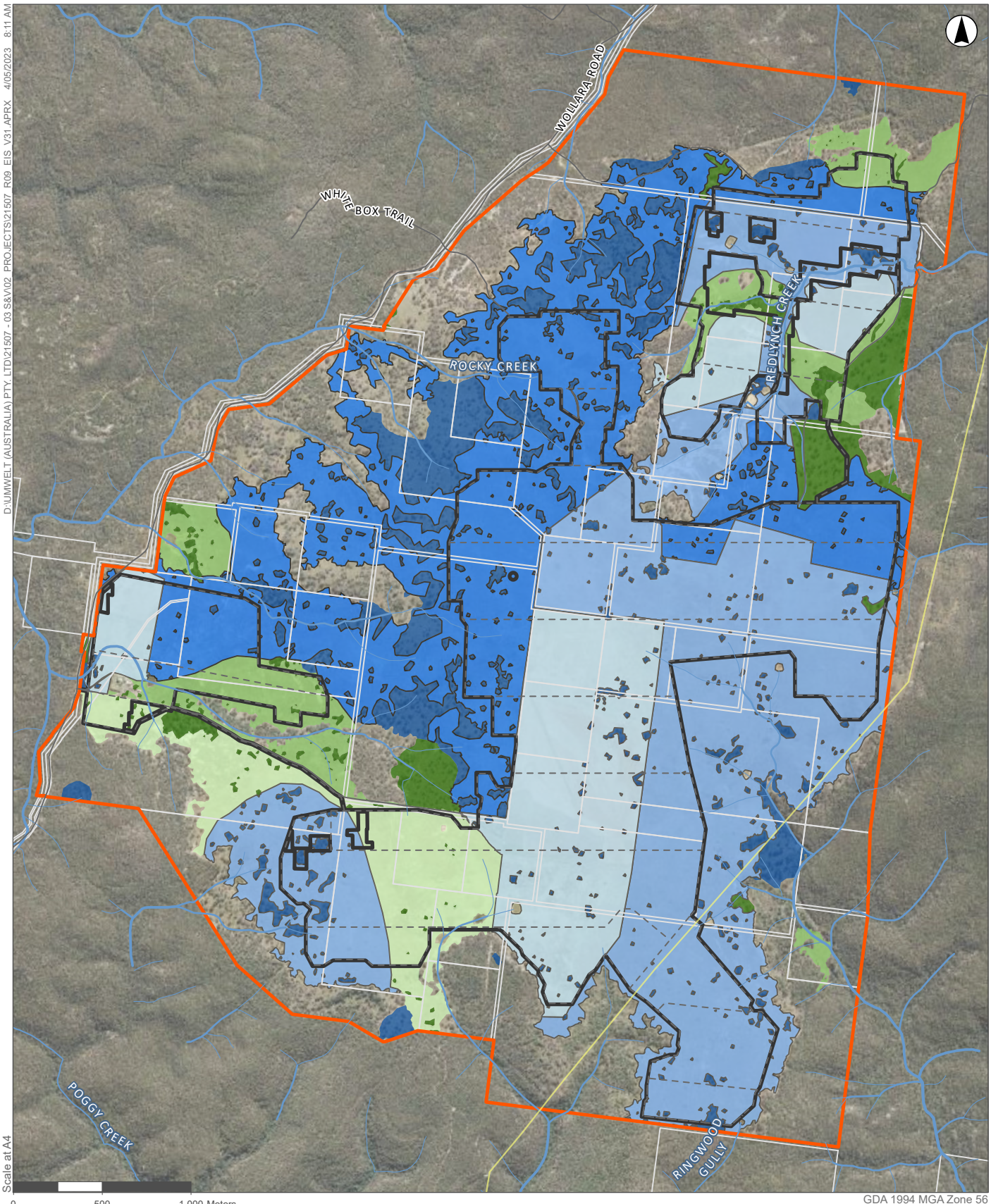
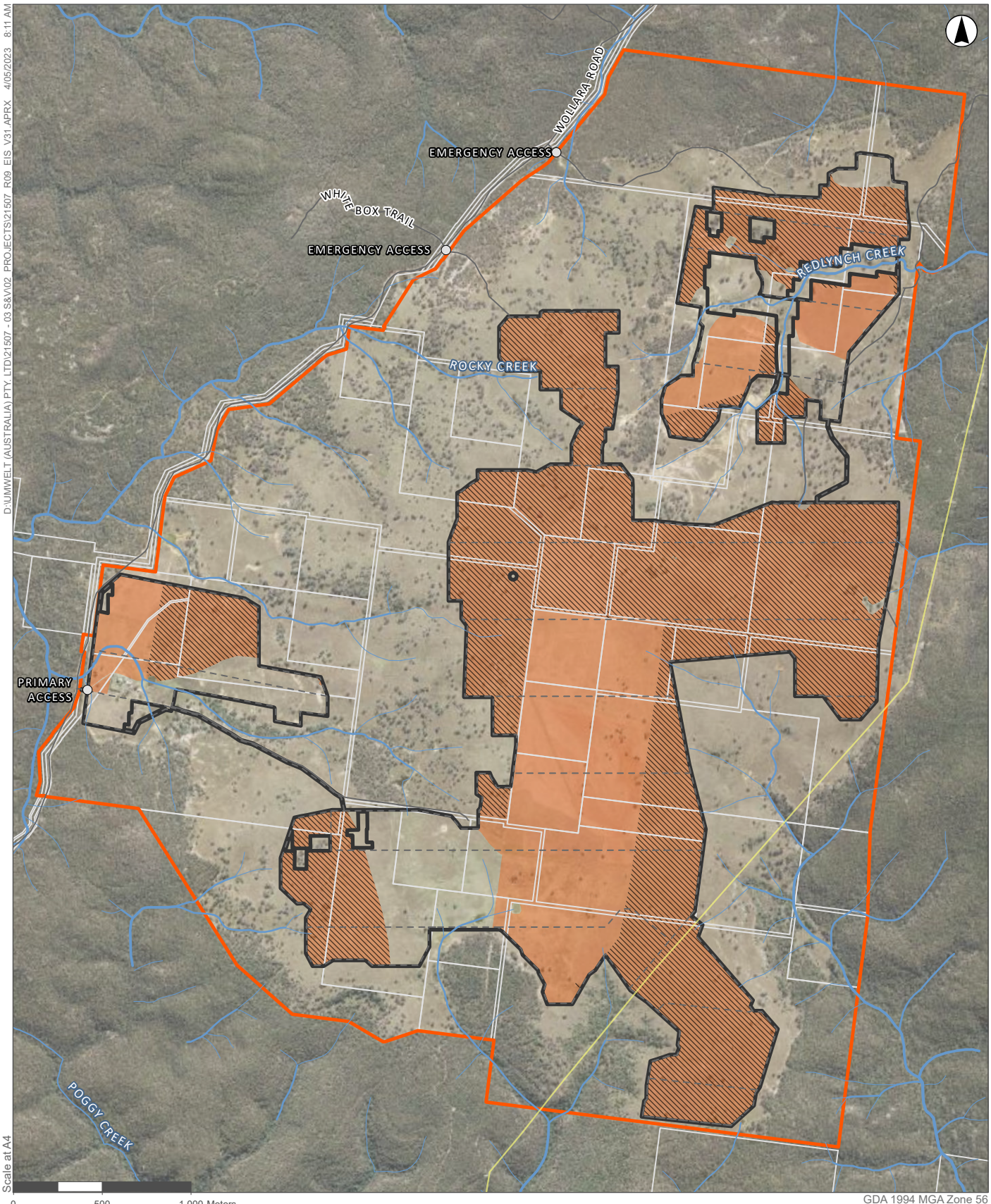


FIGURE 6.1

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**.

