



NEW ENGLAND SOLAR FARM AMENDMENT REPORT

Prepared for UPC Renewables Australia Pty Ltd
June 2019



New England Solar Farm

Amendment report

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New England Solar Farm

Amendment report

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Executive Summary

ES1 Project overview

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (the project).

The project will be developed across two separate arrays of photovoltaic (PV) modules (commonly referred to as 'solar panels'); incorporating transmission infrastructure and substations to enable connection into the existing electricity transmission network. The project will have a targeted 'sent out' electricity generating capacity of up to 720 megawatts (MW) (AC) and a BESS with up to 200 MW (AC) two-hour energy storage.

Construction of the project will take approximately 36 months from the commencement of site establishment works to commissioning of the array areas. It is anticipated that the project will be constructed in two stages to balance the objective of completing construction in a timely manner against the objective of minimising the number of workers on-site and subsequent impacts on local infrastructure and the broader community.

Project components will include:

- the two solar array areas (ie the northern and central arrays);
- a single internal solar array substation (central array) and a single grid substation (northern array);
- associated BESS(s);
- operations and maintenance (O&M) infrastructure, including:
 - O&M buildings including a control room, meeting facilities, a temperature-controlled spare parts storage facility, supervisory control and data acquisition (SCADA) facilities, a workshop and associated infrastructure (eg kitchen, toilets and other facilities); and
 - car parking facilities;
- connection infrastructure between the two array areas (including underground or overhead cabling); and
- a new internal road network to enable access from surrounding local roads to the array areas during construction and operations.

In addition, security fencing and creek crossings (should they be required) will be placed within the project boundary. During construction, a site office compound and temporary laydown areas will be established.

The project is classed as a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). A development application (DA) and environmental impact statement (EIS) was submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The DA and EIS for the project were publicly exhibited from 20 February to 20 March 2019.

Following the public exhibition of the DA and EIS, over 100 submissions were received by NSW Department of Planning and Environment (DPE), including submissions from government agencies and other organisations and public feedback. A response to submissions (RTS) report will be submitted to DPE to respond to the matters raised in these submissions.

As a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has made a number of further amendments to the development footprint that was the subject of the DA and EIS, including the removal of the southern array area.

This amendment report (AR) has been prepared to outline the changes to the project that have been made since the public exhibition of the EIS and provide a summary of the impacts associated with the amended project. This report will be submitted to DPE in conjunction with the RTS.

ES2 Project refinements

As a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has performed a number of further revisions to the development footprint that was the subject of the DA and EIS.

The development footprint no longer includes the southern array area. PV module technology is continuing to improve and the modules that are likely to be utilised for the project have a higher watt rating than was originally anticipated during the preliminary design stages of the project. In addition, UPC will maximise the extent of project infrastructure within the development footprint for the northern and central array areas, where practicable. As a result of these efficiencies, the project will be able to achieve the targeted generating capacity of up to 720 MW through development across the northern and central array footprints only.

In response to feedback received from neighbouring landholders, further revisions have been made to the extent of the northern array area to increase the distance between the development footprint and neighbouring residences and thereby minimise visibility of project infrastructure.

In addition to changes to the development footprint, there have also been revisions to:

- **Connection infrastructure between the northern and central array areas** – As part of the ongoing detailed design of the infrastructure layout within the development footprint, it may be necessary to utilise either underground or overhead cabling (or a combination of the two) to connect the two array areas. No changes to the alignment or extent of the three potential connection corridors between the northern and central array areas are required. The only change will be that, where previously, new overhead electricity transmission lines (ETLs) were proposed exclusively to transport electricity between the array areas, underground cabling may be installed in their place. Subsequently, no additional impact assessments are considered necessary.
- **Substation configuration** – UPC has confirmed that the grid substation will be adjacent to TransGrid's 330 kV transmission line in the northern array area. At the grid substation, the electricity generated by the two solar arrays will be stepped up to 330 kV and injected into the electricity grid. A solar array substation may still be required in the central array area to step the medium voltage (MV) up to high voltage (HV). Two parcels of land are currently under consideration for the placement of the solar array substation.
- **Delivery of construction materials and project infrastructure** – As part of ongoing design, UPC has been considering the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure. The final decision by UPC on whether the Main Northern Railway line will be used will depend on a number of factors, including timing and logistics; sequencing of works; cost and safety considerations; and EPC contractor acceptance of this alternative to using the road network. Utilising the Main Northern Railway line for deliveries would reduce the number of project-related heavy vehicles on the local and regional road network.

ES3 Environmental assessment

ES3.1 Overview

As a result of the amendments to the project, the outcomes of a number of the technical assessments prepared as part of the EIS have changed. Importantly, the amendments to the project have:

- reduced the extent of the development footprint (ie the area in which project infrastructure will be placed);
- reduced the number of sensitive receptors (ie dwellings) within 2 km of the development footprint; and
- reduced the number of local roads that will be used by project-related light and heavy vehicle movements.

The relevant assessments have been revised to assess the impacts associated with the amended project.

ES3.2 Biodiversity

The project is within a heavily disturbed landscape of agricultural land, with limited patches of native vegetation which are highly fragmented. Refinements to the development footprint have reduced the extent of native vegetation directly impacted by the project and potential loss of species habitat.

Direct impacts to native vegetation requiring offsets include:

- direct impacts on 1.6 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion (planted);
- direct impacts on 5.7 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (woodland);
- direct impacts to 65 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion; and
- direct impacts to 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (noting this is exclusive of one paddock tree which did not require offsets as it was assigned to Class 1).

A total of 162 ecosystem credits are required to offset the residual impacts of the amended project. Offsets will be provided in accordance with the biodiversity offset framework.

A biodiversity management plan (BMP) will be prepared and implemented to manage potential impacts on biodiversity during the construction and operation of the project.

ES3.3 Aboriginal cultural heritage

As a result of the amendments to the development footprint, there has been a reduction to the number of Aboriginal cultural heritage sites likely to be impacted by the project.

Field surveys performed as part of the Aboriginal cultural heritage assessment (ACHA) identified 102 previously unrecorded sites within the development footprint, including four grinding groove sites and two areas of archaeological deposits considered to have high significance levels.

Avoidance of significant Aboriginal cultural heritage values has been a key aspect of the project refinement process, wherever possible. Subsequently, only one site of high significance (NE70) will experience peripheral impacts, and should this occur, it will be in an area of low to negligible archaeological potential.

Two sites of moderate significance (NE27 and NE49) are currently designated for impact by the project. Similar to NE70, NE27 will only experience peripheral impacts, and should this occur, it will be in an area of low to negligible archaeological potential. NE49 is a felled scar tree and will be salvaged.

The remaining sites currently designated for impact by the project are all of low scientific significance.

An Aboriginal heritage management plan (AHMP) will be developed in consultation with DPE, the registered Aboriginal parties (RAPs) and NSW Office of Environment and Heritage (OEH). The AHMP will detail the management and mitigation of all identified Aboriginal sites along with special procedures and training and reporting protocols.

ES3.4 Historic heritage

Impacts to heritage, largely to the visual aspect of the cultural landscape, will occur. The amendments to the project have reduced the extent of the development footprint and the number of identified heritage sites that will be impacted by the project. There has also been a subsequent reduction to the level of impact to the cultural landscape. If managed carefully, impacts will not be significant as all known significant archaeological sites have been excised from the development footprint.

A historic heritage management plan (HHMP) will be prepared to guide the conservation of heritage items, including site specific management measures, along with general measures, including an unexpected finds protocol.

ES3.5 Land

The project will reduce the total area of land under agricultural production in the Uralla Shire LGA and more generally within the New England North West region through the establishment of the solar arrays and associated infrastructure. However, the loss of agricultural land represents a very small fraction of the agricultural output of both the Uralla Shire LGA and New England North West region.

The amendments to the development footprint have reduced the amount of land mapped as biophysical strategic agricultural land (BSAL) within the array areas to approximately 87.7 ha (northern array area only). In addition, approximately 12 ha of land mapped as BSAL intersects with the proposed electrical cabling corridor between the northern and central array areas. This represents a total of approximately 0.0036% of the total land area mapped as BSAL in NSW.

Land management practises will avoid or minimise potential impacts to neighbouring agricultural operations that have been identified during engagement with the local community and as part of the land use conflict risk assessment. The project will adopt a two-level hierarchical system for erosion and sediment control management and mitigation, consisting of a soil and water management plan (SWMP) supported by a set of progressive erosion and sediment control plans (ESCPs).

ES3.6 Visual

The project is not anticipated to have any significant adverse visual impacts on the locality. As a result of the amendments to the project, the number of non-project related residences within 2 km of the development footprint has been significantly reduced from 41 to 28, with 3 residences within 1 km of the development footprint. Of these three residences, uninterrupted views of the amended development footprint are unlikely.

The revised visual assessment determined that, of the viewpoints assessed, infrastructure may be visible to varying degrees from 13 of the 22 viewpoints. Based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the PV modules, the impact assessment predicts:

- a negligible visual impact for viewpoints 9 and 12;
- a slight visual impact for viewpoints 1, 2, 3, 4, 7, 8, 13, 14, 18 and 19;
- a slight/moderate visual impact for viewpoints 10, 11, 15, 16, 17, 20, 21 and 22; and
- a moderate visual impact for viewpoints 5 and 6.

Visual impacts from three items of local heritage significance listed on the Uralla LEP have also been considered as part of the VIA. As a result of the amendments to the development footprint, it is unlikely that project infrastructure will be visible from these locations.

ES3.7 Noise

The results of the revised noise and vibration impact assessment (NVIA) demonstrate that noise levels during peak construction are predicted to satisfy the recommended noise management levels (NMLs) at all locations during standard hours. Outside of standard hours, construction noise levels are predicted to be above the recommended NMLs at two locations (N1 and N40) during the *NSW Noise Policy for Industry* (NPfI) (EPA 2017) defined daytime period and at five locations (N1, N2, N4, N5 and N40) during limited times in the NPfI defined night-time period. Night-time maximum noise level events are predicted to be above the recommended L_{Amax} sleep disturbance screening criteria at two assessment locations (N1 and N40).

Operational noise levels are shown to satisfy the NPfI noise trigger levels at all assessment locations during the daytime, evening and night-time periods for the entirety of the project's operations.

Vibration associated with the proposed construction works is not expected to generate impacts at the nearest assessment location.

Should construction materials and project infrastructure be delivered via the Main Northern Railway line, rail noise associated with the proposed unloading activities is unlikely to cause impacts at the nearest assessment locations.

Traffic generated by the project is expected to comply with the relevant *NSW Road Noise Policy* (RNP) (DECCW 2011) criteria at the majority of the assessment locations. The exception is the most affected residence on Big Ridge Road, where predicted noise levels are 2 dB above the relevant RNP criteria during the daytime period. The road traffic noise predictions are based on peak construction traffic volumes and provide a highly conservative assessment.

Notwithstanding, with effective implementation of the recommended mitigation and management measures (including buffer zones during out of hours construction), construction noise levels and maximum noise level events are predicted to comply with the relevant criteria at all assessment locations.

ES3.8 Traffic and transport

The amendments to the project have reduced the number of local roads that will be used by project-related light and heavy vehicle movements. Access to the two array areas will be from the following local roads:

- Barleyfields Road and Big Ridge Road (northern array); and
- Barleyfields Road, Big Ridge Road and Munsies Road (central array).

To reduce the volume of project-related traffic on Munsies Road, where practicable, vehicles will travel from the Big Ridge Road site access points for the northern array to access the central array via an internal site access road between the northern and central array areas.

The peak daily project-related vehicle movements should be considered as a limited duration construction traffic impact as they are anticipated to occur across two four-month periods within the overall 36-month construction period. Further, utilising the Main Northern Railway line for deliveries has potential to reduce the number of project-related heavy vehicles on the local and regional road network.

Project-related peak and average construction vehicle movements will have a short-term impact on traffic conditions and usability, which is proposed to be managed by road condition inspections and maintenance procedures. These additional road maintenance procedures will be negotiated and agreed between UPC and Uralla Shire Council as part of the project's traffic management plan (TMP).

ES3.9 Water

There are several first and second order watercourses in the amended development footprint; however, these are ephemeral and, in most cases, do not have a discernible channel, lack aquatic vegetation and are dominated by grass species prevalent across the development footprint.

Impacts on 1st and 2nd order watercourses within the amended development footprint will be minimised to the extent practicable. Watercourse crossing plans detailing the design of proposed crossings of higher order watercourses outside of the development footprint will be prepared in consultation with NSW Department of Industry – Lands and Water Division.

The project is not likely to impact groundwater during construction, operation and decommissioning due to the estimated depth to groundwater within the project boundary and the limited amount and depth of subsurface disturbance activities required during the installation and decommissioning of project infrastructure.

ES3.10 Other environmental aspects

The amendments to the project have not resulted in any significant changes to the outcomes of the assessments prepared as part of the EIS to consider the following environmental aspects:

- hazards and risks;
- bushfires;
- social;
- economic;
- air quality;
- waste management; and
- cumulative impacts.

ES4 Justification and conclusion

The project has been designed to avoid and minimise adverse biophysical, social and economic impacts where possible. The residual impacts have been identified and assessed. While there are some unavoidable impacts, principally during the project's construction period, a suite of design, mitigation and management measures have been proposed to address these.

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

- It is suitably located:
 - in a region with ideal climatic and physical conditions for large-scale solar energy generation that has been identified by the NSW Government as a priority Renewable Energy Zone;
 - within close proximity of existing infrastructure with adequate capacity to receive the energy proposed to be generated; and
 - adjacent to agricultural land uses that are compatible with large-scale solar energy generation.
- The design of the project has been an iterative design and environmental assessment process to ensure impacts have been avoided and minimised as much as possible. This has included refining the design in consultation with neighbouring landholders, local and NSW Government agencies, registered Aboriginal parties and the local community.
- The project will not result in significant biophysical, social or economic impacts, and the EIS and AR have identified that any residual impacts can be appropriately managed and/or offset in accordance with NSW Government policy.
- The benefits of the project are in the public interest and will provide renewable energy, increased energy security and direct and indirect economic benefits, through the creation of employment opportunities and benefits to the local and regional economy through income and expenditure during the life of the project.
- UPC is committed to the long-term environmental management of the land within the development footprint. At the end of the project's investment and operational life, the development footprint will be returned to its pre-existing agricultural land use or another land use as agreed by the project owner and the landholders at that time.

The project is in line with the objects of the EP&A Act and will enable the orderly and logical use of natural, physical and human resources existing within the local area and greater New England North West region. There will be economic investment and employment benefits both locally and regionally and a realised opportunity for renewable energy generation, while minimising potential environmental and social impacts. A suite of design, mitigation and management measures are proposed to avoid, minimise and manage the biophysical, social and economic impacts of the project.

The project is consistent with the principle of inter-generational equity. The project will contribute to the sustainable transition of electricity generation in NSW to a more reliable, more affordable and cleaner energy future. Once decommissioned, the land within the development footprint can be rehabilitated to its current use if required thereby allowing for either continuation of renewable energy generation or a return to agricultural production, both of which would provide benefits for future generations.

