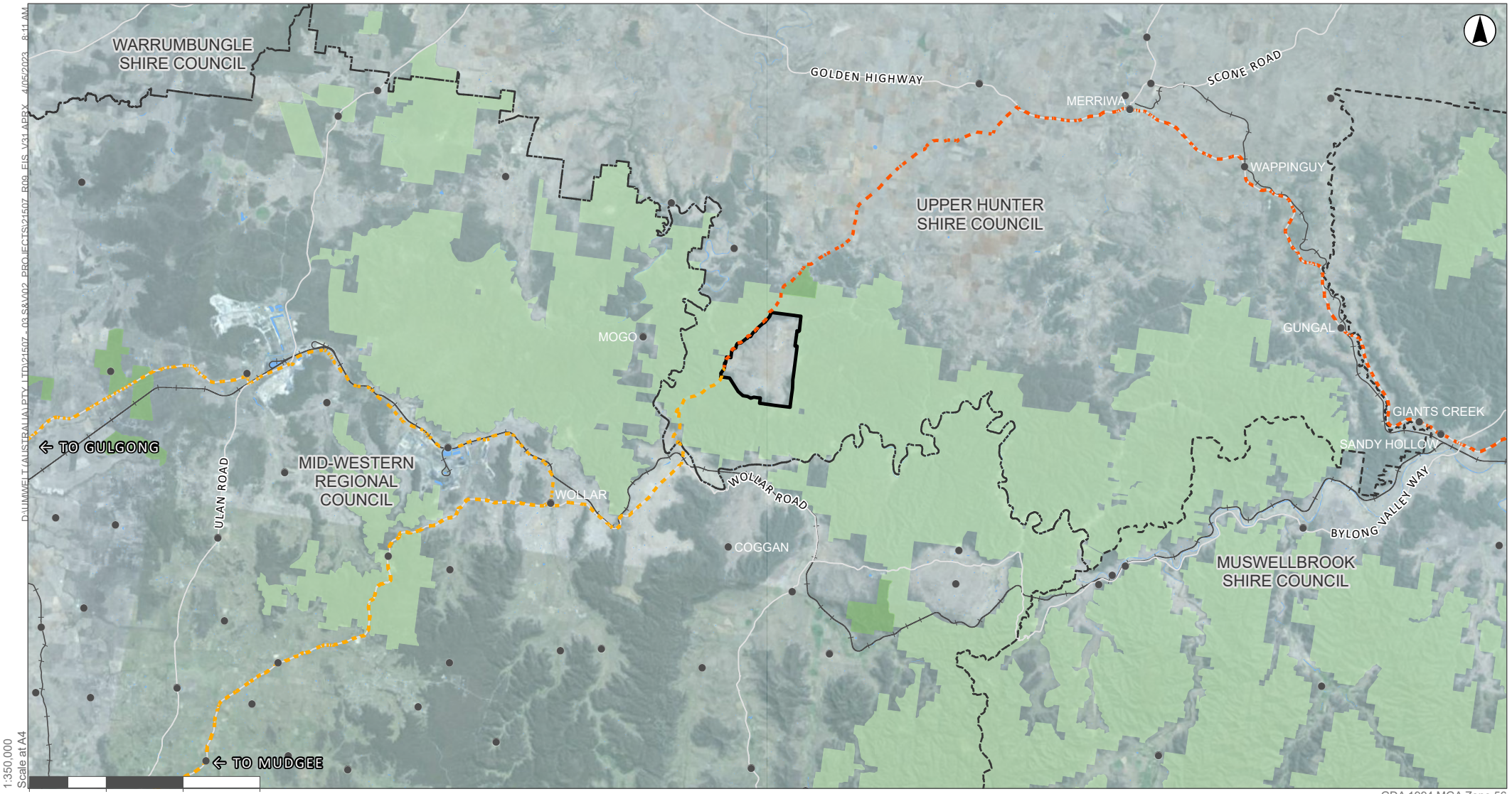
Major solar components would be delivered to the Port of Newcastle and transported to the Project Area by truck via the New England Highway and through to the Golden Highway, Ringwood Road and Wollara Road. These materials and vehicles would access the Project Area via the southern entrance off Wollara 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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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)*.

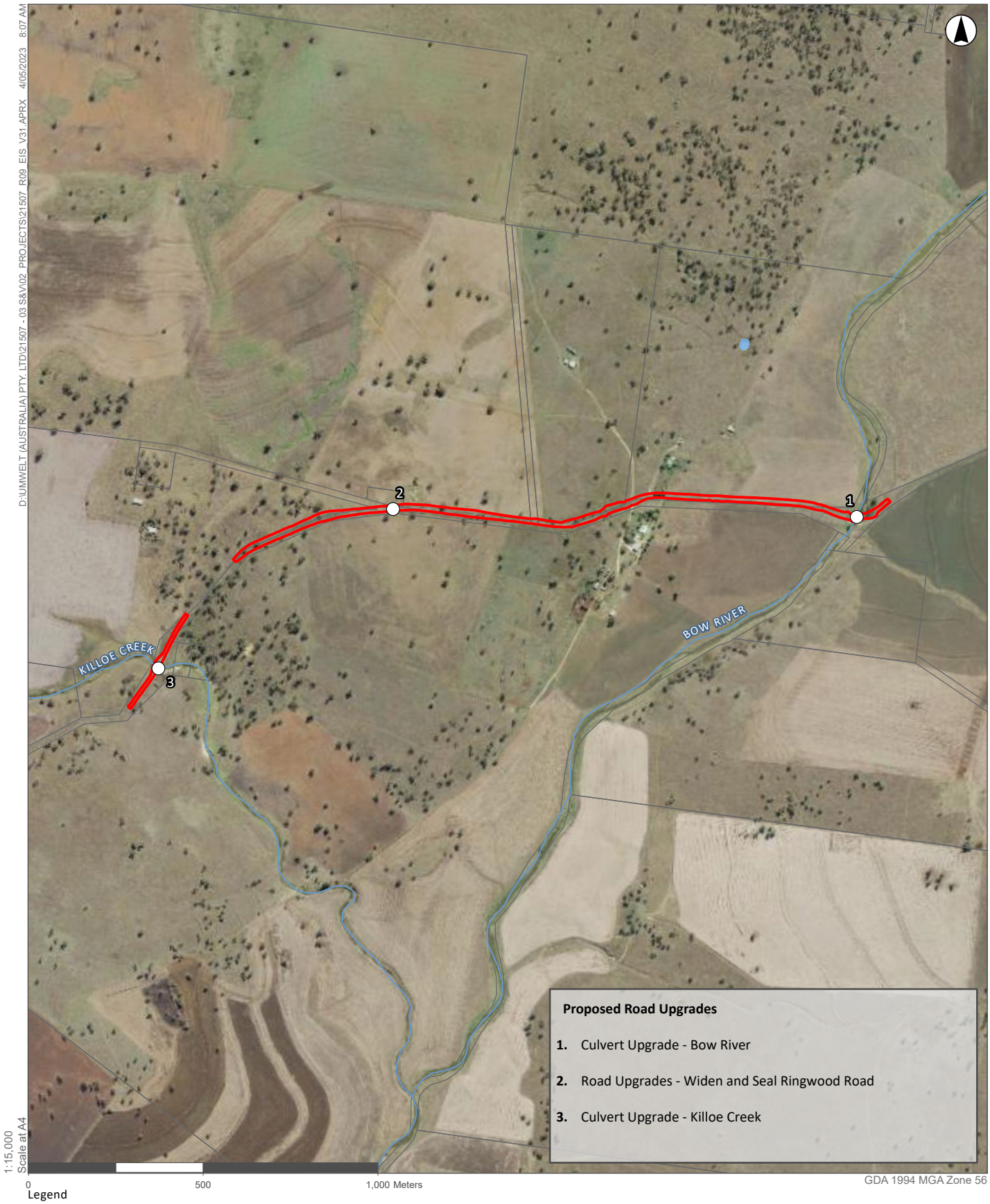


FIGURE 3.4

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.

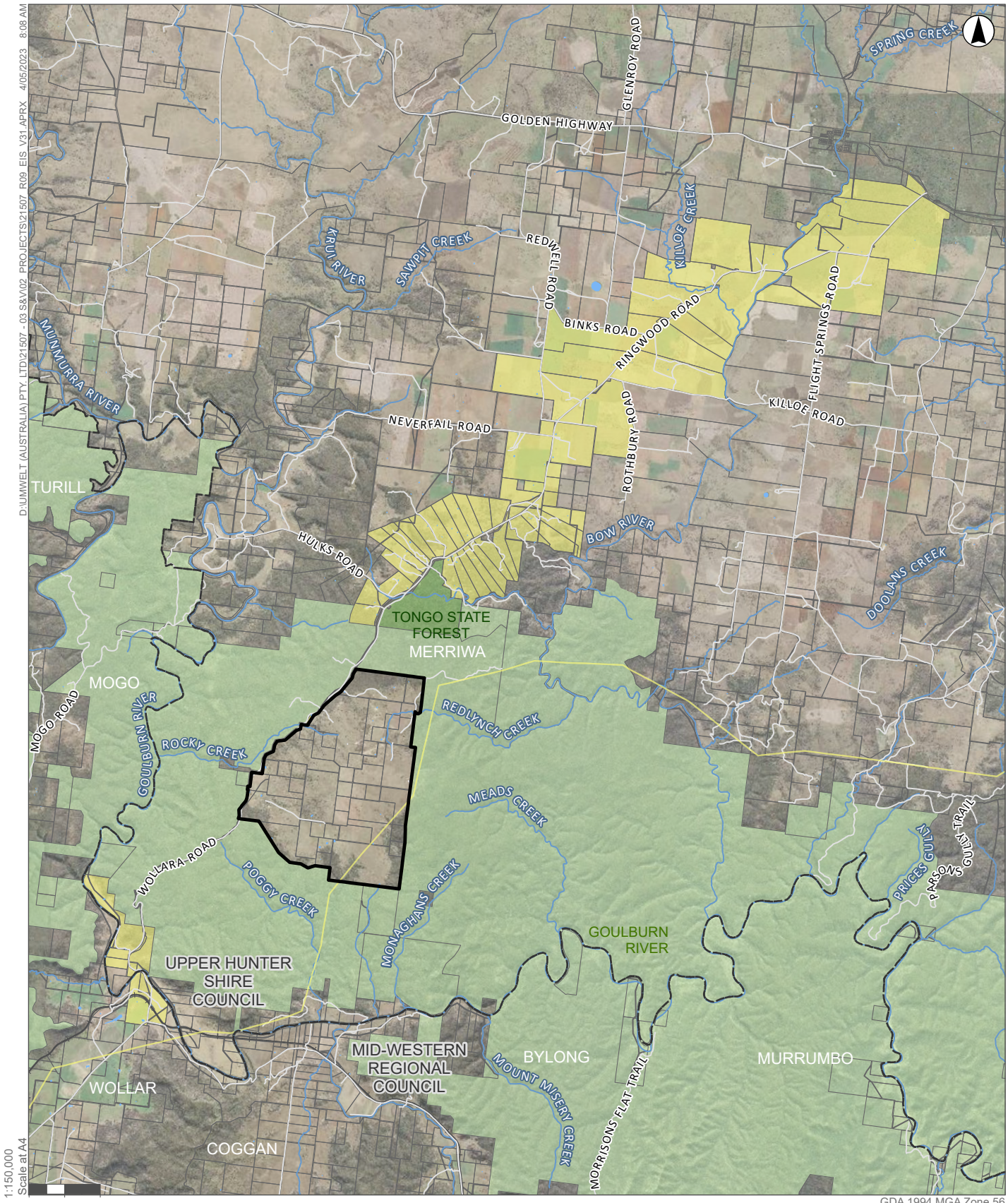


FIGURE 5.1

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

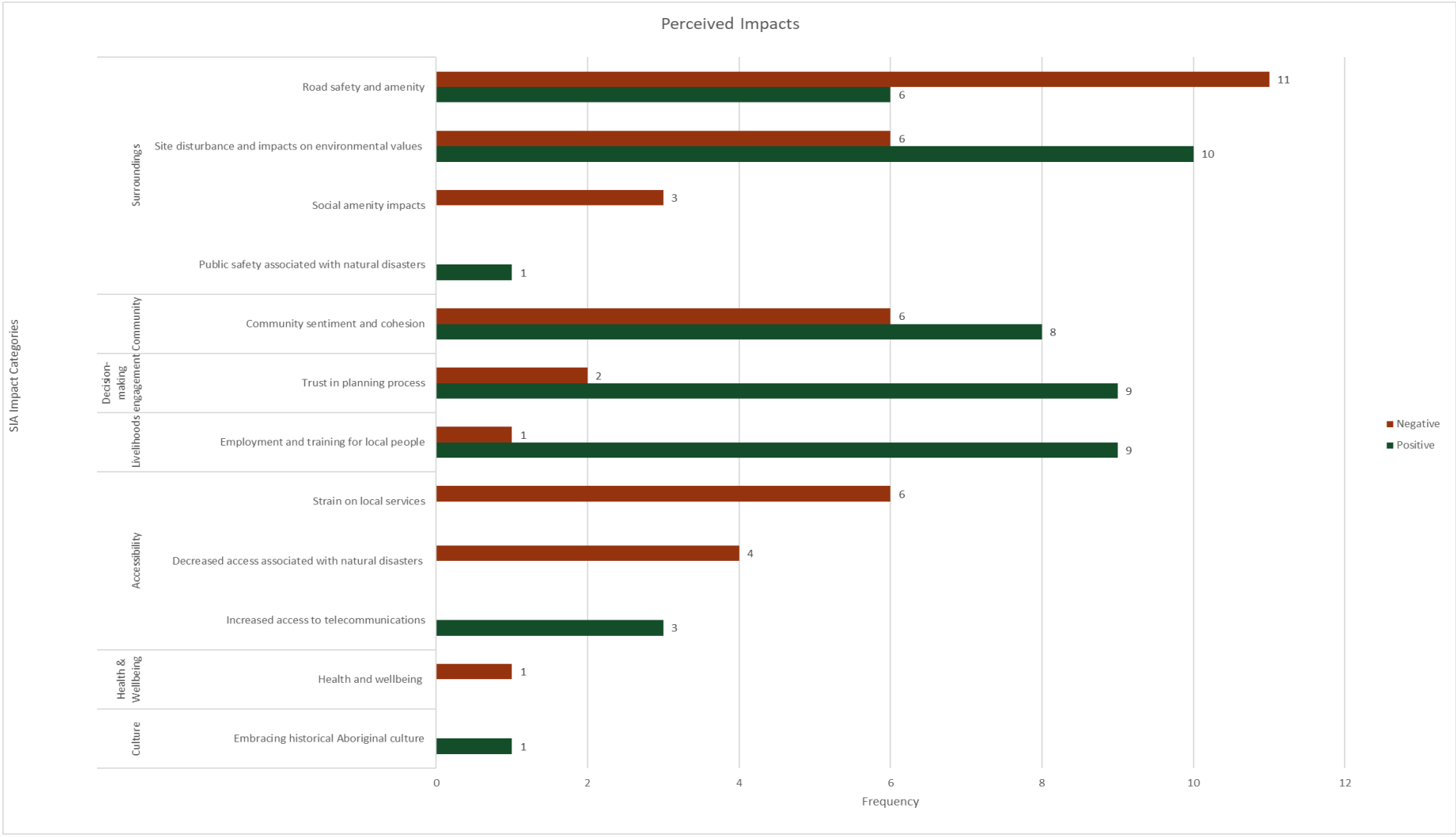


Figure 5.3 Perceived Social Impacts

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)

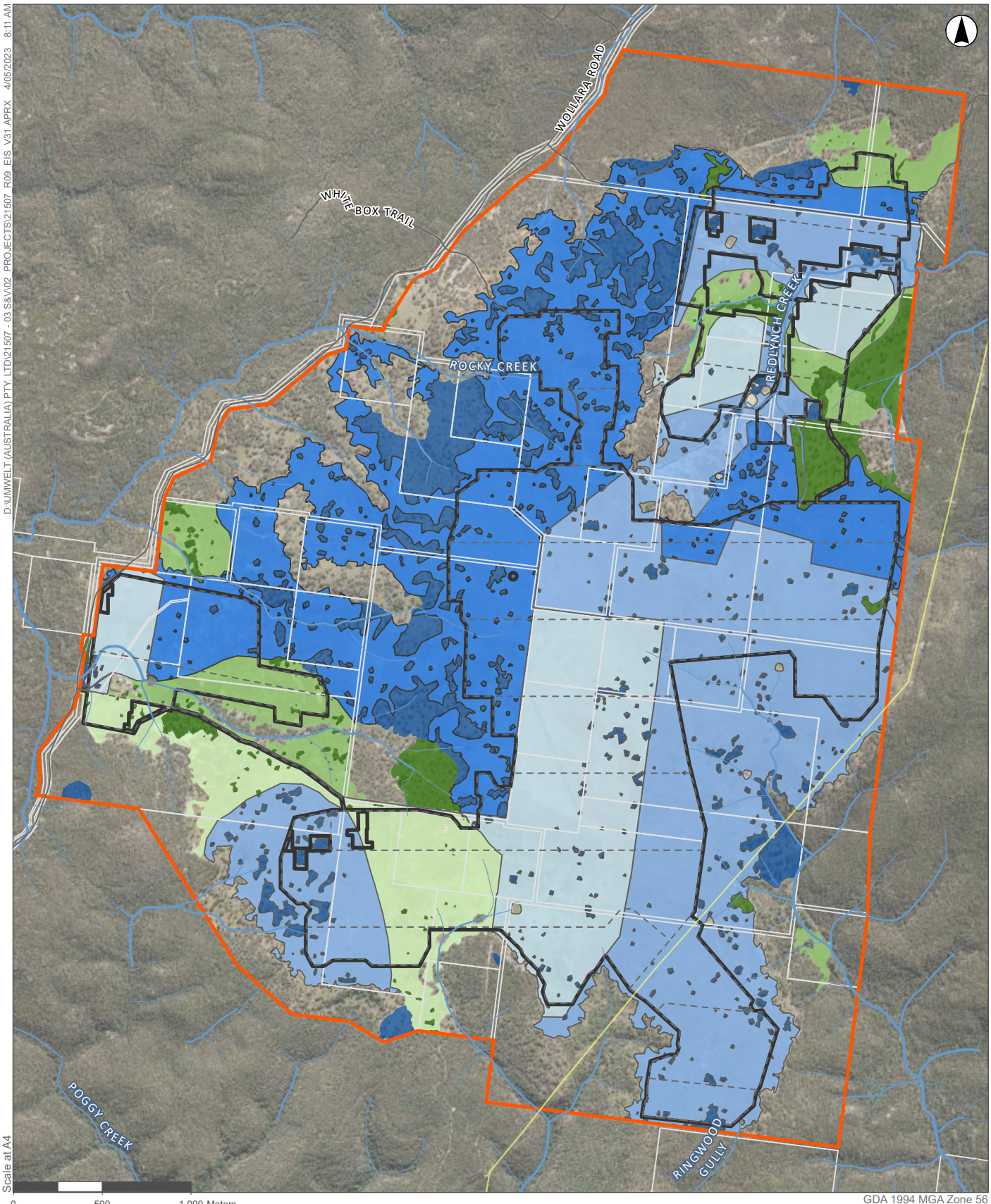
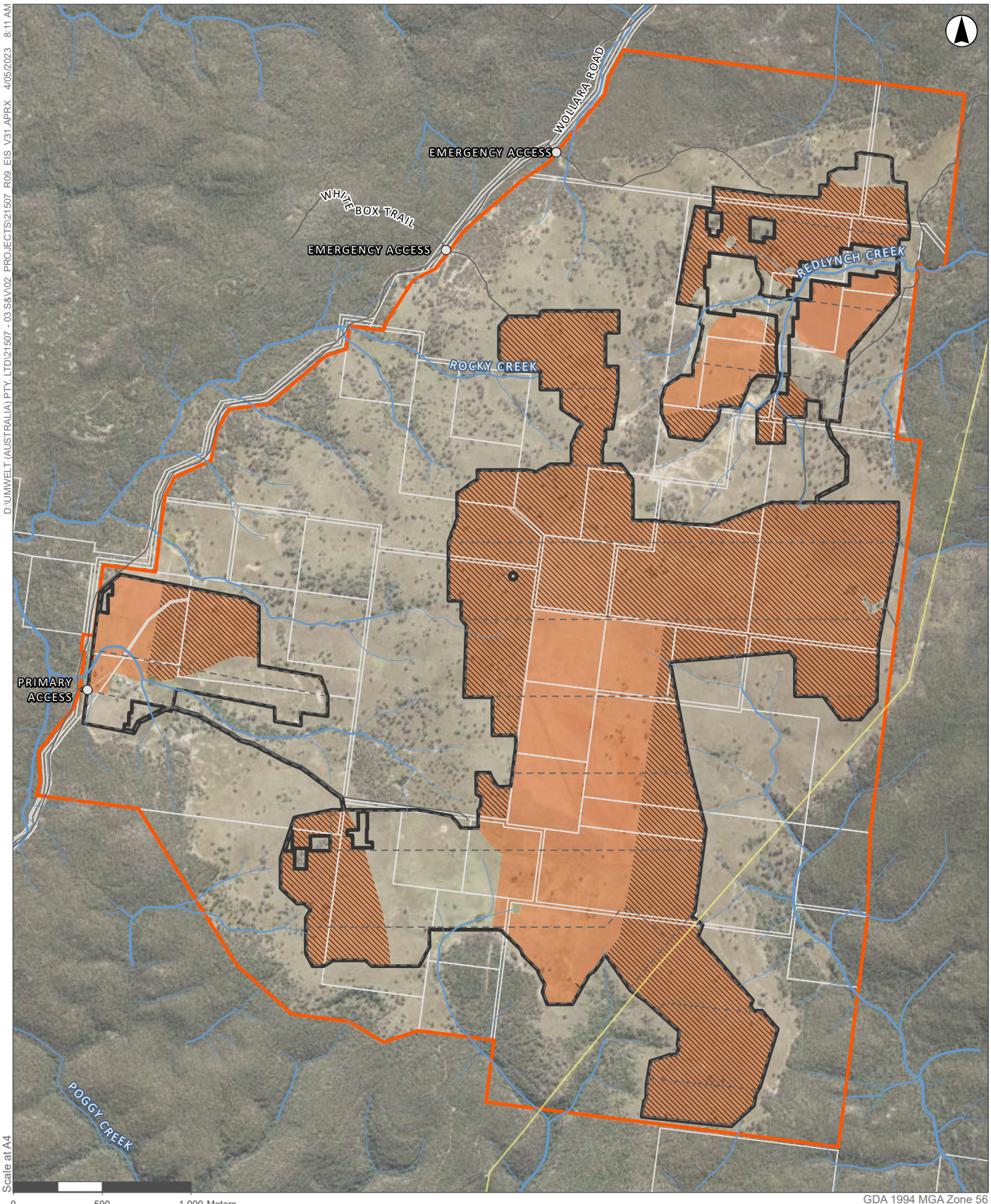


FIGURE 6.1

Plant Community Types in Solar Farm Development Footprint

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)



Legend

- Access Points
- Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- Electricity Transmission Line
- Property Boundaries
- Development Footprint
- Project Area

Threatened Ecological Communities within the Development Footprint

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland VEC - EPBC Act
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC - BC Act

FIGURE 6.2

Threatened Ecological Communities in Solar Farm Development Footprint

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

Threatened Species Assessment

The NSW BAM categorises threatened species as either ecosystem-credit species or species-credit species. Credits are required for impacts on species-credit species but not for ecosystem-credit species as they are considered to be already covered by credits generated for impacts on native vegetation. The BAM calculator used for the BDAR predicts the species-credit species that may occur and requires consideration of these species in the assessment.

A full list of the ecosystem-credit species and the species-credit species predicted to occur by the BAM Calculator and/or the literature review and consideration of their likelihood of occurrence in the vegetation zones within the Project Area is provided in the BDAR (provided in **Appendix 6**). Targeted surveys were undertaken for all candidate threatened flora and fauna species across the Project Area.

The completion of surveys and assessments identified that the Project could impact the following threatened species listed within the BC Act and/or the EPBC Act:

- Mapped important habitat for the Regent Honeyeater (*Anthochaera phrygia*) which is a potential serious and irreversible impact (SAII) entity.
- Barking Owl (*Ninox connivens*) (breeding and foraging habitat).
- White-throated Needletail (*Hirundapus caudacutus*).
- Glossy Black Cockatoo (*Calyptorhynchus lathami*) (foraging habitat only).
- Diamond Firetail (*Stagonopleura guttata*).
- Dusky Woodswallow (*Artamus cyanopterus*).
- Little Lorikeet (*Glossopsitta pusilla*).
- Regent Honeyeater and Barking Owl targeted surveys were completed for the Project, the results of these surveys are shown below in **Figure 6.3** and **Figure 6.4**.

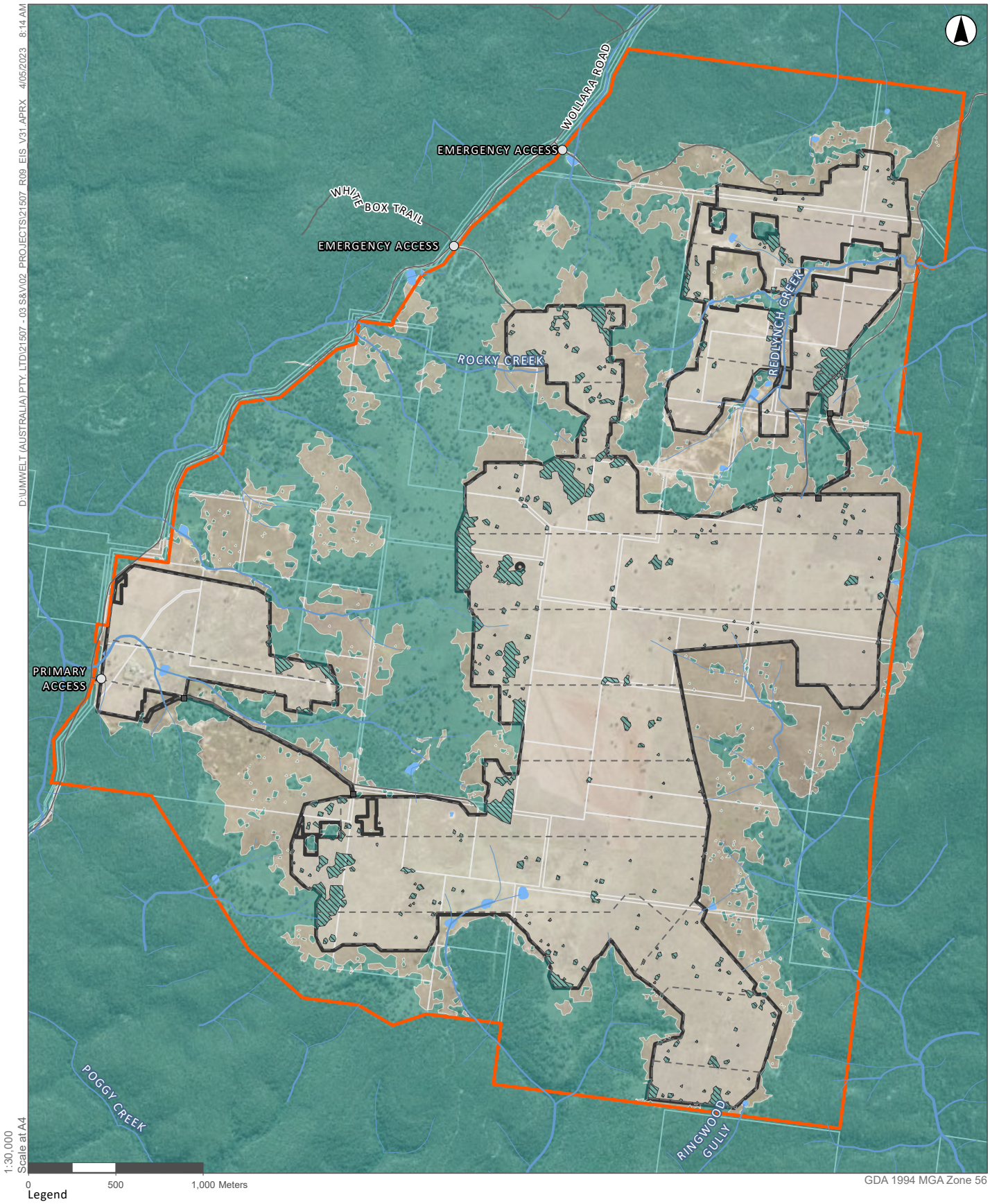
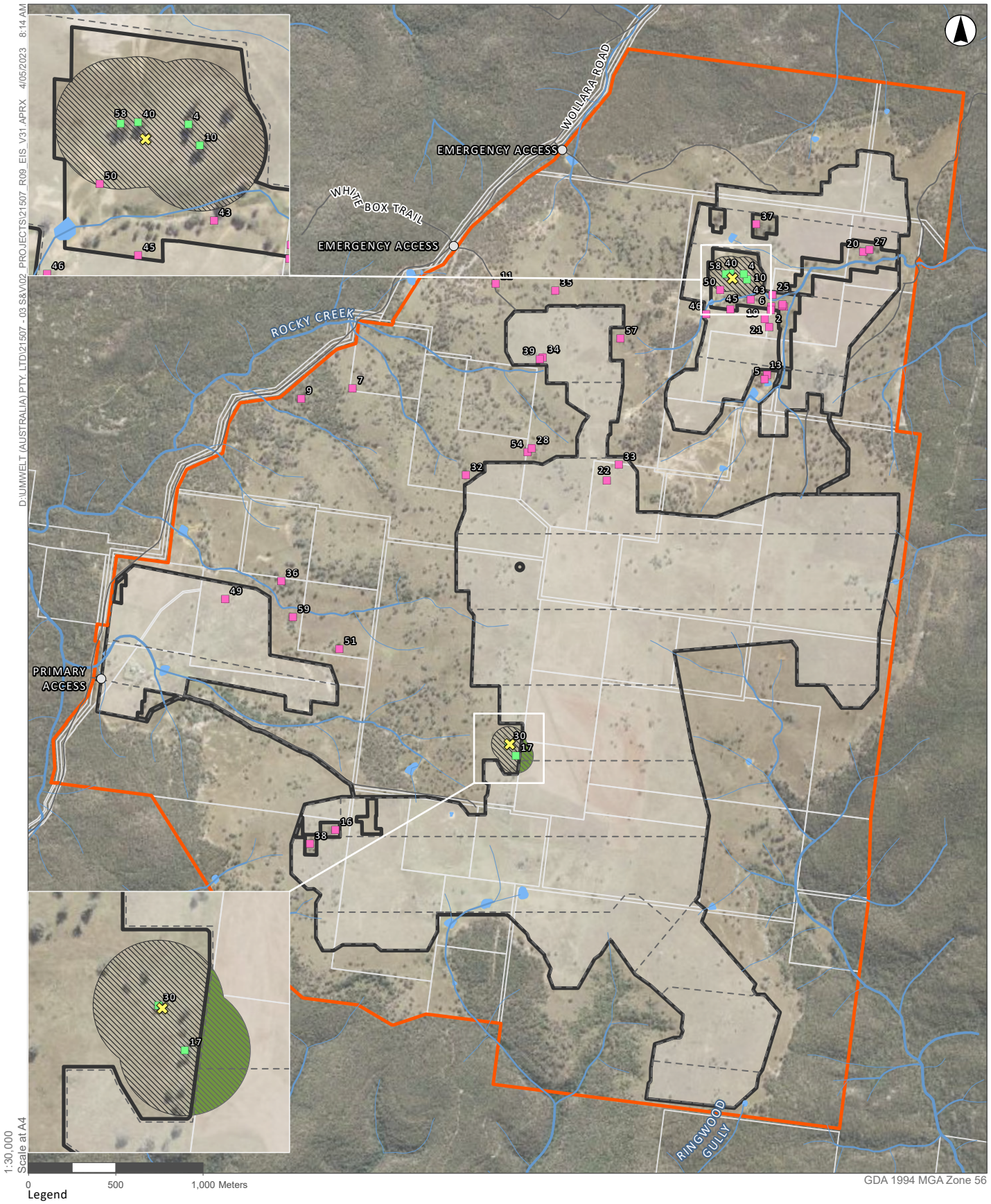


FIGURE 6.3

Regent Honeyeater Habitat

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)



Legend

- Access Points
- Proposed Access Tracks
- Existing Roads and Tracks
- Property Boundaries
- Development Footprint
- Project Area
- Barking Owl Observation Locations
- Hollow Bearing Trees >20cm Opening (no Barking Owl activity detected)
- Hollow Bearing Trees >20cm Opening (where Barking Owl activity detected)
- Barking Owl Potential Nest Tree Buffer (100m)
- Barking Owl Species Polygon

FIGURE 6.4

Barking Owl Habitat within the Project Area

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

6.3.1.4 Avoidance and Mitigation of Impacts

The biodiversity assessment commenced during early Project design stages, allowing the Development Footprint to be progressively refined and minimised to reduce and avoid biodiversity impacts, particularly in areas with higher ecological value and vegetation connectivity.

The entire Project Area (2,000 ha) was initially investigated for potential establishment of the Project. Areas with intact vegetation were removed from the Development Footprint early in the planning process. Further refinement based on surveys and biodiversity constraints have reduced the Development Footprint for the solar arrays and associated infrastructure to 799 ha. Specifically, the Development Footprint alterations have resulted in biodiversity impact avoidance through an initial avoidance of 38% (reducing from 2,000 ha to 1.249 ha) of the Project Area, a secondary reduction of approximately 30% reduction (reducing from 1,249 ha to 882 ha) and a further reduction in the Development Footprint of approximately 10% (882 ha to 799.5 ha). Lightsource bp has sought to balance the area of biodiversity impacts with the retention of areas for a future Biodiversity Stewardship Agreement to provide offsets as part of the Project.

Development Footprint refinements have also reduced impacts the PCT 483 Scattered Trees by of approximately 34% (35.9 ha to 23.64 ha).

The Project has been designed to maximise the most disturbed part of the Project Area which have undergone historic clearing and are currently managed for livestock grazing. These areas have lower biodiversity values.

In particular, parts of the Project Area which contained large areas of suitable habitat for the Regent Honeyeater (*Anthochaera phrygia*), Barking Owl (*Ninox connivens*), Large-eared Pied-bat (*Chalinolobus dwyeri*) and the Eastern Cave Bat (*Vespadelus troughtoni*) have been avoided. The Project layout has also completely avoided impacts to PCT 1655, which corresponds to the Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion vulnerable ecological community.

Changes to the Development Footprint have also avoided areas of White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands CEEC observed to be in moderate-good condition. This community is a SAII entity, avoidance and reduction in the Development Footprint has targeted utilising the derived native grassland areas of this community and avoided where possible scattered tree condition zones, where possible. The retained areas of vegetation ensure the provision of a wildlife corridor between each of the three distinct solar array development areas. Regent Honeyeater is at threat of SAII and the Project Area has been reduced to minimise this impact.

Most areas of intact vegetation were avoided during refinement of the Development Footprint as part of the iterative design process. Further refinements to the Project have resulted in the retention of:

- All areas of moderate to good condition White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.
- All areas of the vulnerable ecological community Hunter Valley Footslopes Slaty Gum Woodland.
- Much of the mapped Regent Honeyeater Important Habitat within the Project Area.
- All suitable Barking Owl breeding trees where activity was detected during surveys.
- PCTs associated with the threatened microbat species Large-eared Pied Bat and Eastern Cave Bat.
- The third order sections of Redlynch Creek.

Underground cabling required to connect parts of the Project to the substation and BESS in the south-eastern section of the Project Area have been strategically located within the footprints of the access roads and low biodiversity areas to minimise potential impacts.

The Development Footprint has also been designed to avoid part of waterbodies in the Project Area, in particular the main drainage trunk and third order section Redlynch Creek will be retained with impacts limited to the designated crossing points.

In addition to this there have been several Project refinements incorporated into the design and layout of the Project since the preparation of the initial Scoping Report and the completion of biodiversity surveys, to avoid and/or minimise impacts to sensitive environmental features. These refinements to reduce impacts have been implemented as an outcome of ongoing consultation with landholders.

Lightsource bp has committed to the implementation of the following specific control measures to minimise the impacts of the Project on biodiversity:

- Workforce education and training.
- Implementation of vegetation protection zones for areas to be retained.
- Ecologist pre-clearance surveys and supervision of works.
- Erosion and sedimentation control measures.
- Weed and pest management.
- Fencing, access control and fauna exclusion measures.

Each of these mitigation measures will be included within the CEMP, OEMP and DREMP.

6.3.1.5 Impact Assessment

Direct Impacts

The Project would result in direct impacts to native vegetation communities and threatened species habitats within the Development Footprint as detailed in **Table 6.4** as a result of clearing works for infrastructure.

Table 6.4 Direct Impacts on Biodiversity Features

PCT/TEC/EC or Threatened Species and Their Habitat	Status	Total Direct Impact Area (ha)
White Box – Yellow Boc – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	BC Act and EPBC Act listed CEEC	Derived native grassland component = 675.99 Scattered Trees component = 23.64 Total extent = 699.63
Regent honeyeater (*Anthochaera phrygia*) **Mapped important habitat**	BC Act and EPBC Act listed Critically Endangered	45.09
Barking Owl **Breeding habitat**	BC Act listed vulnerable	1.21

Indirect Impacts

Potential indirect impacts on biodiversity are anticipated to occur primarily through the construction phase of the Project, and hence many would be considered temporary and/or short-term. Indirect impacts on biodiversity are anticipated as a result of:

- Increased site occupation and human visitation resulting in reduced habitat suitability for threatened fauna.
- Reduced connectivity of habitat, however a reduced level of connectivity will be retained through planned corridors.
- Light spill impacts which may occur intermittently and only in the case of an emergency, with consequences likely to be minor.
- Construction noise which may result in a short-term reduction in the suitability of retained and adjoining habitats during construction works for sensitive fauna species.
- Impacts on air quality which have a low potential to occur if appropriate dust suppression measures are undertaken but which may result in physical injury to fauna species and short-term reduced photosynthetic capacity for impacted flora.
- Water availability impacts due to loss of existing watercourses within the site and altered hydrology and sedimentation of downstream environments.
- Weed and pest invasion.

Prescribed Impacts

All prescribed impacts, as listed within the BC Regulation, have been assessed for the Project.
The prescribed impact considered relevant to the Project is that associated with loss of habitat connectivity. The areas of clearing proposed for the Project primarily consist of native vegetation composed of scattered canopy trees, areas of derived native grassland and highly disturbed agricultural land assessed as Category 1 – Exempt Land.

The Project design includes corridors between the three distinct solar farm array areas to enable habitat connectivity through the site, while habitat connectivity around the site is not likely to be impacted. Areas to be impacted are already substantially degraded by thinning and agricultural management, such that species utilising these areas for connectivity are already highly mobile and disturbance tolerant, and as a result the reduction in wildlife connectivity is unlikely to have any substantive impacts.

Serious and Irreversible Impacts (SAII)

Under the BC Act, a determination of whether an impact is serious and irreversible must be made in accordance with the principles prescribed in the BC Regulation. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community.

The BDAR provided further assessment for two entities considered at risk of a SAII (Regent Honeyeater and White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (refer to **Section 9.0** of the BDAR in **Appendix 6**)). This assessment was used to inform further design refinements in order to reduce impacts to these entities. This included reducing the Development Footprint and strategic location of solar arrays to reduce impacts on connectivity and areas of high quality.

6.3.1.6 Biodiversity Credit Impact Summary

The NSW BAM requires the use of an online calculator and project specific survey and impact data to calculate the number of biodiversity credits that account for the impact of a project on biodiversity. The proponent must offset these credits as part of progressing the development if it is approved.

Following the application of appropriate avoidance and mitigation measures, the BAM assessment identified the biodiversity credits listed in **Table 6.5** are required to offset the biodiversity impacts of the Project.

Table 6.5 Biodiversity Offset Credits

PCT/Species-Credit	Credit Type	No. Credits Required
PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Ecosystem-credit	4,642
PCT 1661 Narrow-leaved Iron bark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter Sydney Basin	Ecosystem-credit	136
Regent Honeyeater Important Habitat (*Anthochaera phyrygia*)	Species-credit	1,546
Barking Owl (*Ninox connivens)*	Species-credit	7

6.3.1.7 Biodiversity Offset Strategy

Lightsource bp is committed to delivering a biodiversity offset strategy that appropriately compensates for residual significant ecological impacts as a result of the Project. The proponent has, where possible, altered the Project to avoid and minimise ecological impacts in the design stage, and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements.

Lightsource bp is currently investigating the option of Biodiversity Stewardship Agreement (BSA) within the Project Area on the residual land around the Development Footprint.

The biodiversity offsets strategy will be developed during the assessment process in consultation with Biodiversity Conservation Division (BCD), DPE and DCCEEW and will be based on the credits required to be retained to offset the impacts of the Project (refer to **Table 6.5**).

6.3.1.8 Road Repairs and Upgrades

6.3.1.9 Existing Environment

The environment for the Road Repairs and Upgrades is limited to the existing alignment of the road reserve of Ringwood Road. Typical of a road reserve adjoining agricultural land, parts of the area have been cleared. Some remnant scattered canopy tree vegetation exists, however this is highly fragmented.

6.3.1.10 Methodology

The BDAR was prepared in accordance with the BAM and the Biodiversity Assessment Method Operational Manual – Stage 1 (DPIE, 2020). Further detail regarding the methodology, including detailed survey information, is included in the BDAR refer to **Appendix 7**.

6.3.1.11 Assessment Results

Excluded Impacts

For the purposes of this assessment, no areas of excluded impacts /Category 1 land have been assessed for the proposed road and culvert upgrades.

Native Vegetation Assessment

Surveys of the Road Repairs and Upgrades area identified one PCT which has been split into two native vegetation zones based on condition types. Details of the vegetation zones and associated PCTs are listed below, summarised in **Table 6.6** and illustrated in **Figure 6.5**.

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:

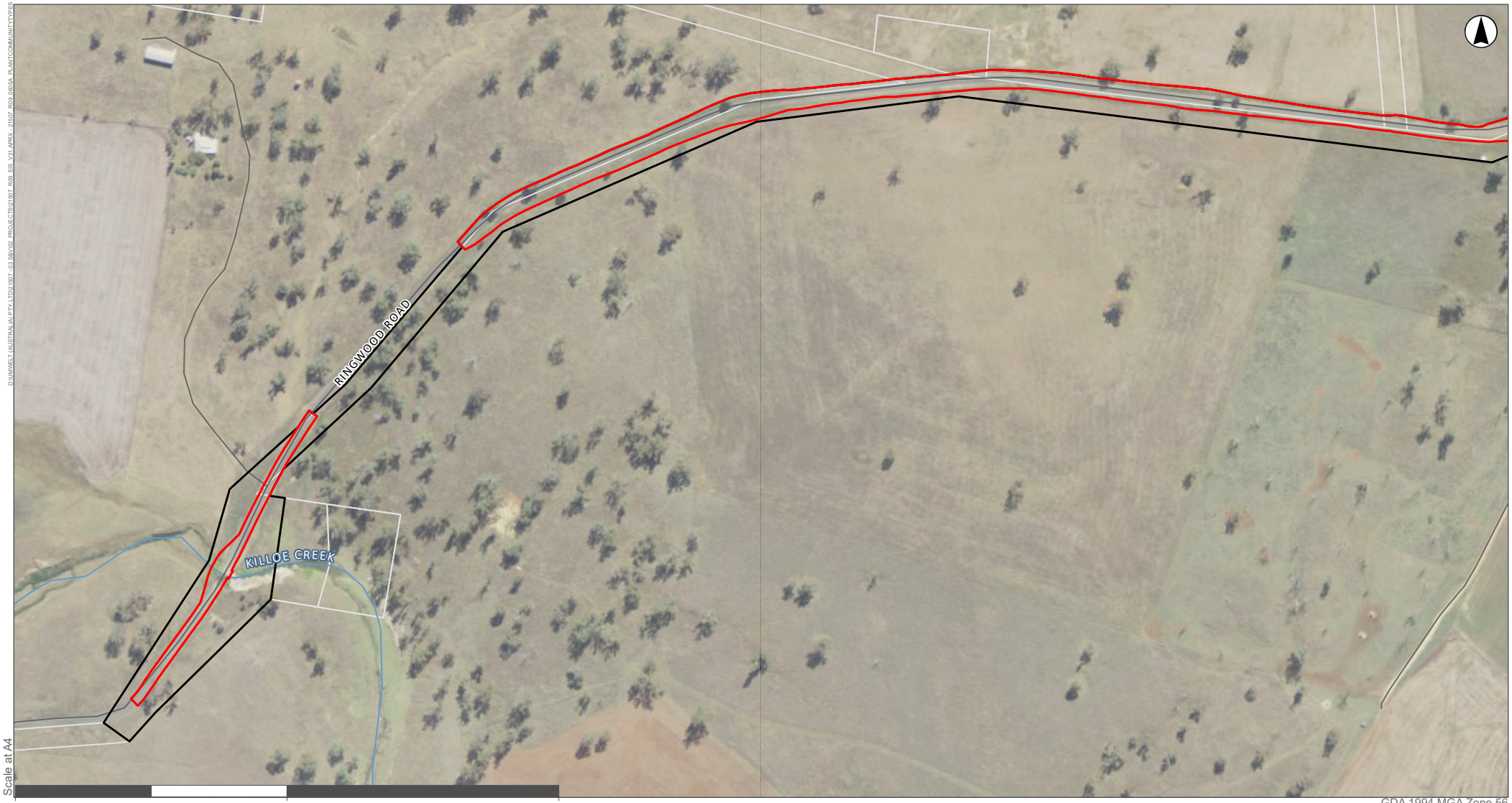
- PCT 483 Condition Zone 1 – Remnant woodland:
    - Consists of occasional scattered trees characterised by *Eucalyptus melliodora* with scattered occurrences of *Eucalyptus albens x moluccana* and *Angophora floribunda.*
- PCT 483 Condition Zone 2 – Exotic dominated grassland:
    - Consists of typically dominated exotic grasses and does not comprise of derived native grassland. Dominant species included *Sonchus oleraceus, Hyparrhenia hirta, Bromus catharticus and Avena sativa.*

Table 6.6 Vegetation Zones within the Road Repairs and Upgrades Development Footprint

Zone No.[2]	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	Remnant Woodland	0.06
2	483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Exotic dominated derived native grassland	2.07

[2] Vegetation zone 4 has been removed from the Development Footprint to avoid impacts to PCT 1655.

Further details of each PCT and 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 7**) along with vegetation integrity scores.



1:5,000
Scale at A4

0 0.25 0.5 Kilometres

GDA 1994 MGA Zone 56

Legend

- Road
- Watercourse
- Property Boundaries
- Road Repairs and Upgrades Area
- Project Area (as defined in the BDAR)

Plant Community Types

- PCT 483 Condition Zone 1 Remnant Woodland (0.055 ha)
- PCT 483 Condition Zone 2 Exotic Dominated Grassland (2.069 ha)
- Cleared Land (1.464 ha)

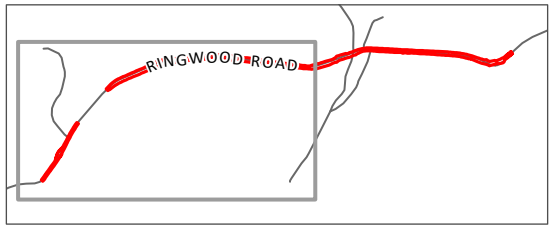


FIGURE 6.5 A

Plant Community Types in the Road Repairs and Upgrades Area

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



1:5,000
Scale at A4

0 0.25 0.5 Kilometres

GDA 1994 MGA Zone 56

Legend

- Road
- Watercourse
- Property Boundaries
- Road Repairs and Upgrades Area
- Project Area (as defined in the BDAR)

Plant Community Types

- PCT 483 Condition Zone 1 Remnant Woodland (0.055 ha)
- PCT 483 Condition Zone 2 Exotic Dominated Grassland (2.069 ha)
- Cleared Land (1.464 ha)

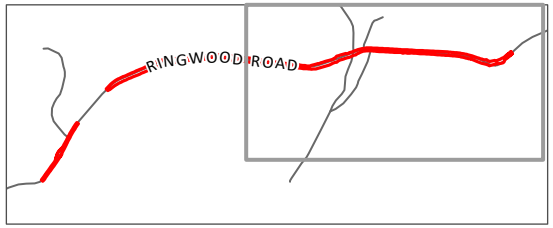
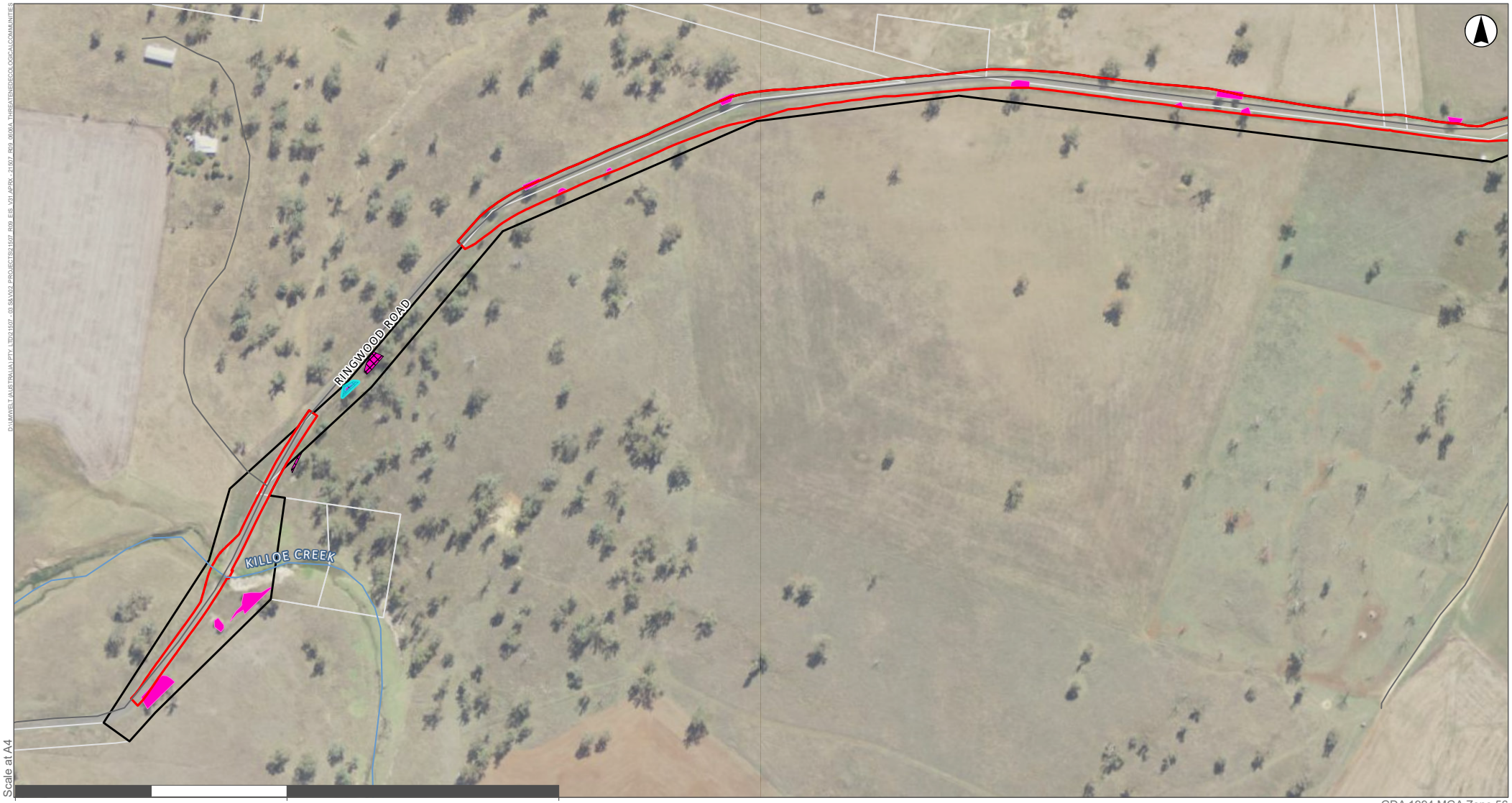


FIGURE 6.5 B

Plant Community Types in the Road Repairs and Upgrades Area

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



1:5,000
Scale at A4

0 0.25 0.5 Kilometres

GDA 1994 MGA Zone 56

Legend

- Road
- Watercourse
- Property Boundaries
- Road Repairs and Upgrades Area
- Project Area (as defined in the BDAR)
- BC Act TEC - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

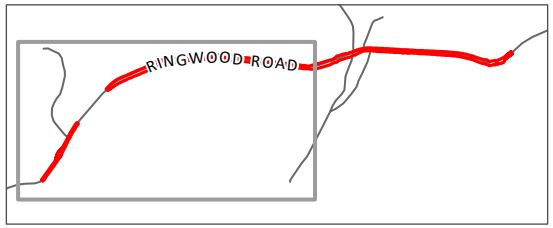


FIGURE 6.6 A

Threatened Ecological Communities in Road Repairs and Upgrades Area

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



1:5,000
Scale at A4

0 0.25 0.5 Kilometres

GDA 1994 MGA Zone 56

Legend

- Road
- Watercourse
- Property Boundaries
- Road Repairs and Upgrades Area
- Project Area (as defined in the BDAR)
- BC Act TEC - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

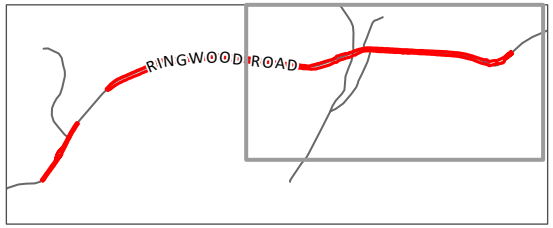


FIGURE 6.6 B

Threatened Ecological Communities in Road Repairs and Upgrades Area

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

Threatened Species Assessment

No threatened flora or fauna species were identified within the Road Repairs and Upgrades footprint.

6.3.1.12 Avoidance and Mitigation of Impacts

The proposed works have been designed within the alignment of the existing road corridor and will minimise impacts through the confinement of the works to within this footprint. Further refinements can be investigated post approval during the detailed design stage, however limitations on refinements are present due to the requirement to adhere to Austroads and TfNSW standard on road designs.

The culvert upgrades have potential to disturb habitats within Killoe Creek and Bow River, however appropriate environmental controls will be implemented to mitigate potential adverse impacts.
The location of the works to avoid watercourses is not feasible.

Each of these mitigation measures will be included within the Biodiversity Management Plan (BMP) CEMP, OEMP and DREMP.

6.3.1.13 Impact Assessment

Direct Impacts

The Project would result in direct impacts to native vegetation communities within Road Repairs and Upgrade footprint as detailed in **Table 6.7**.

Table 6.7 Direct Impact on Biodiversity Features

PCT/TEC/EC or Threatened Species and Their Habitat	Status	Total Direct Impact Area (ha)
White Box – Yellow Boc – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	BC Act listed	0.06

Indirect Impacts

Potential indirect impacts on biodiversity are anticipated to occur primarily through the construction phase of the Project, and hence many would be considered temporary and/or short-term. Indirect impacts on biodiversity are anticipated as a result of:

- Construction noise which may result in a short-term reduction in the suitability of adjoining areas during construction works for sensitive fauna species.
- Impacts on air quality which have a low potential to occur if appropriate dust suppression measures are undertaken but which may result in physical injury to fauna species and short-term reduced photosynthetic capacity for impacted flora.
- Weed and pest invasion.

Serious and Irreversible Impacts (SAII)

The BDAR provided further assessment for one entity considered at risk of a SAII, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (refer to Section 9.0 of the BDAR in **Appendix 7**).

6.3.1.14 Biodiversity Credit Impact Summary

The NSW BAM requires the use of an online calculator and project specific survey and impact data to calculate the number of biodiversity credits that account for the impact of a project on biodiversity. The proponent must offset these credits as part of progressing the development if it is approved.

Following the application of appropriate avoidance and mitigation measures, the BAM assessment identified the biodiversity credits listed in **Table 6.8** are required to offset the biodiversity impacts of the Project.

Table 6.8 Road Repairs and Upgrades Biodiversity Offset Credits

PCT/Species-Credit	Credit Type	No. Credits Required
PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Ecosystem-credit	3

6.3.1.15 Biodiversity Offset Strategy

Refer to **Section 6.3.1.7**, requirements of biodiversity offsets associated with the Road Repairs and Upgrades component of the Project will be addressed with the requirements of the solar farm site.

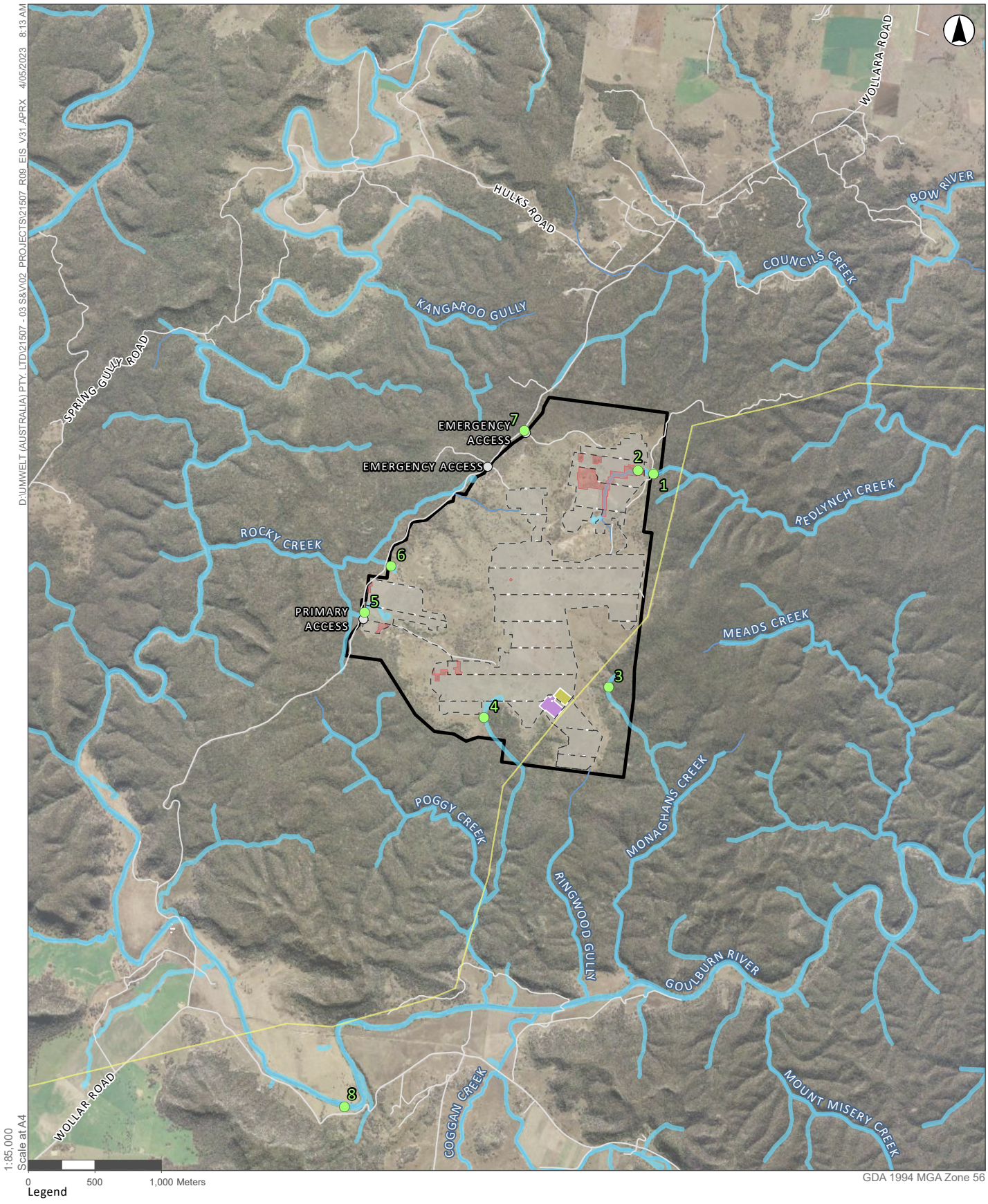
6.3.2 Aquatic Biodiversity

6.3.2.1 Existing Environment

The Project Area is located within the catchment of the Goulburn River in eastern NSW. The Goulburn River is the largest tributary of the Hunter River, accounting for 40% of its catchment area but only contributing 23% of its flows.

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 (KFH) (refer to **Figure 6.7**), however all (with the exception of Redlynch Creek) are highly ephemeral, only holding water for a short time following rainfall and receding rapidly, leaving very few remnant pools for fish refuge. During the site survey Redlynch Creek contained remnant pools and some free-flowing water and has a farm dam constructed within the watercourse. None of the watercourses within the Project Area contained important habitat features such as aquatic plants (macrophytes), bank overhang, trailing bank vegetation, riffle sections or woody debris/snags (except for Monaghans Creek which was dry at the time of survey but did contain woody debris).

All watercourses and riparian zones have been significantly modified by agricultural land practices, including complete removal of the riparian vegetation to top of bank in most areas.



Legend

- Access Points
- Survey Site
- Proposed Access Tracks
- Electricity Transmission Line
- Watercourse
- Roads and Tracks
- Project Area
- Exclusion Zones - Environmentally Sensitive Areas
- Battery Energy Storage System
- Substation
- Inverters
- Development Footprint
- Key Fish Habitat

FIGURE 6.7

Key Fish Habitat and Survey Sites

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

6.3.2.2 Methodology

The Aquatic Assessment was undertaken by Coast Ecology (2023, refer to **Appendix 8**), broadly in accordance with the *Aquatic Ecology in Environmental Impact Assessment – EIA Guideline Series* (NSW Department of Planning, 2003) and relevant legislation for a study area encompassing a 10 km buffer around the Project Area. The methodology included:

- Desktop assessment of relevant guidelines, previous species sighting records, documents and reports relevant to the Project using public ecological databases and websites.
- Stream order mapping using the Strahler stream ordering system to characterise the watercourses within the study area.
- Watercourse classification to identify Key Fish Habitat (KFH) and its sensitivity and type according to DPI guidelines.
- Field survey including:
    - Aquatic habitat assessment of watercourses identified as moderate or high priority ranking.
    - Targeted threatened species surveys.
    - Riparian and aquatic vegetation survey and mapping.

6.3.2.3 Assessment Results

Six watercourses within the Project Area were subject to field survey and habitat assessment which found that all watercourses were highly ephemeral, with only Redlynch Creek containing shallow remnant pools following rainfall. First and second order drainage lines were dry and most riparian zones were significantly modified by agricultural land practices.

Targeted threatened fauna surveys were undertaken using bait traps in remnant pools on Redlynch Creek, however, no aquatic fauna was recorded. Desktop studies identified one endangered population (Darling River Hardyhead) and one threatened species (Southern Purple Spotted Gudgeon) with a moderate likelihood of occurrence in the Goulburn River, however watercourses within the Project Area are considered unlikely to provide habitat for these species.

Three watercourses (or sections of) mapped as KFH occur within the Development Footprint:

- Approximately 250 m of Redlynch Creek.
- Approximately 150 m of an unnamed tributary of Poggy Creek.
- Approximately 530 m of an unnamed tributary of Rocky Creek.

As a part of the Road Repairs and Upgrades, the culvert upgrade areas intersect the permanent watercourses, Killoe Creek which is a 4th order watercourse and Bow River which is a 5th order watercourse. These watercourses are both part of the Goulburn River catchment. There are no estuaries or wetlands located within these areas. No aquatic habitat or threatened species were identified within the Road Repairs and Upgrades Development Footprint.

6.3.2.4 Impact Assessment

Direct impacts from the Project on aquatic biodiversity would include removal of vegetation, temporary barriers to fish passage, potential modification to riparian habitat through the spread of exotic flora, potential mortality to protected aquatic fauna during farm dam dewatering and filling, and potential impacts on water quality through soil disturbance on waterfront land. Potential indirect impacts to aquatic biodiversity relate to the mobilisation of poor-quality stormwater runoff from construction activities due to vegetation removal, earthworks and the establishment and use of construction compounds and access tracks.

Following assessment, all watercourses within the Project Area were considered to have a low or negligible risk of potential impact from the Project during construction, operation and decommissioning due to the highly ephemeral nature of the watercourses, the lack of important KFH features and/or the minor nature of works proposed.

The Aquatic Assessment concluded that the impacts of the Project would not significantly compromise the functionality, long-term connectivity or viability of habitats, or ecological processes within watercourses in the Project Area nor would it directly impact threatened species/populations with potential to occur. Most of the 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.

The Project will not result in any direct instream impacts to the Goulburn River, and potential indirect impacts would be mitigated through the implementation of erosion and sediment controls.

The Road Repairs and Upgrades proposed were also assessed within an Aquatic Assessment within the Road Upgrades BDAR (**Appendix 7**). It was identified that the installation of culverts may trigger a Key Threatened Process under the FM Act, specifically 'installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams'. Culverts designed and installed in accordance with reference to the following guidelines:

- Guidelines for Controlled Activities on Waterfront Land (the CAA Guidelines) (Department of Planning, Industry and Environment (DPIE) Water, 2018).
- Why Do Fish Cross the Road? Fish Passage Requirements for Waterway Crossings (NSW Department of Primary Industries (DPI) Fisheries, 2003).
- Fisheries NSW Policy and guidelines for fish habitat conservation and management, (NSW DPI, 2013).

When installed in accordance with the guidelines mentioned above the culvert upgrades would not significantly impact natural flow regimes.

6.3.2.5 Avoidance and Mitigation of Impacts

The Aquatic Assessment concluded that risks to aquatic biodiversity in the vicinity of the Project Area could be effectively managed through the implementation of mitigation measures as detailed below.

During design:

- Expansion of exclusion zones to exclude the majority of mapped hydro lines (including a large section of Redlynch Creek) and associated riparian vegetation. As such no riparian vegetation would be impacted by the Project.

During construction:

- Implementation of appropriate erosion and sediment controls.
- Avoidance of waterfront land during construction works.
- Provision of onsite spill kits for construction works within 100 metres of a watercourse.
- Undertaking instream construction works (for access tracks) when watercourses are dry (where practicable).
- Design of any instream structures, using relevant guidelines, particularly on watercourses mapped as KFH to maintain fish passage and minimise impacts to natural flow regimes (refer to **Section 6.3.2.4**).
- Rehabilitation of disturbed bed and banks of watercourses mapped as KFH with stabilising vegetation.

During operation and decommissioning:

- Routine maintenance of vehicles (to reduce the risk of oil spills etc.).
- Routine maintenance of culverts (to ensure they are clear of debris).
- Minimal use of herbicides to control exotic species (to reduce pollutants entering downstream watercourses).

6.3.3 Cumulative Biodiversity Impacts

The Project has potential to affect habitat connectivity for flora and fauna species and this issue was examined further in relation to potential cumulative impacts with the Merriwa Solar Farm, due to its proposed location on the eastern side of the Goulburn River National Park.

The areas of clearing for the Project primarily consist of native vegetation composed of scattered canopy trees, areas of derived native grassland and areas of composed of highly disturbed agricultural land. The Project includes corridors between the three distinct solar array areas to enable the persistence of habitat connectivity through the site and the BDAR (refer to **Appendix 6**) concluded that habitat connectivity around the site is not likely to be impacted as:

- areas proposed for clearing were already substantially degraded by thinning and agricultural management
- species utilising these areas for connectivity are already highly mobile and disturbance tolerant.

Due to the nature and layout of the site, which is surrounded by undeveloped land, the BDAR concluded there will be no overall changes to landscape connectivity for wildlife movement.

In addition to these biodiversity cumulative impacts, broader cumulative impacts are addressed in **Appendix 22**.

Lightsource bp is investigating the feasibility of an onsite BSA to meet the credit obligations of the Project, which will mitigate broader cumulative impacts.

6.4 Aboriginal Cultural Heritage

An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been prepared for the Project by Ozark Environmental & Heritage Consultants to investigate:

- The presence of Aboriginal objects within the Project Area.
- Determine with the Registered Aboriginal Parties (RAPs) whether there are intangible cultural values within the Project Area.
- Assess the potential harm to any identified heritage values, and to provide mitigation and management measures to manage or prevent harm associated with the Project.

The full ACHAR is included in **Appendix 9** and key findings are summarised in the sections below.

The ACHAR was prepared in accordance with the SEARs. The archaeological assessment followed the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Code of Practice) (DECCW 2010a) while the Aboriginal cultural heritage assessment followed the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (the Guide) (OEH 2011) and the *Aboriginal cultural heritage consultation requirements for proponents* (ACHCRs) (DECCW 2010b).

6.4.1 Existing Environment

The Project Area is located near the boundary of several different Aboriginal tribal groups, namely the Kamilaroi (Gomeroi), Geawegal, Wonnarua, and Wiradjuri. The Project Area is also within a Native Title registered claim of the Gomeroi People (NC2011/006, NSD37/2019) and within the Wanaruah Local Aboriginal Land Council (Warunuah LALC) area.

The Project Area is confined to a broad plateau that overlooks the Goulburn River National Park and is generally flat with some minor drainage lines and creeks providing some undulation in the landscape. The Project Area would have been hospitable to Aboriginal people, however there is limited land in the Project Area that would have supported substantial Aboriginal occupation.

The location of the Project Area on a basalt plateau limits the occurrence of permanent waterways, although there are several non-perennial watercourses within the Project Area, such as Redlynch Creek, which would have provided limited freshwater and subsistence requirements. Occupation was likely short term and sporadic as the short-term water supply would have made it unattractive for long-term camping.

It is likely that Aboriginal land management in the Project Area consisted of fire regimes to maintain an open grassland. The topography of the Project Area and the surrounding steep country within the Goulburn River National Park suggest it would have provided an ideal hunting ground for attracting and then corralling and trapping game within the steep gullies towards the edges of the Project Area.

Land use activities including vegetation clearance, grazing, and cultivation have more recently dominated the Project Area and these activities have likely displaced Aboriginal objects or sites or removed them entirely.

6.4.2 Consultation

The consultation undertaken for the Project is presented in Appendix 1 of the ACHAR (refer to **Appendix 9**).

Consultation was undertaken in four main stages:

- **Stage 1 – Notification and Registration of Interest:** Individual targeted letters were sent to RAPs and government agencies. Public advertisement of the Project was also undertaken to identify, notify and register Aboriginal people who hold cultural knowledge relevant to the Project Area.
- **Stage 2 – Presentation of Information:** Consultation to provide information about the Project and the assessment methodology to all RAPs.
- **Stage 3 – Gathering Information about Cultural Significance:** Information about Aboriginal cultural values was gathered through RAP consultation and field work.
- **Stage 4 – Review of the Draft ACHAR:** A copy of the draft ACHAR was provided to all RAPs with an invitation to review and comment on all aspects of the document, noting that information on cultural significance and any recommendations provided from an Aboriginal cultural perspective would be documented in the final ACHAR.

As a result of the Project notification process, 14 RAPs registered an interest in the Project and were part of an active consultation process in relation to identifying and assessing the significance of the Aboriginal cultural heritage values/Aboriginal objects and/or places and determining and carrying out appropriate strategies to mitigate impacts upon Aboriginal heritage. Throughout all stages of the assessment process, the RAPs were invited to identify how they would like to participate in the Project's ACHAR process, including what cultural information they wanted to share to inform the assessment process, and what information (if any) should remain non-disclosed in the assessment and reporting process.

The Gomeroi Native Title Applicant was one of the RAPs consulted as part of the AHCAR process.

6.4.3 Methodology

The approach taken acknowledged and respected that Aboriginal people have the right to directly participate in matters that may affect their heritage, and have the right to maintain culture, language, knowledge and identity.

The purpose of the ACHAR was to identify and assess heritage constraints relevant to the proposed works to meet the following objectives:

- Undertake background research on the study area from appropriate data sources to formulate a predicative model for site location within the study area.
- Identify and record Aboriginal cultural heritage values within the survey areas (including intangible cultural values, Aboriginal objects, and any landforms likely to contain further archaeological deposits).

- Assess the significance of any recorded Aboriginal cultural values, Aboriginal objects, or sites in consultation with RAPs.
- Assess the likely impacts of the proposed work to Aboriginal cultural heritage values and provide mitigation and management recommendations.

A field survey was undertaken by an OzArk archaeologist and representatives of four RAPs over one week from 15 August 2022 to 19 August 2022. The survey strategy involved a series of pedestrian transects (approximately 25 m spacing), orientated either north–south or east–west to achieve systematic coverage (refer to **Appendix 9**).

6.4.4 Results

A desktop search was conducted on the following databases to identify any previously recorded Aboriginal heritage within the Project Area. The results of this search are summarised in **Table 6.9** and shown in **Figure 6.8**.

Table 6.9 ACHA Desktop Database Search Results

Database	Date of Search	Type of Search	Results
Commonwealth Heritage Listings	25 July 2022	Upper Hunter LGA	No places listed on either the National or Commonwealth heritage lists are located within the Project Area.
National Native Title Claims Search	25 July 2022	NSW	The Project Area includes land currently subject to Native Title Claim by the Gomeroi People (Tribunal File No. NC2011/006, Federal Court No. NSD2308/2011).
Aboriginal Heritage Information Management System (AHIMS)	1 June 2022	22 x 22 km region covering the Project Area and the 25 km road corridor between the Project Area and Golden Highway	One artefact site (37-1-0053) is located within the Project Area but outside the Development Footprint. No AHIMS sites are located within the Development Footprint.
Upper Hunter LEP 2013	25 July 2022	Upper Hunter LGA	No Aboriginal places noted to occur near the Project Area.