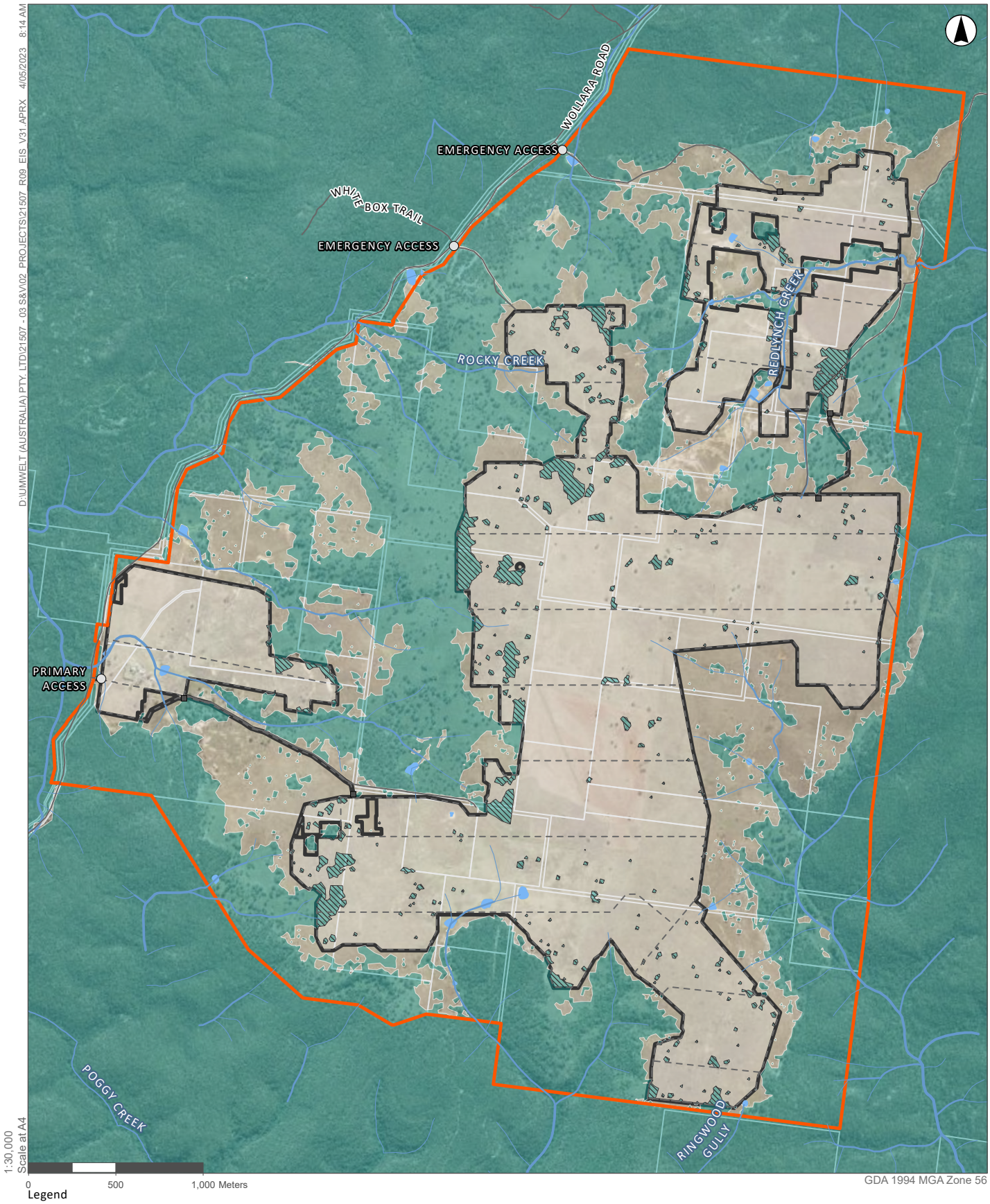
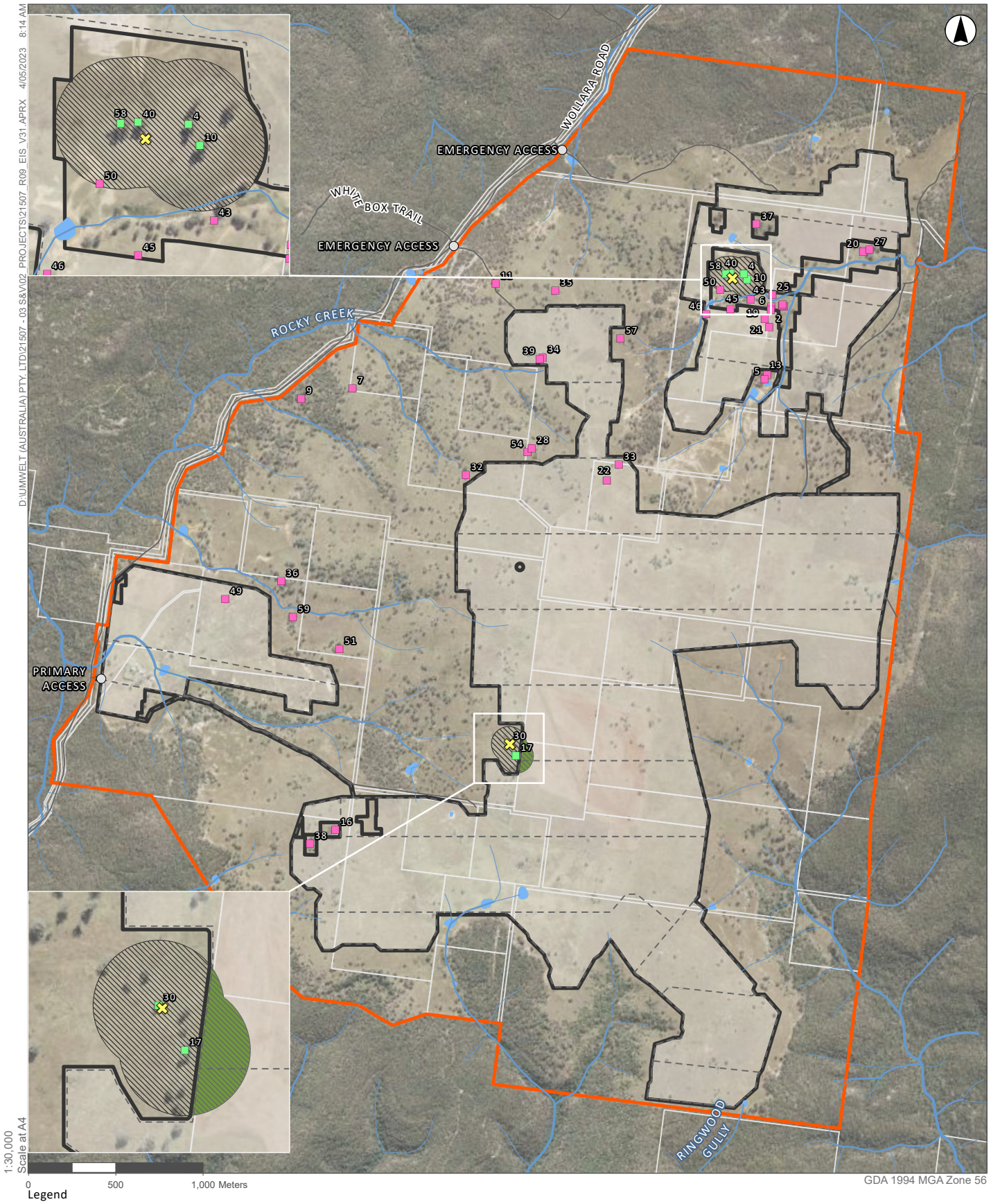