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1 Introduction

1.1 Project overview

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (Figure 1.1) (the project).

The project is classed as a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). A development application (DA) and environmental impact statement (EIS) was submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The DA and EIS for the project were publicly exhibited from 20 February to 20 March 2019.

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As a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has made a number of further amendments to the development footprint that was the subject of the DA and EIS, including the removal of the southern array area. A detailed description of these amendments is provided in Section 1.2 and Chapter 2.

This amendment report (AR) has been prepared to outline the changes to the project that have been made since the public exhibition of the EIS and provide a summary of the impacts associated with the amended project. This report will be submitted to DPE in conjunction with the RTS report.

The project will be developed across two separate arrays of photovoltaic (PV) modules (commonly referred to as 'solar panels') and these continue to be referred to as the 'northern' and 'central' arrays, incorporating transmission infrastructure between the two arrays and a grid-interfacing substation (grid substation) to enable connection into the existing electricity transmission network (refer Figure 1.1).

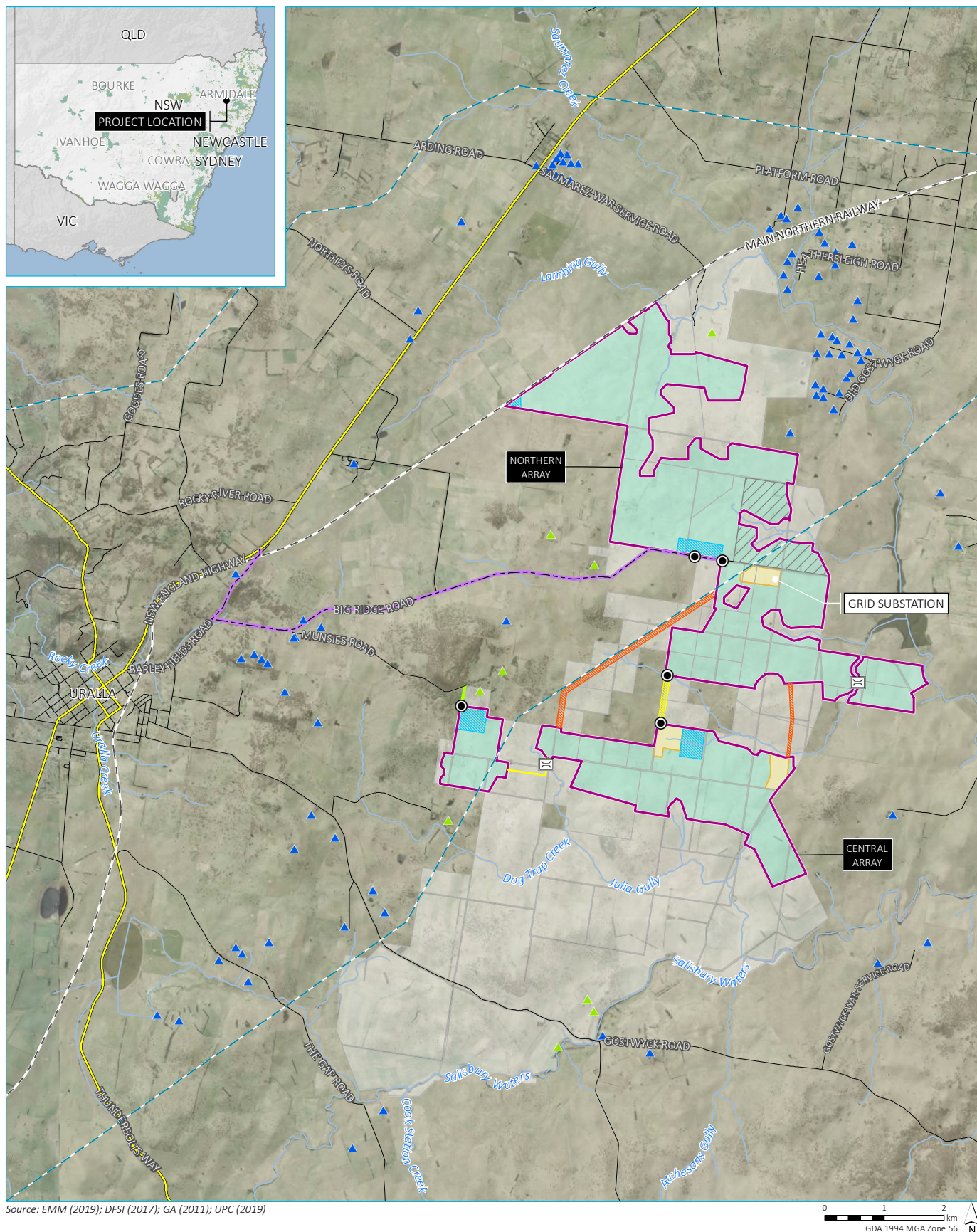
Due to technological advances and optimisation of the project layout, the project continues to have a targeted 'sent out' electricity generating capacity of up to 720 megawatts (MW) (AC) and up to 200 MW (AC) two-hour energy storage. Depending on its final size and design, the project will have an estimated capital investment value of up to \$768 million AUD.

The project will represent a major injection of capital investment into the New England North West region and the Uralla Shire LGA. The regional economy will benefit from the project through the creation of employment opportunities and other indirect economic benefits. Direct employment opportunities generated by the project will include up to 700 full-time equivalents (FTEs) at the peak of construction and up to 15 FTEs during operations. The project will also result in a diversification of the income earned by the landholders involved in the project, most of whom will continue farming on their properties within the region.

1.2 Project refinement

As described within Section 1.4.2 of the EIS, the design and location of the development footprint has undergone a number of significant revisions in response to ongoing stakeholder engagement, environmental constraints identification and engineering assessment.

As noted in Section 1.1, as a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has performed a number of further revisions to the development footprint that was the subject of the DA and EIS. The evolution of the project from the project investigation area through to the amended development footprint as described in this report is illustrated in Figure 1.2 and further described in Table 1.1.



KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Primary vehicle access route

Sensitive receptors

- ▲ Project-related
- ▲ Non-project related

Project boundary

Development footprint

- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint

Potential creek crossing

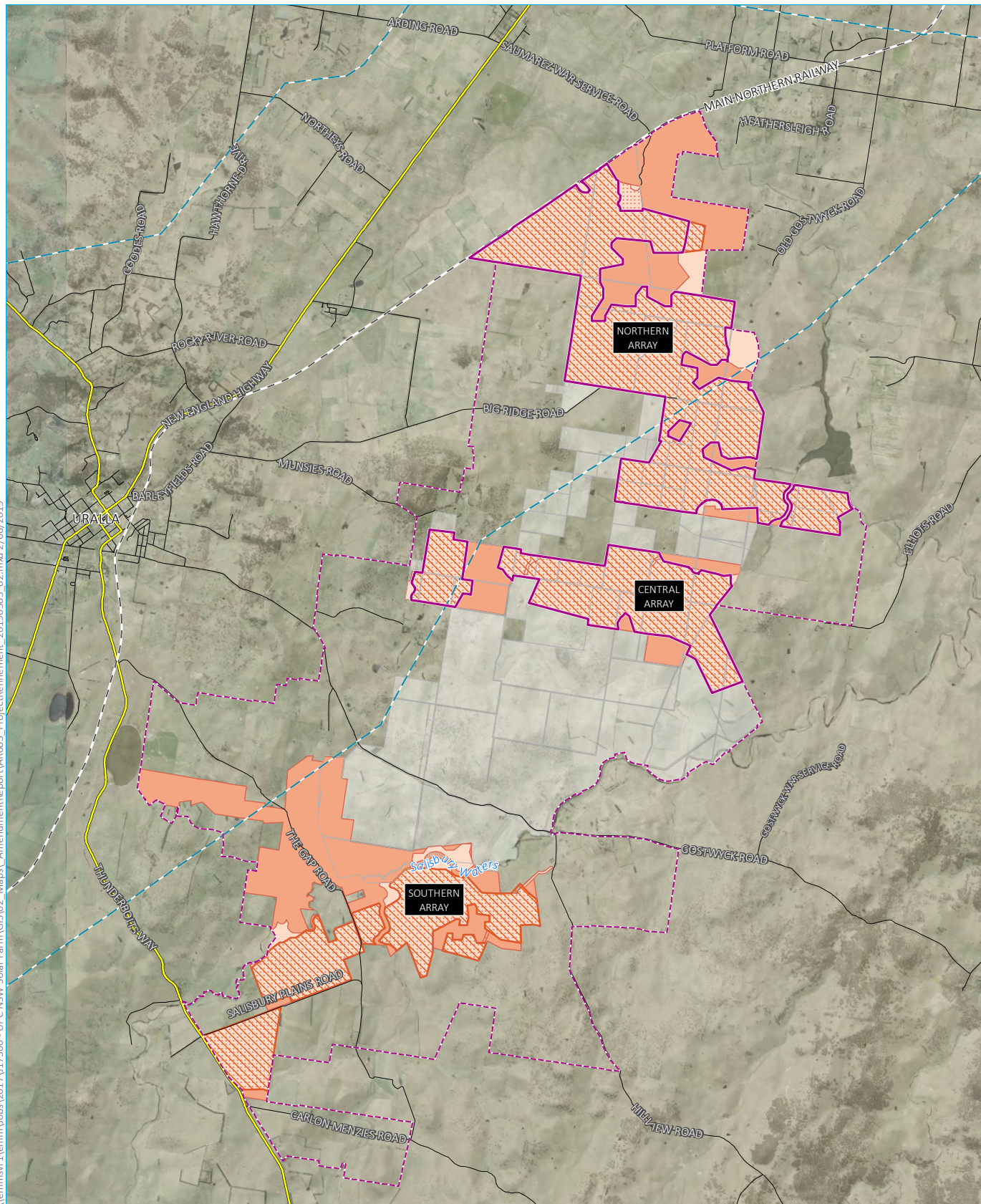
Proposed primary site access point

- Potential site for construction accommodation village

Location of the New England Solar Farm

New England Solar Farm Amendment report Figure 1.1

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Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

- | | | |
|--------------------------|----------------------------|-----------------------|
| 330 kV transmission line | Project investigation area | Project boundary |
| Rail line | PEA site boundary | Development footprint |
| Main road | Preliminary study area | |
| Local road | Refined study area | |
| | EIS development footprint | |

Key steps in project refinement

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Figure 1.2

Table 1.1 **Key steps in project refinement**

Footprint	Area (ha)	Key reasons for selection
Project investigation area	11,622	Proximity to 330 kV electricity transmission network. Elevation and high solar irradiance.
PEA site boundary (array areas only)	4,244	Favourable topography. Modified landscape. Access to the local and regional road network.
Preliminary study area (array areas only)	2,863	Minimise clearance of native vegetation. Minimise surface disturbance requirements. Minimise visibility of project infrastructure from receptors. Reduce land use conflicts. Avoid higher order watercourses.
Refined study area (array areas only)	2,711	Avoid Aboriginal cultural heritage and historic heritage sites. Avoid areas likely to be inundated by flood waters adjacent to Salisbury Waters. Minimise visibility of project infrastructure from receptors.
EIS development footprint (array areas only)	2,696	The development footprint represented the final extent of EIS and DA and was reduced further in size as a response to identified environmental constraints. Avoid Aboriginal cultural heritage and historic heritage sites.
Development footprint (array areas only)	2,027	The development footprint no longer includes the southern array area. In addition, a portion of the northern array area has been removed to minimise visibility of project infrastructure from receptors.

As noted in Table 1.1, the development footprint no longer includes the southern array area. PV module technology is continuing to improve and the modules that are likely to be utilised for the project have a higher watt rating than was originally anticipated during the preliminary design stages of the project. In addition, UPC will maximise the extent of project infrastructure within the development footprint for the northern and central array areas, where practicable. As a result of these efficiencies, the project will be able to achieve the targeted generating capacity of up to 720 MW through development across the northern and central array footprints only and consistent with the information presented in the EIS, the project will still produce enough clean renewable electricity to power the equivalent of approximately 250,000 homes.

In response to feedback received from neighbouring landholders (namely N4 and N5 – refer Figure 5.6), revisions have been made to the northern extent of the northern array area to increase the distance between the development footprint and neighbouring residences and thereby minimise visibility of project infrastructure. As part of this refinement, an area of approximately 16 ha has been excluded from the development footprint for the northern array area (refer Figure 1.2).

In addition to changes to the development footprint, there have also been revisions to connection infrastructure between the northern and central array areas and substation configuration. UPC has also been investigating the potential to use the Main Northern Railway line to deliver construction materials and project infrastructure. These revisions are discussed further in Chapter 2.

1.3 Purpose of report

This AR accompanies the RTS for the project and outlines the changes to the project that have been made since the public exhibition of the EIS and provides a summary of the impacts associated with the amended project.

As noted within the SEARs (Appendix A of the EIS), UPC is seeking development consent for the New England Solar Farm, which includes:

- the construction and operation of photovoltaic energy facility with an estimated capacity of up to 800 MW;
- development of associated infrastructure, including a substation and battery storage facilities; and
- a temporary construction accommodation facility.

This AR has been prepared by EMM Consulting Pty Ltd (EMM) on behalf of UPC.

1.4 Structure of the report

This AR consists of the main AR document and supporting appendices and is structured as follows:

- Chapter 1 – Introduction

Provides an introduction to the project, including an overview of the project, information about the project history (including additional project refinements), and the purpose and structure of this AR.
- Chapter 2 – Project description

Provides a detailed outline of the project and describes the changes to the project description that was presented in the DA and EIS.
- Chapter 3 – Strategic and statutory context

Reiterates the strategic justification in the context of Commonwealth and State Government policies, initiatives and regional plans and the legislative framework and approval process for the project under relevant legislation.
- Chapter 4 – Engagement

Provides an overview of the engagement and community outreach performed in the time elapsed since the completion of the public exhibition period of the EIS (specifically in relation to the amendments to the project description and extent of the development footprint) and a summary of the results of this engagement.
- Chapter 5 – Environmental impact assessment

Provides a summary of the impacts associated with the amended project, including consideration of any additional management measures to be implemented.
- Chapter 6 – Mitigation measures

Provides a summary of the management and mitigation measures.
- Chapter 7 – Conclusion

Provides a justification for the amended project.
- Appendices

The appendices to the AR, which support the main document:
 - Appendix A – Updated project description;
 - Appendix B – Updated mitigation measures table;

- Appendix C – Stakeholder engagement materials;
- Appendix D – Addendum to the biodiversity development assessment report (BDAR);
- Appendix E – Addendum to the Aboriginal cultural heritage assessment report (ACHAR);
- Appendix F – Updated site management measures for historic heritage;
- Appendix G – Updated Land Use Conflict Risk Assessment (LUCRA); and
- Appendix H – Viewshed analysis figures.

2 Project description

2.1 Overview

The project involves the development, construction and operation of a solar PV electricity generation facility and BESS, which consists of PV modules, batteries, inverters, transformers and associated infrastructure.