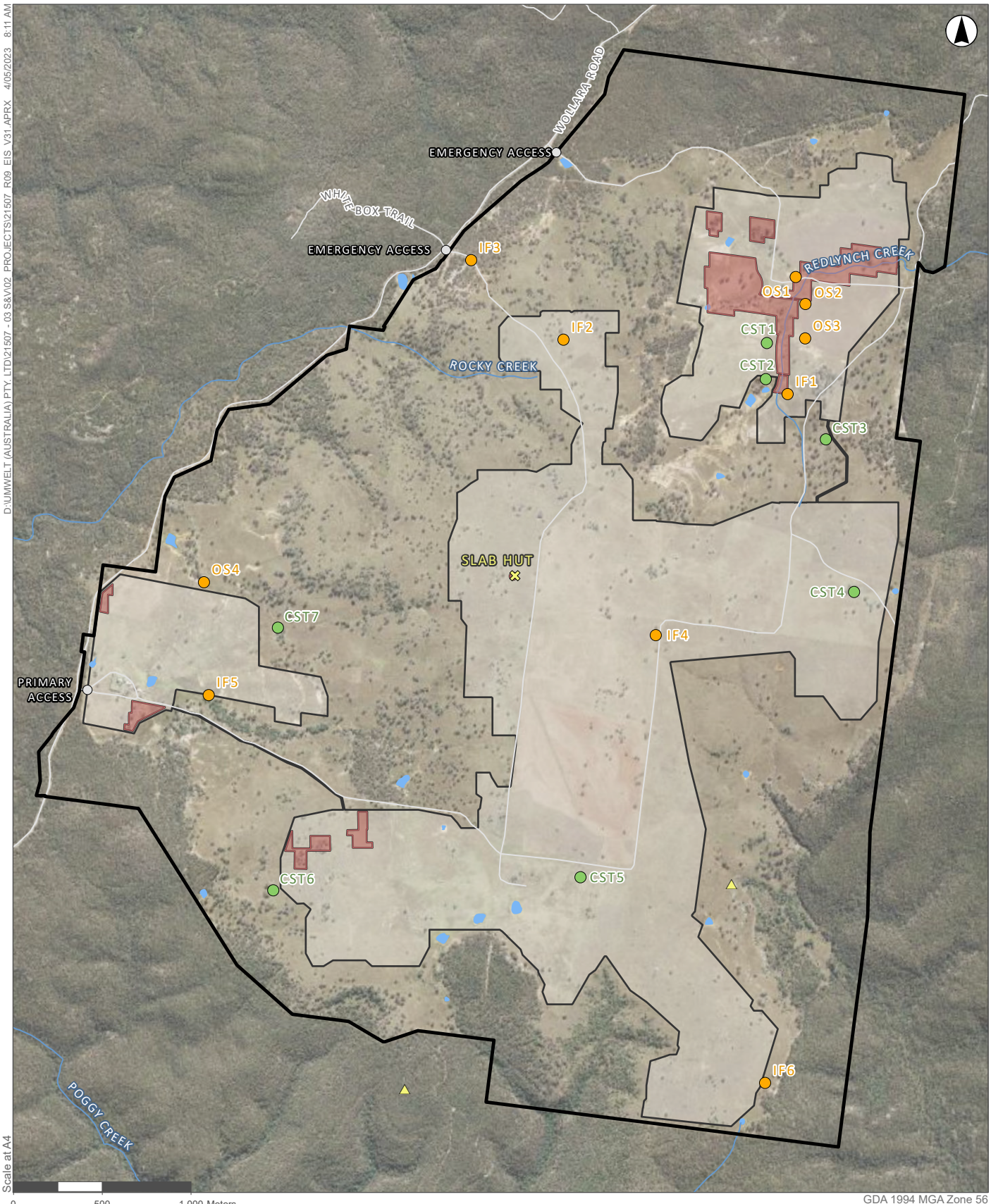
The field survey program identified the following newly recorded sites within the Project Area and Road Repairs and Upgrades Area (refer to **Figure 6.8**):

- One grinding groove site (Road Repairs and Upgrades Area).
- Four artefact scatter sites (Project Area.
- Six isolated find sites (Project Area).

Most sites were identified along the drainage landform. The grinding groove site, one artefact scatter and one isolated find are outside of the access route and the Development Footprint respectively and will not be harmed by the Project.

In addition, seven trees with scars were inspected during the survey. The ACHAR states that the scars on these trees do not display sufficient attributes to be considered to have a cultural origin and they have not been recorded as Aboriginal objects or registered with AHIMS. However, the RAPs present during the survey indicated that these trees were of cultural importance and believe that the scarring was perhaps Aboriginal in origin. Three of these trees are within the Development Footprint. For these reasons, the locations of these trees have been recorded (refer to **Figure 6.9**) and management recommendations around their conservation formulated (refer to **Section 6.4.6**).

Several potential historical sites were also identified during the survey, and these are discussed in the historic heritage impact assessment (refer to **Section 6.5**). However, one of these sites, the remains of the O'Brien homestead slab hut (Slab Hut), retains cultural value for the Aboriginal community. The site of the Slab Hut includes tangible remains related to the shared Aboriginal and European histories of the Merriwa area. This item and its history and archaeological significance are assessed in further detail in **Section 6.5**.



Legend

- Access Points
- Newly Recorded Aboriginal Cultural Heritage Sites
- Trees with Scars
- O'Brien Homestead Ruins
- Roads and Tracks
- Watercourse
- Project Area
- Exclusion Zones - Environmentally Sensitive Areas
- Waterbodies

AHIMS

- Artefact Site

FIGURE 6.8

Aboriginal Heritage Survey Results

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

Soil survey test pit locations excavated for the completion of the soil, land and agriculture assessments (refer to **Section 6.6**) were also inspected and it was concluded that no Aboriginal objects, or potential for subsurface archaeological deposits, were identified within or near any of the soil test pit locations.

6.4.5 Assessment of Significance and Impacts

The Project Area holds cultural significance to the local Aboriginal community, as Aboriginal people value their heritage as tangible links with the lifestyles and values of their ancestors (Perry, 2001). Perry (2001) also notes that the landforms of the Project Area were possibly a look-out location for Aboriginal people and that the Aboriginal sites in the area are of high importance as a reminder of the current community's ancestors as the original occupiers of the land.

The ACHAR 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. While the sites themselves have been assessed as having low to moderate scientific values, as they are unremarkable in their manifestation and are site types which are commonly represented in the region, their loss represents a further diminution of the district's archaeological resource. Eight of the eleven recorded sites are located within the Development Footprint and are likely to be impacted by the Project.

The recordings illustrate that the elevated plateau which comprises the Project Area was used and visited by Aboriginal groups in the past but that the Project Area did not afford good camping locations. The exception to this is the few creek systems in the Project Area such as Redlynch Creek and a tributary to Rocky Creek where occupation was more frequent but still at a low density. While camping was not frequently occurring, it may be that the Project Area was frequently used for hunting; an activity that leaves a sparse archaeological signature.

The only recorded archaeological site with aesthetic significance is the grinding groove site, as they are visible to the layperson and the grooves maintain their association with Killoe Creek. Thus, the association of running water and visible grooves have a strong aesthetic significance. This site is located outside the Development Footprint and will not be disturbed by the Project.

The road works associated with the Project will not impact on any Aboriginal items or places. Road works will be contained within the road reserve. Although the grinding groove site is located near the road works, there will be no impact to this item.

The remains of the O'Brien Slab Hut have archaeological potential, cultural value for both Indigenous and non-Indigenous people, and strong historic values. The ACHAR considers that this relic of a violent period in rural race relations can also signify a reconciliation with these events. This provides this site with exceptional heritage values.

6.4.6 Management and Mitigation Measures

The following archaeological management and mitigation measures will be implemented for the Project:

- Following development consent, the proponent will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) which is to be agreed to by the RAPs and DPE (with input from Heritage NSW). The ACHMP will include an unanticipated finds protocol, unanticipated skeletal remains protocol, protocols related to heritage inductions for work crews, and long-term management of any Aboriginal sites being impacted.
- Eight Aboriginal sites within the Development Footprint will be salvaged by a surface collection of visible artefacts. The recommended methodology for the salvage will be set out in the ACHMP and will include the measures outlined in Section 9.2.1 of the ACHA (refer to **Appendix 9**).
- Four of the seven trees of community interest will be retained. The three trees located within the Development Footprint will be removed in accordance with procedures set out in an ACHMP, developed in consultation with the RAPs. This will be included in a site visit and photographic recording with RAPS at the time of surface collection. These results and any RAP comments will be included in the salvage report following salvage activities.
- The ruins of the O'Brien homestead slab hut (Slab Hut) will be avoided from all ground disturbing impacts by a 20 m buffer.
- The three identified sites that lie outside the Project access route/Development Footprint will be retained. Should works need to take place near any site, the site would be included on all applicable construction plans and the location made known to all work crews working in the vicinity of the site to ensure the site is not inadvertently impacted.

6.5 Historic Heritage

A Historical Heritage Assessment (HHA) has been prepared by Umwelt (2023). The SEARs require the EIS to *'assess the impact to historic heritage having regard to the NSW Heritage Manual'.*

6.5.1 Existing Environment

A detailed review of the historical context of the Project Area and surrounds was undertaken to gain an understanding of the potential historical resource that may occur within and surrounding the Project Area. A full description of the historical context of the Project is included in **Appendix 10** with a summary included below.

6.5.1.1 European Settlement of the Goulburn River Area

The first European exploration of the Goulburn River region was undertaken in the early 1820s. The area was initially known as Gummum Plains, after the river which was then referred to as the Gummum Creek. By 1830 land distribution was officially occurring across the Gummum Plains. The open plains of the area were highly suited for the pastoral pursuits of the early settlers, with wool being the principal industry in the area. Generally, new settlers occupied the more fertile lands along the various watercourses in the region.

The town of Merriwa was surveyed in 1839, prior to its official gazettal on 22 January 1840. Within ten years, Merriwa township included 30 houses, in addition to the houses on the numerous stations and homesteads which were established in the region.

6.5.1.2 Poggy Station

Poggy Station (also referred to as Poggie) is the historical name of the pastoral property within the Project Area. It is unknown when this property was first occupied by early settlers in the area, however by 1866 government records show that sheep brands were registered with this name.

Poggy originally consisted of a cleared pasture for raising sheep and cattle, with a timber slab hut providing a home for the O'Brien family. It is reported that this hut was used until 1900 when it was abandoned after the murders of Mrs Elizabeth O'Brien and her son James in the hut (referred to as the Slab Hut) (refer to **Section 6.5.1.3** below).

A second dwelling was constructed in the north of the Project Area, in the vicinity of Redlynch Creek in c.1900, where it is believed that M. O'Brien resided following the death of his family. The 1900s dwelling was extended multiple times, prior to being abandoned in the late twentieth century (referred to as the 1900 house).

A third dwelling was constructed in the mid-twentieth century in the south-west of the Project Area (referred to as the post-war house), and this remains in use as a private residence. The land remains in agricultural use.

6.5.1.3 Jimmy Governor and the Poggy Murders

In July of 1900 a tragedy struck the Poggy Station, with the murder of Mrs Elizabeth O'Brien and her 15-month-old son James and the attempted murder of Mrs T. Bennet, a nurse visiting the O'Brien hut at the time. They were killed in the original Slab Hut at Poggy station by Jimmy Governor and his two accomplices.

Jimmy Governor was an Aboriginal man who worked as a labourer for rations on many different properties across the region, and sometimes worked as a tracker for the local Cassilis police. The murders at the Poggy Station were two of several perpetrated by the Governor brothers (Jimmy and Joe) and Jacky Underwood over a period of 14 weeks. Although Underwood was quickly captured, Jimmy and his brother Joe spent the 14 weeks as bushrangers, committing several robberies as far north as Narrabri and the Quirindi district.

After several close escapes, Jimmy was captured near Wingham while Joe was shot dead north of Singleton in October 1900. Jimmy stood trial in Sydney in November 1900 and was convicted and sentenced to death. He was hanged at Darlinghurst Gaol on 18 January 1901 and buried in an unmarked grave in the Anglican section of Rookwood cemetery. Underwood had been hanged in Dubbo gaol four days before (Australian National University, 1983).

6.5.1.4 Statutory Heritage Listings

To inform this assessment, searches of all relevant heritage databases were undertaken. As a result of these searches, it was identified that:

- No Commonwealth or National heritage items or places are located within the Project Area.
- No items listed on the NSW State Heritage Register are located within the Project Area.
- No items listed on any Section 170 Heritage and Conservation Register (NSW State Agency heritage registers) are located within the Project Area.
- No items listed on Schedule 5 of an LEP are located within the Project Area.

However, there are several local heritage items in the region surrounding the Project Area, the closest of which is the Goulburn River National Park, part of which is a locally listed landscape heritage item under the *Mid-Western Regional Local Environmental Plan 2012*.

6.5.2 Methodology

To inform this assessment, searches of all relevant heritage databases were undertaken. This included searches of:

- The Commonwealth Heritage List.
- The National Heritage List.
- The NSW State Heritage Register.
- Heritage Act Section 170 Heritage and Conservation Registers (where publicly available).
- Relevant Local Environment Plans.

The HHA has been undertaken in accordance with guidelines set out in the *NSW Heritage Manual 1996* and include identification and assessment of:

- Listed heritage items within or in proximity to the Project Area and Road Upgrades Area.
- Items, buildings, structures, or other elements of potential historical heritage significance (i.e. those which are not listed) located within or in proximity to the Project Area.
- Any areas of historical archaeological potential within or in proximity to the Project Area.
- The likelihood, extent, and nature of potential impacts to any listed or unlisted heritage significance located within or in proximity to the Project Area.
- The HHA also provides appropriate measures to avoid, manage and/or mitigate any identified impacts.

A summary of the key findings of the HHA is provided below with the full report available in **Appendix 10**.

6.5.3 Assessment Results

A visual inspection of the Project Area was undertaken by Umwelt on 16 August 2022 to confirm the setting and context of the Project Area and to identify any potential heritage or archaeological items, with results listed in **Table 6.10**.

Table 6.10 Identified Structures

Item	Assessment Type	Referred to as
c.1900 house (abandoned)	Heritage item	1900 House
Ancillary structures and sheds	Heritage item	n/a
Post-war house (occupied)	Heritage item	Post War House
Remains of the O'Brien homestead (slab hut)	Archaeological item	Slab Hut

6.5.3.1 Heritage Items

The Project Area consists generally of undeveloped or agricultural landscape, with limited built elements or structures. The structures identified during the visual inspection and historical research (refer to **Figure 6.9**) included:

- c.1900 house (abandoned) (1900 House)
- ancillary structures and sheds of varying ages and conditions associated with the agricultural use of the land
- post-war house currently used as the primary residence for the Project Area (Post War House).

Upon visual inspection and review of the historical context of the Project Area, the structures were not identified as having potential significance and did not warrant a detailed assessment against the NSW State heritage criteria.

The earliest known structure within the Project Area is the original Slab Hut which housed the O'Brien family until 1900 (Slab Hut). Although the majority of the structure has been removed, remnants of the timber structure mark the location of the former hut, refer to **Figure 6.9**. Due to the nature of these remains, they were assessed as an archaeological item, rather than a heritage item (refer to **Section 6.5.3** below).

No heritage items or structures were identified within the Road Upgrades Area. This area is located to the north of the Project along Ringwood Road.

6.5.3.2 Archaeological Items

There is high potential for archaeological remains associated with the original Slab Hut to survive within the Project Area and these archaeological remains are likely of local significance for their historical value with the early settlement of the area, and their association with the O'Brien family and the Jimmy Governor murders of the 1900s, refer to **Figure 6.10**. It is likely that the remains have research potential to provide evidence for the material remains available to the early settler in rural NSW from the 1830s, particularly in a domestic setting on a remote pastoral property.

In addition to the Slab Hut, the area surrounding the c.1900 house located in the north-east corner of the Project Area may contain archaeological evidence of a cesspit or outbuildings and artefact deposits associated with early development and use of the house. There is low to moderate potential for these archaeological remains to be present and it is unlikely that these archaeological remains would meet the threshold for local significance based on the available information for the property.

In addition to the archaeological potential identified above, the Project Area has some potential to retain evidence of undocumented structures associated with the rearing of sheep on the property. This could be ephemeral structures or camps used seasonally or for short periods of time by workers on the property. The archaeological remains may include structures, such as stone chimneys, cladding, remains of timber posts or post holes. However, given the low intensity use or temporary nature of these structures, and limited availability of materials during early development of the region, it is likely that significant structural remains were removed or were significantly impacted by the continued pastoral activities across the site. The potential for these archaeological remains to survive is therefore considered low. **Figure 6.10** shows the historical archaeological potential of the Project Area.

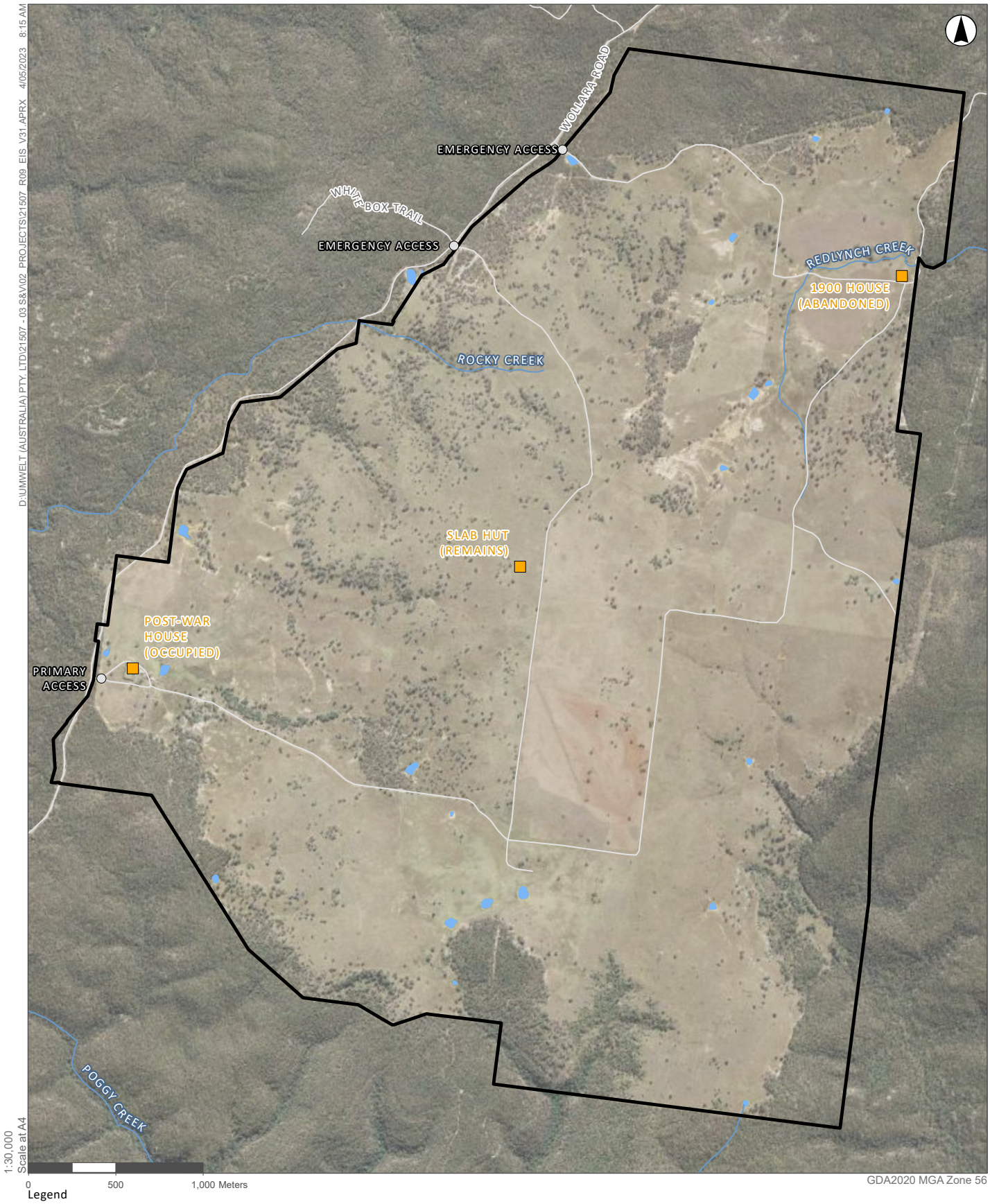


FIGURE 6.9

Location of Three Identified Residential Structures within the Project Area

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

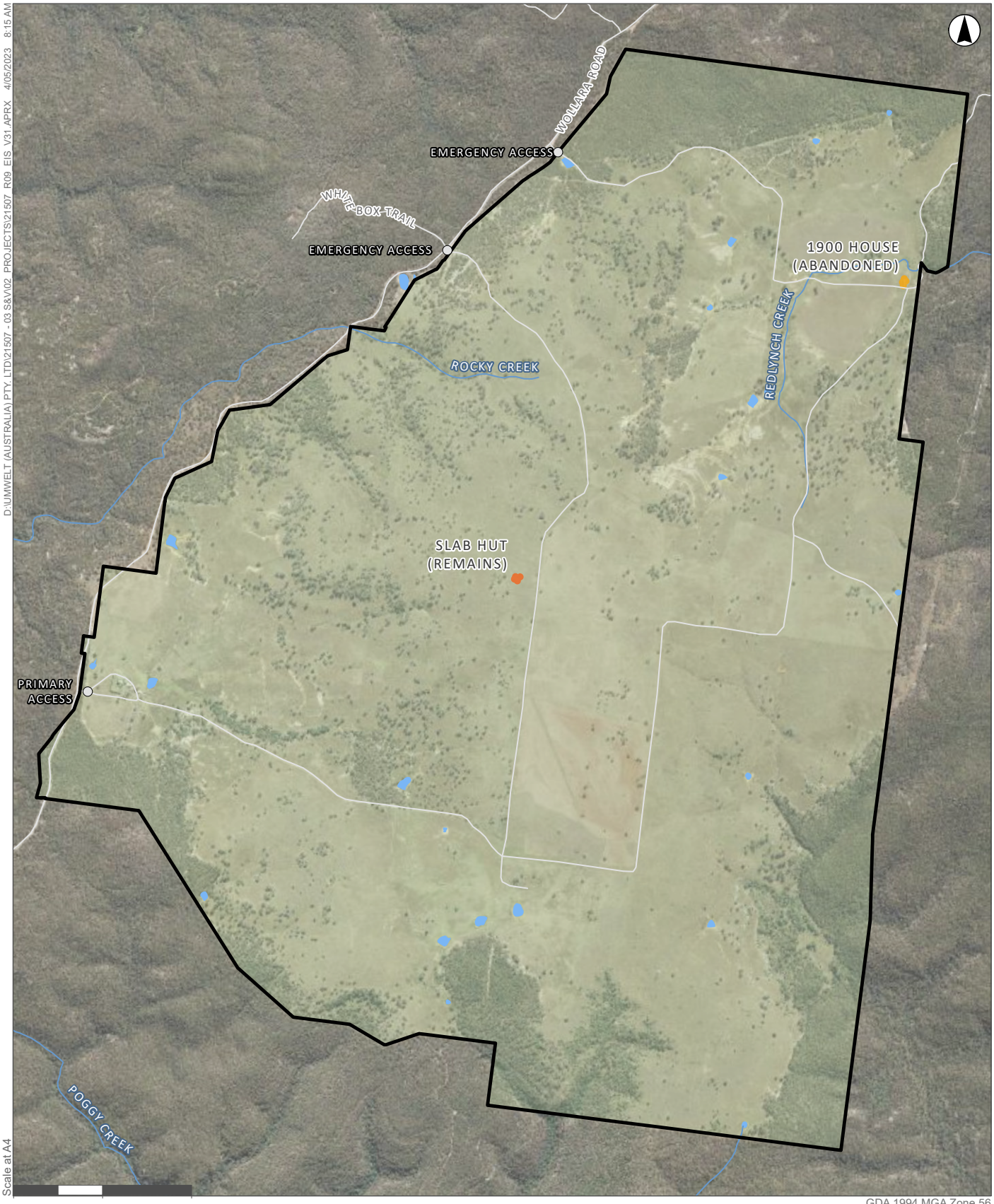


FIGURE 6.10

Historical Archaeological Potential

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

6.5.4 Assessment of Impacts

6.5.4.1 Impacts to Heritage Items

As identified above, there are no items listed on a statutory heritage register within the Project Area. Additionally, no potential heritage items have been identified within the Project Area based on the review of historical background and site inspection undertaken as part of this assessment. The Project would therefore not impact any heritage items within the Project Area.

The Project Area is located within the vicinity of the Goulburn River National Park, part of which is a locally listed landscape heritage item. Due to the topography of the surrounding area, and distance (>2.5 km) between the Project Area and the heritage item, views to the Goulburn River National Park will be maintained and the character and setting of the heritage item will not be impacted. Additionally, no physical impacts to the Goulburn River National Park are proposed as part of the Project.

The proposed road and culvert upgrades are located greater than 5 km from the nearest listed heritage item; and are not located in the vicinity of any potential heritage items. They would not result in visual or physical impacts to listed or potential heritage items in the vicinity of the proposed works.

6.5.4.2 Impacts to Historical Archaeology

The proposed construction activities associated with the Project include significant ground disturbing works for the establishment of the Project construction site and installation of the solar panel arrangement, BESS, substation and associated infrastructure.

The Development Footprint for the Project includes works within areas of the site identified as having moderate to low archaeological potential, refer to **Figure 6.10**. The construction impacts associated with the Project would require ground disturbance for the preparation of the site (such as regrading, removal of topsoil and establishment of access tracks) and subsequent construction of the solar panels and associated components of the Project. This would likely result in significant impacts to, or total removal of, any historical archaeological remains within the Development Footprint. This includes the removal of archaeological evidence associated with the use of the c.1900 house in the north-east corner. However, these archaeological remains are unlikely to be of local significance or meet the definition of a 'relic'. Their removal would be a minor to negligible heritage impact.

An exclusion zone around the area of historical archaeological potential associated with the Slab Hut has been included within the layout for the Project. Therefore, no ground disturbing works are proposed within the area of high archaeological potential. This will avoid significant impacts to, or removal of archaeology associated with the Slab Hut and its use by the O'Brien family resulting from the Project.

6.5.5 Management and Mitigation Measures

The following management measures are recommended to be implemented through the design and construction phase of the Project to minimise and/or manage impacts to historical archaeology within the Project Area.

- Impacts to the areas of high historical archaeological potential are to be avoided wherever possible. An exclusion zone of 20 m has been established around the Slab Hut, the area identified as having historical archaeological potential.

- All contractors and Project team for the Project should be made aware of the archaeological potential and heritage sensitivity of the site, through a heritage-specific induction which outlines their requirements under the *Heritage Act 1977* and the Project approvals.
- A Heritage Management Plan would be developed for the Project, an unexpected heritage finds protocol should be implemented for the construction works in the unlikely event that historical archaeological remains should be encountered during construction works.

6.6 Land

A Soil, Land and Agriculture Assessment including detailed Land Use Conflict Risk Analysis (LUCRA) has been prepared by Umwelt (2023) to address the SEARs requirements relating to land, as presented in **Appendix 1**. The full reports are provided in **Appendix 11** with the outcomes of the assessment summarised below. The stakeholder engagement identified a community concern around the potential loss of community sense of place due to change in the land use from agriculture to renewable energy generation and this is also addressed within this section.

6.6.1 Existing Environment

The topography of the Project Area is generally flat to undulating in terrain, with some drainage lines and creeks providing minor undulation in the landscape. The Project Area consists of agricultural land in the form of open paddocks, the majority of which has been subject to land clearing over a long history of grazing and cropping.

As a result, the Project Area now supports a mosaic of exotic vegetation, derived native grassland in a range of conditions, isolated paddock trees, areas of thinned woodland forest, and areas of intact woodland and forest around its periphery.

The Singleton 1:250,000 Geological Map (Rasmus et al., 1969) indicates that the Project Area is predominantly underlain by Olivine basalt with occasional sediment interbeds, Dolerite, Trachyte and Microsyenite.

Works associated with the Road Upgrades Area located north of the Project Area along Ringwood Road will be contained within the road reserve. Upgrades to the road will not change the land use of the area.

6.6.2 Methodology

Full details of the assessment approaches are provided in **Appendix 11**. Broadly the assessment involved:

- Desktop review of regional mapping accessed using the NSW Government eSPADE information system and SEED web-based portals to assess soil and landscape baseline data relevant to the Project Area.
- A soil survey, including field sampling and in-situ soils classification, conducted during August 2022 with additional sampling occurring in January 2023. These samples were taken in reference to the *Australian Soil and Land Survey Field Handbook* (2009) and *The Australian Soil Classification* (Isbell, 1996). Samples were taken from 28 locations in August 2022 and a further eight locations in January 2023. These sampling locations are shown in **Figure 6.11**.

- The field survey included collection of GPS recordings and photographs of soil sampling sites and profiles, slope and landforms. Samples were submitted to the NATA accredited (No. 14960) Environmental Analysis Laboratory (EAL) for laboratory analysis.

- Land and Soil Capability (LSC) assessment, conducted in accordance with the *Land and Soil Capability Assessment Scheme; Second approximation* (DPIE, 2012) (the LSC Guidelines) to establish the limitations to the land and the likelihood of degradation under eight hazards. Following an assessment of each site and soil profile against the eight identified hazards, the results were used to establish the LSC of each site.

- No Biophysical Strategic Agricultural Land (BSAL) was mapped across or within close proximity to the Project Area. The nearest regionally mapped BSAL is approximately 4 km to the northwest of the site. Given the lack of presence of BSAL across or immediately surrounding the site, a BSAL assessment was not required to be conducted.

- The Project Area is mapped as State Significant Agricultural Land (SSAL) under the draft mapping prepared by DPE. SSAL areas are recognised as essential for future agricultural land use planning as they contain fertile soils, key climatic conditions and general land capability.

- A LUCRA was prepared in accordance with the *Land Use Conflict Risk Assessment Guidelines* (2011) fact sheet provided by the NSW DPI. The LUCRA is provided in Appendix B of the Soils, Land and Agriculture Assessment which is provided as **Appendix 10** of this EIS.

- As the Project Area is surrounded by Goulburn River National Park, there are no immediate residential neighbours and as such no consultation was undertaken with residential neighbours as part of the LUCRA. Engagement and interviews were conducted with National Parks and Wildlife Service (NPWS) to establish their views on the potential use of agricultural land for energy production.

Full details of the assessment approach and methodology are provided in **Appendix 11** and was conducted in accordance with the Solar Guidelines 2022.

6.6.3 Results Discussion

6.6.3.1 Survey Results

The following predominant soil types were identified within the Project Area following surveys:

- Dermosols – soils with structured B2 Horizon and lacking a strong texture contrast between the A and B Horizons, and other soils with B2 horizons that have grade of pedality greater than weak throughout the major part of the horizon. These soils in the Project Area were derived from weathered basalt and were predominately identified on the hill slopes surrounding the basaltic cap.

- Ferrosols – soils with B2 Horizons in which the major part has a free iron oxide content greater than 5% Fe in the fine earth fraction (<2 mm), and do not have a clear or abrupt textural B horizon or a B2 horizon in which at least 0.3 m has vertic properties. These soils are almost entirely formed on either mafic or ultramafic igneous rocks, their metamorphic equivalents, or alluvium derived therefrom.

- Sodosol – soils with strong texture contrast between A horizons and sodic B horizons which are not strongly acid and in which the major part of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is sodic, that being soils with an Exchangeable Sodium Percentage (ESP) >6%).

The locations of the three identified soil types are shown in **Figure 6.12**. Physical soil descriptions and photographs of each sampling site and soil profile are provided in **Appendix 11**.

6.6.3.2 Laboratory Analysis

Laboratory analysis indicates:

- **Soil Acidity and Salinity** – the majority of the topsoil collected at the sampling sites was 'strongly acidic' to 'slightly acidic', and 'non-saline to 'slightly saline'. The subsoil ranged from 'slightly acidic' to 'strongly alkaline'. No acid sulfate soils were identified.

- **Soil Erosion** – presence of slightly dispersive to dispersive soils was identified in the Project Area, indicating that soils are unlikely to present an erosion issue.

- **Soil Fertility** – low Effective Cation Exchange Capacity (ECEC) and low Cowell Phosphorus levels (both indicators of soil fertility) were identified. Although site soils were generally high in fertility, some areas were low in fertility which may affect the establishment and growth of vegetation in exposed surfaces.

- **Soil Compaction** – the field survey did not identify any potential clay pans and compaction issues that could occur following the long-term use of the Project Area for agriculture production.

6.6.3.3 Land and Soil Capability Assessment

The results of the LSC assessment, as illustrated in **Figure 6.13**, indicate:

- 23 Sites (1, 2, 5, 10–19, 22–28, 30, 33 and 36) were classed as Class 4 land. This classification indicates that the land has moderate capability with moderate to high limitations for high-impact land capability. This land will restrict land management options for high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment, and technology.

- 13 sites (3, 4, 6–9, 20, 21, 29, 31, 32, 34 and 35) were classified as Class 6 land. This land has low capability and very high limitation for high-impact land uses. Additionally, areas within the Project Area contained rocky outcrops, and although they were not assessed, would meet the classification of Class 6 land.

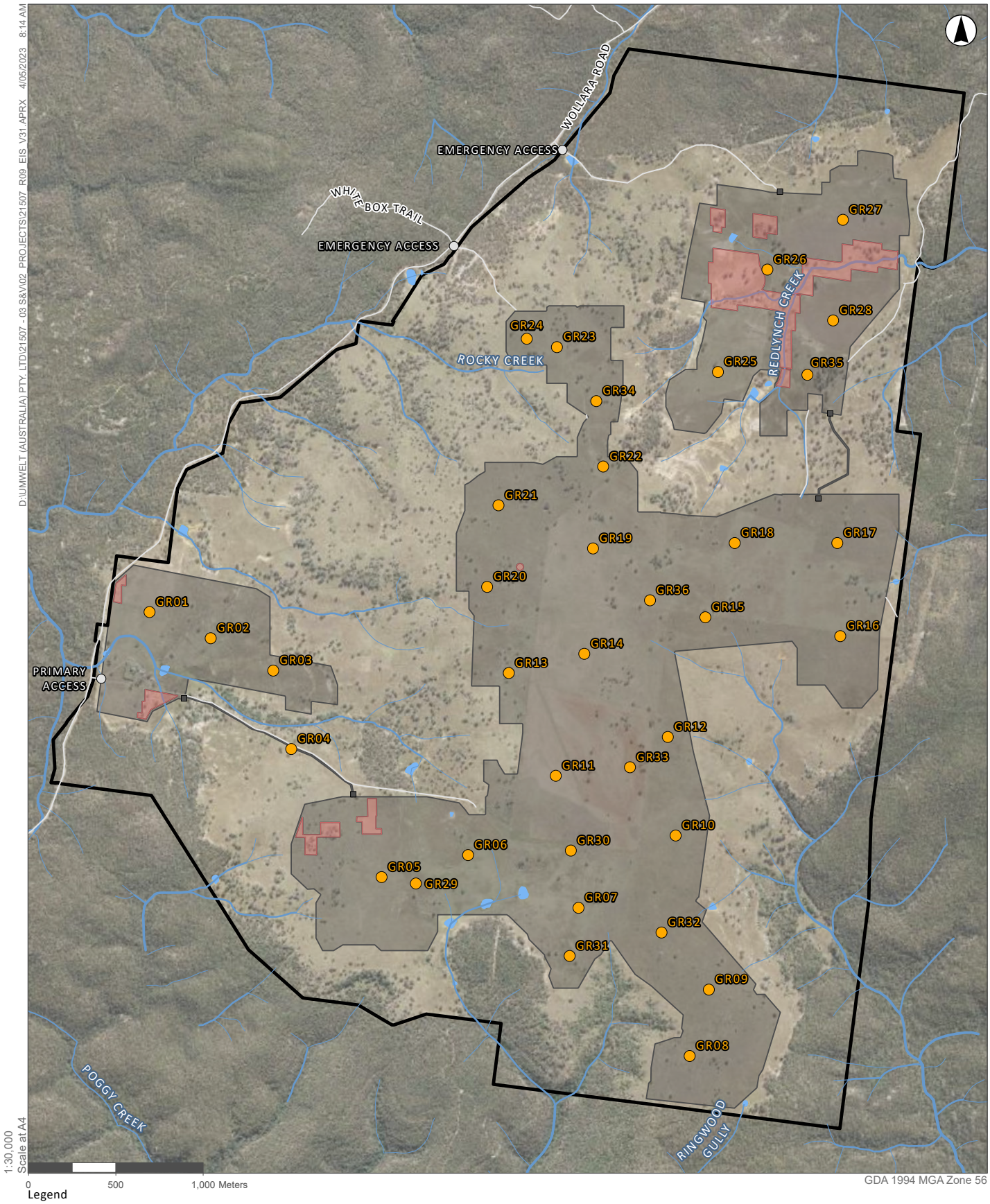


FIGURE 6.11

Soil Sampling Sites

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

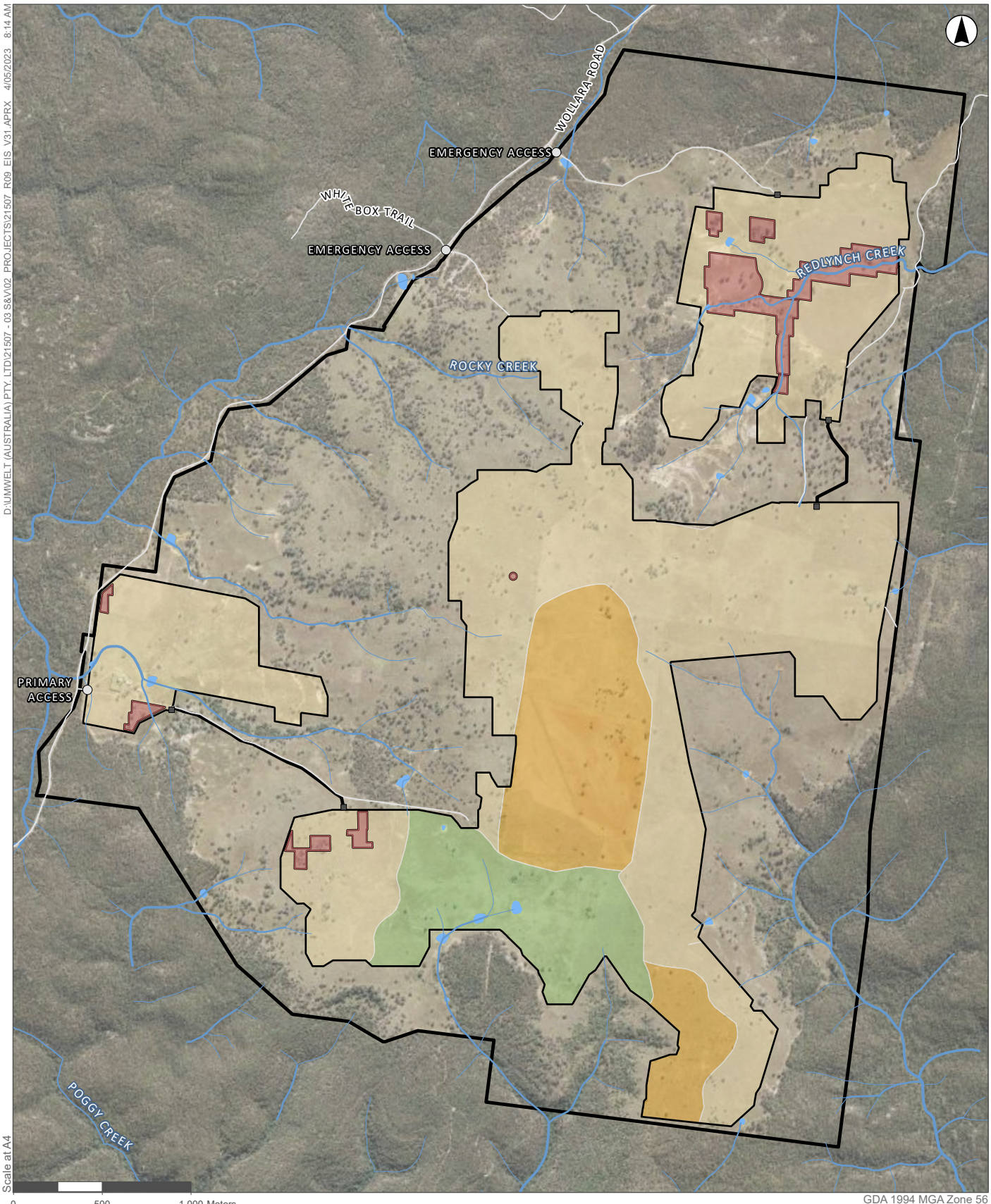


FIGURE 6.12

Identified Soil Types

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

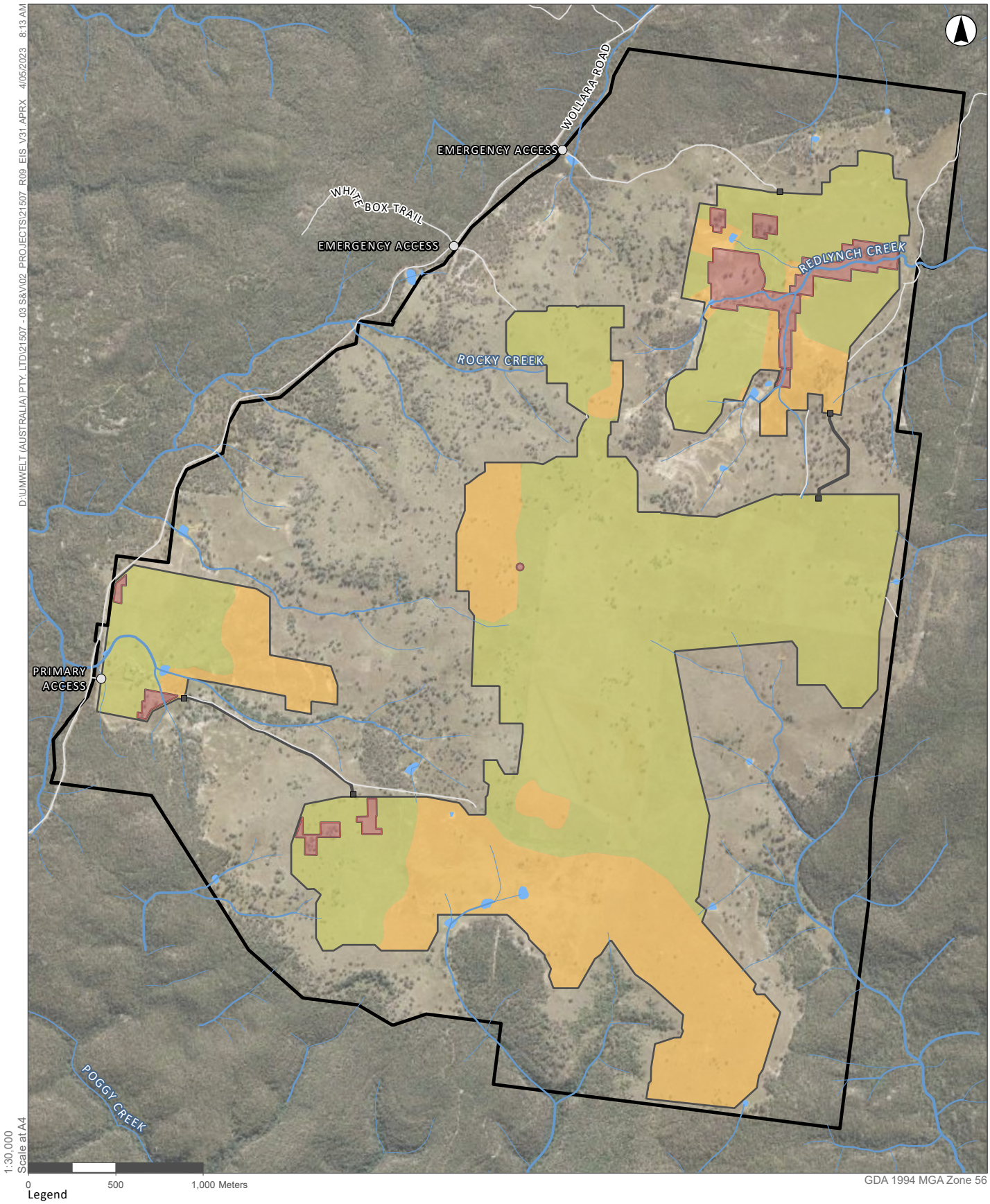


FIGURE 6.13

Confirmed Land and Soil Capability

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

6.6.4 Assessment of Impacts

6.6.4.1 Impacts on Agricultural Land

Approximately 799.5 ha of the 2,000 ha Project Area would be used for the siting of the solar panels and associated infrastructure. The Project will impact agricultural productivity within the Project Area by removing approximately 160 ha of marginal cropping land from production and removing cattle grazing (cattle grazing may continue within a BSA within the Project Area, pending approval on compatibility) from the Project Area.

The Project will be designed to offer a dual purpose allowing the area to be grazed by livestock, in particular sheep. Sheep grazing would be trialled within the security fenced area where the solar panels are located. Lightsource bp will implement measures to manage the co-existence of farming activities and the operation of the Project. An OEMP will be developed in consultation with the host landholders and DPI Agriculture.

The *Australian Guide to Agrisolar for Large-Scale Solar, for proponents and farmers* (Agrisolar Guide 2021) was prepared by the Clean Energy Council (March 2021) to act as a guide for co-sharing of agriculture and solar farming in Australia. The Agrisolar Guide 2021 identified that there were at least 13 large-scale solar farms successfully grazing sheep (identified as 'solar grazing') in Australia in 2020 and identified a number of successfully trialled positive benefits including:

- Sheep help control vegetation growth within the Project Area, reducing the need for mowing or spraying, which reduced grass fire risks.
- Maintenance costs are reduced as result of vegetation being controlled by sheep.
- Animal welfare conditions are improved, with:
    - The solar panels providing shade and protection from strong winds for sheep resulting in higher quality wool.
    - Safety from predators is enhanced by the installation of secure boundary fencing.
    - Cover provided by the panels improves safety from raptors.
    - Reduced wool contamination (from burrs).

The Agrisolar Guide 2021 provides a number of recommendations to ensure land sharing success, and these recommendations will be incorporated into the OEMP to be prepared for the Project. This will include measures for managing stock (sheep), including a requirement to keep the stock in good health, ensuring frequent shearing (to keep wool growth low), ensure mustering is conducted in an agreed safe manner, and that any fatalities are managed by the farmer. There is also potential for parts of the Project Area to be established as a BSA which may allow cattle grazing to continue, subject to appropriate management plans and approvals.

The community has reported wild dog activity in the area and have raised concerns that agrisolar land use may increase wild dog activity, presenting a risk to livestock and local fauna. Mitigation and management measures such as a Wild Dog Management Plant would be implemented to reduce this risk.

After the initial operating period (40 years or more), the solar farm would either be decommissioned, removing all infrastructure and returning its existing land capability, or repurposed with new PV equipment subject to the site technical feasibility and planning consents.

6.6.4.2 Soil Erosion

Due to the presence of sodic and dispersive soils within the Project Area, the risk of erosion on site due to construction activities is considered high (mostly limited to the southern section of the Project Area). In these areas, excavation of soils should be limited where possible and excavated soils should be stockpiled and contained to avoid potential dispersion and sediment transfer. Disturbance to ground cover should be limited where possible. Maintenance of ground cover will also aid in the prevention of topsoil losses from erosive forces (primarily water and wind) and can assist in the prevention of tunnel erosion.

All construction and decommissioning activities for the Project will be undertaken in accordance with an Erosion and Sediment Control Plan (ESCP) as detailed in **Section 6.10.5**. Additionally,, a CEMP will be prepared by Lightsource bp that identifies erosion and sediment control mitigation measures prior to works commencing.

Similarly, the operation and decommissioning of the Project would be in accordance with an OEMP or Decommissioning and Rehabilitation Management Plan (DRMP) that will detail measures to limit erosion during the operation of the Project.

6.6.4.3 Weeds, Pests and Farm Biosecurity

With appropriate mitigation measures in place, there is low potential for weeds and invasive pests to spread or impact neighbouring land.

As detailed in **Section 6.6.5**, Lightsource bp will prepare and implement an OEMP, which would outline appropriate measures to manage weeds, pests and farm biosecurity.

6.6.4.4 Spraying Impacts

Weed spraying would be undertaken throughout the Project Area to manage and control targeted weed species in accordance with the OEMP. Spray drift from weed spraying has the potential to impact the neighbouring Goulburn River National Park. In accordance with the *Pesticides Act 1999* along with advice provided by the NSW EPA, a variety of strategies outlined in **Section 6.6.5** will be implemented to minimise conflict and/or damage arising from spray drift.

6.6.4.5 Socio-Economic Impacts

Socio-economic impacts associated with the agriculture industry as a result of the Project are expected to be negligible. The Development Footprint within the Project Area occupies approximately 799.5 ha of agricultural land accounting for less than 0.0007% of the total amount of land associated with agricultural use (1,081,841 ha) within the Hunter Region of NSW (DPI 2013) resulting in a negligible reduction in the overall productivity of the region.

As there will be negligible impact to agriculture activity (with sheep grazing compatible with the Development Footprint), impacts to supporting services, processing and value adding industries relevant to agricultural enterprises are considered negligible.

6.6.4.6 Land Use Conflict

Land use conflicts may arise as a result of the Project, if management and mitigation measures are not appropriately implemented. A risk identification and ranking process has been undertaken as part of the LUCRA in accordance with *Land Use Conflict Assessment Guide* (DPI, 2011) and presented in detail Appendix B of the Soils, Land and Agriculture Assessment found in **Appendix 11**.

Key risks identified during this process include traffic during construction and decommissioning, and bushfire. With the implementation of measures outlined in **Section 6.6.5** the potential impact of change in land use on the surrounding land and land users will be manageable and minor. Additionally, once decommissioned, the Project Area will be remediated to enable agricultural production including cropping and grazing to resume at the previous capacity.

6.6.4.7 Other Land Use Impacts

The SEARs require an assessment of the potential impact of the development on existing land uses on the site and adjacent land, including flood prone land, Crown lands, mining, quarries, mineral or petroleum rights. These are addressed in this section.

Flood Prone Land

The Project Area is not identified as flood prone land. The Project Area was found to present a low risk of flooding under both the existing and climate change conditions modelled (refer to **Section 6.10** for further details on flooding impacts).

Crown Lands

Some parcels of Crown Land are located within the Project Area, primarily along Wollara Road. Consultation with Crown Lands has been undertaken during the EIS process, and Lightsource bp has made an application to purchase these parcels of land, refer to **Figure 1.2**. Landholder consent has been obtained from Crown Lands, refer to **Appendix 4**.

Mining, Quarries, Mineral or Petroleum Rights

There are no mining, quarrying, mineral or petroleum rights held over the Project Area.

6.6.5 Cumulative Land Impacts

Cumulative land impacts were assessed in the LUCRA (refer to **Appendix 10**) and are associated with the significant development of major renewable energy projects in the nearby CWO REZ and Hunter-Central Coast REZ. As such there are several solar farms within the region that are approved or in planning. This cumulative area of land utilised for these renewable energy projects compared with the land utilised for agricultural use within the Upper Hunter Region of NSW (DPI, 2013) will result in a negligible reduction in the overall productivity of the greater region.

The Project will be designed to support potential sheep grazing into the future, there is also potential for cattle grazing to continue within the Project Area in a BSA, as such there will be negligible impact to agriculture activity (with grazing able to continue within the Development Footprint), impacts to supporting services, processing and value adding industries relevant to agricultural enterprises will be negligible.

Further details on cumulative land impacts are provided in **Appendix 22**.

6.6.6 Management and Mitigation Measures

The following management and mitigation measures will be implemented to address key land use issues associated with the Project:

- A CEMP will be prepared by Lightsource bp that identifies erosion and sediment control measures prior to works commencing.
- An ESCP will be developed as part of the CEMP, in accordance with the *Managing Urban Stormwater: Soils and Construction Volume 1 (NSW DPIE, 2004) "*The Blue Book". The ESCP will be implemented, with particular consideration for the dispersive soils identified within the Project Area.
- If required, an 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. This will include measures to manage the stock appropriately, including a requirement to keep the stock in good health, ensuring frequent shearing (to keep wool growth low), ensure mustering is conducted in an agreed safe manner, and that any fatalities are managed by the land manager. As a part of the OEMP a Wild Dog Management Plan will also be prepared for sheep grazing management.
- The OEMP will be developed in consultation with DPI Agriculture and will be implemented post construction.
- The Project Area will be rehabilitated to a condition as close as practicable to the condition that existed prior to construction of the Project. This will be achieved through the implementation of a DREMP (refer to **Appendix 21**) as part of the OEMP for the Project.
- The OEMP will detail the management requirements, including:
    - inspection of all vehicles and machinery entering the Project Area, and cleaning if applicable to remove weeds including seeds
    - appropriate weed management practices to be adopted, including regular weed spraying
    - appropriate pest management practices to be adopted
    - limit vehicle access to the established internal road network.

6.7 Visual Amenity

A detailed Landscape Character and Visual Impact Assessment (LCVIA) was undertaken by Envisage Consulting Pty Ltd (2022, refer to **Appendix 12**) to assess the visual impacts associated with the Project in accordance with the SEARs (refer to **Appendix 1**) and the Large Scale Solar Guidelines, Technical Supplement – Landscape and Visual Impact Assessment (2022) (Technical Supplement). A glint and glare assessment was undertaken by Moir Landscape Architecture Pty Ltd (refer to **Appendix 13**) in accordance with the *Technical Supplement*. Both reports are summarised below.

6.7.1 Existing Environment

The visual character of the local landscape comprises 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 National Park is characterised by a dense forest of native trees, shrubs and grasses.

Nearest receivers to the Project were identified as a part of the Noise and Vibration Assessment (NVIA), these are summarised in **Table 6.16**. These were used for the assessment as a part of the LCVIA. Excluding the involved landholder, none of the above nearby receivers would have direct visibility to the Project Area.

The key outcomes of the LCVIA are summarised below and provided in full in **Appendix 12**. The LCVIA also included an assessment of the cumulative visual impacts associated with the Project and other nearby projects, as further discussed in **Section 6.7**.

Glint and glare impacts can be relatively uncommon; however, this can cause visual impacts to receptors. Glint and Glare assessments evaluate glare resulting from solar farms at different receptors based on proximity, orientation and specifications of the PV modules. Glint is generally defined as a momentary flash of bright light while glare can be defined as continuous source of excessive brightness proportionates to ambient lighting. It is assumed that there are currently no glint or glare considerations for the Project Area as it currently stands (supporting agricultural land use).

6.7.2 Landscape and Visual Amenity

6.7.3 Methodology

The LCVIA includes two components:

- **Landscape character assessment:** to understand the sensitivities of the landscape and to help determine the overall impact of the project on an area's character and sense of place.
- **Visual impact assessment:** to understand the likely impacts of the project on people's viewpoints within the private and public domain.

Both assessments require evaluation of an area's 'sensitivity' (that is, how sensitive the existing area, or view, is to change) and the 'magnitude of change' a project would have on an area (that is, its physical scale, how distant it is, and its contrast within the existing landscape or view).

6.7.3.1 Landscape Character Assessment

The first stage of the assessment is baseline analysis of the existing landscape character and its sensitivity. The baseline identifies and describes the physical landscape and key attributes and identified landscape values for the community (including the indigenous community), local council and affected landholders.

If the landscape includes distinct character areas with different qualities, the study area can be divided into different character zones.

The scenic quality of the landscape is also classified. The final stage determines the impact of the proposal on each landscape character zone, by evaluating the sensitivity of the landscape and the magnitude of the project's effects in that area. Sensitivity and magnitude are assigned a rating (low, moderate or high).

6.7.3.2 Visual Impact Assessment

The process for visual impact assessment is broken into two phases:

- **A preliminary assessment** – to identify viewpoints requiring a detailed assessment.
- **The detailed assessment.**

Preliminary Assessment

The Technical Supplement's steps to be undertaken for the preliminary assessment are:

1. to identify viewpoints from public roads and rail lines within 2.5 km of the Project
2. to identify other public and private viewpoints within 4 km of the Project
3. to measure the distance from the viewpoints to the proposed Development Footprint
4. to determine the 'relative height difference' between the Project and each viewpoint
5. to plot the 'vertical field of view' for each viewpoint
6. to measure the 'horizontal field of view' of the Development Footprint at each viewpoint
7. to determine whether detailed assessment is required using the Technical Supplement matrix.

Detailed Assessment

A detailed assessment is undertaken for viewpoints identified in the preliminary assessment. The detailed assessment involves the following stages:

- **Stage 1**: the identified viewpoints are refined by determining whether there is a direct line-of-sight to the Project. Those viewpoints without a line-of-sight do not require further assessment. Those with a line-of-sight are classified to determine whether the view is primary or secondary.
- **Stage 2**: The visual magnitude of the Project is then determined by calculating the volume of the horizontal and vertical fields of view occupied by the Project from each viewpoint. This is done by producing a 180-degree photomontage of the view (note that the photomontage is for analytical purposes only and not representative of what a viewer would see as it shows a far wider and visually distorted view) and overlaying the Technical Supplement's Visual Magnitude Grid Tool. The rating of magnitude is determined by the number of occupied cells.
- **Stage 3**: The visual sensitivity of each viewpoint is then rated (from very low, low, moderate, or high) and combined with the assigned scenic quality category of the area in view.
- **Stage 4**: the overall visual impact of each viewpoint is determined by combining the identified visual magnitude and visual sensitivity.
- **Stage 5**: For viewpoints with a moderate or high rating, it is mandatory to investigate mitigation options to reduce impact.

The VIA further included a consideration of reflectivity and glare as well as night lighting impacts and consideration of the *Dark Sky Planning Guideline 2016*. The Project Area is located within 200 km of Siding Spring Observatory and therefore falls within the Dark Sky Region of NSW.

6.7.3.3 Site Inspection

A site inspection was undertaken on 3–4 May 2022, involving a walk over of all of the parts of the Project Area and surrounding publicly accessible areas (including Goulburn River National Park). Further field investigations were undertaken between 6–8 February 2023 to update the assessment to be consistent with the landscape and visual assessment methodology presented in the Technical Supplement.

6.7.3.4 Photography

Photographs were taken in landscape format using a full frame sensor digital camera with a fixed 50 mm lens and GPS positioning. The 50 mm lens is regarded as being the closest to human eyesight, although it does not illustrate wider (unfocussed) peripheral vision, in accordance with the Technical Supplement.

6.7.3.5 Photomontage

Photomontages illustrate the predicted view of the Project at a momentary point in time. These are representative of the average height of the panels as they will vary depending on the Project Areas topography. The panel rotation shown in the montages represents the 'worst case' – that is, with the highest rotation of panels toward the viewpoint.

Photomontages were independently prepared by Cambium Group and are found in **Appendix 12** of this EIS.

6.7.4 Results

6.7.4.1 Preliminary Assessment

The results of the preliminary assessment determined that six viewpoints would require detailed assessment – comprising five private viewpoints (R03, R05, R09, R21, R46) and the single public viewpoint (Wollara Road), refer to **Figure 6.14**.

6.7.4.2 Detailed Assessment

Stage 1: Refine and Classify Viewpoints

Following the Stage 1 investigations, there remained three private viewpoints (R3, R5, R46), and one public viewpoint (Wollara Road), which required detailed assessment.

Stage 2: Determine Magnitude (of Change of View)

For the public viewpoint at Wollara Road a panoramic photograph and 3D model overlay of the Project was produced.

Access was not available for remaining private viewpoints (R3, R5 and R46). As such a simulated image was modelled based on the topography and an outline (wireframe) of the Project was overlain to the image. These images represent a 'worst-case scenario' of the magnitude of the Project in view. Based on these modelled views the number of cells in each was identified and counted, which was then compared to the visual magnitude thresholds. The resulting magnitude is shown in **Table 6.11** below.

Table 6.11 Visual Magnitude Ratings

Viewpoint	Number of occupied cells	Visual magnitude rating
Wollara Road	67	Very high
R3	0	Very low
R5	1	Very low
R46	0	Very low

Stage 3: Determine Visual Sensitivity

The sensitivity and scenic quality were combined to provide the visual sensitivity ratings of each viewpoint in accordance with the Technical Supplement. The resulting ratings are summarised in **Table 6.12** below. Access was not available for private viewpoints (R3, R5 and R46). As such scenic quality was determined based on site inspections to nearby properties, aerial photography and the classification for residential zoning.

Table 6.12 Visual Sensitivity Ratings

Viewpoint	Sensitivity	Scenic Quality	Visual Sensitivity Rating
Wollara Road	**Low** – low use tourist road	**Low** – limited, close view of forest and adjacent agricultural scenery.	**Low**
R3	**Moderate** – assumed as primary view from dwelling zoned RU1	**Moderate** – assumed there is a localised view of forested landscape and agricultural scenery.	**Moderate**
R5	**Moderate** – assumed as primary view from dwelling zoned RU1	**Moderate** – assumed there is localised view of forested landscape and agricultural scenery.	**Moderate**
R46	**Moderate** – rating is assumed as primary view from dwelling zoned RU1	**Moderate** – assumed there is a localised view of forested landscape and agricultural scenery.	**Moderate**

Stage 4: Visual Impact

The overall impact rating is determined by combining the visual magnitude rating with the visual sensitivity rating, this is shown in **Table 6.13**. Viewpoints with a moderate, or higher impact are assessed against performance objectives.

Table 6.13 Visual Impact Ratings

Viewpoint	Visual Magnitude Rating	Visual Sensitivity Rating	Visual Impact Rating	Visual Mitigation required?
Wollara Road	Very high	Low	Moderate	Yes, refer to **Section 6.7.7**
R3	Very low	Moderate	Low	No
R5	Very low	Moderate	Low	No
R46	Very low	Moderate	Low	No

Stage 5: Performance Objectives and Mitigation

Wollara Road was determined as the only viewpoint with a moderate visual impact and as such is the only viewpoint requiring the mandatory assessment against the 'performance objectives'. The performance objectives for a viewpoint with a moderate visual impact are:

- Visual impact mitigation is required in consultation with the affected landowner and should be proportional to the scale of impact.
- There is no expectation this mitigation should eliminate the view of the development entirely but must reduce the impact to an acceptable level.
- Appropriate mitigation options include vegetation screening or project landscaping to reduce impacts.
- If the available mitigation options would not be effective in reducing impacts or are unsuitable due to the nature of the impact (e.g., screening would result in the obstruction of views), then project redesign and/or impact agreements should be considered.

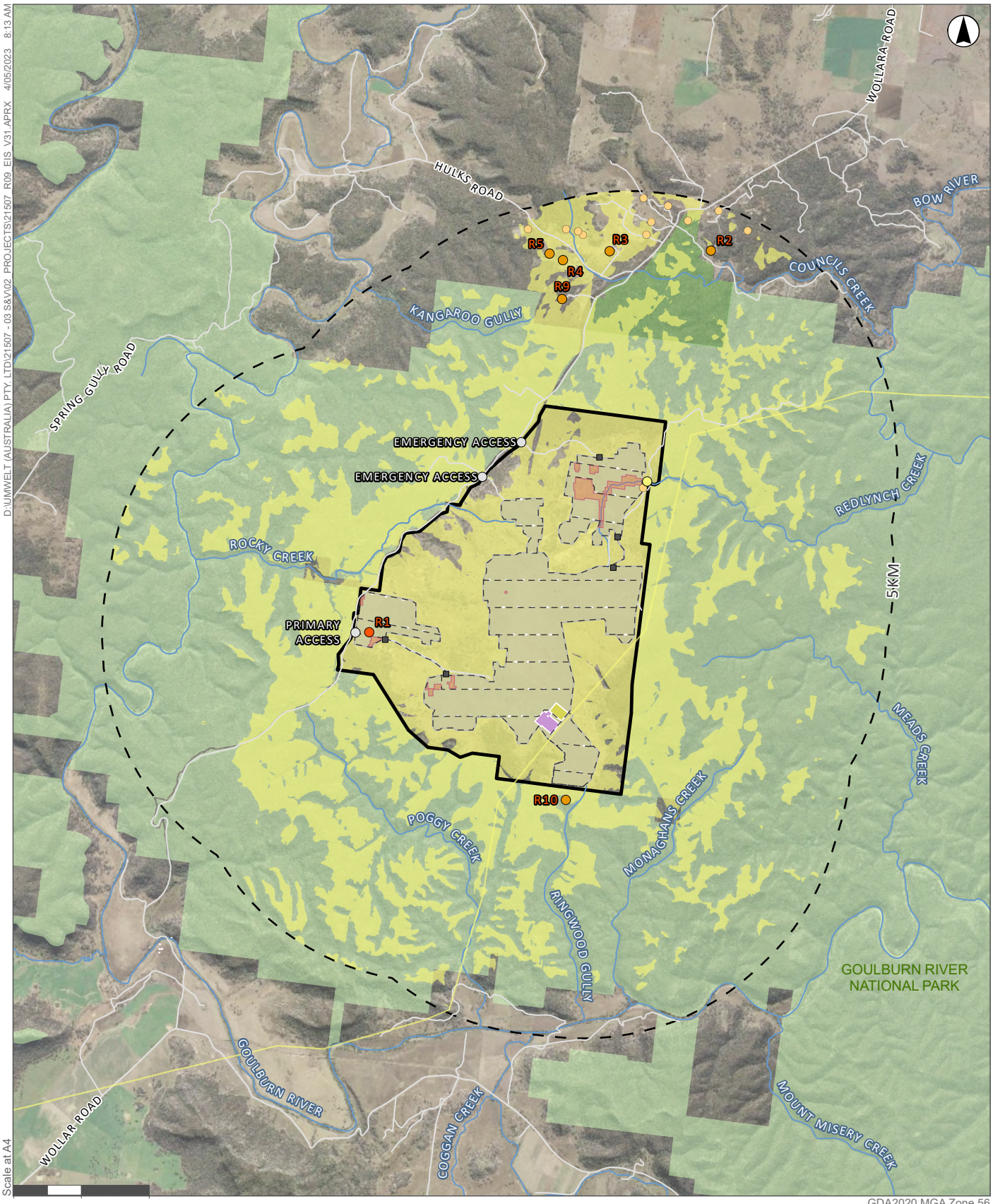
Visual Impact Consultation

Landowners immediately surrounding the Project include:

- NSW National Parks and Wildlife Service.
- NSW Crown Lands.
- Traditional Aboriginal custodians.

Umwelt's consultation with these landowners commenced through Project briefing meetings (held during September – November 2021) and has been ongoing. During consultation, surrounding landowners have been asked if they have visual concerns about the Project, and whether screening is important. To date no concerns have been raised.

Broader community consultation has also been ongoing throughout the development of the Project, via phone calls, emails and surveys between Umwelt and community representatives, and through Project community information sessions (held throughout 2021 and 2022). During consultation community representatives were asked to indicate how important the matter of 'visual amenity and changes to the landscape character' was to them. The matter was not rated as important by community representatives who participated in consultation.



Legend

- Host Receiver
- Sensitive Receiver
- Dwelling (abandoned)
- Dwellings
- Access Points
- Gate
- Proposed Access Tracks
- Electricity Transmission Line
- Watercourse
- Roads and Tracks
- Project Area (4km buffer)
- Project Area
- Exclusion Zones - Environmentally Sensitive Areas
- Battery Energy Storage System
- Substation
- Inverters
- NSW National Parks
- NSW State Forests
- Development Footprint
- Viewshed

FIGURE 6.14

Receivers and Viewshed

For the Goulburn River National Park (R10), given the vastness of the park and available bushwalking area, a receiver point 200 m from the Project Area was adopted for noise prediction purposes. For the predictions, the receiver point was located proximity to the substation and BESS (the highest noise emitting source on site)

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

6.7.5 Assessment of Impacts

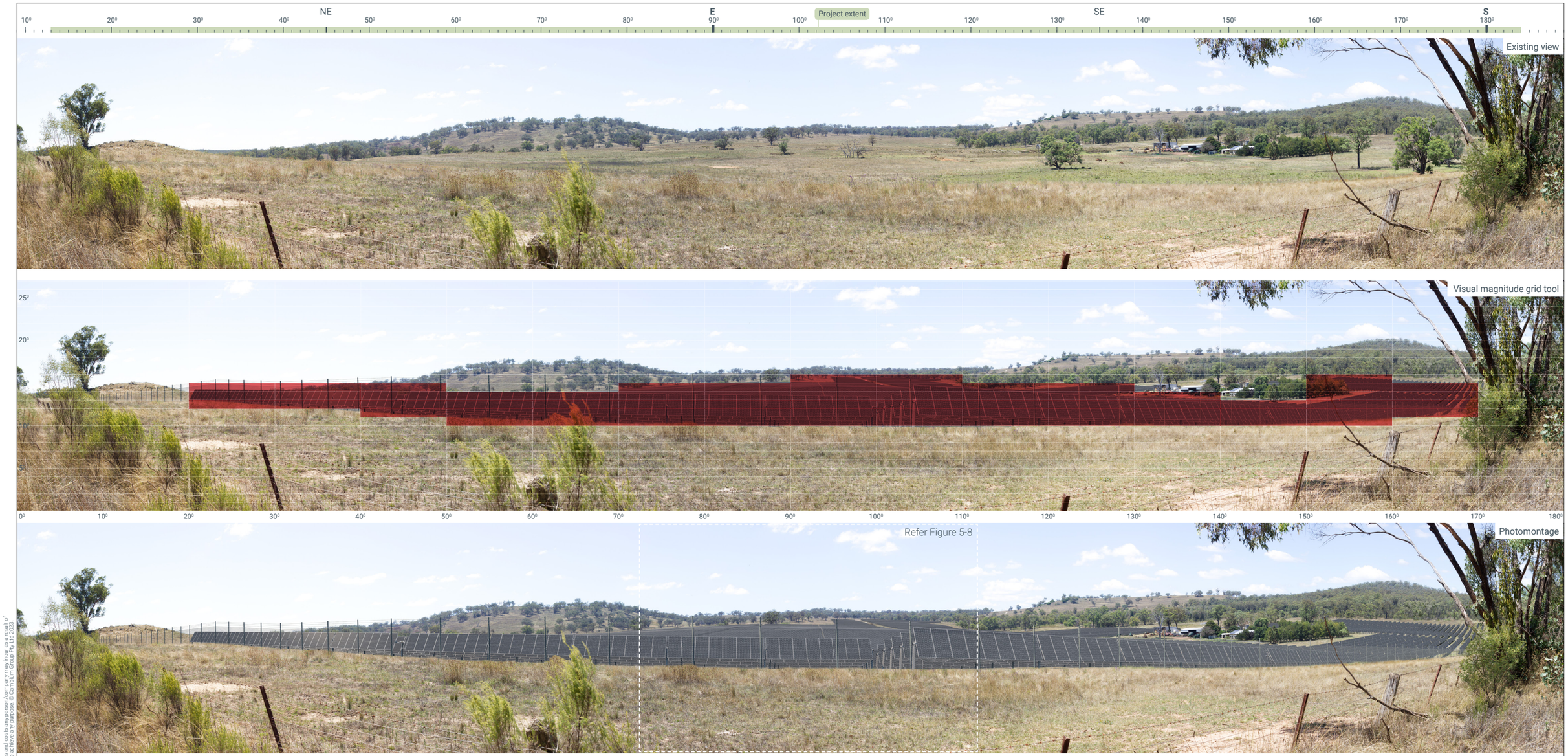
6.7.5.1 Visual Impact

The Project Area's isolated location (surrounded by Goulburn River National Park) partially screens it from view. Due to its location the Project has minimal impacts on neighbouring residents and visual amenity. The preliminary assessment determined that six viewpoints required detailed assessment – five private viewpoints (R03, R05, R09, R21, R46) and a single public viewpoint (Wollara Road). Two of these viewpoints (R09 and R21), were eliminated during the field inspection (Stage 1) as there were existing site features obstructing the view toward the Project Area, and thus further assessment was not required.

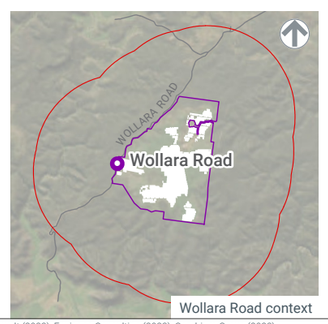
Modelling was used to visualise views from the four remaining viewpoints (R3, R5, R46 and Wollara Road). The highest visual impact (moderate) would occur at Wollara Road. With the implementation of perimeter landscaping in 3–5 years the impact would be reduced to very low as a residual rating. Remaining private viewpoints were rated as having low visual impact (refer **Figure 6.15**).

Proposed landscaping is shown in the draft landscape plan and is intended to screen views of the Project infrastructure from Wollara Road (for road users travelling through Goulburn River National Park) and would be located along the Wollara Road frontage within the Project Area. A detailed landscape plan would be prepared in consultation with NPWS prior to commencement of construction of the Project (refer **Figure 6.16**).