FIGURE 6.3

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:

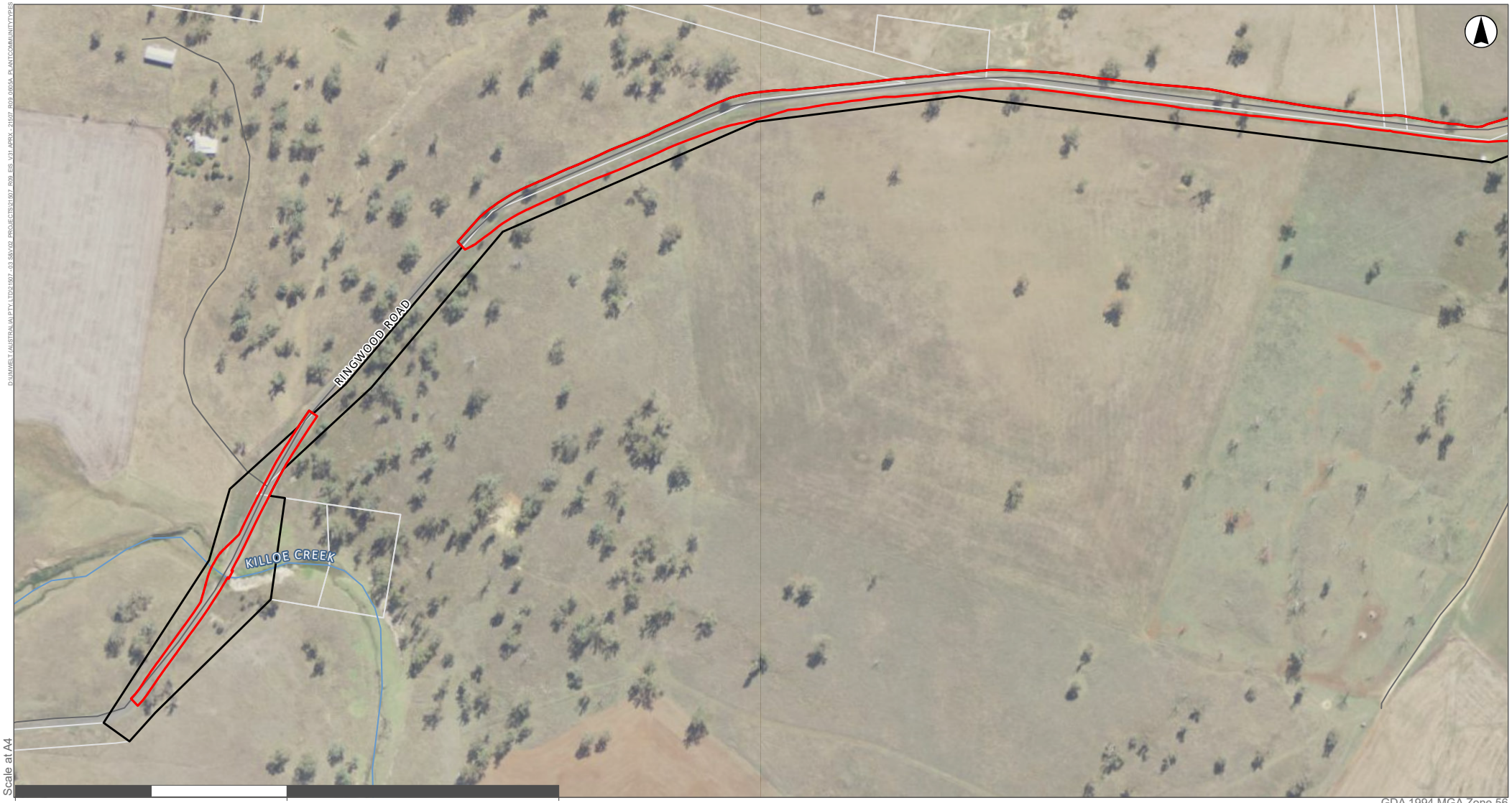
- PCT 483 Condition Zone 1 – Remnant woodland:
    - Consists of occasional scattered trees characterised by *Eucalyptus melliodora* with scattered occurrences of *Eucalyptus albens x moluccana* and *Angophora floribunda.*
- PCT 483 Condition Zone 2 – Exotic dominated grassland:
    - Consists of typically 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)

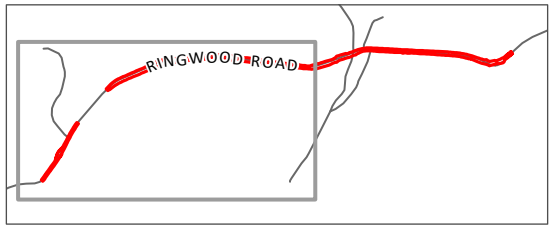


FIGURE 6.5 A

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)