The amended development footprint provided on Figure 2.1 incorporates the land required for:

- the two solar array areas (northern and central);
- a single internal solar array substation (central array) and a single grid substation (northern array);
- associated BESS(s);
- operations and maintenance (O&M) infrastructure, including:
 - O&M buildings (namely meeting facilities, a temperature-controlled spare parts storage facility, supervisory control and data acquisition (SCADA) facilities, a workshop and associated infrastructure); and
 - car parking facilities;
- connection infrastructure between the two array areas (including underground or overhead cabling); and
- a new internal road network to enable access from surrounding local roads to the two array areas during construction and operations.

In addition, security fencing and creek crossings (should they be required) will be placed within the project boundary.

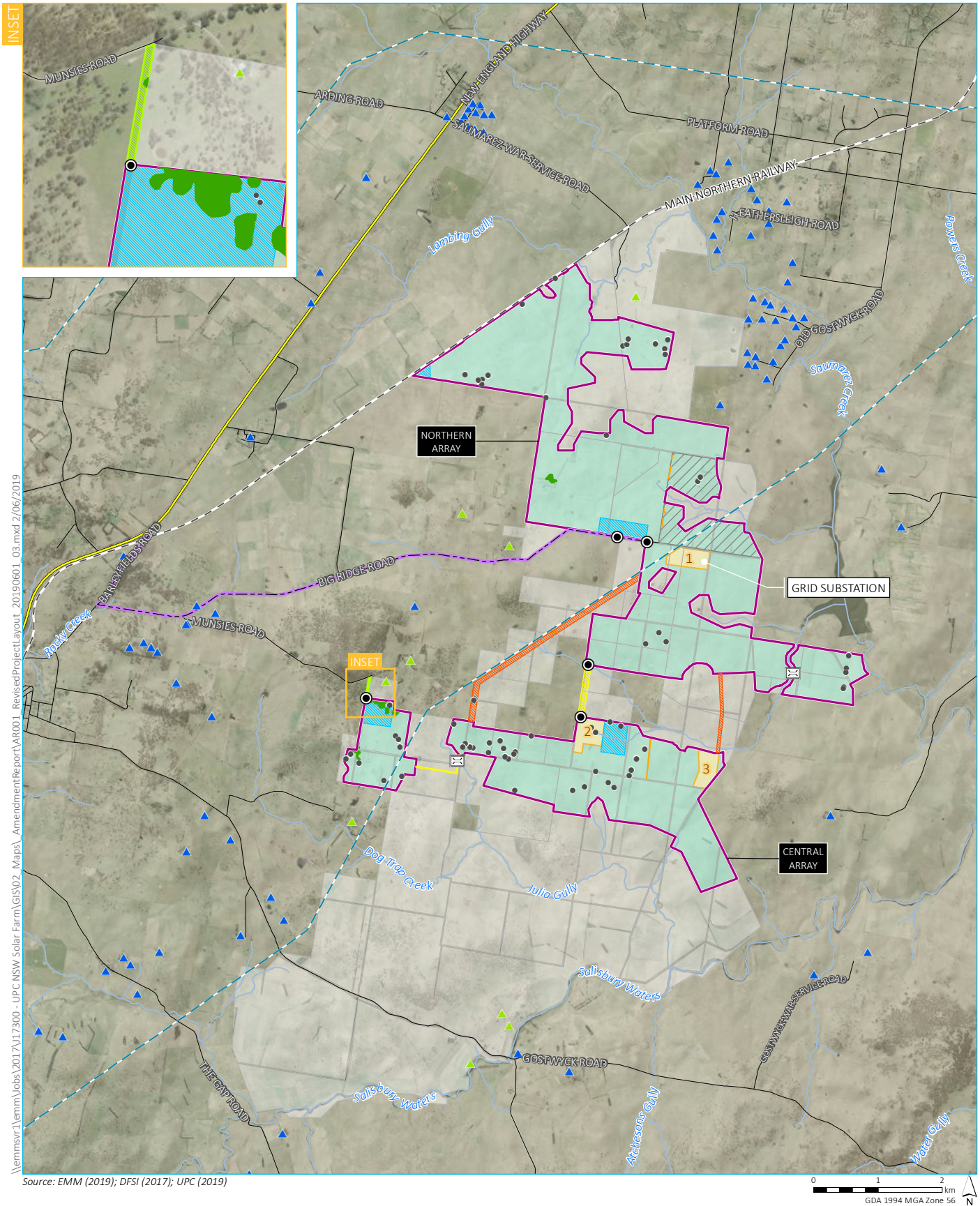
The project will have a targeted 'sent out' electricity generating capacity of up to 720 MW (AC) and up to 200 MW (AC) two-hour energy storage. The final number of PV modules within the two array areas will be dependent on detailed design, availability and commercial considerations at the time of construction.

Electricity generated by the project will be injected into the grid via a new cut-in and grid substation connected to TransGrid's 330 kV transmission line that traverses the northern and central array areas (refer Figure 2.1).

The grid substation will be constructed in the northern array (referred to as Location 1 on Figure 2.1). The solar array substation within the central array will be constructed in one of two potential locations (referred to as locations 2 and 3 on Figure 2.1). It is possible that, following detailed design, the solar array substation within the central array area could be highly reduced in size and complexity or the need for it eliminated altogether, if, for example no intermediate transformation is needed. If this occurs, some of or all of the parcels of land identified as locations 2 and 3 on Figure 2.1 will be utilised for PV modules and ancillary infrastructure.

The exact location of the electrical cabling to connect the northern and central array areas will be determined as part of detailed design; however, it will be restricted to the three corridors presented in Figure 2.1. Electrical cabling within the three corridors may be buried underground or require the construction of new overhead electricity transmission lines (ETLs).

The project description provided within the EIS has been updated to account for the amendments to the project and is included as Appendix A.



KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Primary vehicle access route
- Sensitive receptors
 - Project-related
 - Non-project related

- Project boundary
- Development footprint
- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint (location number)

- Potential creek crossing
- Proposed primary site access point
- Potential site for construction accommodation village
- Plant community types requiring offsets
 - PCT 510 planted
 - PCT 1174 woodland
 - Paddock trees requiring offsets

Amended project layout

New England Solar Farm
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Figure 2.1

2.2 Site description

The project will be developed within the Uralla Shire LGA. At its closest point, the project boundary is approximately 6 km east of the township of Uralla, and the northern array area starts approximately 8.6 km south of Armidale (refer to Figure 1.1).

The amended project boundary for the development footprint, consisting of the full extent of the involved landholder lots, encompasses a total area of approximately 5,515 ha. The project boundary intersects land legally described and identified in Table 2.1 and Figure 2.2. Based on the current design and lease agreements between UPC and the project landholders, no subdivision is proposed on the lots identified within Table 2.1, with the exception of land required for the grid substation (refer to grey highlighted lots).

A number of Crown roads are located in the project boundary, which are currently either subject to closure or will be closed as required in consultation with the NSW Department of Industry – Lands & Water (DoI Lands and Water) in parallel with the planning assessment and approval process for the project.

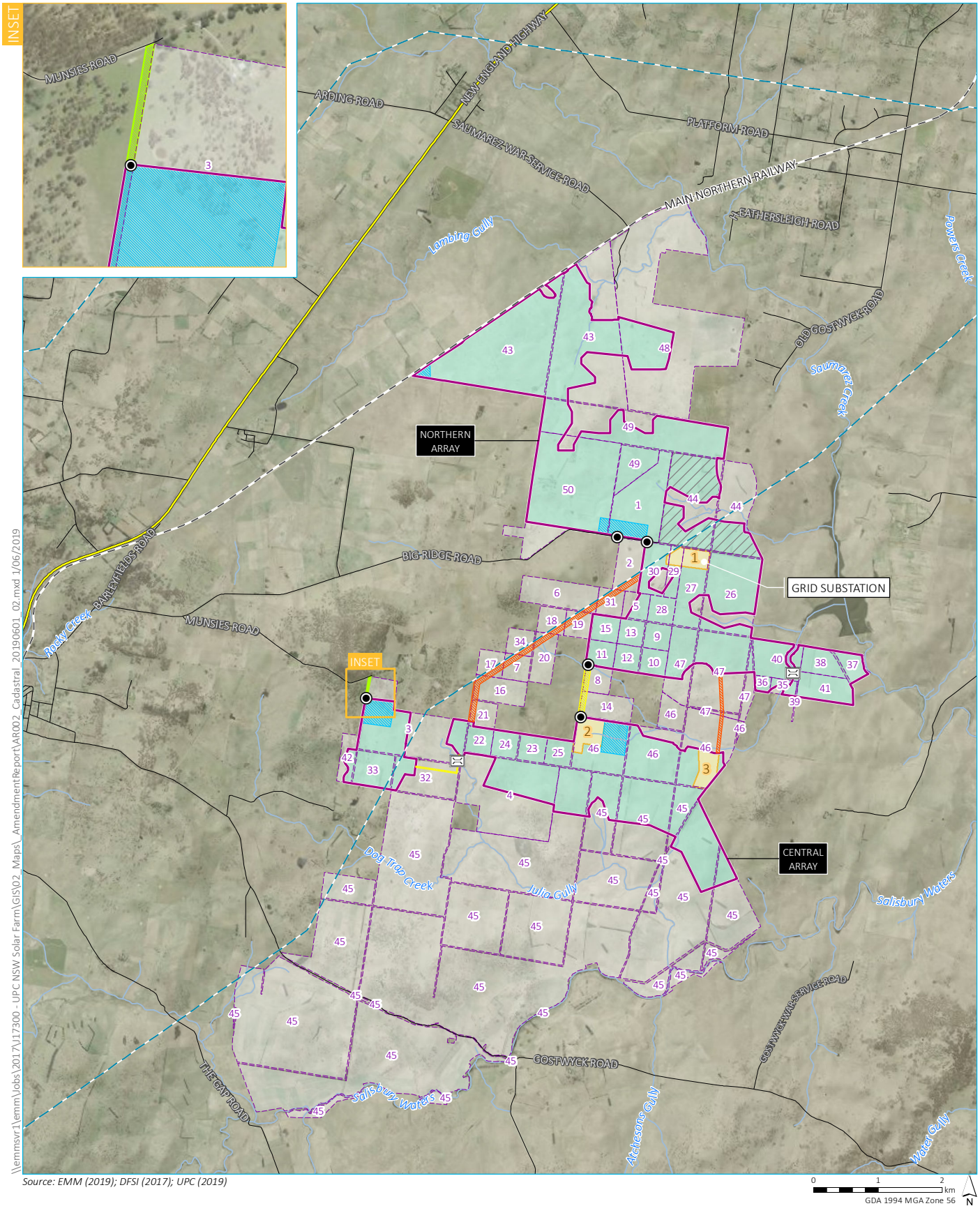
Table 2.1 Involved lots within the project boundary

Project infrastructure component	Lot	Deposited plan (DP)	Label (refer Figure 2.2)
Northern – PV module array	2	DP567937	1
Potential electrical cabling	82	DP755814	2
Central – PV module array			
Potential site access/electrical cabling	183	DP755827	3
Central – PV module array	154	DP755827	4
Northern – PV module array	79	DP755814	5
Potential electrical cabling	202	DP755814	6
Potential electrical cabling	109	DP755827	7
Potential site access/electrical cabling	108	DP755827	8
Northern – PV module array	89	DP755827	9
Northern – PV module array	103	DP755827	10
Northern – PV module array	101	DP755827	11
Northern – PV module array	102	DP755827	12
Northern – PV module array	90	DP755827	13
Potential site access/electrical cabling	113	DP755827	14
Northern – PV module array	91	DP755827	15
Potential electrical cabling	111	DP755827	16
Potential electrical cabling	110	DP755827	17
Potential electrical cabling	93	DP755827	18
Northern – PV module array			
Potential electrical cabling	92	DP755827	19
Potential electrical cabling	98	DP755827	20
Central – PV module array			
Potential electrical cabling	122	DP755827	21
Central – PV module array	123	DP755827	22
Central – PV module array	125	DP755827	23
Central – PV module array	124	DP755827	24

Table 2.1 **Involved lots within the project boundary**

Project infrastructure component	Lot	Deposited plan (DP)	Label (refer Figure 2.2)
Central – PV module array	126	DP755827	25
Northern – PV module array	4	DP172594	26
Northern – PV module array	B	DP172594	27
Northern – PV module array	78	DP755814	28
Northern – PV module array	84	DP755814	29
Northern – PV module array	83	DP755814	30
Potential electrical cabling	80	DP755814	31
Central – PV module array			
Potential site access/electrical cabling	181	DP755827	32
Central – PV module array	182	DP755827	33
Potential electrical cabling	97	DP755827	34
Northern – PV module array	2	DP127777	35
Northern – PV module array	1	DP127777	36
Northern – PV module array	39	DP755827	37
Northern – PV module array	38	DP755827	38
Northern – PV module array	5	DP127777	39
Northern – PV module array	1	DP405515	40
Northern – PV module array	37	DP755827	41
Central – PV module array	296	DP755827	42
Northern – PV module array	221	DP755814	43
Northern – PV module array	2	DP174053	44
Central – PV module array	1	DP227322	45
Central – PV module array			
Potential electrical cabling	8	DP173619	46
Northern – PV module array			
Potential electrical cabling	6	DP172594	47
Northern – PV module array	21	DP1167870	48
Northern – PV module array	23	DP1171290	49
Northern – PV module array	24	DP1171290	50

The development footprint is the area within the project boundary on which infrastructure will be located (with the exception of areas of avoidance identified in Chapter 5 of the EIS and supporting technical assessments). The development footprint encompasses a total area of 2,070 ha, which includes 1,402 ha within the northern array area, 625 ha within the central array area and 43 ha associated with electrical cabling and site access corridors. Within the development footprint, approximately 1,000 ha will be required for the rows of PV modules. The remaining area is associated with power conversion units (PCUs), space between the rows, internal access tracks and associated infrastructure (including substations and BESSs). The development footprint also includes land required for connection infrastructure between the two array areas as well as land required for new internal roads to enable access to the two array areas from the surrounding road network. Subject to detailed design and consultation with the project landholders, security fencing and creek crossings may be required on land outside of the development footprint, but within the project boundary.



KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Project boundary
- Development footprint
- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint (location number)

- Potential creek crossing
- Proposed primary site access point
- Potential site for construction accommodation village

Cadastral details

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Figure 2.2

2.3 Project infrastructure

2.3.1 Solar arrays, PV modules, medium voltage cable network and power control units

The project will involve the development of two separate arrays of PV modules and PCUs. The number of PV modules and PCUs required will be dependent on the final detailed design of the project; however, based on a 720 MW (AC) facility, 30% oversizing and 400 W panels, it is anticipated that there will be approximately 2.4 million PV modules. Should the Ingeteam 5 MW PCU block be utilised across the two array areas, it is anticipated that there will be approximately 150 PCUs.

No changes to the configuration of the PV modules, PCUs and medium voltage (MV) cable reticulation network within the two array areas (as presented within Section 2.3.1 of the EIS) are proposed.