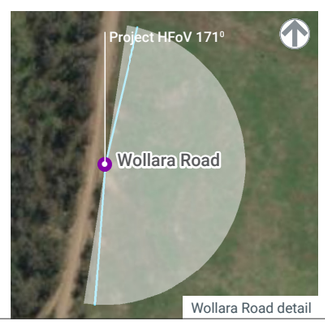
Figure 6-15
Wollara Road photomontage



Viewpoint ID	Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Visual sensitivity	Occupied cells	Magnitude rating	Impact rating
Wollara Road	32m	Public	Low	Low	Low	67	Very high	Moderate



Wollara Road context



Wollara Road detail

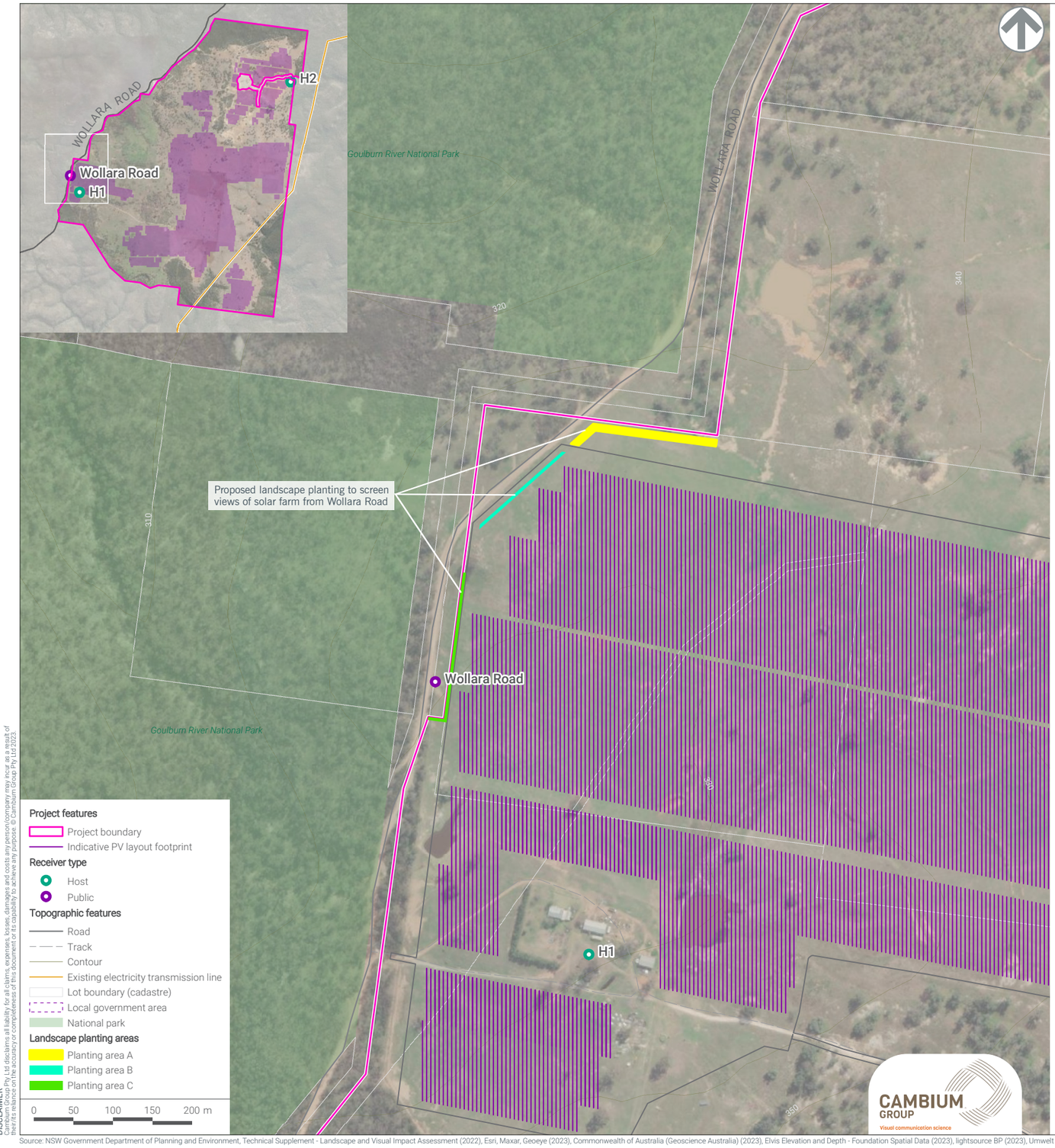
Date	07/02/23
Time	12:09
Camera level	332mAHD
Camera coordinates	E224256.m, N6424587m
Camera	Canon EOS 6D Mark II (full frame DLSR)
Panorama type	50mm portrait
Bearing	99°
Vertical field of view	39.6° (cropped to 27°)
Horizontal field of view	180°
Geodetic datum	GDA2020
Projection	MGA
Zone	56
Photography	Envisage Consulting

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Visual communication science

Source: NSW Government Department of Planning and Environment, Technical Supplement - Landscape and Visual Impact Assessment (2022), Esri, Maxar, Geoeye (2023), Commonwealth of Australia (Geoscience Australia) (2023), Elvis Elevation and Depth - Foundation Spatial Data (2023), lightsource BP (2023), Umwelt (2023), Envisage Consulting (2023), Cambium Group (2023).

Figure 6-16
Draft landscape plan



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Landscape strategy

The aim of proposed landscaping is to establish a quick growing, dense screen to reduce public views of the solar panels (from Wollara Road), as well as providing additional ecological benefits. Plant species have been selected that:

- are locally native
- are suitable for the site conditions (are hardy)
- will provide effective visual screening
- will provide ecological benefits (such as a food source for birds, habitat etc)
- include quick growing as well as longer-living species.

Draft landscape plan and planting guide

The draft landscape plan (shown Figure 1) indicates proposed perimeter screen planting on-site, adjacent to Wollara Road. Three planting areas (A, B and C) are proposed based on expected mature plant heights to avoid casting shadows on solar panels:

- Planting area A is 8 m wide and includes plants to 18 m high
- Planting area B is 8 m wide and includes plants to 8 m high
- Planting area C is 4 m wide and includes plants to 5 m high

Sourcing plants

1. Proposed species are shown in the draft planting schedule (Table 1).
2. Propagate plants from local provenance sourced seed. Plan for sourcing as early as feasible.
3. Plant pot sizes for all plants to be 75 mm tubestock.

Site preparation

4. When marking out planting area, ensure the root zone of remnant vegetation is protected.
5. Eradicate existing weeds and pasture grass species within the planting area at least one month before planting (with spot removal/treatment prior to planting if required). Carefully manage weed control measures when in vicinity of existing trees. Any proposed use of herbicides to be approved by NPWS.
6. Cultivate to a depth of 60 cm in tyned rows 50 – 100 cm apart for full width of planting area. Do not cultivate within the root zone of remnant vegetation.
7. Incorporate soil improver and/or organic fertiliser (if appropriate and approved by NPWS) following soil testing in a number of locations to determine the appropriate soil conditioning.
8. Apply mulch to a minimum depth of 75mm across the planting area.

Planting

9. Avoid planting during harsh weather conditions (i.e. mid-summer and mid-winter)
10. Select species for each planting area (A, B or C) from the draft planting schedule. Ensure only species marked for each planting area, are planted within that planting area.
11. Planting random order within each planting area to ensure an even mix of species .
12. Plant within the central 6 m of the 8 m wide planting area for planting areas A and B, and the central 2 m of the 4 m wide planting area for planting area C (i.e. with a 1 m buffer along each side).
13. Plant at densities to achieve about 50 plants per 10 lineal metres of the planting area.
14. Install natural fibre weed mats and biodegradable plant guards around each plant suitable for rabbit protection (if applicable) and install stock fencing around the planting area to protect from grazing sheep/cattle if necessary.
15. Water at the time of planting, weekly for first 3 months, fortnightly for next 3 months and as required over first 18 months. Watering to take account of any rainfall and adjust as needed.
16. Keep records of maintenance practices, including listing species that have failed and any substituted plant species.

[1] This ratio is generally consistent with the *Revegetation Guide for Holbrook, Hume and Urana Districts* (Murray Catchment Management Committee & Department of Land & Water Conservation (1998)

Draft planting schedule

The draft plant schedule provides an indicative range of site-appropriate species[1] for future use in landscaping the site. The selection of species would be further refined during preparation of the detailed landscape plan.

Table 1: Planting schedule

Botanical name	Common name	Approximate mature height (m)	Planting area
Medium tree			
Acacia implexa	Hickory Wattle	5 - 12	A
Callitris endlicheri	Black Cypress Pine	15	A
Eucalyptus dealbata	Tumbledown Red Gum	15	A
Pittosporum undulatum	Native Daphne	15	A
Small tree / tall shrub			
Acacia decurrens	Black wattle	3 - 10	A and B
Acacia doratoxylon	Currawang	3 - 8	A and B
Acacia linearifolia	Narrow-leaved wattle	10	A and B
Persoonia linearis	Narrow-leaved Geebung	2 - 5	A, B and C
Shrub			
Allocasuarina distyla	Scrub She-oak	1 - 3	A, B and C
Baeckea densifolia (Harmogia densifolia)		1.5	A, B and C
Calytrix tetragona	Common Fringe-myrtle	2	A, B and C
Cassinia cunninghamii	Cunningham's Everlasting	1 - 1.5	A, B and C
Dodonaea triangularis		3	A, B and C
Grevillea sericea	Pink Spider Flower	2	A, B and C
Hibbertia monogyna		0.5	A, B and C
Indigofera australis	Australian Indigo	2.5	A, B and C
Leptospermum parvifolium		2	A, B and C
Leucopogon muticus	Blunt Beard-heath	1.5	A, B and C
Tall grass			
Lomandra glauca	Pale Mat-rush		A, B and C
Lomandra longifolia	Spiny-headed mat-rush		A, B and C
Climber			
Clematis aristata	Old Man's Beard		A, B and C

[1] *Vegetation of the Merriwa Area, New South Wales*, R.H.D McRae and M.G. Cooper, 1985
* Species has been identified at the Project site during the ecological survey

Detailed landscape plan

Subsequent to project approval, a detailed landscape plan would be prepared which would refine the concepts presented in this draft. It is recommended that the detailed landscape plan be prepared with input from the NSW National Parks and Wildlife Service. Final species selection, ratio/rate of planting, and the planting guide may vary depending on future advice, the Project construction program and plant availability at the time.

The detailed landscape plan is to include a landscape maintenance plan for the operational period of the Project, to ensure proposed landscaping achieves, and continues to achieve, intended outcomes. The maintenance plan is to include:

- a defined initial establishment period of a minimum of 18 months
- a schedule for monitoring planting areas and watering during the establishment period
- ongoing maintenance practices during and post establishment (such as a weeding/mulching regime)
- guidance for replacement planting (for plants that fail to thrive).

Plan prepared by registered landscape architect (Stacey Brodbeck) RLA #719 (Australian Institute of Landscape Architects). A detailed landscape plan is required once the project is approved, to fully document and confirm planting locations and plant species.

Source: NSW Government Department of Planning and Environment, Technical Supplement - Landscape and Visual Impact Assessment (2022), Esri, Maxar, Geoeye (2023), Commonwealth of Australia (Geoscience Australia) (2023), Elvis Elevation and Depth - Foundation Spatial Data (2023), lightsource BP (2023), Umwelt (2023), Envisage Consulting (2023), Cambium Group (2023).

6.7.5.2 Landscape Character Impact

The overall assessed impact of the Project on landscape character is ***low***. The solar farm would change the character of the landscape by introducing somewhat uncharacteristic dark, linear, built elements across cleared parts of the open, agricultural landscape. However, the Project is generally low in height, would not cause noticeable landform change, retains vegetation and additional native vegetation would be established alongside Wollara Road to reduce visibility and integrate the Project with the existing landscape.

The Project has been designed to facilitate sheep grazing within the Development Footprint, thus retaining some of the grazing function and some agricultural characteristics of the rural landscape. It is also important to note that the Project is reversible that is, the components could be removed and there would be little residual impact to the landscape.

6.7.5.3 Lighting

Lighting associated with the Project is minimal. The solar farm would not be lit at night, and workers would not attend the site except in emergency or security situations.

There is minimal lighting associated with the Project. The inverters will require targeted lighting during commissioning and operations. Sensor lights will be used around the substation for security purposes only. Lights may also be used by employees in an emergency.

6.7.5.4 Lighting Impact

The Project is located within 200 km of the Siding Spring Observatory and falls within the Dark Sky Region of NSW. The *NSW Dark Sky Planning Guidelines* (DPE, 2016) provide guidance to manage light in the Dark Sky Region and are a matter for consideration for all development under the EP&A Act. The Guidelines provide technical information on good lighting design, use of shielded, downward facing and site appropriate lighting. Lighting design principles that are applicable to the Project are included in mitigation measures in **Section 6.7.7**. There is minimal lighting associated with the Project. The inverters will require targeted lighting during commissioning and operations. Sensor lights will be used around the substation for security purposes only. Lights may also be used by employees in an emergency.

Based on the proposed lighted, outlined in (**Section 3.3.4**), it is considered unlikely that the Project would create a noticeable impact on the existing night-time landscape.

6.7.6 Cumulative Visual Impacts

As a part of the LCVIA a cumulative impact assessment was conducted for visual impacts associated with the Project. This cumulative impact assessment used a methodology based on the NSW Cumulative Impact Assessment Guidelines for State Significant Projects (NSW Government, 2022), and the UK Landscape Institutes Guidelines for Landscape and Visual Impact Assessment (3rd edition).

A distance of 35 km was used in this assessment, to account for the visual experience of short journeys and travel through the landscape, beyond a stationary viewpoint. On rural road a 35 km distance would take around half an hour to drive,a relatively short, local journey, with changing visual experiences along the route.

Renewable energy projects within the 35 km study area include Wollar Solar Farm, Merriwa Energy Hub and the EnergyCo Central West Orana Transmission Line (which will support future renewable projects in the Central West Orana REZ). The only other existing infrastructure in this study area is the existing 500 kV transmission line that runs through the Project Area. There is also a local mine/quarry (0.5 ha) on Wollara road, 4 km north of the Project Area. More broadly within 100 km of the Project Area there are significantly more renewable energy and other large-scale projects in planning, development and construction.

6.7.6.1 Cumulative Impact to Landscape Character

Cumulative changes to landscape character have the potential to affect the experience of the rural landscape and visual amenity.

The Wollar Solar Farm and the proposed Merriwa Energy Hub are relatively distant from the Project Area (Wollar Solar Farm 30 km southwest, Merriwa Energy Hub 28 km east). Both of these projects are visually separated from the Project Area by distance, and all three projects are relatively visually isolated being located on small, local roads (Wollar Solar Farm on Barigan Road, Merriwa Energy Hub on Flaggs Road, and the Project on Wollara Road). These local roads would most likely be only accessed by local residents and have little broader exposure.

It is expected that most tourist, recreational, and other road users would travel via the Golden Highway, or Castlereagh Highway and not encounter all three projects, although travelling through the Goulburn River National Park is very lightly trafficked and not used as primary access to the National Park.

It is unlikely that a resident road user would see multiple solar farms on a single journey during a regular route. It would be even less likely that a tourist would encounter multiple solar farms in a single day.

If all three proposals were to proceed, the cumulative impact would not alter the existing, dominant rural/agricultural and native forest characteristics of the landscape.

6.7.6.2 Cumulative Impacts to Viewpoints

Wollar Solar Farm would be around 30 km to the southwest of, and Merriwa Energy Hub would be over 28 km to the east of, the three representative viewpoints identified for the Project. Solar modules and other elements associated with the Wollar Solar Farm or Merriwa Energy Hub would not be visible from these viewpoints.

None of the viewpoints identified for Wollar Solar Farm or Merriwa Energy Hub would view the proposed Goulburn River Solar Farm due to distance, intervening existing vegetation and landform.

If all solar farm proposals were to proceed, the cumulative visual impact to viewpoints would not be compounded beyond the impact from each single proposal.

6.7.7 Management and Mitigation Measures

6.7.7.1 Draft Landscape Plan

Perimeter planning along Wollara Road is proposed in the vicinity of the proposed Project infrastructure. The draft landscape plan outlines the intended planting strategy and the location for planting, including a draft planting schedule (list of appropriate plant species) planting guide and ongoing management.

The aim of proposed landscaping is to establish a quick growing, dense screen to reduce public views of Project infrastructure from Wollara Road, as well as providing additional ecological benefits. Planting would be within the Project Area, located between Wollara Road and the Development Footprint's perimeter security fence, in three planting areas based on expected mature plant heights (to avoid casting shadows on the solar panels).

A draft of the landscape plan was sent to NPWS (February 2023) for feedback. NPWS advised the plan looked appropriate and will continue to be consulted prior to construction and implementation of the landscape plan.

6.7.7.2 Other Mitigation Measures

Mitigation measures proposed to reduce the visibility of the Project include:

- Lighting would be installed in accordance with *AS4228-1997 – Control of Obtrusive Effects of Outdoor Lighting* and designed and installed to best practice principles identified within the *Dark Sky Planning Guidelines.*
- If possible, colour treat ancillary components of the Project, such as inverters and office/storage containers that would be visible from Wollara Road, so they are darker in colour and less prominent.
- Setback of the construction compound, vehicle parking and equipment storage areas in the vicinity of the Post War homestead so they are set back from Wollara Road and partially screened from view (from Wollara Road) via existing and new vegetation screening.
- Where soil disturbance is required, wind erosion controls would be implemented including the use of water carts, covering of stockpiles and avoiding ground disturbance during windy conditions.
- Signage (if required) would be of sufficient size to contain only information sufficient for the basic facility and company identification, for safety, navigation, and delivery purposes.
- Retention of as much existing vegetation within the Project Area as possible. Protect existing trees (that are to be retained) during construction activities.

6.7.8 Glint and Glare

6.7.8.1 Methodology

A glint and glare assessment was conducted utilising the Solar Glare Hazard Analysis Tool developed by Scandia National Laboratories. This tool is used to evaluate glare resulting from solar farms at different receptors based on proximity, orientation and specification of the PV modules.

This tool is used to indicate the nature of glare that can be expected at each potential receptor. Glare can be broadly classified into three categories, represented by three colours:

- **Green glare** – low potential for temporary after-image.
- **Yellow glare** – potential for temporary after-image.
- **Red glare** – retinal burn, not expected for PV.

The tool used to assess the glint and glare hazard was run in a simulation interval of one minute, based on the reflectivity of solar arrays of PV modules which typically last one minute.

The following factors were considered in the modelling tool:

- Position of the sun over time with respect to the location of the proposed solar farm.
- A worst-case scenario assuming clear weather all year round, (i.e. no consideration of cloud coverage).
- Tracking axis tilt, tracking axis orientation and properties of the PV modules.
- Potential to screen the impact by surrounding topography (does not take into account intervening elements such as vegetation and built structures).

Three types of receivers are addressed within the glint and glare assessment:

- Residential Receptors.
- Road and Rail Receptors.
- Aviation Receptors (no landing strips are within 5 km of the Development Footprint so no further assessment is required).

All residential viewpoints within 3 km of the Project that have a line of sight of the PV module array were analysed for the daily and yearly glare impacts in minutes. Representative viewpoints could be used for residential receivers that are clustered. All residential receivers must be assessed at a height of 1.5 m.

Table 6.14 Residential Receptors Impact Rating and Performance Objectives

High Glare Impact	Moderate Glare Impact	Low Glare Impact
>30 minutes per day **>30 minutes per day**	<30 minutes per day <30 minutes per day	<10 minutes per day <10 minutes per day
Significant amount of glare should be avoided	Implement mitigation measures to reduce impacts as far as practicable	No mitigation required

Further details on the modelling assumptions are provided in **Appendix 13**.

6.7.8.2 Assessment of Impacts

The Glint and Glare assessment identified residential receivers as viewpoints which within 3 km have a line of sight of the solar arrays. Or residential receptors are identified as a representative cluster of viewpoints that would have a line of sight of the solar arrays. One private residential receptor was identified within 2.5 km of the nearest solar panel. No yellow glare was identified for the residential receiver. Three public residential receptors were identified within 3–5 km of the solar array, including Spring Gully Campground, Big River Campground and Goulburn River National Park. The assessment indicated low to moderate potential for green glare for Big River Campground and Spring Gully Campground.

No rail receptors were identified for the Project; however, one road receptor was identified, Wollara Road. Wollara Road is adjacent to the western boundary of the Project Area. The glare assessment identified that Wollara Road will experience 11 hours of yellow glare per year from the Project, which has moderate potential for an after image. Existing vegetation and topography, however, is likely to obscure glare from the Project.

No aviation receptors within 5 km of the Project Area were identified.

6.7.8.3 Mitigation and Management Measures

To mitigate potential glare impacts the implementation of landscaping (screening) along the Project boundary adjacent Wollara Road is recommended. The screening will likely fragment potential glare impacts from the Project, as addressed in the proposed landscaping as a part of the LCVIA. More details on the landscape plan are provided in **Section 6.7.7.1**.

6.8 Noise and Vibration

A Noise and Vibration Impact Assessment (NVIA) was prepared by Umwelt (2023) (refer to **Appendix 14**) to address the SEARs in relation to noise including:

- An assessment of the construction noise impacts of the Project in accordance with the Interim Construction Noise Guideline (ICNG).
- Operational noise impacts in accordance with the NSW Noise Policy for Industry (NPfI) (2017).
- Cumulative noise impacts (considering other developments in the area).
- A draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.

6.8.1 Existing Environment

The Project Area 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 Production). Given the rural environment, monitoring of background noise levels was not undertaken, and minimum background noise levels i.e. 35 dB(A) for the day and 30 dB(A) for the evening and night periods were adopted in accordance with the NPfI.

Table 6.15 presents the ICNG Construction Noise Management Levels for representative receivers surrounding the Project. The assessment levels are intended to guide the need for and the selection of feasible work practices to minimise construction noise impacts.

Table 6.15 ICNG Construction Noise Management Levels, dB(A)

Land use	Construction time	Noise Management Level LAeq (15 min)
Residential	Recommended Standard Hours Monday to Friday – 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or Public Holidays	Noise affected: RBL + 10 dB(A)

Land use	Construction time	Noise Management Level LAeq (15 min)
Residential	Recommended Standard Hours Monday to Friday – 7:00 am to 6:00 pm Saturday 8:00 am to 1:00 pm No work on Sundays or Public Holidays	Highly noise affected: 75 dB(A)
Residential	Outside recommended standard hours	Noise affected: RBL + 5 dB(A)
Passive Recreation	All construction hours	60 dB(A)1

The nearest receivers in the area surrounding the Project are shown on **Figure 6.17**.

A number of residential receivers are located on the northern, southern and western sides of the Goulburn River National Park (refer to **Table 6.16** below). The nearest non-involved dwelling sensitive receiver is located approximately 3 km north of the Project Area with dense bushland as a buffer in between. There are no other sensitive land uses (such as schools or places of worship) within or surrounding the Project Area.

One residential receiver is located within the Project Area. This is considered an 'involved dwelling' (i.e. owned by a landholder involved in the Project) and is not considered as a sensitive receiver for the purposes of the assessment (R01 in **Table 6.16**). An abandoned house (1900 house) located in the north-east corner of the Project Area is not considered further in the assessment as it is a structure, not a dwelling and will be demolished prior to construction.

For the Goulburn River National Park, given the vastness of the park and the unlikely chance of park use (i.e. bush walking) occurring at the same time as construction operating near the development boundary, a receiver point 200 m from the Project Area was adopted for noise prediction purposes. This is represented as R10 on **Figure 6.17**.

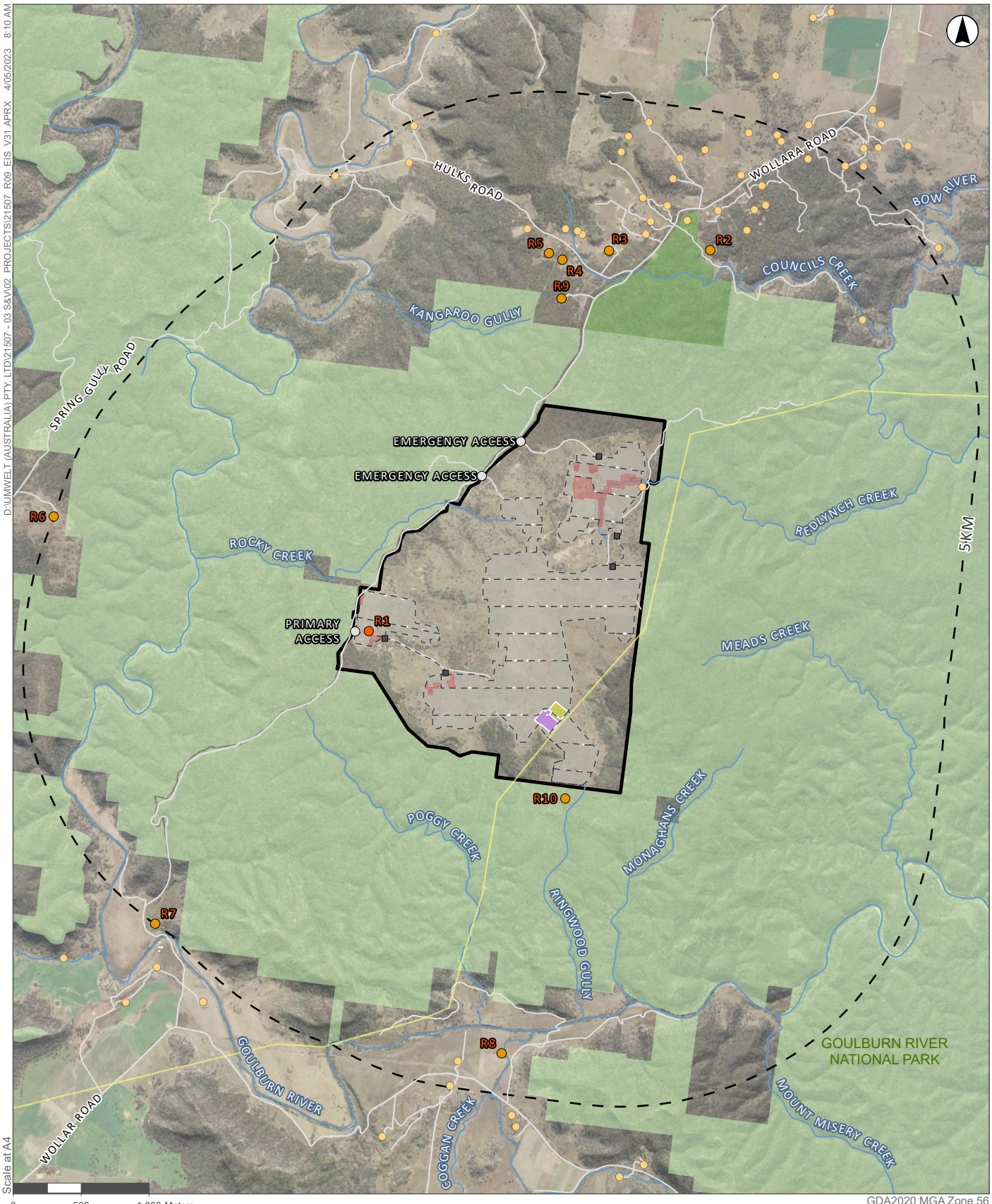
Details for all modelled receivers are presented in **Table 6.16** below.

Table 6.16 Nearest Receivers

Receiver ID	Receiver Type	Address / Description	Approx. distance (km) and direction
R01 (involved)[3]	Residential	2771 Wollara Road, Merriwa (Lot 58 DP750956)	Within Project Area
R02	Residential	1893 Wollara Road, Merriwa (Lot 13 DP731205)	3.2 km north
R03	Residential	54 Hulks Road, Merriwa (Lot 12 DP746396)	3.0 km north
R04	Residential	54 Hulks Road, Merriwa (Lot 14 DP746396)	3.1 km north
R05	Residential	153 Hulks Road, Merriwa (Lot 16 DP746396)	3.2 km north
R06	Residential	1324 Mogo Rd, Mogo (Lot 12 DP610756)	5.1 km west
R07	Residential	3483–3492 Wollara Road, Merriwa (Lot 14 DP750966)	5.4 km southwest

[3] Receiver R01 is involved in the Project and therefore is not considered sensitive.

Receiver ID	Receiver Type	Address / Description	Approx. distance (km) and direction
R08	Residential	5657 Wollar Road, Coggan (Lot 45 DP755421)	4.5 km south
R09	Residential	2076 Wollar Road, Merriwa (Lot 15 746396)	1.7 km north
R10	Passive Recreation	Goulburn River National Park	Adjacent to Project Area in all directions
R11	Residential	549 Ringwood Road, Merriwa	15 km northwest



Legend

- Host Receiver
- Sensitive Receiver (within 5km, identified in Noise Assessment)
- Dwellings
- Access Points
- Gate
- Proposed Access Tracks
- Electricity Transmission Line
- Watercourse
- Roads and Tracks
- Project Area (5km buffer)
- Project Area
- Exclusion Zones - Environmentally Sensitive Areas
- Battery Energy Storage System
- Substation
- Inverters
- NSW National Parks
- NSW State Forests
- Development Footprint

FIGURE 6.17

Sensitive Receivers (Noise)

For the Goulburn River National Park (R10), given the vastness of the park and available bushwalking area, a receiver point 200 m from the Project Area was adopted for noise prediction purposes.
For the predictions, the receiver point was located proximity to the substation and BESS (the highest noise emitting source on site)

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

6.8.2 Noise and Vibration Criteria

6.8.2.1 Construction Noise

Assessment levels for noise from construction activities, excluding noise from construction-related traffic on public roads, are defined in the ICNG (refer to **Table 6.17**). The Construction Noise Management Levels (NMLs) for sensitive receivers, which are based on the adopted minimum background noise levels, are summarised in **Table 6.17**.

Table 6.17 Construction Noise Management Levels

Receiver	Noise Management Levels (NML), dB(A) – Standard Hours of Construction[4]: Noise Affected $L_{Aeq(15\ min)}$	Noise Management Levels (NML), dB(A) – Standard Hours of Construction[4]: Highly Noise Affected $L_{Aeq(15\ min)}$	Noise Management Levels (NML), dB(A) – Outside Standard Hours[4]: Noise Affected $L_{Aeq(15\ min)}$
All Residences[5]	45	75	40 (day) 35 (night)
Passive Recreation	60	-[6]	60

6.8.2.2 Construction Vibration

Criteria for vibration impacts on building structures recommended in the DEC's *Assessing Vibration: A Technical Guideline* (the vibration guideline) are based on British Standard *BS7385 (1993) Part 2 Evaluation and measurement of vibration in buildings* (BS7385). The criteria in BS7385 are given in terms of peak component vibration velocity values from transient (impulsive) vibration events. The criteria for continuous vibration are recommended to be 50% lower than for impulsive vibration.

Historic heritage assessments have confirmed that there are no listed heritage items within, or in close proximity to, the Project Area, therefore the vibration criteria for the protection of structures and buildings from cosmetic damage (e.g. hairline cracks in drywalls, etc.) are applicable (rather than more stringent criteria for heritage buildings) (refer to **Table 6.18** below). Due to the large separation distances between the Project Area and the nearest sensitive receivers (i.e. approximately 3 km), human annoyance from vibration-inducing construction equipment/activities is anticipated to be negligible and is not addressed further in the NVIA.

The original Slab Hut identified in the Historical Heritage Assessment (refer to **Section 6.7**) was assessed as a heritage structure that can be more sensitive to vibration impacts than modern structures. The minimum distance of proposed infrastructure and machinery is 20 m from the original Slab Hut.

[4] ICNG recommended standard construction hours: Monday to Friday 7.00 am–6.00 pm; Saturday 8.00 am–1.00 pm.
[5] Residential receiver R01 is an 'involved' residence and the NMLs are not applicable.
[6] Highly noise affected criteria not applicable for non-residential receivers.

Table 6.18 BS 7385 Vibration Criteria for Cosmetic Damage to Structures

Type of Structure	Peak Component Particle Velocity (mm/s): 4 Hz–15 Hz	Peak Component Particle Velocity (mm/s): 15 Hz–40 Hz	Peak Component Particle Velocity (mm/s): 40 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 (transient (impulsive) vibration) 25 (continuous vibration)	50 (transient (impulsive) vibration) 25 (continuous vibration)	50 (transient (impulsive) vibration) 25 (continuous vibration)
Un-reinforced or light framed structures Residential or light commercial type buildings	15–20 (transient (impulsive) vibration) 7.5–10 (continuous vibration)	20–50 (transient (impulsive) vibration) 10–25 (continuous vibration)	50 (transient (impulsive) vibration) 25 (continuous vibration)

6.8.2.3 Operational Noise

The operational noise criteria applicable to the Project have been derived in accordance with the NPfI, based on adopted background noise levels presented in **Section 6.8.1**.

The NPfI sets out two noise criteria to assess the potential noise impacts resulting from industrial activity. The first is used to control short-term intrusive noise and its impacts on residences whilst the second is used to protect against cumulative noise impacts and maintain noise level amenity for particular land uses including residences.

The Project Noise Trigger Levels (PNTLs) derived in accordance with the NPfI are the lower (that is, the more stringent) values of the Project Intrusiveness Noise Level (PINL) and Project Amenity Noise Level (PANL) in terms of $L_{Aeq(15\ minute)}$ noise levels. Applying the more stringent of the two as the PNTL ensures that intrusive noise is limited, and amenity is protected and that no single industry can unacceptably change the noise level of an area.

The PNTLs provide a benchmark or objective for assessing a proposal or site. They are not intended for use as a mandatory requirement. The PNTL is a level that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response; for example, further investigation of mitigation measures.

The PNTL, feasible and reasonable mitigation, and consideration of residual noise impacts are used together to assess noise impact and manage the noise from a proposal or site. The PNTLs are shown in **Table 6.19**.

Table 6.19 Project Noise Trigger Levels – Residential Receivers, $L_{Aeq(15\ minute)}$, dB(A)

Receiver	Time of day[7]	PINL	PANL	PNTL
All residential receivers[8]	Day	40	53	**40**
All residential receivers[8]	Evening	35	48	**35**
All residential receivers[8]	Night	35	43	**35**
Passive recreation area	When in use	-	53	**53**

[7] Day period is 7.00 am–6.00 pm Monday-Saturday and 8.00 am–6.00 pm Sunday and Public Holidays, evening period is 6.00 pm–10.00 pm and night period is 10.00 pm to commencement of day period.

[8] Residential receiver R01 is an 'involved' residence and the PNTLs are not applicable.

6.8.2.4 Road Traffic Noise Criteria

An assessment for potential noise levels from Project related traffic on Ringwood/Wollara Road is required. The NSW *Road Noise Policy* (RNP) (DECCW, 2011) sets out criteria for road traffic noise through the provision of a framework that addresses traffic noise issues associated with new developments, new or upgraded road developments, or planned building developments. Based on functionality, Ringwood Road/Wollara Road is classified as a sub-arterial road. **Table 6.20** outlines the road traffic noise criteria for residential land uses along Ringwood Road/Wollara Road.

Table 6.20 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria dB(A): Day 7 am to 10 pm	Assessment Criteria dB(A): Night 10 pm to 7 am
Freeway/ arterial/ sub-arterial road	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq,(15 hour) 60 (external)	LAeq,(9 hour) 55 (external)

6.8.3 Methodology

Prediction of the construction and operational noise levels was undertaken with the proprietary computer noise modelling software CadnaA (Version 2021 MR 2), using the CONCAWE noise prediction algorithms.

The CadnaA software is approved for use by the DPE and EPA. The software utilises terrain data, source and receptor locations and heights, source sound power levels (in octave or 1/3 octave frequency bands) and input meteorological conditions to predict noise levels. The CONCAWE prediction method accounts for the influence of noise propagation from atmospheric temperature, atmospheric relative humidity, wind speed, wind direction and Atmospheric Pasquill Stability Class (for defining the presence and strength of temperature inversions).

Construction noise impacts were predicted based on several construction activity scenarios and associated plant and equipment. Operational noise impacts were predicted based on indicative sound power level data provided by Lightsource bp for the proposed equipment.

The construction activities will broadly include the following scenarios:

1. Site establishment and civil works.
2. Piling and foundations.
3. Assembly of all equipment (trackers, inverters, modules, balance of system).
4. Underground cabling.
5. Commissioning.
6. Site rehabilitation, removal of temporary construction facilities.

Noting that it is likely that some of these activities may occur simultaneously through the progression of the construction program. Further details for all modelling scenarios, including indicative equipment quantities and sound power levels, are provided in the NVIA in **Appendix 14**.

6.8.4 Assessment of Impacts

6.8.4.1 Construction Noise

Construction noise levels have been predicted for six indicative construction scenarios under default worst-case noise-enhancing meteorological conditions (D-class with 3 m/s windspeed or F-class with 2 m/s windspeed) in accordance with the NPfI (refer to the NVIA in **Appendix 14** for detailed equipment schedules). The predictions are conservative and assume all equipment associated with each scenario is operating simultaneously at the closest point within the Development Footprint to the respective residential receiver location. In reality, a receiver would experience a range of construction noise levels, dependent upon the number of plant items operating at any one time and their precise location on site.

Results for each construction scenario (1 to 6) for the identified receivers are presented in **Table 6.21**. The predicted noise level contours for the worst-case scenario (Scenario 1) are presented graphically in **Figure 6.19**.

Table 6.21 Predicted Construction Noise Levels, dB(A)[9]

Receiver ID	Noise Management Level, LAeq(15 min): Standard Hours	Noise Management Level, LAeq(15 min): Outside Standard Hours	Construction Scenario Noise Prediction, LAeq(15 min): Scenario 1	Construction Scenario Noise Prediction, LAeq(15 min): Scenario 2	Construction Scenario Noise Prediction, LAeq(15 min): Scenario 3	Construction Scenario Noise Prediction, LAeq(15 min): Scenario 4	Construction Scenario Noise Prediction, LAeq(15 min): Scenario 5	Construction Scenario Noise Prediction, LAeq(15 min): Scenario 6
R01[10]	-	-	61	59	57	54	54	54
R02	45	40	<20	<20	<20	<20	<20	<20
R03	45	40	31	29	27	24	24	24
R04	45	40	31	29	27	24	24	24
R05	45	40	30	28	26	23	23	23
R06	45	40	24	22	20	<20	<20	<20
R07	45	40	<20	<20	<20	<20	<20	<20
R08	45	40	<20	<20	<20	<20	<20	<20
R09	45	40	27	25	23	<20	<20	<20
R10	60	30	52	50	48	45	45	45

[9] Predictions below 20 dB(A) have been presented as <20.
[10] Residential receiver R01 is an 'involved' residence and the Noise Management Levels are not applicable.

The construction noise levels are predicted to comply with the daytime noise management levels at all sensitive receivers not involved with the Project. Nevertheless, reasonable and feasible noise mitigation and management strategies have been provided in **Section 6.8.6**. Whilst it is not essential to adopt these measures, in accordance with the ICNG, it is considered best practice to minimise construction noise as much as possible.

6.8.4.2 Construction Vibration

Construction vibration impacts have been assessed with reference to the criteria provided in **Table 6.18**, and using the recommended safe working distances provided in Table 2 of the NSW Construction Noise and Vibration Guideline (CNVG) (RMS, 2016) as a guide (refer to Table 5.3 in the NVIA in **Appendix 14**). Due to the large separation distances between the Project and the involved sensitive receivers (i.e. approximately 3 km), vibration impacts from construction activities are anticipated to be negligible.

6.8.4.3 Road Upgrades Construction Noise and Vibration Assessment

Road Upgrades are proposed outside of the Project Area, the following works are proposed:

- **Work Area 1** – Culvert upgrade along Ringwood Road at Bow River.
- **Work Area 2** – Road repairs along Ringwood Road – 1.8 km section to be widened and resealed between Bow River and Killoe Creek.
- **Work Area 3** – Culvert upgrades along Ringwood Road at Killoe Creek.

Construction noise levels have been predicted for five construction scenarios under default worst-case noise-enhancing meteorological conditions (D-class with 3 m/s windspeed or F-class with 2 m/s windspeed) in accordance with the NPfI (refer to the NVIA in **Appendix 14** for detailed equipment schedules). Results for each construction scenario (7 to 11) for the identified receivers are presented in **Table 6.25**.

The construction noise levels are predicted to exceed the noise management levels at some receivers for some of the work areas and scenarios. However, no receivers are predicted to be highly noise affected (i.e., exposed to construction noise levels greater than 75 dB(a)) including:

- For work Area 1 exceedances were predicted at R11 and R15 of up to 8 dB(A).
- For work Area 2, exceedances of up to 28 dB(A), 15 dB(A) and 27 dB(A) were respectively predicted at R11, R14 and R15.
- For work Area 3, exceedances of up to 10 dB(A) were predicted at R14.

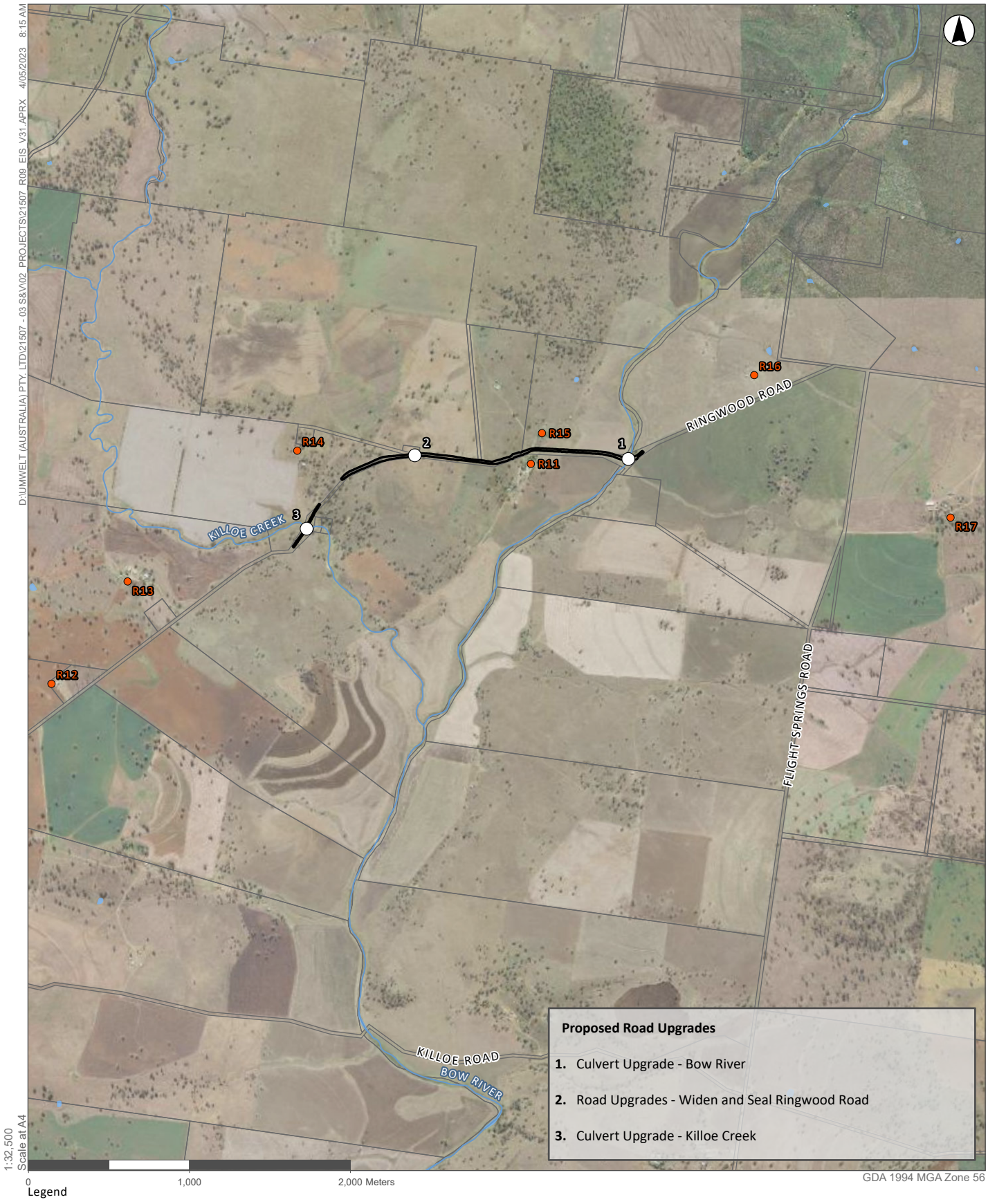


FIGURE 6.18

Road Upgrade Work Areas and Sensitive Receivers

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

Table 6.22 Predicted Construction Noise Levels, dB(a)[11]

Receiver ID	Noise Management Level LAeq(15 min): Standard Hours	Construction Scenario Noise Prediction LAeq(15 min): Work Area 1 – Sc.7, 8 & 10	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 1 – Sc.9	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 1 – Sc.11	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 2 – Sc.7, 8 & 10	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 2 – Sc.9	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 2 – Sc.11	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 3 – Sc.7, 8 & 10	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 3 – Sc.9	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 3 – Sc.11
R11	45	47	44	43	**67**	n/a	**63**	<20	<20	<20
R12	45	<20	<20	<20	29	n/a	25	24	21	20
R13	45	<20	<20	<20	37	n/a	33	35	32	31
R14	45	<20	<20	<20	**54**	n/a	**50**	**49**	**46**	45
R15	45	**47**	44	43	**66**	n/a	**62**	<20	<20	<20
R16	45	33	30	29	36	n/a	32	<20	<20	<20
R17	45	20	<20	<20	21	n/a	<20	<20	<20	<20

[11] Predictions below 20 dB(A) have been presented as <20, Receivers outside of the assessment area have been excluded from this table.

Table 6.23 Predicted Construction Noise Levels, dB(a)[11] Includes high noise emitting plant (i.e., tub grinder, chainsaw, rock hammers, jackhammer and concrete saws

Receiver ID	Noise Management Level LAeq(15 min): Standard Hours	Construction Scenario Noise Prediction LAeq(15 min): Work Area 1 – Sc.7, 8 & 10	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 1 – Sc.9	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 1 – Sc.11	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 2 – Sc.7, 8 & 10	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 2 – Sc.9	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 2 – Sc.11	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 3 – Sc.7, 8 & 10	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 3 – Sc.9	Construction Scenario Noise Prediction, LAeq(15 min): Work Area 3 – Sc.11
R11	45	**53**[12]	**49**	n/a	**73**	n/a	n/a	24	20	n/a
R12	45	21	<20	n/a	35	n/a	n/a	30	26	n/a
R13	45	21	<20	n/a	43	n/a	n/a	41	37	n/a
R14	45	23	<20	n/a	**60**	n/a	n/a	**55**	**51**	n/a
R15	45	53	**49**	n/a	**72**	n/a	n/a	24	20	n/a
R16	45	39	35	n/a	42	n/a	n/a	<20	<20	n/a
R17	45	26	22	n/a	27	n/a	n/a	20	<20	n/a

[12] Predicted exceedances are in **bold**.

6.8.4.4 Operational Noise

Operational noise levels were predicted under default worst-case meteorological conditions (D-class with 3 m/s windspeed or F-class with 2 m/s windspeed) in accordance with the NPfI. For a conservative assessment against the night-time noise goal, it was assumed that all plant and equipment would be operating concurrently at 100% capacity.

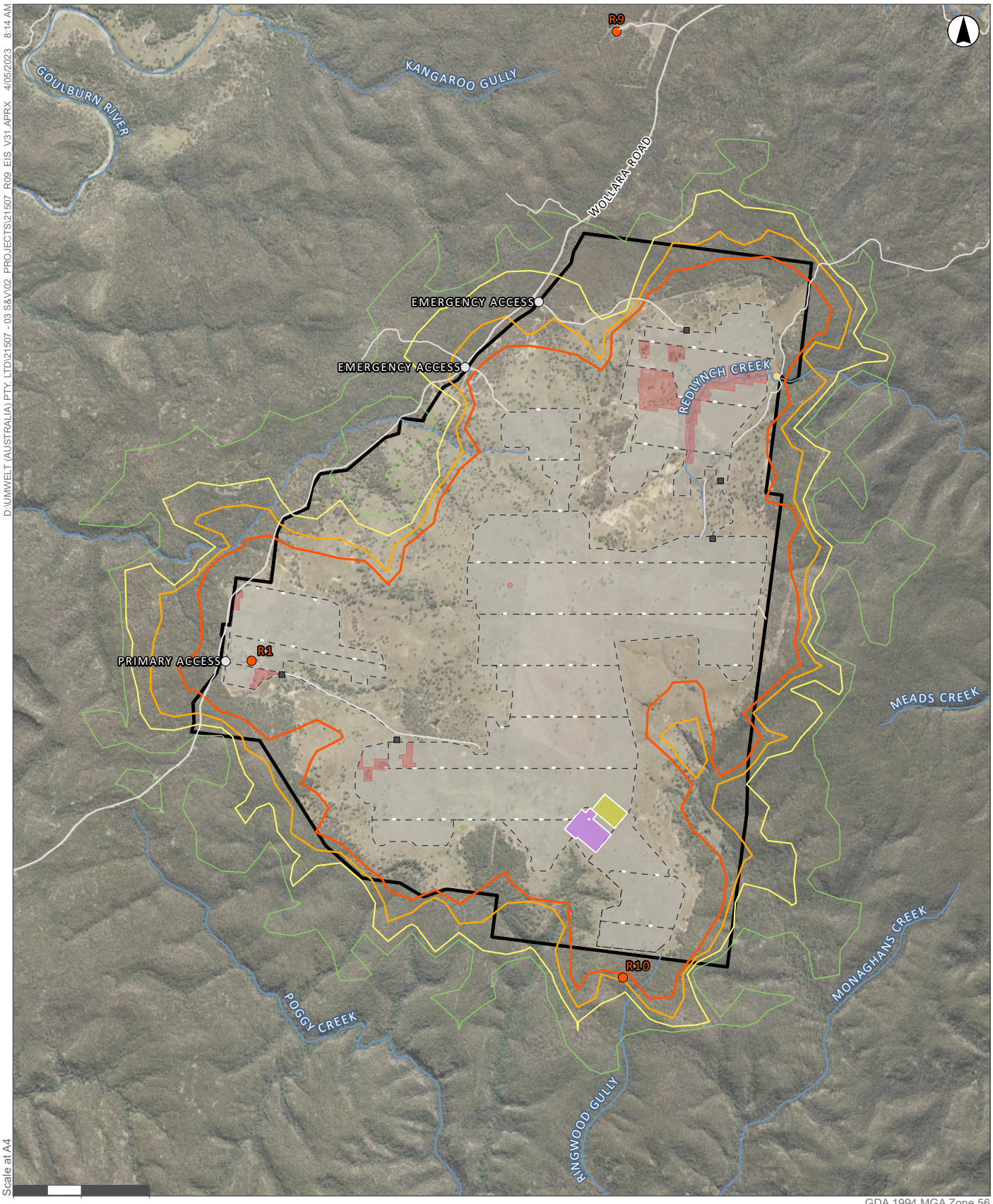
The predicted operational noise levels at the identified receivers are presented in **Table 6.24** and shown graphically as noise contours in **Figure 6.20**.

Table 6.24 Predicted Operational Noise Levels, dB(A)[13]

Receiver ID	Night-time PNTL, LAeq(15 min)	Predicted Noise Level, LAeq(15 min)
R01 [14]	-	46
R02	35	<20
R03	35	<20
R04	35	<20
R05	35	<20
R06	35	<20
R07	35	<20
R08	35	<20
R09	35	<20
R10 [15]	53	38

The operational noise levels are predicted to comply with the day, evening and night-time noise limits at all nearby sensitive receivers not involved with the Project. Therefore, no additional noise mitigation is anticipated to be required for the operation of the Project.

[13] Predictions below 20 dB(A) have been presented as <20.
[14] Residential receiver R01 is an 'involved' residence and the PNTLs are not applicable.
[15] This is a worst-case representative location for passive recreational users of the National Park.



Legend

- Dwelling (abandoned) (1)
- Sensitive Receivers (3)
- Gate
- Access Points
- Roads and Tracks
- Watercourse

Predicted Noise Levels

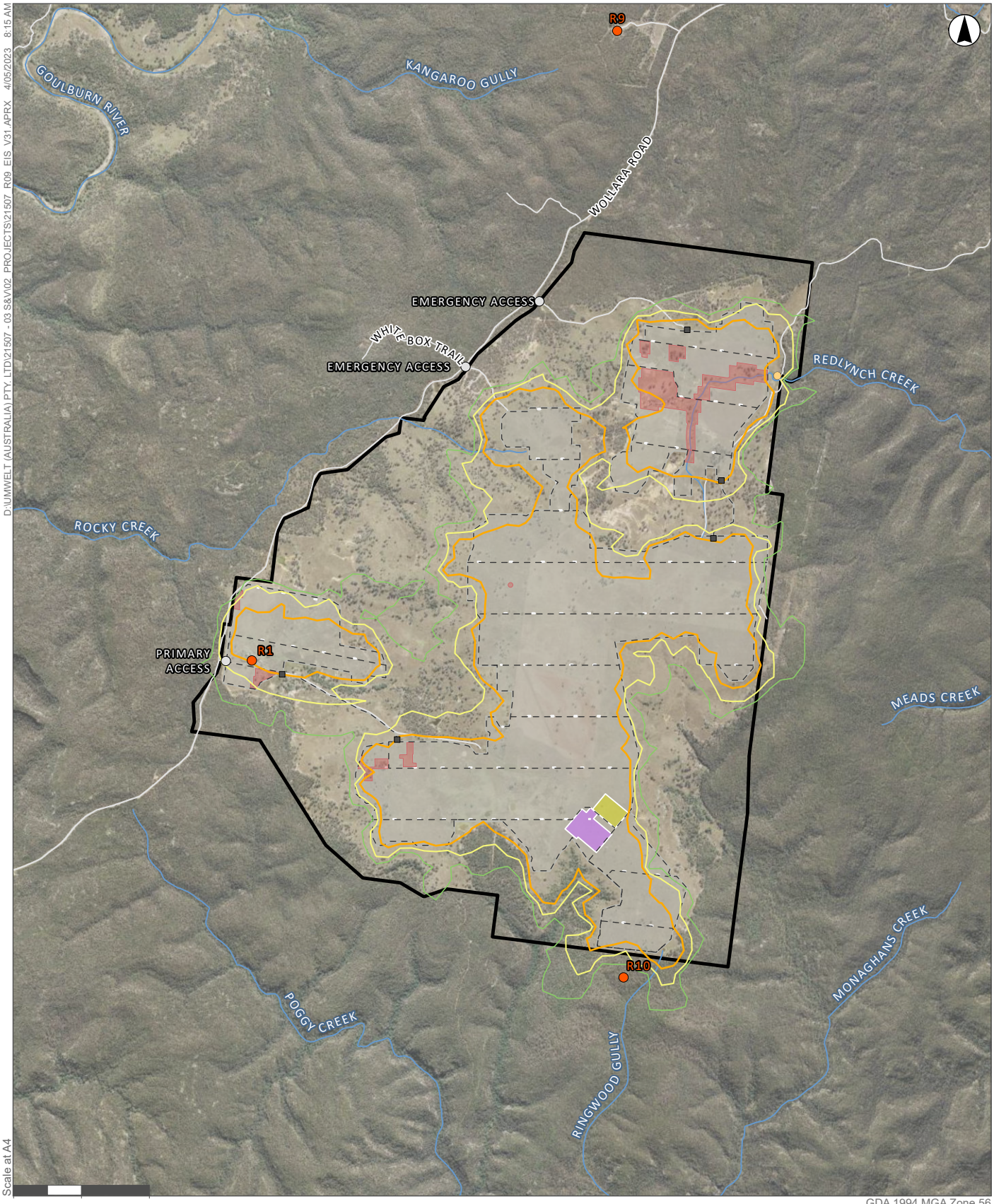
- Noise Contour Level 40 dB(A)
- Noise Contour Level 45 dB(A)
- Noise Contour Level 50 dB(A)
- Noise Contour Level 55 dB(A)

- Project Area
- Exclusion Zones - Environmentally Sensitive Areas
- Battery Energy Storage System
- Substation
- Inverters
- Development Footprint

FIGURE 6.19

Predicted Construction Noise Levels - Scenario 1

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



Legend

- Dwelling (abandoned)
- Sensitive Receivers
- Gate
- Access Points
- Proposed Access Tracks
- Roads and Tracks
- Watercourse

Predicted Noise Levels

- Noise Contour Level 35 dB(A)
- Noise Contour Level 40 dB(A)
- Noise Contour Level 45 dB(A)
- Project Area
- Exclusion Zones - Environmentally Sensitive Areas
- Battery Energy Storage System
- Substation
- Inverters
- Development Footprint

FIGURE 6.20

Predicted Operational Noise Levels

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

6.8.4.5 Road Traffic Noise

Construction material and equipment would typically be transported by road from the Port of Newcastle, via the Golden Highway and Ringwood Road/Wollara Road to the Project Area. The nearest and potentially most affected receiver for road traffic noise has been identified as 549 Ringwood Road (R11) which is located approximately 70 metres from the carriageway of Ringwood Rd/Wollara Rd.

Road traffic noise calculations were performed with CadnaA (Version 2021 MR 2), using the Calculation of Road Traffic Noise (CoRTN) algorithms. Based upon the traffic volumes and assumptions provided in the Traffic and Transport assessment in **Section 6.9**, the predicted traffic noise levels for the nearest receiver are shown in **Table 6.25**.

Table 6.25 Predicted Traffic Noise levels 549 Ringwood Road, L_{Aeq}, dB(A)

Time Period	RNP criteria	Existing traffic noise levels	Combined traffic noise levels	Noise Level Change	Comply/ Exceed
Day LAeq(15 hour) (7.00 am–10.00 pm)	60	45	50	N/A[16]	Complies
Night LAeq(9 hour) (10.00 pm–7.00 am)	55	34	44	N/A[16]	Complies

As shown in **Table 6.25**, the construction traffic noise levels associated with the Project are predicted to comply with the criteria. In accordance with the RNP the Project construction traffic noise is predicted to be acceptable and have minor impact.

Operational traffic movements are expected to be minimal (up to 10 two-way vehicle trips per day), therefore road traffic noise from operational traffic is anticipated to be negligible and was not further assessed.

6.8.5 Cumulative Noise Impacts

There are three open cut coal mines and 14 existing and proposed renewable energy projects located within the vicinity of the Project Area. There are also 14 existing and proposed renewable energy projects located within the vicinity of the Project Area. Wollar Solar Farm and Wilpinjong Mine are the closest, located approximately 16 km south-west of the Project Area. Others include Merriwa Solar Farm located 25 km east of the Project Area (also known as Merriwa Energy Hub), Stubbo Solar Farm, Beryl Solar Farm, Tallawang Solar Farm, Barneys Reef Wind Farm, Birrawa Solar Farm and Dunedoo Solar Farm but these are located greater than 45 km west of the Project Area.

The significant separation distances mean that these other projects and operations would not contribute acoustically to the established noise criteria and noise management levels of the sensitive receivers in proximity to the Project Area.

[16] Change in noise level assessment is not applicable if the predicted noise level is below the noise limit.

Furthermore, in regard to operational noise, as specified in the NPfI, where a PANL which is set 5 dB below the recommended amenity noise level can be met, no additional consideration of cumulative industrial noise is required. Based on the noise predictions in **Table 6.24**, the Project can readily achieve the PANL minus 5 dB.

Therefore, no cumulative noise impact is anticipated due to the construction and operation of the Project and any surrounding developments.

6.8.6 Management and Mitigation Measures

The construction noise levels for the road upgrades on Ringwood Road are predicted to exceed the nominated noise management levels (R11, R14 and R15). A draft Construction Noise and Vibration Management Plan for the road upgrades has been prepared and is provided in **Appendix 14**.

The construction noise levels for the Solar Farm and BESS are predicted to comply with the nominated noise management levels. Whilst it is not essential to adopt the below measures, in accordance with the ICNG, it is considered best practice to minimise construction noise as much as possible. The vibration measures should be considered for identified structures within the Project Area.

6.8.6.1 Construction Noise

A draft Construction Noise and Vibration Management Plan for the road upgrades has been prepared and is provided in **Appendix 14**. This will be updated (as required) prior to commencement of construction and form part of the CEMP for the Project.

A Noise and Vibration Management Plan (NVMP) for the Solar Farm will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the ICNG and identify:

- All potential significant noise and vibration generating activities associated with the Project.
- Feasible and reasonable mitigation measures to be implemented.
- A monitoring program to assess performance against relevant noise and vibration criteria.
- Arrangements for consultation with affected neighbours and sensitive receivers, including notification and complaint handling procedures.
- Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.
- All sensitive receivers likely to be affected should be notified at least 7 days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact.
  The notification should include:
  - Details of the Project.
  - The construction period and construction hours.
  - Contact information for project management staff.
  - Complaint and incident reporting.
  - How to obtain further information.

- All employees, contractors and subcontractors are to receive an environmental induction. The induction must include at a minimum, all applicable mitigation measures; hours of works; any limitations on high noise-generating activities; location of nearest sensitive receivers; designated parking areas; relevant approval conditions and incident procedures.
- Contractors should keep noise to a minimum, including limiting the use of loud stereos/radios, shouting on site and car door slams.
- Where practical, no dropping of materials from height or throwing of metal items.
- The noise levels of plant and equipment should have operating sound power levels consistent with those nominated in the NVIA.
- Noise emitting plant to be directed away from sensitive receivers and to be throttled down or shut down when not in use.
- Non-tonal reversing beepers could be fitted and used on construction vehicles and mobile plant used regularly on site and for any out of hours work.
- Limit the use of engine compression brakes.
- Where feasible and reasonable, work generating high noise and/or vibration should be scheduled during less sensitive time periods.

6.8.6.2 Construction Vibration

- In the unlikely event that any vibration-generating equipment would be used within the recommended safe working distances nominated in **Table 6.18**, the following is recommended:

- An independent specific structural assessment is undertaken on the structure to ascertain the structural integrity and its ability to withstand vibration, and establishment of an appropriate vibration criterion.
- A dilapidation survey is undertaken on the structure prior to works commencing, and regular inspection of the structure throughout the construction activities.
- Site specific vibration minimum working distances are established for the nominated equipment on site.
- Where appropriate, continuous vibration monitoring is conducted on the structure for the duration of the period of construction while vibration generating equipment is used. The vibration logger should be equipped with the facility to remotely alert the site to reduce or cease construction activities if vibration levels are approaching the criterion threshold.

6.9 Traffic and Transport

A Traffic and Transport Impact Assessment (TTIA) (2023, refer to **Appendix 15**) has been prepared for the Project by Turnbull Engineering Pty Ltd (Turnbull) to assess the existing transport network conditions and the anticipated Project impacts during construction and operation. The TTIA addresses the requirements of the SEARs with respect to traffic and transport, as listed below:

- An assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation.
- An assessment of the likely transport impacts to the site access route(s), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance.
- A cumulative impact assessment of traffic from nearby developments.
- Details of measures to mitigate and/or manage potential impacts including a schedule of all required road repairs, road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authorities.

The TTIA also addresses the additional requirements of Transport for NSW (TfNSW), as detailed in correspondence with DPE dated 19 January 2022, refer to **Appendix 15**.

A copy of the TTIA is provided in **Appendix 15** with key outcomes summarised in the sections below.

6.9.1 Existing Transport Network

6.9.1.1 Roads

Project access routes for light and heavy vehicles include the Golden Highway, Ringwood Road, Wollara Road and Wollar Road (refer to **Figure 6.21**). Heavy and oversized vehicles would be limited to accessing the site from the north while light vehicles and shuttle buses would access the site from both the north and south from surrounding regional towns with a preference of entering from the north.

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. Three site access points are proposed on Wollara Road as shown **Figure 6.21**, with the southern access point providing the primary site access and the northern two providing emergency access only.

Classifications and descriptions of key access roads are provided in **Table 6.26** below.

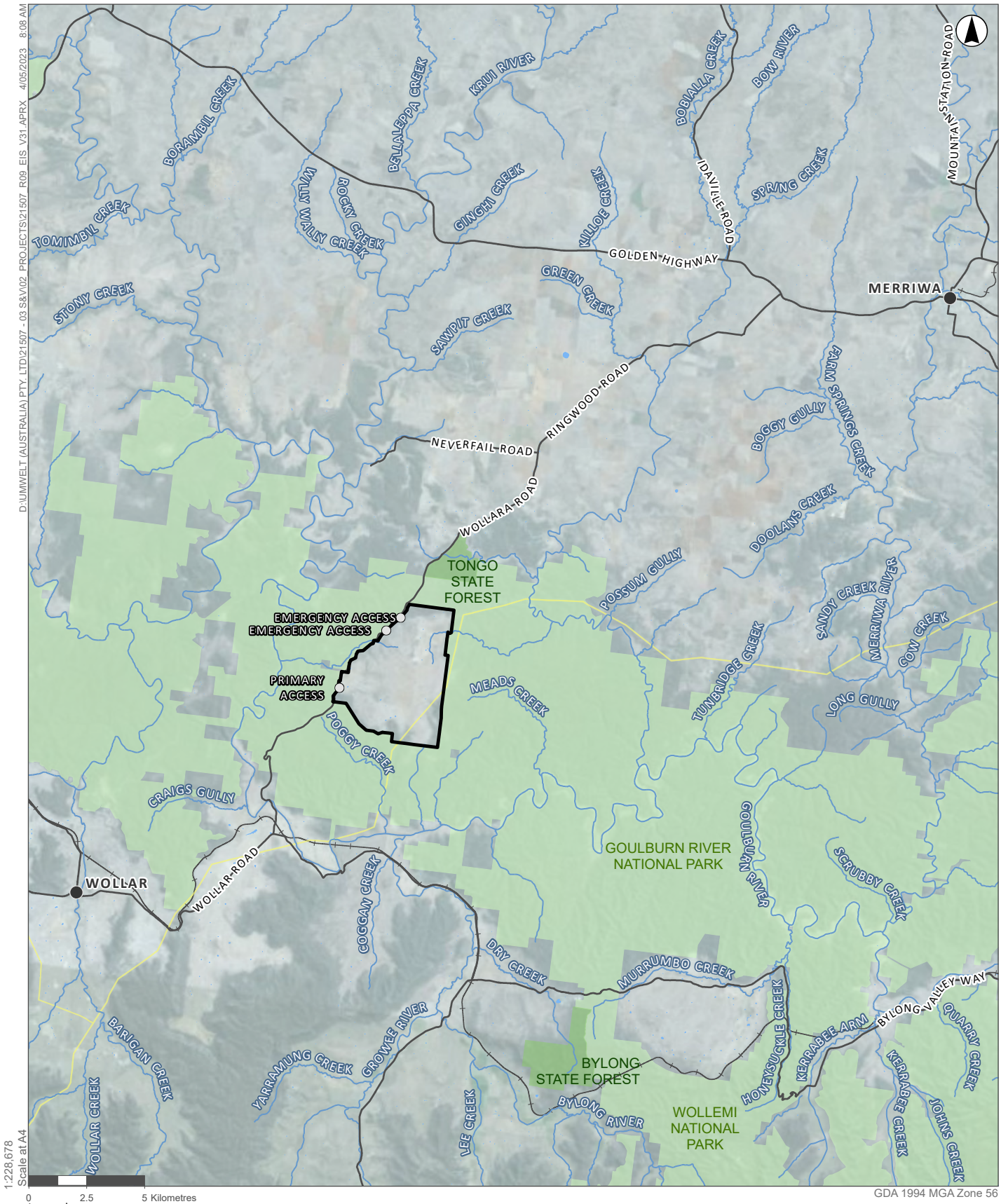


FIGURE 6.21

Road Network and Site Access

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

Table 6.26 Key Roads

Road Name	Classification	Description
Golden Highway	State Road (B84)	• Key east-west arterial connector linking the New England Highway (between Branxton and Singleton) to the Newell Highway at Dubbo, passing through Denman, Merriwa and Dunedoo. • Two-lane, undivided sealed road with varying shoulder widths and formations. • Posted speed limit of 100 km/h. • Approved B-double route subject to a long-term package of upgrades to facilitate the movement of heavy vehicles.
Ringwood Road	Local Road	• Forms part of a continuous north-south road corridor with Wollara Road between the Golden Highway in the north and Wollar Road in the south. Ringwood Road is divided into two sections in this corridor, with the northern section running between the Golden Highway and Neverfail Road, and the southern section running between the Goulburn River crossing and Wollar Road (refer to **Figure 6.21**). • Sealed road which is generally flat with low vertical grades. • Unsealed road between the Goulburn River crossing and Wollar Road. • Operates under a default speed limit of 100 km/h as there were no regulatory speed signs observed during site inspection, however advisory speed signs (35, 65 and 85 km/h) were observed at bends along the alignment.
Wollara Road	Local Road	• Forms part of a continuous north-south road corridor with Ringwood Road between the Golden Highway in the north and Wollar Road in the south. The Wollara Road section runs between Neverfail Road and the Goulburn River crossing (refer to **Figure 6.21**). • Provides direct access to the Project Area. • Comprises a combination of sealed and unsealed sections north of the site, and unsealed sections south of the site. • Operates under a default speed limit of 100 km/h as there were no regulatory or advisory speed signs observed during site inspection.
Wollar Road	Regional Road	• East-west connector between Bylong (at its junction with Bylong Valley Way) and Budgee Budgee (at its junction with Ulan Road). • Sealed road with posted speed limit of 100 km/h. • Approved B-double route but includes an 80 km/h B-double speed limit and may only be used by B-doubles outside of school bus operation times.

6.9.1.2 Intersections

Key intersections assessed in the TTIA are described in **Table 6.27** below.

Table 6.27 Key Intersections

Intersection	Layout/Geometry	Existing AM Peak	Existing PM Peak
Golden Highway – Ringwood Road	Priority controlled intersection (Give Way signage from Ringwood Road). Basic left turn and right turn treatments. Auxiliary left turn lane on Golden Highway westbound approach.	0715 to 0815	1500 to 1600
Wollar Road – Ringwood Road	Priority controlled intersection (Stop signage from Ringwood Road). Basic left turn and right turn treatments.	0600 to 0700	1730 to 1830

At the Golden Highway – Ringwood Road intersection, evening peak hour volumes are generally higher than morning peak volumes. In addition, traffic volumes turning into and out of Ringwood Road are low, with Golden Highway eastbound and westbound through vehicles as the major movements at the intersection. At the Wollara – Ringwood Road intersection, traffic volumes are low during both peak hours.

The Safe Intersection Sight Distance (SISD) was calculated for the Golden Highway – Ringwood Road intersection as it is proposed as the main site access point for heavy vehicles, based on Table 5.2 of the *Guide to Road Design Part 3: Geometric Design* (Austroads, 2021). Assuming a design vehicle speed of 100 km/h and a driver reaction time of 2.5 seconds, a SISD of 262 m is required. Site investigations and a review of aerial imagery indicates that the sight distance may be slightly deficient for existing vehicles. However, given that adequate warning signage notifying motorists on the Golden Highway that trucks are turning into and out of Ringwood Road is already installed near the intersection, no additional repairs would be required.

An assessment of intersection performance based on criteria outlined in the *Guide to Traffic Generating Developments* (Roads and Traffic Authority, 2002) and using SIDRA Intersection modelling software indicates that both intersections currently operate at a Level of Service (LOS) 'A' with spare capacity, low average delays and minimal queues on all approaches during both the morning and evening peak periods.

6.9.1.3 Parking

There are no formal parking facilities located near the site. A heavy vehicle rest area is located on the northern side of the Golden Highway, approximately 300 m west of the Golden Highway– Ringwood Road intersection. The closest formal parking facilities are located in the towns of Merriwa and Wollar, some 20 to 30 km from the site.

6.9.1.4 Public Transport

Private bus services operate on weekdays between Merriwa and Scone, with an additional service between Merriwa and Singleton operating once per month. These private bus services connect Merriwa to the NSW rail network at Aberdeen, Scone, Muswellbrook and Singleton. An additional private bus service between Newcastle and Dubbo via Merriwa operates three days per week. A school bus route runs on Wollar Road between Mudgee and Wollar, with one service provided on school days in each direction, corresponding to school start and finish times. There are no bus services operating along Wollara Road and Ringwood Road.

The Sandy Hollow – Gulgong rail line, primarily used to transport coal from the Ulan mines passes through Wollar (refer to **Figure 6.21**). The rail line has numerous level crossings on Ulan Road, Wollar Road and Ringwood Road, south of the Project Area. Another rail line between Merriwa and Sandy Hollow is part of the Country Regional Network, however this line is currently non-operational.

6.9.1.5 Active Transport

The pedestrian and cycle network surrounding the Project Area is limited. There are no formal pedestrian or cycle facilities provided on the Golden Highway, Ringwood Road, Wollara Road or Wollar Road.

Sections of the Golden Highway, at locations where the road shoulder is wide enough to facilitate cyclists, are defined as moderate or high difficulty cycle routes by TfNSW. Bicycle NSW also identifies a scenic cycle route between Bylong and Merriwa, which travels directly past the Project Area via the Golden Highway, Forest Reserve Road, Killoe Road, Ringwood Road, Wollara Road, Wollar Road and Bylong Valley Way.

6.9.1.6 Road Safety

Crash data from TfNSW's Centre for Road Safety indicates that in the five-year period from 2016 to 2020, a total of 32 crashes were recorded on roads in proximity to the Project Area. Three crashes occurred near the Wollar Road – Ringwood Road intersection, with these crashes resulting in moderate or serious injuries. Two crashes occurred on Wollara Road and Ringwood Road, resulting in moderate injuries. Crashes along the Golden Highway were generally dispersed with increased occurrences in and around the Merriwa town centre.

6.9.1.7 Road Upgrades

Proposed road upgrades on Ringwood Road would include a 1.8 km section to be widened and resealed between Bow River and Killoe Creek. These repairs will include 8 m bitumen-sealed formation with a minimum of 500 mm unsealed shoulders. 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 warning signs (such as 'Narrow Bridge', 'Road Narrows', 'Steep Climb' and 'Symbolic Truck') are recommended along sections of Ringwood Road and Wollara Road where the road narrows and near the site access points (refer to **Appendix B** of the TTIA [**Appendix 15**] for further details).

6.9.2 Methodology

The TTIA considered the following:

- Existing traffic and transport within the study area including a review of:
    - The road network.
    - Parking provision.
    - Public transport.
    - Pedestrians and bicycle users.
    - Road safety.

- Construction traffic and transport associated with the Project.
- Operational traffic and transport associated with the Project.
- Potential mitigation measure that may be implemented to minimise traffic and transport impacts associated.

6.9.3 Assessment of Impacts

Traffic and transport impacts associated with the Project would primarily occur during the construction phase as a result of the increase in traffic movements associated 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.

The Project would generate approximately 350 direct jobs with an average of 250 workers required during the peak months of the construction period. Actual onsite workforce numbers would vary from month to month, depending on the intensity of the proposed works at the time. During peak construction, the following traffic movements are anticipated to be generated by the Project:

- Light vehicles – 60 two-way trips per day.
- Shuttle buses – 15 two-way trips per day.
- Heavy vehicles – 55 two-way trips per day.
- Water Trucks – at least one on site at all times.

In addition, 6 to 12 oversized loads are expected throughout the construction period, with a maximum of two oversized loads on any day.

During operation, it is likely that up to 10 staff would be on-site concurrently. Staff travelling to and from the site during operation of the Project would generate on average 10 two-way trips per day.