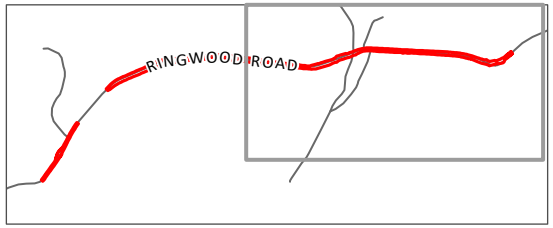
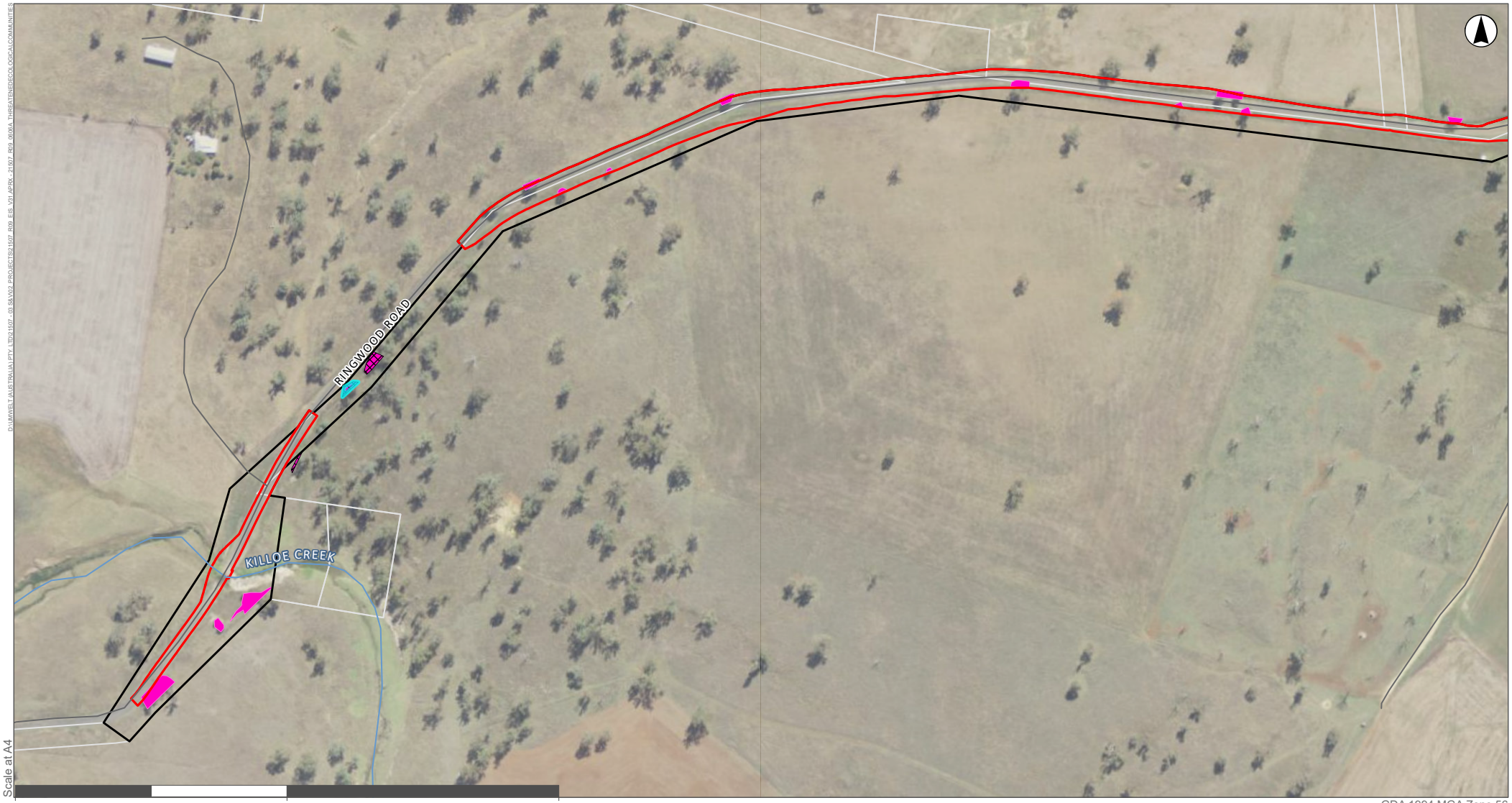


FIGURE 6.5 B

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

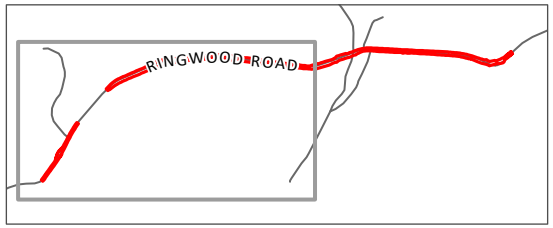


FIGURE 6.6 A

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

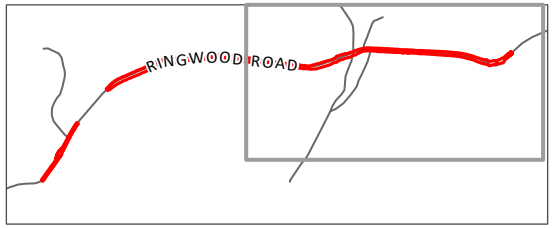


FIGURE 6.6 B

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.

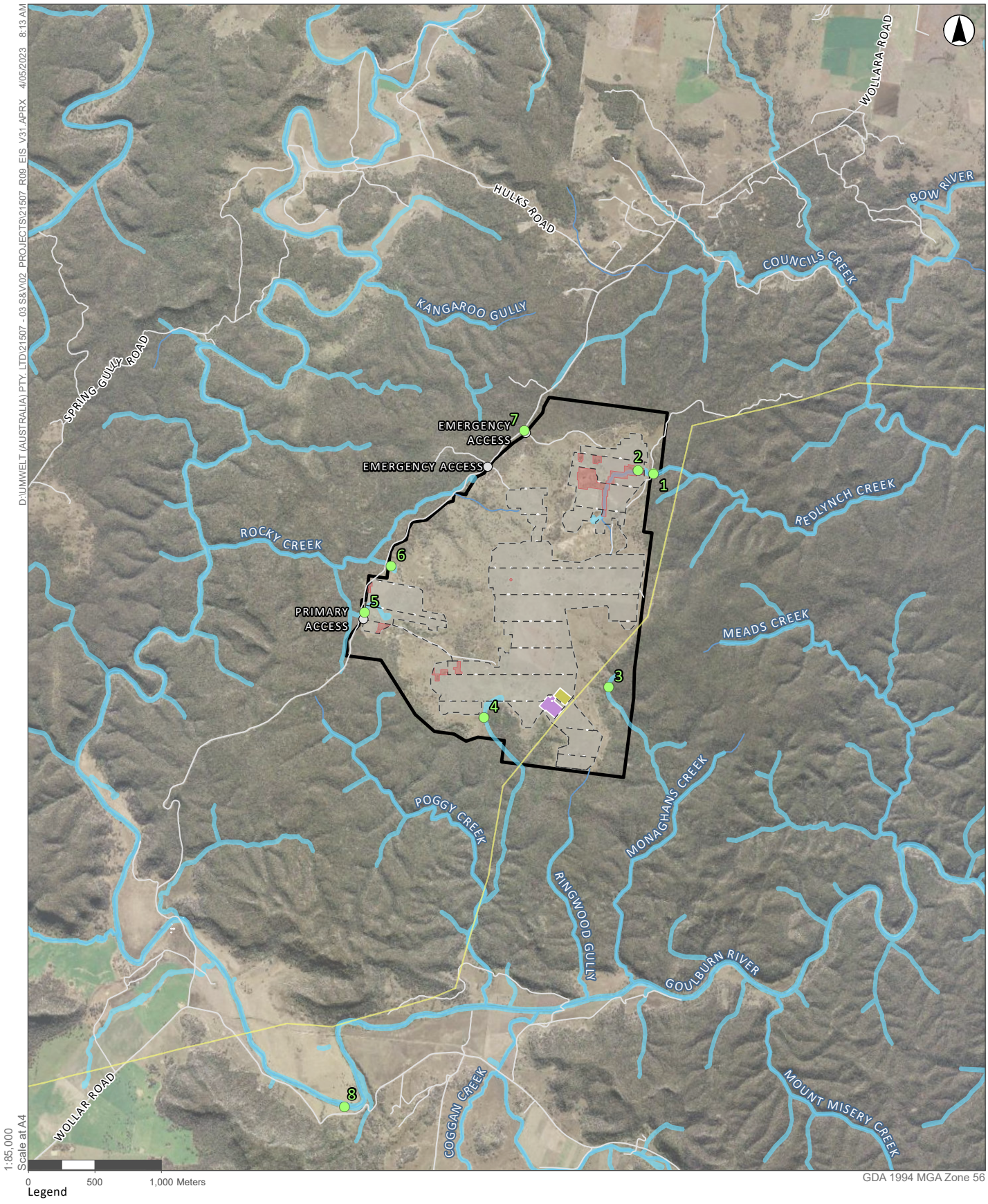
6.3.2 Aquatic Biodiversity

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.