2.3.2 Solar array substations

As noted in Section 2.1, a solar array substation may be required in the central array to step the MV up to HV. Two parcels of land that form part of Lot 8 of DP 173619 (Label 46 in Figure 2.2) are currently under consideration for the placement of the solar array substation within the central array. The indicative locations for the solar array substation are provided in Figure 2.1. A larger footprint than what will likely be required has been provided at each location to allow for flexibility for placement of this infrastructure during the detailed design stage of the project (should it be required). Subject to detailed design, PV modules and ancillary infrastructure may also be placed within the substation/BESS footprints identified on Figure 2.1.

2.3.3 Collector network and grid substation

As part of the ongoing detailed design of the infrastructure layout within the development footprint, it may be necessary to utilise either underground or overhead cabling (or a combination of the two) to connect the two array areas. This optionality differs from the description of the collector network presented in Section 2.3.3 of the EIS. Use of overhead 33 kV conductors to connect the central array to the grid substation will remove the need for intermediate transformation at the central array. Overhead conductors are more cost effective and experience less electrical losses due to the cooling effect of the air as well as involving less surface disturbance.

No changes to the alignment or extent of the three potential connection corridors between the northern and central array areas are required (refer Figure 2.1). The only change will be that, where previously, new overhead ETLs were proposed exclusively to transport electricity between the array areas, underground cabling may be installed in their place. Subsequently, no additional impact assessments are considered necessary.

Indicative alignments for each of the electrical cabling corridors that may extend between the northern and central array areas are presented in Figure 2.1. The exact route of the electrical cabling within the two solar array areas has not yet been determined so this is not shown in the figure. This will be determined during the detailed design stage of the project.

The grid substation will be adjacent to TransGrid's 330 kV transmission line, which traverses the northern and central array areas (refer Figure 2.1). At the grid substation, the electricity generated by the two solar arrays will be stepped up to 330 kV and injected into the electricity grid via an existing TransGrid 330 kV transmission line. The grid substation will be within the indicative area of 10 ha that is shown on Figure 2.1 and will require a pad area of approximately 4 ha. The indicative area provided on Figure 2.1 covers part of the following lots:

- Lot B of DP 172594 (Label 27 in Figure 2.2);
- Lot 83 of DP 755814 (Label 30 in Figure 2.2); and
- Lot 84 of DP 755814 (Label 29 in Figure 2.2).

The exact dimensions of the grid substation will be refined during the detailed design stage of the project and in consultation with TransGrid. The exact location of the grid substation will be confirmed prior to the commencement of construction.

The land on which the grid substation is constructed is likely to require subdivision as this is a typical requirement of TransGrid, the likely owner/operator of the cut-in section of the yard. At the end of the operational life of the grid substation, the infrastructure on the subdivided lot will be decommissioned and the lot will be reconsolidated back into the residual lot. The proposed subdivision will be the subject of ongoing discussion with Uralla Shire Council, DPE and the project landholders.

2.3.4 Battery and energy storage system

As noted in Section 2.3.4 of the EIS, the BESS will be adjacent to one or more substations within the development footprint and will be housed within either a number of small enclosures/cabinets or larger battery buildings.

The specific design details for the BESS and their respective enclosure types have not been confirmed; however, it is anticipated that the BESS for the project will consist of either one BESS facility at the grid substation or two BESS facilities (one at the grid substation and one at the internal solar array substation, should one be needed at the central array). Each of the footprints presented on Figure 2.1 provide adequate flexibility for design and siting of the applicable BESS at each location.

The specific design details for the BESS will not be known until the completion of the detailed design stage of the project; however, the approximate dimensions and major components for each BESS will be generally aligned with the information presented in Section 2.3.4 of the EIS.

2.3.5 Construction accommodation village

No changes to the description of the construction accommodation village, as presented in Section 2.3.5 of the EIS, are required as part of the amendments to the project. If required, the construction accommodation village will be located on part of Lot 2 of DP 174053 in the northern array area (Label 44 in Figure 2.2).

2.3.6 Supporting infrastructure

In addition to the infrastructure described above and the more detailed description presented in Section 2.3 of the EIS, the project will also require:

- one or more O&M buildings (namely meeting facilities, a temperature-controlled spare parts storage facility, SCADA facilities, a workshop and associated infrastructure);
- a number of new internal roads to enable access to the two array areas from the surrounding road network including Munsies Road and Big Ridge Road (refer Figure 2.1);
- emergency access points to enable access to the two array areas from the surrounding road network in the case of an emergency (eg fire or flood);
- parking and internal access roads/tracks within the two array areas to allow for construction and ongoing maintenance; and
- fencing and landscaping around the solar arrays, substations and BESSs.

O&M buildings and associated infrastructure will likely be constructed within the footprints nominated for the substations and BESSs; however, their exact location will be determined during detailed design (refer Figure 2.1). The locations for the emergency access points will be identified as part of the project's emergency response plan (ERP) during detailed design.

Temporary infrastructure during the construction stage of the project including laydown and storage areas and a site compound are also likely to be required in the two solar array areas. Laydown areas will likely be in close proximity to the primary site access points and will be placed away from environmentally sensitive areas, where possible. Indicative locations for laydown areas and site compounds within the two array areas are provided on Figure 2.1.

Chain-link (or mesh) security fencing will be installed within the project boundary to a height of up to 2.4 m high. The specific location of the security fencing will be determined in consultation with the contractors selected for the construction of the project and project landholders. Fencing will restrict public access to the development footprint. Where possible, fencing will be positioned to minimise disruption to ongoing agricultural operations on land adjacent to the development footprint.

2.4 Construction

2.4.1 Site preparation

The need for heavy civil works such as grading/levelling and compaction will be minimised as much as practicable, as the flattest land areas within the array areas, which are already mostly cleared of vegetation, have been selected. Civil works will be required to prepare the array areas, which includes installing fencing, internal access tracks, and minor earth works (such as for installation of underground electrical cabling). It is anticipated that some cutting and filling may be required in undulating areas within the development footprint; however, this will be avoided where practicable.

Some heavier earth moving will likely be required for certain project infrastructure (eg substations and BESSs) in those instances where a level pad is necessary. In addition, grading around lower order streams and drainage channels within the three array areas may also be required in order to manage erosion during construction.

As part of site establishment works, management measures will be implemented to mitigate potential impacts on the environment and receptors within close proximity of the development footprint. Where required, additional or improved drainage channels, sediment control ponds and dust control measures will be implemented. Further, laydown areas and waste handling, fuel and chemical storage areas will be strategically placed to minimise potential environmental impacts during the construction stage of the project.

Site establishment works and preparation for construction may include:

- the establishment of a temporary construction site compound in a fenced-off area within the development footprint including:
 - a site office;
 - containers for storage;
 - workshops;
 - parking areas; and
 - temporary laydown areas.
- construction of access tracks and installation of boundary fencing;
- site survey to confirm infrastructure positioning and placement; and
- ongoing geotechnical investigations to confirm the ground conditions.

Should it be required, the installation of the construction accommodation village on Lot 2 of DP 174053 may also occur as part of the site establishment works and preparation for construction.

2.4.2 Construction activities

No changes to the description of construction activities, as presented in Section 2.4.2 of the EIS, are required as part of the amendments to the project.

2.4.3 Construction plant and equipment

No changes to the list of plant and equipment, as presented in Section 2.4.3 of the EIS, are required as part of the amendments to the project.

2.4.4 Delivery of construction materials and infrastructure

As noted in Section 2.4.4 of the EIS, construction materials and infrastructure may be transported to the array areas via road. Heavy vehicles up to 25 m in length will require access to the array areas. Construction materials and infrastructure delivered to the array areas will include:

- PV modules;
- piles;
- tracking tubes and associated tracker equipment (eg motors, bearings, drivetrains, etc);
- electrical infrastructure including cabling and PCUs;
- construction and permanent O&M buildings and associated infrastructure; and
- earthworks and lifting machinery and equipment.

Over-dimensional vehicle movements should be limited to a total of six vehicles for the delivery of the 33 kV/132 kV transformers that will be located at the solar array substation (if required) and the 33 kV/132 kV/330 kV transformers that will be located at the grid substation. The maximum estimated length of the over-dimensional vehicles is estimated to be up to 120 m. Decommissioning will require the same number of over-dimensional vehicles (ie to remove the transformers). No over-dimensional vehicle movements are anticipated during operations.

As part of ongoing design, UPC has also been considering the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure. The use of the Main Northern Railway line for deliveries to the northern array area has been the subject of consultation with John Holland Country Regional Network (JHR), Transport for NSW (TfNSW) and DPE. Additional information in relation to this activity is provided below. It should be noted that the final decision by UPC on whether the Main Northern Railway line will be used for delivery of construction materials and infrastructure will depend on a number of factors, including:

- timing and logistics;
- sequencing of works;
- cost and safety considerations; and
- EPC contractor acceptance of this alternative to using the road network.

i Location of train unloading and associated works

The proposed location of the train unloading is identified on Figure 2.3 and includes works within:

- part of Lot 221 of DP 755814 (within the development footprint for the northern array area) – this area will be used as a temporary laydown area during construction, primarily for the short-term storage of shipping containers (or similar); and
- part of Lot 2 of DP 982376 (outside of the development footprint within the rail corridor) – a temporary hardstand will be constructed in this area to facilitate safe and efficient use of a mobile forklift, reach stacker or similar during unloading activities.

A larger footprint than what will likely be required has been provided at each location to allow for flexibility for placement of this infrastructure during the detailed design stage of the project. The exact dimensions for the temporary hardstand will be refined during the detailed design stage of the project and in consultation with JHR and TfNSW.

UPC proposes to unload the trains using specific container unloading equipment such as a mobile forklift or reach stacker. The equipment will unload the train within the temporary hardstand area and transport the shipping containers (or similar) to the temporary laydown area within the development footprint for the northern array area (refer Figure 2.3). During unloading, the train will likely shunt along the track to allow for safe and efficient unloading from the full length of the temporary hardstand (approximately 100 m). This will allow UPC to unload approximately four containers with each train movement.

The existing level of the rail corridor, Main Northern Railway line and development footprint for the northern array is quite flat through the area shown in Figure 2.3 and it is anticipated that minimal ground disturbance will be required (refer Photograph 2.1 and Photograph 2.2). The level crossing visible in Figure 2.3 and Photograph 2.1 only services the property on which the northern array is located, subsequently, there will be no impacts on the users of the level crossing.

Construction materials and infrastructure delivered to the temporary laydown area will then be relocated to other areas within the development footprint using internal access roads.

All light and heavy vehicles that require access to the temporary laydown area (within the development footprint for the northern array area) and the temporary hardstand (adjacent to the Main Northern Railway line and within the rail corridor) will travel to these areas from the primary site access point for the northern array area (off Big Ridge Road) using the project's internal access roads. This includes heavy vehicles transporting gravel (or similar) to the two areas during site establishment works, as well as deliveries of construction plant and equipment. It is anticipated that this equipment will already be available on-site as it will be the same equipment that will be used during the construction of the project's internal access roads.

The location for an emergency access point will be identified as part of the project's emergency response plan (ERP) during detailed design.



Photograph 2.1 **General condition of Lot 2 of DP 982376 at the proposed laydown area – looking south (outside of the development footprint and project boundary)**



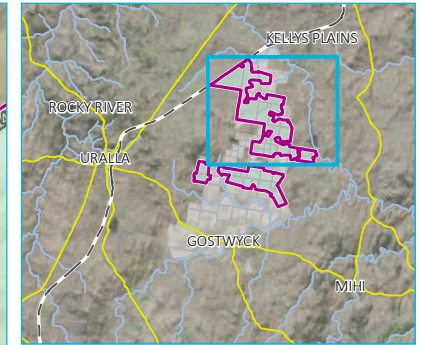
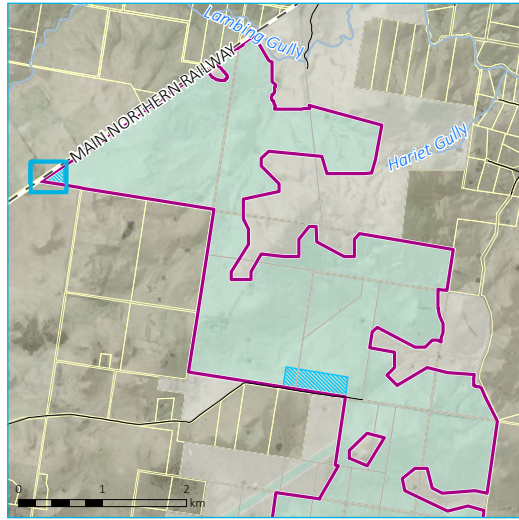
Photograph 2.2 **General condition of Lot 2 of DP 982376 at the proposed laydown area – looking north (outside of the development footprint and project boundary)**

The shipping containers (or similar) will likely have a height of approximately 2.9 m. The equipment proposed for use during train unloading have limited vertical reach. Subsequently, the maximum height of infrastructure within the laydown area during the unloading activities will be approximately 8.7 m.

As noted above, the containers will only be stored within the temporary laydown area on-site for a short duration, before being unloaded or transferred elsewhere within the development footprint. Once emptied, the shipping containers (or similar) will be removed off-site during subsequent train movements.

At the completion of construction, PV modules and ancillary infrastructure may be placed within the laydown area identified on Figure 2.3. The temporary hardstand within the rail corridor will be decommissioned and rehabilitated in consultation with JHR and TfNSW.

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KEY

- Rail line
- Named watercourse
- Main road
- Local road
- Cadastral boundary
- Project boundary
- Hardstand in rail corridor
- Development footprint
- Solar array
- Potential laydown area/site compound

Deliveries via the
Main Northern Railway

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Figure 2.3

ii Origins, timing, frequency and duration

It is anticipated that it will take approximately 4 hours to unload each train and that an average of 2 trains per week may be used for the delivery of construction materials and infrastructure.

The trains will likely originate at Port Botany in Sydney and will need to stable in Armidale to allow for passenger services to pass. The train from Sydney to Armidale passes the northern array area at approximately 8:50 am. The return train to Sydney passes the northern array area at approximately 5:20 pm. Therefore, UPC proposes to unload the train during the day between these two train services.

As part of consultation with JHR, the potential to unload at night was discussed as this would allow a longer window between passenger trains; however, this is currently not the preferred approach as it would require the use of temporary lighting plant at both the hardstand and laydown areas.

iii Consultation and approval process

UPC has been engaging with JHR and TfNSW in relation to the proposed use of the rail line (refer Appendix C). This included a site inspection of the areas identified in Figure 2.3, Photograph 2.1 and Photograph 2.2.

During this consultation, it was confirmed that JHR are the agent/operator of the Main Northern Railway line at the proposed location and TfNSW are the owner and sole approver for any proposed works within the rail corridor.

To allow for the development of the hardstand and unloading operations (ie activities outside of the development footprint), a licence from TfNSW is required. As noted during consultation with DPE, this is a separate approval process and will be undertaken in consultation with JHR and TfNSW.