6.9.3.1 Swept Path Analysis

Swept paths along the proposed heavy vehicle route were assessed and details are provided in Appendix B of the TTIA in **Appendix 15**. The swept path analysis concluded that:

- At the Golden Highway – Ringwood Road intersection, semi-trailers performing a right turn from Ringwood Road onto the Golden Highway would have to cross a small portion of the solid dividing line when merging onto the Golden Highway. Due to existing road signage warning motorists of turning heavy vehicles from side streets as well as low traffic volumes, this would not present any safety issues.
- A narrow bridge is located on the northern end of Ringwood Road and can only safely accommodate one vehicle crossing at any given time due to limited road width and poor road condition. Additional 'Narrow Bridge' warning signs are recommended to notify drivers of the limited road space and the need to potentially give way to oncoming traffic. Upgrades to this narrow bridge are proposed as apart of the Road Repairs and Upgrades).
- The primary site access point in its current configuration may only be able to accommodate one vehicle entry/exit at a time due to the density of surrounding vegetation. To avoid impacts on the surrounding

vegetation traffic management would be used to control vehicle movements at the site access. No vegetation removal is required for single movements. Traffic management measures would be outlined in a Construction Traffic Management Plan (CTMP) to be prepared prior to the commencement of construction.

- The two emergency access points would be used for emergency and National Parks and Wildlife Service access only, and not for construction access.

6.9.3.2 Oversize Overmass vehicle routes

The transportation of large Project infrastructure would require Oversize Overmass (OSOM) vehicles exceeding the regulatory limits of standard vehicle dimensions of 19 m in length, 2.5 m in width, 4.3 t in weight (depending on axle group). OSOM vehicles would likely be transported to the site from Port of Newcastle via Industrial Drive, Pacific Highway, Newcastle Inner City Bypass, Newcastle Road, Hunter Expressway, New England Highway and Golden Highway. These are all approved B-double roads and would be suitable for OSOM.

A high-level review of the indicative OSOM vehicle route was undertaken by Turnbull Engineering (2023). Locations that may require traffic management measures are described in **Table 6.28**.

Table 6.28 Oversize Overmass Vehicle Route Area Requiring Potential Traffic Management

Location	Matter Requiring Management
Pacific Highway/Newcastle Inner City Bypass	Due to the intersection geometry, traffic management may be required so that OSOM vehicles can negotiate the left turn from Pacific Highway onto Newcastle Inner City Bypass.
Newcastle Inner City Bypass in Sandgate and Jesmond	Due to vertical limitations at four overpasses along the Bypass, OSOM vehicle loads may need to be lowered to ensure enough clearance is provided.
New England Highway / Golden Highway	The NSW Government is currently upgrading this intersection as part of the New England Highway Upgrade between Belford and Golden Highway, which is scheduled for completion in late 2024. A review of available public information shows that the existing and proposed intersection design could accommodate OSOM vehicles. As part of the detailed OSOM route assessment, the progress of the New England Highway Upgrade project would be checked to determine if traffic management measures are required.
Golden Highway / Putty Road / Mount Thorley Road intersection	Due to the intersection geometry, traffic management may be required so that OSOM vehicles can negotiate the right turn from Golden Highway/Putty Road onto Golden Highway/Mount Thorley Road.
Golden Highway near Ogilvies Hill and Winery Hill	Due to some steep grades, additional pull trucks may be required to assist OSOM vehicle movements through this area.
Golden Highway at Denman Bridge	Due to vertical and horizontal limitations at the Denman Bridge truss structure, OSOM vehicle loads may need to be lowered to ensure enough clearance is provided.

Location	Matter Requiring Management
Golden Highway / Ringwood Road intersection	Due to the intersection geometry, traffic management may be required so that OSOM vehicles can turn into and out of Ringwood Road.
Ringwood Road and Wollara Road	The causeways at Bow River and Killoe Creek were identified as inadequate to accommodate OSOM vehicles. Hence, culvert upgrades are proposed and would be designed and constructed to be able to accommodate the OSOM vehicles generated by the Project.

6.9.3.3 Road Repairs, Signage and Culvert Upgrades

Review of the roads forming part of the construction vehicle routes based on visual inspection identified sections of Ringwood Road and Wollara Road has poor pavement condition and poor condition. The Upper Hunter Shire Council were contacted to determine the existing pavement profile of these road and if any works had been carried out on these roads with available design drawings. Based on the visual inspection and information received from Council, Ringwood Road would require various repairs and upgrades to support the required vehicles and traffic for the Project. **Table 6.29** provides a summary of the schedule of road repairs, these works are anticipated to occur prior to construction and take approximately 3 months to complete.

Table 6.29 Schedule of Road Repairs, Signage and Culvert Upgrades

Item	Works	Timing
1	Repairs of Ringwood Road between Killoe and Bow River including a 1.8 km section to be widened and resealed between Bow River and Killoe Creek.	Prior to the Construction of the Project
2	Additional signage along Ringwood Road and Wollara Road (Refer to Appendix B of the TTIA in **Appendix 15**).	Prior to the Construction of the Project
3	Installation of a Culvert on Ringwood Road at Bow River.	Prior to the Construction of the Project
4	Installation of a Culvert on Ringwood Road at Killoe Creek.	Prior to the Construction of the Project

Impacts from construction traffic associated with the road and culvert upgrades are anticipated to be minor given the low volume of traffic using these roads. Furthermore, the number of construction vehicles generated during the road and culvert upgrades would be lower than the number of construction vehicles generated during construction of the Project. The community would be notified of any works proposed and changed road conditions so that impacted road users can plan their trips well in advance of the proposed changes.

6.9.3.4 Impacts on Road Network

The peak construction year assessed in the TTIA is 2025, representing a worst-case scenario when background traffic volumes and construction volumes are at their highest. A two per cent per year background traffic growth rate was applied to the 2022 traffic volumes collected, based on corridor growths outlined in the *Golden Highway Corridor Strategy* (Transport for NSW, 2016).

Peak hour construction volumes were determined by applying the following assumptions to the daily construction volumes outlined above:

- All light vehicle and shuttle bus trips were assumed to travel inbound during the morning peak hour and outbound during the evening peak hour to represent a worst-case scenario. In reality, the majority of light vehicle and shuttle bus trips would likely occur before the morning peak hour and after the evening peak hour.
- Light vehicle and shuttle bus trips were evenly distributed on the road network, with equal proportions travelling to and from the Project Area from the north and south.
- Ten percent of daily heavy vehicle trips were assumed to occur during the peak periods.
- Inbound and outbound heavy vehicle trips were assumed to occur during both peak periods.
- Oversized vehicle trips would not occur during the peak periods.
- Shuttle buses have been classified as heavy vehicles for modelling purposes.

Modelled intersection performance with the addition of Project construction traffic is predicted to result in a marginal increase in average travel time of up to one second, with the LOS at both intersections remaining at 'A'. Both intersections would continue to operate with spare capacity, low average delays and minimal queues during the morning and evening peak periods. Therefore, overall impacts on road network performance during construction are anticipated to be minor.

The *Guide to Road Traffic Management Part 6: Intersections, Interchanges and Crossings Management* (Austroads, 2020) specifies warrants for additional turning bays at intersections, based on a combination of peak hour through and turning traffic movements. Calculations for the Golden Highway – Ringwood Road intersection (traffic from the north of the Project Area) and the Ringwood Road – Wollar Road intersection (traffic from the south of the Project Area) are provided in **Appendix 15** and conclude that additional turn treatments would not be required at either intersection during construction. This is supported by the 2025 intersection performance results where both intersections would operate with spare capacity and at a good Level of Service (LOS) (a traffic grading system used to asses performance of transport infrastructure) during construction.

6.9.3.5 Impacts on Public and Active Transport

Minimal impacts are anticipated on bus services that travel on the Golden Highway or Wollar Road given the infrequency of these bus services, the low volume of peak hour construction traffic generated by the Project, and the ample spare capacity available on the road network. Furthermore, construction vehicles on Wollar Road approaching the Project Area from the south would comprise of light vehicle and shuttle buses. These trips would generally occur prior to school start and end times. Hence, it is unlikely that the school bus service operating on Wollar Road would interact with construction traffic.

Similarly, given the infrequency of train services, impacts on the rail network due to the Project are expected to be minimal. Level rail crossings located on Ulan Road, Wollar Road and Ringwood Road would be traversed by construction light vehicles and shuttle buses travelling to and from the Project Area from the south. Given the infrequent number of trains using this line, minimal impacts are anticipated on the rail network.

No impacts on the pedestrian network are anticipated during construction, given the limited pedestrian infrastructure in the study area. Similarly, the overall impact on cyclists is anticipated to be minor, given the low cyclist volumes on the Golden Highway, Ringwood Road and Wollara Road.

6.9.4 Cumulative Traffic Impacts

Approved and proposed projects within proximity to the Project that have construction programs that overlap with construction of this Project may present cumulative impacts relating to the combined increased demand on local infrastructure, transport and services. Projects that were considered for the cumulative construction traffic impact assessment are:

- Stubbo Solar Farm
- Wollar Solar Farm
- Dunedoo Solar Farm
- Liverpool Range Wind Farm
- Valley of the Winds Wind Farm
- Bowdens Silver Project
- Barneys Reef Wind Farm
- Tallawang Solar Farm
- Birriwa Solar Farm
- Merriwa Solar Farm (Merriwa Energy Hub)
- Spicers Creek Wind Farm
- Sandy Creek Wind Farm
- Cobbora Solar Farm.

Figure 6.22 shows the location of these projects in relation to the Project Area.

Projects were assessed based on their proposed vehicle routes, construction timing and anticipated traffic generation rates, where available (refer to Section 4.1.5 of **Appendix 15** for further detail). The assessment concluded that cumulative impacts are anticipated to be minor given that the Golden Highway is the only common construction vehicle route for the majority of nearby relevant projects and has spare capacity to accommodate cumulative construction vehicle volumes. In addition, peak construction of some projects would not coincide with peak construction of this Project. During non-peak construction of other projects, the surrounding road network would be able to accommodate the additional construction volumes due to spare capacity available.

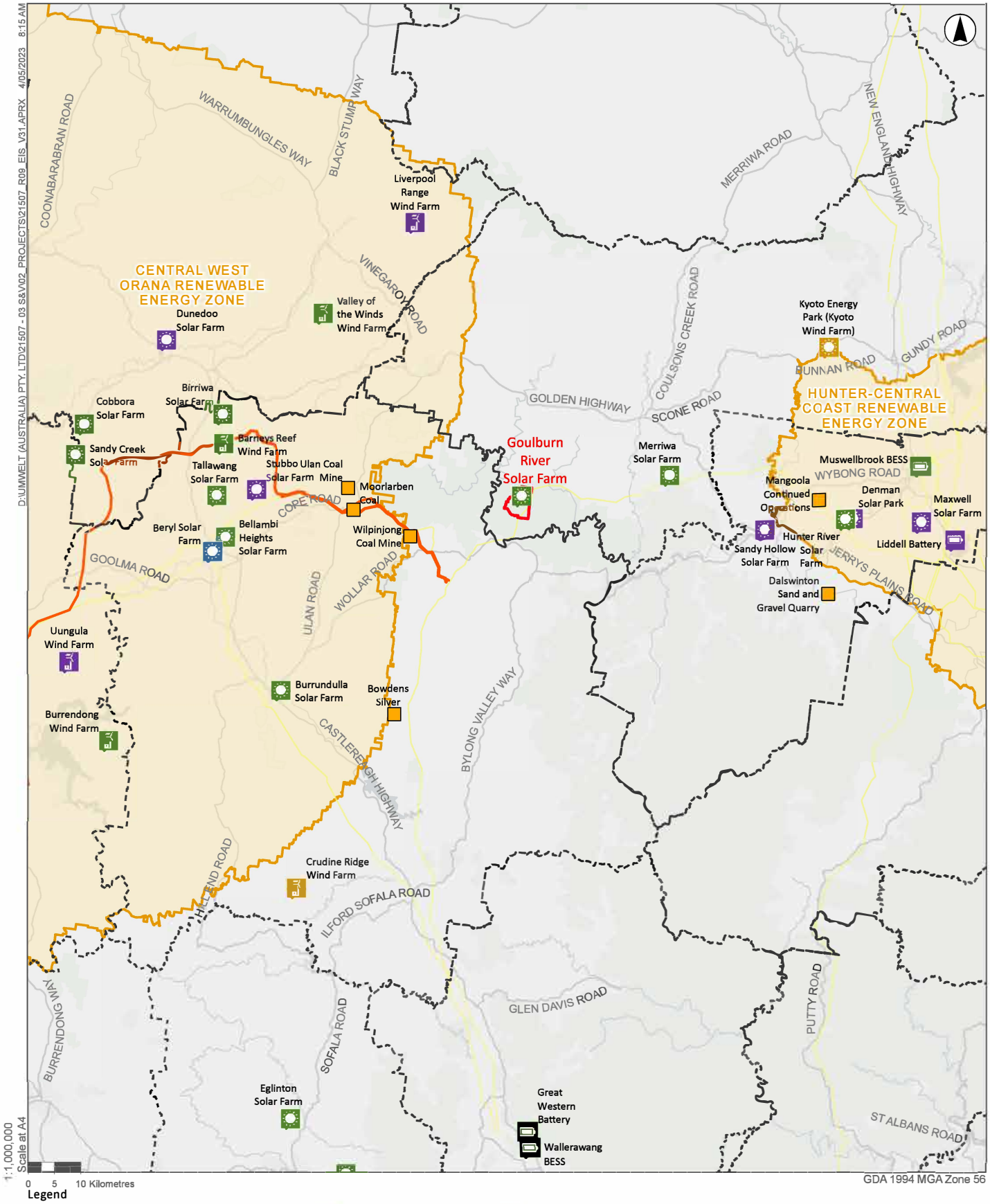


FIGURE 6.22

Nearby Projects for Cumulative Impact Assessment

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

6.9.5 Management and Mitigation Measures

The following mitigation and management measures are recommended to minimise traffic and transport impacts during construction and/or operation of the Project:

- Prior to the commencement of construction, a Construction Traffic Management Plan (CTMP) would be prepared in accordance with relevant guidelines and in consultation with TfNSW, Upper Hunter Shire Council, National Parks and Wildlife Service and any other relevant stakeholders. The CTMP would outline how construction activities would avoid, mitigate and manage risks involving construction activities, users of the traffic and transport network and residents.
- Deliveries to the Project Area (excluding OSOM) would be carried out by 19 m semi-trailers to comply with heavy vehicle restrictions on Wollara Road and Ringwood Road.
- A detailed OSOM route assessment would be undertaken by the construction contractor and detailed in a CTMP when OSOM vehicle dimensions and loadings are confirmed to determine traffic management requirements.
- The community would be notified in advance of proposed road and transport network changes through appropriate media and other forms of community liaison.
- Where relevant, Road Occupancy Licences (ROLs) and crane permits would be submitted and approved prior to the closure of any roads.
- Construction workers would be encouraged to carpool or use the shuttle buses to travel to and from the construction site.
- Parking requirements for the Project during construction and operation would be provided on-site, and parking would not be provided on public roads adjacent to the Project Area.
- Additional warning signs are recommended along sections of Ringwood Road and Wollara Road where the road narrows and near the site access points.
- Upper Hunter Shire Council will continue to be consulted on repairs required to parts of Ringwood Road.

6.10 Water Resources

A Water Resources Impact Assessment (WRIA) has been prepared by Umwelt (2023, refer to **Appendix 16**) to assess the potential impacts of the Project on flooding, groundwater levels, erosion and sedimentation, water quality, water users and water sourcing and licensing. The WRIA addresses the requirements of the SEARs with respect to water, as listed below:

- An assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts.
- Details of water requirements and supply arrangements for construction and operation.
- A description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).

It is noted that the SEARs also require identification of likely impacts to waterfront land and an assessment of activities with regard to DPI guidelines, and these aspects are discussed in the Aquatic Biodiversity assessment in **Section 6.3.2**.

A copy of the WRIA is provided in **Appendix 16** with key outcomes summarised in the sections below.

6.10.1 Existing Environment

As discussed in **Section 2.3.2**, the Project Area is located within the Hunter River catchment, within the Goulburn River sub-catchment. The majority of the watercourses in the Project Area are first and second order streams, with sections of Redlynch Creek, Rocky Creek and Monaghans Creek also becoming third order watercourses within the Project Area. All watercourses within the Project Area eventually flow into the Goulburn River (refer to **Figure 6.23**). The identified watercourse alignments within their corresponding Strahler stream order are also shown in **Figure 6.23**.

The topography of the Project area varies, with the majority of the Project Area lying between elevations of 400 m AHD and 440 m AHD. As the Project Area is located on top of a ridge, watercourses and unnamed flow paths within the Project Area are located towards the boundary. There are approximately 20 to 30 small man-made farm dams present within the Project Area where water pooling occurs for extended periods.

Groundwater within the Project Area is managed under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources* (DPE, 2022). Areas to the south-west and north-west of the Project Area, surrounding the Goulburn River are mapped in the Upper Hunter LEP as areas of 'Groundwater Vulnerability'. There are no identified areas of groundwater vulnerability within the Project Area.

There are no registered groundwater bores within the Project Area. The closest groundwater bore is approximately 3 km north-west of the Project Area and is used for stock and domestic water supply purposes. The last recorded groundwater depth at this location was 41 m below ground level in June 2014 (WaterNSW, 2021). Three bores approximately 4 km south of the Project Area located along the Goulburn River are used for either monitoring or water supply purposes.

The Goulburn River supports a number of identified moderate and low priority groundwater dependent ecosystems (GDEs) within the area surrounding the Project Area. Moderate potential aquatic GDEs were identified along significant reach lengths of the Goulburn River, west and south of the Project Area. Low potential terrestrial GDEs were identified within the Project Area, with some isolated small areas of medium and high potential terrestrial GDEs located well downstream of the Project Area along the natural surface water drainage paths (Bureau of Meteorology, 2017).

6.10.1.1 Water Licensing Requirements

The Project Area is subject to the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2022. Licensed surface water use in the Upper Goulburn River Water Source is primarily for agriculture (irrigation) use.

Approximately 20–30 small man-made farm dams located within the Project Area and are currently used for livestock water points.

The existing dams within the Project Area are unlikely to be licensed as they capture water under a harvestable right. The total capacity of all dams on a property allowed under the harvestable right is called the Maximum Harvestable Right Dam Capacity which has been calculated for the Project Area as 130 megalitres (based on a Project Area of 2,000 ha) (WaterNSW, 2022b). No change in licensing is expected to be required, however this will be confirmed prior to construction.

No change to the natural surface waterway outlets from the Project Area is being proposed and no water discharge is proposed as part of the Project.

6.10.1.2 Proposed Water Supply and Use

During construction, non-potable water would primarily be used for plant establishment, dust suppression and site ablutions. The associated water demand for the 27-month construction period is estimated to peak at 11.26 ML/month.

During operations, non-potable water would be required for occasional maintenance activities such as washing of the PV solar panels, amenities and potable water would be required by operational staff as well as for stock. Washing of the panels would not require any detergent or cleaning agents. It is expected that this water demand would be minimal. Average water use will be 3,000 L used onsite each day at the O&M facility, water for livestock is approximately 8–16,000 L per day and 8 ML per year for panel cleaning. In addition to this 2 ML per year is estimated for onsite works like road maintenance.

Potable water demands for both the construction and operational phases of the Project will be primarily sourced from rainfall stored in on-site water tanks at the O&M facility and augmented by water trucks if required. Potable water storages will be routinely tested to ensure water quality meets the requirements of the Australian Drinking Water Guidelines (ADWG) and an appropriate maintenance regime will be implemented to ensure ADWG water quality standards are maintained.

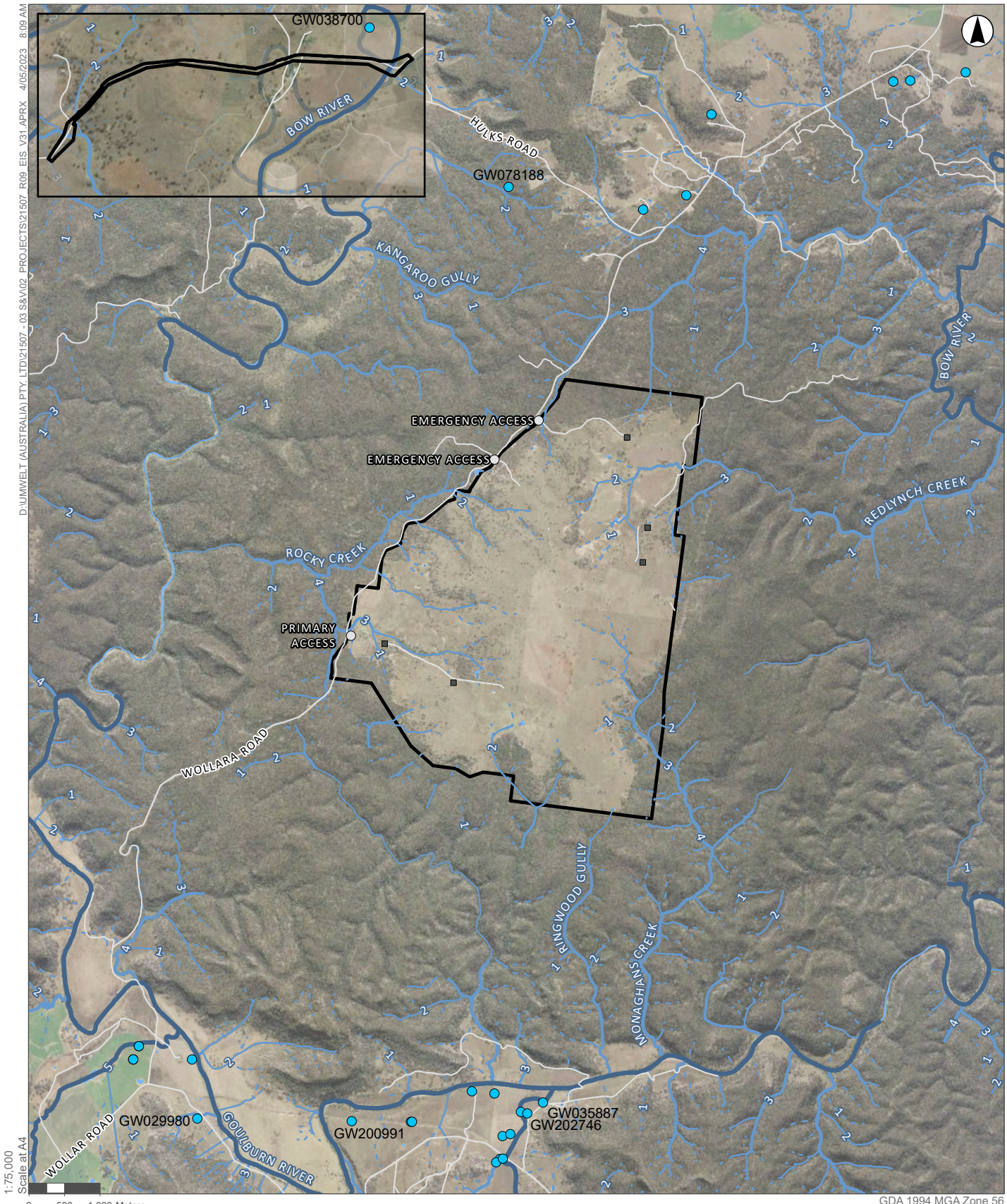


FIGURE 6.23

Hydrological Context

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

6.10.2 Assessment Methodology

The hydrological assessment was undertaken in accordance with Australian Rainfall and Runoff (Ball et al., 2019) and with consideration of the relevant provisions of the NSW Floodplain Development Manual (2005). There are no specific floodplain risk management plans prepared by Upper Hunter Shire Council that cover the Project Area. There are also no rural floodplain management plans covering the Project Area, but the analysis and reporting undertaken in the WRIA is consistent with the expectations of a Rural Floodplain Management Plan.

A flood 164nvestingation was undertaken for 10%, 1%, 0.5% and 0.2% Annual Exceedance Probability (AEP) events and the Probably Maximum Flood (PMF). AEP is a measure of the likelihood a flood level or flow will be equalled or exceeded in any given year. The PMF is the largest flood that could be conceivably expected to occur at a particular location.

Hydraulic modelling of the Project Area was completed using a two-dimensional (2D) TUFLOW flood model. TUFLOW software is one of the most widely used hydraulic modelling software packages in Australia and is considered an appropriate modelling tool for modelling riverine and local overland flooding.

The model provided estimates of flood levels, depth, velocities, and flood hazard for each of the modelled design events. The hydraulic model was run for both existing and climate change conditions. Climate change modelling was undertaken using the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood-producing rainfall events due to climate change.

6.10.3 Assessment of Impacts

The WRIA discusses potential impacts to water resources as a result of the Project in relation to:

- Impacts to surface water quality of receiving and downstream waterways.
- Impacts to flooding, including flow rates, velocities and depths.
- Impacts on water supply.
- Impacts to groundwater, including impacts to downstream users and GDEs.

6.10.3.1 Water Quality Impacts

Water quality impacts are most likely to be experienced during construction and decommissioning of the Project, when soils would be subject to disturbance due to vegetation removal, excavation works and stockpiling of materials, which can potentially lead to sediments and/or pollutants mobilising in runoff and entering local waterways. The key factor influencing the extent of sediment runoff and stormwater pollution is likely to be weather events. The occurrence of a major storm event at a critical phase of the construction period could potentially result in higher levels of turbid runoff. With the implementation of erosion and sediment control measures (outlined in **Section 6.10.5**) potential construction-related erosion and sedimentation impacts would be appropriately managed and are expected to be minor.

Water quality impacts during the operational phase are expected to be minimal as the day-to-day activities during this phase would be limited to routine maintenance and monitoring. There is potential however for stormwater runoff from impervious surfaces, accidental spills or discharge through use and storage of chemicals such as fuel as well as the use of herbicides for vegetation control. With the implementation of operational management measures outlined in **Section 6.10.5** water quality impacts are expected to be negligible.

Road upgrades along Ringwood Road are expected to have minimal impacts during construction and with the implementation of erosion and sediment control measures, and the design of appropriate erosion and scour protection, potential construction-related erosion and sedimentation impacts would be appropriately managed. The potential operational impacts are mitigated through detailed design being undertaken in line with relevant guidelines prior to any works commencing. With the implementation of management measures outlined in **Section 6.10.5** water quality impacts from road upgrades are expected to be minimal.

6.10.3.2 Impact on Stream Stability, Riparian Health and Fish Passage

There are several ephemeral and perennial streams traversing the Project Area, while design has sought to avoid works in or near these areas, several waterway crossings will be required for site access, internal roads and electrical cabling. Project crossings will be designed to minimise impacts on stream stability and fish passage with reference to relevant and current guidelines and standards.

Works on waterfront land defined as within 40 m of top of bank of defined 3rd order stream, i.e. the lower reaches of Redlynch Creek, Rocky Creek, Monaghans Creek and Road Repairs and Upgrades at Bow River and Killoe Creek) will be managed through measured outlined in the Soil and Water Management Plan, detailed in **Section 6.10.5** and will be incorporated into the design of the works.

6.10.3.3 Flooding Impacts

The Project Area was found to present a low risk of flooding under both the existing and climate change conditions modelled. Detailed flood modelling results are provided in Appendix C of the WRIA (refer to **Appendix 16**) and summarised below for each event.

10% AEP Modelling Results

The 10% AEP modelling results show there is generally no widespread flooding within the Project Area, with active flowpaths typically confined within the watercourses and local depressions. The flood hazard within the site for this flood event is mostly characterised as H1: 'Generally safe for vehicles, people and buildings', with isolated areas of higher flood hazard (H5 and higher) predicted in the north-eastern and southern areas of the Project Area, however these areas are well confined to the waterways and defined drainage lines (which will be avoided).

1% AEP Modelling Results

The 1% AEP event represents the principal flood planning event for the Project. The general flood inundation patterns and extents are similar to the 10% AEP event, albeit with increasing depths and velocities associated with the higher flows. The Project Area is typically located over the upper catchments of the minor watercourses that flow through the Project Area, and this provides for the 1% AEP flood inundation to be largely confined to narrow corridors along the watercourse alignments.

Flood depths remain generally less than 0.3 m along overland flow paths and local depressions, with depths of flow along the minor watercourses within the Project Area typically up to 1 m with some localised higher depths along the reaches. A similar flood depth range is observed for farm dams. The mainstream flooding of the creek adjacent to the Project Area is still relatively confined.

High velocities up to approximately 4.5 m/s are predicted within the north-east and western channels. Review of aerial imagery shows existing evidence of erosion and sedimentation (due to higher flow velocities and steeper areas).

The flood hazard within the Project Area for this flood event is mostly characterised as H1: 'Generally safe for vehicles, people and buildings', and only reaches above this in the waterways and defined drainage lines. Within some of the watercourse alignments, flood hazard classes H5 and H6 are attained and accordingly would represent areas where infrastructure should be avoided.

Climate Change Modelling Results

The flood inundation patterns and extents are generally similar to the 1% AEP design results (as discussed above). The modelling shows no activation of additional flow paths or extended inundation areas that materially impact on the proposed development.

Flood depth remains generally less than 0.3 m for overland flow areas with flood depths up to 2 m along the well-defined mapping extents of the larger watercourses.

The 0.5% and 0.2% AEP climate change flood depths are only marginally larger than that of 1% AEP existing conditions. Higher AEP events show similar results indicating the inundation impact of climate change is not anticipated to be a significant issue for the Project. The results suggest the Project Area is able to drain effectively without a significant increase in floodplain area which could hold water at high depths for extended periods of time.

PMF Modelling Results

Under the modelled PMF event, flood extents along the defined watercourses and overland flow paths have generally increased with broader areas of overland sheet flow (up to 0.5 m depth) as a result of extreme rainfall intensity, but are still typically confined to the general watercourse alignments albeit with increasing flood depth. The watercourses within the Project Area have flood depths up to 4 m in the lower reaches with a similar flood depth range observed within the Project Area's dams under the PMF event.

Corresponding to the increase in the flood depth distribution across the Project Area, flow velocities are increased for the PMF event. Within defined watercourses, velocities reach between 5.0 and 6.0 m/s. Review of aerial imagery shows evidence of erosion and sedimentation due to higher flow velocities and steeper areas.

The flood hazard within the Project Area is mostly characterised as H1: 'Generally safe for vehicles, people and buildings' and only reaches above this in the waterways and defined drainage lines. Within some of the watercourse alignments, flood hazard classes H5 and H6 are attained and accordingly would represent areas where infrastructure should be avoided.

A comparison of the 1% AEP and PMF inundation extents is shown on **Figure 6.24**.

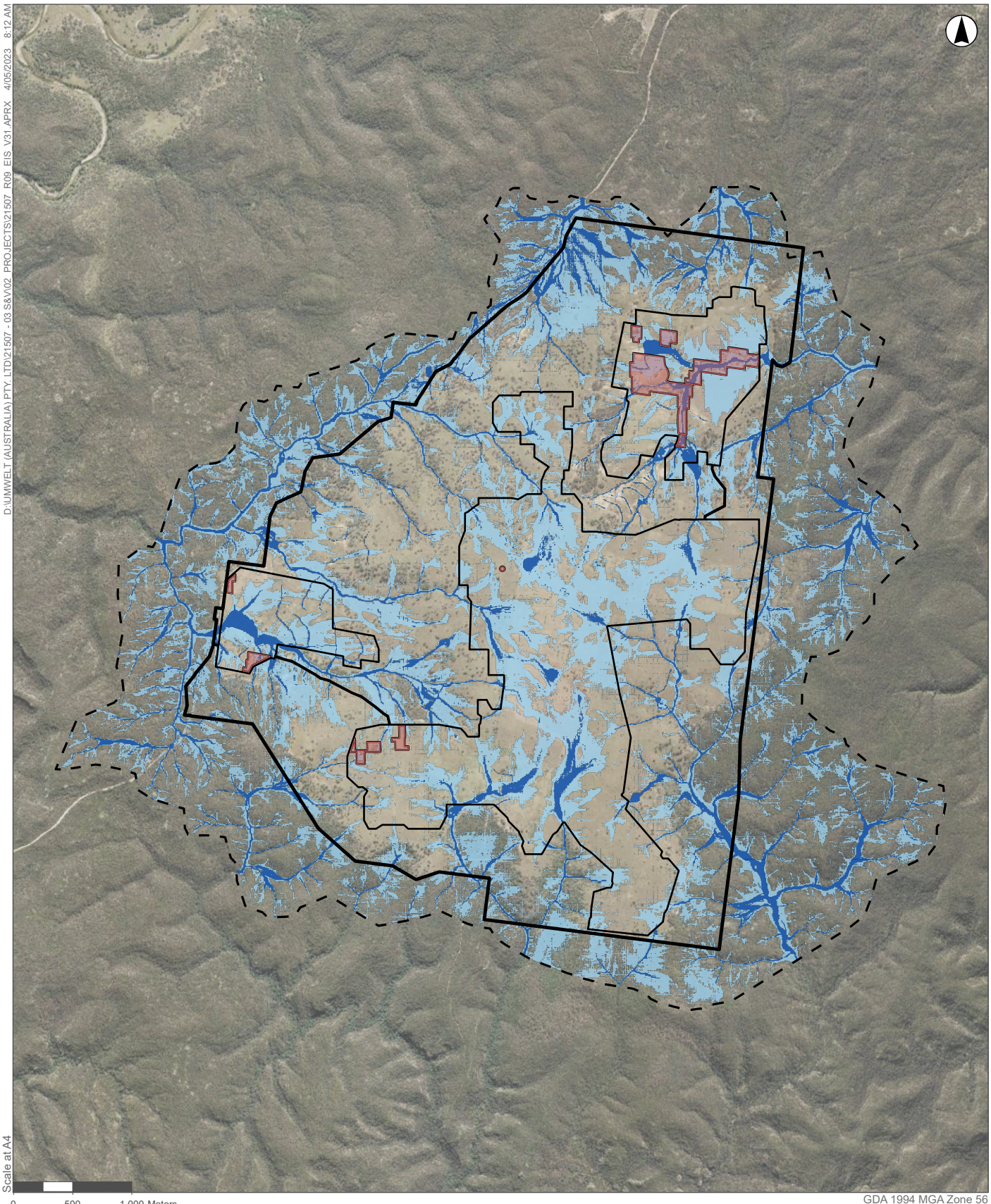


FIGURE 6.24

Flood Extents

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

6.10.3.4 Water Supply Impacts

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, subject to availability. A water sourcing strategy would be developed to ensure there are no water supply impacts to adjacent landowners or other stakeholders. The use of any farm dams would be agreed with the landholder, water usage for the Project construction and operation is described in **Section 3.7**.

Water requirements beyond existing water rights would be sourced from commercial suppliers and delivered to the Project Area by water tanker. Based on the above, it is anticipated that the Project's proposed water use during construction and decommissioning would not have a negative impact on water supply to the Project Area and the region.

During operations, a minimal water demand would be required for ongoing maintenance activities washing PV panels, amenities, and potable purposes by operational staff as well as for stock. Potable water demands for both the construction and operational phases of the Project will be primarily sourced from rainfall stored in on-site water tanks at the O&M facility and augmented by water trucks if required.

6.10.3.5 Groundwater Impacts

Impacts to groundwater resources, including GDEs, are not expected as the groundwater table is unlikely to be intercepted during Project construction, operation or decommissioning. Groundwater is not proposed to be used to supply water to the Project and the depth to groundwater within the Project Area (based on available information) means that groundwater quality impacts are also unlikely.

6.10.4 Cumulative Water Impacts

Cumulative impacts are considered to be negligible as the Project is located in the upper reaches of the catchment (mainly 1st and 2nd order streams) and other projects do not occur in these areas. Culvert upgrades at Killoe Creek and Bow River (4th and 5th order steams) will temporarily impact these watercourses. The culvert works are not anticipated to lead to long term or cumulative impacts on the streams as regular flow regimes will be restored following construction.

6.10.5 Management and Mitigation Measures

The following mitigation and management measures are recommended to minimise water impacts during construction and/or operation of the Project:

- Solar panels will be designed to provide a minimum of 300 mm freeboard for the lowest edge above the maximum 1% AEP flood level.
- Solar panel piles will be designed to withstand the 1% AEP flood velocities expected in the Project Area.
- No sensitive infrastructure (e.g., substation, BESS, etc.) will be placed within 20 m of any Strahler 3 or above order streams.
- All waterway crossings will be designed and constructed in compliance with DPI Water Guidelines, including:

- Guidelines for Controlled Activities on Waterfront Land (the CAA Guidelines) (Department of Planning, Industry and Environment (DPIE) Water, 2018).
- Why Do Fish Cross the Road? Fish Passage Requirements for Waterway Crossings (NSW Department of Primary Industries (DPI) Fisheries, 2003).
- Fisheries NSW Policy and guidelines for fish habitat conservation and management, (NSW DPI, 2013).

- Further flood investigations will be carried out where required during detailed design to confirm the flood immunity objectives and design criteria for the Project are met.
- 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.
- Debris will be cleared from fencing following flood events.
- An OEMP will be developed for the Project to address potentially adverse impacts on the receiving environment surface water quality during the operational phase. This will include the development and appropriate maintenance of suitable ground cover around solar panels, and grassed table drains near access tracks to minimise the potential for erosion and export of sediment. Additional measures for the treatment of stormwater quality are not considered necessary.
- Water sources would be confirmed during the detailed design phase and in consultation with suppliers and landholders and be subject to availability.
- Post-construction, disturbed areas will be stabilised by the establishment and maintenance of a vegetated ground cover consisting of low-growing grasses.
- Proposed road repairs and culvert upgrades at Ringwood Rod would have:
  - Appropriate scour protection designed for the upgrades.
  - Be designed to minimise afflux at an acceptable level.
  - Be designed to accommodate a 5% AEP event.
  - Be constructed at existing invert levels or similar to maintain existing flow conveyance in channel.

6.11 Hazard, Risk and Bushfire Threat

Regarding hazard and risk, the SEARs require the EIS to include:

- A preliminary risk screening completed in accordance with *State Environmental Planning Policy– Resilience and Hazards 2021 (*Resilience and Hazards SEPP) (formerly SEPP 33).
- A Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis* (DoP, 2011) *and Multi-Level Risk Assessment* (DoP, 2011). The PHA must consider all recent standards and codes and verify separation distances to on-site and off-site receptors to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, '*Risk Criteria for Land Use Safety Planning*' (DoP, 2011).

- An assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, electric and magnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric and Magnetic Fields.

The hazard and risk assessments to address the SEARs are provided in the following sections.

6.11.1 Existing Environment

The Project Area is relatively isolated and there are no direct residential neighbours, however several rural properties occur within a 10 km radius of the Project Area. The closest residents are within 3 km and there is one dwelling (host landholder) located within the Project Area (refer to **Figure 2.2**).

Land within the Project Area has been subject to extensive clearing associated with historic agricultural land use, with areas of scattered woodland vegetation. It is physically isolated from nearby residential receivers by the surrounding forest vegetation associated with the Goulburn River National Park and Tongo State Forest, which represent a potential bushfire threat to the site due to high fuel loads (refer to **Section 6.11.3** below). The Project Area is traversed by an existing 500 kV transmission line which crosses the south-east portion of the site.

6.11.2 Preliminary Hazard Analysis

A Preliminary Hazard Analysis (PHA) was prepared by Umwelt (2023) in accordance with the SEARs for the Project and relevant guidelines and legislative requirements. The following section contains a summary of the key outcomes of the PHA, while a full copy of the report is provided in **Appendix 17**.

6.11.2.1 Methodology

The PHA considered the hazards and risks posed to off-site receivers and involved dwellings associated with the transport, storage and use of hazardous materials for the Project and has been prepared generally in accordance with:

- Resilience and Hazards SEPP.
- Applying SEPP 33: Hazardous and Offensive Development Application Guidelines (NSW Department of Planning, 2011).
- Multi-Level Risk Assessment (NSW Department of Planning, 2011).
- Hazardous Industry Planning and Advisory Paper 4 – Risk Criteria for Land Use Safety Planning (HIPAP 4) (NSW Department of Planning, 2011).
- Hazardous Industry Planning and Advisory Paper 6 – Hazard Analysis (HIPAP 6) (NSW Department of Planning, 2011).
- Manual for Classification of Risks due to Major Accidents in Process and Related Industries (International Atomic Energy Agency, 1996).

The detailed methodology and calculations used to identify and assess the potential hazards and respective failure scenarios that have the potential for off-site impacts are outlined in **Appendix 17** with results detailed in the sections below.

6.11.2.2 Preliminary Risk Screening

The hazardous materials to be stored/used/transported for the Project are:

- Lithium-ion batteries (LIBs), a Class 9 miscellaneous dangerous good.
- Electrical transformer insulating oil, which is not classified as a dangerous good.

Neither of these hazardous material types has a relevant screening threshold in the Resilience and Hazards SEPP. However, with the rapid proliferation of LIBs in portable devices, electric vehicles, energy storage systems and a range of other applications in recent years, the potential hazards associated with LIBs have become evident. It is known that LIBs may present fire, explosion and toxic gas release hazards as a result of manufacturing faults or a range of battery abuse scenarios. Therefore, given the large scale of the Project BESS, the limited global experience with large capacity grid connected LIB BESSs, and to maintain a conservative approach with respect to the assessment of hazards and risk, further assessment was considered appropriate.

Based on the very low frequency of hazardous materials being transported to the Project Area and the use of suitably accredited freight companies, no further assessment of transport risks (e.g. a transport route analysis) was considered necessary.

6.11.2.3 Risk Assessment

The PHA identified a number of hazard events involving LIBs and electrical transformers with the potential for harmful off-site impacts. It was determined using the Multi-Level Risk Assessment (2011) risk classification and prioritisation process that a Level 2 semi-quantitative risk assessment would be required to demonstrate that the Project can comply with relevant criteria.

Fire, explosion and toxic gas release events were modelled to determine the required distance that LIB units should be distanced from the site boundary and involved dwellings to ensure the risk criteria provided in HIPAP 4 are met.

The semi quantitative analysis undertaken estimated that the greatest distance from a LIB cell (Gridstack Fluence Cube) at which an individual could be subject to injurious impact is 68 m as a consequence of a BESS explosion scenario at a frequency of less than 10^{-5} events per year. Given Lightsource bp will locate all Gridstack Fluence Cubes at least 68 m from the site boundary and involved dwellings, no off-site impacts with the potential to cause injury or fatality are predicted.

A risk assessment considering the results of the consequence modelling and the estimated likelihood of a LIB fire/thermal runaway scenario resulting in either a fire, explosion or toxic gas release indicated that the Project would comply with HIPAP 4 risk criteria for land use planning provided adequate separation distances between Gridstack Fluence Cubes and the site boundary/involved dwellings are maintained.

6.11.2.4 Risk Management and Mitigation Measures

Lightsource bp will implement a range of technical and non-technical risk mitigation and management measures including rigorous design standards and maintenance practices. Compliance with HIPAP 4 criteria is conditional on these technical and non-technical risk mitigation and management measures being implemented.

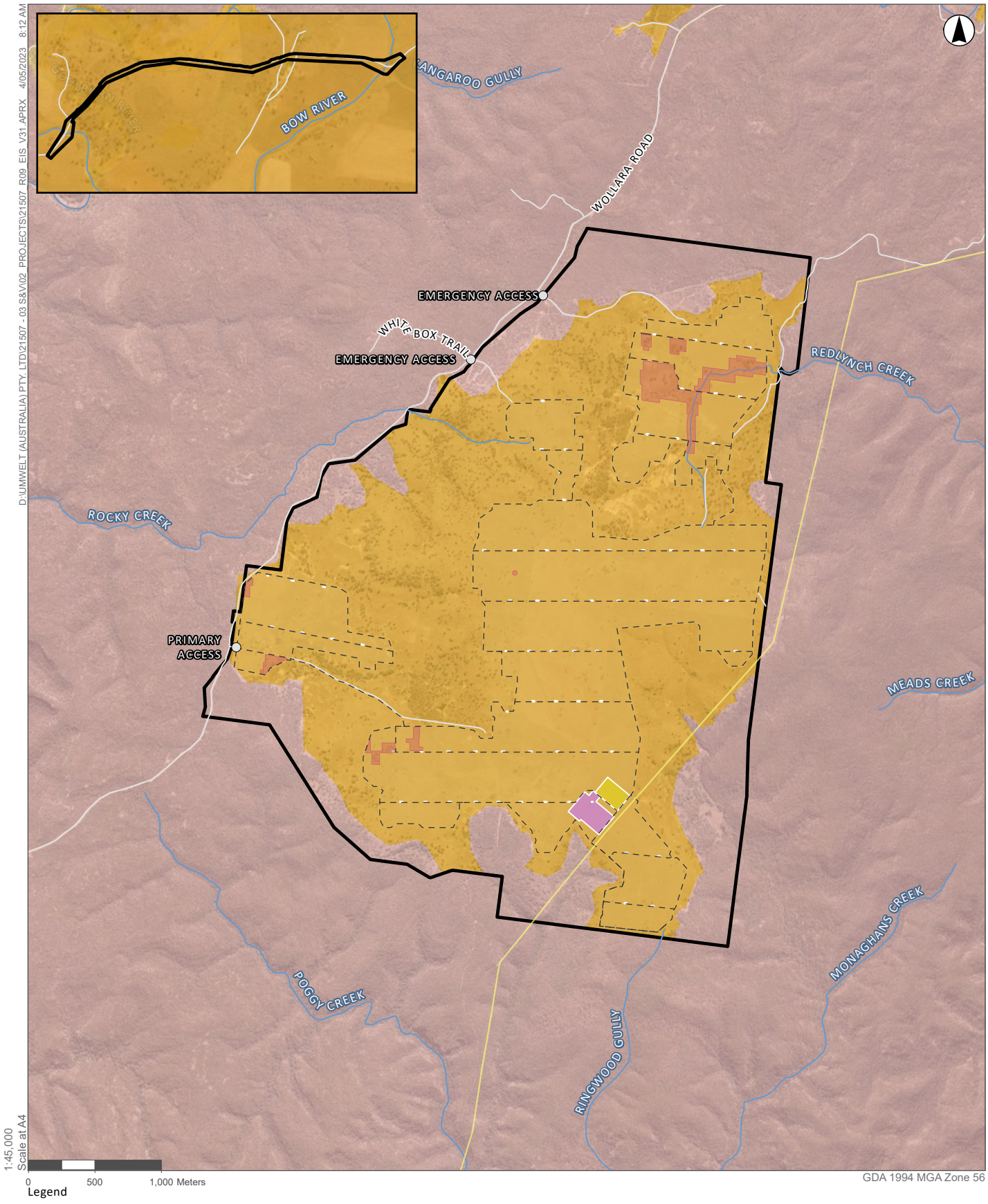
It is considered that the fire and explosion risks associated with the substation can be adequately managed provided electrical transformers are designed, installed, operated and maintained in accordance with relevant Australian Standards. Lightsource bp is committed to ensuring that this is achieved.

A Final Hazard Analysis, Fire Safety Study and Emergency Plan will be developed as the Project design progresses toward completion to ensure the final Project design adheres to the risk management measures outlined in the PHA and that the separation distances to the site boundary/involved dwellings are appropriate for the specific battery cell type (i.e. chemistry and capacity) to be used.

6.11.3 Bushfire Risk

The Project Area is identified as bushfire prone land by the NSW Rural Fire Service (RFS) bushfire prone land mapping (NSW RFS, 2021) and the SEARs require an assessment of hazards and risk associated with bushfire.

Land within the Project Area has been subject to extensive clearing associated with historic agricultural land use, with areas of scattered woodland vegetation remaining. The property is surrounded by forest vegetation associated with the Goulburn River National Park which represents the potential bushfire threat to the Project Area. Land within the Project Area is mapped as Category 2 vegetation which is generally considered lower risk vegetation. It is characterised by remnant vegetation and represents a lower bushfire risk to surrounding development. The Goulburn River National Park is mapped as Category 1 vegetation which is characterised by areas of forest with high fuel loads.



Legend

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

Bushfire Prone Land

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3

FIGURE 6.25

Bushfire Prone Land

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

6.11.3.1 Methodology

This section provides a bushfire threat assessment in accordance with *Planning for Bushfire Projection 2019* (PBP 2019) and the SEARs, including an assessment of potential bushfire hazards applicable to the Project Area and the proposed bushfire management for the Project.

It is noted that consultation with NSW RFS and Fire and Rescue NSW (FRNSW) has also been undertaken for the Project. This is further discussed in **Section 6.12**.

6.11.3.2 Bushfire Assessment

Planning for Bushfire Protection (PBP 2019) (NSW Rural Fire Service, 2019) requires solar farms to have adequate clearances to combustible vegetation as well as firefighting access and water. At a minimum, a 10 m Asset Protection Zone (APZ) is required for the structures and associated buildings/infrastructure (with the APZ being maintained to the standard of an Inner Protection Area) for the life of the Project. Essential equipment for solar farms should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies. It should also be designed and maintained so that it will not serve as a bush fire risk to surrounding land.

As discussed in **Section 6.11.2**, the PHA indicates that appropriate risk management measures can be applied to the Project to meet HIPAP 4 risk criteria for individual fatality, injury and propagation. Appropriate hazard safeguards and controls have been identified to be applied to the Project through the development and implementation of the Emergency Plan which will assist with the management of bushfire (refer to Section 7.3 of the PHA in **Appendix 17**).

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.

6.11.3.3 Bushfire Management and Mitigation Measures

Asset Protection Zones

The design of the solar farm will include a minimum 10 m setback around the perimeter of the Development Footprint. The proposed layout will also include 4 m wide access tracks around the perimeter of the proposed infrastructure within the 10 m setback, assisting with separating the infrastructure from adjacent vegetation within the Project Area. These setbacks provide for sufficient separation distances to limit the spread of bushfire and to provide an adequate defendable space for firefighting. The solar farm will be appropriately maintained over the life of the Project and all vegetation maintenance and management will be undertaken in accordance with relevant requirements set out in the proposed Bushfire Management Plan.

Access

As discussed in **Section 3.3.4,** 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 provide emergency access only, with primary access provided through the southern access point.

Internal access roads consisting of compacted gravel, approximately 4 m wide, would be constructed to accommodate construction and operational traffic movements and emergency access throughout the Project Area. The indicative location of the access roads is illustrated on **Figure 1.4**. Roads will be maintained throughout the Project life to allow for safe and accessible travel of emergency vehicles (if required).

Water Supply

An appropriate dedicated water supply for bushfire protection will be provided. Water supply for the Project would likely be sourced from commercial suppliers in the nearby region (via water trucks), rain water collected from onsite rainwater tanks (at O&M facility) or farm dams within the Project Area (subject to availability).

Emergency Plan

An Emergency Plan (EP) will be developed and implemented for the Project in accordance with PBP 2019 and *Hazardous Industry Planning and Advisory Paper No. 1 – Emergency Planning* (HIPAP 1) (DoP, 2011b) in consultation with relevant emergency services organisations (i.e. Fire and Rescue NSW (FRNSW), NSW Rural Fire Service (RFS), NSW Ambulance) and the Local Emergency Management Committee (LEMC). The EP will detail the management measures to minimise the risk of hazardous events as well as emergency response procedures including an evacuation plan for site personnel, nearby dwellings and surrounding premises (refer to Section 7.3 of the PHA in **Appendix 15** for further detail).

6.11.4 Electromagnetic Fields

In accordance with the SEARs, a qualitative assessment of the risks associated with potential electromagnetic fields (EMF) and the proposed grid connection infrastructure has been undertaken, and suitable safeguards and mitigation measures have been proposed to reduce any potential risks.

6.11.4.1 Background and Guidelines

Electric and magnetic fields (EMF)occur wherever electricity is produced, transmitted or used, and so are found commonly in everyday life. Many of the fundamental components of a solar farm (including power conversion (inverter) units, substations and powerlines) inherently produce varying levels of EMF emissions. The solar PV arrays themselves do not emit EMF. EMF is only present once the inverter stations convert the electricity produced into an alternating current (AC). In Australia, electrical devices and infrastructure such as transmission lines and substations, operate at a frequency of 50 Hz which falls within the Extremely Low Frequency (ELF) range of EMF between 0 and 300 Hz.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Commonwealth Government's primary authority on radiation protection and nuclear safety. The ARPANSA website notes that "*exposure to ELF (extremely low frequency) EMF at high levels can affect the functioning of the nervous system*" but that "*most of the research indicates that ELF EMF exposure normally encountered in the environment, including in the vicinity of powerlines, does not pose a risk to human health*". Generally, distances beyond 50 m from a high voltage powerline are not expected to have higher than typical EMF and for substations EMF levels at distances of 5 to 10 m away are no higher than background levels in a typical home.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) published *Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)* in 1998. The guidelines were updated in 2010, specific to the low-frequency range of the electromagnetic spectrum, i.e. from 1 Hz to 100 kHz with the objective of establishing guidelines for limiting EMF exposure that would provide protection against known adverse health effects.

To prevent health-related interactions with ELF EMF, ICNIRP recommends limiting exposure so that the threshold at which adverse effects due to interactions between the body and the external EMF is never reached. The reference levels for occupational and general public exposure for EMF at 50 Hz are shown in **Table 6.30**. The guideline adopts more stringent exposure restrictions for the general public compared to occupational exposures, recognising that in many cases general public are unaware of their exposure to EMF.

Table 6.30 ICNIRP EMF Reference Levels at 50 Hz

Exposure Characteristic	Electric Field Strength kilovolts per metre (kV/m)	Magnetic flux density microteslas (µT)
Occupational	10	1,000
General public	5	200

Source: ICNIRP, 2010.

Human responses to EMFs depend on the field strength, ambient environmental conditions, and individual sensitivity. The strengths of EMFs decrease rapidly with increasing distance from operating electrical equipment and can also be reduced by shielding. Trees, tall fences, buildings and most other large structures provide shielding from some electric fields.

6.11.4.2 EMF Sources

EMF would potentially be generated during the construction and operational phases of the Project from a number of EMF sources including inverters, BESS, overhead transmission lines, substation as well as cabling (underground) and collection circuits. Potential EMF produced by these components are discussed below.

Solar Arrays and Inverters

Research into EMF produced by commercial solar PV electricity-generating installations in Porterville and San Bernadino, California (Tell et al. 2015), identified that static magnetic fields were very small compared to exposure limits established by ICNIRP. The highest 60-Hz[17] magnetic fields were measured adjacent to transformers and inverters. The magnetic fields measured complied in every case with ICNIRP occupational exposure limits. In all cases, electric fields were negligible compared to ICNIRP limits. Specific findings were as follows:

- There was no evidence of magnetic fields created from the PV modules.
- The highest AC and DC magnetic fields were measured adjacent to the inverter and transformer and both were lower than ICNIRP's occupational exposure limit.

[17] Note that US power supply operates at 60 Hz frequency, compared to 50 Hz in Australia.

- The strength of the magnetic fields attenuated rapidly with distance (i.e. within 2-3 m the fields dropped to background levels).
- Electric fields were negligible to non-detectable, most likely due to the enclosures provided for the electricity generating equipment.

BESS

EMF is considered in the safety design process for any BESS site. The magnetic field associated with a BESS will vary depending on several factors including configuration, capacity and type of housing. When there is no current flowing, there is no magnetic field generated, meaning that for BESS operations, magnetic fields will only be generated during the charging or discharging cycle. Assuming that the BESS will be designed in accordance with electrical safety standards and codes, the general public would be excluded from any exposures from these sources.

Overhead Transmission Lines

The magnetic field from transmission lines varies with configuration, phasing and load, however typical magnetic fields near high voltage overhead transmission lines are estimated by ARPANSA to be between 1 µT and 20 µT (directly underneath) and 0.2 µT and 5 µT (at the edge of easement).

Substations

The highest sources of magnetic fields associated with a large transmission substation would generally occur at the boundary from the incoming and outgoing transmission lines. Generally, the application of electrical safety standards and codes (e.g. fence, enclosure, distance) will result in exclusion of general public exposures from these sources. This is consistent with the measurement of typical magnetic field reported by ARPANSA of between 1 µT and 8 µT at a substation fence.

Underground Cabling

Underground networks typically have no electric fields as these are effectively screened by ground cover while magnetic fields at the centreline are higher, but disperse much more rapidly, than for overhead networks (Energy Networks Association, 2016).

6.11.4.3 Assessment

The design, selection and procurement of the electrical equipment for the Project would comply with relevant international and Australian standards for generation of and exposure to EMF. The required electrical safety standards and codes (including provision of fencing, enclosures, and physical distance) would be utilised to eliminate EMF exposure to the general public from these sources.

A number of residential receivers are located on the northern, southern and western sides of the Goulburn River National Park, however the nearest non-involved sensitive receiver is located approximately 3 km north of the Project infrastructure. There are no other sensitive land uses (such as schools or places of worship) within or surrounding the Project Area. The Project Area is therefore suitably removed from the nearest sensitive receiver. EMF decrease rapidly from the source. Public access to the Project Area would be restricted via security fencing and appropriate buffer distances provided between EMF sources and the closest areas of public access (Wollara Road and Goulburn River National Park).

Staff involved in the construction and decommissioning of the Project would be exposed to EMF for the duration of the works. However, the inherently low EMF levels produced by the proposed infrastructure combined with the temporary nature of the construction and decommissioning phases mean that exposure levels will be below the recommendations for general public and occupational exposure. It is therefore concluded that there will be low to negligible potential for EMF impacts upon human health throughout the construction, operation and decommissioning phases of the Project.

With the implementation of management measures outlined in **Section 6.11.4.4**, it is considered that the EMF exposure risk of the Project can be appropriately managed in all stages.

6.11.4.4 Management and Mitigation Measures

The layout of the Project has been designed considering buffer distances between the EMF sources and sensitive receivers, road and National Park users and the general public. In addition, the design, selection and procurement of electrical equipment for the Project would comply with relevant international and Australian standards for generation of and exposure to EMF.

The following measures will be implemented to manage any EMF risks:

- All project infrastructure will be designed in accordance with relevant industry standards.
- All relevant procedures in relation to a high voltage installation will be adhered to throughout the life of the Project.
- Public access will be restricted throughout the life of the Project.

6.12 Social Amenity

The SEARs require the EIS to include an 'assessment of the social and economic impacts in accordance with the *Social Impact Assessment Guidelines* (DPE, February 2023)'. The Social Impact Assessment (SIA) has been prepared by Umwelt, in line with the key principles and resources outlined in the NSW Government's Social Impact Assessment Guidelines for State Significant Projects (SIA Guidelines) (2023) to address the SEARs. The SIA further took consideration of the Undertaking Engagement Guidelines for State Significant Projects (2022) and the Large-Scale Solar Energy Guidelines 2022.

A key component of the SIA is the process of gaining an understanding from a local community and business perspective of the issues, values and uses associated with the assessment area. More specifically the process aids the identification of issues of concern and potential opportunities associated with the Project. These matters are assessed to predict any significant social impacts in relation to the Project which may require mitigation or enhancement.

The outcomes of the SIA are summarised in **Section 5.0** as well as in the following sections with the full SIA report contained in **Appendix 18**.

6.12.1 Methodology

Concerns and feedback relating to the Project identified throughout the engagement undertaken by Lightsource bp and Umwelt, have been considered by the Project team, and have been used to inform the refinement of the Project design and the development of this EIS including proposed management and mitigation measures.

As illustrated in **Figure 6.26**, and consistent with the SIA guidelines, the SIA process involved three key phases. **Figure 6.27** shows the social locality, which shows the area that describes the social baseline profile of communities including the geographical and spatial governance, development context, community capital/assets, key community values, issues and concerns, as well as the policy setting for renewable energy development. Full details regarding the SIA methodology are provided in **Appendix 18**.

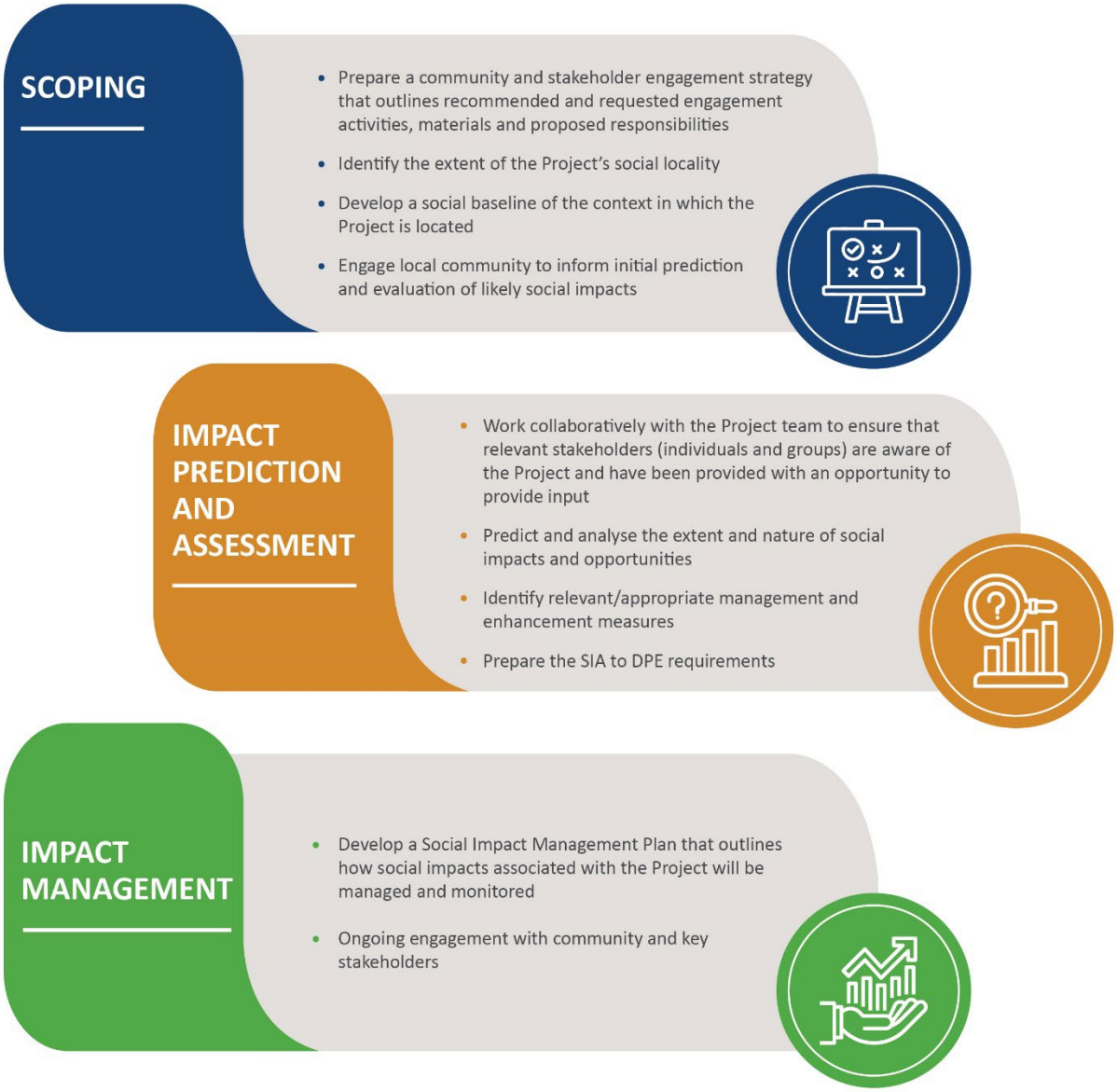


Figure 6.26 SIA Program Phases

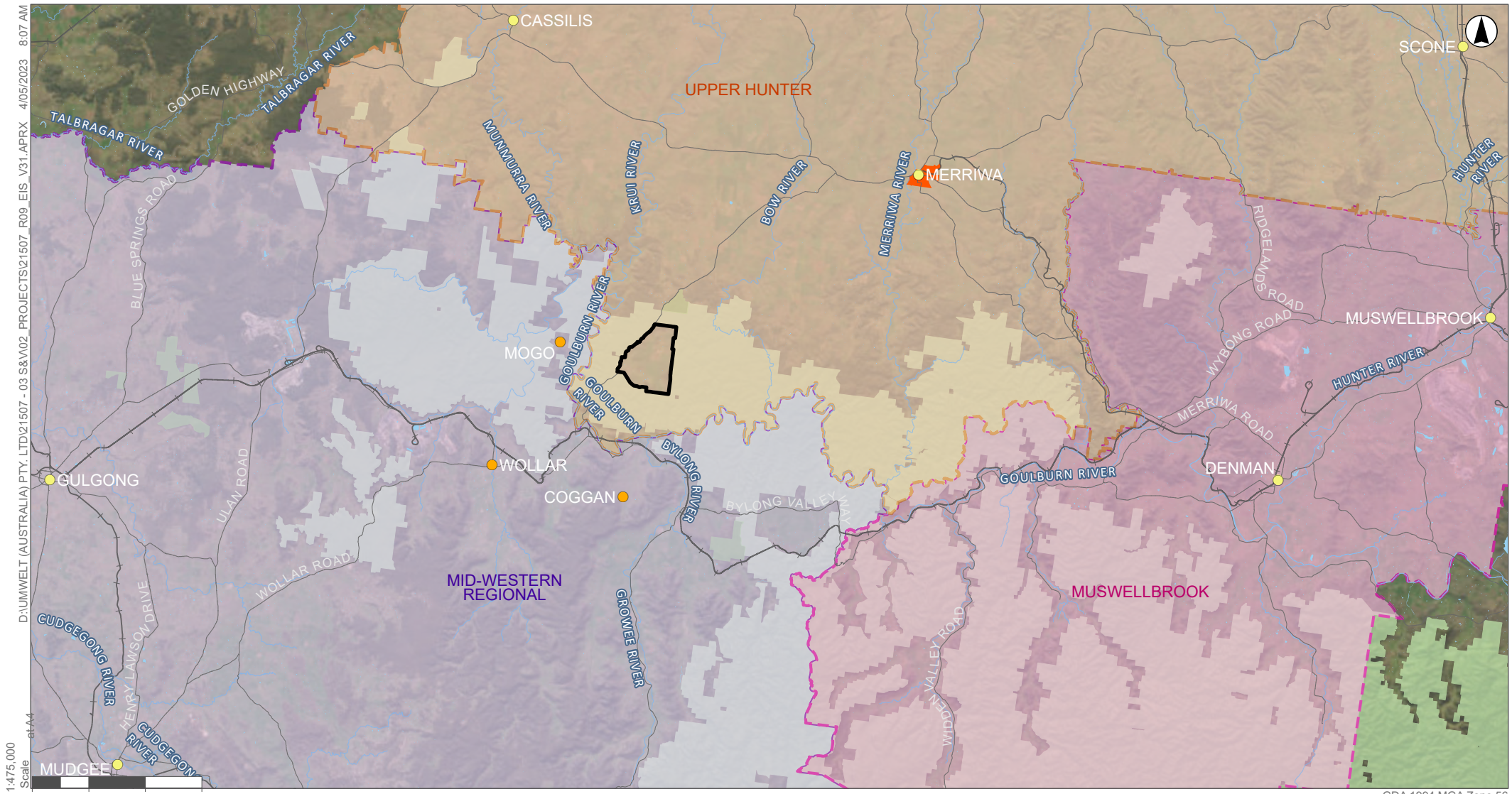


FIGURE 6.27
Social Locality

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

6.12.2 Stakeholder Engagement

Throughout the development of the Project various stakeholders have been engaged, to understand their views and opinion on the Project. A summary of the stakeholders contacted throughout the EIS phase is provided in **Table 6.31**.

Table 6.31 Stakeholders Consulted During the EIS Phase

Stakeholder Group	Number of Stakeholders Contacted	Number of Participants
Accommodation provider	16	4
Broader community member (those living within the social locality)	9	3
Community group/association	34	16
Education service provider	2	-
Health and emergency service providers	15	8
Host/proximal landholders (includes all residences along Wollara Road & Ringwood Road)	17	17
Local Aboriginal Land Council &/or Registered Aboriginal Parties	5	3
Local business	14	5
Total	**112**	**56**

6.12.3 Social Baseline

The Project's 'area of social influence' (or social impact assessment study area) comprises of the Upper Hunter LGA (as host LGA), Mid-Western Regional LGA (neighbouring LGA) and Muswellbrook LGA (neighbouring LGA). Rural localities within these LGA's include Merriwa, Cassilis, Mudgee, Gulgong, Rylstone, Denman, Muswellbrook and Scone.

The Project Area is surrounded by the Goulburn River National Park as well as being near the catchment of the Goulburn River. Rural industries represent the dominant land use across the Upper Hunter LGA, with key economic sectors including the equine industry, agricultural production (predominately beef, viticulture, and dairying), coal and other mineral mining, and tourism. Challenges for the Upper Hunter region revolve around maintaining and developing agricultural productivity while supporting the development of other industries, this includes the benefits and risks associated with mining, coal seam gas, and continued urban expansion. In addition to this the area is also vulnerable to natural disasters including drought, flooding, and bushfires. The changing climatic conditions have included up until recently insistent drought conditions as well as reducing winter rainfall, leading to harsher fires. These have impacted agricultural conditions in recent years.

The Project is located on land traditionally occupied by the Wonnarua Nation, with the Wonnarua Nation being the traditional owners of what is today the Upper Hunter Region. The Project Area is represented by the Wannaruah Local Aboriginal Land Council (LALC) and is proximate to land represented by the Mudgee LALC. At a local government level, the Project sits within the Upper Hunter Shire LGA. At the State and Federal level, the Project falls in the Upper Hunter Region, and the New England division respectively.

The Upper Hunter LGA has a decreasing population and over time (from 2021) is expected to reduce by approximately 10% by 2041. There is a proportionally higher Aboriginal population within Merriwa (7.5%) and in the Upper Hunter LGA (7%) when compared to wider NSW (3.4%) (ABS, 2021). Merriwa and the Muswellbrook LGA have the highest proportion of Aboriginal residents across the social locality with 7.5% and 11.7% of their populations identifying as Aboriginal in 2021. Rates of avoidable deaths are higher in the Mid-Western and Upper Hunter LGAs (147.9 and 139.9 per 100,000 people) compared to the State average (118.1 per 100,000 people) and regional and rural NSW (146.6 per 100,000 people). Rates of death from all avoidable causes were significantly higher in Muswellbrook LGA at 191.5 avoidable deaths per year per 100,000 residents (ABS, 2021).

As identified in the Goulburn River National Park Plan of Management, 347 Aboriginal sites have been recorded in the National Park which surrounds the Project. The State Heritage Register lists one heritage item of State significance in Merriwa (approximately 28 km) and twenty-three items of local significance within the Merriwa township (Upper Hunter Local Environmental Plan). As such there are strong connections to local Aboriginal and European heritage. There are strong cultural ties to regular events and festivals such as the Festival of the Fleeces.

There are strong social connections and volunteerism as the proportion of the LGA's population who participated in voluntary work through an organisation or group in the last 12 months was above the State proportion at 16% and 13% respectively (ABS, 2021).

The agriculture, forestry, and fishing sectors are central to livelihoods across the social locality and are the top industries of employment in the Upper Hunter LGA (ABS, 2021). These industries provide significant employment in Merriwa, and the Mid-Western LGA (ABS, 2021). Mining is also a significant contributor to the share of industries by employment, particularly in the Mid-Western and Muswellbrook LGAs, where it is a top industry of employment (ABS, 2021). Merriwa residents experience considerably higher levels of economic disadvantage as compared to their surrounding communities and the State's population (ABS, 2021). Upper Hunter LGA residents have greater economic advantage (score 7) relative to Muswellbrook and Mid-Western LGA residents (score 4 & 6 respectively). Interestingly, residents in Merriwa experience considerably higher levels of economic disadvantage, ranking in the lowest 20% of all locations across the State (score 2) (SEIFA, 2016).

The availability of short-stay accommodation in towns most proximal to the Project is limited, however a range of options exist in nearby regional centres. Most accommodation options are within a 60 minute drive of the Project and are located in the towns of Mudgee and Scone, however, there are also options in smaller townships located closer to the Project Area, including Gulgong, Rylstone, Denman and nearby Merriwa. Health care challenges within the Upper Hunter and Mid-Western Regional LGAs is identified as a key issue as there are is limited access for the rural communities to general practitioners and specialists than compared with the state average. The closest large hospital is Muswellbrook Hospital, which is 104 km and a 1 hour and 20-minute drive from the Project Area.

6.12.4 Assessment of Social Impacts

Potential road safety impacts were identified as the most frequently raised issue of concern for the community during the consultation process. This is in relation to the low quality of Wollara and Ringwood Road, of which the Project would use to access the Project Area. Many of the residents alongside the road raised that road repairs 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 improvement to their way of life.

Social impacts to the Project Area were also raised, regarding how the Project may affect local community values associated with the natural environment and agriculture, 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, as well as the changes in land-use from agricultural to solar panels that the Project would cause, resulting in a reduction in land-based livelihoods in the community.

Throughout the Project design development particularly during the early design stages of 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 the design refinements identified through specialist studies aligned with the concerns raised about the Project. **Table 6.32** provides a summary of the significance of the Project's social impacts, following implementation of the proposed management and enhancement strategies detailed in **Section 6.14.5**.

Further detail in relation to the issues raised and relevant perceived social impacts is provided in the SIA included in **Appendix 16**. It is important to note that unlike other technical studies undertaken for this EIS, there are no quantitative thresholds in social impact assessment and the assessment heavily relies on a qualitative assessment. Therefore, the social risk assessment is also informed by the socio-economic baseline data, outcomes of literature reviews, experience with other projects and outcomes of consultation that reflect the felt or lived experiences of consulted stakeholders and findings of technical studies.

An important component of the SIA has been the integration of technical studies with the risk rating of a Project factor or impact as identified by consulted stakeholders i.e. the sensitivity / susceptibility / vulnerability of people to adverse changes caused by the impact and/or the importance placed on the relevant social matter. Consequently, stakeholder ratings of risk were determined by assessing impacts identified through the consultation process. The resulting ranking (i.e. low, moderate and high) was determined by the frequency that an issue was raised by a particular stakeholder group in the engagement process. These views have been presented in **Table 6.32** as stakeholder perceived significance.