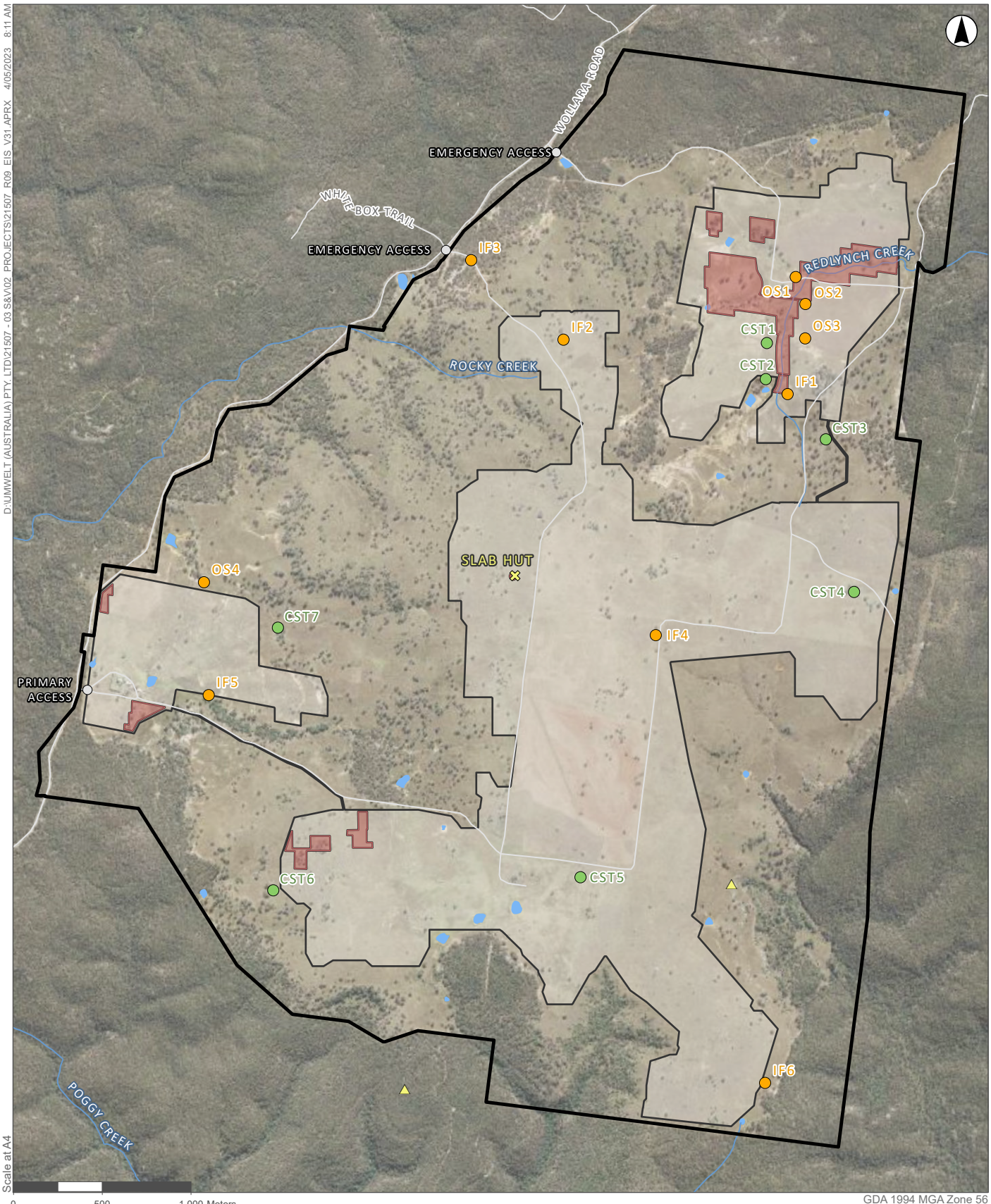
The field survey program identified the following newly recorded sites within the Project Area and Road Repairs and Upgrades Area (refer to **Figure 6.8**):

- 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.