As the agent/operator, JHR has provided an informal briefing to TfNSW to introduce the project and the proposed activities and it's been confirmed that the proposed unloading activities are operationally viable with sufficient siding resources available along the relevant sections of the Main Northern Railway line.

Evidence of UPC's dialogue with JHR and TfNSW in relation to the proposed activities (ie development of a temporary hardstand and performing unloading operations for a limited period) is provided in Appendix C. UPC will commence the application process directly with JHR (who handle the administrative part of the process) and TfNSW (who will be the approval authority and distribute the licence).

iv Additional assessment requirements

During consultation with DPE, it was noted that potential noise impacts from the train unloading activities required further consideration. To address this, the following additional assessments have been performed with the results summarised in Section 5.7 of this report:

- a quantitative assessment of potential construction noise impacts from rail delivery and unloading of construction materials with respect to the NSW *Interim Construction Noise Guideline* (DECC 2009); and
- a quantitative assessment of potential sleep disturbance impacts from rail delivery and unloading of construction materials with respect to the NPfI (EPA 2017).

Based on the limited use of the Main Northern Railway line at this location, a quantitative assessment of the proposed works on existing rail use is not considered warranted.

There are no sensitive receptors (ie dwellings) within 2 km of the proposed temporary hardstand or laydown area. Due to their temporary nature (ie maximum of the 36-month construction period) and the presence of remnant vegetation and planted wind breaks within the surrounding landscape, the train unloading activities and associated works are considered unlikely to have any significant noise, dust or visual amenity impacts on the closest receptors (refer Figure 5.7). Nonetheless, the noise management and mitigation measures described in Appendix B will be implemented as part of any future unloading activities, where practical.

The use of the Main Northern Railway line for delivery of construction materials and project infrastructure would reduce the number of project-related heavy vehicles on the local and regional road network. As this activity is still

subject to further consultation with JHR and TfNSW and there are a number of factors that may influence UPC's decision on whether or not to utilise this alternative, the assumptions made as part of the traffic impact assessment have not been revised. The results presented in Section 5.8 assume that the delivery of construction materials and project infrastructure will be via road only and are therefore considered a worst case scenario.

2.4.5 Construction staging, duration and hours

Construction of the project is still anticipated to take approximately 36 months from the commencement of site establishment works to commissioning of the two array areas. It is anticipated that the project will be constructed in two stages.

Stage 1 will include complete construction of the northern array area including the grid substation and is anticipated to take approximately 25 months to complete.

Stage 2 will include complete construction of the central array area and is anticipated to take approximately 20 months to complete. Stage 2 also includes the construction of the BESS, which is also anticipated to take approximately 20 months to complete.

Stage 2 will commence approximately 12 months after the commencement of site establishment works planned as part of Stage 1.

As noted within the EIS, the exact timing of each stage, including the commencement of Stage 1, the commencement of Stage 2, and the subsequent duration of the overlap between the two stages will be determined during the contracting, detailed design and financing stage of the project following project approval. Similarly, the overall duration of the project's construction will also be confirmed at this time once the preferred engineering, procurement and construction (EPC) contractor is selected and the detailed construction schedule is confirmed. The timeframes are indicative only and reflect a conservative upper limit of potential impacts from the project.

Construction activities will be undertaken from 6am to 6pm Monday to Sunday. Exceptions to these hours may be required on limited occasions. Uralla Shire Council and surrounding landholders will be notified of any exceptions.

2.4.6 Construction workforce

Consistent with the information presented in Section 2.4.6 of the EIS, the project will require a peak construction workforce of up to 700 people.

No changes to the peak and average workforce assumptions, as presented in Section 2.4.6 of the EIS, are required as part of the amendments to the project.

During construction, there will be a preference for employment of local and regional residents where they are able to demonstrate relevant skills and experience and a cultural fit with UPC and the EPC contractor.

2.5 Services

The project may require connections to the electricity, telecommunications, water and sewer networks. During construction, electricity requirements will be met by backup generators.

2.6 Operation

Consistent with the information presented in Section 2.6 of the EIS, the project will require a workforce of up to 15 FTEs during operations.

No changes to the project's operational lifespan or the tasks required during the ongoing operation of the project, as presented in Section 2.6 of the EIS, are required as part of the amendments of the project.

2.7 Decommissioning

No changes to the description of project decommissioning, as presented in Section 2.7 of the EIS, are required as part of the amendments to the project.

2.8 Environmental management

An environmental management strategy will be implemented to provide the strategic framework for environmental management of the project.

Chapter 5 provides an updated summary of the management measures that will be implemented during the construction and operation of the project to manage, mitigate and/or monitor potential impacts identified within the EIS and this AR.

3 Strategic and statutory context

3.1 Strategic context

The project will support the Commonwealth and NSW governments to achieve renewable energy and greenhouse gas (GHG) emission reduction targets. The production of renewable energy directly aligns with the objectives of the NSW Government's *Renewable Energy Action Plan* (REAP) and the project will contribute to increased energy security through valuable contributions to a more diverse energy mix.

Once operational, the project will generate up to approximately 2,000 GWh of electricity annually. This is the equivalent of the electricity required to power up to 250,000 NSW households. In addition, the electricity generated by the project will contribute to Australia's targets as part of its commitments under the United Nations Paris Agreement on Climate Change. As part of the Paris Agreement, Australia will seek to reduce emissions by 26-28% below 2005 levels by 2030.

The project, in conjunction with other large-scale renewable energy projects, has potential to fill the need for replacement power generating capacity as ageing coal-fired generators in NSW are shut down. The construction of the project and its associated 200 MW (AC) two-hour energy storage will also contribute to the future development of the New England region as a renewable energy zone (REZ) which has been flagged by the NSW Government, TransGrid and the Australian Energy Market Operator (AEMO).

By encouraging economic activity and creating employment opportunities, the project will support growth and development in the New England region and will help to achieve a more diverse and sustainable economy. The project will provide a number of direct and indirect social, economic and environmental benefits that align with the values of Uralla Shire Council and the *New England North West Regional Plan* (NSW Government 2017), including the creation of employment opportunities, diversification of revenue streams and significant reductions in GHG emissions.

3.2 Statutory context

3.2.1 Approval process

As noted in Section 1.1, the project is classed as SSD under the SRD SEPP. A DA and EIS was submitted under Part 4, Division 4.1 of the EP&A Act. The DA and EIS for the project were publicly exhibited from 20 February to 20 March 2019.

Following the public exhibition of the DA and EIS, over 100 submissions were received by DPE, including submissions from government agency and other organisations and public feedback. An RTS report will be submitted to DPE to respond to the matters raised in these submissions.

Following receipt of this AR and the RTS report, DPE will prepare its assessment report considering the EIS, this AR, all submissions received during the exhibition process and the RTS report. DPE's assessment report will then be forwarded to the consent authority for consideration before determining the DA.

The Independent Planning Commission (IPC) have been determined the consent authority for the project. DPE are still responsible for preparing the assessment report to the IPC about this DA. However, DPE's report will not be binding on the IPC.

3.2.2 Summary of licences, approvals and permits

No changes to the summary of the licences, approvals and permits that are likely to be required for the project, as presented in Section 3.2.5 of the EIS, are necessary as part of the amendments to the project.

As noted in Section 2.4.4, should the Main Northern Railway Line be used for delivery of construction materials and project infrastructure, a licence from TfNSW would be required to allow for the development of the hardstand and unloading operations (ie activities outside of the development footprint). As noted during consultation with DPE, this is a separate approval process and will be undertaken in consultation with JHR and TfNSW.

As noted above, the IPC have been determined the consent authority for the project.

4 Engagement

4.1 Introduction

Stakeholder engagement on the New England Solar Farm has been comprehensive to date and reflects the importance UPC places on this aspect to its business. Since the submission of the EIS, UPC has continued to work with all stakeholders as the approval process for the project progresses.

This chapter provides an overview of the engagement activities carried out as part of the preparation of the AR.

Consultation has been, and will continue to be, undertaken with a range of stakeholders including various local and NSW Government agencies, the local community and neighbouring landholders. Ongoing stakeholder engagement has been led by UPC with the support of EMM.

This chapter includes:

- a summary of the objectives of consultation since the public exhibition of the EIS (Section 4.2);
- a summary of the engagement activities performed with regulatory, community, industry and other stakeholders (Section 4.3); and
- a record of media coverage following the amendments to the development footprint (Section 4.4).

Further details on stakeholder engagement activities are provided in Appendix C, which contains a copy of the following materials:

- a summary of the consultation register, which provides a record of all consultation undertaken as part of the preparation of the AR and RTS and provides key outcomes of this consultation;
- copies of community consultation materials (including community fact sheets, information boards, posters and flyers) presented to the local community;
- copies of government and regulatory agencies consultation (where relevant); and
- copies of media coverage.

4.2 Consultation objectives

The primary objectives for the stakeholder engagement that has occurred since the decision to amend the development footprint have been to ensure identified stakeholders have a sufficient understanding of:

- the amendments to the development footprint;
- how the amended project may affect them; and
- understand the interests that stakeholders have in the amended project, and how residual impacts are predicted to be experienced from their perspective.

4.3 Engagement with stakeholders

4.3.1 Regulatory

Engagement with key regulatory stakeholders (including DPE, Uralla Shire Council, OEH and DPI) commenced in February 2018. As key workstreams progressed, SEARs for the project were released and potential impacts were identified, engagement with regulatory stakeholders expanded to include DRG-GSNSW, EPA, RMS and Local Land Services (LLS).

As described in Section 1.1, UPC has performed a number of further amendments to the development footprint that was the subject of the DA and EIS, including the removal of the southern array area. These amendments have been the subject of further engagement with DPE, Uralla Shire Council, RMS, OEH and DPI.

Representatives from UPC met with Uralla Shire Council's Mayor and General Manager in April 2019 to advise them of UPC's decision to remove the southern array from the current DA for the project. Uralla Shire Council's councillors and selected staff were also informed of this decision via email. A follow-up meeting was held with Uralla Shire Council staff in May 2019 to further discuss the amendments to the project and how these relate to Uralla Shire Council's submission on the DA and EIS. UPC's formal response to that submission and the matters raised within it are provided in the RTS report.

Consultation with RMS, OEH and DPI in relation to the amendments to the project has focused on the subsequent change in potential impacts to regional roads, biodiversity and Aboriginal heritage, and agricultural production, respectively.

4.3.2 Community

i Targeted engagement with neighbouring landholders

As part of the amendments to the project and preparation of this AR, consultation has been, and will continue to be, undertaken with the local community and neighbouring landholders.

In April 2019, UPC met with landholders involved with the southern array area to advise them of UPC's decision to withdraw this area from the current DA for the project. UPC has committed to further engagement with this group of landholders following further consideration of the potential to develop a large-scale solar farm in this area.

In addition, the property owners of S9 (the closest non-project related rural residential property to the development footprint for the southern array area) and other neighbouring landholders were contacted by a representative from UPC and informed of UPC's decision to withdraw the southern array area from the current DA for the project.

As described in Section 1.3, in response to feedback received from neighbouring landholders (namely N4 and N5 – refer Figure 5.6), revisions have been made to the northern extent of the northern array area to increase the distance between the development footprint and neighbouring residences and thereby minimise visibility of project infrastructure. As part of this refinement, an area of approximately 16 ha has been excluded from the development footprint for the northern array area (refer Figure 1.2).

The additional refinement to the northern array area has also further reduced potential views north-west from N1 towards the northern array area. This outcome has been communicated to the landholder (refer Appendix C). As a result of this refinement, the actual visible extent of project infrastructure from N1 will be significantly less than that shown in the photomontage presented in the visual impact assessment (VIA) (refer Photograph C.6 of Appendix I of the EIS).

ii Community feedback

In verbal feedback provided to UPC, local residents have expressed their appreciation for UPC's ongoing engagement with the local community, as well as their willingness to listen to, and work to resolve, concerns (including through ongoing refinements to the development footprint). This includes the removal of the southern array area from the current DA, which has generally been positively received by the community.

iii Community engagement materials

To provide an opportunity for the local community to find out more about the project and engage with the project team, UPC launched the New England Solar Farm web page, community information line and email account in April 2018. The project web page remains active and in February 2019, UPC also created a dedicated Facebook page for the project. The aim of the Facebook page is to provide an open two-way channel for the community to share information or ask questions about the project, as well as renewable energy in general. The page has almost 100 members and approximately 70 posts have been published providing information on the project and the renewable energy industry. Local newspaper advertisements were published and project postcards and stakeholder emails were distributed to the local community to inform them of the launch of the Facebook page.

Since February, both Facebook and the web page have been used to provide regular progress updates to a wide audience, as well as helping to answer questions and hear the community's comments on the project.

In April 2019, the 'frequently asked questions' section of the project website was updated to reflect the amendments to the project and a detailed project update, media release and fact sheet were published providing details of UPC's decision to remove the southern array area from the current DA. This included a revised map showing the amendments to the development footprint. Stakeholder emails and Facebook posts were also distributed linking to the updated project material. Community members have been able to ask questions or make comments on the project amendments via the Facebook page both in private and public forums.

In addition, both the community information line and email account remain active and provide an avenue through which the community can stay up-to-date on the project and continue to share their views, concerns and ideas with the project team.

UPC continues to record the details of parties interested in participating in the construction and operation of the project. To facilitate this further, UPC has provided a contractor enquiry form on the project website.

iv Aboriginal stakeholders

Aboriginal stakeholders were identified and consulted as part of the preparation of the ACHA in accordance with *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a). A detailed description of this consultation was presented in Appendix D and Section 5.3 of the EIS.

The amendments to the project have been communicated to the registered Aboriginal parties (RAPs) and a summary of this consultation is provided in Section 5.3 and Appendix E of this report.

4.3.3 Industry and other stakeholders

i Uralla-Walcha Community for Responsible Solar/Wind Action Group

The Uralla-Walcha Community for Responsible Solar/Wind Action Group (herein referred to as the Action Group) is a special interest group comprised of members of the community that has been established to voice their concerns about large-scale wind and solar developments with the objective of ensuring these projects are responsibly integrated into the Uralla Shire and Walcha LGAs.

A representative from UPC contacted members of the Action Group in April 2019 to advise them of UPC's decision to withdraw the southern array area from the current DA for the project. UPC has committed to further engagement with the Action Group prior to the submission of any future DA for development of a large-scale solar farm in the southern array area. The members of the Action Group that were informed supported UPC's decision to remove the southern array from the current DA and agreed to try to resolve the issues raised prior to submitting any future DA for the southern array area.

As acknowledged within their submission on the DA and EIS, the Action Group do not object to the development of the northern and central array areas.

Regular project updates and invitations to the project's community information and feedback sessions have been provided to the Honourable Adam Marshall, State Government Member for Northern Tablelands since 2018. A representative from UPC contacted Adam in April 2019 to advise him of UPC's decision to withdraw the southern array area from the current DA for the project.

A representative from UPC also contacted the Federal Wind and Solar Farm Commissioner, Andrew Dyer, in April 2019 to advise him of UPC's decision to withdraw the southern array area from the current DA for the project. It should be noted that Andrew had previously provided independent information to community members in relation to the project.