In line with the SIA Guideline, to assess the overall social risk, the magnitude is cross-referenced with the likelihood to determine an overall risk assessment rating (i.e. low, moderate, high, or very high). In the case of some impacts, this risk assessment has involved reference to the relevant technical reports of the EIS (e.g. traffic, noise, air quality etc.), however, the associated social impacts have been assessed through the social risking process. It should be noted that the residual social risk ratings represent the risk post implementation of mitigation measures with the majority of residual social impact rated low.

Table 6.32 Evaluation of Social Impacts

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation)[19]	Mitigation or Enhancement	Residual Significance Rating
Surroundings	Project establishment	Decreased road safety due to further deterioration and speeding along Wollara and Ringwood Road, due to heavy vehicle traffic to and from the Golden Highway through Merriwa Town	Proximal residents & all road users	Construction phase Decommissioning	High	High	Undertake road repairs and upgrades. Prepare a roads repair, upgrades and maintenance plan ahead of construction and communicate it to the community. Implementation of a road safety management plan and Construction Traffic Management Plan (CTMP).	Low
Surroundings	Project establishment and construction	Decreased road safety for cars and the local traffic due to the combination of fast-growing grass along Wollara and Ringwood Road, affecting the level of visibility, in combination with the addition traffic of heavy vehicles	Proximal residents & all road users	Construction phase Decommissioning	High	High	Prepare a roads repair, upgrades and maintenance plan ahead of construction and communicate it to the community. Implementation of a road safety management plan and Construction Traffic Management Plan (CTMP).	Low

[18] Level of concern or interest from the perspective of the affected party: L = Low; M = Medium; H = High, VH = Very High.
[19] Significance rating (L: Low, M: Medium, H: High, VH: Very High).

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
Surroundings	Project establishment and construction	Lack of trust from the community relating to the developer's commitment to preserve/protect local environmental values, such as fast-growing weeds in the Project Area spreading to nearby properties	Proximal residents	Construction and Operation phase	Medium	Medium	Proactive, thorough and transparent consultation process throughout Project planning, assessment and development. Preparation and implementation of the Construction Environment Management Plan (CEMP), Operational Environment Management Plan (OEMP) and landscape management plan. Provide community with information of the complaint procedure during construction (through CEMP) and operations (through OEMP).	Low
Surroundings	Project establishment and operation	Fears of increased presence of wild dogs in and around the Project Area due to proposed sheep grazing on site, placing danger to the local community and other animals (pets and livestock)	Proximal residents	Operation phase	High	High	Collaboration with the Wild Dog Association to support a Wild Dog Management Plan as part of the broader Community Benefit Sharing Strategy.	Low

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
							Formulate plans for Agrisolar initiatives to support other innovative forms of dual land use, including a plan to support mitigation measures related to the wild dogs, ahead of Project construction in consultation with host and neighbouring landholders, as well as community organisations. Wild Dog Management Plan as part of the OEMP.	
Surroundings	Project establishment and operation	Loss of community sense of place due to change in the land-use from agricultural to solar panels	Proximal residents	Construction and Operation phase	Low	Low	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.	Low

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
Surroundings	Project Decommissioning	Concerns regarding the relatively short lifespan of the Project relating to waste creation and future land use, which could decrease community support for the project	Broader community	Operation and decommissioning phase	Low	Low	Prepare a Waste Management Plan as part of the CEMP that is based on the waste hierarchy. Prepare a decommissioning strategy that explores options and formulate plans for future land use post-decommissioning and consideration of project life expansion. Proactive, thorough and transparent consultation process throughout the Project lifespan. Select a designated recycler for the solar panels and plan for future costings, Lightsource bp has a Memorandum of Understanding with Lotus Energy to recycle the solar panels from the Project.	Low
Surroundings	Project Construction	Increased noise and dust due to heavy vehicle traffic at Wollara and Ringwood Road causing disturbance to nearby residents	Proximal residents	Construction phase	Medium	Medium	Implementation of a road safety management plan and Construction Traffic Management Plan (CTMP).	Low

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
							Prepare a roads repair, upgrades and maintenance plan ahead of construction and communicate it to the community. Limit construction activities to standard working daylight hours. Keep the local community informed around the construction hours and any subsequent changes.	
Surroundings	Project establishment, construction and operation	Loss of community sense of place due to changes in the visual landscape due to the Project development	Proximal residents	Construction and Operation phase	Low	Low	Consider visual screening from public viewpoints.	Low
Surroundings & Accessibility	Project establishment	Decreased accessibility between towns and services due to deterioration of Wollara and Ringwood Road as a result of the additional traffic.	Proximal residents & all road users	Construction phase	High	Medium	Prepare a roads repair and maintenance plan ahead of construction and communicate it to the community. Implementation of a road safety management plan and Construction Traffic Management Plan (CTMP).	Low

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
Surroundings & Accessibility	Project establishment and operation	Increased community anxiety regarding potential delay of emergency/bushfire responses due to the lack of public access to the site, which could reduce safety of local residents and ability to protect private properties in the event of a bushfire	Proximal residents, broader community and service providers	Construction and Operation phase	Medium	High	Communicate Bushfire Management Plan to community through consultation process and implement mitigation measures, including working with local Aboriginal community to engage in cultural cool burns on the site. Implementation of the Asset Protection Zone (APZ) and have on site water carts. Providing training and site tours for local emergency services (VRA, RFS and Fire and Rescue) to familiarise them with the access points and procedures and to also provide solar farm specific bushfire skills.	Medium
Way of life, Community, Culture & Health and Wellbeing	Construction workforce influx	Potential decrease to levels of social cohesion in local communities due to influx of construction workers	Broader community	Construction phase	Medium	Medium	Proactive, thorough, and transparent consultation process throughout Project planning, assessment and development. Accommodation, Employment and Procurement Strategy to be in place ahead of construction.	Medium

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
							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.	
Way of life, Community, Culture & Health and Wellbeing	Project operation	Increased social wellbeing due to community hosting project that contributes to a more sustainable region by reducing reliance on carbon intensive industries	Proximal residents, Local and broader community	Planning, construction and operation phases	Medium	Medium	Clear communication and information sharing with the local community regarding the benefits of the renewable energy industry. Community Benefit Sharing Strategy to consider initiatives that focus on increasing social wellbeing and community participation.	High

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
Way of life, Community, Culture & Health and Wellbeing	Project establishment and operation	Project being built in proximity of significant Aboriginal and European Heritage and cultural values causing concern over preservation and valuing of family and community histories	Traditional owners, RAPs, LALC, Aboriginal Groups and host landholders	Planning, construction, and operation phases	Low	Medium	Implementation of Aboriginal Cultural Heritage Management Plan in consultation with Registered Aboriginal Parties and local residents.	Low
Engagement and Decision-Making Systems	Project determination and establishment	Opportunity for the local community to participate meaningfully and influence project decision making due to existing high-level awareness of project and activities in community	Broader community	Planning phase	Medium	Medium	Ongoing Community Engagement Strategy, implemented in a way that increases opportunities for the community to work together with Lightsource bp during the project development. Community Benefit Sharing Strategy to consider initiatives that focus on increasing social wellbeing and community participation.	High

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
Livelihoods	Project establishment and construction	Opportunity to stimulate a growing industry and to upskill local workers through project workforce requirements, which in turn can increase human and economic capital across social locality	Local and broader community, local business owners	Construction phase	Medium	High	Accommodation, Employment and Procurement Strategy to include targeted and proactive initiatives to maximise local employment and sourcing from local communities such as through job-ready training (i.e., apprenticeships), up-skilling and capacity building supports, in collaboration with local stakeholders and training providers, to improve job-readiness in the pre-construction phase of the Project.	High

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation)[19]	Mitigation or Enhancement	Residual Significance Rating
Livelihoods	Project establishment and construction	Increased economic and human capital across social locality due to project procurement opportunities	Local and broader community, local business owners	Construction phase	Medium	High	Accommodation, Employment and Procurement Strategy to include targeted and proactive initiatives to maximise local employment and sourcing from local communities such as through job-ready training (i.e., apprenticeships), up-skilling and capacity building supports, in collaboration with local stakeholders and training providers, to improve job-readiness in the pre-construction phase of the Project.	High
Livelihoods	Project construction workforce	Increased spending in local towns bringing about positive growth for local businesses and services	Local and broader community, local business owners	Construction phase	Medium	High	Accommodation, Employment and Procurement Strategy to include targeted and proactive initiatives to maximise the capacity and use of local businesses, and to be developed in collaboration with local business providers.	High

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation)[19]	Mitigation or Enhancement	Residual Significance Rating
Accessibility	Project construction	Strain on local accommodation and housing sector due to the influx of workforce, including potential cumulative impacts associated with other nearby developments.	Accommodation providers Local residents Service providers Local government	Construction phase	High	High	Accommodation, Employment and Procurement Strategy to be in place ahead of construction and to be developed in collaboration with local Council and stakeholders. Proactive, thorough, and transparent consultation process throughout Project planning, assessment and development.	Medium
Accessibility	Project construction	Strain on local health care and emergency services due to the influx of new population combined with the existing shortage of emergency services and healthcare workers, including potential cumulative	Emergency service providers,	Construction phase	Medium	High	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.	Medium

Impact Category	Project Aspect	Impact Description	Extent / Affected Parties	Duration	Perceived Significance [18]	Significance Rating (before mitigation) [19]	Mitigation or Enhancement	Residual Significance Rating
							Proactive, thorough, and transparent consultation process throughout Project planning, assessment and development.	
Accessibility	Project establishment	Improved access to telecommunication services	Emergency service providers, proximal residents	Construction and operation phases	Medium	Medium	Ongoing Community Engagement Strategy, implemented in a way to increase opportunities for the community to work with the Project during development. Ensure plans to install telecommunications services onsite is cognisant of local community and service provider access needs and integrates infrastructure provision with community benefit sharing program where feasible.	High

6.12.5 Management and Mitigation Measures

There are a number of elements of the Project proposed, that provide positive elements to the community, including installation of a shared telecommunications tower and Road Repairs and Upgrades (that have been assessed in previously in **Section 3.4.2** and **Section 3.7.3**).

To minimise potential negative social impacts and enhance social benefits for the community; there have been a number of Project design changes and a range of management measures developed for the Project, these include:

A range of social mitigation and management measures outlined in detail in the SIA (refer to **Appendix 16**), including:

- 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, 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.

6.12.6 Cumulative Social Impacts

The SIA (refer to Section 3.3 in **Appendix 18**) discussed both the positive and negative impacts of the projected population influx on the region. Local businesses and service providers have the opportunity to realise commercial benefits from accommodating and servicing the workforce while, at the same time, accessibility issues may occur for other user groups potentially affecting affordability and availability of accommodation and community services. This would particularly be the case when considering the cumulative effect of population influx between multiple projects with potential concurrent development programs, in the context of the REZ's and multiple development projects in planning nearby. When considered cumulatively, the potential strain on local accommodation and other township services could result in a high social impact. **Appendix 22** provides a detailed cumulative impact assessment for all aspects considered as a part of the EIS, in addition to the mitigation measures outlined in **Section 6.12.5** Lightsource bp will monitor nearby developments as the Project progresses assess and upcoming or ongoing cumulative impacts.

6.13 Economics

An Economic Impact Assessment (EIA) for the Project was prepared by Ethos Urban Pty Ltd (2023), in accordance with the SEARs, to address the economic benefits and impacts of the Project for the region and the State as a whole.

During the stakeholder engagement program, community responses regarding the economic impacts of the Project most frequently identified positive economic impacts, particularly relating to benefits to local livelihoods through opportunities for local employment and procurement and the sharing of Project benefits at the local community level (refer to **Section 5.3**). However, there were also some community concerns raised in relation to negative economic impacts including potential strain on local services due to an influx of construction workforce and the cumulative effects on local infrastructure and services due to workforce influx across regional projects. These impacts and economic-related concerns are addressed in the EIA, with results summarised in the sections below with further detail provided in **Appendix 19**.

6.13.1 Methodology

The EIA defined its Study Area in terms of the following LGAs:

- Upper Hunter Shire (in which the Project is to be located).
- Mid-Western Regional.
- Muswellbrook Shire.

The main regional cities/townships/settlements in the EIA Study Area are all located within a 60-minute drive of the Project Area.

The EIA undertook a baseline analysis of population, labour markets, and occupational and business structures for the Study Area and NSW to allow an assessment of the:

- Capacity and opportunities of townships in the Study Area to participate and service the Project.
- Potential for retention of Project investment in the Study Area.
- Direct and indirect Project employment.
- Business and industry participation opportunities, with reference to baseline analysis outcomes regarding workforce size and skills composition and procurement activities.
- Agricultural impacts including employment and production impacts through land consumption and disruption to activities, and benefits to host landowners from new incomes and improved on-site infrastructure.
- Accommodation and housing impacts with reference to the baseline analysis and the estimated number of construction workers that may require accommodation at the Project's peak.
- Cumulative impacts relating to the potential concurrent construction of major infrastructure projects within 100 km of the Project Area, particularly in relation to the nearby CWO and Hunter-Central Coast REZ.
- Economic stimulus impacts including project wages and spending, uplift in Council rates revenues, and Proponent's Community Shared Benefits Strategy payments.

Based on this assessment, mitigation measures relating to accommodation, workforce and procurement and community benefit sharing were proposed.

6.13.2 Baseline Regional Economic Profile

6.13.2.1 Population

The population of the Study Area totalled 55,930 persons as of June 2021 (ABS Estimated Resident Population, 2021). Over the period 2022-2036, annual population growth in the Study Area is expected to be +0.4% pa (or +230 persons per annum over 14 years) compared to the NSW growth rate of +1.0% p.a. The Upper Hunter LGA is projected to experience population decline over the coming years. In this regard local investment projects (such as the proposed Project) can generate new employment opportunities for residents, workers transitioning from the mining sector as well as more diverse income streams for local farmers. These factors may contribute to retaining, and potentially expanding, population levels within this area.

6.13.2.2 Labour Force, Occupational and Business Structure

As of March 2022 (latest available), the Study Area had an unemployment rate of 3.1%, which is significantly lower than the rate for NSW (4.6%). The Project is likely to require 250 workers on average over the construction phase (or 350 workers at the Project's construction peak), with potentially 35% of these workers (87–122 workers) sourced locally or from within the Study Area, providing new opportunities for unemployed job seekers (subject to appropriate skills match).

The latest available employment related census data (ABS Census 2016) shows 45.9% of employed residents in the Study Area were occupied in activities generally associated with the types of skills required for the construction of a solar farm (e.g., technicians and trades workers, machinery operators and drivers, and labourers). The Study Area's representation in these occupations is well above the State average of 27.8%, indicating a generally suitable occupational base for the proposed Project is present in the region.

The Study Area's occupational and business structures indicate a good base exists to service the needs of the Project.

6.13.2.3 Township Services

Current accommodation data reflects a constrained rental market in the Study Area with vacancy rates generally below 1.0%. At the same time data shows that 13.7% of Study Area dwellings (3,360 dwellings) were unoccupied at the 2021 Census, which is notably higher than the average for NSW (9.4%). Mid-Western Regional LGA had a significant share of unoccupied dwellings (15.0%) or 1,700 dwellings, which is likely related to a large number of holiday homes in this well touristed area. Shared private housing accommodation is one potential option for Project workers, with some of the Study Area's unoccupied dwellings having the potential to enter the housing market to support the construction phase of the Project.

Large renewable energy projects, such as the Project, tend to harness the local rental market with the majority of longer-term workers living in shared accommodation (reflecting both convenience and cost). As a result, the local rental markets tend to reach or almost reach full utilisation and may require further supply to be brought to the market. It is possible this situation might occur during the construction phase of the Project based on the current constrained nature of the local rental market and the relatively high share of unoccupied dwellings (including holiday homes) located in the Study Area.

The major regional townships of Mudgee and Scone have the capacity and labour force to service many aspects of the Project, with smaller settlements such as Merriwa, Gulgong, Denman and Rylstone, also likely to provide labour, accommodation and other general services to the Project.

6.13.3 Assessment of Economic Impacts

The net economic impacts of the Project, as presented in the EIA, are shown in **Table 6.33**.

Table 6.33 Net Economic Outcomes

Factor	Value
Negative Economic Outcome: Temporary loss of agricultural land (40 years)	799.5 ha
Negative Economic Outcome: Loss of employment (direct and indirect)	0 jobs
Positive Economic Outcome: Capital investment	Approximately $880 million
Positive Economic Outcome: Study Area investment (including wage stimulus)	+$130 million (assumes 15% of total investment)
Positive Economic Outcome: Construction employment (direct and indirect)	350 direct and 560 indirect jobs, 910 FTE total jobs nationally (over 27 months), including Study Area jobs (125 FTE direct on-site, 110 FTE indirect off-site)
Positive Economic Outcome: Operational employment (direct and indirect)	40 FTE total jobs (10 FTE direct and 30 FTE indirect), including Study Area jobs (10 FTE direct on-site, 3 FTE indirect off-site)
Operational Economic Stimulus: Total net local economic stimulus (operational wage stimulus, community/neighbour payments, increased Council land tax returns)	+$120 million (over 40 years)
Total Economic Benefits	**+$250 million (Construction period PLUS 40 years operation)**

6.13.3.1 Project Investment and Employment Impacts

Overall, the Project will involve approximately $880 million in investment during the construction phase (of which approximately $130 million will be retained in the Study Area during construction) and will support 910 Full Time Equivalent (FTE) positions in the national economy over the 27-month construction period (350 direct FTE jobs and 560 indirect FTE jobs). Once operational, 40 FTE jobs will be supported nationally by the Project (10 direct FTE jobs and 30 indirect FTE jobs). Of this national total, the Study Area is expected to benefit from 350 FTE construction jobs and 13 FTE ongoing jobs associated with the Project.

The Study Area has moderate capacity in terms of construction-related workers and businesses to manage both the requirements of the Project, and concurrent regional infrastructure projects if required. The Project will provide new participation opportunities for businesses and workers located in the Study Area, having regard for the good match of skills and resources available.

6.13.3.2 Accommodation and Local Wage Spending Stimulus Impacts

The 'external' Project labour requirement would be expected to generate an accommodation need for 350 workers at the peak of the Project construction. This represents 36% of total commercial accommodation rooms/cabins within a 60-minute drive of the Project Area. However, further capacity is available in caravan parks (powered sites), private rentals (e.g. long-term houses/units, short-term Airbnb), and potentially unoccupied dwellings – some of which may become available to the market to support the Project. The Project will generate new revenues for commercial accommodation providers and also private property owners over the construction phase (especially in off-peak seasons) including in small townships such as Rylstone, Gulgong and Merriwa.

While accommodation data indicates that reasonable capacity currently exists in the Study Area to accommodate the number of non-local workers expected at the peak of the Project; increased demand from concurrent regional infrastructure projects and seasonal accommodation demands (tourism, agricultural and mining activities etc) also need to be considered. An Accommodation Employment and Procurement Strategy (AEPS) construction workforce strategy/plan would form part of pre-construction planning (refer to **Section 6.13.4**) to minimise impacts on the local community.

Construction workers relocating to the region would be expected to inject approximately $30.1 million (2022 dollars) in new spending into the economy over the construction phase, supporting approximately 150 FTE jobs in the service sector in the Study Area over this time.

6.13.3.3 Agricultural and Tourism Impacts

Once operational the Project has been designed to be compatible with agricultural activity through the ability for continued use of the Project Area to occur through sheep grazing. No loss of employment associated with the existing agricultural land use of the Project Area is anticipated as a result of the Project as the new mixed-use arrangement is likely to require a similar number of employees as the present set up.

Operation of the Project could also potentially support small-scale tourism and educational opportunities in the future, especially in light of the significant development of the renewable energy sector in the nearby CWO and Hunter Central Coast REZ over the coming years.

6.13.3.4 Ongoing Economic Stimulus

Ongoing economic stimulus associated with the operation of the Project is estimated at approximately $120 million (over 40 years, CPI adjusted) relating to, operational wage stimulus, Community Benefits Fund and net land tax revenue to Council. Further details on each of these elements are provided in the EIA in **Appendix 19**.

6.13.3.5 National Grid Supply Benefits

With an operational capacity of 550 MW, the Project has the potential to provide sufficient renewable energy to support the annual electricity needs of the equivalent of approximately 156,000 NSW households, representing over ten times the annual electricity requirements of the Study Area and highlighting the importance of the facility from a renewable energy generation perspective.

The Project will also contribute to the reduction of greenhouse gas emissions across NSW, avoiding the production of up to 705,000 tonnes per annum.

6.13.4 Management and Mitigation Measures

To minimise potential Project impacts and maximise Project benefits, the following mitigation measures are recommended by the EIA:

- Prior to commencing construction, it is recommended the Proponent prepare an Accommodation, Procurement and Employment Strategy (APES) for the Project in consultation with relevant stakeholders, including:
    - Measures to ensure there is sufficient accommodation for the workforce associated with the construction phase of the Project.
    - Measures to address any specific cumulative impacts arising associated with other State significant development projects in the area.
    - Measure to prioritise the employment of local workers and the procurement of local businesses for the construction and operation of the Project.
    - A program to monitor and review the effectiveness of the strategy over the life of the Project.
- To ensure the broader community benefits from the construction and operation of the Project, it is recommended the Proponent develop a Community Shared Benefit Strategy (CSBS) including a Community Fund to be available to the wider community.

6.13.5 Cumulative Economic Impacts

Cumulative economic impacts were assessed in the EIA (refer to **Appendix 19**) and are associated with significant development of major renewable energy projects in the CWO REZ and Hunter Central Coast REZ in the coming years combined with ongoing demand from the tourism, agriculture and mining sectors. Competition for labour and accommodation are the primary cumulative impacts of relevance from an economic perspective. It is understood that concerns about workers accommodation and potential impacts on housing availability was a key theme from community feedback in stakeholder consultations.

The EIA also acknowledged potential impacts due to insufficient accommodation and workers to service the Project and concurrent demands. In this regard, the EIA recommended strategies to manage accommodation demand, and local procurement and employment in the region.

Lightsource bp has committed to the preparation of an Accommodation, Procurement and Employment Strategy (AEPS) in consultation with relevant stakeholders, and a Community Shared Benefit Strategy (CSBS).

6.14 Waste Management

The SEARs require the EIS to quantify and classify the likely waste streams to be generated by the Project, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste. A qualitative waste assessment was undertaken for the Project, as presented in this section, which involved:

- Initial classification of wastes generated by the Project, to identify wastes which may be recycled, require landfilling and/or may be classified as hazardous and require special arrangements (or cannot be disposed of locally).
- Review of the capacity of, and acceptable wastes that can be received by, waste management facilities in the surrounding LGAs.

Management of waste streams will be guided by the principles of the waste hierarchy, where emphasis is placed upon reducing, reusing, and recycling prior to disposal of wastes. Appropriate and best-practice waste management will be implemented as part of the Project in accordance with the following legislation and guidelines:

- DPE *Large Scale Solar Energy Guideline 2022*.
- NSW *Protection of the Environment Operations Act 1997* (POEO Act).
- NSW Protection of the Environment Operations (Waste) Regulation 2014.
- NSW *Waste Avoidance and Resource Recovery Act 2001* (WARR Act).
- Commonwealth *Recycling and Waste Reduction Act 2020*.

The DPE Large Scale Solar Guideline 2022 (NSW DPE, 2022) addresses some of the common issues for large scale solar developments and outlines the requirements for several of these issues. Requirements for waste management include:

- Identification of waste types (including the appropriate waste classification) and estimates of waste expected to be generated at each stage of the project.
- Identification of end markets for waste materials generated at each stage of the project.
- Evidence from local councils or facilities that the identified waste classifications and volume can be accepted at the appropriate stage of the project's life cycle.
- Consideration of circular design principles and strategies to mitigate impacts and reduce waste generation throughout all stages of the project (such as using recycled, reusable and low-impact raw materials where possible).
- End-of-life reuse, refurbishment and recycling strategies for PV panels and associated equipment that maximise high recovery methods.

The *NSW Waste Avoidance and Resource Recovery Strategy* (EPA, 2014a) outlines the requirements for best practice waste management, which combines the principles of ecologically sustainable development with the implementation of resource management hierarchy principles as specified in the WARR Act (refer to **Figure 6.28**), which include:

- Avoidance of unnecessary resource consumption.
- Resource recovery (including reuse, reprocessing, recycling, and energy recovery consistent with the most efficient use of the recovered resources).
- Disposal, including management of all disposal options in the most environmentally responsible manner in accordance with the *Waste Avoidance and Resource Recovery Strategy 2014–2021* (EPA, 2014a).

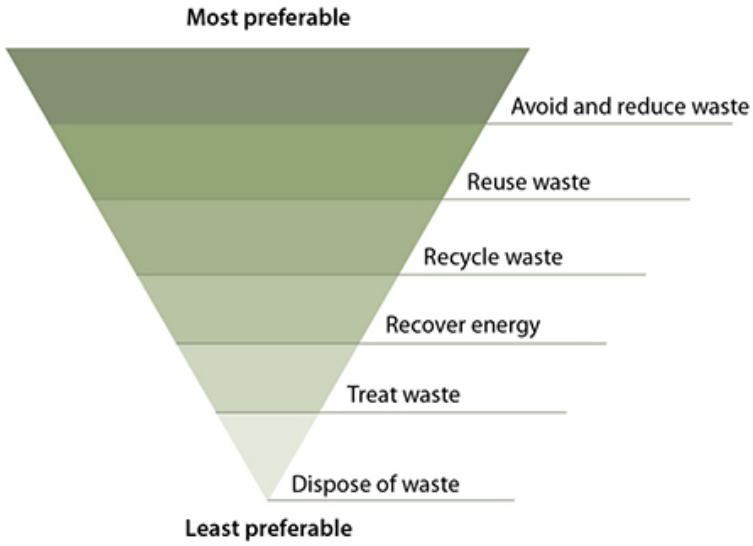


Figure 6.28 NSW EPA Waste Hierarchy (EPA, 2017)

6.14.1 Existing Environment

Waste generated by the Project that cannot be reused or recycled would be disposed of at suitable waste management facilities within the Upper Hunter, Muswellbrook or Mid-Western LGA. The Project Area is located close to the border of the Upper Hunter LGA and the Mid-Western LGA, and Muswellbrook LGA is also in close proximity and so use of waste facilities within these three LGAs would be considered. A review of operating waste management facilities within these LGAs was undertaken to determine suitability to accept waste generated by the Project. The facilities located closest to the Project are:

- Upper Hunter LGA Facilities:
    - Scone Landfill (approximately 77 km east of the Project) – waste accepted at this facility includes mixed waste, green waste, recycling, scrap metal, e-waste, tyres, dead animals (by appointment).
    - Murrurundi Waste Management Facility (approximately 86 km north-east of the Project) – waste accepted at this facility includes mixed waste, recycling, scrap metal, e-waste, tyres and green waste.
    - Merriwa Waste Management Facility (approximate 24 km north-east of the Project) – waste accepted at this facility includes mixed waste, recycling, scrap metal, e-waste, tyres and green waste.
    - Aberdeen Waste Management Facility (approximately 77 km east of the Project) – waste accepted at this facility includes mixed waste, green waste, recycling, scrap metal, e waste, tyres, dead animals (by appointment) and asbestos (by appointment).
- Mid-Western LGA Facilities:
    - Gulgong Waste Facility (approximately 50 km south-west of the Project)- waste accepted at this facility includes general waste, recycling, green waste, scrap metal and e-waste.

- Mudgee Waste Facility (approximately 57 km south-west of the Project) is the LGAs primary facility for receiving commercial and building waste – other waste accepted at this facility includes general waste, recycling, green waste, scrap metal, e-waste, tyres, mine waste, dead animals (by appointment) and asbestos (by appointment).
- Kandos Waste Facility (approximately 60 km south-east of the Project) – waste accepted at this facility includes general waste, recycling, green waste, scrap metal and e-waste.

- Muswellbrook LGA Facilities (nearby):
  - Muswellbrook Waste and Recycling Facility (approximately 48 km east of the Project Area) – waste accepted at this facility includes household waste and hazardous material, cars and other vehicles, chemicals and liquids, construction and demolition materials, electrical equipment, food and beverage packaging, furniture and fittings, lighting, metals, paper and cardboard and rubber.

Lightsource bp will consult with local councils prior to the commencement of construction to identify suitable waste disposal locations.

6.14.2 Predicted Waste Streams

Under the *Waste Classification Guidelines – Part 1: Classifying wastes* (EPA, 2014b), waste can be classified into six different classes based on risks to the environment and human health. These are:

- Special waste – asbestos, waste tyres and clinical wastes.
- Liquid waste – wastewater effluent, fuels and lubricants.
- Hazardous waste – contaminated soils.
- Restricted solid waste.
- General solid waste (putrescible) – food waste, organics and animal wastes.
- General solid waste (non-putrescible) – glass, plastic, rubber, bricks, concrete, metal, paper, cardboard and other domestic waste.

Identified waste types expected to be generated by the Project during the construction, operation and decommissioning phases are included in **Table 6.34**, assessed in the context of the above guidelines.

Table 6.34 Potential Waste Classification, Estimates, End Use and Processing Facilities

Phase	Waste Type	Estimated Volume (m^3)	End Market/Facility
Construction	Green Waste	0 m^3 All green waste processed onsite	Processed onsite.
Construction	Hazardous Waste	5,000 L of oil, lubricants and liquids	Muswellbrook waste & Recycling Facility.
Construction	Liquid Waste	8,981 m^3	Cleanaway Kooragang TTS Liquid Waste Services.

Phase	Waste Type	Estimated Volume (m^3)	End Market/Facility
Construction	General Solid Waste (Non-Putrescible) – Mixed	3,020 m^3	Muswellbrook waste & Recycling Facility. Otherwise, Newcastle waste management facilities.
Construction	General Solid Waste (Non-Putrescible) – Office	8,282 m^3	Muswellbrook waste & Recycling Facility.
Construction	General Solid Waste (Non-Putrescible) – Cardboard	900 m^3	Muswellbrook waste & Recycling Facility. Newcastle waste management facilities.
Construction	General Solid Waste (Non-Putrescible) – Steel	580 m^3	Muswellbrook waste & Recycling Facility.
Construction	General Solid Waste (Non-Putrescible) – Timber	600 m^3	Muswellbrook waste & Recycling Facility. Newcastle waste management facilities.
Operation	Green Waste	0 m^3 p.a.	N/A.
Operation	Hazardous Waste	1,000 L p.a.	Muswellbrook waste & Recycling Facility
Operation	Liquid Waste	255 m^3 p.a.	Trucked to licensed facility.
Operation	General Solid Waste (Non-Putrescible) – Mixed	1.22 m^3 p.a.	Muswellbrook waste & Recycling Facility.
Operation	General Solid Waste (Non-Putrescible) – Office	3.36 m^3 p.a.	Muswellbrook waste & Recycling Facility.
Operation	General Solid Waste (Non-Putrescible) – Cardboard	0.36 m^3 p.a.	Muswellbrook waste & Recycling Facility.
Operation	General Solid Waste (Non-Putrescible) – Steel	0.23 m^3 p.a.	Muswellbrook waste & Recycling Facility.
Operation	General Solid Waste (Non-Putrescible) – Timber	0.24 m^3 p.a.	Muswellbrook waste & Recycling Facility.
Decommissioning	Green Waste	0 m^3	N/A.
Decommissioning	Hazardous Waste	464 m^3	Muswellbrook waste & Recycling Facility
Decommissioning	Liquid Waste	255 m^3	Trucked to licensed facility.
Decommissioning	General Solid Waste (Non-Putrescible) – Mixed	23,000 tonnes of panels	Lotus Energy licensed panel recycling, Melbourne
Decommissioning	General Solid Waste (Non-Putrescible) – Office	800 Tonnes	Muswellbrook waste & Recycling Facility.
Decommissioning	General Solid Waste (Non-Putrescible) – Cardboard	None	

Phase	Waste Type	Estimated Volume (m^3)	End Market/Facility
Decommissioning	General Solid Waste (Non-Putrescible) – Steel	40,000 tonnes of steel 15,000 tonnes of copper wiring	JJ's Waste & Recycling – Newcastle.
Decommissioning	General Solid Waste (Non-Putrescible) – Timber	None	

6.14.3 Impact Assessment

The majority of Project waste would be generated during the construction and decommissioning stages with minor quantities of waste to be generated by the day-to-day operation of the Project. If not appropriately stored and managed, waste generated by the Project could have a range of environmental and health impacts, including:

- Reduction in aesthetic quality and visual amenity of the locality.
- Impacts to water quality.
- Degradation of ecosystems and loss of habitat.
- Spread of pest species.
- Human health impacts.
- Contamination of soils and water.
- Reduction in local landfill capacity due to additional waste volumes, particularly in relation to cumulative impacts which may arise where multiple developments are utilising the same local landfill facility.

Measures outlined in **Section 6.14.5** would be implemented during the construction of the Project to suitably manage these waste impacts.

6.14.4 Cumulative Waste Impacts

- Several renewable projects are proposed within the region, it is anticipated that these projects will generate similar or more waste quantities and streams. The capacity of waste recycling facilities within the region as mentioned in **Section 6.14.1** are time sensitive and as such unable to be confirmed at this stage. Prior to and during construction, Lightsource bp will contact relevant Councils and organise to ensure waste is transported to a facility which has capacity to process waste.

6.14.5 Management and Mitigation Measures

6.14.5.1 Construction

As part of the detailed design and construction phase a Waste Management Plan would be prepared including a detailed breakdown of the waste types and quantities in accordance with relevant legislation and guidelines. Lightsource bp is committed to ensuring waste generated by the Project is able to be reused and recycled in accordance with the waste management hierarchy.

Lightsource bp is currently trialling a circular design principle that provides sustainable packaging solutions for most products that contribute a bulk amount of waste during the construction phase. Upon successful trial results, this circular design principle will be implemented into this project. Some wastes may need to be disposed of to landfill, and in this case the proponent will liaise with the relevant local authorities to avoid any cumulative impacts that may result from the waste disposal needs of multiple developments in the region.

The Waste Management Plan will include the following measures:

- A summary of the waste types, classification and estimated annual quantities of wastes produced during the construction of the Project.
- Measures to manage waste disposal in accordance with the principles of the waste hierarchy, with emphasis on reducing, reusing and recycling wastes prior to disposal.
- The procedure for assessing, classifying and storing waste in accordance with EPA guidelines.
- Procedures for storage, transport and disposal of waste.
- Monitoring, record keeping and reporting, including the use of waste tracking data to demonstrate the lawful disposal of contaminated products, waste or residues generated by the Project (if any).

6.14.5.2 Operation

Waste generated during the operational phase of the Project will be limited to those generated by operational maintenance activities and operational staff. Volumes are anticipated to be significantly less than those produced during construction and decommissioning, and management will occur through a Waste Management Plan as part of the OEMP.

6.14.5.3 Decommissioning

A Decommissioning and Rehabilitation Management Framework has been prepared for the Project by Umwelt (refer to **Appendix 21**). This Framework has been developed to demonstrate a commitment to ensuring 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.

The Framework is a working document and as such it is expected that updates may be required post-approval to reflect the specific conditions or management measures outlined in the conditions of consent, and prior to the end of the operational life of the solar farm to include consideration of circumstances which may have changed during operations.

Lightsource bp has a partnership with Lotus Energy to manage the recycling of solar panels, including throughout the life of the Project if panels are damaged during construction or operations, and in the decommissioning stage. Other solar farm infrastructure (i.e., electrical cabling, steel posts, metal) will be recycled at appropriate waste management facilities.

6.15 Air Quality

A qualitative assessment of the Project's potential air quality impacts has been undertaken to assess potential impacts associated with dust generated during construction. This involved:

- Identification of sensitive receivers that may potentially be impacted.
- Understanding the existing air quality catchment and current sources of air emissions.
- Identification and assessment of potential sources of air emissions.
- Recommending management and mitigation measures to reduce air emissions because of the Project.

6.15.1 Existing Air Quality

The main sources of existing particulate matter emissions in the area surrounding the Project include:

- Dust and vehicle and machinery exhaust emissions associated with agricultural production.
- Vehicle emissions from traveling on Wollara Road and Golden Highway, particularly the unsealed part of Wollara Road.
- Bushfires.

The NSW DPE operates a comprehensive air quality monitoring network to provide the community of NSW with accurate and up-to-date information about air quality. Data from the monitoring network is presented online as ambient concentrations and Air Quality Index (AQI) values which are updated hourly and stored in a database.

The closest located air quality monitoring station is approximately 8 km north-east of Merriwa, on the Merriwa Scone Road (coordinates 32°7'6"S, 150°26'26"E), about 33.5 km northeast of the Project Area. This station is situated within a rural setting, approximately 170 m away from Scone Road, this monitoring station is similar in location and rural setting to the Project Area and is therefore considered representative. The following air pollutants are measured at Merriwa (DPIE, 2022):

- Larger particles (less than 10 microns in diameter).
- Smaller particles (less than 2.5 microns in diameter).
- Nitrogen dioxide (NO_2).
- Sulphur dioxide (SO_2).
- Ammonia (NH_3).

A search of the most recent air quality concentration data – updated hourly – on 14 November 2022 for Merriwa stated that the air quality was 'good' (DPIE, 2022).

A review of the National Pollution Inventory (NPI) (Department of Climate Change, Energy, the Environment and Water , 2022) identified two scheduled facilities that operate within the vicinity of the Project (30 km radius):

- Ulan Coal Mine at Ulan Road, Ulan (approximately 30 km west).
- Merriwa Petroleum Depot, Merriwa (approximately 30 km northeast).

6.15.2 Assessment of Impacts

6.15.2.1 Construction and Decommissioning

The main source of emissions to the air during construction would involve dust and air borne particles generated from traffic accessing the Project Area alongside Wollara Road (unsealed) and other construction activities including road repairs and culvert upgrades (along Ringwood Road), site preparations (construction) or demolition work and vehicle, plant and equipment and exhaust emissions. These emission sources are temporary in nature as the road repairs and upgrades package which will occur before construction of the rest of the Project. These upgrades will significantly reduce the dust emissions potentially generated in the construction phase and the high movement of construction vehicles.

Exhaust emissions from vehicles and machinery have the potential to impact on human health as well as contribute to greenhouse emissions and leave residues on private properties. The use of heavy vehicles, equipment and machinery would be largely limited to the construction period and emissions would be localised. Given the buffer provided by the Goulburn River National Park between the Project Area and any nearby sensitive receivers, any impacts from exhaust emissions are expected to be minimal and temporary in nature. Further, Lightsource bp has committed to implementing road repairs to Ringwood Road that would likely result in reduced dust disturbance. This is further discussed in **Section 6.9**.

The nearest sensitive receiver (not associated with the Project) is approximately 3 km away from the Project Area off Wollara Road with substantial set back from Wollara Road (closest point is 70 m). Given the temporary nature of the construction activities, the physical distance between the receiver and the Project, and Wollara Road, it is expected that any impacts from dust and exhaust emissions would be minimal.

With the implementation of air quality controls and mitigation measures proposed in **Section 6.15.3** it is expected that the construction and decommissioning activities would have a negligible impact on local air quality.

6.15.2.2 Operation

The Project has been designed to be compatible with up to 2,000 sheep grazing across the property, within the fenced Development Footprint. In addition to this, ongoing maintenance of the Project Area and infrastructure will be required, as outlined in **Section 3.5**. The infrastructure maintenance activities would result in minor, localised vehicle emissions and generation of dust from vehicles travelling along the internal, unsealed access roads.

With the implementation of the management and mitigation measures proposed in **Section 6.15.3**, the predicted air quality impacts during the operation of the Project can be adequately managed.

6.15.3 Management and Mitigation Measures

Measures outlined below would be implemented as part of the Project to efficiently manage air quality impacts:

- As part of the CEMP, develop and implement protocols to minimise the air emissions during the construction, including:
    - Water suppression on all exposed areas, unsealed roads and stockpile areas when required (i.e. if visible dust emissions are observed).
    - The location and scale of activities which generate dust emissions would be modified and limited during periods of dry and windy weather.
    - Engines to switch off when not in use for prolonged periods.
    - Development of a complaint procedure to identify and respond to complaints.
- Areas within the Project Area which have been temporarily disturbed by construction and operational activities will be rehabilitated.
- Once construction has been completed, establish and maintain ground cover in accordance with the OEMP.

7.0 Matters of National Environmental Significance

On the 2 February 2022, the DCCEEW confirmed the Goulburn River Solar Farm (EPBC 2021/9102) (referred to in this section as the proposed action) constitutes a controlled action under Section 75 of the EPBC Act. The Road Repairs and Upgrades were not a part of the controlled action decision by DCCEEW, a self-assessment for these works has been completed. This assessment determined the Road Repairs and Upgrade works would not have a significant impact on MNES, details of this assessment is provided in **Section 7.1,** with the assessment conducted in **Appendix 7**. As the Road Repairs and Upgrades were determined not a significant impact this was not referred.

For the Project Area the controlling provisions under the EPBC Act for the Project are:

- Listed threatened species and communities (sections 18 and 18A).

DCCEEW species records and habitat mapping indicates that there is likely to be potential impacts to the following:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered.
- Regent Honeyeater (*Anthochaera phygia*) – Critically Endangered.

Additionally, there is some risk that there may be significant impacts on the following communities and species and further assessment is required to determine their presence in the Project Area and any potential impacts of the Project:

- Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered.
- Swift Parrot (*Lathamus discolor*) – Critically Endangered.
- Painted Honeyeater (*Grantiella picta*) – Vulnerable.
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable.
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable.
- Pink tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable.
- Bluegrass (*Dichanthium setosum*) – Vulnerable.
- *Homoranthus darwinioides* – Vulnerable.

Further consideration for several threatened species and ecological communities have been identified as priority management species following the 2019-2020 bushfires. This includes the species likely to be impacted as mentioned above. The following species may also be impacted by the Project:

- Koala (*Phascolarctos cinereus*) (Combined Population of QLD, NSW and the ACT) – Vulnerable.
- Greater Glider (*Petauroides volans*) – Vulnerable.

- Brush tailed Rock wallaby (*Petrogale penicillata*) – Vulnerable.
- Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus* (South-east mainland population)) – Endangered.
- New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – Vulnerable.
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable.

The assessment path for the Project is in accordance with the *Amending Agreement of No. 1 to the Bilateral Agreement* under Section 45 of the EPBC Act relating to environmental assessment between the Commonwealth and NSW Governments. DCCEEW has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Appendix 1** of this EIS).

The assessment of Matters of National Environmental Significance (MNES) including the additional information outlined above is provided in both of the Biodiversity Assessment Development Report s(BDAR) for the Project (provided in **Appendix 6 and Appendix 7**) and should be read in conjunction with the BDAR. **Section 7.2** below provides a summary of the Key findings of the assessment of MNES.

7.1 Road Repairs and Upgrades Self-Assessment

One MNES, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland, was found to be present within the Road Repairs and Upgrades Area. Impacts to this CEEC have been avoided with none of the CEEC to be directly impacted by the Road Repairs and Upgrade works. No other MNES were identified within the Road Repairs and Upgrades Area. **Table 7.1** provides a summary of the impacts to MNES as a result of the Road Repairs and Upgrades.

Table 7.1 Impact to EPBC Act Threatened Species and Communities

Name of EPBC Act listed entity	Nature & consequence of impact (direct and indirect)	Duration of impact (e.g. construction, operation, life of the Project)	Quantum of impact (ha)	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Nil	N/A	0.09	N/A	Not significant (for impacts associated with the public road and culvert upgrades)

An assessment of significance was conducted for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (refer to **Appendix 7**). The assessment considered the criteria set out in the *Matters of National Environmental Significance Impact Guidelines 1.1* – Critically Endangered Ecological Communities, significant impact criteria (DE, 2013). This assessment concluded that Road Repairs and Upgrade works are considered unlikely to have a significant adverse impact on the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grasslands.

7.2 Summary of MNES Impact

The direct impacts of the Project, as they relate to the clearing of EPBC Act-listed CEEC and threatened species habitat, as summarised in **Table 7.2**, are predicted to be long-term or permanent. Further avoidance and minimisation measures are proposed, and a detailed BOS, will be prepared as part of the Project prior to construction commencing in order to compensate for the residual impacts of habitat loss that cannot be adequately avoided or minimised.

Table 7.2 Predicted Impacts from the Project on EPBC Act listed species and communities

Impact Type	MNES	Description	Nature of Impact	Direct Impact Area (ha)	Offsetting required?
Direct	White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands	Loss of 496.11 ha of woodland through clearing. Scattered trees condition zone = 19.26 ha Derived native grassland moderate condition zone = 168.48 ha Derived native grassland moderate to low condition zone = 308.37 ha	Permanent	496.11	Yes, see **Table 7.3**
Direct	Regent Honeyeater	Loss of 45.09 mapped important habitat through clearing.	Permanent	45.09	Yes, see **Table 7.3**

7.3 Impact Avoidance Strategies

Several Project refinements have been incorporated into the design and layout of the Project since the preparation of the initial Scoping Report and the completion of biodiversity surveys, to avoid and/or minimise impacts to sensitive environmental features. These refinements have been implemented as an outcome of ongoing consultation with landholders, refining the engineering design and targeted ecological surveys conducted across the Project Area. This has resulted in three main iterations to the Development Footprint to achieve the current Development Footprint, refer to **Section 1.4.2**.

The Project has been designed to take advantage of the most disturbed parts of the Project Area and is centered on the areas Assessed as Category 1 Land and areas of derived native grassland and scattered trees which have been subject to historical clearing and are currently managed for livestock grazing. Most of the areas of intact vegetation were avoided during the design of the Development Footprint in the iterative design process.

The Project has been designed to retain wildlife corridors between each of the three distinct solar array areas. The retained habitats incorporate the higher quality habitats present within the Project Area.

The reduction in the initial Development Footprint was particularly focused on avoiding areas of mapped Important Habitat for the Regent Honeyeater and the higher quality areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community, refer to **Figure 2.4**.

7.4 Proposed Biodiversity Offset Strategy

A comprehensive BOS will be developed for the Project in accordance with relevant NSW state legislation and/or policies, in accordance with the *Biodiversity Conservation Act 2016*. Accordingly, the offset strategy for the Project will be developed in consultation with the Department of Planning and Environment (DPE) and DCCEEW.

To meet offsets required for Commonwealth listed entities for controlled actions under the NSW Biodiversity Offset Scheme, Lightsource bp retains the ability to:

- Retire biodiversity credits based on the like-for-like provisions in the Biodiversity Conservation Regulation 2017.
- Fund biodiversity conservation action listed in the Ancillary rules: Biodiversity conservation action and directly benefit the threatened entity impacted.
- Pay into the Biodiversity Conservation Fund, noting it is the proponent's responsibility to notify the Biodiversity Trust that their payment is for a controlled action.
- Retain residual areas within the Project Area for a future Biodiversity Stewardship Agreement to provide offsets as part of the Project.

The Biodiversity Conservation Trust is required to meet the Commonwealth offset requirement component in a like-for-like manner. This is by retiring like-for-like credits, by funding conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and benefits the threatened entity impacted or by funding other conservation measures approved by the NSW Minister for Energy and Environment that directly benefit the entity impacted. **Table 7.3** outlines the credit requirements for the relevant habitat areas for impacted MNES outlined in **Section 7.2**, as calculated by the BAM.

Table 7.3 Ecosystem Credits Relevant for Impacted TEC MNES

MNES	PCTs and Habitats	Credits Required
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper hunter valley (*Includes areas which does not correspond to EPBC Act Listed CEEC, however included in purposes for offset calculations*)	4,642
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	**Total Ecosystem Credits**	**4,642**

Table 7.4 Species Credits Relevant for Impacted MNES

MNES	Credits Required
Regent Honeyeater (*Anthochaera phrygis*)	1,546
Total Species Credits	**1,506**

The MNES that were determined by DCCEEW to be significantly impacted by the Project are included in the credit liability for ecosystems required to be offset.

The Biodiversity Offset Strategy will be developed with the consideration of the need to compensate for residual significant impacts to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC and Regent Honeyeater with the aim to maintain or improve the biodiversity values of the surrounding region in the medium to long term. This aim will be delivered through the securing of in-perpetuity 'like-for-like' land-based offsets and in conjunction with the various impact mitigation and offset strategies that are proposed to be employed as part of the Project. Further details regarding the proposed biodiversity offset strategy is discussed in **Section 6.3.1.7**.

8.0 Environmental Management and Mitigation Measures

The SEARs for the Project required a consolidated summary of all proposed environmental management and monitoring measures, highlighting all of the commitments included in the assessment be provided. If development consent for the Project is granted, Lightsource bp will commit to the environmental management measures outlined below.

8.1 Environmental Management Framework

The environmental impacts associated with the Project would be managed through the implementation of a project specific suite of management measures detailed in **Section 6.0** and summarised below. This is through the implementation of a Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) which will also monitor compliance for the Project. A DRMF, refer to **Appendix 21** has been prepared to guide the Decommissioning Management Plan which will be prepared closer to the closing of operations.

The following standalone subplans would be incorporated into the CEMP and OEMP:

- Biodiversity Management Plan.
- Cultural Heritage Management Plan (Aboriginal and Historic Heritage).
- Soil and Water Management Plan, including:
    - Erosion Sediment Control Plan.
- Sheep Grazing Vegetation Management Plan.
- Wild Dog Management Plan.
- Landscape Management Plan.
- Noise and Vibration Management Plan.
- Weed and Pest Management Plan.
- Construction Traffic Management Plan.
- Emergency Management Plan, including Bushfire and Hazards.
- Social Impact Management Plan, including:
    - Community Engagement Strategy.
    - Community Shared Benefit Strategy.
    - Accommodation, Employment and Procurement Strategy.
- Waste Management Plan.

Prior to decommissioning a Decommissioning and Rehabilitation Environmental Management Plan.

(DREMP) will be prepared in accordance with the Decommissioning and Rehabilitation Management Framework. This will include:

- A DREMP will be prepared prior to the commencement of the decommissioning phase of the Project to manage environmental risks. The Decommissioning and Rehabilitation Management Framework will support the development of the management plan in the decommissioning phase.

8.2 Summary of Management Measures

A consolidated summary of management measures is provided in **Appendix 5**.

9.0 Justification of the Project

The SEARs require the EIS to provide both a *'strategic justification for the development focusing on site selection and suitability of the proposed site'*. This section addresses this requirement and provides a conclusion discussing the justification for the Project (**Section 9.1**), taking into consideration the suitability of the Project Area (**Section 9.2**), design refinement process (**Section 9.3**) and the biophysical, social and economic impacts (**Section 9.4**).

Section 9.5 discusses the principals of Ecologically Sustainable Development (ESD) as defined in Division 5, Section 193 (1) of the EP&A Regulation 2021, and in **Section 9.6** the Project is considered in the context of the objects of the EP&A Act.

9.1 Project Justification

As discussed in **Section 2.1**, the Project is a direct response to the NSW Government's commitment to transition to renewable electricity generation.

The Project would provide a number of benefits at Federal, State, regional and local levels, including:

- Generating enough electricity to supply approximately 156,000 households on an annual basis in NSW.
- Generating enough energy to meet 4% of the average NSW demand at peak output.
- Avoiding 705,000 tonnes of CO_2 emissions each year.
- Designing the Project for dual land use operation with approximately 2,000 sheep to be retained onsite while the Project is operational (sheep grazing will be trialled in the Development Footprint), plus additional cattle grazing outside the Development Footprint.
- Diversifying land use and economic activity in regional NSW.
- Generating a capital investment of approximately $880 million, including $130 million in local investment during construction and $120 milion during operations over the course of the 40 year operating life.
- Providing 350 direct jobs during the construction phase and 10 direct jobs nationally during the operational phase.

The Project is justified and of interest to the public as:

- It is suitably located in a region with ideal climatic and physical conditions for large-scale solar energy generation.
- 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.
- It would result in minimal visual impacts as the Project Area is screened by the Goulburn River National Park.
- The large, isolated Project Area (2000 ha) provides flexibility in design (within limits) 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 reducing environmental and ecological impacts on the land within the Project Area. The consequences of not proceeding with the Project would result in:

- Loss of opportunity to move towards cleaner electricity generation.
- Loss of increased energy security and supply to 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. A Community Shared Benefit Strategy will also be developed for the Project.

9.2 Suitability of the Site

In preliminary phases of the Project, Lightsource bp undertook a site constraints and opportunities analysis to identify the most appropriate site. This analysis involved the following considerations for site suitability:

- Current land use.
- Land available to purchase.
- Capability to connect to the electricity grid and access to transmission line network.
- Environmental and social constraints, including biodiversity and heritage.
- High quality solar irradiation levels.
- Land suitability (i.e. topography) to support a utility solar farm.

Specifically, this Project Area was identified as suitable due to the following:

- The Project Area is strategically located to connect to the existing transmission infrastructure and in an area with high solar energy potential.
- The Project Area has two landholders and was available for purchase by Lightsource bp.
- The Project Area has been disturbed and/or historically cleared for agricultural land use practices, primarily cattle grazing and some cropping.

- The Project Area is isolated from sensitive receptors which minimises environmental and social impacts. The Project Area is surrounded by a buffer of at least 2 km of native vegetation associated with the Goulburn River National Park and as such there are minimal sensitive receptors to the project for visual impacts and noise and vibration. The closest non-involved dwelling is located approximately 3 km north of the Project Area, in addition to this there are no other sensitive land uses (such as schools or places of worship near the Project Area). The Project Area is therefore suitably removed from the nearest sensitive receiver.

- There is no need for additional easement works outside the Project Area to connect the Project to the electricity network. There is a high capacity 500 kV transmission line that runs through south eastern corner of the Project Area. The location of this transmission line allows for connection to the national electricity grid with minimal works required. Often the location of a high-quality renewable resource (high solar irradiance and wind energy resources) and transmission line infrastructure does not align and similar size renewable energy projects would require significant works to connect to the national electricity grid.

9.3 Design Refinement

The conceptual layout of the Project Infrastrucutre has been developed to maximise the use of existing disturbed areas and avoid and minimise impact to identified biodiversity and heritage values on the Project Area.

The location of the Project including the design, technology, layout and size have been developed through consideration of a number of alternatives (refer to **Section 2.6**) and an iterative design process. This has ensured that the Project maximises benefits for the locality and region in the long term, while avoiding and minimising the potential impacts to heritage and the environment. Key features of the iterative design process include:

- Reducing the Project's Development Footprint subsequent to the lodgement of the Scoping Report from 2,000 ha to 1,249 ha, then to 882 ha and further to 799.5 ha in order to minimise 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 (*Anthochaera Phrygia)* important habitat.

- Alterations to the Project to reduce impacts to suitable breeding habitat for Barking Owl (*Ninox connivens*).

- Alterations to the Project to 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 White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC) 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 minimise impacts on biodiversity, avoid Redlynch Creek which crosses the Project Area, and the Slab Hut remains.

- The Project has also been designed to be compatible with sheep grazing to facilitate ongoing agricultural land use. This will be trialled across the Development Footprint.

9.4 Environmental, Cumulative, Social and Economic Impacts

As identified throughout the EIS and in **Section 9.1** the Project has undergone an iterative design process. The conceptual layout for the solar arrays, connection to existing transmission line corridor, internal access tracks and other supporting infrastructure has been subject to ongoing refinement with the aim of minimising associated environmental, cumulative, social and economic impacts.

The various environmental, cumulative, social and economic impacts of the Project have been identified and were subject to a detailed environmental assessment as summarised in **Section 6.0**. This has been based on:

- Assessment of the site characteristics (existing environment).
- Consultation with relevant government agencies.
- Engagement with local community and other stakeholders.
- Environmental and social risk analysis.
- Application of the principles of ESD, including the precautionary principle, intergenerational equity, conservation of biological diversity and valuation and pricing of resources.
- Expert technical assessment.

The key issues identified, including those specified in the SEARs, were subject to comprehensive specialist assessment to identify the potential impacts of the Project on the existing environment. These assessments are detailed in **Section 6.0** and the appendices to this EIS.

Lightsource bp has utilised the findings of detailed assessment of environmental, cultural, social and economic impacts to refine the Project. This has enabled the impacts of the Project to be minimised by:

- Obtaining a detailed understanding of the issues and impacts by scientific evaluation and stakeholder engagement.
- Undertaking detailed Project planning considering the environmental, social and cultural constraints of the locality and investigation of various project alternatives which resulted in changes to the Project that reduced impacts.
- Active engagement with key stakeholders, including proximal landholders, to identify key concerns and issues and to allow these to be considered in the Project design process.
- Commitment to proactive and appropriate strategies to avoid, minimise, mitigate, offset or manage a range of potential environmental impacts (refer to **Section 6.0** and **Section 8.0**).

- Consideration of potential cumulative impact associated with the Project and its interaction with other similar developments (type and scale) within the region. Consideration of cumulative impacts has been undertaken in specialist assessments for biodiversity, land, visual amenity, noise and vibration, traffic and transport, social amenity and economic matters. The cumulative impacts of waste management have been assessed through a qualitative assessment.

- Cumulative impacts have been considered in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (CIA Guidelines) (DPIE, 2021). Further details on cumulative impacts are provided in **Appendix 20**.

As outlined in **Section 6.0**, the potential environmental, cultural, social and economic impacts associated with the Project can be appropriately managed through the implementation of appropriate management, mitigation and monitoring measures. A consolidated list of the proposed management and mitigation measures is provided in **Section 8.0.**

9.5 Ecologically Sustainable Development

An object of the EP&A Act is to encourage ESD within NSW. As noted in **Section 4.0**, the Project is classified as SSD in accordance with the Planning Systems SEPP and has been subject to an environmental impact assessment under Part 4, section 4.2 (8) of the EP&A Act.

To justify the Project with regard to the principles of ESD, the benefits of the Project in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD encompass the following:

- the precautionary principle
- intergenerational equity
- conservation of biological diversity
- valuation, pricing and incentive mechanisms.

9.5.1 The Precautionary Principle

The EP&A Reg defines the precautionary principle as:

> *i. if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*

In order to achieve a level of scientific certainty in relation to potential impacts associated with the Project, the EIS includes an extensive evaluation of all the key components of the Project. Detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented in this EIS.

The EIS and assessment process has involved a detailed study of the existing environment and where applicable the use of scientific modelling and surveys to assess and determine potential impacts as a result of the Project. To this end, there has been careful evaluation as part of the project design and assessment process to avoid where possible, irreversible damage to the environment. Specialist studies have been undertaken to provide accurate information to assist with evaluation and development of the Project. Mitigation measures are provided in **Section 8.0**.

ii. The decision-making process for the design, impact assessment and development and development of management process has been transparent in the following:

- Government authorities, landholders potentially affected by the Project, the local community, the Aboriginal community and other stakeholders were consulted during preparation of this EIS (refer to **Section 5.0**). This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures.

- The community has been engaged throughout the development and assessment of the Project through a range of mechanisms including one-on-one meetings, community information sessions to inform project design and management of key issues, and community information sheets, amongst other mechanisms (refer to **Section 5.0**) which provided landholders and stakeholders with both information and the opportunity to influence Project outcomes (refer to **Section 2.6.4**).

- Lightsource bp will develop and implement a CEMP, OEMP and DREMP, which will implement best practice management and will incorporate all identified mitigation and management measures identified in this EIS. Additionally, the Project will be subject to an independent auditing and verification process consistent with relevant requirements for SSD projects. The CEMP, OEMP and DREMP will incorporate the additional controls committed to in this EIS (refer to **Section 8.0**).

9.5.2 Intergenerational Equity

The EP&A Regulation defines the principle of intergenerational equity as:

> *...that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The objectives of the Project are outlined in **Section 1.5** and in relation to intergenerational equity, they include to:

- Implement the Project in an environmentally responsible manner to minimise project specific and cumulative environmental and social impacts.

- Minimise additional disturbance by maximising the use of disturbed area (due to historical and current and grazing activities) within the Project Area.

- Generate local and regional employment opportunities as well as potential for training and upskilling opportunities.
- Develop comprehensive mitigation and management strategies to mitigate and offset predicted impacts associated with the Project.

Further to the Project objectives, a range of environmental management measures discussed in **Section 6.0** and **Section 8.0** have been developed and evaluated to minimise the impact on the environment to the greatest extent reasonably possible.

The Project would benefit future generations by reducing the reliance on energy sources derived from non-renewable resources, which produce greenhouse gas emissions. During the operation both sheep grazing and solar energy will operate in conjunction of each other, both of which would provide benefits for future generations. Once decommissioned, the land within the development footprint will continue to be used for sheep grazing if deemed viable.

The EP&A Act requires consent authority to consider matters of relevance to the public interest. Matters of public interest have been held to include intergenerational equity.

9.5.3 Conservation of Biological Diversity

The EP&A Regulation identifies that the principle of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision-making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. All environmental components, ecosystems and habitat values potentially affected by the Project have been assessed in the BDAR (refer to **Appendix 6**). Potential biodiversity related impacts are outlined in this EIS (refer to **Section 6.2**) and measures to ameliorate any negative impact are outlined in **Section 8.0**.

The layout of the solar arrays across the Project Area has been developed to minimise disturbance to areas of high biodiversity value and ensure ecological connectivity. Following the application of avoidance and mitigation measures, the BAM assessment has identified the biodiversity credit requirement to offset the impacts of the residual impacts of the Project and the required management and mitigation measures to be implemented. The principle of Conservation of Biological Diversity is considered to be satisfied.

9.5.4 Valuation Principle

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle has been defined in the EP&A Regulation as follows:

- *that environmental factors should be included in the valuation of assets and services, such as:*
    - *(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement;*
    - *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and*

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

The environmental consequences of the Project have been assessed in this EIS (refer to **Section 6.0**) and mitigation measures identified for factors with potential for adverse impact (**Section 8.0**). Implementing the mitigation measures would impose an economic cost on the proponent, increasing both the capital and operating costs of the Project. This signifies those environmental resources have been given appropriate valuation.

The Project has been developed and designed with the objective of minimising potential impacts on the environment. This indicates that the design of the Project has been developed with the environmental objective in mind.

The aims, structure and content of this EIS have incorporated these ESD principles. The mitigation measures in **Section 8.0** provide an auditable environmental management commitment to these parameters. The Project aligns with the principals of ESD and is considered to be satisfied, due to the social, economic and environmental benefits provided in **Section 1.5**, and the mitigation measures put in place to protect from adverse impacts on the environment.

9.6 Objects of the EP&A Act

The objects of the EP&A Act, and how these are addressed in relation to the Project, are presented in **Table 9.1**. It shows that the Project is justified on the basis of its consistency with the EP&A Act.

Table 9.1 Objects of the EP&A Act

Object	Response
To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	Project would result in the loss of cropping within the small amount of agricultural land currently used for this purpose. This activity would be restricted for a period of approximately 40 years (35 lifetime of the Project years and 4 years of construction and decommissioning activities) however in the meantime, the Project Area can be used for grazing agriculture (sheep) (cattle grazing could potentially continue, in BSA site) and can be returned to cropping agricultural use upon decommissioning. The Project would not result in the sterilisation of natural resources including mineral resources. There are no existing exploration or mineral licences in the Project Area. The Project has been designed and located to avoid native vegetation, heritage items and sensitive environments (i.e. waterways) as much as possible and to minimise the use of natural and artificial resources while considering the social and economic welfare of the local community.
To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in **Section 9.5**.

Object	Response
To promote the orderly and economic use and development of land.	The Project aims to promote the orderly and economic use of the land through the diversification of agricultural land with renewable electricity generation. The Project is also connecting into existing transmission infrastructure, maximising the economic potential of the infrastructure.
To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The Project's planning and design process has considered environmental impacts and has incorporated several mitigation and management measures to reduce further impacts.
To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The Project will not impact upon any significant or listed areas of built and cultural heritage (including Aboriginal heritage). However, an Unexpected (heritage) Finds Protocol will be developed prior to construction.
To provide increased opportunity for community participation in environmental planning and assessment.	Engagement activities undertaken during the development of the EIS are outlined in **Section 5.0** Lightsource bp would continue to consult with the local community and key stakeholders during the Project's development.

9.7 Conclusion

As outlined in **Section 9.5**, the Project has been assessed against the principles of ESD as required by the EP&A Act and EP&A Regulation. This assessment has indicated that while the Project, would have some impacts, these impacts can be effectively managed, mitigated and offset and the development will result in significant economic benefits. The assessment therefore concludes that the Project is consistent with the principles of ESD. The Project will provide long-term, strategic benefits to the State of NSW, including:

- Renewable energy supply to assist with fulfilling the current obligations under State and Federal renewable energy targets.
- Providing for cleaner reliable electricity generation, assisting with meeting current load demand while reducing greenhouse gas emissions and the impacts of climate change.
- The Project will also provide direct financial benefits to the regional and local community, including: a capital investment of approximately $880 million of which approximately $250 million will be retained in the region over the life of the Project.
- Employment generation creating up to 350 direct and 560 indirect jobs during the 27 month construction phase with around 13 FTE jobs (10 FTE direct and 3 FTE indirect) created during the operational phase.
- Indirect benefits to local services through the construction and operation phases.
- Community Benefit Fund payments and increased Council land tax returns from the Project Area. It is considered this economic stimulus will also assist with supporting the ongoing agricultural land use within the Region.

Lightsource bp has applied an iterative approach through the development of this EIS responding to both environmental and cultural heritage constraints and community concerns through refinement of the layout and the overall Project approach. Through the implementation of best practice management, 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. The Project aligns with the principals of ESD and is considered to be satisfied, due to the social, economic and environmental benefits.

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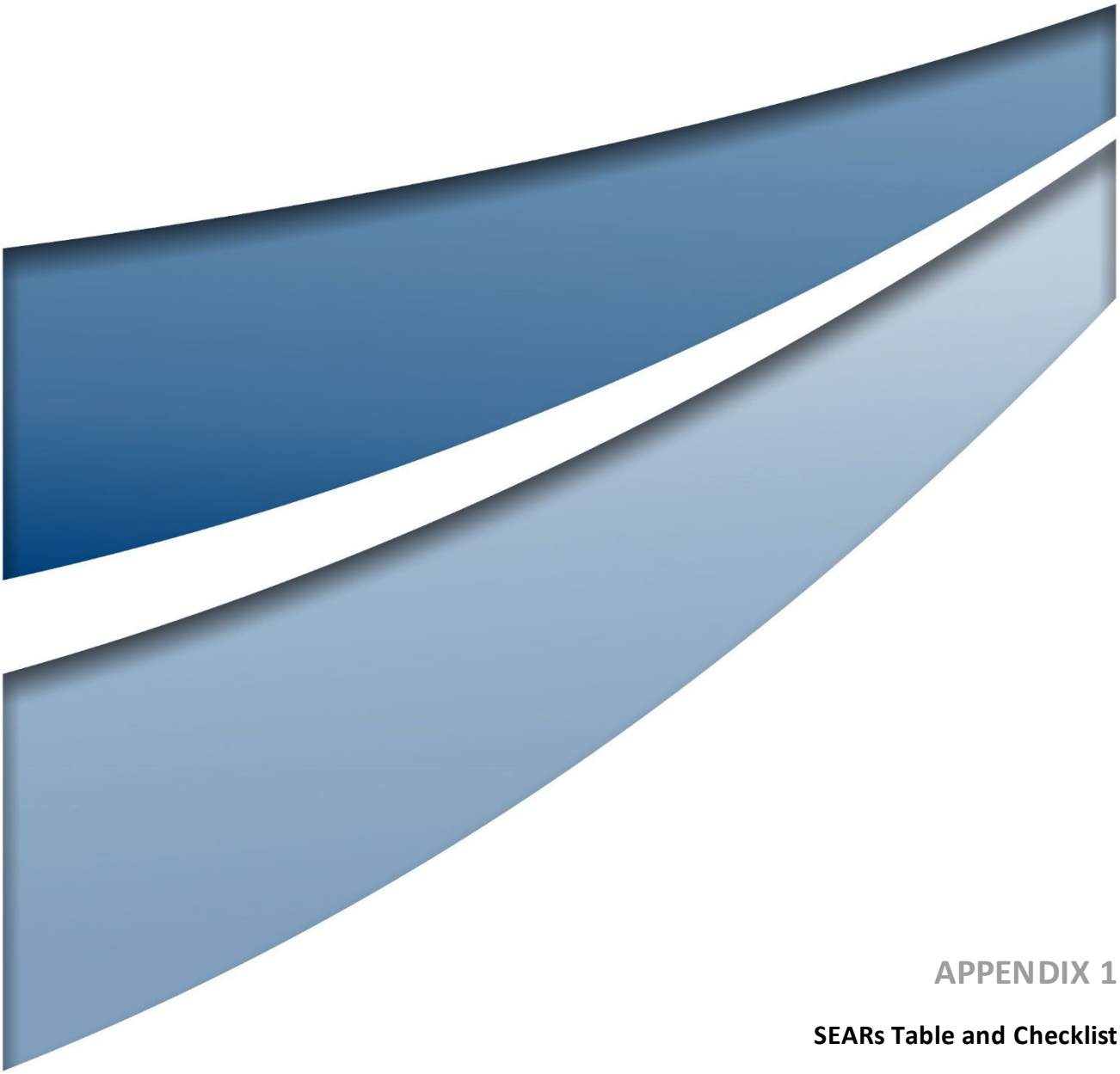
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APPENDIX 1

SEARs Table and Checklist

Planning, Industry & Environment

Mrs Diana Mitchell
Principal Environmental Planner
LIGHTSOURCE DEVELOPMENT SERVICES AUSTRALIA PTY LTD
717 Bourke Street
Docklands Victoria 3008

01/02/2022

Dear Mrs Mitchell

Goulburn River Solar Farm (SSD-33964533)
Planning Secretary's Environmental Assessment Requirements

Please find attached a copy of the Planning Secretary's environmental assessment requirements (SEARs) for the preparation of an environmental impact statement (EIS) for the Goulburn River Solar Farm (see Attachment 1).

The SEARs have been prepared in consultation with relevant public authorities, based on the information you have provided. A copy of the advice from the public authorities is attached for your information (see Attachment 2). Any additional comments from National Parks and Wildlife Service, Rural Fire Service NSW and Transgrid will be forwarded at a later date.

Where relevant, the Planning Secretary may modify the SEARs to ensure the environmental assessment of the project covers all relevant matters and is consistent with contemporary assessment practice.

From 1 July 2021, all SEARs will expire two years from the date of issue (or the date they were last modified) unless the Planning Secretary has granted an extension. If you would like to seek an extension, you should contact the Department at least three months prior to the expiry date.

If your Development Application (DA) and EIS is not submitted within two years (or by the agreed extension date), you will need to make a new application for SEARs to progress your project.

Preparing your EIS

The Department wishes to emphasise the importance of effective and genuine community consultation. A comprehensive open and transparent community consultation engagement process must be undertaken during the preparation of the EIS. This process must ensure that the community is provided with a good understanding of what is proposed, description of any potential impacts and they are actively engaged in issues of concern to them.

If your environmental impact statement (EIS) is submitted after 1 April 2022, it must be prepared having regard to the Department's new *State Significant Development Guidelines – Preparing an Environmental Impact Statement.* These guidelines and other relevant guides, including the *Undertaking Engagement Guidelines for State Significant Projects* are available at www.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework.

Note - If you submit your EIS after 31 December 2022, a Registered Environmental Assessment Practitioner (REAP) will need to declare that your EIS meets certain standards in relation to compliance, completeness, accuracy and legibility.

Lodging your development application (DA)
Once you submit your EIS, we will check it for completeness to confirm it addresses the requirements in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. We will also notify you of the DA fee for your project.

Please note that **your DA is not taken to be lodged until the DA fee has been paid**.

To minimise lodgement delays, please contact the Department at least two weeks before you submit your DA and EIS to confirm DA fee payment arrangements. This will give us sufficient time to ensure your fees can be determined quickly.

Information needed to determine the DA fee
Your application will need to be accompanied by a Quantity Surveyor's Report supporting the estimated cost of works for your project. You must ensure that the information in the report is consistent with the information provided in your DA form.

If your project involves any subdivision of land, you must also ensure that your report includes a breakdown of estimated costs for any other component of your project.

Public exhibition requirements
When you contact us, regarding the applicable DA fee, we will also advise whether hard and/or electronic copies of the DA and EIS will be required for public exhibition.

Matters of National Environmental Significance
Any development likely to have a significant impact on matters of National Environmental Significance will require approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to approvals required under NSW legislation.

It is your responsibility to contact the Commonwealth Department of Agriculture, Water and the Environment to determine if you need approval under the EPBC Act (http://www.environment.gov.au or 6274 1111).

Your assigned planning officer is Kurtis Wathen. If you have any questions, please contact Kurtis Wathen on 02 8289 6981 or at kurtis.wathen@dpie.nsw.gov.au

Yours sincerely,



Nicole Brewer
Director
Energy Assessments
As delegate for the Planning Secretary

Attachment 1 – Planning Secretary's Environmental Assessment Requirements
Attachment 2 – Agency Advice

Guidelines for preparing assessment documentation relevant to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) for proposals being assessed under the NSW Assessment Bilateral

Goulburn River Solar Farm (EPBC 2021/9102)

Introduction

1. On 2 February 2022, a delegate of the Federal Minister for the Department of Agriculture, Water and the Environment (formerly Department of Environment and Energy) determined Goulburn River Solar Farm was a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act controlling provisions for the proposed actions are:

    i. listed threatened species and communities (sections 18 and 18A)

2. The proposed action will be assessed in accordance with the bilateral assessment agreement Amending Agreement No. 1, and as such, is required to be assessed in the manner specified in Schedule 1 to that Agreement, including, addressing the matters outlined in Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regulations).

3. The proponent must undertake an assessment of all protected matters that may be impacted by the development under the controlling provision identified in paragraph 1. The Commonwealth Department of Agriculture, Water and the Environment considers that the proposed action is likely to have a significant impact on threatened species and communities and migratory species listed in **Appendix A**.

4. The proponent must consider each of the protected matters under the triggered controlling provisions that may be impacted by the action. Note that this may not be a complete list and it is the responsibility of the proponent to undertake an analysis of the relevant impacts and ensure all protected matters that are likely to be impacted are assessed for the Commonwealth Minister's consideration.

General Requirements

Relevant Regulations

5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations 2000 (*Cth) and all matters outlined below in relation to the controlling provisions.

Project Description

6. The title of the action, background to the action and current status.

7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.

8. How the action relates to any other actions that have been, or are being taken in the region affected by the action.

9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.