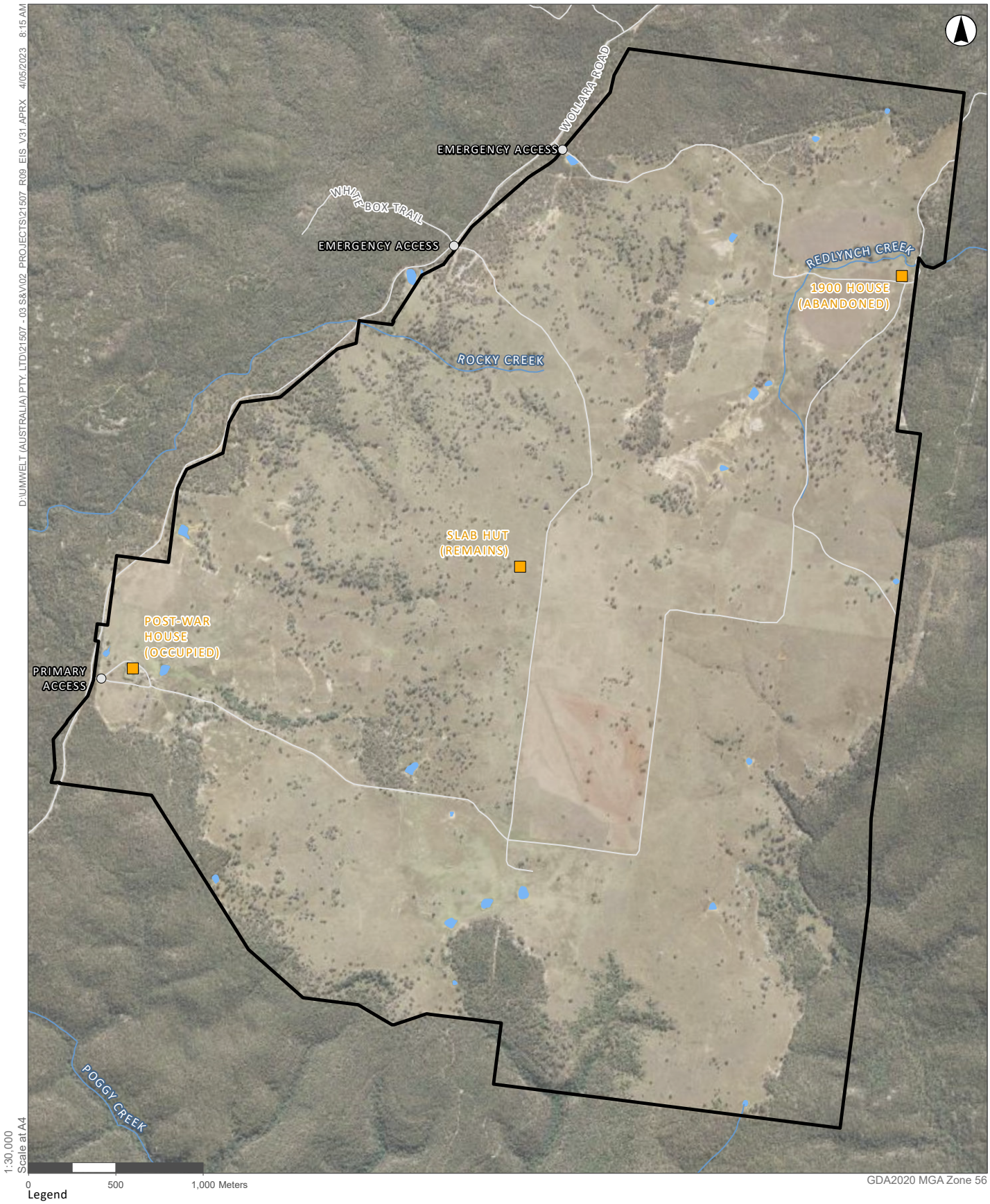


FIGURE 6.9

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)

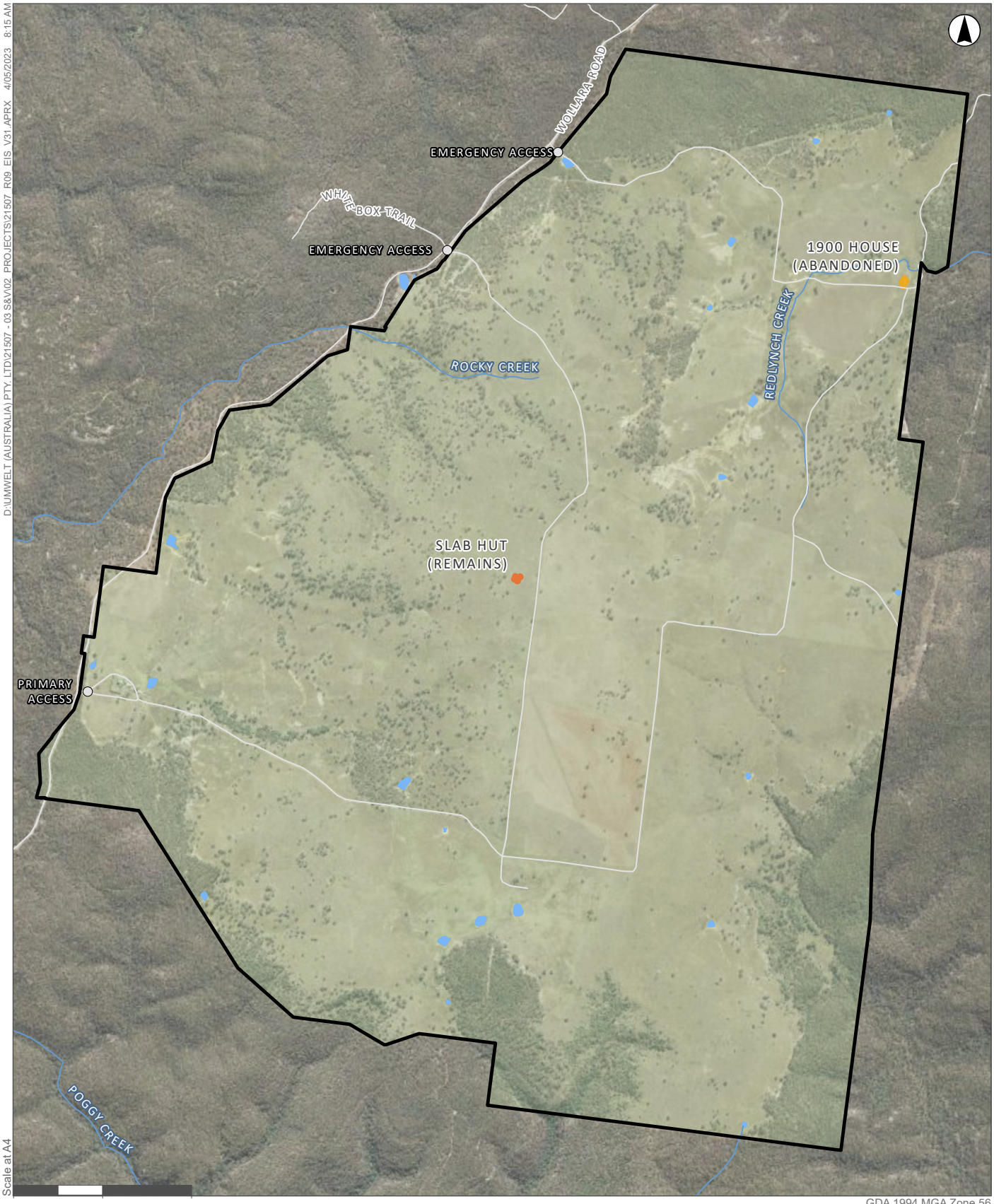


FIGURE 6.10

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.