Both Mr Marshall and Mr Dyer expressed their support for UPC's ongoing consultation efforts and the decision to try to resolve concerns in relation to the southern array area by removing it from the current DA.

4.3.4 Media coverage

The project has been the subject of media coverage, including newspaper articles within the Armidale Express, Uralla Wordsworth, The Northern Daily Leader and The Walcha News, and stories from local television and radio news providers, including PRIME7, NBN News and ABC Regional radio.

UPC provided information to local media to encourage wider communication of the amendments to the project. As a result, the Armidale Express, Uralla Wordsworth and ABC North West published stories with storied detailing UPC's decision to remove the southern array area from the DA. A link to the online content is provided below:

<https://www.armidaleexpress.com.au/story/6037946/upc-new-england-solar-farm-plans-revised-after-submissions/>

<https://online.flowpaper.com/79750743/23rdAprilEditionFINALWEB/#page=8>

A copy of selected media coverage is also provided in Appendix C.

5 Environmental impact assessment

5.1 Introduction

The SEARs identified the key matters for assessment in the EIS, which included consideration of the following:

- biodiversity;
- heritage;
- land;
- visual;
- noise;
- transport;
- water;
- hazards and risks;
- socio-economic;
- waste; and
- cumulative impacts.

Consideration of impacts to air quality was also included in the EIS.

This chapter of the AR summarises how the changes to the project impact the assessments of each of the key matters listed above. Where required, addendums to the technical reports prepared as part of the EIS have been appended to this report (refer to Appendix D to Appendix H). A summary of the mitigation and management measures is included in Chapter 6 and Appendix B.

5.2 Biodiversity

5.2.1 Overview

A biodiversity development assessment report (BDAR) was prepared in accordance with relevant NSW and Commonwealth legislation, governmental assessment requirements, guidelines and policies, and in consultation with OEH (Appendix C of the EIS).

The amendments to the project have reduced the extent of the development footprint. A memorandum has been prepared as an addendum to the BDAR (Appendix D of this report) and details the updates to the BDAR that were required as a result of the amendments to the project.

In addition, OEH provided a submission relating to the BDAR as part of their review of the EIS during the public exhibition period. A number of the matters raised in this submission have been incorporated into the memorandum to avoid unnecessary duplication (eg where a change to the offset calculations was required).

This section of the AR provides a summary of the biodiversity impacts associated with the amended project.

5.2.2 Existing environment

i Landscape features

The bioregion and subregion remain unchanged for the amended development footprint. A total of three Mitchell landscapes intersect with the development footprint, including:

- Moonbi - Walcha Granites (45%);
- Niangala Plateau and Slopes (42%); and
- Uralla Basalts and Sands (13%).

As a result of the amendments to the project, the development footprint is no longer within close proximity of Salisbury Waters or Cook Station Creek (sixth and fifth order streams, respectively). At its closest point, the central array is approximately 1 km from Salisbury Waters and approximately 5 km from Cook Station Creek.

The removal of the southern array has also increased the distance between Dangars Lagoon and the development footprint. At its closest point, Dangars Lagoon is approximately 5.6 km from the central array area.

ii Native vegetation

a Overview

The extent and type of native vegetation was assessed by a review of regional vegetation and habitat mapping as well as a site survey, carried out in accordance with the BAM guidelines and tools (OEH 2017). The percentage of native vegetation cover within a 1,500 m buffer of the two array areas is approximately 6.96%; however, this is significantly reduced to approximately 0.47% within the amended development footprint as the project has been refined to avoid areas of native vegetation where practicable.

b Plant community types

Two PCTs and four vegetation zones were identified within the amended development footprint from vegetation mapping and site surveys. These are presented in Table 5.1 and shown in Figure 5.1.

Table 5.1 Vegetation zones mapped within the amended development footprint

Plant community type	Condition class	Area (ha)	Status
510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Woodland	36	Not listed under the EPBC Act. Listed under the NSW BC Act - White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (EEC). Vegetation integrity score: 11
510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Pasture	985.1	Not listed under the EPBC Act. Listed under the NSW BC Act - White Box Yellow Box Blakely's Red Gum Woodland EEC. Vegetation integrity score: 13.6
510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Planted	1.6	Not listed under the EPBC Act or the NSW BC Act. Vegetation integrity score: 43.9
1174 - Silvertop Stringybark open forest of the New England Tableland Bioregion	Woodland	5.7	Not listed under the EPBC Act or the NSW BC Act. Vegetation integrity score: 29.1

Areas of land within the development footprint that have not been assigned to PCTs do not require inputting to the Biodiversity Assessment Method (BAM) calculator and therefore do not require plots, a condition description or generate a vegetation integrity score.

As part of OEH's submission on the BDAR and EIS, it was noted that clearing of planted vegetation does not require impact assessment or offsetting, other than consideration of biodiversity impacts specified in Clause 6.1 of the NSW Biodiversity Conservation Regulation 2017, providing that the vegetation was not established with assistance of public funds or forestry purposes. Vegetation that meets this description is classed as Category 1 exempt land, which allows for vegetation clearing to occur without approval. Consequently, planted vegetation within the development footprint has been split into two zones (refer Figure 5.1):

- Category 1 planted vegetation, which is exempt from assessment; and
- PCT 510 planted, those areas where public funding assistance occurred.

c Paddock trees

As part of the BDAR, a total of 93 paddock trees were assessed (refer Section 4.3.7 of the BDAR). The amendments to the project removed 21 paddock trees from the development footprint. Subsequently, a total of 72 paddock trees have been considered as part of the revised paddock tree assessment, comprising 12 different species.

The majority (65) of the paddock trees were assigned to PCT 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion, with 7 trees assigned to PCT 1174 Silvertop Stringybark open forest of the New England Tableland Bioregion.

A summary of the paddock trees identified within the amended development footprint is provided in Section 3.2 and Figure 3.2 of Appendix D.

iii Habitat assessment

The fauna habitat assessment presented in Section 5.1 of the BDAR is still applicable to the amended development footprint. Native vegetation is highly modified by both historical and ongoing management practices. Where woodland occurs, it is either limited to planted native wind breaks or patchy remnant woodland with an entirely absent midstorey and disturbed groundcover. Assessment of fauna and flora habitat concluded that the development footprint is only likely to support species that are able to persist in highly modified agricultural landscapes.

The most prominent change to the fauna habitat assessment is a reduction in the number of potential watercourse crossing points (including Cook Station Creek and Salisbury Waters). Watercourses described within the BDAR, which may require crossings include:

- an unnamed third order stream adjacent to two land parcels that form part of the northern array area; and
- an unnamed third order stream that is a tributary to Julia Gully and intersects the proposed site access corridor and ETL easement between two land parcels that form part of the central array area.

iv Threatened species

As noted in Section 5.3.4 of the BDAR, no threatened species were recorded within the development footprint opportunistically or during targeted surveys.

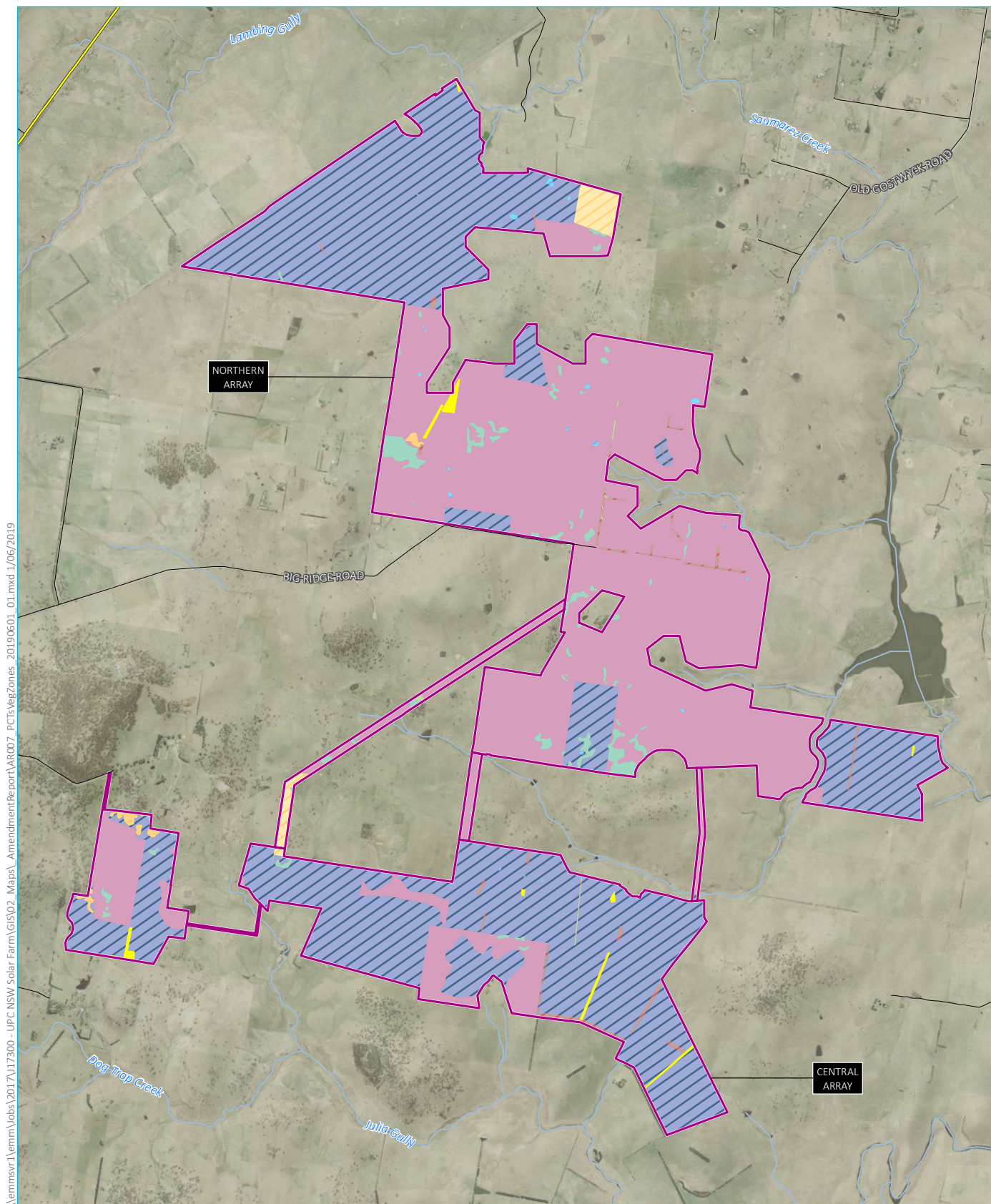
The survey effort and approach for the majority of the species credit species remains appropriate. The only target species requiring additional survey effort as a result of the amendments is the Koala (*Phascolarctos cinereus*).

Targeted surveys for Koala as part of the preparation of the BDAR (refer Figure 5.2 of the BDAR) were originally focused on the southern array area where the habitat and connectivity were considered most optimal. The removal of the southern array area as part of the amendments to the project led to a lack of Spot Assessment Technique (SATs) in the amended development footprint. However, it should be noted that given the initial investigations were conducted on the most optimal habitat across the development footprint presented as part of the EIS, the conclusion that the amended development footprint does not contain important koala habitat is still valid.

Anecdotal records of Koala were raised as part of stakeholder engagement with neighbouring landholders who own properties west of the central array. Subsequently, three additional SATs were conducted in the western portion of the central array area to address concerns from these landholders over potential impacts to local Koala populations as a result of the project's construction. The SAT locations were selected based on their relatively good connectivity to woodland areas to the west of the development footprint (refer to Figure 4.1 of Appendix D).

No Koala scats were observed in any of the three SAT areas (90 trees searched), nor were any Koala or distinctive 'poc' marks recorded. Given the scarcity of preferred feed tree species within the amended development footprint, the lack of records and the poor connectivity between woodland patches, the development footprint is not considered to contain important habitat for Koala, confirming the findings of the original assessment presented in Table 4.6 of the BDAR.

In summary, no important koala habitat is present in the amended development footprint based on lack of species occurrence and habitat assessment.



Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

- Development footprint
- Main road
- Local road
- Watercourse/drainage line

Plant community type and vegetation zone

- Category 1 - planted vegetation
- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted

Plant community types and vegetation zones in the development footprint

- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam

Plant community types and vegetation zones in the development footprint

New England Solar Farm
Amendment report
Figure 5.1

5.2.3 Assessment of impacts

i Potential direct and indirect impacts

The potential direct, indirect and prescribed impacts discussed in Section 6.1 of the BDAR remain relevant to the amended project. A number of the watercourse crossings considered as part of the BDAR will no longer be required as a result of the amendments to the project.

As noted in Section 1.2, since the public exhibition of the EIS, UPC has made revisions to the connection infrastructure between the northern and central array areas and the proposed substation configuration. No changes to the alignment or extent of the three potential connection corridors between the northern and central array areas are required (refer Figure 2.1). The only change will be that, where previously, new overhead ETLs were proposed exclusively to transport electricity between the array areas, underground cabling may be installed in their place. An additional temporary laydown area is also proposed for the northern array to facilitate potential train unloading activities should the Main Northern Railway line be utilised to deliver construction materials and infrastructure.

No additional direct, indirect or prescribed impacts to those considered in Section 6.1 of the BDAR are anticipated as a result of these amendments.

ii Serious and irreversible impacts

As noted in Section 6.3 of the BDAR, White Box Yellow Box Blakely's Red Gum Woodland is considered a potential entity to meet the serious and irreversible impacts principle.

Two zones of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion (PCT510_woodland and PCT510_pasture) meet the threatened ecological community (TEC) listing of White Box Yellow Box Blakely's Red Gum Woodland.

As a result of the amendments to the development footprint and subsequent exclusion of plots from the southern array area, PCT 510_pasture and PCT 510_woodland have vegetation integrity scores of 13.6 and 11 respectively, which are below the threshold condition regarding serious and irreversible impacts and therefore need no further consideration.

iii Impacts requiring offsets

Some impacts will require offsetting in accordance with Section 10 of the BAM.

Impacts to native vegetation requiring offsets include:

- direct impacts on 1.6 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted;
- direct impacts on 5.7 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland;
- direct impacts to 65 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion; and
- direct impacts to 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (noting this is exclusive of one paddock tree which did not require offsets as it was assigned to Class 1).

Native vegetation (including PCTs and paddock trees) requiring offsets is identified on Figure 2.1.

A total of 162 ecosystem credits are required to offset the residual impacts of the project. A credit report for area offsets and paddock trees is provided in Appendix B and Appendix C of the addendum to the BDAR (Appendix D).

Offsets will be provided in accordance with the biodiversity offset framework outlined in the BDAR and undertaken by an accredited person, as required by the SEARs.

iv Matters of national environment significance

An assessment of the impacts of the project on matters of national environmental significance (MNES) within the development footprint was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required (refer Section 7.1 of the BDAR).