Impacts

10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including:

    i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts;

    ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;

    iii. analysis of the significance of the relevant impacts; and

    iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts.

Avoidance, mitigation and offsetting

11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including:

    i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures,

    ii. any statutory policy basis for the mitigation measures;

    iii. the cost of the mitigation measures;

    iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;

    v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.

12. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.

13. For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any:

    i. conservation advice or recovery plan for the species or community;

    ii. relevant threat abatement plan for the species or community;

    iii. wildlife conservation plan for the species; and

    iv. any strategic assessment.

Note: the relevant guidelines and policy statements for each species and community are available from the Department of the Environment Species Profiles and Threats Database. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl]

14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15-17.

Key Issues

Biodiversity (threatened species and communities and migratory species)

Assessment Requirements

15. The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.
16. For each of the EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action the EIS must provide a separate:

    a. description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans;

    b. details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements;

    c. description of the relevant impacts of the action having regard to the full national extent of the species or community's range; and

    d. description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action;

    e. identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account;

    f. a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established.

    g. details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and

    h. details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites.

Note: For the purposes of approval under the EPBC Act, it is a requirement that offsets directly contribute to the ongoing viability of the specific protected matter impacted by a proposed action and deliver an overall conservation outcome that improves or maintains the viability of the MNES i.e. 'like for like'. In applying the BAM, residual impacts on EPBC Act listed threatened ecological communities must be offset with Plant Community Type(s) (PCT) that are ascribed to the specific EPBC listed ecological community. PCTs from a different vegetation class will not generally be acceptable as offsets for EPBC listed communities.

17. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy. http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.

Other approvals and conditions

18. Information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations 2000.

Environmental Record of person proposing to take the action

19. Information in relation to the environmental record of a person proposing to take the action must include details as prescribed in Schedule 4 Clause 6 of the EPBC Regulations 2000.

Information Sources

20. For information given in an EIS, the EIS must state the source of the information, how recent the information is, how the reliability of the information was tested; and what uncertainties (if any) are in the information.

REFERENCES

- *Environment Protection and Biodiversity Conservation Act 1999* - section 51-55, section 96A(3)(a)(b), 101A(3)(a)(b), section 136, section 527E
- *Environment Protection and Biodiversity Conservation Regulations 2000* Schedule 4
- Amending Agreement No. 1 (2020) - Item 18.1, Item 18.5, Schedule 1
- *Matters of National Environmental Significance - Significant impact guidelines 1.1* (2013) EPBC Act
- *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy October 2012

Appendix A

Protected matters relevant to the Goulburn River Solar Farm (EPBC 2021/9102) project

Based on the information in the referral documentation, the location of the action, species records and likely habitat present in the area, there are likely to be significant impacts to:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered
- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered

Additionally, there is some risk that there may be significant impacts on the following matters and further assessment to determine if the communities and species listed below are present in the proposed action area and, if so, the extent to which they may be impacted by the proposed action, is required:

- Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered
- Swift Parrot (*Lathamus discolor*) – Critically Endangered
- Painted Honeyeater (*Grantiella picta*) – Vulnerable
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable
- Pink tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable
- Bluegrass (*Dichanthium setosum*) – Vulnerable
- *Homoranthus darwinioides* – Vulnerable

Several threatened species and ecological communities have been identified as priority management species following the 2019-20 bushfires. This includes the White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland threatened ecological community and the Regent Honeyeater (as discussed above), and the following listed species that may be impacted by the proposed action:

- Koala (*Phascolarctos cinereus*) (Combined Population of QLD, NSW and the ACT) – Vulnerable
- Greater Glider (*Petauroides Volans*) – Vulnerable
- Brush tailed Rock wallaby (*Petrogale penicillata*) – Vulnerable
- Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus* (South-east mainland population)) – Endangered
- New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – Vulnerable
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable

Further analysis of the impacts of the fires on those species and communities identified above should be undertaken during the assessment.

Note: uncertainty around the extent and number of protected matters that may be impacted will need to be resolved through the assessment process once final alignment and construction plans have been completed.

Note: this may not be a complete list and it is the responsibility of the proponent to ensure any protected matters under these controlling provisions are assessed for the Commonwealth decision-maker's consideration.

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*

Schedule 2 of the Environmental Planning and Assessment Regulation 2000

Application Number	SSD-33951458
Project Name	Goulburn River Solar Farm which includes: • the construction, operation and decommissioning of a solar photovoltaic (PV) energy generating facility with an estimated capacity up to 520 MW; and • associated infrastructure, including battery storage of up to 260 MW / 520 MWh
Location	2335 Wollara Road, Merriwa, approximately 28 km south of Merriwa township within the Upper Hunter Shire Council Local Government Area
Applicant	Lightsource Development Services Australia Pty Ltd
Date of Issue	01/02/2022
General Requirements	The environmental impact statement (EIS) must meet the minimum form and content requirements as prescribed by Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and must have regard to the *State Significant Development Guidelines*. In particular, the EIS must include: • stand-alone executive summary; • a full description of the development, including: - details of construction, operation and decommissioning; - a high quality site plan at an adequate scale showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); - a high quality detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development; • a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including existing land use, other proposed or approved solar and major projects, rural/residential development, Crown lands within and adjacent to the project site, National Parks and Wildlife Service land and subdivision potential); • an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including: - a description of the existing environment likely to be affected by the

	development using sufficient baseline data; - an assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice including the *Large-scale Solar Energy Guideline* (DPIE 2018, subject to revision) and *Cumulative Impact Assessment Guideline* (DPIE, July 2021); - a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and - a description of the measures that would be implemented to monitor and report on the environmental performance of the development; • a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS; • a detailed evaluation of the merits of the project as a whole having regard to: - the requirements in Section 4.15 of the *Environmental Planning and Assessment Act 1979*, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development; - the suitability of the site with respect to potential land use conflicts with - existing and future surrounding land uses; and - feasible alternatives to the development and its key components (including opportunities for shared infrastructure with proposed developments in the region), and the consequences of not carrying out the development; • a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter; and • a signed statement from the author of the EIS, certifying that the information contained within the document is neither false nor misleading. The EIS must also be accompanied by: • a report from a suitably qualified person providing a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; • an estimate of the jobs that will be created during the construction and operational phases of the proposed project; and • certification that the information provided is accurate at the date of preparation. The development application must be accompanied by the consent of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).
Key issues	The EIS must address the following specific matters: • **Biodiversity** – including: - 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 Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE 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, and
- if an offset is required, details of the measures proposed to address the offset obligations.

- **Heritage** – including:
  - an assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the Code of Practice for the *Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010);
  - evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010); and
  - assess the impact to historic heritage having regard to the NSW Heritage Manual.
- **Land** – including:
  - a detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, permissibility, strategic context and existing site constraints;
  - an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:
    - flood prone land, Crown lands, mining, quarries, mineral or petroleum rights;
    - a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and
    - a cumulative impact assessment of nearby developments;
  - an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:
    - consideration of the zoning provisions applying to the land, including subdivision (if required);
    - completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's *Land Use Conflict Risk Assessment Guide;* and
  - a detailed assessment of the impact on agricultural resources and agricultural productivity, including:
    - an agricultural impact statement;
    - consideration of potential mitigation measures which may reduce

project impacts on agricultural land;
    - detailed economic assessment of impacts on agricultural land, agricultural production and agricultural supply chains;
    - justification for the project considering other alternatives and site design which may have lesser impacts on agricultural land;

- **Visual** – including:
  - a detailed assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the project (including arrays, transmission lines, substations, battery storage and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas and road corridors in the public domain and on the Siding Spring Observatory in accordance with the *Dark Sky Planning Guideline* (2016); and
  - provide details of measures to mitigate and/or manage potential impacts (including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners);
- **Noise** – including an assessment of the construction noise impacts of the development in accordance with the *Interim Construction Noise Guideline* (ICNG), operational noise impacts in accordance with the *NSW Noise Policy for Industry* (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;
- **Transport** – including:
  - an assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation;
  - an assessment of the likely transport impacts to the site access route(s), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance;
  - a cumulative impact assessment of traffic from nearby developments; and
  - provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authorities;
- **Water** – including:
  - an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts;
  - details of water requirements and supply arrangements for construction and operation; and
  - where the project involves works within 40 metres of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI *Guidelines for Controlled Activities on Waterfront Land* (2018) and (if necessary) *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (DPI 2003), and *Policy & Guidelines for Fish Habitat Conservation & Management* (DPE, 2013); and
  - a description of the erosion and sediment control measures that would be

	implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004); • **Hazards–** including: - a preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33* (DoP, 2011); - a Preliminary Hazard Analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011). The PHA must consider all recent standards and codes and verify separation distances to on-site and off-site receptors to prevent fire propagation and compliance with *Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning* (DoP, 2011); and - an assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the *International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields;* • **Social Impact –** including an assessment of the social impacts in accordance with *Social Impact Assessment Guideline* (DPIE, July 2021); • **Economic** –including an assessment of the economic impacts or benefits of the project for the region and the State as a whole, and • **Waste** – identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.
Plans and Documents	The EIS must include all relevant plans, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents. In addition, the EIS must include high quality files of maps and figures of the subject site and proposal.
Legislation, Policies & Guidelines	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. A list of some of the legislation, policies and guidelines that may be relevant to the assessment of the project can be found at: • https://www.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework/Improving-assessment-guidance • https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines; and • http://www.environment.gov.au/epbc/publications#assessments
Consultation	During the preparation of the EIS, you should consult with the relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders. In particular, you must undertake detailed consultation with affected landowners surrounding the development, Upper Hunter Shire Council, Crown Lands, NSW

	Aboriginal Land Council and Transport for NSW. The EIS must: • detail how engagement undertaken was consistent with the *Undertaking Engagement Guidelines for State Significant Projects* (DPIE, July 2021); and • describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, an explanation should be provided.
Expiry Date	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, your SEARs will expire. If an extension to these SEARs will be required, please consult with the Planning Secretary 3 months prior to the expiry date.

Our ref: DOC21/1137261-3
Your ref: SSD-33964533

Kurtis Wathen

Environmental Assessment Officer
Energy Resource Assessments
Department of Planning, Industry and Environment
Kurtis.Wathen@dpie.nsw.gov.au

Dear Kurtis

Input into Secretary's Environmental Assessment Requirements – Goulburn River Solar Farm (SSD 33964533) – Upper Hunter Shire LGA

I refer to your Major Projects Portal request on 22 December 2021 seeking input into the Secretary's Environmental Assessment Requirements (SEARs) for the Goulburn River Solar Farm, located at 2335 Wollara Road, Merriwa. This project area stretches across 44 lots and is 2000 hectares in size. The proposed development is within the Upper Hunter Shire local government area.

The Biodiversity Conservation Division (BCD) of the Department of Planning, Industry and Environment (the Department) understands that Lightsource bp are proposing the construction of a solar farm which will include an approximate 520 megawatt peak (MWp) of solar electricity generation with a Battery Energy Storage System with a 260 MWp and 520 megawatt hour capacity. The project will also include supporting infrastructure, such as a substation and connection to an existing 500 kilovolt transmission line which intersects with the property. BCD understands that the proposal is a State Significant Development (SSD-33964533) project under the *Environmental Planning and Assessment Act 1979*.

BCD has reviewed the document '*Goulburn River Solar Farm Scoping Report*' as prepared by Umwelt (Australia) Pty Ltd (dated 17 December 2021) and has prepared Standard SEARs which are presented in **Attachment A**. There are no project-specific SEARs provided for this project (**Attachment B**). Details of guidance documents are provided in **Attachment C**.

If you have any further questions in relation to this matter, please contact Jayme Lennon, Senior Conservation Planning Officer, on 9585 6935 or at huntercentralcoast@environment.nsw.gov.au.

Yours sincerely

STEVEN CRICK
Senior Team Leader Planning
Hunter Central Coast Branch
Biodiversity and Conservation Division

23 December 2021

Enclosure: Attachments A, B, C

Attachment A – Standard Environmental Assessment Requirements

Biodiversity

1. Biodiversity impacts related to the proposed development (SSD-33951458) are to be assessed in accordance with the Biodiversity Assessment Method 2020 and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the *Biodiversity Conservation Act 2016* (s6.12), *Biodiversity Conservation Regulation 2017* (s6.8) and Biodiversity Assessment Method 2020.
2. 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 Biodiversity Assessment Method 2020.
3. The BDAR must include details of the measures proposed to address the offset obligation as follows;
    - The total number and classes of biodiversity credits required to be retired for the development/project;
    - The number and classes of like-for-like biodiversity credits proposed to be retired;
    - The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules;
    - Any proposal to fund a biodiversity conservation action;
    - Any proposal to conduct ecological rehabilitation (if a mining project);
    - Any proposal to make a payment to the Biodiversity Conservation Fund.

If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.

4. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the *Biodiversity Conservation Act 2016*.

Water and soils
5. The EIS must map the following features relevant to water and soils including: a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). b. Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method). c. Wetlands as described in s4.2 of the Biodiversity Assessment Method. d. Groundwater. e. Groundwater dependent ecosystems. f. Proposed intake and discharge locations.
6. The EIS must describe background conditions for any water resource likely to be affected by the development, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters. d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
7. The EIS must assess the impacts of the development on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.

8. The EIS must assess the impact of the development on hydrology, including:
    a. Water balance including quantity, quality and source.
    b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.
    c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.
    d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).
    e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.
    f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.
    g. Identification of proposed monitoring of hydrological attributes.

Flooding and coastal erosion

9. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:
    a. Flood prone land.
    b. Flood planning area, the area below the flood planning level.
    c. Hydraulic categorisation (floodways and flood storage areas).

10. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.

11. The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios:
    a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.

12. Modelling in the EIS must consider and document:
    a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood.
    b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories.
    c. Relevant provisions of the NSW Floodplain Development Manual 2005.

13. The EIS must assess the impacts on the proposed development on flood behaviour, including:

    a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.
    b. Consistency with Council floodplain risk management plans.
    c. Compatibility with the flood hazard of the land.
    d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
    e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
    f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
    g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council.
    h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.
    i. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES.
    j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

14. The [EIS/EA] must describe the potential effects of coastal processes and hazards (within the meaning of the Coastal Management Act 2016), including sea level rise and climate change:

    a. On the proposed development
    b. Arising from the proposed development.

15. The [EIS/EA] must consider have regard to any certified Coastal Management Program (or Coastal Zone Management Plan) and be consistent with the management objectives described in the Coastal Management Act 2016 and development controls for coastal management areas mapped under the State Environmental Planning Policy (Coastal Management) 2018.

Attachment B – Project specific environmental assessment requirements

Biodiversity - nil
Water and soils - nil
Flooding and coastal erosion - nil

Attachment C – Guidance material

Title	Web address
Relevant legislation	
Biodiversity Conservation Act 2016	https://www.legislation.nsw.gov.au/#/view/act/2016/63/full
Coastal Management Act 2016	https://www.legislation.nsw.gov.au/#/view/act/2016/20/full
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
Marine Parks Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Wilderness Act 1987	http://www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Biodiversity	
Biodiversity Assessment Method (OEH, 2020)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf
Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH, 2017)	http://www.environment.nsw.gov.au/resources/bcact/guidance-decision-makers-determine-serious-irreversible-impact-170204.pdf
Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE, 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
NSW Survey Guide for Threatened Frogs – A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method	https://www.environment.nsw.gov.au/research-and-publications/publications-search/species-credit-threatened-bats-nsw-survey-guide-for-biodiversity-assessment-method
Fisheries NSW policies and guidelines	http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx
Revocation, recategorisation and road adjustment policy (OEH, 2012)	http://www.environment.nsw.gov.au/policies/RevocationOfLandPolicy.htm

Title	Web address
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW, 2010)	http://www.environment.nsw.gov.au/protectedareas/developmntadjoiningdecc.htm
Acid sulphate soils	
Acid Sulfate Soils Planning Maps via Data.NSW	http://data.nsw.gov.au/data/
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.environment.nsw.gov.au/resources/epa/Acid-Sulfate-Manual-1998.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	http://www.environment.nsw.gov.au/resources/soils/acid-sulfate-soils-laboratory-methods-guidelines.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Flooding and coastal erosion	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	http://www.environment.nsw.gov.au/floodplains/manual.htm
Guidelines for Preparing Coastal Zone Management Plans	Guidelines for Preparing Coastal Zone Management Plans http://www.environment.nsw.gov.au/resources/coasts/130224CZMPGuide.pdf
NSW Climate Impact Profile	http://climatechange.environment.nsw.gov.au/
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	www.environment.gov.au/water/publications/quality/australian-and-new-zealand-guidelines-fresh-marine-water-quality-volume-1
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

OUT21/18518

Kurtis Wathen
Planning and Assessment Group
NSW Department of Planning and Environment

kurtis.wathen@planning.nsw.gov.au

Dear Mr Wathen

Goulburn River Solar Farm (SSD-33964533)
Comment on the Secretary's Environmental Assessment Requirements (SEARs)

I refer to your email of 22 December 2021 to the Department of Planning and Environment (DPE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

The following advice for you to consider is from DPE Water and NRAR.

The SEARs should include:

- A description of the watercourses located within the vicinity of the development, including Strahler Stream Order as mapped by Spatial Services NS, and appropriate riparian setbacks in accordance with the *Guidelines for riparian corridors on waterfront land.* (https://www.dpie.nsw.gov.au/__data/assets/pdf_file/0008/386207/licensing_approvals_controlled_activities_riparian_corridors.pdf).
- Details of water supply requirements and arrangements for the life of the project (both construction and operation);
- An assessment of the likely impacts (including flooding) on surface water and groundwater resources* and measures proposed to monitor, reduce and mitigate these impacts;
- A description of erosion and sediment control measures to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004);
- The proponent documents and addresses any sedimentation issues, through the development of an Erosion and Sediment Control Plan, in consultation with DPE Water.
- Consideration of any relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at https://water.dpie.nsw.gov.au/home).

* These water resources may include local streams/creeks, drainage channels, wetlands, riparian land, farm dams, floodplains, key fish habitat, groundwater dependent ecosystems and acid sulfate soils), related infrastructure, adjacent licensed water users and basic landholder rights.

Any further referrals to DPE Water and NRAR can be sent by email to water.assessments@dpie.nsw.gov.au. or to the following coordinating officer within DPE Water:

Alistair Drew, Project Officer, E: Alistair.drew@dpie.nsw.gov.au

Yours sincerely



Liz Rogers
Manager, Assessments, Knowledge Division
Department of Planning and Environment: Water
11 January 2022

Department of Primary Industries

OUT22/412

Kurtis Wathen
Energy Assessments
Planning & Assessments

C/- Major Projects Portal

Dear Mr Wathen

Secretary's Environmental Assessment Requirements– Goulburn River Solar Farm and Battery, (SSD-33964533) (Upper Hunter Shire Council)

Thank you for your correspondence dated 22 December 2021 requesting Secretary's Environmental Assessment Requirements (SEARs) for the above proposal for our response.

The NSW Department of Primary Industries (NSW DPI) Agriculture is committed to the protection and growth of agricultural industries, and the land and resources upon which these industries depend. Issues of concern in relation to this project are due to the scale and location on highly productive agricultural land, the long-term impacts on agricultural resources and the ability to rehabilitate the land upon cessation of the development. It is important to note that while DPI Agriculture is required to issue SEARs in relation to this matter, it does not change our view that the subject site's highest and best use is continued agricultural production and not the development as proposed.

We have considered the Scoping Report as well as the draft SEARs provided. As the proposal is located on rural land zoned RU1 Primary Production, the following specific inclusions are required to be addressed in the Environmental Impact Statement in addition to the other matters required in the draft SEARs template:

- The site is predominantly cleared land that is developed and has been used for productive agriculture, with the majority of the 2,000ha Project Site being on Land and Soil Capability (LSC) class 2 and 3 land as described in the Scoping Report. Large parts of the site are also mapped as draft State Significant Agricultural Land as available on the DPI website.
- Due to the matters raised above, an Agricultural Impact Statement (AIS) is required. This is a proportionate requirement relative to the proposal's long-term removal of a large amount of LSC classes 2 and 3 from production. The AIS should include an assessment of agriculture on the site and locality, and the changes due to the solar development on agricultural enterprises and production values during construction and operation. The AIS should include an assessment of the state-wide scarcity of highly productive agricultural land and the relative amount of LSC classes 2 and 3 in the Merriwa locality, and address the cumulative impacts of this proposal and other energy generation and transmission infrastructure in the vicinity.
- Alternative site selection in relation to agriculture impacts is not explored in the Scoping Report. We refer to the Department's revised *Large Scale Solar Energy Guidelines*, where it is requested proponents avoid important agricultural land, consider the agricultural capability of the land during the site selection process and are strongly encouraged to select sites which have limited potential for sustained agricultural production. Accordingly,

the agricultural assessment required as part of the EIS should be detailed and substantial, in justifying site selection against the principles set out in the Guidelines.

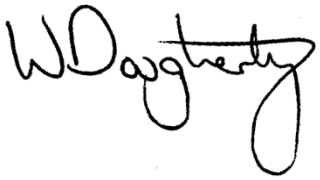
- In the operational and decommissioning plans, consideration should be given to underground cabling on the land. Our recommendation is such cabling be buried to a depth greater than 500 mm for this land use or be completely removed upon decommissioning. This will enable the land to return to full production including cropping.
- The Rehabilitation and Decommissioning/Closure Management Plan should include, but is not limited to, describing the potential design criteria of the final land use and landform, indicators which may be used to guide the return of the land back to agricultural production, along with the expected timeline for the rehabilitation program.
- Biosecurity management issues during and post construction must be assessed in relation to potential agricultural impacts in the EIS.

We note and support the commitment to undertaking a Land Use Conflict Risk Assessment with neighbouring landholdings in the Draft SEARs.

Provided following are recommended SEARs (Attachment 1) and a range of publications to assist consent authorities, community, and proponents in addressing the recommended SEARs (Attachment 2). The main considerations have been highlighted above, however the attached provide additional considerations.

Should you require clarification on any of the information contained in this response, please contact Helen Squires, Agricultural Landuse Planning Officer on 0437 645 719 or by email at landuse.ag@dpi.nsw.gov.au

Yours sincerely



20/01/2022
Warwick Dougherty
A/Group Director, Agricultural Resources

Attachment 1: Environmental Assessment Requirements for Merriwa Solar Farm and Battery

Issue	Environmental Assessment Requirement for Environmental Impact Statement
Site Suitability	• Include a map to scale showing the above operational and infrastructure details including separation distances from sensitive receptors including agricultural land uses.
Consideration of impacts on agricultural resources and land	**Characteristics of Agricultural Land** • Describe the soil, slope, land capability, agricultural productivity, land characteristics and the history of agricultural land uses on the proposed development site. • Describe the current and historical agricultural land uses on surrounding land in the locality including the land capability and agricultural land uses and productivity of the surrounding land. **Impacts on Agricultural Land, Resources and Land Uses** • Detail the potential impacts from the proposed development on agricultural land and agricultural land uses on the site and in the locality. • Detail the location and areas of land to be temporarily/permanently removed from agricultural use, and those areas which are to be returned to agricultural use on completion of the development. • Consider possible cumulative impacts on surrounding agricultural enterprises and landholders. • Assess impacts on agricultural support services, processing and value adding industries. **Measures to mitigate impacts on Agricultural land** • Demonstrate that all significant impacts on current and potential agricultural developments and resources can be reasonably avoided or adequately mitigated. • Detail the expected life span of the proposed development.
Suitable and secure water supply	• Outline any impacts to water use and access for agriculture and measures to mitigate against these impacts.
Biosecurity	• Detail the design of fencing and its adequacy to manage livestock out. • Undertake a biosecurity risk management plan. A biosecurity risk management plan must detail the considered risks and strategies developed to monitor, prevent, eliminate or minimize the following: - the introduction, presence, spread or increase of a pest or disease of plants - the introduction, presence, spread or increase of a pest animal - the introduction, presence, spread or increase of a weed - the introduction, presence, spread or increase of a pest or disease of animals - animals or animal products becoming chemically affected.

	• Specific weed or pest animals for a region are addressed in the regional plans or strategies issued by NSW Local Lands Services.
Traffic movements	• Detail the volume and route of traffic movements for the proposed development and how potential impacts on surrounding agricultural land uses are proposed to be mitigated (eg noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves (TSR) and the movement of livestock or farm vehicles along / across the affected roads.
Land stewardship	• Describe the final proposed land use and land form. • Detail the proposed rehabilitation and decommissioning/closure measures to achieve this land use including the expected timeline for the rehabilitation program. Describe the nature of agricultural productivity post rehabilitation. • Outline the monitoring and mitigation measures to be adopted for rehabilitation remedial actions. • Detail the cropping history or capability for cropping of the land and how the proposed rehabilitation works will enable this land to be used for cropping in the future. This detail is expected to require that cables/pipes are to be buried at a depth >500mm to allow greater opportunity for agricultural activities to continue over the top, particularly for non-decommissioning cables/pipes once restoration is complete. • Where the land contains sodic soils detail the proposed management practices which should ensure than any trenching through sodic soils during construction is to include soil amendment with Gypsum at a minimum rate of 10t/ha (actual rates to be determined following soil testing (Clay content, ECEC and EC)).
Community consultation	• Consult with the owners / managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about the proposal, the likely impacts and suitable mitigation measures or compensation.
Emergency Management	• The proposal is to detail contingency plans to enable the operation to deal with emergency situations. The proposal is to detail Emergency Management procedures and responsibilities for responding to bushfire threats and other possible hazardous events.

Attachment 2: Guidelines for assessment

Title	Location
Infrastructure Proposals on Rural Land	https://www.dpi.nsw.gov.au/agriculture/lup/development-assessment2/infrastructure-proposals
Biosecurity Risk Management in Land Use Planning and Development	https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/1271241/managing-biosecurity-risks-in-land-use-planning-and-development-guide.pdf
Agricultural Impact Statements – technical notes	https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/463789/Agricultural-Impact-Statement-technical-notes.pdf
Draft State Significant Agricultural Land mapping	https://nswdpi.mysocialpinpoint.com/ssal
Land Use Conflict Risk Assessment (LUCRA) Guide	https://www.dpi.nsw.gov.au/agriculture/lup/development-assessment2/lucra

Response History

Public Authority Response **Wednesday, 22 December 2021 12:11:11 PM AEDT**

Notes:

The project identifies a Preliminary Development Boundary. There are no Fisheries issues within the identified boundary footprint.

File Ref. No: FRN22/172 BFS22/125 8000019228
TRIM Doc. No: D22/3278
Contact: Station Officer Aaron Ross

19 January 2022

Kurtis Wathen
NSW Department of Planning, Industry and Environment
Locked Bag 5022
PARRAMATTA NSW 5022

Dear Kurtis Wathen

Re: Comment on Secretary's Environmental Assessment Requirements (SEARs) for Goulburn River Solar Farm (SSD-33964533)

Fire & Rescue NSW (FRNSW) acknowledge correspondence received on 22 December 2021, requesting input into the preparation of the SEARs for the Goulburn River Solar Farm (SSD-33964533).

FRNSW have reviewed the SEARS and Scoping Report and make the following recommendations:

FRNSW will not be providing comment at this time as there is currently insufficient information available regarding the fire safety and emergency response management aspects of the project.

We request that we be given the opportunity to review and provide comment once approvals have been granted and the project has progressed such that there is more relevant detailed information available. FRNSW note that a SEPP 33 screening process will be conducted for the proposal.

As additional details become available Fire & Rescue NSW requests to be consulted with respect to the proposed fire and life safety systems and their configuration at the project's preliminary and final design phases.

While there is currently no requirement for a fire safety study, FRNSW may request one be undertaken at a later stage should information be provided such it is deemed that the development poses unique challenges to the response to and management of an incident.

Fire and Rescue NSW **ABN** 12 593 473 110

Community Safety Directorate
Operational Liaison and Special Hazards Unit
Locked Bag 12,
Greenacre NSW 2190
T 02 9742 7434
F 02 9742 7483

www.fire.nsw.gov.au

For further information please contact the Operational Liaison and Special Hazards Unit, referencing FRNSW file number BFS22/125. Please ensure that all correspondence in relation to this matter is submitted electronically to firesafety@fire.nsw.gov.au.

Yours sincerely,



Superintendent John Hawes
Manager
Operational Liaison and Special Hazards Unit

Cc: kurtis.wathen@dpie.nsw.gov.au

Hazards and Risks – A Preliminary Hazard Analysis (PHA), prepared in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* the Department's *Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis'* and *Multi-level Risk Assessment* (DoP, 2011). The PHA must:

- Consider the most recent standards and codes such as and not limited to NFPA 855, AS 5139, IEC 62897, UL 9540, FM Global DS 5-33, and UL 9540A test reports when establishing separation distances;
- Demonstrate that the separation distances between BESS to on-site or off-site receptors and the separation distances between BESS sub-units (containers, modules, etc.) prevent fire propagation;
- Verify that the areas designated for BESS are sufficient taking into account separation distances between BESS sub-units; and
- Demonstrate that the fire risks from BESS can comply with the Department's *Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning*

Our reference: DOC21/1135472-1
Date: 23 December 2021

HERITAGE NSW – Aboriginal Cultural Heritage - SEARs

Project Name: Major Projects - New Request for Advice - Goulburn River Solar Farm (SSD-33964533) (Upper Hunter Shire)

1. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigation in NSW (DECCW 2010), and be guided by the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011).
2. Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.
3. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to Heritage NSW.
4. The assessment of Aboriginal cultural heritage values must include a surface survey undertaken by a qualified archaeologist. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR.
5. The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts.
6. The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.

NOTE: The process described in the *Due Diligence Code of Practice for the protection of Aboriginal objects in NSW* (DECCW 2010) is not sufficient to assess the impacts on Aboriginal cultural heritage of Major Projects.

Level 6, 10 Valentine Ave Parramatta NSW 2150 ■ Locked Bag 5020 Parramatta NSW 2124
P: 02 9873 8500 ■ E: heritagemailbox@environment.nsw.gov.au

Kurtis Wathen
Environmental Assessment Officer
Energy Resource Assessment
Department of Planning, Industry and Environment
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

Emailed: via Planning Portal

Our ref: DOC22/18926
Your ref: SSD-33964533

20 January 2022

Dear Mr Wathen

Subject: Goulburn River Solar Farm (SSD-33964533) – Request for Secretary's Environmental Assessment Requirements

Thank you for the opportunity to provide advice on the above matter. This is a response from the NSW Department of Regional NSW – Mining, Exploration and Geoscience (MEG) – Geological Survey of NSW (GSNSW).

MEG-GSNSW has no additional requirements to those in the draft SEARs. We request to be consulted in relation to the proposed location of any biodiversity offset areas (both on and off site) or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.

Queries regarding the above information should be directed to the GSNSW - Land Use team at landuse.minerals@geoscience.nsw.gov.au.

Yours sincerely,

Steven Palmer
Manager, Land Use Assessment
Geological Survey of NSW – Mining, Exploration & Geoscience.

CR2021/006240
SF2021/331489
KML

19 January 2022

Department of Planning, Industry & Environment
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Attention: Kurtis Wathen

SSD 33964533
SEARS REQUEST – GOULBURN RIVER SOLAR FARM, WOLLARA ROAD MERRIWA

I refer to the request by the Department of Planning, Industry and Environment (DPIE) dated 22 December 2021 seeking input from Transport for NSW (TfNSW) to the Secretary's Environmental Assessment Requirements (SEARs) for the abovementioned development proposal.

TfNSW key interests are the safety and efficiency of the transport network, the needs of our customers and the integration of land use and transport in accordance with the *Future Transport Strategy 2056*.

TfNSW requests that a Traffic Impact Assessment (TIA) be prepared by a suitably qualified person/s in accordance with the Austroads *Guide to Traffic Management Part 12*, the complementary TfNSW Supplement and *Roads and Maritime Guide to Traffic Generating Developments*.

The TIA should be tailored to the scope of the proposed development and include, but not be limited to, the following:

- A map of the surrounding road network identifying the site access, relevant traffic route/s and connections to the classified (State) road network.
- Assessment of all relevant vehicular traffic routes and intersections for access to / from the subject properties.
- Current traffic counts for all relevant traffic routes and relevant intersections, including connections to the classified (State) road network.

Transport for NSW
6 Stewart Avenue, Newcastle West NSW 2302
Locked Bag 2030, Newcastle West NSW 2302
T – (02) 4908 7688

Level 1, 76 Victoria Street, Grafton NSW 2460
PO Box 576, Grafton NSW 2460
T – (02) 6640 1362

- The anticipated additional vehicular traffic generated from both the construction and operational stages of the project.

- The distribution on the road network of the trips generated by the proposed development. It is requested that the predicted traffic flows are shown diagrammatically to a level of detail sufficient for easy interpretation.

- Consideration of the traffic impacts on existing and proposed intersections, including access to the site, and the capacity of the local and classified road network to safely and efficiently cater for the additional vehicular traffic generated by the proposed development during both the construction and operational stages.

- It is noted that within the Central West Orana REZ there are a number of projects Barneys Reef Wind Farm, Tallawang Solar Farm, Birriwa Solar Farm and Wollar Solar Farm that will utilise the Golden Highway and are likely to pass through the Merriwa locality as a part of the OSOM route. Barneys Reef Wind Farm, Tallawang Solar Farm and Birriwa Solar Farm are currently at SEARs stage while Wollar Solar is under construction. Consideration should be given within the TIA to the cumulative impacts on the road network from the surrounding projects.

- The Ringwood Road/Golden Highway intersection from a Google Earth review does not appear to have sufficient SISD or intersection treatments. An assessment of the SISD and intersection treatments potentially required by this development should form part of the TIA.

- It is noted in the scoping report that the workforce may come from Mudgee and will likely use the Ulan Road (Regional Road) or Wollar Road (Regional Road) to then continue onto Ringwood Road. Ulan and Wollar Road are heavily congested with light vehicle and heavy traffic that is associated with the three coal mines Wilpingjong, Moolarben and Ulan and the currently under construction Wollar Solar Farm. As a part of the TIA, consideration should be given to the implications of light and potentially heavy vehicles (if there is haulage from Mudgee for ancillary aspects to the solar farm) utilising this route from Mudgee.

- Haulage routes for the construction of ancillary aspects of the solar farm should be assessed as a part of the TIA.

- An assessment of turn treatment warrants in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A for relevant intersections along the identified transport route/s, including connections to the classified (State) road network.

- Identify the necessary road network infrastructure upgrades that are required to maintain existing levels of service on both the local and classified road network for the development. In this regard, preliminary concept drawings shall be submitted with the EIS for any identified road infrastructure upgrades. However, it should be

noted that any identified road infrastructure upgrades will need to be to the satisfaction of Transport for NSW and Council.

- Traffic analysis of any major / relevant intersections impacted, using SIDRA or similar traffic model, including:
  - Current traffic counts and 10 year traffic growth projections
  - With and without development scenarios
  - 95th percentile back of queue lengths
  - Delays and level of service on all legs for the relevant intersections
  - Electronic data for TfNSW review.

- Relevant swept path analysis for the largest design vehicle accessing the site.

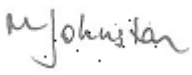
- Any other impacts to the road network including consideration of active transport and public transport facilities.

- Identification of necessary road upgrades that are required to mitigate the impact of the development. Preliminary concept drawings for any road upgrades shall be designed in accordance with Austroads Guidelines, Australian Standards and TfNSW Supplements and be submitted with the EIS. Road upgrades shall be to the satisfaction of TfNSW and/or Council in accordance with relevant Roads Act functions.

- Details of any Traffic Management Plan (TMP) proposed to address the construction phase of the proposed development. The TMP and associated Traffic Control Plans (TCPs) should be prepared by suitably qualified persons in accordance with the *TfNSW Traffic Control at Work Sites Manual*.

Should you require further information please contact Kate Leonard, Development Services Case Officer, on 02 4908 7688 or 0428 260 461 or by emailing development.north@transport.nsw.gov.au.

Yours sincerely



Marg Johnston
Team Leader Development Services
North Region | Community & Place
Regional & Outer Metropolitan

Upper Hunter Shire Council

Thank you for providing Upper Hunter Shire Council with an opportunity to provide input into the Planning Secretaries Environmental Assessment Requirements (SEARs) for the Solar development. I have now reviewed the documentation provided.

Based on the documentation the draft SEARs are considered to provide an adequate coverage of the environmental assessment requirements.

Should you require further information please contact myself in the first instance.

25/01/2022

Record Number: 22/00069#01

Planning Number: SSD-33964533

Goulburn River Solar Farm

The Department of Planning and Environment – Crown Lands has reviewed the Draft SEARs and Scoping Report for the subject proposal.

According to **Figure 4.2** of the **Scoping Report** all three "Potential Access Points" rely on access through a Crown reserve, being TSR 44841 for Travelling Stock, and part of this Crown reserve is also shown as being within the "Preliminary Development Boundary".

Pursuant to clause 49 of the *Environmental Planning and Assessment Regulation 2000* the proponent requires the consent from the Department, as landowner, to lodge the development application, unless the development is designated as a public notification development. The Departments' landowner's consent application form can be found on our website here:
https://www.industry.nsw.gov.au/__data/assets/pdf_file/0003/144345/landowners-consent-application-form.pdf

TSR 44841 is managed by the Hunter Local Land Services (LLS) and is subject to the provisions of the *Local Land Services Act 2013*. Parts of the TSR are subject to undetermined Aboriginal Land Claims, made under the *Aboriginal Land Rights Act 1983*.

There are multiple Crown roads within the project area. If the proposal requires the use of these Crown public roads, they must be either closed and purchased, or transferred to Upper Hunter Shire Council so they can be managed within the local road network. Consent from DPE – Crown Lands must also be obtained prior to any works being undertaken on Crown roads. More information on the management of Crown roads can be found on the Department's website here:
https://www.industry.nsw.gov.au/lands/access/roads

Regarding the SEARs, the Environmental Impact Statement (EIS) must include:

- An accurate description of Crown land within the development area, including Crown roads, and for Crown reserves should specify the land owner, reserve purpose, reserve manager, and any third-party interests, including other permit or licence holder(s), easements, aboriginal land claims and native title considerations and relevant legislation.
- A description of any works, including the construction, operation and maintenance activities, and any ancillary construction activities such as transmission lines, pipelines, bores, access, fencing, signage, storage, offsets and buffers, etc. proposed on the Crown land/roads.
- An assessment of the impact of the proposal on Crown land/roads, including any conflicts with the existing land use(s), and compatibility of the proposal with the notified purpose of the Crown land/road.
- A description of approvals or agreements required to authorise any proposed activity and/or use of the Crown land/roads.
- During preparation of the EIS the proponent is to consult with the Department, as an affected landowner, and the Hunter LLS as land manager.

If the proponent requires further information, or has any questions, please contact Mark Grace, NRM Project Officer in Crown Lands, on (02) 4937 9331 or at mark.grace@crownland.nsw.gov.au.

Yours sincerely



Mark Grace
NRM Project Officer
T 02 4937 9331 | **E** mark.grace@crownland.nsw.gov.au

Forestry Corporation of NSW

FCNSW advises that if there is to be disturbance of Tongo State forest as a result of road works on Wollar Road (see image), then authority from FCNSW must be obtained. Such authority may require the payment of compensation for timber and cost recovery for FCNSW staff time. The granting of authority could take 4-6 weeks.

Please advise ASAP whether disturbance is likely so FCNSW may allocate resources to your planning dept application.

SEARs Checklist

Table 1 Secretary's Environmental Assessment Requirements

Requirement	Addressed in EIS
General Requirements	
• stand-alone executive summary	**Executive Summary**
• a full description of the development, including: ○ details of construction, operation and decommissioning; ○ a high quality site plan at an adequate scale showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process); ○ a high quality detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development;	**Section 3.0** **Figure 3.1** **Figure 3.2**
• a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including existing land use, other proposed or approved solar and major projects, rural/residential development, Crown lands within and adjacent to the project site, National Parks and Wildlife Service land and subdivision potential);	**Section 2.0** **Section 9.1** **Section 9.2**
• an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including: ○ a description of the existing environment likely to be affected by the development using sufficient baseline data; ○ an assessment of the likely impacts of all stages of the development (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region, taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice including the *Large-scale Solar Energy Guideline* (DPIE 2018, subject to revision) and Cumulative Impact Assessment Guideline (DPIE, July 2021); ○ a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and ○ a description of the measures that would be implemented to monitor and report on the environmental performance of the development;	**Section 2.3** **Section 6.0**
• a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS;	**Appendix 5**
• a detailed evaluation of the merits of the project as a whole having regard to: ○ the requirements in Section 4.15 of the *Environmental Planning and Assessment Act 1979*, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development; ○ the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and	**Appendix 3** **Section 9.2** **Section 2.6**

Requirement	Addressed in EIS
○ feasible alternatives to the development and its key components (including opportunities for shared infrastructure with proposed developments in the region), and the consequences of not carrying out the development;	
• a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter; and	**Section 2.1**
• a signed statement from the author of the EIS, certifying that the information contained within the document is neither false nor misleading;	**EIS Declaration**
• a report from a suitably qualified person providing a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived;	**Appendix 20**
• an estimate of the jobs that will be created during the construction and operational phases of the proposed project; and • certification that the information provided is accurate at the date of preparation.	**Appendix 20**
• The development application must be accompanied by the consent of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).	**Appendix 4**
Key Issues	
Biodiversity	
• 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 Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values;	**Section 6.2** **Appendix 6, Appendix 7** and **Appendix 8**
• 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;	**Appendix 6, Appendix 7** and **Appendix 8**
• 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, and	**Section 6.2.2** **Appendix 8**
• if an offset is required, details of the measures proposed to address the offset obligations.	**Section 6.2.1.6** **Section 6.2.1.7** **Appendix 6** and **Appendix 7**
Heritage	
• an assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the *Guide to Investigating,* Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the *Archaeological Investigation of* Aboriginal Objects in NSW (DECCW, 2010);	**Section 6.3** **Appendix 9**
• evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for *Proponents* (DECCW, 2010); and	**Section 6.3.3** **Appendix 9**

Requirement	Addressed in EIS
• assess the impact to historic heritage having regard to the NSW Heritage Manual.	**Section 6.4** **Appendix 10**
Land	
• a detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, permissibility, strategic context and existing site constraints;	**Section 6.5** **Appendix 11**
• an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: ○ flood prone land, Crown lands, mining, quarries, mineral or petroleum rights; ○ a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and ○ a cumulative impact assessment of nearby developments;	**Section 6.5** **Appendix 11**
• an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including: ○ consideration of the zoning provisions applying to the land, including subdivision (if required); ○ completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and	**Section 6.5** **Appendix 11**
• a detailed assessment of the impact on agricultural resources and agricultural productivity, including: ○ an agricultural impact statement; ○ consideration of potential mitigation measures which may reduce project impacts on agricultural land; ○ detailed economic assessment of impacts on agricultural land, agricultural production and agricultural supply chains; ○ justification for the project considering other alternatives and site design which may have lesser impacts on agricultural land;	**Section 6.5** **Appendix 11**
Visual	
• a detailed assessment of the likely visual impacts (including any glare, reflectivity and night lighting) of all components of the project (including arrays, transmission lines, substations, battery storage and any other ancillary infrastructure) on surrounding residences and key locations, scenic or significant vistas and road corridors in the public domain and on the Siding Spring Observatory in accordance with the Dark Sky Planning Guideline (2016); and	**Section 6.6** **Appendix 12** and **Appendix 13**
• provide details of measures to mitigate and/or manage potential impacts (including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners);	**Section 6.6** **Appendix 12** and **Appendix 13**
Noise	
• including an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the *NSW Noise Policy for Industry* (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;	**Section 6.7** **Appendix 14**

Requirement	Addressed in EIS
Transport	
• an assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation;	**Section 6.8** **Appendix 15**
• an assessment of the likely transport impacts to the site access route(s), site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance;	**Section 6.8** **Appendix 15**
• a cumulative impact assessment of traffic from nearby developments; and	**Section 6.8.4** **Appendix 15**
• provide details of measures to mitigate and/or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass/over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authorities;	**Section 6.8.5** **Appendix 15**
Water	
• an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts;	**Section 6.9** **Appendix 16**
• details of water requirements and supply arrangements for construction and operation; and	**Section 3.7.1** **Section 6.9.3.3**
• where the project involves works within 40 metres of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land, and how the activities are to be designed and implemented in accordance with the DPI Guidelines for Controlled Activities on Waterfront Land (2018) and (if necessary) Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI 2003), and Policy & Guidelines for Fish Habitat Conservation & Management (DPE, 2013); and	**Section 6.2.2** **Appendix 6, Appendix 7** and **Appendix 8**
• a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban* Stormwater: Soils & Construction (Landcom 2004);	**Section 6.5** **Appendix 11**
Hazards	
• a preliminary risk screening completed in accordance with *State* Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011);	**Section 6.10.2** **Appendix 17**
• a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). The PHA must consider all recent standards and codes and verify separation distances to on-site and off-site receptors to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning (DoP, 2011); and	**Section 6.10.2** **Appendix 17**
• an assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the *International Commission on* Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields;	**Section 6.10.3** **Section 6.10.4**

Requirement	Addressed in EIS
Social	
• including an assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPIE, July 2021);	**Section 6.11** **Appendix 18**
Economic	
• including an assessment of the economic impacts or benefits of the project for the region and the State as a whole, and	**Section 6.12** **Appendix 19**
Waste	
• identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.	**Section 6.13**
Plans and Documents	
• The EIS must include all relevant plans, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents. In addition, the EIS must include high quality files of maps and figures of the subject site and proposal.	Provided
Legislation, Policies and Guidelines	
• The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. • A list of some of the legislation, policies and guidelines that may be relevant to the assessment of the project can be found at: o https://www.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework/Improving-assessment-guidance o https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines; and o http://www.environment.gov.au/epbc/publications#assessments	**Section 2.0** **Section 6.0** **Appendix 3**
Consultation	
• During the preparation of the EIS, you should consult with the relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders. • In particular, you must undertake detailed consultation with affected landowners surrounding the development, Upper Hunter Shire Council, Crown Lands, NSW Aboriginal Land Council and Transport for NSW. • The EIS must: o detail how engagement undertaken was consistent with the *Undertaking* Engagement Guidelines for State Significant Projects (DPIE, July 2021); and o describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, an explanation should be provided.	**Section 5.0** **Section 6.11** **Appendix 18**

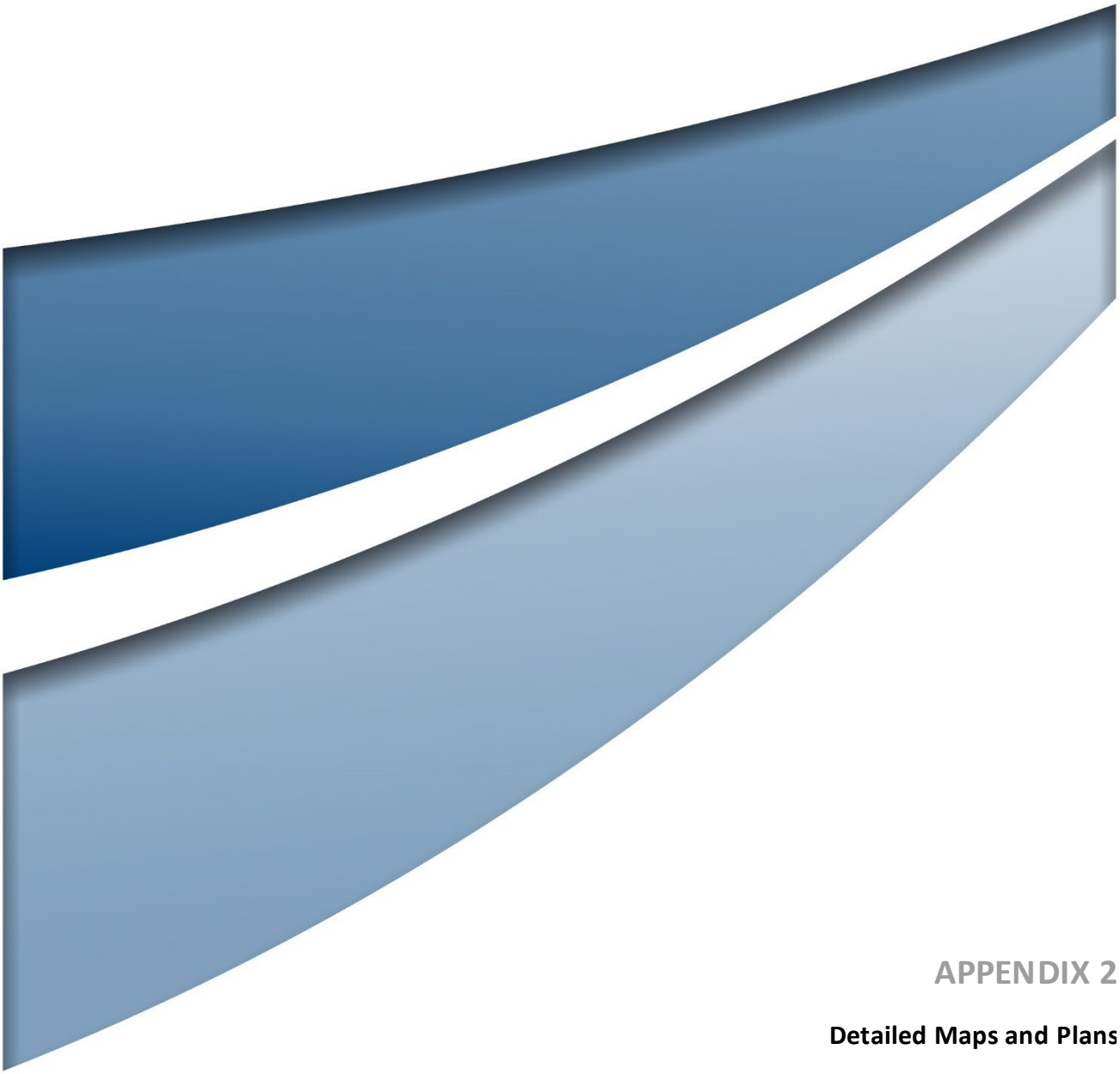
Table 2 Summary of Assessment Requirement (Supplementary SEARs)

Requirement	Addressed in the EIS or BDAR
3. The proponent must undertake an assessment of all protected matters that may be impacted by the development under the controlling provision identified in paragraph 1. The Commonwealth Department of Agriculture, Water and the Environment considers that the proposed action is likely to have a significant impact on threatened species and communities and migratory species listed in **Appendix A**.	
Threatened Species and Communities	
Based on the information in the referral documentation, the location of the action, species records and likely habitat present in the area, there are likely to be significant impacts to:	Appendix C of the Solar Farm Biodiversity Assessment Development Report (BDAR) (**Appendix 6** of the EIS)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered	
Regent Honeyeater (*Anthochaera Phrygia)* – Critically Endangered	
Additionally, there is some risk that there may be significant impacts on the following matters and further assessment to determine if the communities and species listed below are present in the proposed action area and, if so, the extent to which they may be impacted by the proposed action, is required:	
Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered	
Swift Parrot (*Lathamus discolor*) – Critically Endangered	
Painted Honeyeater (*Grantiella picta*) – Vulnerable	
Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable	
Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable	
Pink tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable	
Bluegrass (*Dichanthium setosum*) – Vulnerable	
Homoranthus darwinioides – Vulnerable	
Several threatened species and ecological communities have been identified as priority management species following the 2019–2020 bushfires. This includes the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland threatened ecological community and the Regent Honeyeater (as discussed above), and the following listed species that may be impacted by the proposed action:	
Koala (*Phascolarctos cinereus*) (Combined Population of QLD, NSW and the ACT) – Vulnerable	Appendix C of the Solar Farm BDAR (**Appendix 6** of the EIS)
Greater Glider (*Petauroides Volans*) – Vulnerable	
Brush tailed Rock wallaby (*Petrogale penicillata*) – Vulnerable	
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus* (South-east mainland population)) – Endangered	
New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – Vulnerable	
Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable	

Requirement	Addressed in the EIS or BDAR
Further analysis of the impacts of the fires on those species and communities identified above should be undertaken during the assessment.	
4. The proponent must consider each of the protected matters under the triggered controlling provisions that may be impacted by the action. Note that this may not be a complete list and it is the responsibility of the proponent to undertake an analysis of the relevant impacts and ensure all protected matters that are likely to be impacted are assessed for the Commonwealth Minister's consideration.	
Relevant Regulations	
5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) and all matters outlined below in relation to the controlling provisions.	Noted
Project Description	
6. The title of the action, background to the action and current status.	**Section 1.0**
7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	**Section 3.0**
8. How the action relates to any other actions that have been, or are being taken in the region affected by the action.	**Section 2.0** and **Section 6.5**
9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	**Section 3.0** and **Section 6.2**
Impacts	
10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including:	
i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts;	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible;	
iii. analysis of the significance of the relevant impacts; and	
iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	
Avoidance, Mitigation and Offsetting	
11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including:	
i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures;	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
ii. any statutory policy basis for the mitigation measures;	
iii. the cost of the mitigation measures;	

Requirement	Addressed in the EIS or BDAR
iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing;	
v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	
12. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
13. For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any:	
i. conservation advice or recovery plan for the species or community;	**Appendix C** of the Solar Farm BDAR (Appendix 6 of the EIS)
ii. relevant threat abatement plan for the species or community;	
iii. wildlife conservation plan for the species; and	
iv. any strategic assessment.	
14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15–17.	
Key Issues	
Biodiversity	
15. The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
16. For each of the EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action the EIS must provide a separate:	
a. description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans;	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
b. details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements;	
c. description of the relevant impacts of the action having regard to the full national extent of the species or community's range; and	
d. description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action;	

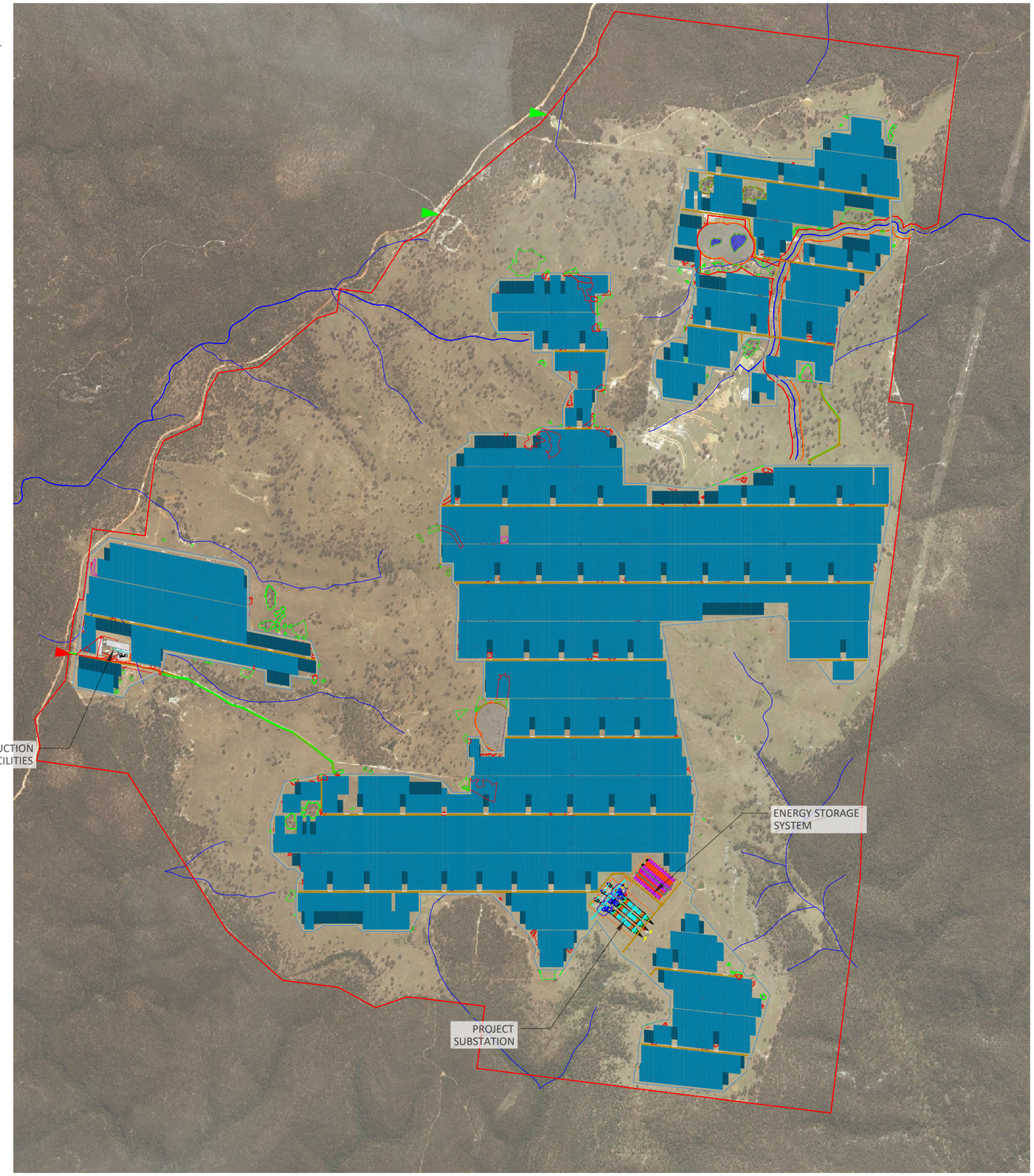
Requirement	Addressed in the EIS or BDAR
e. identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account;	
f. a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established;	
g. details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and	
h. details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites.	
17. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy. http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
Other approvals and conditions	
18. Information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations 2000.	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)
Environmental Record of person proposing to take the action	
19. Information in relation to the environmental record of a person proposing to take the action must include details as prescribed in Schedule 4 Clause 6 of the EPBC Regulations 2000.	Submitted as part of the Referral for the Project under the EPBC Act
Information Sources	
20. For information given in an EIS, the EIS must state the source of the information, how recent the information is, how the reliability of the information was tested; and what uncertainties (if any) are in the information.	**Appendix C** of the Solar Farm BDAR (**Appendix 6** of the EIS)

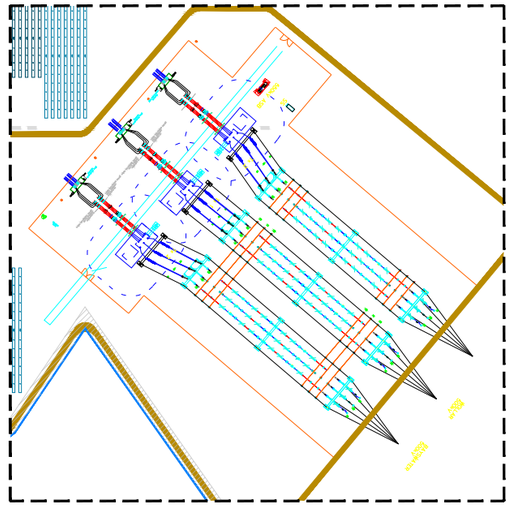


APPENDIX 2

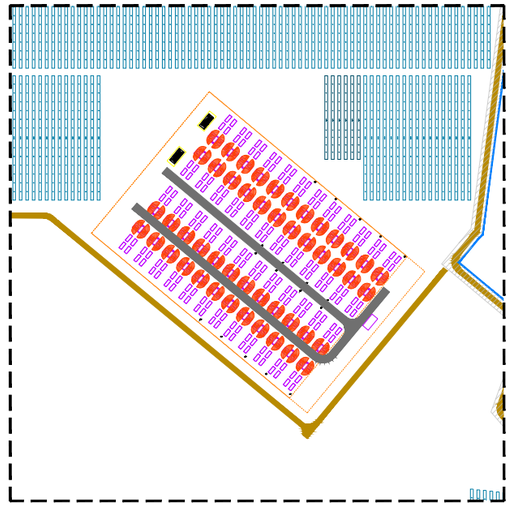
Detailed Maps and Plans

AUS_Goulburn River Solar_LP1-IDL_07





PROJECT SUBSTATION
1:5000



ENERGY STORAGE SYSTEM
1:5000



CONSTRUCTION FACILITIES
1:2500

- Site Boundary
- Site Access
- Secondary Site Access
- Security Fence
- Single Axis Tracker 84 x 1
- Single Axis Tracker 56 x 1
- Inverter & Transformer
- Access Gates
- Fire Break
- Access Road
- Grey box grass woodland
- Barking owl area
- Hydroline: 3rd order streams
- Vegetation to keep
- Vegetation to remove
- Heritage homestead

PV SYSTEM SPECIFICATIONS	
Capacity - DC	551.00 MW_p
Capacity - AC	450.00 MW_{AC}
DC/AC Ratio	1.22
Modules	(1020376) 540 W Bifacial
Mods. per string	28
Pitch	5.3 m
GCR	43.00 %
Mounting structure	(12558) Mono-Line Single Axis Trackers
• Full	11326
• Partial	1232
• Half	----
Inverters	(140) Central Inverter 3900 KVA
• Nominal Power	4200 KVA
Access roads	52805 m
Fenced area	(8297555 m^2) 2050.370 Acres
• Perimeter	30992 m

Revisions:

Rev	Date	Comments	Dwn	Chkd
07	28.03.23	Layout Update	AG	
06	23.03.23	Planning update	AG	
05	23.02.23	Layout update	JI	
04	15.11.22	Constraints update	AGV	
03.2	10.08.22	Layout update after plannings comments	AGV	
03.1	09.08.22	Layout update after comments	AGV	
03	08.08.22	Layout updated (new constraints added)	AGV	
02	13.10.21	West parcel bounday adjusted	AGV	

DRAWN	CHECKED	APPROVED	DATE
AGV			15.11.2022

PROJECT NAME & ADDRESS:
Location:
Goulburn River, Australia

NOTES:
- 540 Wp Bifacial modules
-
-
-

Paper Size:	Scale:	Sheet:
A3	1:25000	1

CAPACITY:
1020376 Modules 551.00 MWp

DRAWING TITLE:
AUS_Goulburn River Solar_LP1-Initial Design Layout_07

DRAWING NUMBER:	STATUS:
LP1-IDL	Preliminary

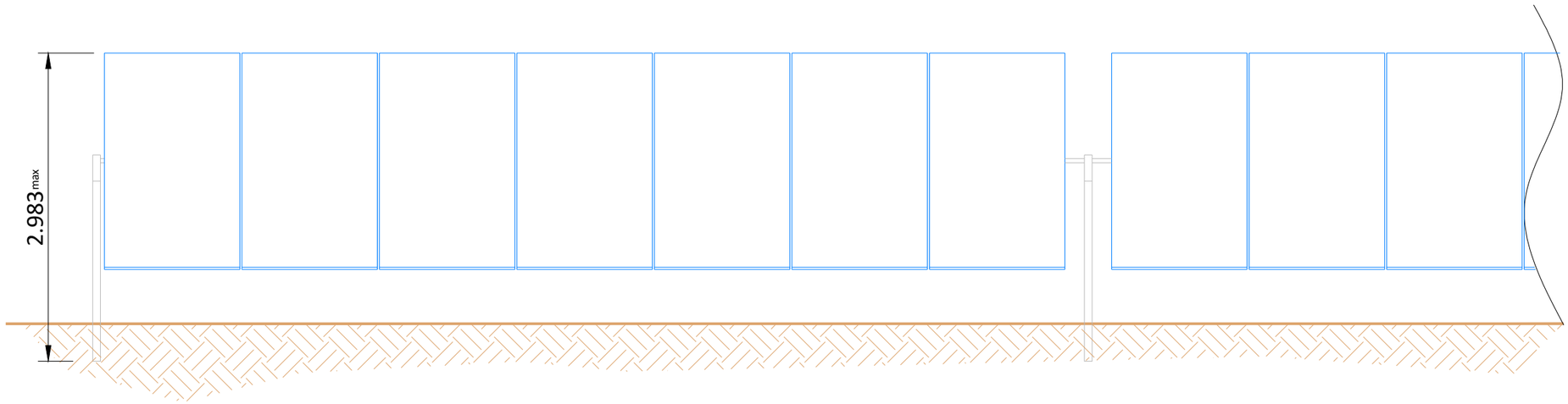
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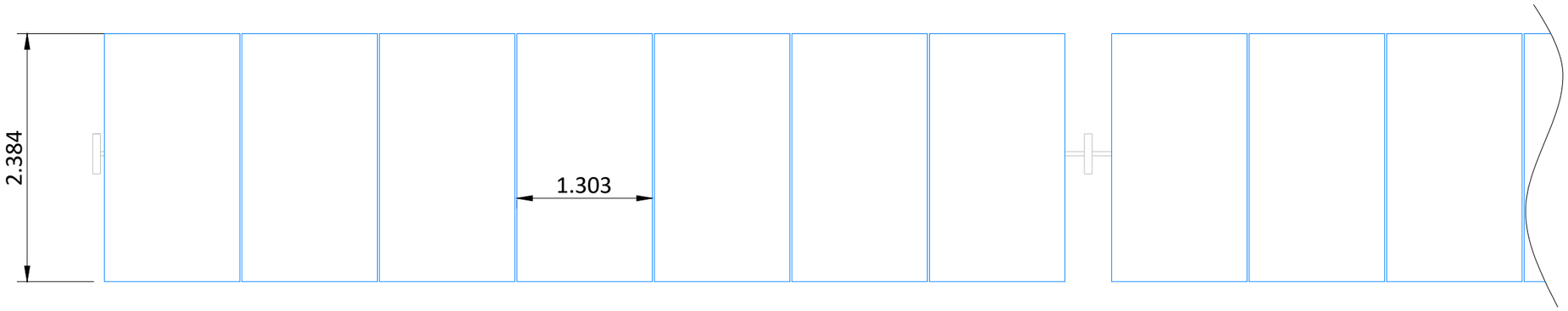
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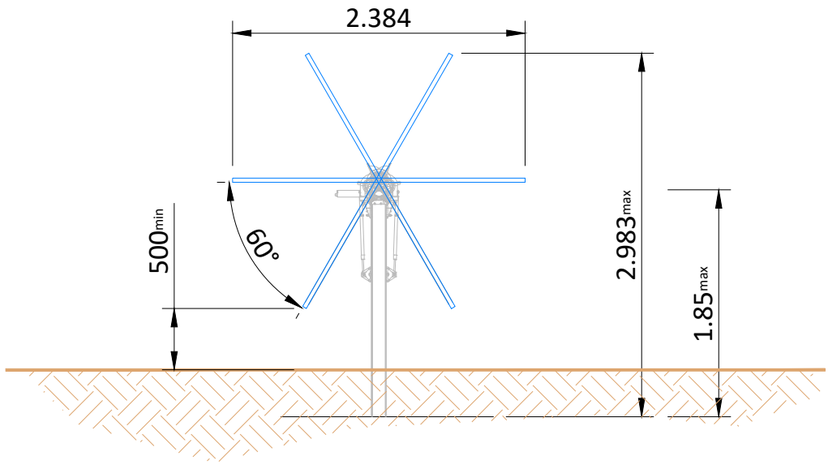
Tracker Elevation



Typical Elevation



Plan



Typical Section

METERS

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A3 - (420 x 297)mm

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DRAWING NUMBER: TR_NXTR	STATUS: Preliminary		

lightsource bp

Lightsource Development Services Australia Pty Ltd
Level 9 401 Collins Street, Melbourne, 3000
General: +61 (3) 9071 0326
Web: www.lightsourcebp.com
info@lightsourcebp.com





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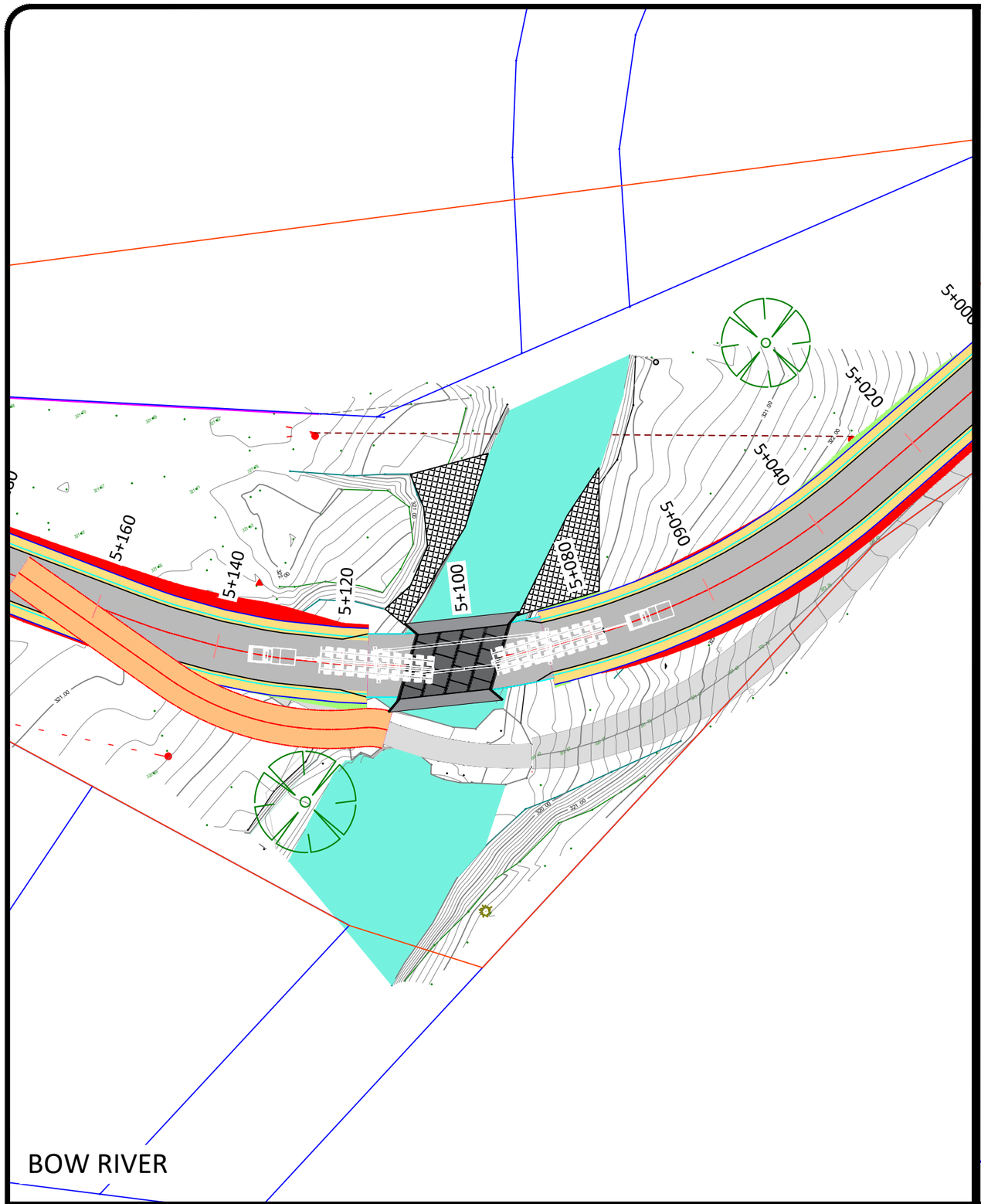
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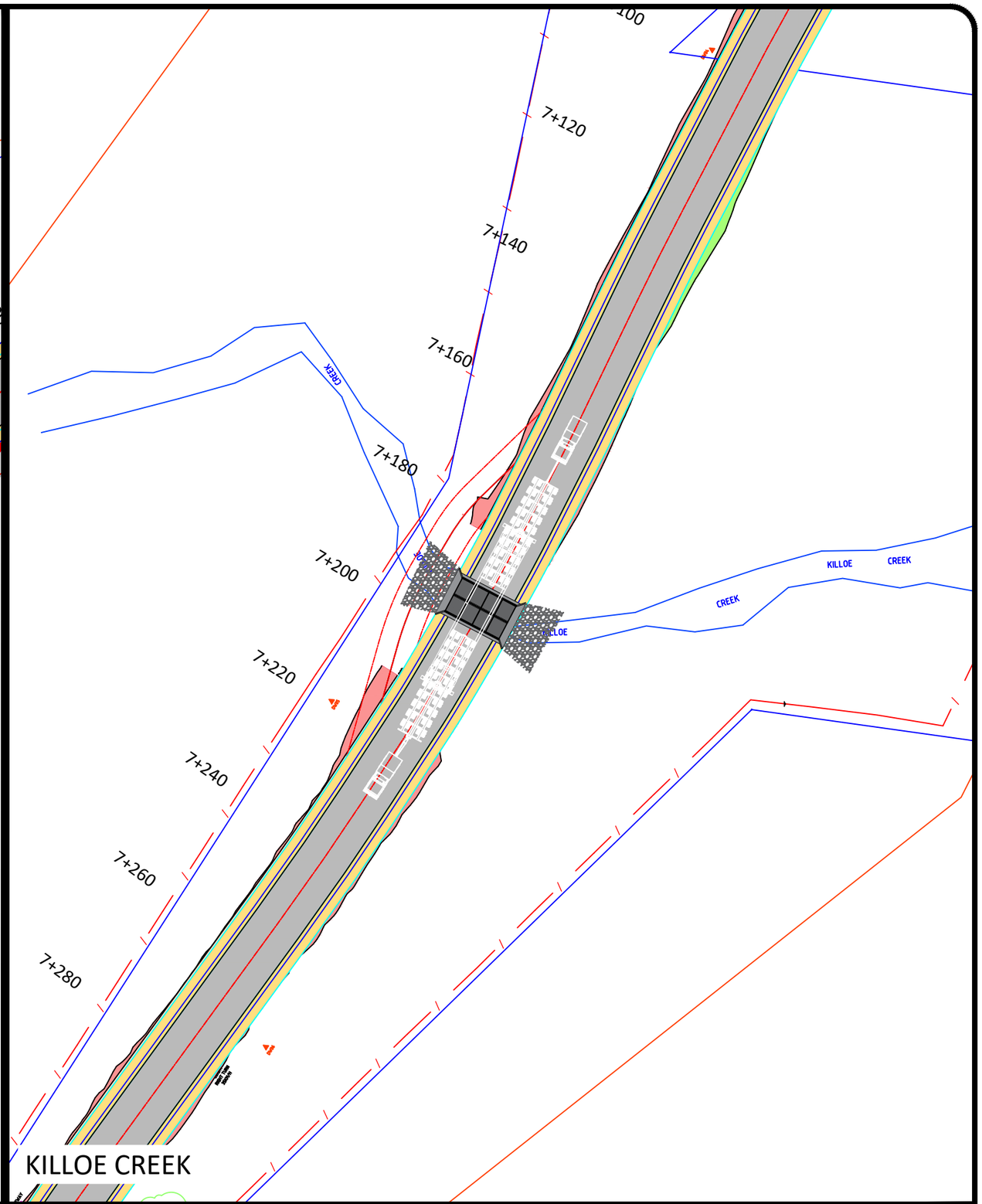
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JOB No: 22Q3J3
COORDINATE SYSTEM: MGA ZONE 56 GDA 2020
DATUM: AHD