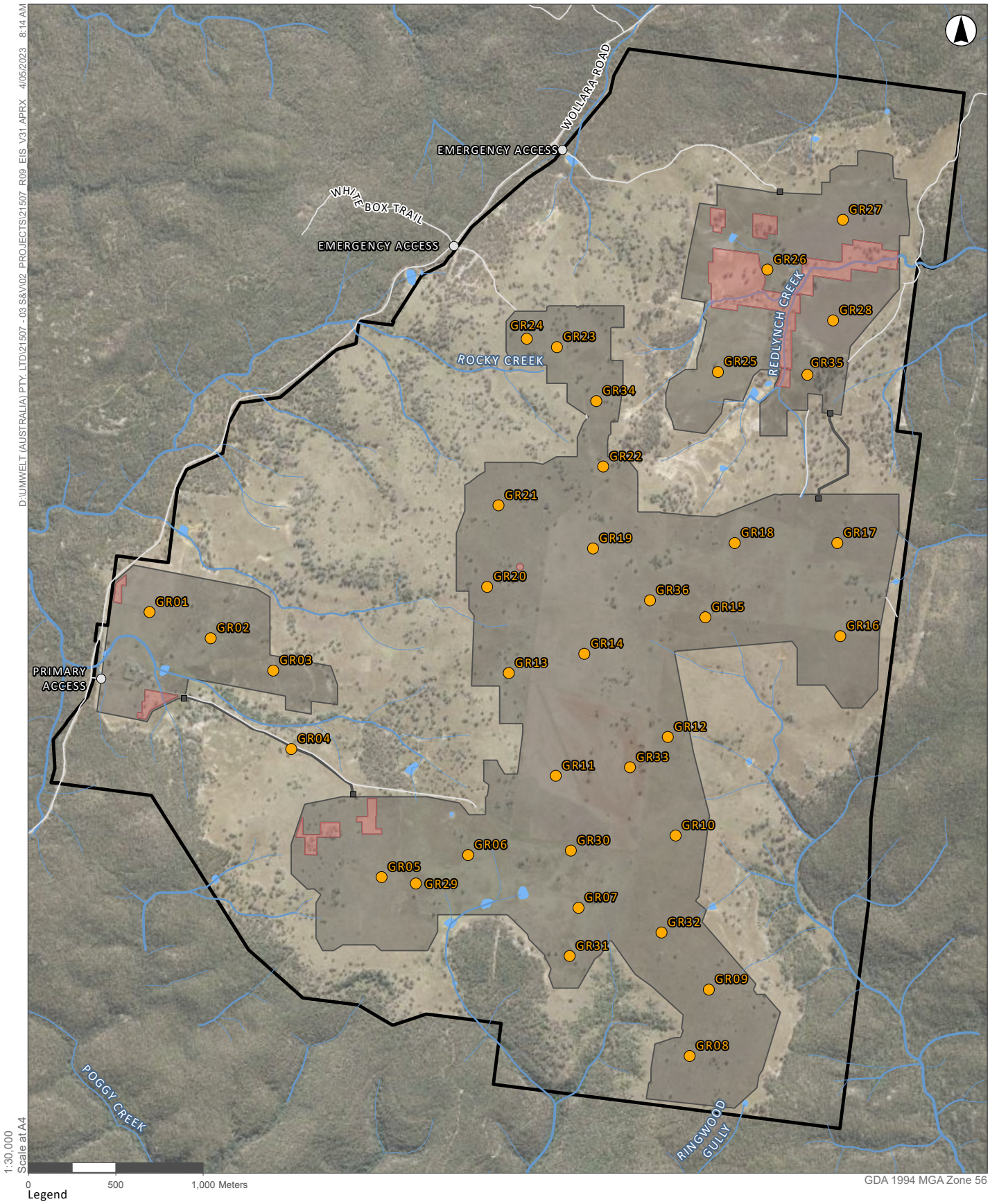


FIGURE 6.11

Soil Sampling Sites

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

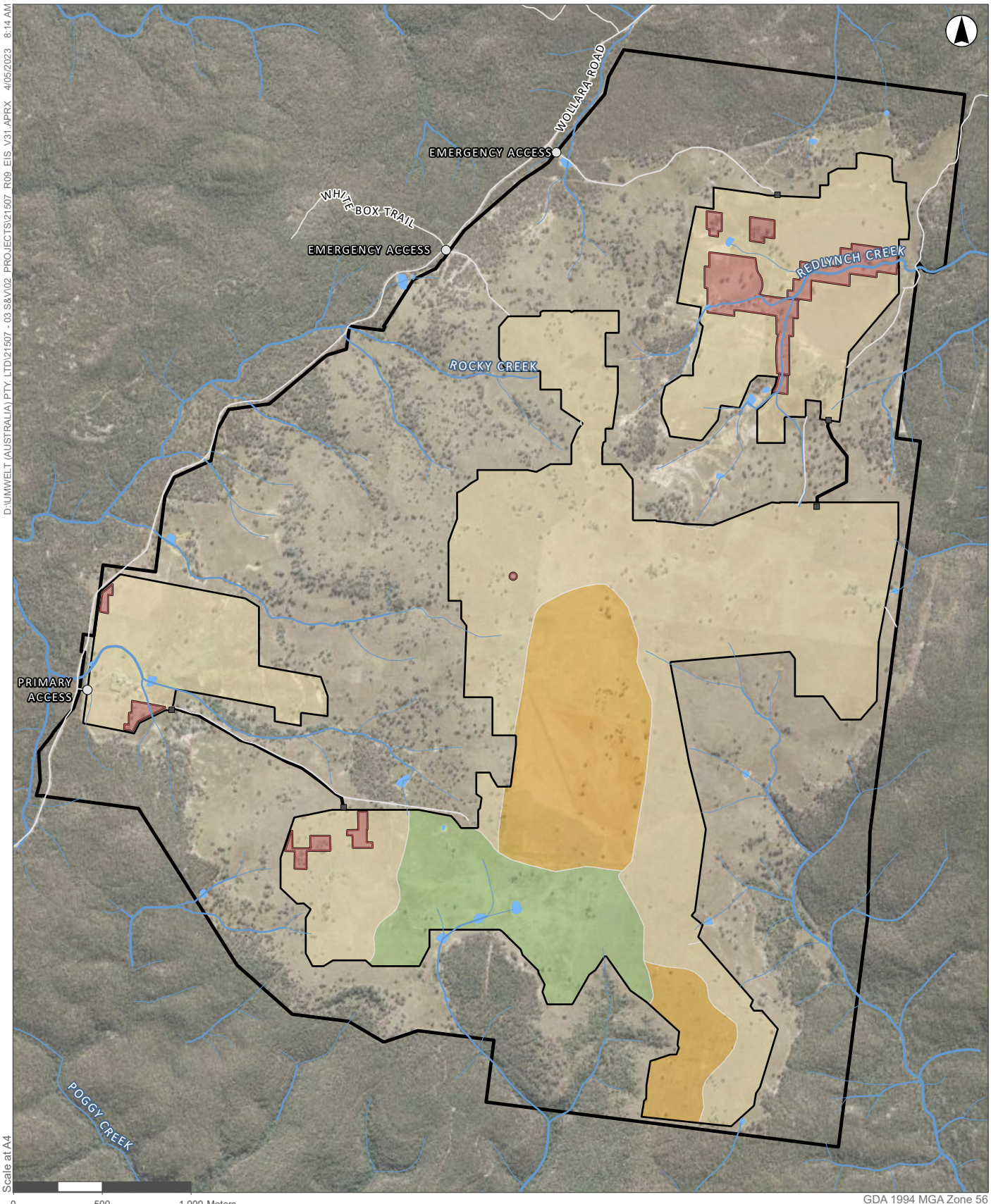


FIGURE 6.12

Identified Soil Types

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