All assessments concluded that no significant impacts on threatened entities are predicted to result from the project. The reduction in size of the development footprint will further reduce impacts and referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

5.2.4 Mitigation measures

As noted in Section 6.2 of the BDAR, a site-specific construction environmental management plan (CEMP) will be prepared prior to the commencement of construction or clearing works to ensure that impacts are minimised.

In addition to the measures listed in the BDAR the following mitigation measures have been included to address OEH's submission on the BDAR during the public exhibition of the EIS:

- A biodiversity management plan (BMP) will be prepared which will contain advice regarding the effective implementation of each of the biodiversity management and mitigation measures listed in Table 6.1 of the BDAR; and
- The BMP will include an unexpected finds procedure for threatened species, which will provide advice and photographs of key species with the potential to occur within the development footprint. If a threatened species or suspected threatened species is found during construction or operation of the project the following actions are recommended;
 - stop work within the vicinity of the species;
 - cordon off the area in question with an appropriate buffer;
 - inform the management team;
 - seek advice from an ecologist or species expert to confirm identification; and
 - consult with the relevant agencies to determine appropriate management, mitigation measures and additional approvals (if required).

5.2.5 Conclusion

The project is within a heavily disturbed landscape of agricultural land, with limited patches of native vegetation which are highly fragmented. Refinements to the development footprint have excluded areas of higher quality vegetation and habitat that may support threatened species. The PCTs in the development footprint are heavily grazed, and in poor condition, and only support fauna species which are able to persist in highly modified agricultural landscapes. No threatened species were identified during ecological surveys. Further, no significant impacts on MNES are predicted to result from the project.

The amendments to the project have further reduced the project's potential impacts on biodiversity.

The project will have direct impacts on biodiversity primarily due to the clearing of native vegetation and loss of species habitat. Indirect impacts on biodiversity may also occur during construction as a result of increased vehicle movements and noise and vibration.

Residual impacts on biodiversity will be managed through the implementation of the BMP, which will include measures such as pre-clearance surveys and standard erosion and sediment control and biosecurity management procedures.

Direct impacts to native vegetation requiring offsets include:

- direct impacts on 1.6 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion (planted);
- direct impacts on 5.7 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (woodland);
- direct impacts to 65 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion; and
- direct impacts to 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (noting this is exclusive of one paddock tree which did not require offsets as it was assigned to Class 1).

A total of 162 ecosystem credits are required to offset the residual impacts of the amended project. Offsets will be provided in accordance with the biodiversity offset framework. A credit report for area offsets and paddock trees is provided in Appendix D.

5.3 Aboriginal cultural heritage

5.3.1 Overview

An Aboriginal cultural heritage assessment report (ACHAR) was prepared in accordance with relevant NSW and Commonwealth legislation, governmental assessment requirements, guidelines and policies, and in consultation with OEH and RAPs (Appendix D of the EIS).

The amendments to the project have reduced the extent of the development footprint. A report has been prepared as an addendum to the ACHAR (Appendix E of this report) and details the updates to the ACHAR that were required as a result of the amendments to the project. The report also addresses several additional assessment commitments that were presented in Section 9.4 of the ACHAR and provides updated impact assessment and management measures in response to the findings of the additional archaeological investigations.

The additional Aboriginal cultural heritage assessments performed during and after the EIS exhibition period included:

- **Additional tree survey and management** – EMM identified that the survey undertaken in 2018 for the ACHA did not include inspection of every tree in the development footprint. Accordingly, further survey targeting all trees within the development footprint was completed so that any newly identified Aboriginal scar trees could be assessed and have management measures ascribed prior to project determination;
- **Scar tree verification and management** – there were four scarred trees (NE45, NE61, NE47 and NE67) that had ambiguous features that could not be discerned between being natural scars or scars created by Aboriginal people. There were an additional two trees of the same nature identified during the additional tree survey in March 2019 (NE101 and NE102). These six trees were marked for expert verification to determine if the scars are natural or of Aboriginal origin so that they could be assessed and have management measures ascribed prior to project determination; and
- **Archaeological test excavation** – UPC further investigated five sites with potential archaeological deposit (PAD) that were identified during archaeological survey to determine the significance of these sites and to establish appropriate project avoidance buffers, if warranted. Test excavation was conducted at sites NE15, NE27, NE33, NE70, and NE83 over 10 days from 8 to 18 March 2019.

In addition, OEH provided a submission relating to the ACHAR as part of their review of the EIS during the public exhibition period. A number of the matters raised in this submission have been incorporated into the memorandum.

This section of the AR provides a summary of the Aboriginal cultural heritage impacts associated with the amended project.

5.3.2 Consultation

EMM initially presented the proposed assessment methodology for the project to RAPs in May 2018. This outlined: the assessment process; a survey strategy; and that test excavation may have been required as part of ACHA. EMM stated that the test excavation would follow the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code) (DECCW 2010b).

As described in Section 5.3.1, during and after the public exhibition of the EIS, a number of additional assessments have been undertaken. In all instances, RAPs received notification of the additional assessments (including supporting methodologies, where relevant). This consultation is described in Section 1.3 of Appendix E and a consultation log and copies of relevant correspondence are provided in Appendix A of Appendix E.

The addendum to the ACHAR was sent to RAPs for review on 4 June 2019.

5.3.3 Existing environment

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

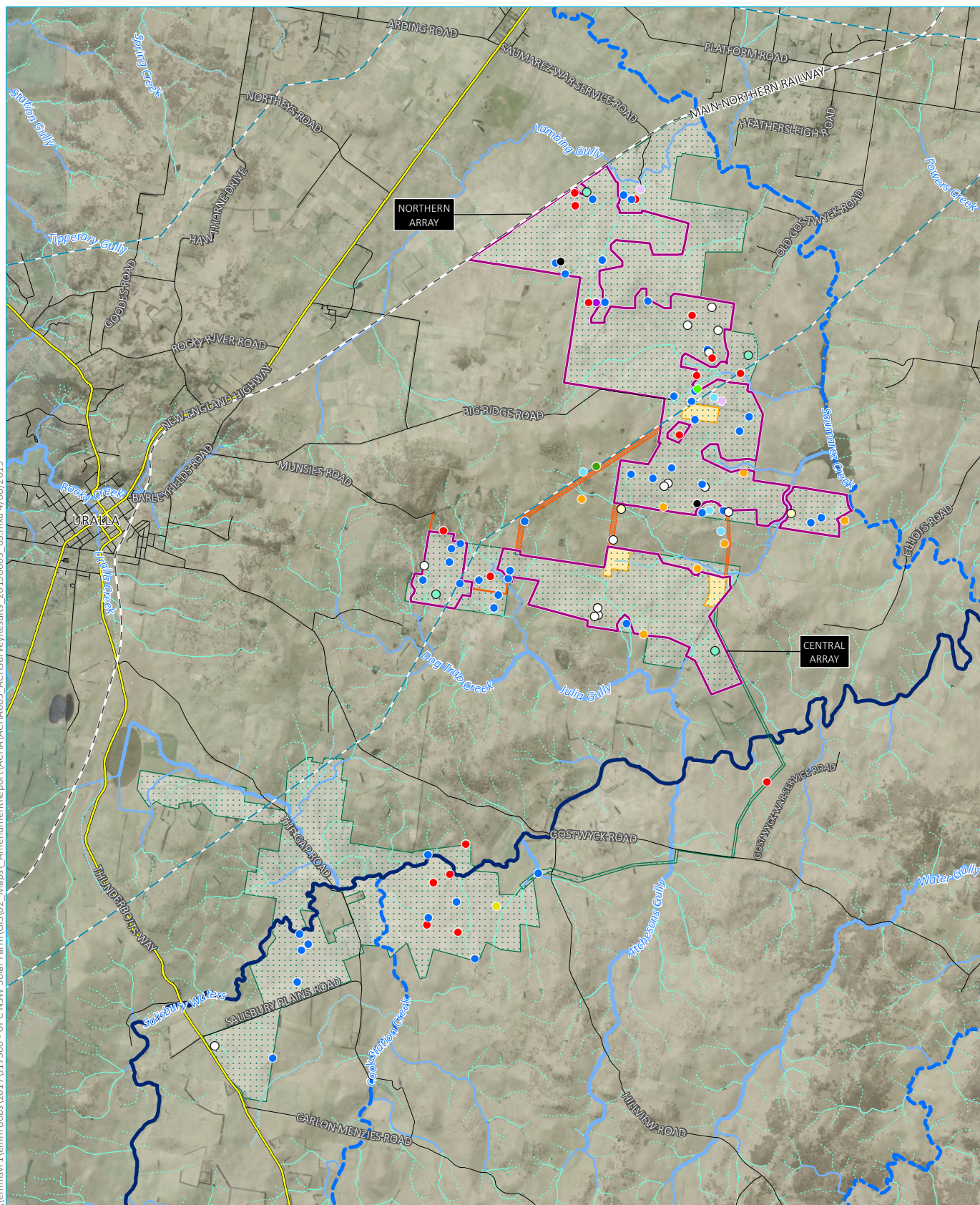
As noted in Section 5.2.2, as a result of the amendments to the project, the development footprint is no longer within close proximity of Salisbury Waters or Cook Station Creek (sixth and fifth order streams, respectively). The removal of the southern array has also increased the distance between Dangars Lagoon and the development footprint.

5.3.4 Assessment of impacts

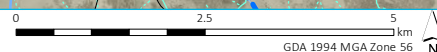
i Aboriginal cultural heritage field survey

A total of 102 sites were assessed as part of the archaeological investigations. The 102 sites comprise 99 Aboriginal sites, a dry stone wall with unverified potential to be an Aboriginal site (NE57) and two trees that are no longer considered to be Aboriginal scar trees (NE61 and NE101) as a result of further investigations (refer below). The site types and their frequencies are listed in Table 5.2 and shown on Figure 5.2.

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Source: EMM (2019); DFSI (2017); UPC (2019)



KEY

- | | | |
|--|-------------------------|--|
| — 330 kV transmission line | Strahler stream order | ○ Artefact scatter, confirmed deposit, PAD |
| — Main road | 1 | ● Dry stone wall |
| — Local road | 2 | ● Grinding groove |
| — Rail line | 3 | ● Grinding groove, PAD |
| Study area | 4 | ● Grinding groove, artefact scatter, PAD |
| Development footprint | 5 | ● Isolated find |
| Solar array | 6 | ● Isolated find, PAD |
| Potential site access/electrical cabling | Site type | ● Isolated find, confirmed deposit, PAD |
| Potential substation/BESS footprint | ● Artefact scatter | ● Quarry, artefact scatter, PAD |
| | ● Artefact scatter, PAD | ○ Scarred tree |
| | | ● Not an Aboriginal scar tree |

Aboriginal cultural heritage field survey results

New England Solar Farm
Amendment report
Figure 5.2

Table 5.2 **Site results summary**

Site type	Site frequency	Percentage of total sites
Isolated find	46	45.1%
Artefact scatter	16	15.7%
Scarred tree	14	13.7%
Artefact scatter, PAD	7	6.9%
Quarry, artefact scatter, PAD	4	3.8%
Grinding groove, artefact scatter, PAD	4	3.8%
Not an Aboriginal scar tree	2	2%
Isolated find, PAD	2	2%
Artefact scatter, confirmed deposit, PAD	2	2%
Isolated find, confirmed deposit, PAD	1	1%
Open artefact scatter	1	1%
Grinding groove	1	1%
Dry stone wall	1	1%
Grinding groove, PAD	1	1%
Total	102	100%

The most frequent and widely distributed Aboriginal objects are stone artefacts which are present in 85 out of the 102 sites (83%) including artefact scatters, isolated finds, quarries and grinding groove sites.

ii Additional scar tree survey

Not every mature native tree within the development footprint was inspected during the survey performed as part of the preparation of the ACHA. Subsequently, two additional days of survey were completed during the public exhibition of the EIS. The methodology for the additional survey is described in Section 3.1.1 of Appendix E.

The survey team identified one Aboriginal scar tree (NE97) and two tree scars that required expert determination (NE101 and NE102). In the process of the targeted tree survey, three additional stone artefact sites were also identified and recorded. NE98 and NE99 are both isolated silcrete artefacts within the central array and were revealed in paddock plough lines. NE100 is a small artefact scatter outside of the central array area on a crest landform.

The newly recorded sites are described in detail in Section 3.1.2 of Appendix E.

iii Scar tree verification

As noted in Section 5.3.1, there were four scarred trees (NE45, NE61, NE47 and NE67) that had ambiguous features that could not be discerned between being natural scars or scars created by Aboriginal people. There were an additional two trees of the same nature identified during the additional tree survey (NE101 and NE102). These six trees were marked for expert verification to determine if the scars are natural or of Aboriginal origin.

The scar tree verification exercise involved two separate site visits from scar tree experts. The first visit was by an OEH representative. The representative provided comment on each of the trees and guided group discussion around tree and scar attributes with the aim of educating the attendees about Aboriginal scar trees and issues around identification. Notwithstanding, they did not provide a determination on the nature of the scars.

In response to OEH's submission to the ACHAR regarding scar tree verification (refer Table 4.1 of the RTS), UPC engaged an archaeologist and scar tree specialist (Andrew Long) to make an independent determination on the six trees requiring verification (namely NE45, NE61, NE47, NE67, NE101 and NE102).

On the balance of evidence available it was Andrew Long's professional opinion that four scarred trees (NE47, NE45, NE67 and NE102) are of Aboriginal origin and should be treated as Aboriginal objects under the NSW *National Parks and Wildlife Act 1974* (NPW Act). However, sites NE61 and NE101 were not considered to be of Aboriginal origin and would not constitute Aboriginal objects under the NPW Act.

iv Test excavation

a Background and methodology

As noted within Section 4.1 of Appendix E, EMM identified that 21 of the Aboriginal sites identified during the archaeological surveys were considered to have PAD. The term PAD was ascribed to the predicted extent of concentrated subsurface Aboriginal objects in an area of potential conservation value.

As part of the ACHA, PAD was identified surrounding quarries (n=5), artefact scatters (n=9), isolated finds (n=3) and grinding grooves with artefact scatters (n=4). UPC committed to avoiding 17 of the 21 sites with PAD (refer to Table 9.2 of Appendix D of the EIS). The remaining five sites with PAD (NE15, NE27, NE33, NE70, and NE83) presented considerable constraints to project design and therefore UPC decided to explore options to develop in and around these areas. Subsequently, during the public exhibition of the EIS, test excavation at these sites was undertaken to establish the nature, significance and extent of these sites to better inform project design and establish suitable areas for avoidance and disturbance.

The primary aim of the test excavation at each site was to differentiate between areas of high and low archaeological potential. The simplest method to address this was through establishing drop-off in subsurface artefact frequencies so that significant areas could be marked for avoidance.

The test excavation method is described in Section 4.2 of Appendix E.

b Results

Detailed results for the test excavation completed at NE15 (Section 4.3), NE27 (Section 4.4), NE33 (Section 4.5), NE70 (Section 4.6) and NE83 (Section 4.7) are provided in Appendix E. The test excavation results build on the archaeological survey results in characterising the archaeological landscape of the development footprint and its surrounds.