SURVEYED: OTHERS
DESIGNED: RS
DRAWN: RJ
SHEET: 1
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RINGWOOD ROAD UPGRADE

DRAWING TITLE:
SWEPTH PATHS

ISSUE STATUS:
CLIENT REVIEW

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COORDINATE SYSTEM: MGA ZONE 56 GDA 2020		SHEET: 2	REV: 0
DATUM: AHD			

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- FENCE LINE
- FOG LINE
- CENTRELINE OF ROAD
- EDGE OF BITUMEN
- EDGE OF UNSEALED SHOULDER
- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 16
DP 11212

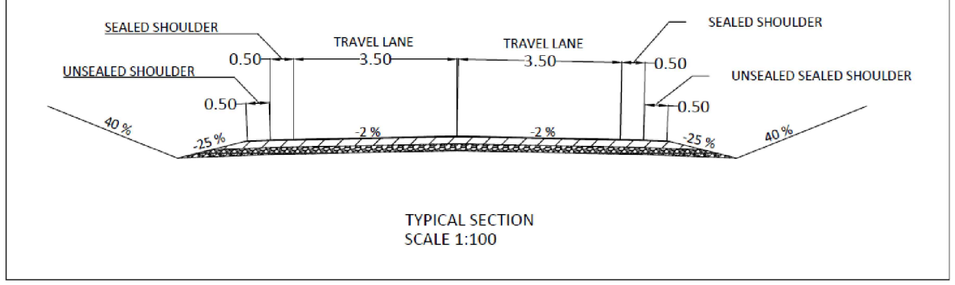
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DP 11212

LOT 222
DP 750934

LOT 254
DP 722258

LOT 151
DP 1011943

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TYPICAL SECTION
SCALE 1:100

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RINGWOOD ROAD UPGRADE

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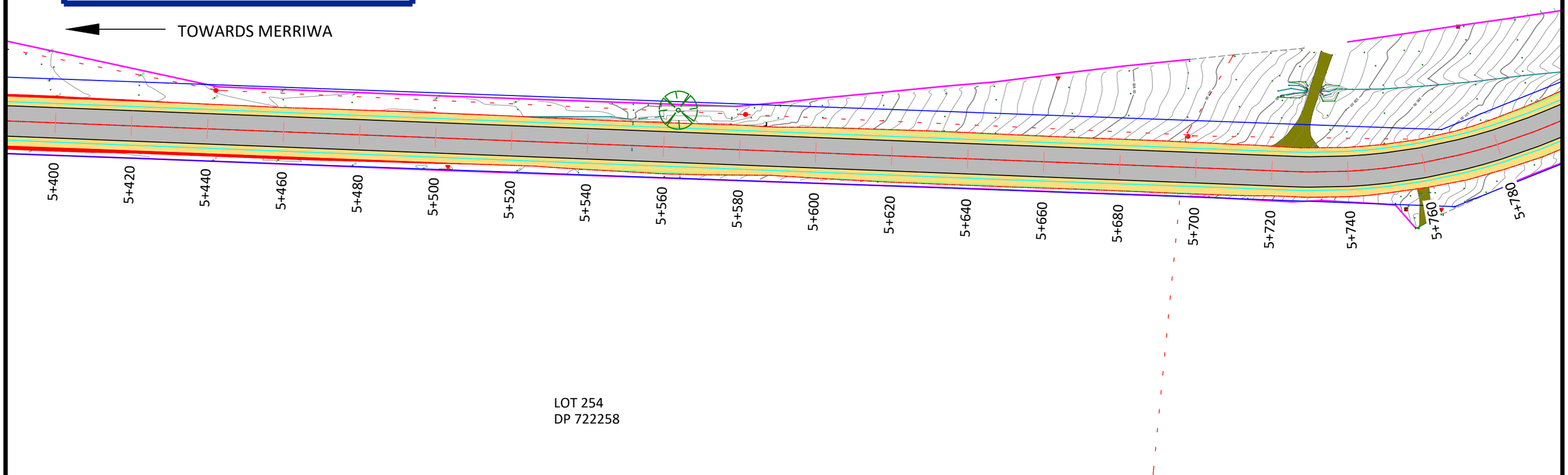
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- FOG LINE
- CENTRELINE OF ROAD
- EDGE OF BITUMEN
- EDGE OF UNSEALED SHOULDER
- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 22
DP 750934



LOT 254
DP 722258

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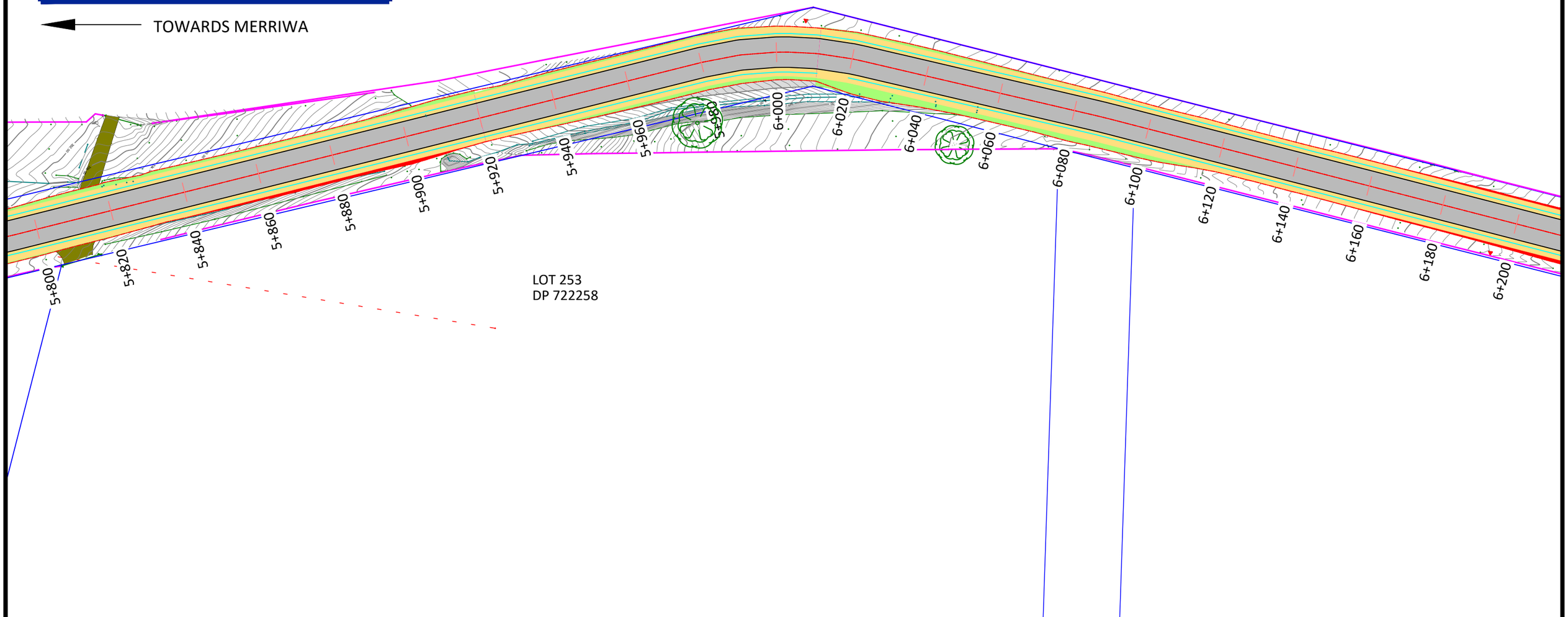
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- FOG LINE
- CENTRELINE OF ROAD
- EDGE OF BITUMEN
- EDGE OF UNSEALED SHOULDER
- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 222
DP 750934



LOT 253
DP 722258

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RINGWOOD ROAD UPGRADE

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ISSUE STATUS:
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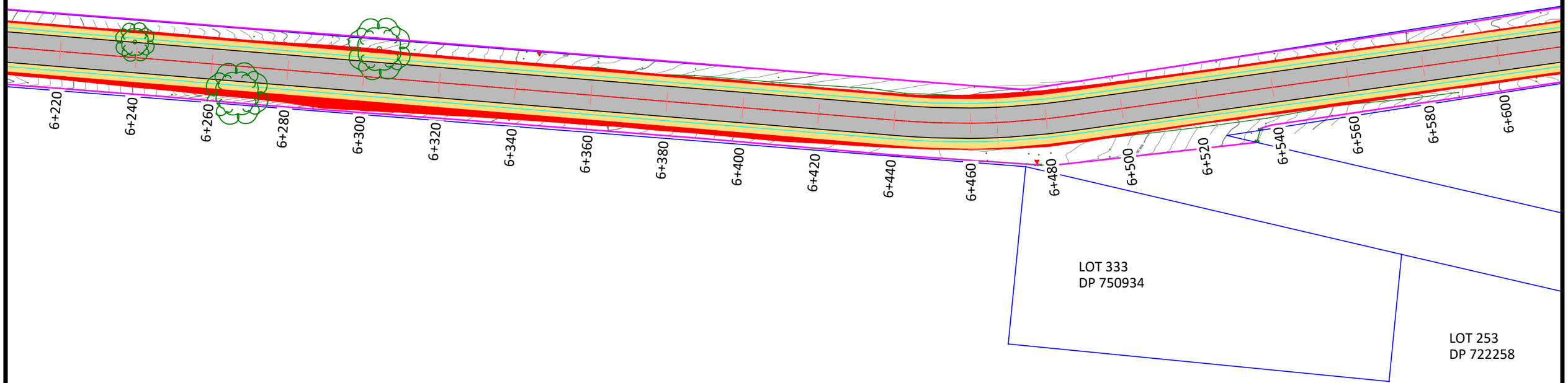
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- FOG LINE
- CENTRELINE OF ROAD
- EDGE OF BITUMEN
- EDGE OF UNSEALED SHOULDER
- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT222
DP 750934



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DRAWING TITLE: Proposed Alignment

ISSUE STATUS: CONCEPTUAL DESIGN CLIENT REVIEW

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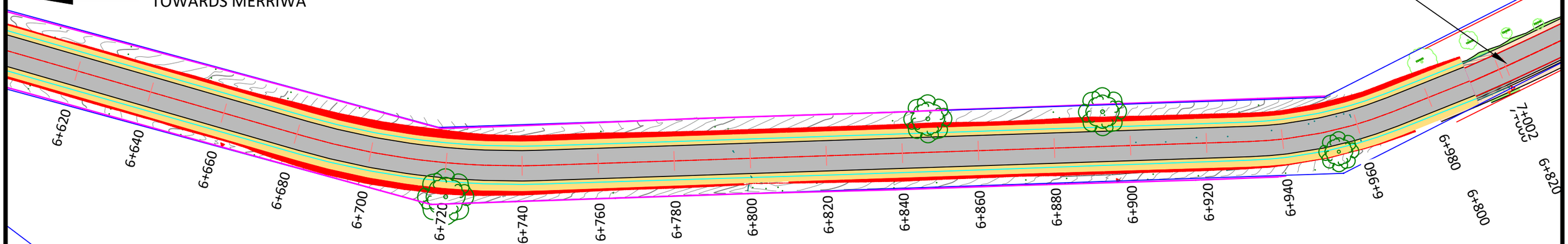
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- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 222
DP 750934

TIE INTO EXISTING CONSTRUCTED ROAD. DESIGNED BY HEC



LOT 216
DP 750934

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PROJECT: RINGWOOD ROAD UPGRADE

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ISSUE STATUS: CONCEPTUAL DESIGN CLIENT REVIEW

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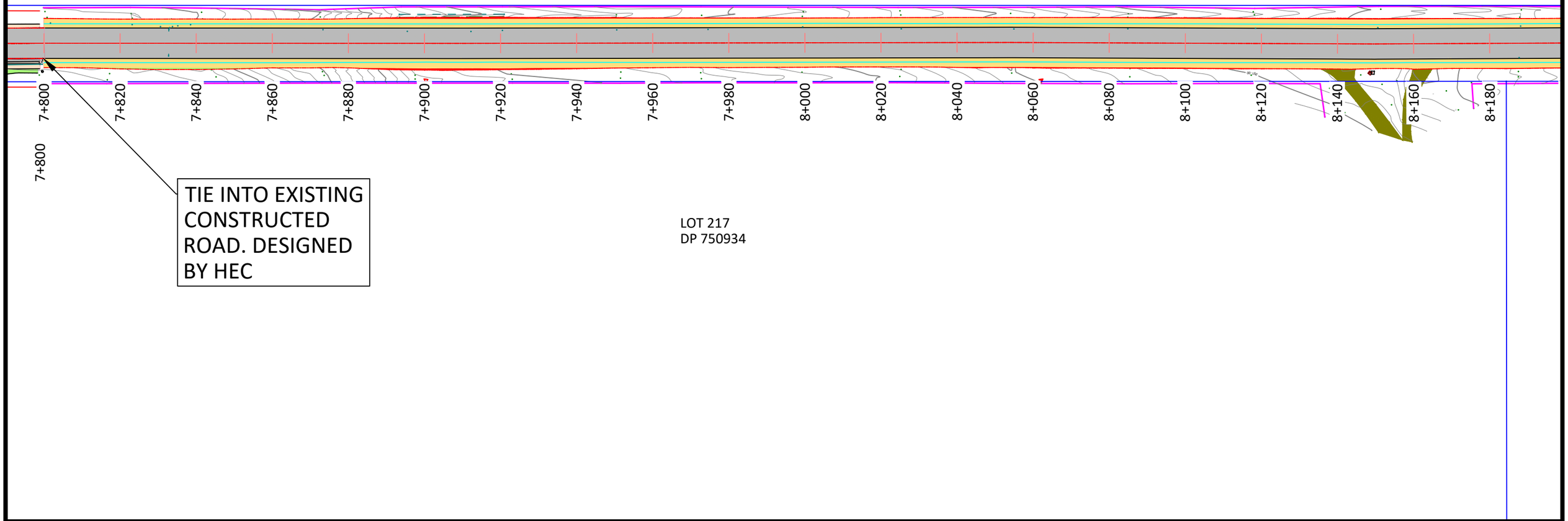
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- EDGE OF BITUMEN
- EDGE OF UNSEALED SHOULDER
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- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 246
DP 750934



LOT 217
DP 750934

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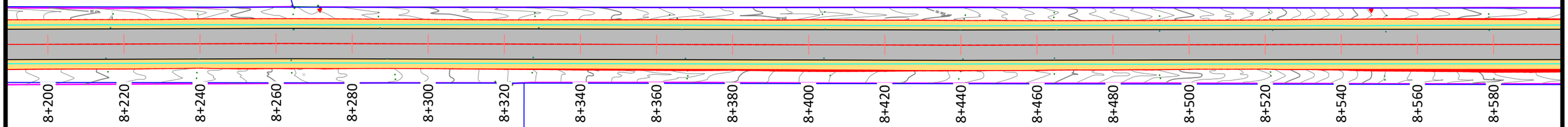
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- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 222
DP 750934

LOT 223
DP 750934



LOT 237
DP 750934

LOT 217
DP 750934

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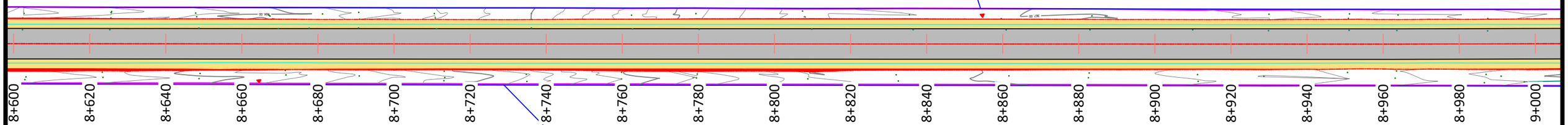
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- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 223
DP 750934

LOT 224
DP 750934



LOT 217
DP 750934

LOT 220
DP 750934

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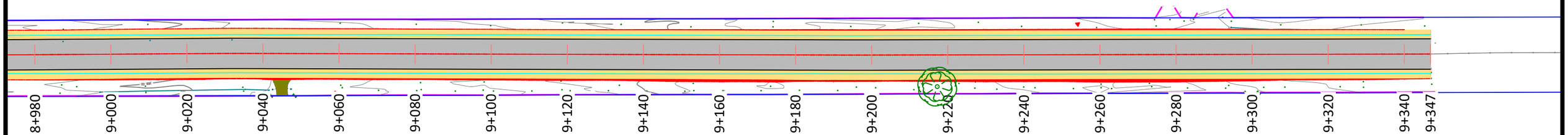
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- EDGE OF UNSEALED SHOULDER
- STORMWATER PIPE
- SURVEY CONTROL POINT
- DENOTES TREE
- DENOTES CUT AND FILL

TOWARDS MERRIWA

LOT 224
DP 750934



LOT 220
DP 750934

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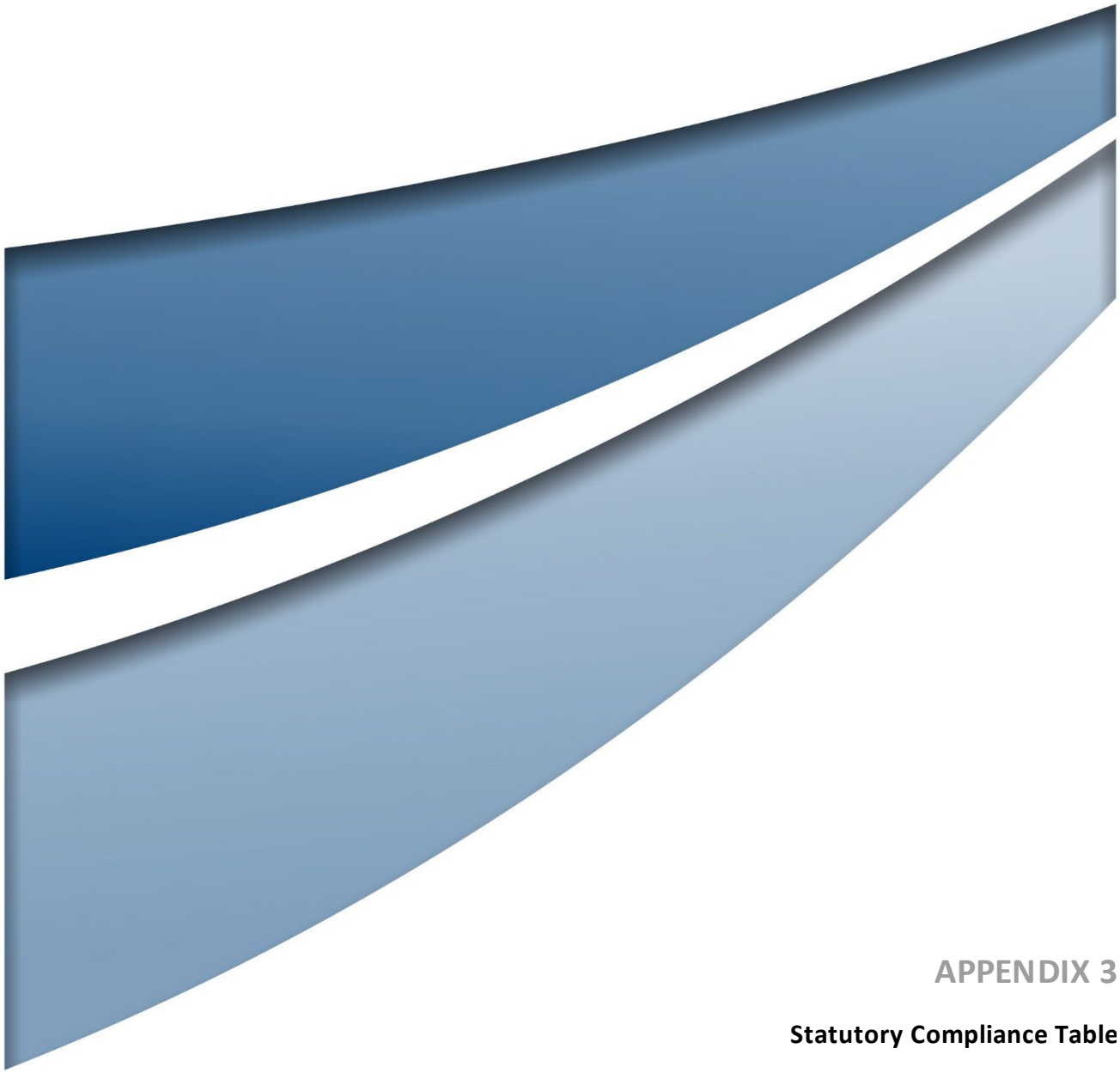
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APPENDIX 3

Statutory Compliance Table

Appendix 3 – Statutory Compliance Table

Table 1 Pre-Conditions Table

Statutory Reference	Pre-Condition	Relevance	Section in EIS
NSW Legislation			
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP)	A consent authority is restricted from granting development consent for proposals on land identified as core Koala habitat without the preparation of a plan.	The Project Area is located within LGAs to which the SEPP applies, and a Biodiversity Assessment has been completed.	**Section 6.2**
State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazard SEPP)	The Resilience and Hazards SEPP requires a consent authority to consider whether an industrial development is potentially hazardous industry or a potentially offensive industry, A Preliminary Hazards Assessment (PHA) is to be completed for potentially hazardous developments to assist the consent authority to determine acceptability.	A PHA has been completed for the Project.	**Section 6.10**
Resilience and Hazards SEPP	Under the Resilience and Hazards SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered any potential contamination issues.	The construction and operation of the Project will be appropriately managed to prevent contamination and any spills (e.g. hydrocarbons from mobile equipment during construction) will be cleaned up and the sites remediated. Decommissioning and rehabilitation following closure of the Project will be undertaken in accordance with relevant consent conditions and legislation/licence requirements and will include consideration of any contamination risks and remediation requirements associated with Project infrastructure (battery energy storage system and substation).	**Section 6.5**

Statutory Reference	Pre-Condition	Relevance	Section in EIS
State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP)	Clause 2.36(1)(b) of the Transport and Infrastructure SEPP state that development for the purpose of electricity generating works that may be carried out by a person with consent on any land in a prescribed non residential zone. RU1 Primary Production is a prescribed non residential zone under Clause 2.35 of the Transport and Infrastructure SEPP. Under Clause 2.7(1) of the Infrastructure SEPP, the prevision prevails where there are inconsistencies with any other environmental planning instruments, including LEPs.	The Project Area is located within land zoned as RU1 Primary Production. Electricity generating works are not expressly permitted in this zone however, under provisions of the Transport and Infrastructure SEPP, the Project is permissible with the development consent.	**Section 4.0**
Transport and Infrastructure SEPP	The Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the State. Amongst a range of other provisions it 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 an area in which the development is carried out, inviting comments about potential safety risks.	Lightsource bp is involved in ongoing consultation with TransGrid in relation to a connection agreement for the Project.	**Section 1.6**
Biodiversity Conservation Act 2016 (BC Act)	Under the BC Act, biodiversity assessment in accordance with the Biodiversity Assessment Method (BAM) is required for any State Significant Development (SSD) project.	The Project is of a class considered an SSD project.	**Section 6.2** **Appendix 6** and **Appendix 7**

Statutory Reference	Pre-Condition	Relevance	Section in EIS
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act regulates pollution to the environment and requires licences for environmental protection including waste, air, water and noise pollution control. Solar farms are not a schedule activity under the POEO Act; thus, the Project does not require an Environmental Protection Licence (EPL).	The Project does not require an Environmental Protection Licence.	N/A
Water Management Act 2000 (WM Act)	Any water extractions (take) from water sources (surface and groundwater) regulated by a Water Sharing Plan (WSP) required for construction purposes requires licensing under the WM Act. A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the WM Act do not apply to approved SSD projects, in accordance with thew provisions of Section 4.41 of the EP&A Act.	The Project will require water for construction and operational activities. This water may be sourced from the Project Area.	**Section 6.9**
Roads Act 1993 (Roads Act)	Under section 138 of the Roads Act, the consent of the appropriate roads' authority is required before a person can erect a structure, carry out work in, on or over a public road or dig up or disturb the surface of a public road. A consent under section 138 of the Roads Act cannot be refused and is to be substantially consistent with an approved SSD in accordance with the provisions of Section 4.42 of the EP&A Act.	The Project requires road works, including the upgrades of two culverts at Bow River and Killoe Creek and upgrades of the road along Ringwood Road. The relevant road authority for the road works described above is the Upper Hunter Shire Council.	**Section 3.0** **Appendix 7**

Statutory Reference	Pre-Condition	Relevance	Section in EIS
Crown Land Management Act 2016 (Crown Land Act)	The Crown Land Act provides for the administration and management of Crown Land in NSW. Crown land may not be occupied, used, sold, leased, licensed, dedicated, reserved or otherwise dealt with unless authorized by the Crown Land Act.	There are small parcels of Crown Land ('paper roads') throughout the Project Area. There are also small portions of Travelling Stock Reserve that intersect the Project Area. Landowner consent for these areas of Crown Lands has been obtained.	**Section 1.7** **Appendix 4**
Contaminated Land Management Act 1997 (CLM Act)	The CLM Act establishes the process for investigating and if required, remediating land that the NSW Environment Protection Authority (EPA) considers to be contaminated significantly enough to require regulation under Division 2 of Part 3.	The Project Area does not contain land listed on the Contaminated Lands Register and is not known to contain any contaminated land.	**Section 6.5**
Dark Sky Guideline 2016	This Guideline is a matter for consideration for all development under the EP&A Act before development consent is granted within the local government areas of Coonamble, Dubbo, Gilgandra and Warrumbungle and the assessment is within 200 km of the Observatory at siding Spring.	As the Project is a SSD within 200 km of the Siding Spring Observatory, the Dark Sky Planning Guideline must be considered before development consent can be granted.	**Section 6.6**
Fisheries Management Act 1994 (FM Act)	The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act applies in relation to all waters that are within the limits of the State and regulates certain activities that have the potential to impact on aquatic habitats. Permits under section 201, 205 and 219 of the FM Act are not required in accordance with the provisions of Section 4.41 of the EP&A Act.	Potential aquatic ecological impacts have been addressed in the EIS.	**Section 6.2**
Biosecurity Act 2015	The *Biosecurity Act 2015,* Schedule 1 requires all private landowners, occupiers, public authorities and Councils to control weeds on their land.	A detailed protocol will be developed to confirm biosecurity is maintained and that grazing does not impact on the safe and efficient operation of the project or result in injury to farm workers or operational and maintenance staff.	**Section 6.5**

Statutory Reference	Pre-Condition	Relevance	Section in EIS
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act sets out to protect and preserve Aboriginal heritage values. Part 6 of this Act refers to Aboriginal objects and places and prevents persons from impacting on an Aboriginal place or relic, without consent or a permit. An Aboriginal heritage impact permit (AHIP) under section 90 of the NPW Act is not required for approved SSD projects in accordance with the provisions of Section 4.41 of the EP&A Act.	An Aboriginal Cultural Heritage Assessment Report (ACHAR) has been completed for the Project.	**Section 6.3** **Appendix 8**
Heritage Act 1977 (Heritage Act)	Under Section 4.41 of the EP&A Act, an approval under Part 4 or a permit under Section 139 of the Heritage Act 1977 would not be required for a State Significant Development. However, this does not exempt the Project from requiring heritage assessment, which may identify heritage/archaeological sites and provide recommendations for their management, and the consideration of the provisions of the relevant statutory controls.	A Historic Heritage Assessment has been completed for the Project.	**Section 6.4** **Appendix 9**
Local Land Service Act 2013 (LLS Act)	Under the 2016 amendments to the Local Land Services Act 2013 (LLS Act), all rural land will be classified as either: • Category 1 (exempt land): clearing of native vegetation without authorisation under the LLS Act is permitted; or • Category 2 (regulated land): clearing of native vegetation is regulated under the LLS Act and some authorisation is required. Vulnerable land under this category will also be provided additional protection (e.g. riparian land).	The Project Area contains areas classified as Category 1 land however these areas were identified as containing critically endangered ecological communities and/or plants, as such the Category 1 exemption does not apply.	**Section 6.2** **Appendix 6**

Statutory Reference	Pre-Condition	Relevance	Section in EIS
Waste Avoidance and Resource Recovery Act 2001 (WARR Act)	The WARR Act includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm.	Waste impacts from the Project have been considered in the EIS.	**Section 6.13** **Appendix 20**
Commonwealth Legislation			
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Under the EPBC Act the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on a matter of national environmental significance (MNES). Approval under Part 9 of the EPBC Act is required for actions that may result in a significant impact on MNES.	The Project was referred to the Commonwealth Minister for the Environment (2021/9102). On 4 February 2021, 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 the following MNES: • Commonwealth listed threatened species and communities The assessment path for the Project is under the bilateral agreement between the Commonwealth and NSW Governments, and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Appendix 1** of the EIS).	**Section 6.2** **Appendix 6**
Native Title Act 1993 (NT Act)	The NT Act recognises the interests and rights Aboriginal people have to land and aims to provide recognition and protection of common law native title rights.	There are no currently known native title claims over the Project Area.	**Section 4.0** and **Section 6.3**

Table 2 Mandatory Considerations Table

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
Considerations under the EP&A Act EP&A Regulation			
Section 1.3	Relevant objects of the Act • to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources • to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment • to promote the orderly and economic use and development of land • to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The Project aims to provide a reliable and affordable source of energy for the people of NSW. The Project will also contribute to reducing greenhouse gas (GHG) emissions associated with energy generation and provide significant economic benefits to the region. The Project has been designed through a comprehensive process that incorporates community and stakeholder feedback and the findings of environmental and social studies to maximise positive social, economic and environmental outcomes while minimising adverse impacts.	**Section 1.0** **Section 2.0** **Section 6.0** **Section 7.0**
Section 4.15	(a) The provisions of: (i) Any environmental planning instrument that apply to the land to which the development application relates.	The following Environmental Planning Instruments apply to the Project: • *State Environmental Planning Policy (Planning Systems) 2021* • *State Environmental Planning Policy (Biodiversity and Conservation) 2021* • *State Environmental Planning Policy (Resilience and Hazards) 2021* • *State Environmental Planning Policy (Transport and Infrastructure) 2021* • *Upper Hunter Local Environmental Plan (LEP) 2013.*	This document **Section 2.0** **Section 4.0**

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
	(ii) Any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved) that apply to the land to which the development application relates	There are no proposed environmental planning instruments that are relevant to the application at the time of preparation.	Not applicable
	(iii) Any development control plan that apply to the land to which the development application relates	Section 2.8 of the Planning Systems SEPP excludes the application of development control plans (whether made before or after the commencement of the SEPP) to SSD projects.	Not applicable
	(iii) (a) Any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4 that apply to the land to which the development application relates	Lightsource bp is committed to entering a Planning Agreement for the Project with the Upper Hunter Shire Council.	**Section 2.5.2**
	(iv) The regulations (to the extent that they prescribe matters for the purposes of this paragraph) that apply to the land to which the development application relates	The EP&A Act is the primary instrument which regulates the environmental impact assessment and approval process for development in NSW.	**Section 4.0**
	(b) The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	Environmental impacts on both the natural and built environments, and social and economic impacts in the locality are addressed within the EIS.	**Section 6.0**
	(c) The suitability of the site for the development	The Project Area is deemed suitable for the development.	**Section 2.0** **Section6.0** **Section 9.0**

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
	(d) Any submissions made in accordance with this Act or the regulations	Comments to be received on the EIS during the public exhibition period will be addressed in the submissions process. Consultation has been undertaken with the community and other stakeholders to inform the EIS.	**Section 5.0**
	(e) The public interest	The Project is deemed beneficial to the public interest.	**Section 9.0**
Section 4.24	Relevant concept approval.	There are no relevant concept approvals for the Project.	Not applicable
Considerations under EPIs			
State Environmental Planning Policy (Planning Systems) 2021	Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that— a. has a capital investment value of more than $30 million, or b. has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance.	The Project is for the purpose of electricity generating works and has a capital investment value of more than $30 million.	Not applicable
State Environmental Planning Policy (Biodiversity and Conservation) 2021	Chapter 3 Koala habitat protection 2020 3.3 Land to which Chapter applies (1) This Chapter applies to land in the following land use ones, or an equivalent land use zone, in a local government area specified in Schedule 1 of State Environmental Planning Policy (Koala Habitat Protection) 2021, but not if the local government area is marked with an * in that Schedule— (a) Zone RU1 Primary Production, (b) Zone RU2 Rural Landscape, (c) Zone RU3 Forestry. …	The Project is located in the Upper Hunter Local Government Area. As the Project Area is located on the land zone RU1 – Primary Production, this SEPP is applicable.	**Section 6.2 and Appendix 6**

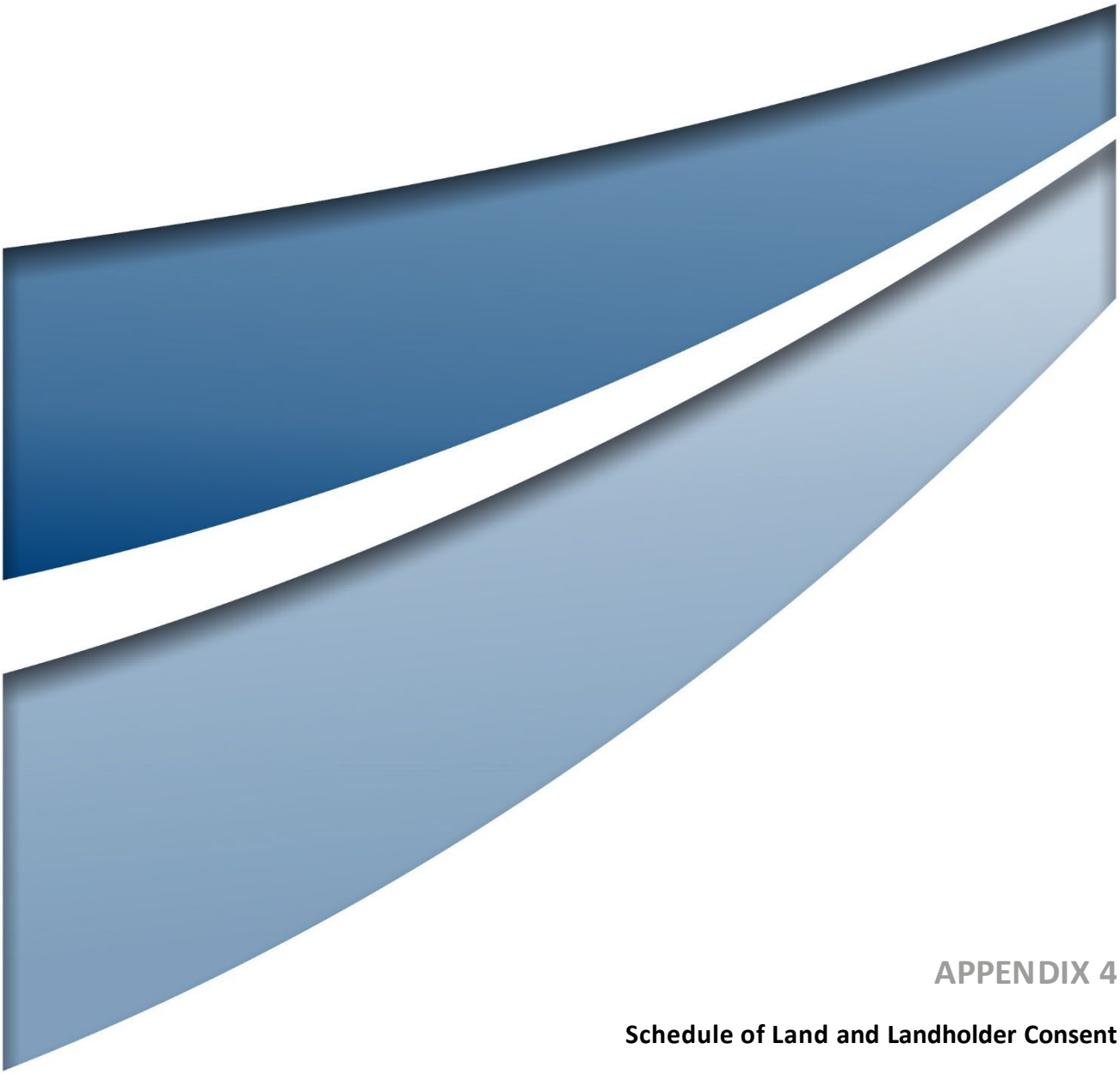
Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
	8.8 Development consent cannot be granted unless neutral or beneficial effect on water quality (1) A consent authority must not grant consent to the carrying out of development under Part 4 of the Act on land in the Sydney drinking water catchment unless it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality. (2) For the purposes of determining whether the carrying out of the proposed development on land in the Sydney drinking water catchment would have a neutral or beneficial effect on water quality, the consent authority must, if the proposed development is one to which the NorBE Tool applies, undertake an assessment using that Tool.	The Project is not located within the Sydney Drinking Water Catchment.	Not applicable
State Environmental Planning Policy (Resilience and Hazards) 2021	3.12 Matters for consideration by consent authorities In determining an application to carry out development to which this Part applies, the consent authority must consider (in addition to any other matters specified in the Act or in an environmental planning instrument applying to the development)—		

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
	(a) current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development, and	The publications regarded as relevant for hazardous and offensive development are: • Hazardous Industry Planning Advisory Paper (HIPAP) series. • LPG Automotive Retail Outlets – Locational Guidelines. • Managing Land Contamination – Planning Guidelines. • Resilience and Hazards SEPP. • Hazardous and Offensive Development Application Guidelines. • Multi-Level Risk Assessment. The relevant components have been considered in the PHA.	**Section 6.10**
	(b) whether any public authority should be consulted concerning any environmental and land use safety requirements with which the development should comply, and	All relevant stakeholders have been consulted with during the preparation of the EIS.	**Section 5.0**
	(c) in the case of development for the purpose of a potentially hazardous industry—a preliminary hazard analysis prepared by or on behalf of the applicant, and	A PHA has been completed and is included as a component of the EIS.	**Section 6.10**
	(d) any feasible alternatives to the carrying out of the development and the reasons for choosing the development the subject of the application (including any feasible alternatives for the location of the development and the reasons for choosing the location the subject of the application), and	Feasible alternatives (including for the location of the development) have been considered in the EIS and the reasons for choosing the development are described.	**Section 2.6**
	(e) any likely future use of the land surrounding the development.	The Project is surrounded by the Goulburn River National Park, the Project will not change this land use.	**Section 6.5**

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
	4.6 Contamination and remediation to be considered in determining development application (1) A consent authority must not consent to the carrying out of any development on land unless— (a) it has considered whether the land is contaminated, and (b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and (c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.	The Project Area is not listed in the Contaminated Land Register or Environmental Management Register. An initial inspection of the Development Footprint did not identify any potential contaminated land.	**Section 6.5**
	(2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subsection (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.	There is no proposed change to the primary land use within the Project Area. The Project Area is not listed in the Contaminated Land Register or Environmental Management Register. An initial inspection of the Development Footprint did not identify any potential contaminated land. Soil sampling was also undertaken across the Project Area.	**Section 6.5**
	(3) The applicant for development consent must carry out the investigation required by subsection (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.	As above.	Not applicable

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
	(4) The land concerned is— (a) land that is within an investigation area, (b) land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out, (c) to the extent to which it is proposed to carry out development on it for residential, educational, recreational or childcare purposes, or for the purposes of a hospital—land— (i) in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and (ii) on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).	The Project Area is not identified as contaminated land on the NSW EPA Contaminated Land Register or Environmental Management Register.	Not applicable
State Environmental Planning Policy (Transport and Infrastructure) 2021	Clause 2.36(1) of the Transport and Infrastructure SEPP states that development for the purpose of electivity works may be carried out by any person with consent on the following land (a) in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source-on any land, (b) in any other case-any land in a prescribed non-residential zone.	The Project is for the purpose of electricity generating works and is located on land zoned as RU1 – Primary Production.	**Section 6.5**
Upper Hunter Environmental Plan	The Project is located in the Upper Hunter Local Government Area and is zoned and RU1- Primary Production.	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 4.0**

Statutory Reference	Mandatory Consideration	Relevance	Section in EIS
Considerations under other legislation			
Biodiversity Conservation Act 2016	Under the BC Act, biodiversity assessment in accordance with the Biodiversity Assessment Method (BAM) is required for any SSD project. The likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.	A Biodiversity Development Assessment Report (BDAR) in accordance with the BAM has been completed for the Project. Consultation with the NSW Biodiversity, Conservation and Science Division (BCS) has also been undertaken during the preparation of the EIS and has been considered in the BDAR.	**Section 5.0** **Section 6.2** **Appendix 6** and **Appendix 7**
Environment Protection and Biodiversity Conservation Act 1999	Under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), a referral is required to be submitted to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for any 'action' that is considered likely to have a significant impact on any Matter of National Environmental Significance (MNES).	The Project was referred to the Commonwealth Minister for the Environment (2021/9102). On 4 February 2021, 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 the following MNES: • Commonwealth listed threatened species and communities. The assessment path for the Project is under the bilateral agreement between the Commonwealth and NSW Governments, and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Appendix 1** of the EIS).	**Section 6.2** **Appendix 6**



APPENDIX 4

Schedule of Land and Landholder Consent

Appendix 4 – Schedule of Land

Lot Number	Plan Number	Plan Label	Controlling Authority	Land Holder Name	Landowner Consent Obtained (Y/N)
Solar Farm Site					
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**			Local Government Authority	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**			Crown	-	Y
7308	1165052	DP1165052	Crown	-	Y
7306	1165073	DP1165073	Crown	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**		332-2096	Crown	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**		709-1511	Crown	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**		212-1511	Crown	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**		3879-2096	Crown	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**		725-1511	Crown	-	Y
No Lot or DP number, area located along Wollara Road as per **Figure 1.2**		2950-2096 R	Crown	-	Y
3	750956	DP750956	Freehold	[redacted]	Y
30	750956	DP750956	Freehold	[redacted]	Y
31	750956	DP750956	Freehold	[redacted]	Y
32	750956	DP750956	Freehold	[redacted]	Y
33	750956	DP750956	Freehold	[redacted]	Y
57	750956	DP750956	Freehold	[redacted]	Y
61	750956	DP750956	Freehold	[redacted]	Y
21	750966	DP750966	Freehold	[redacted]	Y
25	750966	DP750966	Freehold	[redacted]	Y
26	750966	DP750966	Freehold	[redacted]	Y
27	750966	DP750966	Freehold	[redacted]	Y
28	750966	DP750966	Freehold	[redacted]	Y
29	750966	DP750966	Freehold	[redacted]	Y
30	750966	DP750966	Freehold	[redacted]	Y

Lot Number	Plan Number	Plan Label	Controlling Authority	Land Holder Name	Landowner Consent Obtained (Y/N)
38	750966	DP750966	Freehold	[redacted]	Y
39	750966	DP750966	Freehold	[redacted]	Y
84	750966	DP750966	Freehold	[redacted]	Y
85	750966	DP750966	Freehold	[redacted]	Y
5	750966	DP750966	Freehold	[redacted]	Y
6	750966	DP750966	Freehold	[redacted]	Y
7	750966	DP750966	Freehold	[redacted]	Y
8	750966	DP750966	Freehold	[redacted]	Y
9	750966	DP750966	Freehold	[redacted]	Y
10	750966	DP750966	Freehold	[redacted]	Y
58	750956	DP750956	Freehold	[redacted]	Y
62	750956	DP 750956	Freehold	[redacted]	Y
63	750956	DP750956	Freehold	[redacted]	Y
64	750956	DP750956	Freehold	[redacted]	Y
75	750966	DP750966	Freehold	[redacted]	Y
76	750966	DP750966	Freehold	[redacted]	Y
86	750966	DP750966	Freehold	[redacted]	Y
87	750966	DP750966	Freehold	[redacted]	Y
77	750966	DP750966	Freehold	[redacted]	Y
78	750966	DP750966	Freehold	[redacted]	Y
82	750956	DP750966	Freehold	[redacted]	Y
99	750966	DP750966	Freehold	[redacted]	Y
102	750966	DP750966	Freehold	[redacted]	Y
105	750966	DP750966	Freehold	[redacted]	Y
42	750956	DP750956	Freehold	[redacted]	Y
43	750956	DP750956	Freehold	[redacted]	Y
47	750956	DP750956	Freehold	[redacted]	Y
55	750956	DP750956	Freehold	[redacted]	Y
56	750956	DP750956	Freehold	[redacted]	Y
84	750956	DP750956	Freehold	[redacted]	Y
Ringwood Road repairs and upgrades					
No Lot or DP number, area is located along Ringwood Road as per **Figure 1.2** and **Figure 1.3**			Local Government Authority	-	Y

Lot Number	Plan Number	Plan Label	Controlling Authority	Land Holder Name	Landowner Consent Obtained (Y/N)
No Lot or DP number, area located between Bow and Killoe Creek as per **Figure 1.2** and **Figure 1.3**			Local Government Authority	-	Y

Lightsource Development Services Australia
L29/420 George St
Sydney
2000
Australia

www.lightsourcebp.com

1/05/2022

Nicole Brewer
Director, Energy Assessments
NSW Department of Planning and Environment
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

Dear Nicole,

Being the owner of land located at,

Ringwood Road, Merriwa and identified as the following title references:

- Lot 3 in Deposited Plan 750956 (**Lot 3**);
- Lot 30 in Deposited Plan 750956 (**Lot 30**);
- Lot 31 in Deposited Plan 750956 (**Lot 31**);
- Lot 32 in Deposited Plan 750956 (**Lot 32**);
- Lot 33 in Deposited Plan 750956 (**Lot 33**);
- Lot 57 in Deposited Plan 750956 (**Lot 57**);
- Lot 61 in Deposited Plan 750956 (**Lot 61**);
- Lot 21 in Deposited Plan 750966 (**Lot 21**);
- Lot 25 in Deposited Plan 750966 (**Lot 25**);
- Lot 26 in Deposited Plan 750966 (**Lot 26**);
- Lot 27 in Deposited Plan 750966 (**Lot 27**);
- Lot 28 in Deposited Plan 750966 (**Lot 28**);
- Lot 29 in Deposited Plan 750966 (**Lot 29**);
- Lot 30 in Deposited Plan 750966 (**Lot 30 - 750966**)
- Lot 38 in Deposited Plan 750966 (**Lot 38**);
- Lot 39 in Deposited Plan 750966 (**Lot 39**);
- Lot 84 in Deposited Plan 750966 (**Lot 84**);
- Lot 85 in Deposited Plan 750966 (**Lot 85**);
- Lot 5 in Deposited Plan 750966 (**Lot 5**);
- Lot 6 in Deposited Plan 750966 (**Lot 6**);
- Lot 7 in Deposited Plan 750966 (**Lot 7**);
- Lot 8 in Deposited Plan 750966 (**Lot 8**);
- Lot 9 in Deposited Plan 750966 (**Lot 9**);
- Lot 10 in Deposited Plan 750966 (**Lot 10**);
- Lot 58 in Deposited Plan 750956 (**Lot 58**);
- Lot 62 in Deposited Plan 750956 (**Lot 62**);
- Lot 63 in Deposited Plan 750956 (**Lot 63**);
- Lot 64 in Deposited Plan 750956 (**Lot 64**);
- Lot 75 in Deposited Plan 750966 (**Lot 75**);
- Lot 76 in Deposited Plan 750966 (**Lot 76**);
- Lot 86 in Deposited Plan 750966 (**Lot 86**);
- Lot 87 in Deposited Plan 750966 (**Lot 87**);
- Lot 77 in Deposited Plan 750966 (**Lot 77**);
- Lot 78 in Deposited Plan 750966 (**Lot 78**);

- Lot 82 in Deposited Plan 750956 (**Lot 82**);
- Lot 99 in Deposited Plan 750966 (**Lot 99**);
- Lot 102 in Deposited Plan 750966 (**Lot 102**); and
- Lot 105 in Deposited Plan 750966 (**Lot 105**).

provide consent to the applicant,

Lightsource Development Services Australia Pty Limited ABN 26 623 301 799 of Level 29, 420 George Street, Sydney, NSW, 2000,

to apply to a consent authority under section 4.12 of the Environmental Planning and Assessment Act 1979 (NSW) for consent to carry out development, known as Goulburn River Solar Farm, under development application number SSD 33964533,

which is to be carried out on the land described above and includes:

- the construction and operation of a photovoltaic generation facility with an estimated capacity of 550 MWp;
- A Battery Energy Storage System (BESS) with a estimated capacity of 570 MWh; and
- associated infrastructure, including grid connection hardware

Signed, [redacted]

[redacted]

Date: 2 - 5 - 2023.

Lightsource Development Services Australia
L29/420 George St
Sydney
2000
Australia

www.lightsourcebp.com

1/05/2022

Nicole Brewer
Director, Energy Assessments
NSW Department of Planning and Environment
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

Dear Nicole,

Being the owner of land located at,

Ringwood Road, Merriwa and identified as the following title references:

- Lot 42 in Deposited Plan 750956, Folio identifier 42/750956 (Lot 42);
- Lot 43 in Deposited Plan 750956, Folio identifier 43/750956 (Lot 43);
- Lot 47 in Deposited Plan 750956, Folio identifier 47/750956 (Lot 47);
- Lot 55 in Deposited Plan 750956, Folio identifier 55/750956 (Lot 55);
- Lot 56 in Deposited Plan 750956, Folio identifier Auto-Consol 5831-78 (Lot 56); and
- Lot 84 in Deposited Plan 750956, Folio identifier Auto-Consol 5831-78 (Lot 84).

provide consent to the applicant,

Lightsource Development Services Australia Pty Limited ABN 26 623 301 799 of Level 29, 420 George Street, Sydney, NSW, 2000,

to apply to a consent authority under section 4.12 of the Environmental Planning and Assessment Act 1979 (NSW) for consent to carry out development, known as Goulburn River Solar Farm, under development application number SSD 33964533,

which is to be carried out on the land described above and includes:

- the construction and operation of a photovoltaic generation facility with an estimated capacity of 550 MWp;
- A Battery Energy Storage System (BESS) with a estimated capacity of 570 MWh; and
- associated infrastructure, including grid connection hardware

Signed,

[redacted]

Contact Name: Greg McDonald
Contact No: 6540 1126
Our Reference: OUT-3257/23

27 April 2023

Nicole Brewer
Director, Energy Assessments
NSW Department of Planning and Environment
4 Parramatta Square
12 Darcy Street
PARRAMATTA NSW 2150

Dear Nicole

Being the owner of the Council Public Road comprising:

- Ringwood Road, Merriwa; and
- Wollara Road, Merriwa

Upper Hunter Shire Council provides consent to the applicant:

Lightsource Development Services Australia Pty Limited
ABN 26 623 301 799
Level 29, 420 George Street,
Sydney, NSW, 2000

to apply to a consent authority under section 4.12 of the *Environmental Planning and Assessment Act 1979* (NSW) for consent to carry out development, known as Goulburn River Solar Farm, under development application SSD 33964533, which is to be carried out on the land described in Figure 1.2 (Land Ownership). The development includes the following:

- the construction and operation of a photovoltaic generation facility with an estimated capacity of 550 MW;
- a Battery Energy Storage System (BESS) with an estimated capacity of 570 MWh and associated infrastructure including grid connection; and
- various road repairs and upgrades along Ringwood Road and Wollara Road, Merriwa.

Yours sincerely

Greg McDonald
GENERAL MANAGER

Letter to Applicant
Consent Granted
Department of Planning and Environment

Our reference: 23/00144#01
LOC No: 638122

Janet Meyn
janet.meyn@crownland.nsw.gov.au

7 March 2023

Via email: stephen.archer@lightsourcebp.com
diana.mitchell@lightsourcebp.com

Attention: Stephen Archer – Development Manager

Consent for Development Comprising:	Proposed as described below: • State Significant Development (SSD) application 33964533 for the purpose of the Goulburn River Solar Farm at Wollara Road, Merriwa (Refer DOC22/001292). • The Project will involve the construction, operation and decommissioning of a 520 megawatt (MW) solar farm with a Battery Energy Storage System (BESS) of approximately 520 MW-hours and associated infrastructure. The Project will connect to an existing 500 kilovolt (kV) transmission line via a proposed substation to be located in the south-eastern section of the Project Area. • The proposed Goulburn River Solar Farm (the Project) is located approximately 28 km south of Merriwa, New South Wales, off Wollara Road, within the Upper Hunter Local Government Area. The Project encompasses two freehold properties and some sections of Crown land and roads (approximately 21 ha), covering an area of approximately 2000 ha in total. The development footprint for the Project is approximately 882 ha)
Crown Land	Crown Land R44841 for purpose of travelling stock and Crown roads administered under the *Roads Act 1993.* Matters relevant to the Roads Act are central to the considerations for Landowners Consent as set out in the application.
Crown reserve	R44841 for purpose of travelling stock – Lot 7306 DP 1165073 (primary access point) and Lot 7308 DP 1165052 (2 x emergency access points).
Parish	Tongo

County	Brisbane
Applicant	Lightsource Development Services Australia Pty Limited

Consent is granted by the Minister for Lands and Water, to the lodgement of applications for approval under the *Environmental Planning and Assessment Act 1979*, and other associated applications required under other legislation, for the development proposal described above.

The Land Owner Consent is granted conditional to the following:

1. Land Owner Consent will expire after a period of 12 months from the date of this letter if not acted on within that time. Extensions of this consent may be sought.
2. You are required to forward a copy of the DA approval to the NSW Department of Planning and Environment – Crown Lands ("the Department") after approval and prior to commencing works.
3. You are required to ensure that the approval provided is consistent with this Land Owner Consent.
4. The Land Owner Consent is provided for the works detailed on the plans provided by you and retained by the Department as DOC23/002122.

Land Owner Consent is granted in accordance with the following:

- Land Owner Consent is given without prejudice so that consideration of the proposed development may proceed under the *Environmental Planning and Assessment Act 1979* and any other relevant legislation;
- The grant of this Land Owner Consent does not guarantee that any subsequent authority to occupy will be granted;
- Land Owner Consent does not imply the concurrence of the Minister for Lands and Water, for the proposed development and does not provide authorisation under the Crown Lands Act 1989 for this proposal;
- The issue of Land Owner Consent does not prevent the Department from making any submission commenting on, supporting or opposing an application;
- The Minister reserves the right to issue Land Owner Consent for the lodgement of applications for any other development proposals on the subject land concurrent with this Land Owner Consent;
- Any changes made to the proposal, including those imposed by the consent authority, must be consistent with the Land Owner Consent and therefore if modifications are made to the proposed development details must be provided to the Department for approval;
- Land Owner Consent also allows application to any other approval authority necessary for this development proposal.

This letter should be submitted to the relevant consent or approval authority in conjunction with the development application and/or any other application. You are responsible for identifying and obtaining all other consents, approvals and permits required under NSW and Commonwealth laws from other agencies for the proposed development.

It is important that you understand your obligations relating to Condition 3. If any alterations are made to the application (whether in the course of assessment, by

conditions of consent, or otherwise), it is your responsibility to ensure the amended or modified development remains consistent with this Land Owner Consent. If there is any inconsistency or uncertainty you are required to contact the Department before undertaking the development to ensure that the Department consents to the changes. A subsequent LOC application may incur additional application fees.

It is advised that the Department will provide the Department a copy of this Land Owner Consent and will request that the Department notify the Department of the subsequent development application, for potential comment, as part of any public notification procedure.

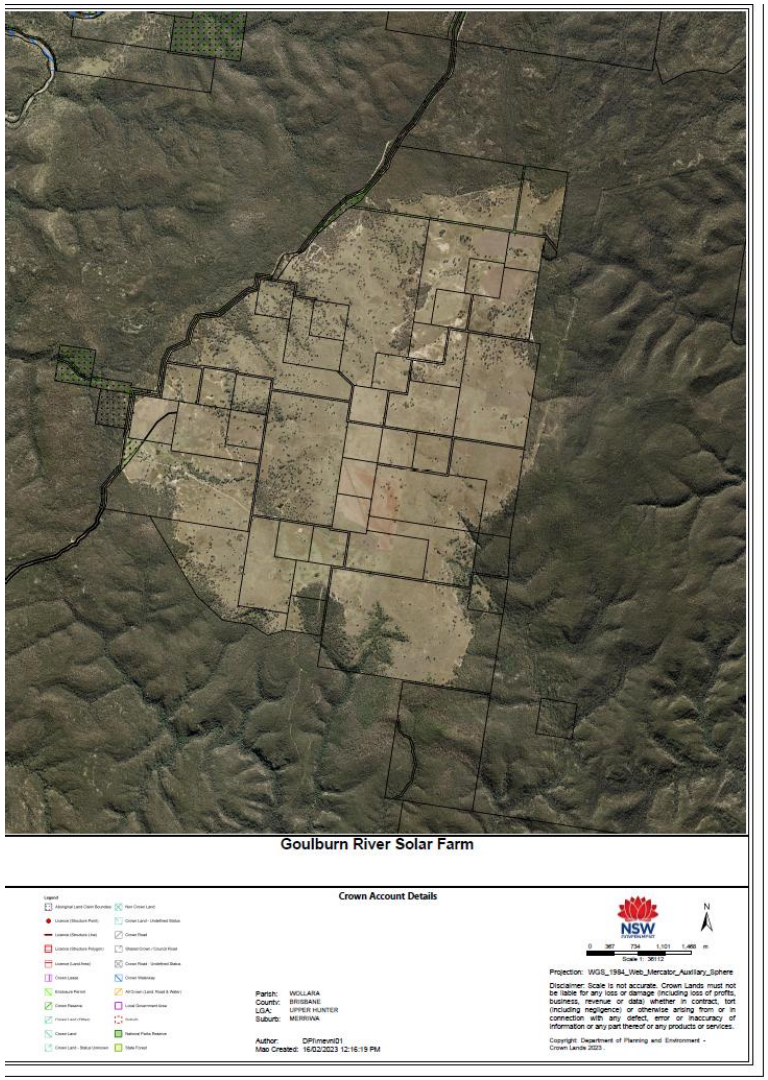
For further information, please contact Janet Meyn.

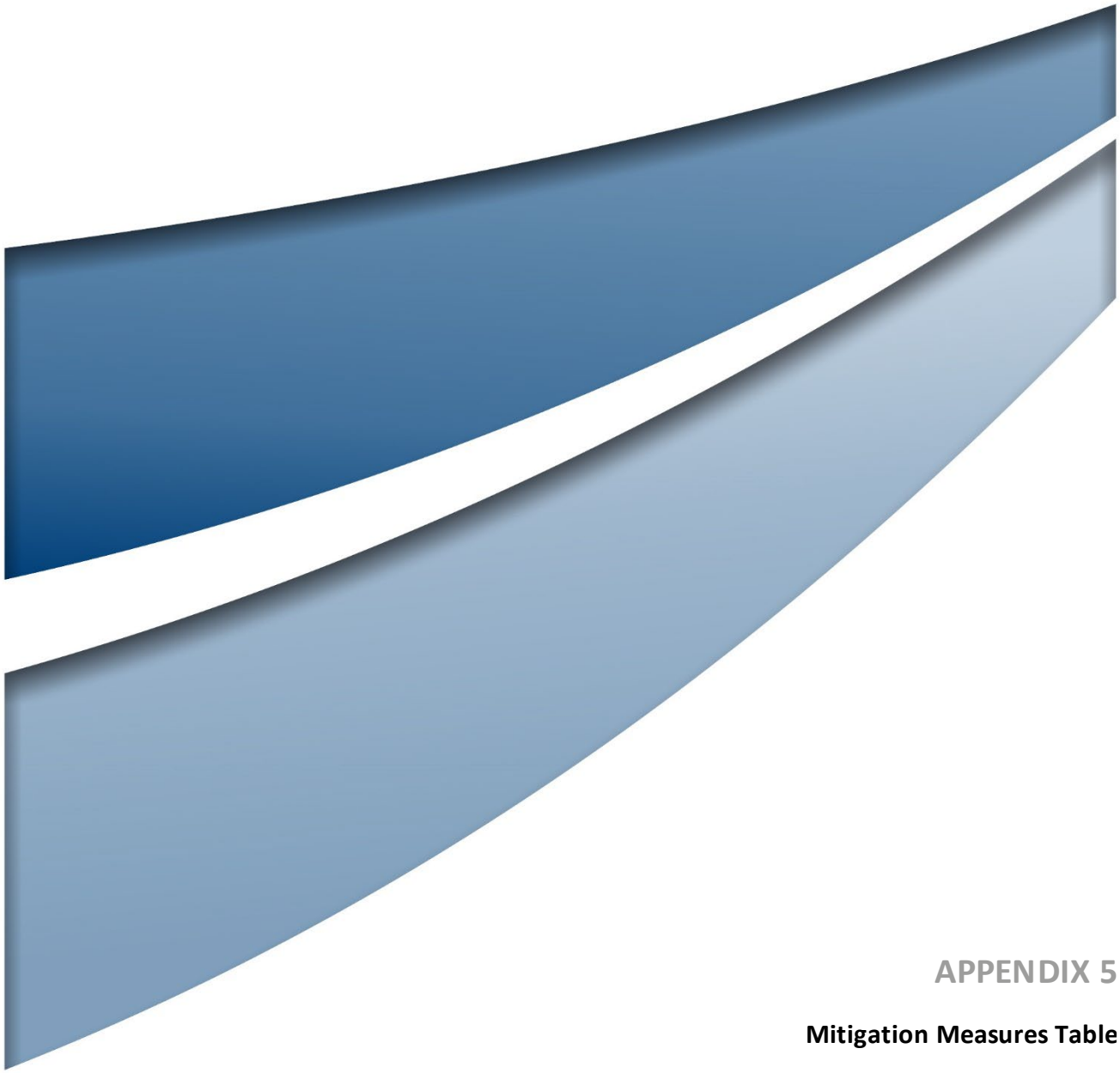
Yours sincerely



Janet Meyn
Senior Property Management Officer
Department of Planning and Environment - Crown Lands

Attachment A – Location Map





APPENDIX 5

Mitigation Measures Table

Appendix 5 – Mitigation and Management Measures

Lightsource bp will be responsible for implementing the management and mitigation measures identified in the EIS. Under the terms of the Engineering, Procurement and Construction (EPC) Contract, the EPC Contractor has control and is responsible for the management of the Project Area during construction and initial operations. This will be followed by the Operation and Maintenance Contractor being responsible during operation. The management and mitigation measures will be implemented through a construction environmental management plan, operational environmental management plan and decommissioning environmental management plan. These plans will be prepared sequentially, prior to each stage of the Project by Lightsource bp and the relevant contractor, and in consultation with relevant Government Agencies. The following table provides a consolidated list of the management and mitigation measures applicable to the Project and relevant timing for implementation.