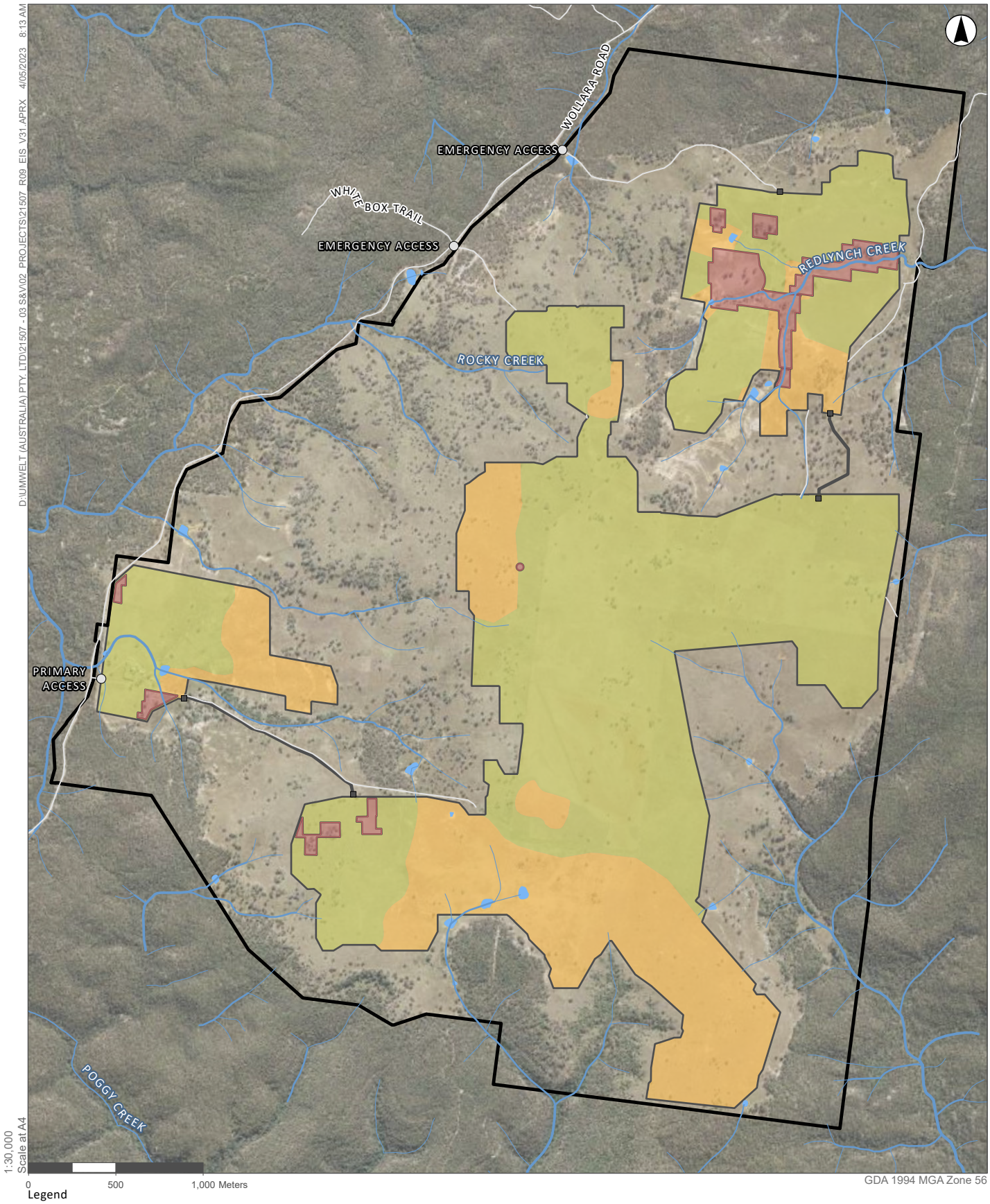


FIGURE 6.13

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.

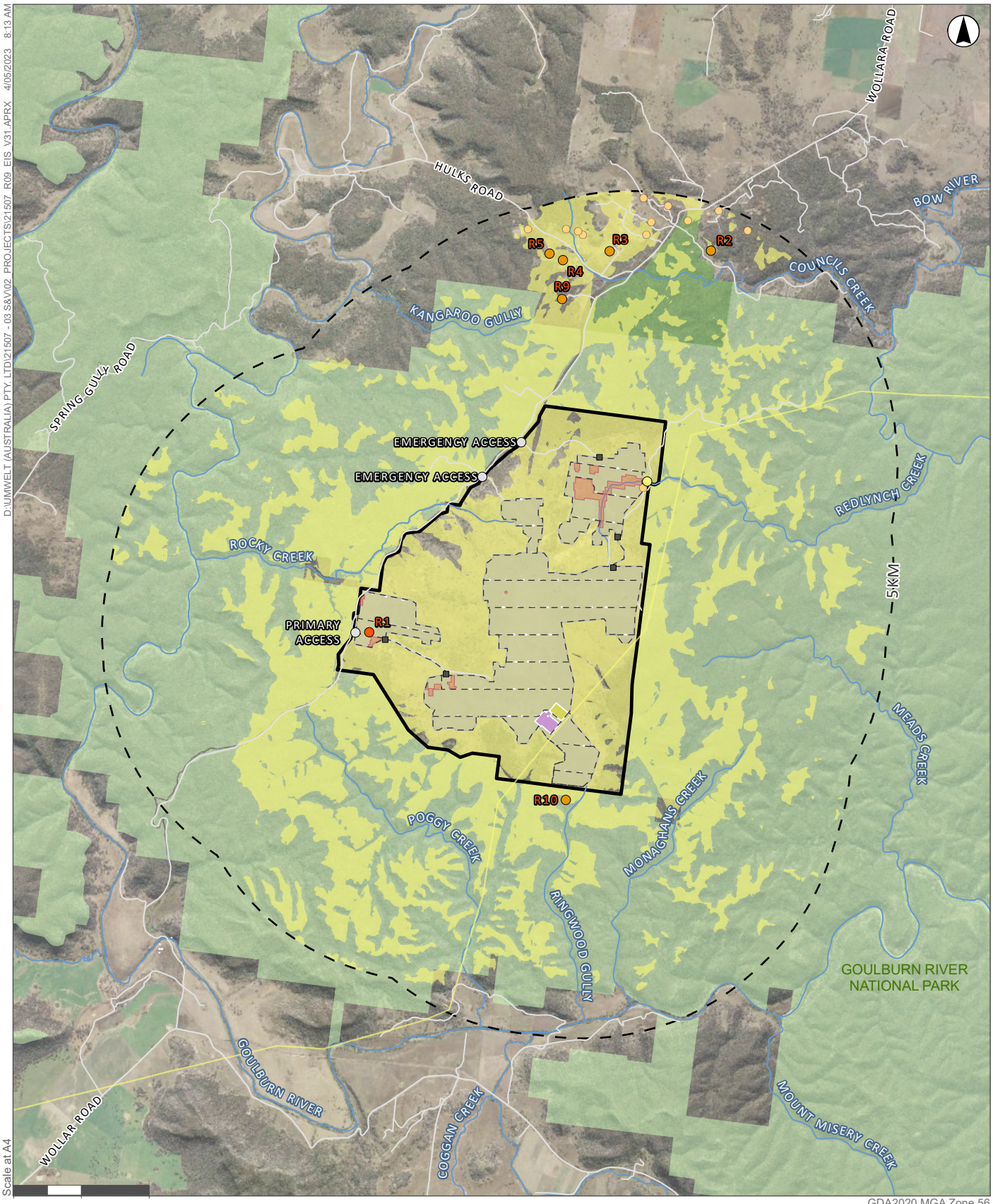
Visual Impact Consultation

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**).