Aspect	Management/Mitigation Measure	Timing
Terrestrial biodiversity	Maintain a wildlife corridor across the Project Area through retention of large areas of suitable habitat for the regent honey eater (*Anthochaera phrygia*) and White Box – Yellow Box – Blakely's Red Gum Grassy woodland and derived native grassland.	Construction and Operation
	Implement the following specific control measures to minimise the impacts of the Project on biodiversity: • workforce education and training • implementation of vegetation protection zones for areas to be retained • ecologist pre-clearance surveys and supervision of works • erosion and sedimentation control measures • weed management • fencing, access control and fauna exclusion measures. Each of these mitigation measures will be included within the CEMP, OEMP and DRMP.	Construction and Operation
	Develop a Biodiversity Offset Strategy (BOS) in consultation with Biodiversity Conservation Division (BCD), DPE and DCCEEW based on the credits required to be retained to offset the impacts of the Project.	Prior to construction commencing

Aspect	Management/Mitigation Measure	Timing
Aquatic biodiversity	During construction: • implementation of appropriate erosion and sediment controls • avoidance of waterfront land during construction works • provision of onsite spill kits for construction works within 100 metres of a watercourse • undertaking instream construction works (for access tracks) when watercourses are dry (where practicable) • design of any instream structures using relevant guidelines (to maintain fish passage and minimise impacts to natural flow regimes), particularly on watercourses mapped as KFH • rehabilitation of disturbed bed and banks of watercourses mapped as KFH with stabilising vegetation • implementation of pre-clearance surveys carried out prior to construction, undertaken by a suitably qualified ecologist • implementation of an unexpected species finds protocol.	Construction
	During operation and decommissioning: • routine maintenance of vehicles (to reduce the risk of oil spills etc) • routine maintenance of culverts (to ensure they are clear of debris) • minimal use of herbicides to control exotic species (to reduce pollutants entering downstream watercourses) • re-establishment of native riparian vegetation endemic to the region and aquatic habitat features within and on the banks of any watercourses directly impacted.	Operation and Decommissioning
Aboriginal cultural heritage	Following development consent, the proponent will develop an Aboriginal Cultural Heritage Management Plan (ACHMP) which is to be agreed to by the RAPs and DPE (with input from Heritage NSW). The ACHMP will include an unanticipated finds protocol, unanticipated skeletal remains protocol, protocols related to heritage inductions for work crews, and long-term management of any Aboriginal sites being impacted.	Prior to construction commencing
	Eight Aboriginal sites within the Development Footprint will be salvaged by a surface collection of visible artefacts. The recommended methodology for the salvage will be set out in the ACHMP and will include the measures outlined in Section 9.2.1 of the ACHAR.	Prior to construction commencing
	Four of the seven trees of community interest will be retained. The three trees of community of community interest located within the Development Footprint will be removed in accordance with a methodology set out in the ACHMP.	Construction
	The ruins of the O'Brien homestead slab hut will be avoided from all ground disturbing impacts by a 20-metre buffer.	Construction

Aspect	Management/Mitigation Measure	Timing
	The two identified sites that lie outside the Project access route/Development Footprint will be retained. Should works need to take place at either location, the site would be included on all applicable construction plans and the location made known to all work crews working in the vicinity of the site to ensure the site is not inadvertently harmed.	Prior to construction commencing
Historic heritage	If impacts to areas of high historical archaeological potential cannot be avoided through design changes, further assessment and investigation would be required prior to the commencement of construction activities. This would include the preparation of an archaeological research design and test excavation methodology to confirm the extent of historical archaeological remains present, and the likely significance level of any historical archaeological remains on the site.	Prior to construction commencing
	All contractors and project team for the Project should be made aware of the archaeological potential and heritage sensitivity of the site, through a heritage-specific induction which outlines their requirements under the NSW *Heritage Act 1977* and the Project Approvals.	Construction, operation and decommissioning
	An unexpected heritage finds protocol should be implemented for the construction works in the unlikely event that historical archaeological remains should be encountered during construction works.	Construction
Land	A CEMP will be prepared by Lightsource bp that identifies erosion and sediment control measures prior to works commencing.	Prior to construction commencing
	An ESCP will be developed as part of the CEMP, in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (NSW DPIE, 2004) "The Blue Book". The ESCP will be implemented, and particular consideration of the dispersive soils identified within the Project Area will be considered.	Prior to construction commencing
	Areas outside of the Developmental Footprint but within the Project Area may be established as a Biodiversity Stewardship Site. If determined to be compatible, with cattle grazing will be facilitated throughout this area.	Prior to construction commencing
	If required, an 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. This will include measures to manage the stock appropriately, including a requirement to keep the stock in good health, ensuring frequent shearing (to keep wool growth low), ensure mustering is conducted in an agreed safe manner, and that any fatalities are managed by the farmer. As a part of the OEMP a Wild Dog Management Plan will also be prepared for sheep grazing management.	Operations
	The OEMP will be developed in consultation with the host landholders and DPI Agriculture and will be implemented post construction.	Operations

Aspect	Management/Mitigation Measure	Timing
	The Project Area will be rehabilitated to a condition as close as practicable to the condition that existed prior to construction of the Project and in consultation with the landowner. This will be achieved through the implementation of a Rehabilitation Management Plan as part of the OEMP for the Project.	Decommissioning
	The OEMP will detail the management requirements, including: • inspection of all vehicles and machinery entering the Project Area, and cleaning if applicable to remove weeds including seeds • appropriate weed management practices to be adopted, including regular weed spraying • appropriate pest management practices to be adopted • limit vehicle access to the established internal road network.	Operation
Visual	Retention of as much existing vegetation within the Project Area as possible.	Design
	Setback of the construction compound, vehicle parking and equipment storage areas from Wollara Road by a minimum of 50 m and partially screened from view (from Wollara Road) via existing and new vegetation screening.	Design
	Signage (if required) would be of sufficient size to contain only information sufficient for the basic facility and company identification, for safety, navigation, and delivery purposes.	Construction
	Where soil disturbance is required, wind erosion controls would be implemented including the use of water carts, covering of stockpiles and avoiding ground disturbance during windy conditions.	Construction
	Lighting would be installed in accordance with AS4228-1997 – Control of Obtrusive Effects of Outdoor Lighting and designed and installed to best practice principles identified within the Dark Sky Planning Guidelines.	Construction
	Where possible colour treat ancillary components of the Project.	Construction
	Landscaping in accordance with the draft Landscape Plan (prepared as part of the VIA) to screen views of the Project Area. The plan illustrates proposed tree and shrub planting on-site, along the western perimeter of the Project Area to screen views from Wollara Road.	Construction
	Monitor visual impacts, contact nearest residents to determine social issues. If social issues experienced, discuss possible remedies.	Operation

Aspect	Management/Mitigation Measure	Timing
Noise and vibration	All sensitive receivers likely to be affected should be notified at least 7 days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification should include: • details of the Project • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information.	Construction
	All employees, contractors and subcontractors are to receive an environmental induction. The induction must include at a minimum, all applicable mitigation measures; hours of works; any limitations on high noise-generating activities; location of nearest sensitive receivers; designated parking areas; relevant approval conditions and incident procedures.	Construction
	Contractors should keep noise to a minimum, including limiting the use of loud stereos/radios, shouting on site and car door slams.	Construction
	Where practical, no dropping of materials from height or throwing of metal items.	Construction
	The noise levels of plant and equipment should have operating sound power levels consistent with those nominated in the NVIA.	Construction
	Noise emitting plant to be directed away from sensitive receivers and to be throttled down or shut down when not in use.	Construction
	Non-tonal reversing beepers could be fitted and used on construction vehicles and mobile plant used regularly on site and for any out of hours work.	Construction
	Limit the use of engine compression brakes.	Construction

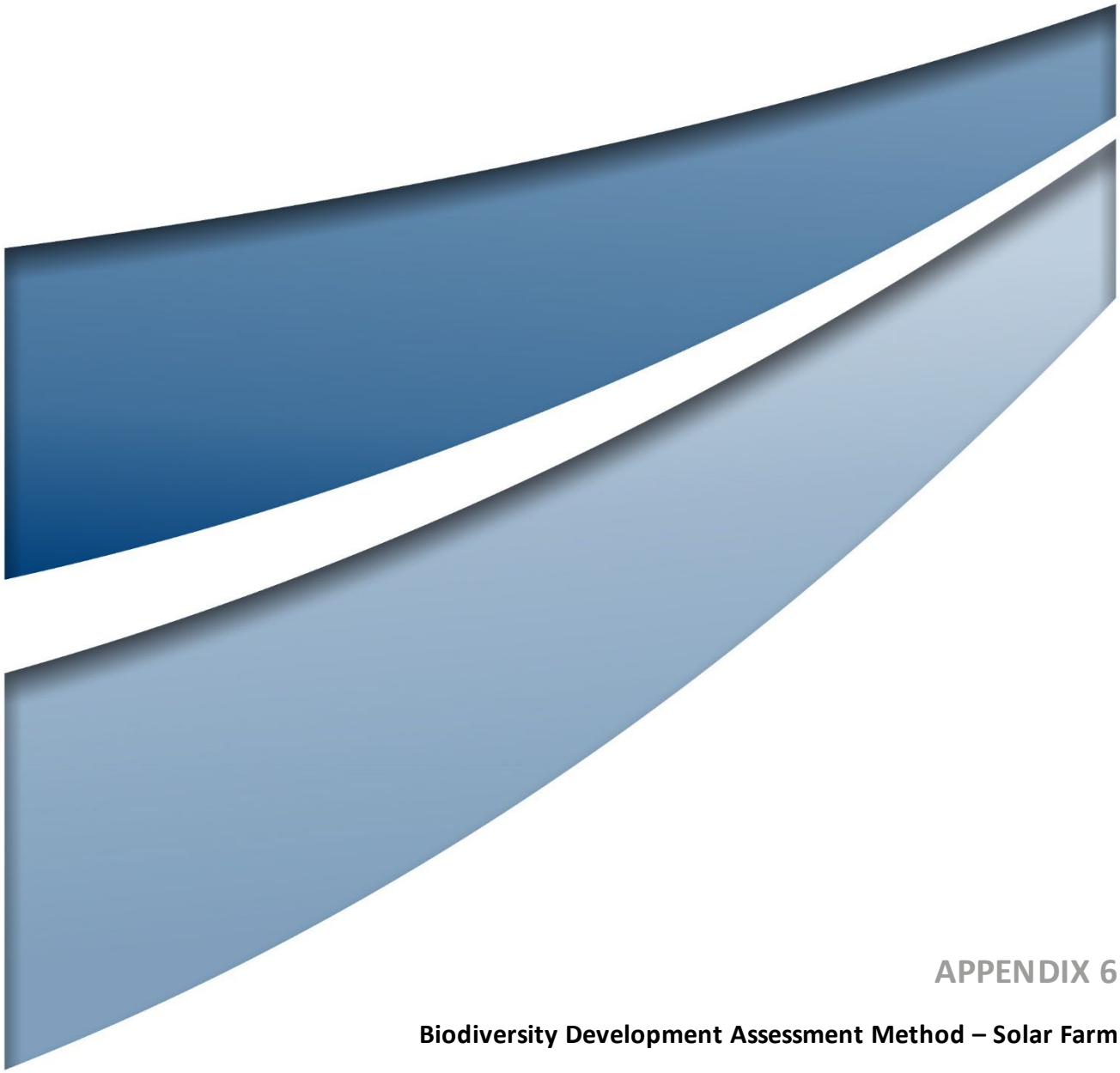
Aspect	Management/Mitigation Measure	Timing
	In the unlikely event that any vibration-generating equipment would be used within the recommended safe working distances nominated in **Table 6.11** of the EIS, the following is recommended: • An independent specific structural assessment is undertaken on the structure to ascertain the structural integrity and its ability to withstand vibration, and establishment of an appropriate vibration criterion. • A dilapidation survey is undertaken on the structure prior to works commencing, and regular inspection of the structure throughout the construction activities. • Site specific vibration minimum working distances are established for the nominated equipment on site. • Where appropriate, continuous vibration monitoring is conducted on the structure for the duration of the period of construction while vibration generating equipment is used. The vibration logger should be equipped with the facility to remotely alert the site to reduce or cease construction activities if vibration levels are approaching the criterion threshold.	Construction
	A Draft Construction Noise and Vibration Management Plan (DCNVMP) has been prepared for the management of potential noise and vibration impacts associated with Ringwood Road upgrade works, which details mitigation/controls where required.	Construction
Traffic and Transport	Prior to the commencement of construction, a Construction Traffic Management Plan (CTMP) would be prepared in accordance with relevant guidelines and in consultation with TfNSW, Upper Hunter Shire Council, National Parks and Wildlife Service and any other relevant stakeholders. The CTMP would outline how construction activities would avoid, mitigate and manage risks involving construction activities, users of the traffic and transport network and residents.	Prior to construction commencing
	The community would be notified in advance of proposed road and transport network changes through appropriate media and other forms of community liaison.	Construction
	Where relevant, Road Occupancy Licences (ROLs) and crane permits would be submitted and approved prior to the closure of any roads.	Construction
	Construction workers would be encouraged to carpool or use the shuttle buses to travel to and from the construction site.	Construction
	Parking requirements for the Project during construction and operation would be provided on-site, and parking would not be provided on public roads adjacent to the Project Area.	Construction and Operation
	Additional warning signs are recommended along sections of Ringwood Road and Wollara Road where the road narrows and near the site access points.	Construction
	Swept paths of the proposed site access points with high resolution surveys/aerials would be developed as the project progresses to determine the most appropriate site access arrangements.	Construction

Aspect	Management/Mitigation Measure	Timing
	A detailed Oversized Over Mass (OSOM) vehicle route assessment would be undertaken by the construction contractor and outlined in the Transport Management Plan. The Plan will detail OSOM route, duration, road closures, traffic closures, traffic detours, notifications and any required Traffic Guidance Schemes.	Prior to construction commencing
	Prior to the commencement of construction, a CTMP would be prepared in consultation with Transport for NSW, Upper Hunter Shire Council, National Parks and Wildlife Service and any other relevant stakeholders, outlining how construction activities would avoid, mitigate and manage risks involving construction activities, users of the traffic and transport network and residents.	Prior to construction commencing
Water Resources	Solar panels will be designed to provide a minimum of 300 mm freeboard for the lowest edge above the maximum 1% AEP flood level.	Design
	Solar panel piles will be designed to withstand the 1% AEP flood velocities expected in the Project Area.	Design
	No sensitive infrastructure (e.g., substation, BESS, etc.) will be placed within 20 m of any Strahler 3 or above order streams.	Design
	All waterway crossings will be designed and constructed in compliance with DPI Water Guidelines.	Design and Construction
	Further flood investigations will be carried out where required during detailed design to confirm the flood immunity objectives and design criteria for the Project are met.	Design
	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.	Prior to construction commencing
	Debris will be cleared from fencing following flood events.	Construction and Operation
	An Operational Environmental Management Plan (OEMP) will be developed for the Project to address potentially adverse impacts on the receiving environment surface water quality during the operational phase. This will include the development and appropriate maintenance of suitable ground cover around solar panels, and grassed table drains near access tracks to minimise the potential for erosion and export of sediment. Additional measures for the treatment of stormwater quality are not considered necessary.	Operation
	Water sources would be confirmed during the detailed design phase and in consultation with suppliers and landholders and be subject to availability.	Design
	Post-construction, disturbed areas will be stabilised by the establishment and maintenance of a vegetated groundcover consisting of low-growing grasses.	Prior to construction commencing

Aspect	Management/Mitigation Measure	Timing
	Road repairs and upgrades to Ringwood Road and culvert upgrades will include: • Appropriate scour protection will be designed for the road repairs and culvert upgrades • Road and culvert upgrades will be designed to maximise afflux at an acceptable level • Culverts will be designed to accommodate a 5% AEP event • Culverts will be constructed at existing invert levels or similar to maintain low flow conveyance in channel.	Prior to construction commencing
Hazard, Risk and Bushfire Threat	Lightsource bp will implement a range of technical and non-technical risk mitigation and management measures including rigorous design standards and maintenance practices. Compliance with HIPAP 4 criteria is conditional on these technical and non-technical risk mitigation and management measures being implemented.	Design
	Electrical transformers to be designed, installed, operated and maintained in accordance with relevant Australian Standards.	Construction and Operation
	A Final Hazard Analysis, Fire Safety Study and Emergency Plan will be developed as the Project design progresses toward completion to ensure the final Project design adheres to the risk management measures outlined in the PHA and that the separation distances to the site boundary/involved dwellings are appropriate for the specific battery cell type (i.e. chemistry and capacity) to be used.	Prior to construction commencing
	Asset protection zones will be implemented and maintained for the life of the Project.	Construction and Operation
	Roads and access points will be maintained throughout the Project life to allow for safe and accessible travel for emergencies (if required).	Construction and Operation
	An appropriate dedicated water supply for bushfire protection will be provided.	Construction and Operation
	All project infrastructure will be designed in accordance with relevant industry standards to manage any EMF risks.	Design
	All relevant procedures in relation to a high voltage installation will be adhered to throughout the life of the Project.	Construction and Operation
	Public access will be restricted throughout the life of the Project.	Construction and Operation

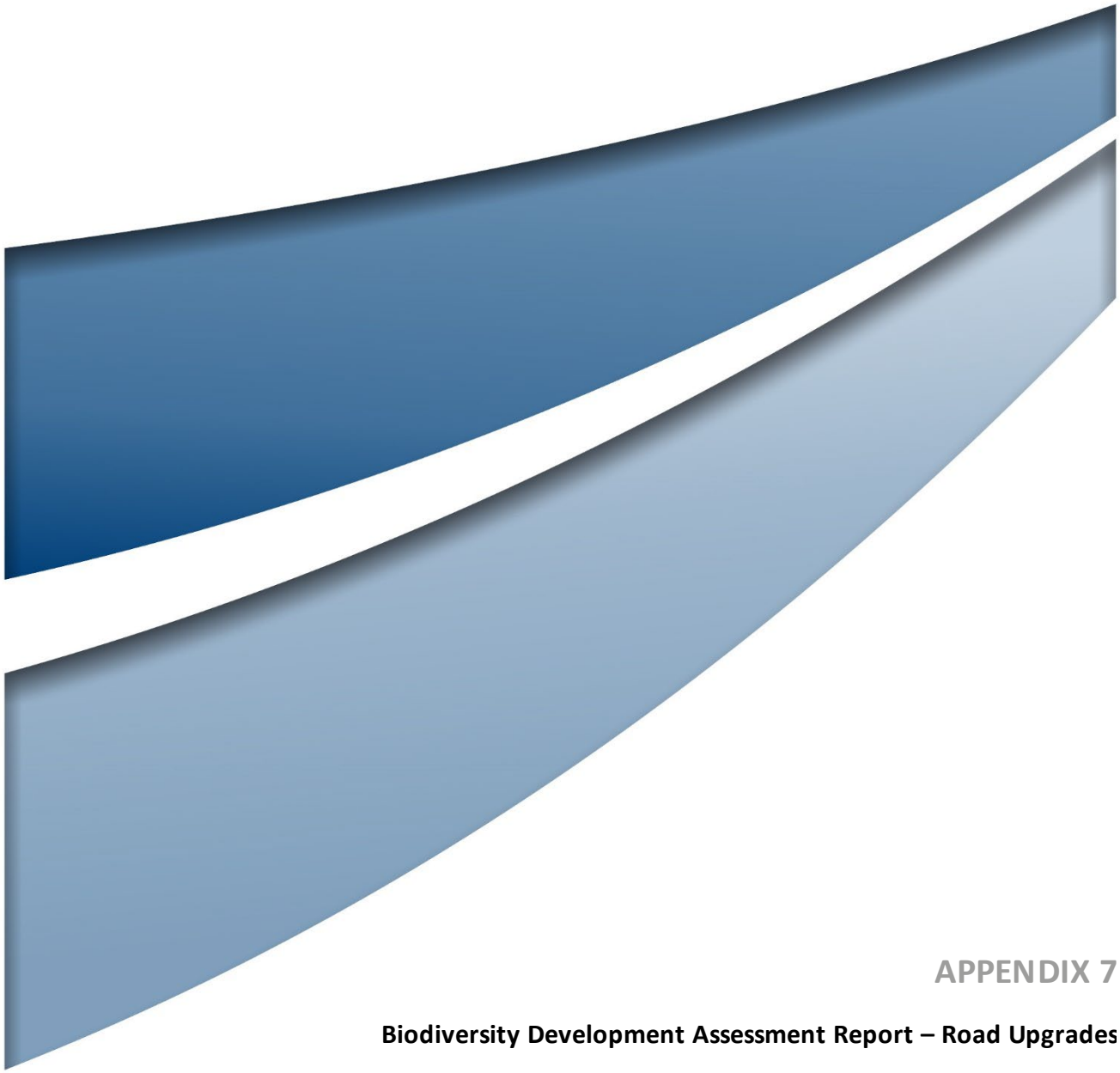
Aspect	Management/Mitigation Measure	Timing
Social Amenity	A Social Impact Management Plan (SIMP) will be prepared and implemented for the Project to manage and enhance social impacts through each stage of the Project.	Prior to construction commencing
	A Community Engagement Strategy will be prepared for the Project to include consistent, transparent and proactive information provision and consultation with stakeholders throughout Project development.	Prior to construction commencing
	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.	Prior to construction commencing
	An 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.	Prior to construction commencing
Economic	Lightsource bp will prepare an Accommodation, Procurement and Employment Strategy (APAES) for the Project in consultation with relevant stakeholders, including: • measures to ensure there is sufficient accommodation for the workforce associated with the construction phase of the Project • measures to address any specific cumulative impacts arising associated with other State significant development projects in the area • measure to prioritise the employment of local workers and the procurement of local businesses for the construction and operation of the Project • a program to monitor and review the effectiveness of the strategy over the life of the Project.	Prior to construction commencing
	A Community Benefits Sharing Strategy will be developed and implemented for the Project including a Community Fund to be available to the wider community.	Prior to construction commencing

Aspect	Management/Mitigation Measure	Timing
Waste Management	Lightsource bp will prepare a Waste Management Plan, which will include a detailed breakdown of the waste types and quantities in accordance with relevant with relevant legislation and guidelines. Waste will be reused and recycled in accordance with a waste management hierarchy. The waste management plan will include the following: • a summary of the waste types, classification and estimated annual quantities of wastes produced during the construction of the Project • measures to manage waste disposal in accordance with the principles of the waste hierarchy, with emphasis on reducing, reusing and recycling wastes prior to disposal • the procedure for assessing, classifying and storing waste in accordance with EPA guidelines • procedures for storage, transport and disposal of waste • monitoring, record keeping and reporting, including the use of waste tracking data to demonstrate the lawful disposal of contaminated products, waste or residues generated by the Project (if any).	Construction
	Management of wastes generated during the operational phase of the Project will occur through a Waste Management Plan as part of the OEMP.	Operation
	A Decommissioning and Rehabilitation Management Framework has been prepared for the Project to demonstrate a commitment to ensuring appropriate environmental management is undertaken during decommissioning and rehabilitation phase in accordance with legislative requirements, conditions of consent, stakeholder interest and industry best practice. The Framework will be updated throughout the life of the Project as appropriate.	Decommissioning
Air Quality	As part of the CEMP, protocols to minimise air emissions during construction will include: • water suppression on all exposed areas, unsealed rads and stockpile area when required (i.e. if visible dust emissions are observed) • the location and scale of activities which generate dust emissions would be modified and limited during periods of dry and windy weather • engines to switch off when not in use for prolonged periods • development of a complaints procedure to identify and respond to complaints.	Construction
	Areas within the Project Area which have been temporarily disturbed by construction and operational activities will be rehabilitated.	Construction and Operation
	Once construction has been completed, ground cover will be established and maintained in accordance with the OEMP.	Operations



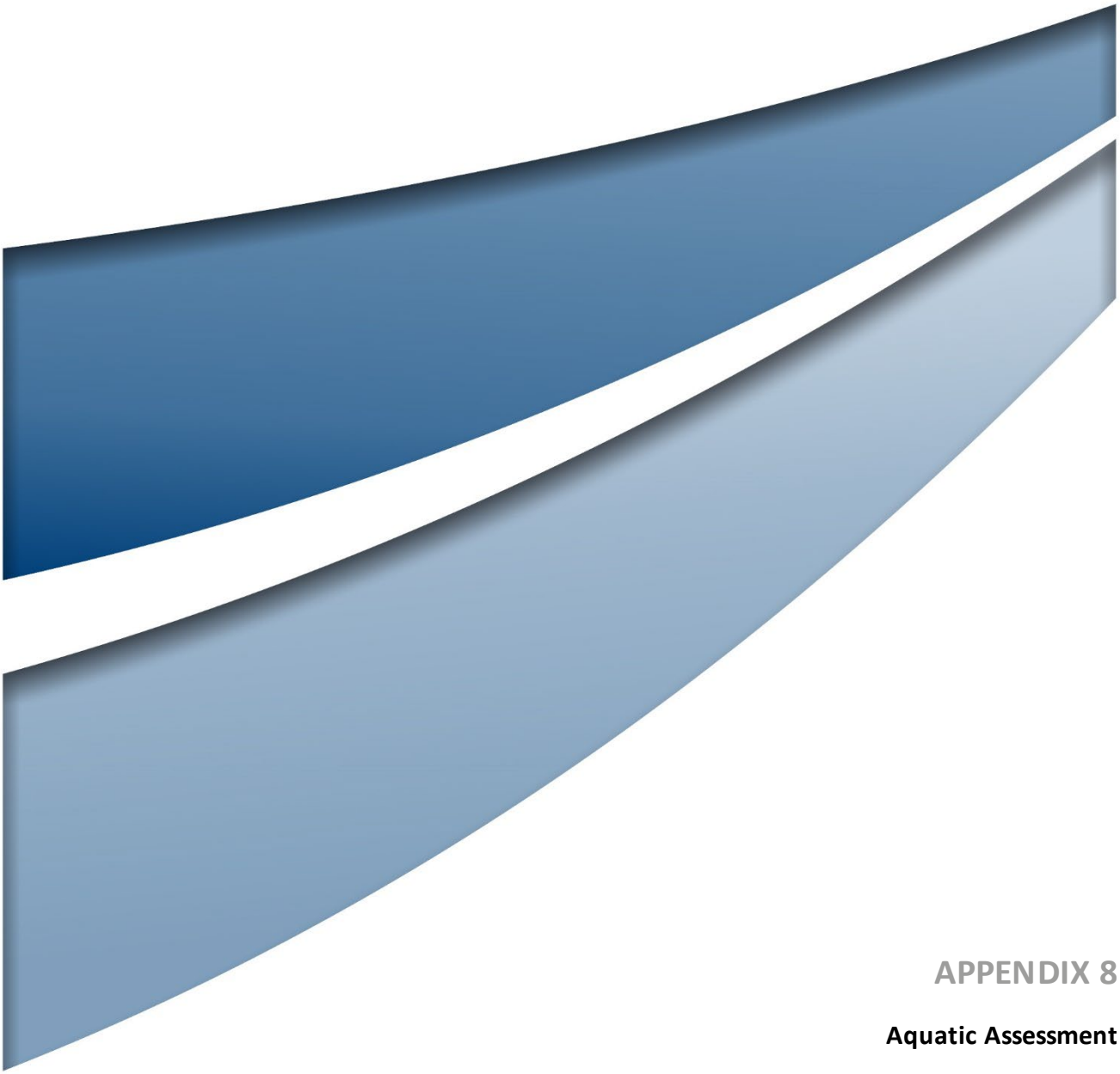
APPENDIX 6

Biodiversity Development Assessment Method – Solar Farm



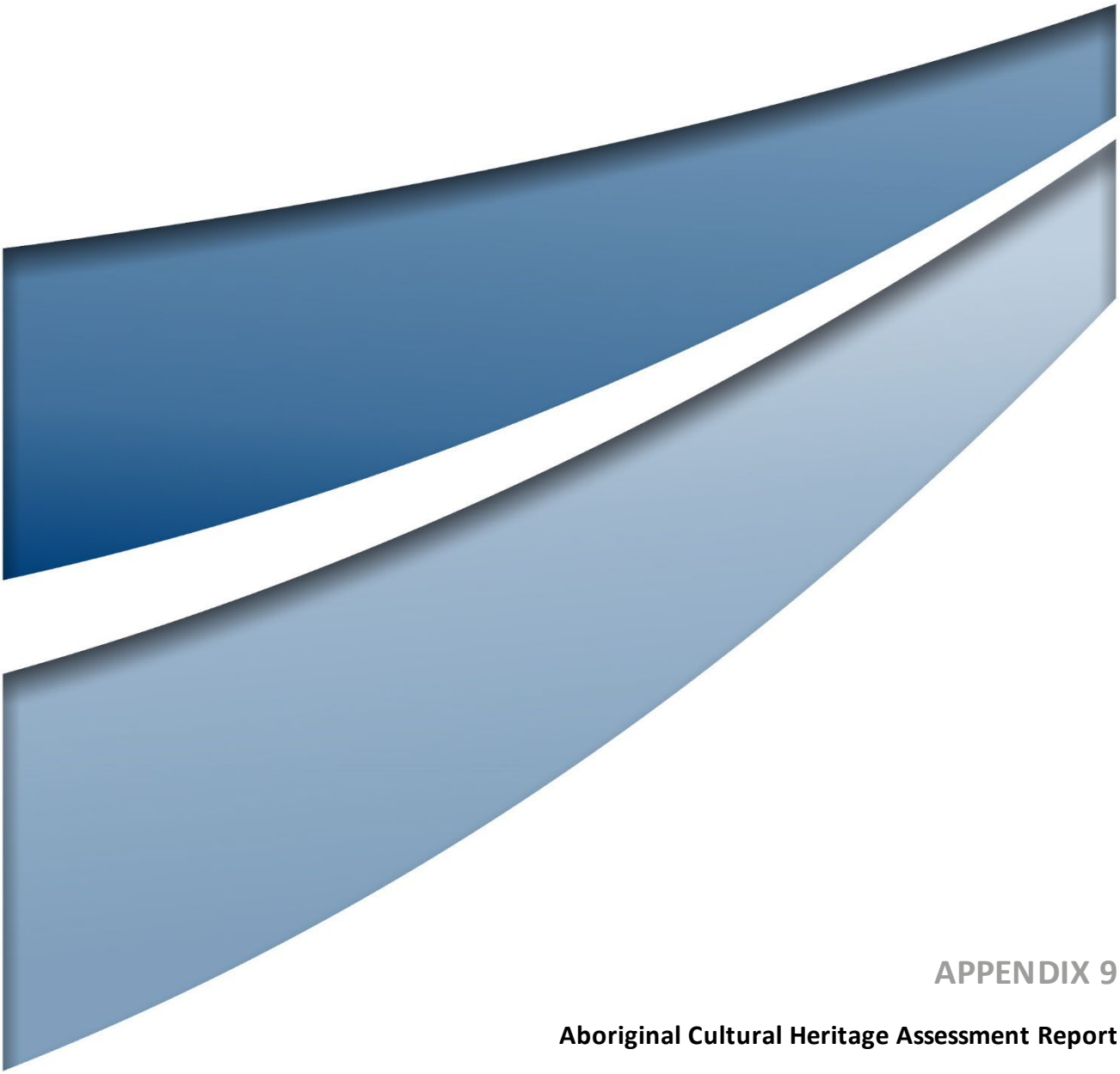
APPENDIX 7

Biodiversity Development Assessment Report – Road Upgrades



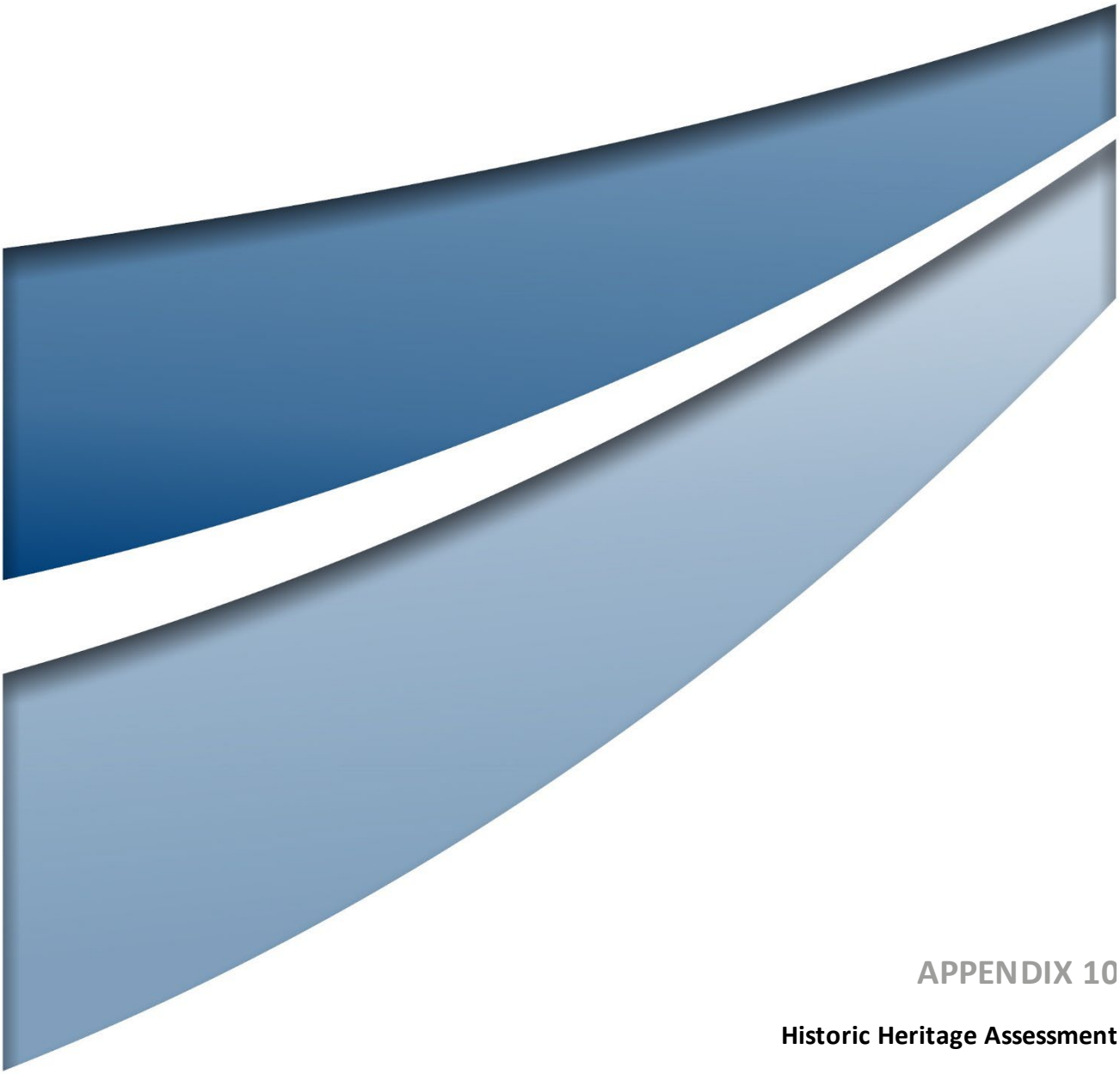
APPENDIX 8

Aquatic Assessment



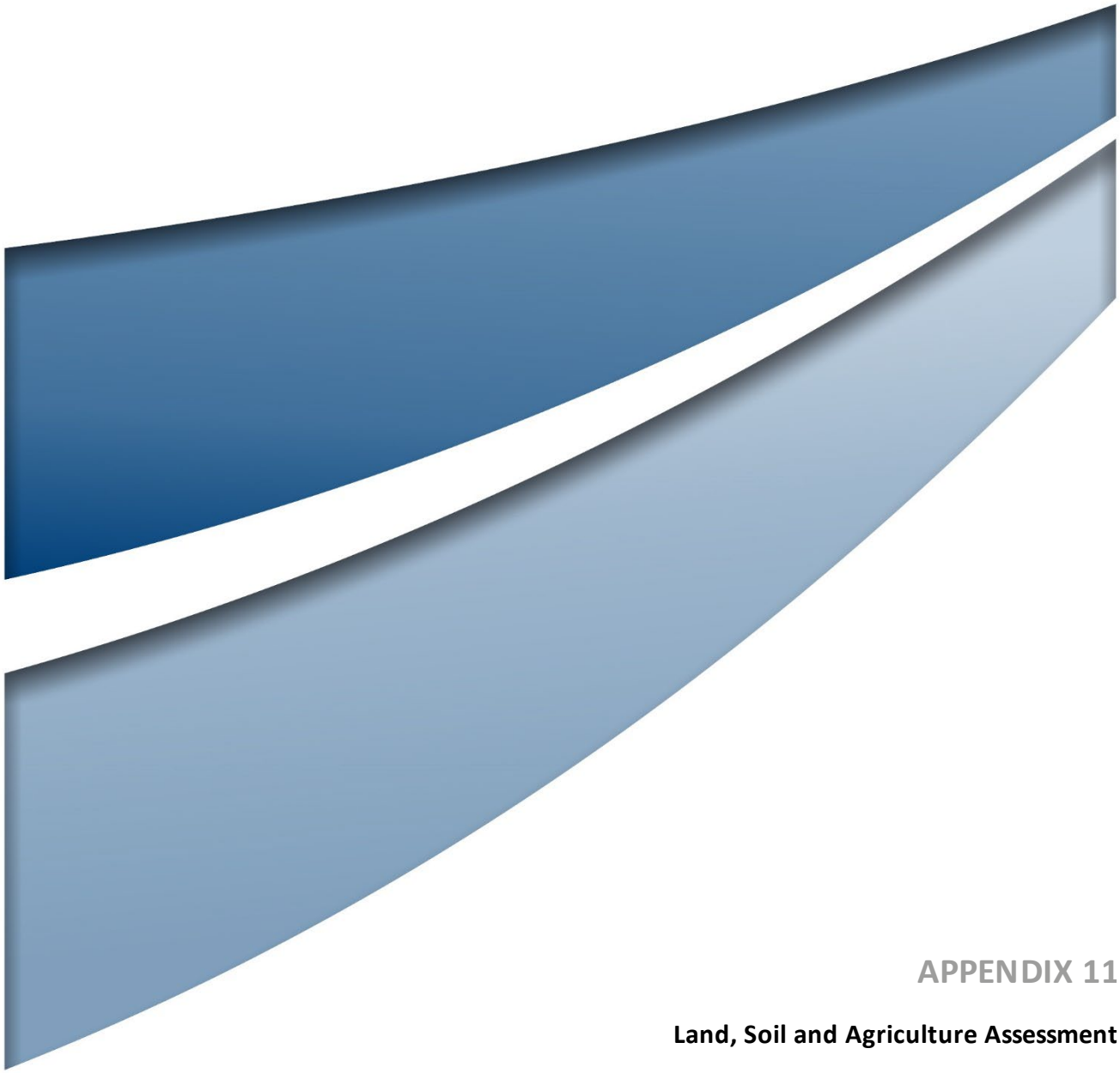
APPENDIX 9

Aboriginal Cultural Heritage Assessment Report



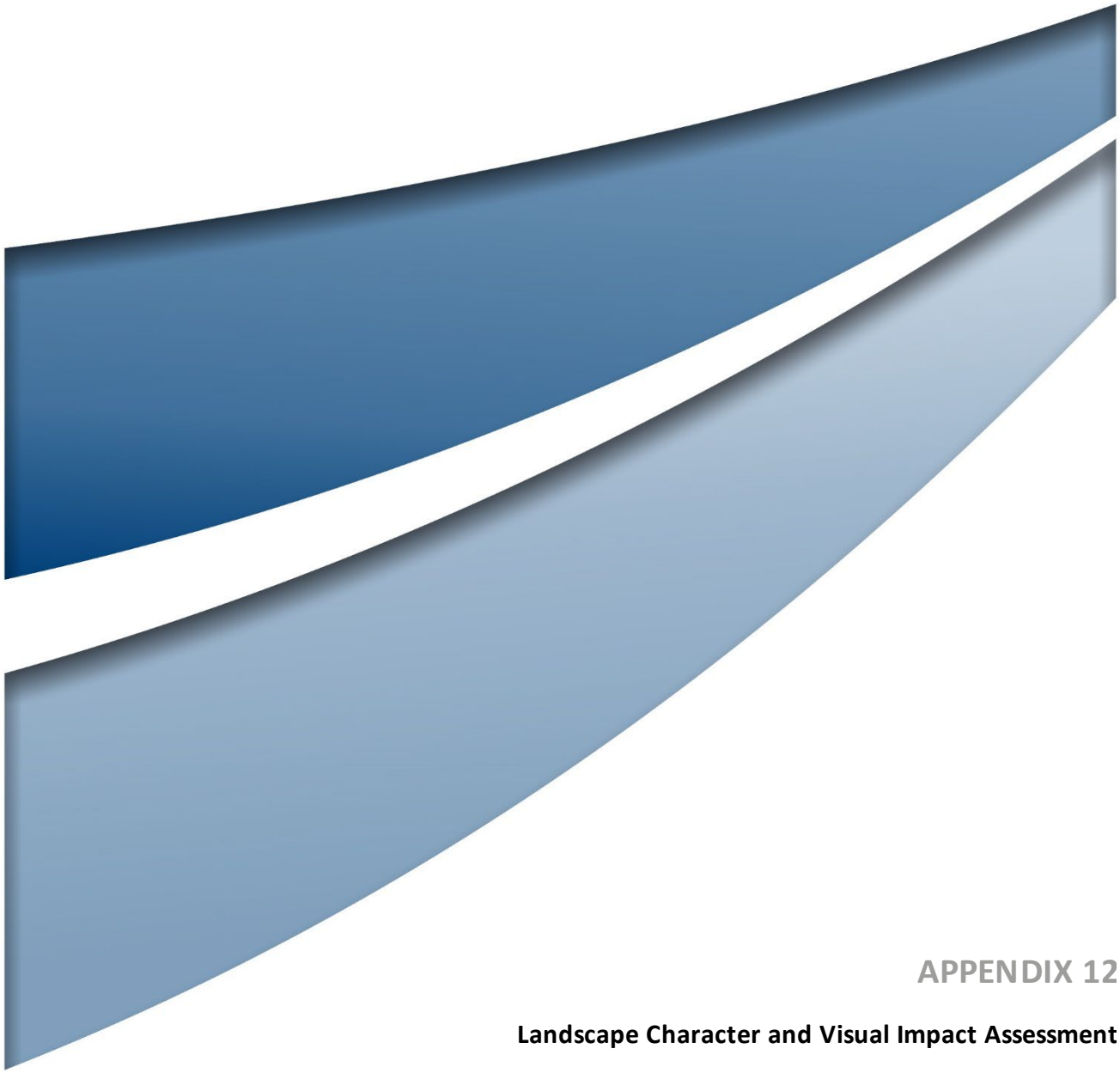
APPENDIX 10

Historic Heritage Assessment



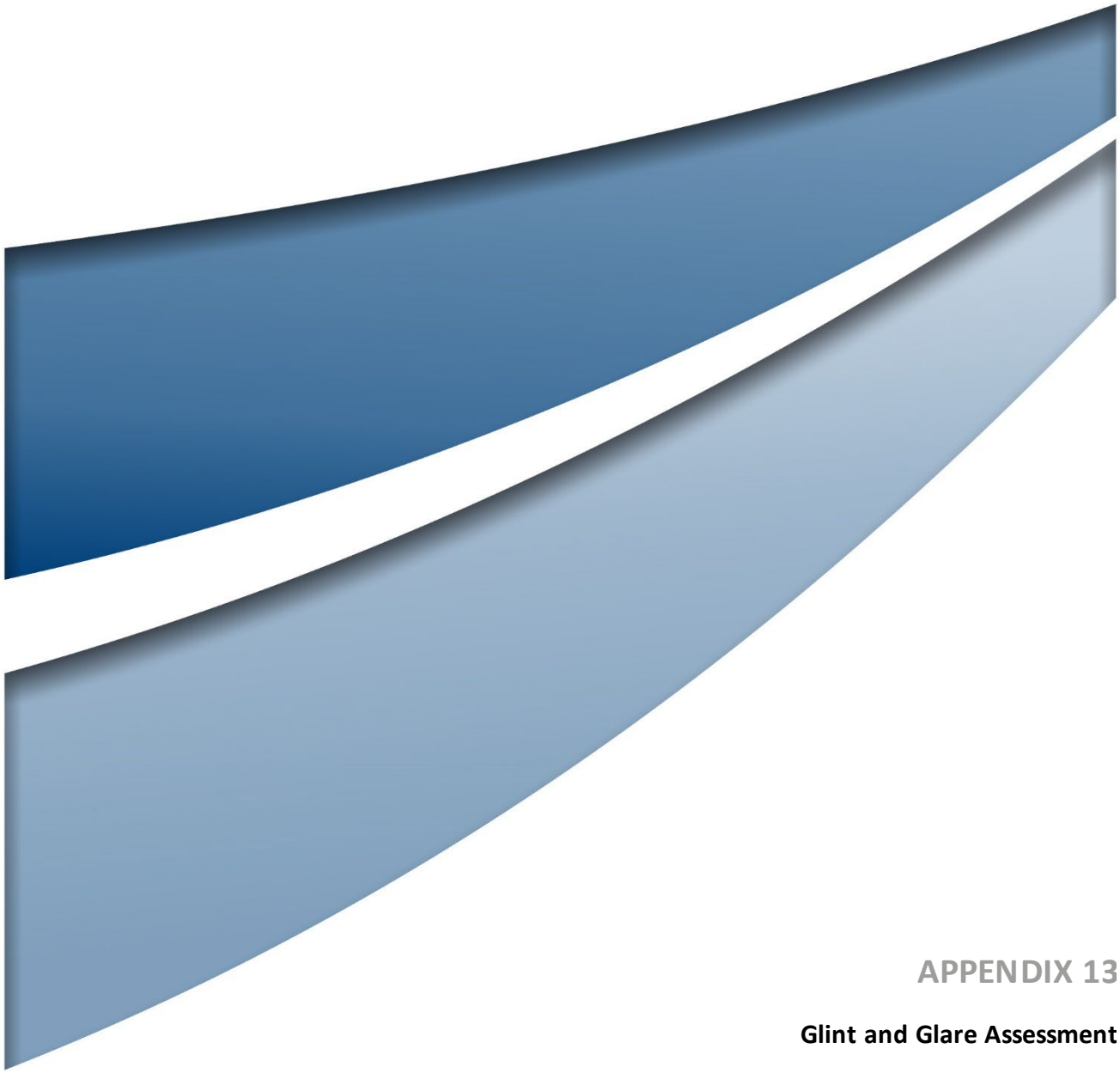
APPENDIX 11

Land, Soil and Agriculture Assessment



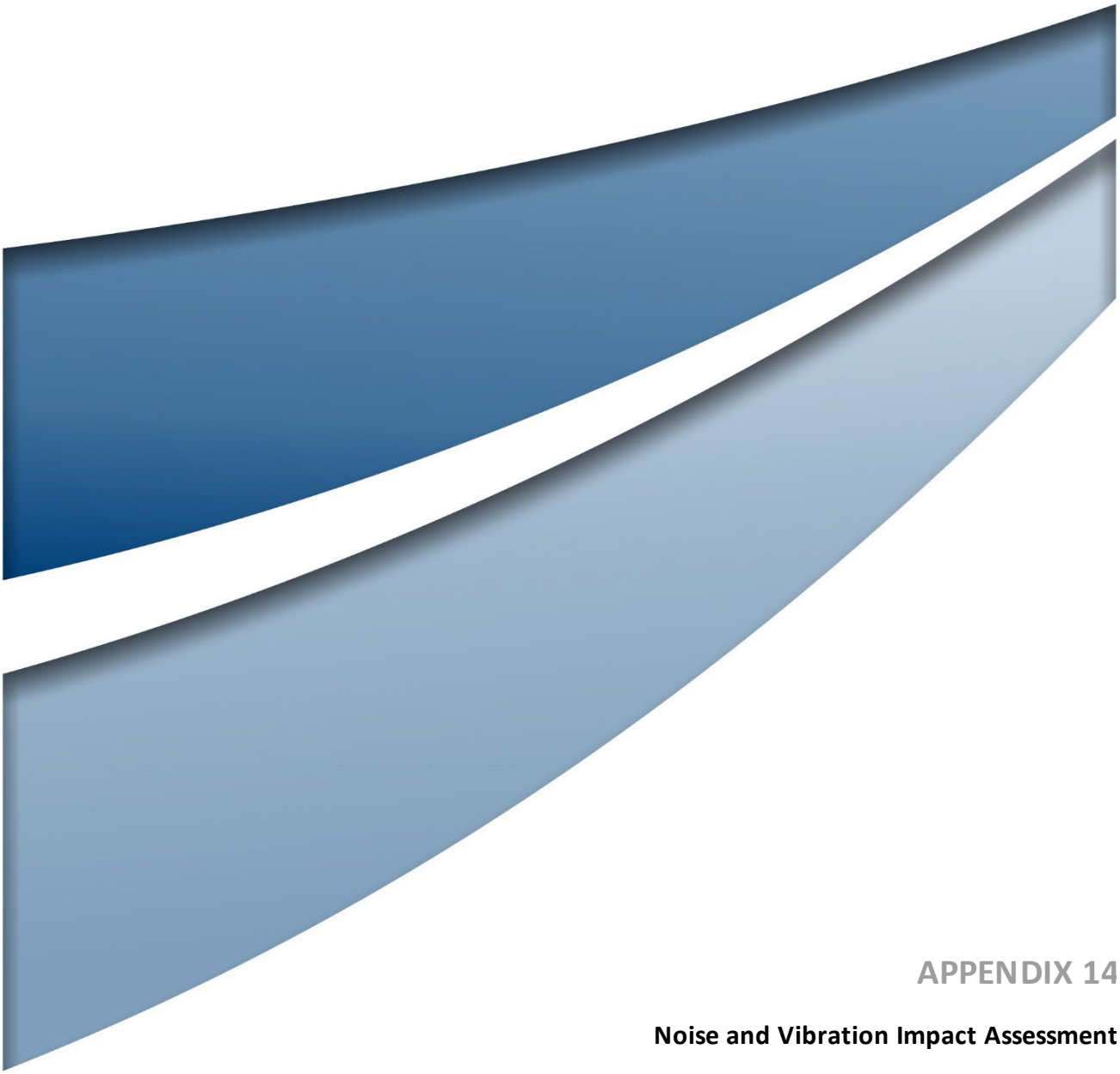
APPENDIX 12

Landscape Character and Visual Impact Assessment



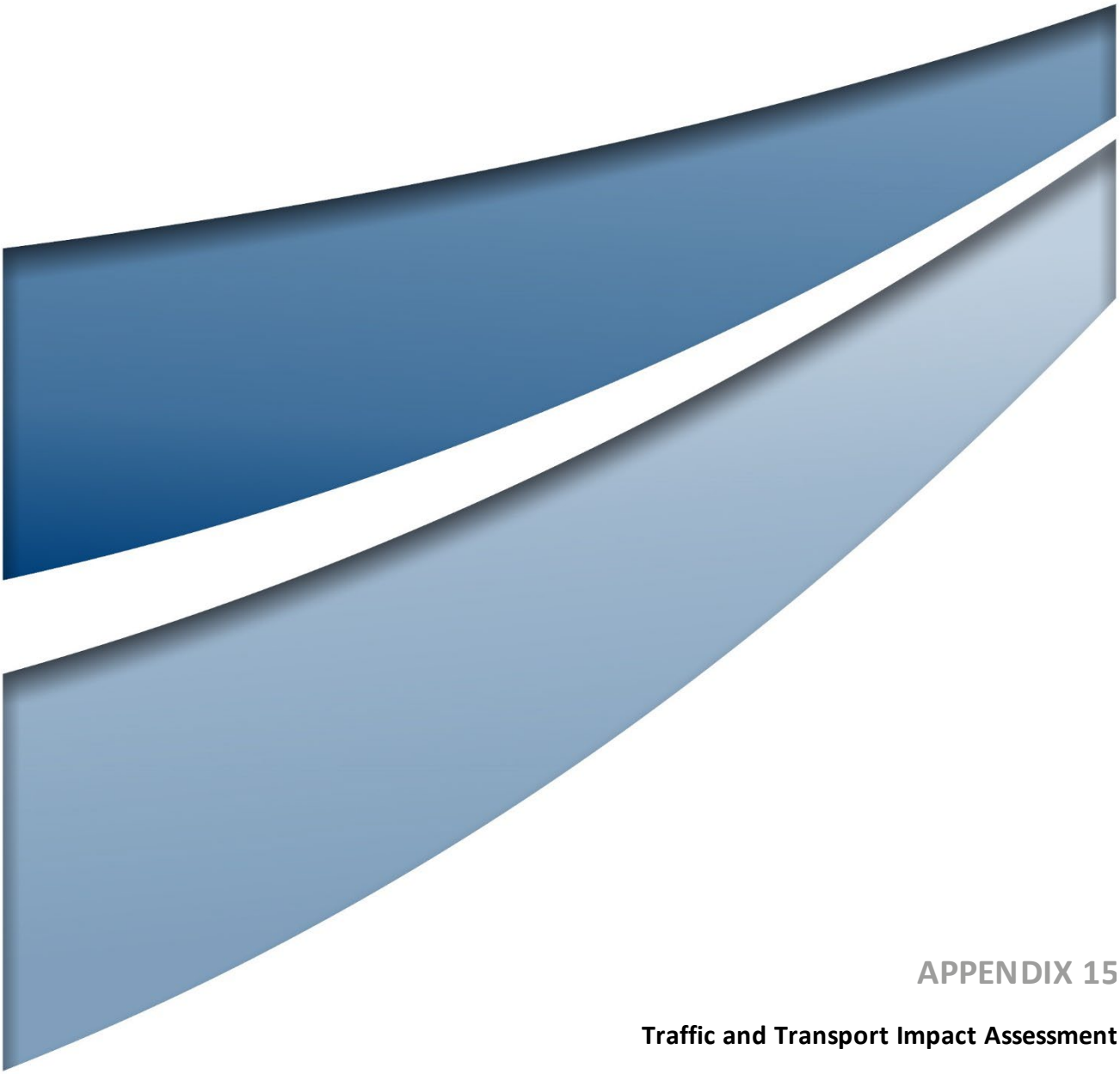
APPENDIX 13

Glint and Glare Assessment



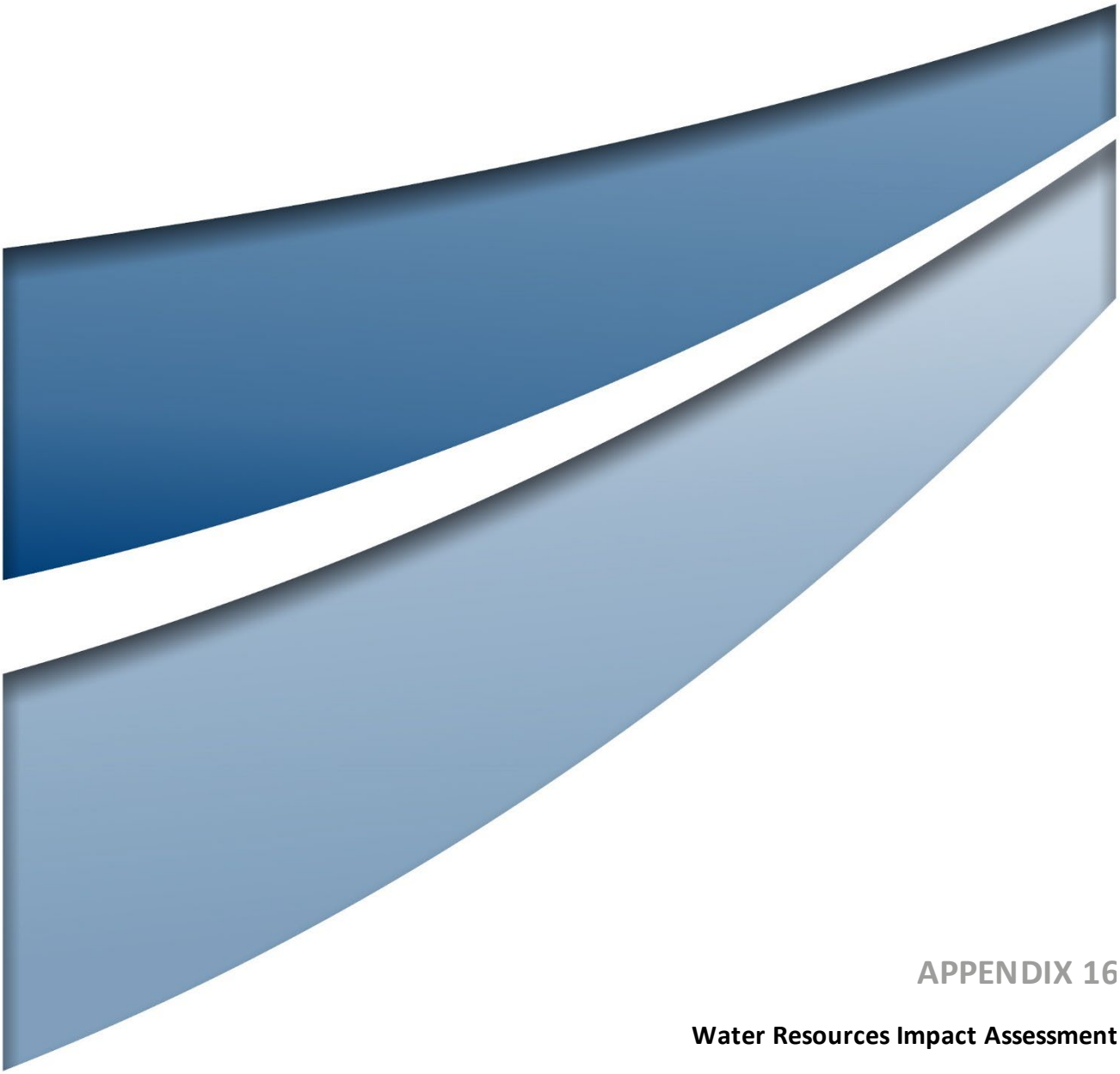
APPENDIX 14

Noise and Vibration Impact Assessment



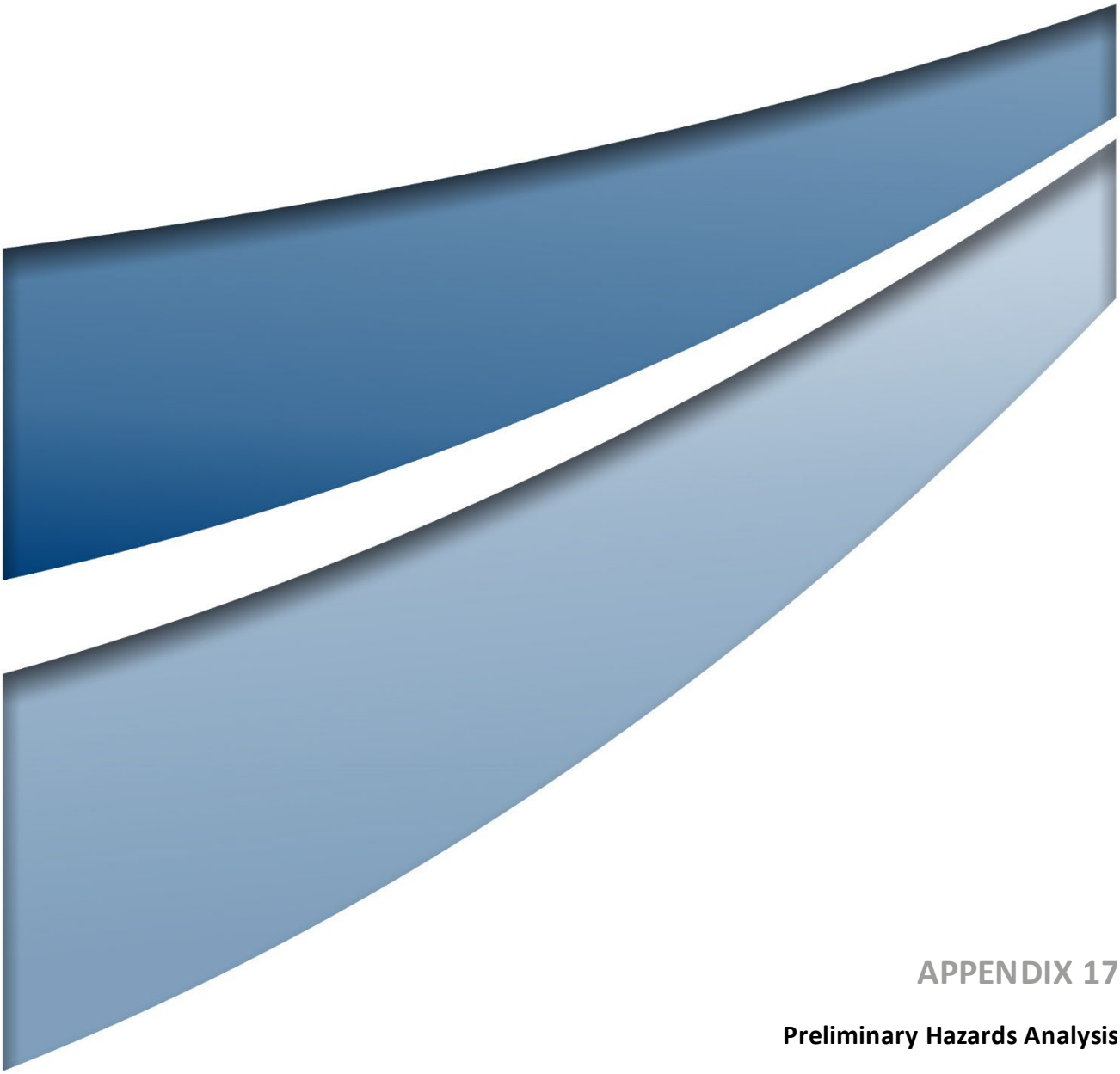
APPENDIX 15

Traffic and Transport Impact Assessment



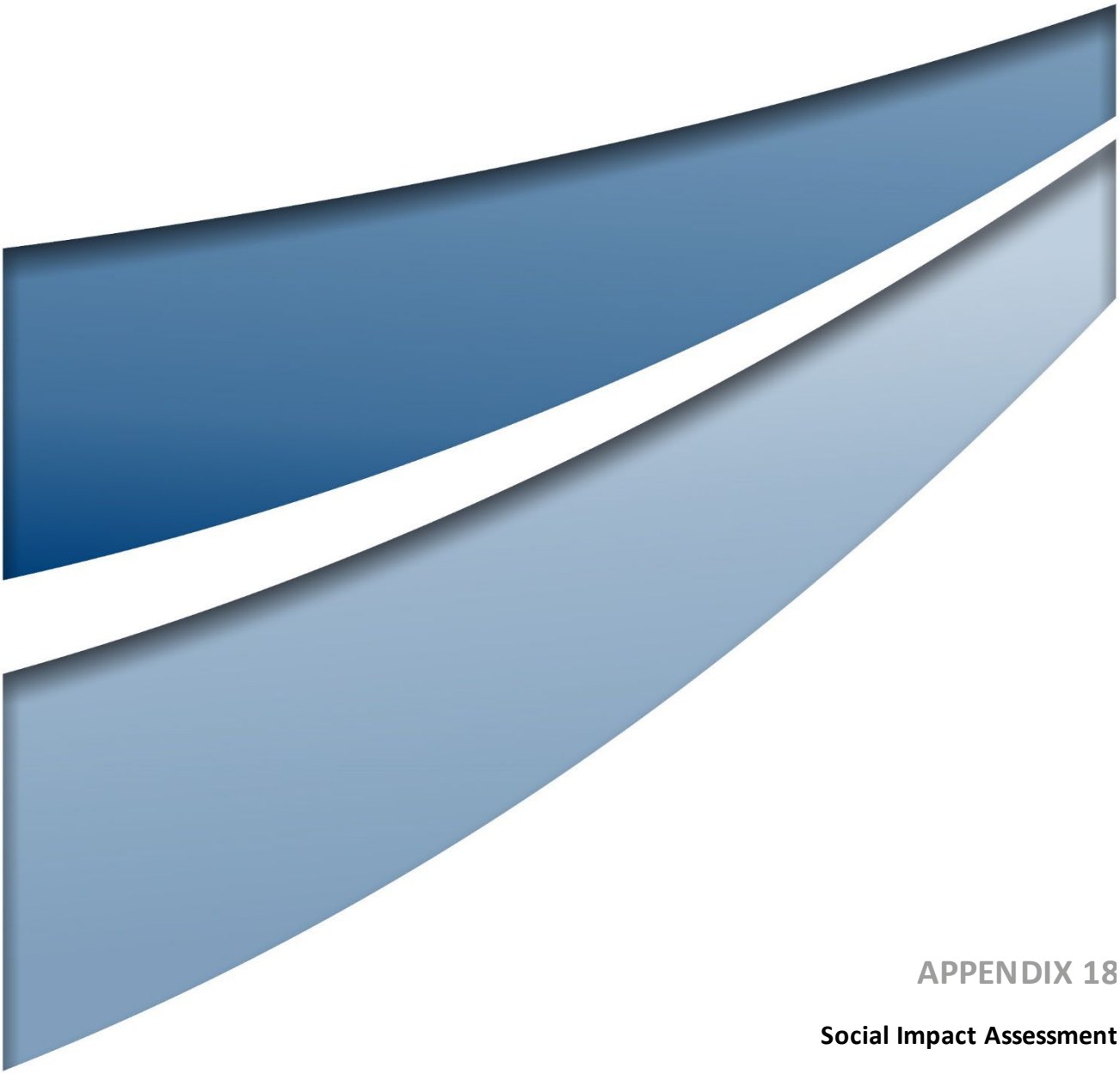
APPENDIX 16

Water Resources Impact Assessment



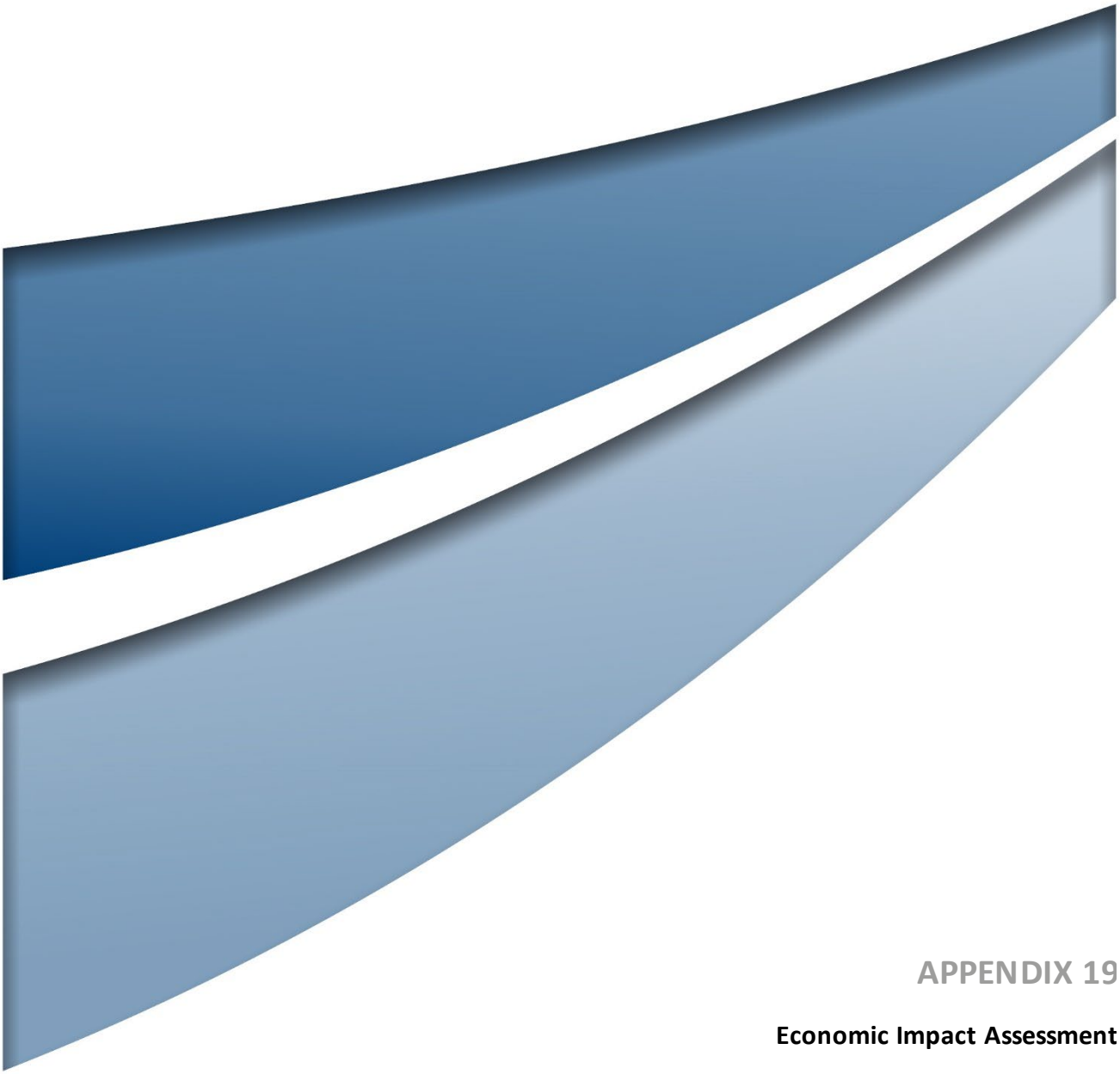
APPENDIX 17

Preliminary Hazards Analysis



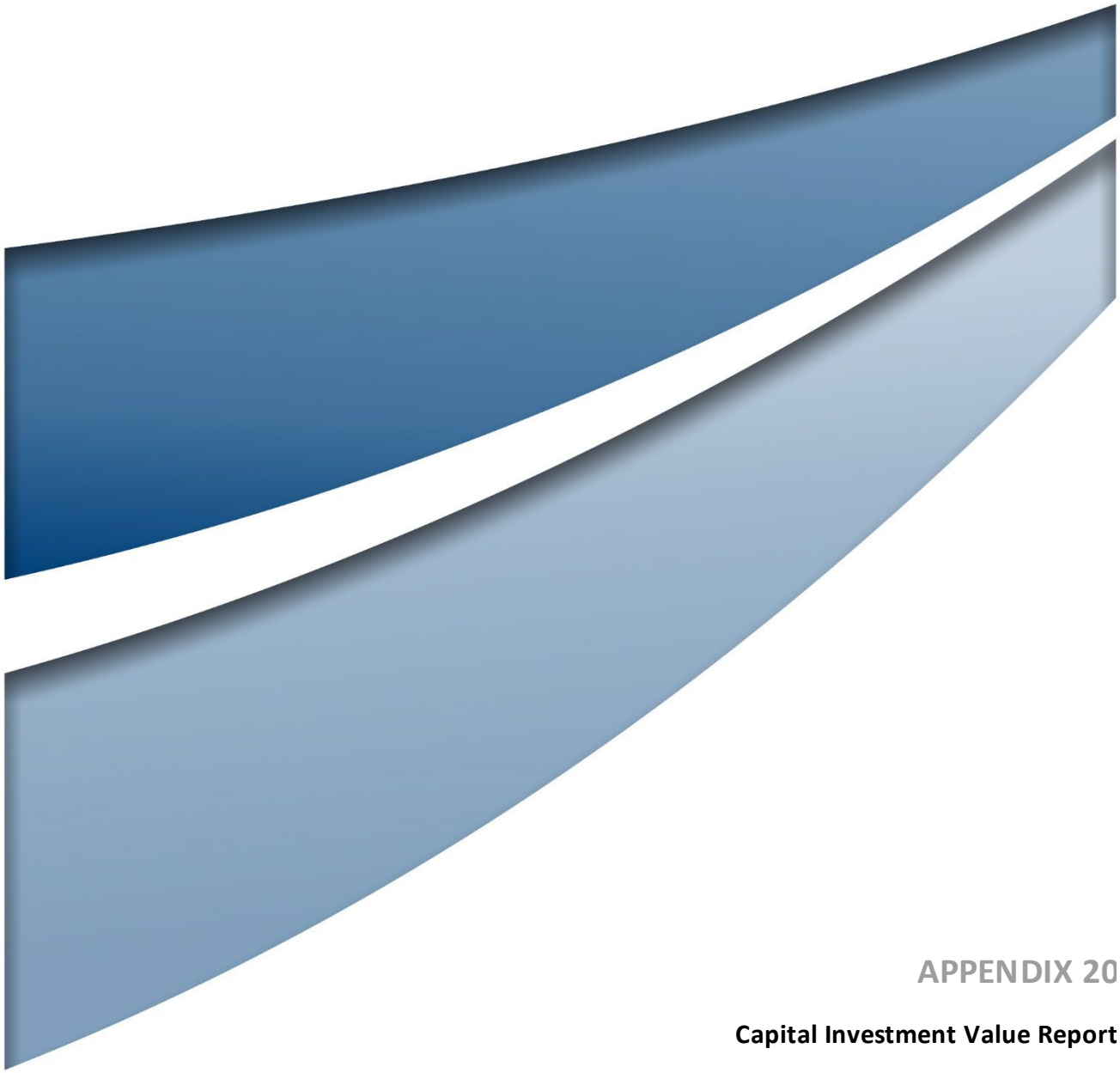
APPENDIX 18

Social Impact Assessment



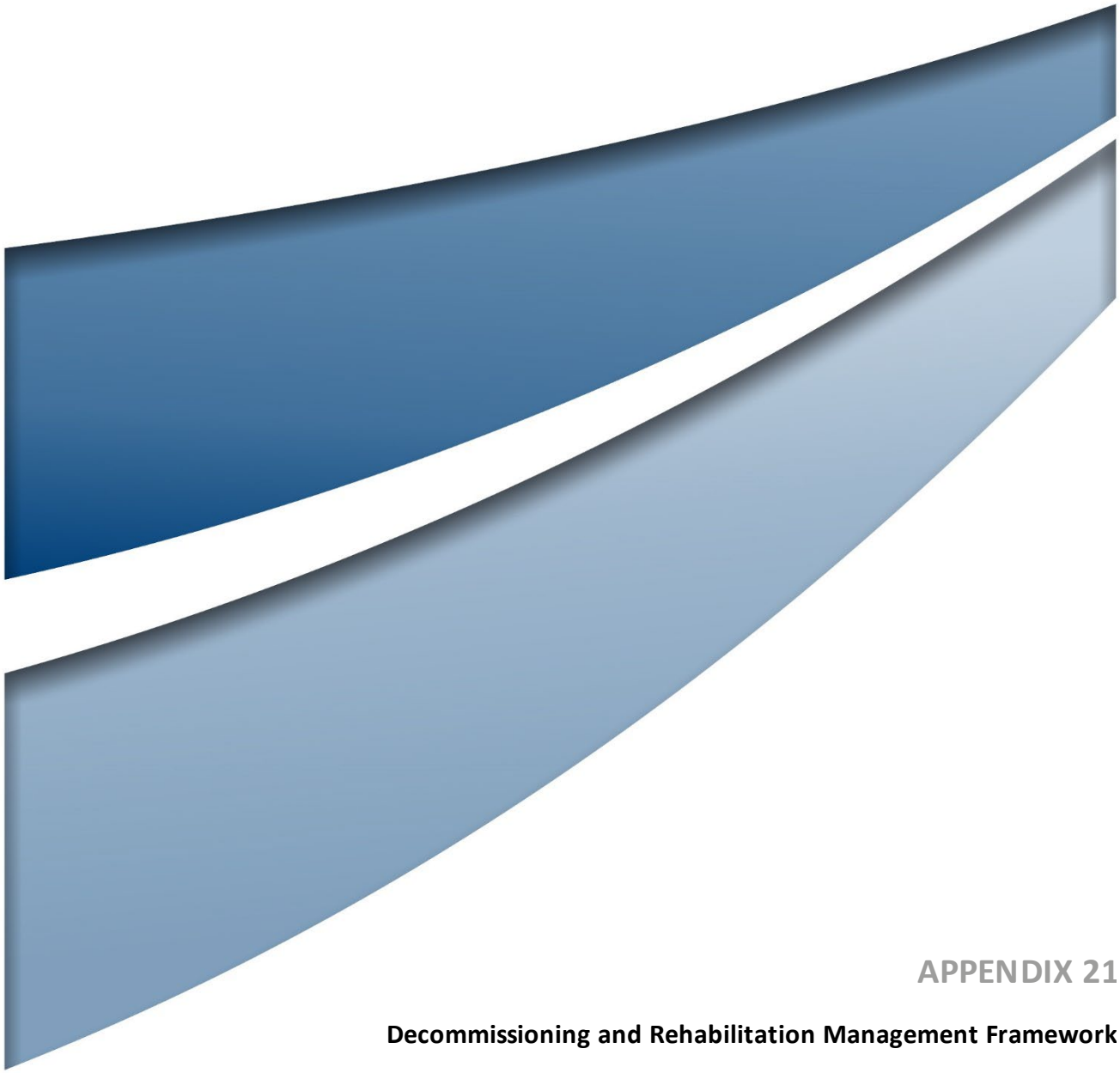
APPENDIX 19

Economic Impact Assessment



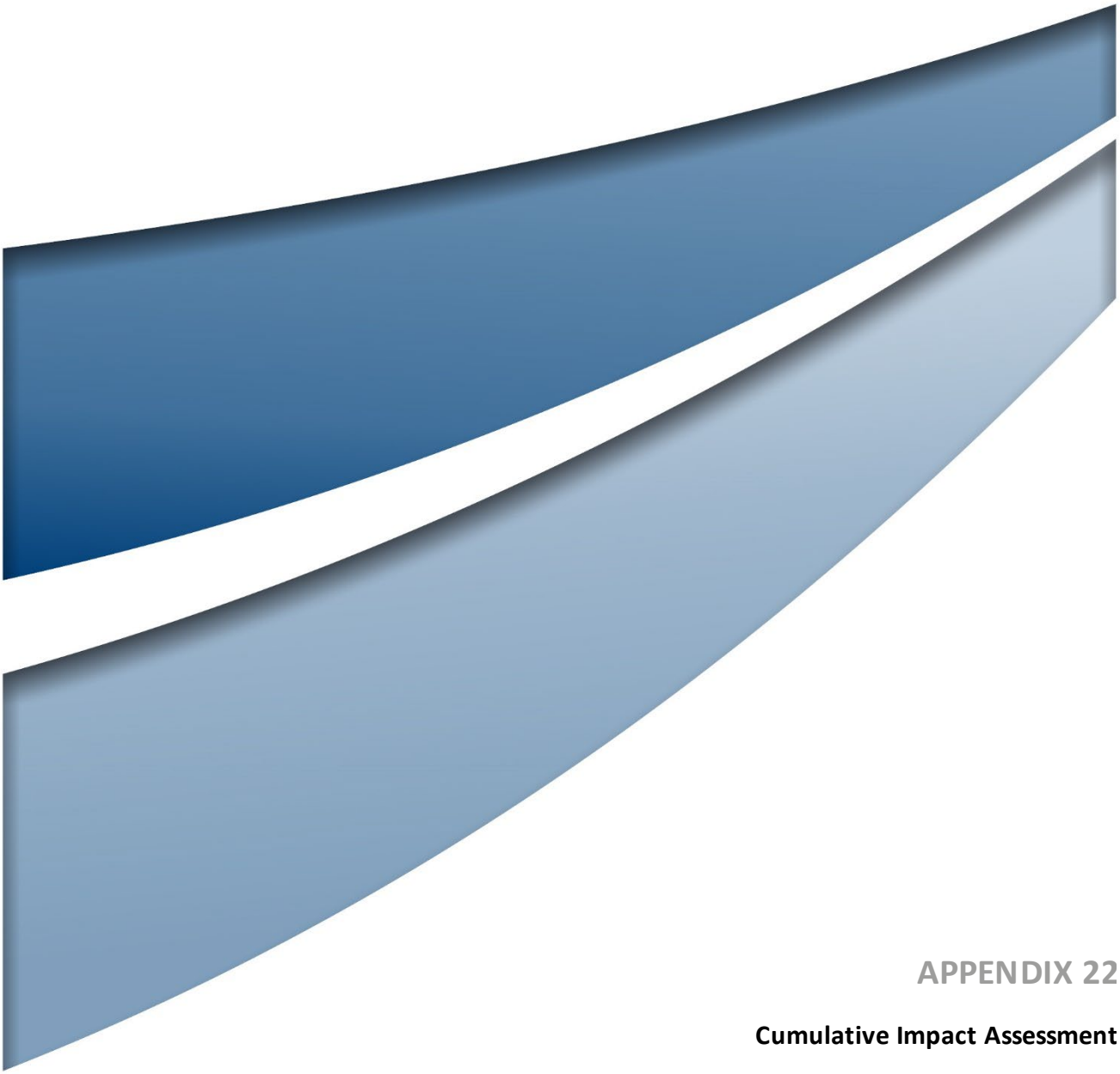
APPENDIX 20

Capital Investment Value Report



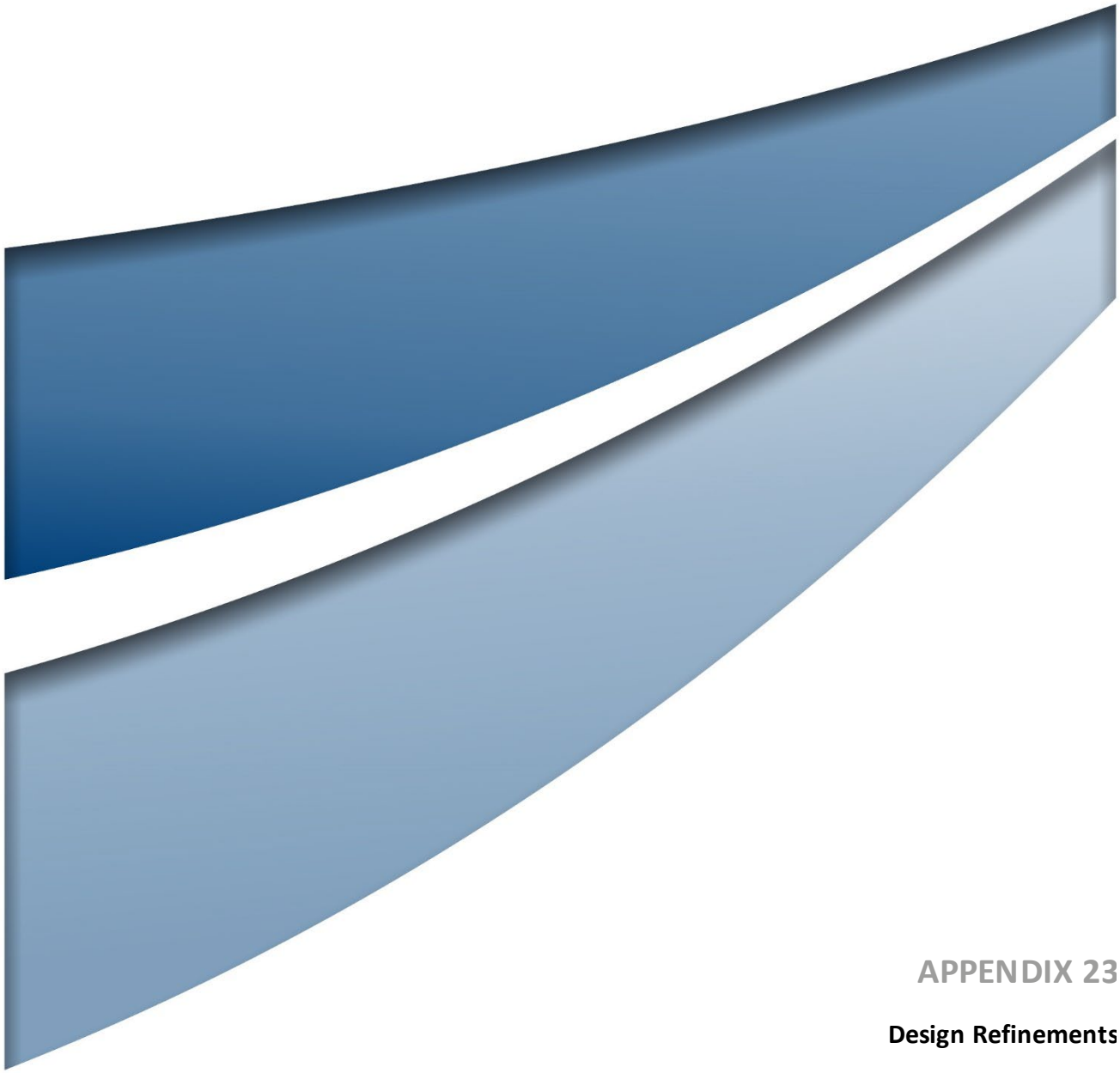
APPENDIX 21

Decommissioning and Rehabilitation Management Framework



APPENDIX 22

Cumulative Impact Assessment



APPENDIX 23

Design Refinements

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