The results presented in Chapter 4 of Appendix E further support the prediction of relatively intact archaeological sites situated on elevated rocky crest landforms (refer Section 6.6.1 of Appendix D of the EIS).

The stark drop-off in archaeological material beyond the rocky crests at NE70 and NE83 further support the notion that Aboriginal people targeted these landforms not only for raw materials (ie silcrete and basalt) and ground axe manufacture, but for utilitarian camping activities. The reasons behind the significant artefact drop-off away from the rocky crests are likely because such areas are more disturbed and also would have represented either non-occupied or peripheral occupation areas.

Based on the predictive model employed as part of the ACHA, NE27 had the highest archaeological potential out of the open artefact sites within a cleared landscape (ie not on rocky crests). NE27 has favourable landscape characteristics including being adjacent to perennial water on an elevated flat crest and within 1.5 km of a significant grinding groove (ie NE09). However, although there is evidence of Aboriginal camping and stone tool manufacture, even the most sensitive areas closest to the watercourse are met with patchy results and low to moderate artefact frequencies per test pit when compared to NE70. This suggests that the other open camp sites (ie those in less favourable contexts on cleared and cultivated paddocks) are likely to have low archaeological potential.

The results of the text excavation at NE83 provide further evidence that this site represents a basalt axe quarry and provides a significant connection to the broader archaeological landscape. Two AHIMS-listed quarries for procuring axes were identified within 2 km of the development footprint. NE83 indicates that basalt material for axe grinding was sourced locally and was possibly used at nearby grinding groove sites.

The raw materials recovered from the test excavation were generally expected. Silcrete dominates assemblages across the development footprint in surface and subsurface examples.

v Significance assessment

The frequency of sites falling within each significance category (as summarised in Table 5.7 of the EIS) has been updated to account for the results of the additional assessments undertaken since the public exhibition of the EIS. The significance values listed in Table 5.3 are based on assessed scientific and education values.

Table 5.3 Scientific significance frequency by type

Site type	Significance level					Total
	High	Moderate	Low	Undetermined	Not applicable	
Isolated find		1	45			46
Artefact scatter		2	14			16
Scarred tree		11	3			14
Artefact scatter, PAD		7				7
Quarry, artefact scatter, PAD		4				4
Grinding groove, artefact scatter, PAD	3	1				4
Not an Aboriginal scar tree					2	2
Isolated find, PAD		2				2
Artefact scatter, confirmed deposit, PAD	1	1				2
Isolated find, confirmed deposit, PAD	1					1
Open artefact scatter			1			1
Grinding groove		1				1
Dry stone wall (historical site)				1		1
Grinding groove, PAD	1					1
Total	6	30	63	1	2	102

A total of six sites of high significance have been identified. Of these, four are grinding grooves with research potential related to the type of groove created, the location of the grooves and the material the grooves are on. The other sites of high significance include:

- NE70, which is considered a good example of an open stone artefact site with easily identifiable features and good examples of artefacts; and
- NE83, which provides a unique example of a basalt axe quarry and an open camp site with smaller implements and has high connectedness to nearby grinding groove sites.

The 30 sites of moderate significance predominantly relate to artefact scatters, quarries and scarred trees. Although some of these sites may have the potential for higher scientific significance (ie if they were explored through excavation), further investigations are not warranted as they will be avoided by the project.

The 63 sites that have low significance are generally sites that do not have the same capacity to inform about past Aboriginal life, typically due to highly disturbed conditions. Notwithstanding the limited scientific potential of some sites, each site is of cultural significance to the Aboriginal community.

vi Potential sources of impact

The ground disturbance activities proposed as part of the project have the potential to disturb Aboriginal objects identified within the development footprint. A detailed description of these activities is provided in Section 8.1.1 of the ACHAR (Appendix D of the EIS).

As noted in Section 1.2, since the public exhibition of the EIS, UPC has made revisions to the connection infrastructure between the northern and central arrays and the proposed substation configuration. No changes to the alignment or extent of the three potential connection corridors between the northern and central array areas are required (refer Figure 2.1). The only change will be that, where previously, new overhead ETLs were proposed exclusively to transport electricity between the array areas, underground cabling may be installed in their place.

Further, an additional temporary laydown area is proposed for the northern array to facilitate potential train unloading activities should the Main Northern Railway line be utilised to deliver construction materials and infrastructure (refer Figure 2.3).

Outside of the development footprint, ground disturbance activities with the potential to disturb Aboriginal objects will be limited to the installation of security fencing (typically along existing property fence lines) and a number of creek crossings, should they be required. Security fencing will be restricted to land within the project boundary and will avoid identified sites. The exact location of creek crossings will be determined during detailed design.

vii Definition of impact types

Impacts to Aboriginal heritage values can include disturbance and loss. Disturbance means Aboriginal sites and objects will be disrupted and moved a short distance through the displacement of ground. Partial disturbance occurs where a portion of a site will be disturbed. Total disturbance is when the entirety of the Aboriginal site will be disturbed, and total loss is where the artefacts are removed or destroyed.

viii Impacts and site significance

a Overview

Impacts to Aboriginal sites are summarised according to their level of significance in Table 5.4.

Table 5.4 Scientific significance and levels of impact

Site significance/site type	None	Other	Partial disturbance	Total disturbance	Total loss	Total
High	5		1			6
Artefact scatter, confirmed deposit, PAD			1			1
Grinding groove, artefact scatter, PAD	3					3
Grinding groove, PAD	1					1
Isolated find, confirmed deposit, PAD	1					1
Moderate	27	1	1		1	30
Artefact scatter	2					2
Artefact scatter, confirmed deposit, PAD			1			1
Artefact scatter, PAD	7					7
Grinding groove	1					1
Grinding groove, artefact scatter, PAD	1					1
Isolated find	1					1
Isolated find, PAD	1	1				2
Quarry, artefact scatter, PAD	4					4
Scarred tree	10				1	11
Low	32	1		28	2	63
Artefact scatter	8	1		5		14
Isolated find	20			23	2	45

Table 5.4 Scientific significance and levels of impact

Site significance/site type	None	Other	Partial disturbance	Total disturbance	Total loss	Total
Open artefact scatter	1					1
Scarred tree	3					3
Not applicable	1					1
Dry stone wall	1					1
Total	65	2	2	28	3	100

Out of the 100 sites determined to be Aboriginal objects as part of the ACHA (including the additional assessments undertaken during and after the public exhibition of the EIS), 65 sites will be avoided and 35 sites will be impacted to some degree. Of the impacted sites:

- 28 sites will be totally disturbed;
- 2 sites will be partially disturbed; and
- 3 sites will be subject to total loss.

As described in Section 8.2 of the ACHAR, two of the sites listed as being impacted (NE10 and NE13) will not be impacted by the project elements; however, RAPs have raised concern that they may be inadvertently impacted by project landholder vehicle movements in the future. During consultation, RAPs noted that they would prefer it if their surface contents are collected to ensure the artefacts are not lost.

As a result of the removal of the southern array area, a total of 11 sites previously designated for impact will now be avoided by the project as they are no longer within the development footprint.

Two sites (NE61 and NE101) will be removed; however, these are not considered to be Aboriginal scar trees. These sites have not been included in Table 5.4.

b Scar trees

Following the additional scar tree survey and verification exercise and OEH's submission regarding tree scars, UPC has committed to avoiding all 13 standing probable Aboriginal scar trees identified within the amended development footprint. One felled probable Aboriginal scar tree (NE49) will be impacted; however, this tree will be salvaged (refer to Section 7.2 of Appendix E). NE61 and NE101 are not considered to be Aboriginal scar trees and therefore will be impacted through the development of the solar arrays.

c Test excavation

The test excavation results at NE27 and NE70 have assisted in characterising the extent and nature of subsurface archaeological material. UPC will avoid the significant portions of these sites as defined and described in Appendix E. These sites will receive peripheral impacts in areas of low to negligible archaeological potential (generally in areas where test pits recovered either one or no stone artefacts) through project development. The proposed impact areas adjacent to these sites are areas where it is acknowledged that the subsurface material may have been peripheral to the main camp areas once occupied by Aboriginal people, or that the material may have been dispersed through post-depositional disturbance and soil movement.

NE83 will be avoided. Test excavation extending away from the site and PAD boundary did not identify archaeological material and therefore it is unlikely that the project will impact archaeological material associated with NE83.

NE15 will be impacted by the construction of the northern array area. No archaeological deposit was identified during test excavation and, therefore, the primary impacts will be to the surface artefacts associated with this site.

NE33 is outside of the amended development footprint; however, test excavation did not identify archaeological deposit at NE33 and it would hypothetically be suitable for future development.

ix Potential impacts to unidentified sites

Stone artefacts may occur sporadically within the development footprint in areas outside the transect paths and may be impacted by the project. The project is unlikely to impact other site types such as quarries or grinding groove sites as the survey specifically targeted landform features predicted to contain such sites. Unknown artefacts may occur in existing moderately to highly disturbed areas; however, these are predicted to be of low scientific significance.

As a result of the additional scar tree survey and scar tree verification exercise, it is very unlikely that there are any unknown scar trees within the development footprint.

5.3.5 Management and mitigation measures

i Overview

A revised summary of the number of sites to be addressed by each management measure is provided in Table 5.5.

Table 5.5 Site management summary

Management measure/site type	Count
Avoidance	65
Artefact scatter	10
Artefact scatter, PAD	7
Dry stone wall	1
Grinding groove	1
Grinding groove, artefact scatter, PAD	4
Grinding groove, PAD	1
Isolated find	21
Isolated find, confirmed deposit, PAD	1
Isolated find, PAD	1
Open artefact scatter	1
Quarry, artefact scatter, PAD	4
Scarred tree	13
No management required (not an Aboriginal scarred tree)	2
Not an Aboriginal scarred tree	2
Salvage (remove and relocate)	1
Scarred tree	1
Surface collection	32
Artefact scatter	6
Isolated find	25
Isolated find, PAD	1
Avoid significant area (unmitigated impact to peripheral area with low to negligible artefact densities)	2
Artefact scatter, confirmed deposit, PAD	2
Total	102

ii Aboriginal heritage management plan

As described in Section 9.2.2 of the ACHAR (Appendix D of the EIS), an Aboriginal heritage management plan (AHMP) will be developed in consultation with DPE, RAPs and OEH. The AHMP will be prepared after project approval and will address all relevant conditions of approval. The AHMP will provide the details of the management measures outlined in the sections below and referenced in further detail in Section 7.2 of Appendix E and Section 9.2 of the ACHAR (Appendix D of the EIS).

iii Avoidance

Avoidance of Aboriginal sites is a preferred management option as it ensures that Aboriginal sites, and their landscape information, will be preserved for future generations.

A total of 65 sites out of 102 sites will be completely avoided by the project. Additionally, two sites investigated during test excavation (NE27 and NE70) will have their significant areas avoided by the project with only peripheral impacts expected.

The avoidance methods described in Section 9.2.3 of the ACHAR (Appendix D of the EIS) will be detailed in the project's AHMP.

iv Collection

All surface artefact sites (artefact scatters and isolated finds) impacted by the project will be collected. This will involve collecting the entire visible contents of 26 isolated artefacts and 6 artefact scatters.

The collection will be undertaken by qualified archaeologists and RAP representatives in accordance with the methodology provided in Section 9.2.4 of the ACHAR (Appendix D of the EIS).

v Special procedures

The ACHAR details the special procedures to be followed as part of the management of Aboriginal cultural heritage and includes reference to the storage of Aboriginal cultural materials and associated documentation in a keeping place, RAP site access arrangements and protocols for the discovery of Aboriginal ancestral remains or new Aboriginal sites.

As described in Section 9.3.2 of the ACHAR (Appendix D of the EIS), UPC is committed to providing ongoing management opportunities and access for Aboriginal people to NE09, and access to NE68 following completion of construction. The details of site access for NE09 and NE68 will be developed during consultation with the RAPs as part of the development of the AHMP.

In the event that newly identified sites will be impacted by the construction of the project and cannot be avoided, they will be managed in a manner commensurate with their assessed significance, consistent with the management measures provided for similar sites.

5.3.6 Conclusion

Field surveys performed as part of the ACHA identified 102 previously unrecorded sites within the development footprint, including four grinding groove sites and two areas of archaeological deposits considered to have high significance levels. The majority of the sites identified during the field survey were found on hill crests and slopes and consisted primarily of stone artefacts.

Avoidance of significant Aboriginal cultural heritage values has been a key aspect of the project refinement process, wherever possible. Subsequently, only one site of high significance (NE70) will experience peripheral impacts, and should this occur, it will be in an area of low to negligible archaeological potential.

Two sites of moderate significance (NE27 and NE49) are currently designated for impact by the project. Similar to NE70, NE27 will only experience peripheral impacts, and should this occur, it will be in an area of low to negligible archaeological potential. NE49 is a felled scar tree and will be salvaged.

The remaining sites currently designated for impact by the project are all of low scientific significance.

An AHMP will be developed in consultation with DPE, the RAPs and OEH. The AHMP will detail the management and mitigation of all identified Aboriginal sites along with special procedures and training and reporting protocols.

5.4 Historic heritage

5.4.1 Overview

A historic heritage assessment (HHA) and Statement of Heritage Impact (SoHI) were prepared in accordance with NSW guidelines and policies, including the *NSW Heritage Manual* (Heritage Office 1996), as well as the principles of the Australia ICOMOS (2013) *Burra Charter*.

The amendments to the project have reduced the extent of the development footprint and the number of identified heritage sites that will be impacted by the project. This section of the AR provides a summary of the historic heritage impacts associated with the amended project.

5.4.2 Existing environment

i Heritage listings

No heritage items listed on the National Heritage List (NHL) or Commonwealth Heritage List (CHL) occur adjacent to or within the project boundary. Several items identified on the State Heritage Register (SHR) and Section 170 Registers occur to the west of the project boundary. No State listed heritage items occur within the project boundary.

Uralla Shire LGA lists a number of items on Schedule 5 (environmental heritage) of the Uralla LEP. Many of the Uralla Shire LGA's heritage items are centred on the township of Uralla. One Uralla LEP listed heritage item occurs within the project boundary, namely Gostwyck Memorial Chapel and Precinct (I10 on Figure 5.3).

ii Heritage items in amended development footprint

Several heritage items were identified within the development footprint. These included:

- granite tors (stone outcrop) (HNE14);
- remnant fence lines (HNE21 and HNE43);
- rows of poplars (HNE41);
- old road alignment (HNE20);
- former stockyard (HNE34); and
- the cultural landscape (HNE37), including views through Gostwyck Station (HNE15) and from granite tors (HNE16).

The heritage items and heritage listings in the development footprint are presented in Figure 5.3. As a result of the amendments to the project, HNE26, HNE11 and HNE12 are no longer within the development footprint.

5.4.3 Assessment of impacts

The amended project will have impacts on heritage items and locations within the development footprint, as well as the cultural landscape in the region as listed below:

- partial impacts to the old alignment of Old Gostwyck Road (HNE20);

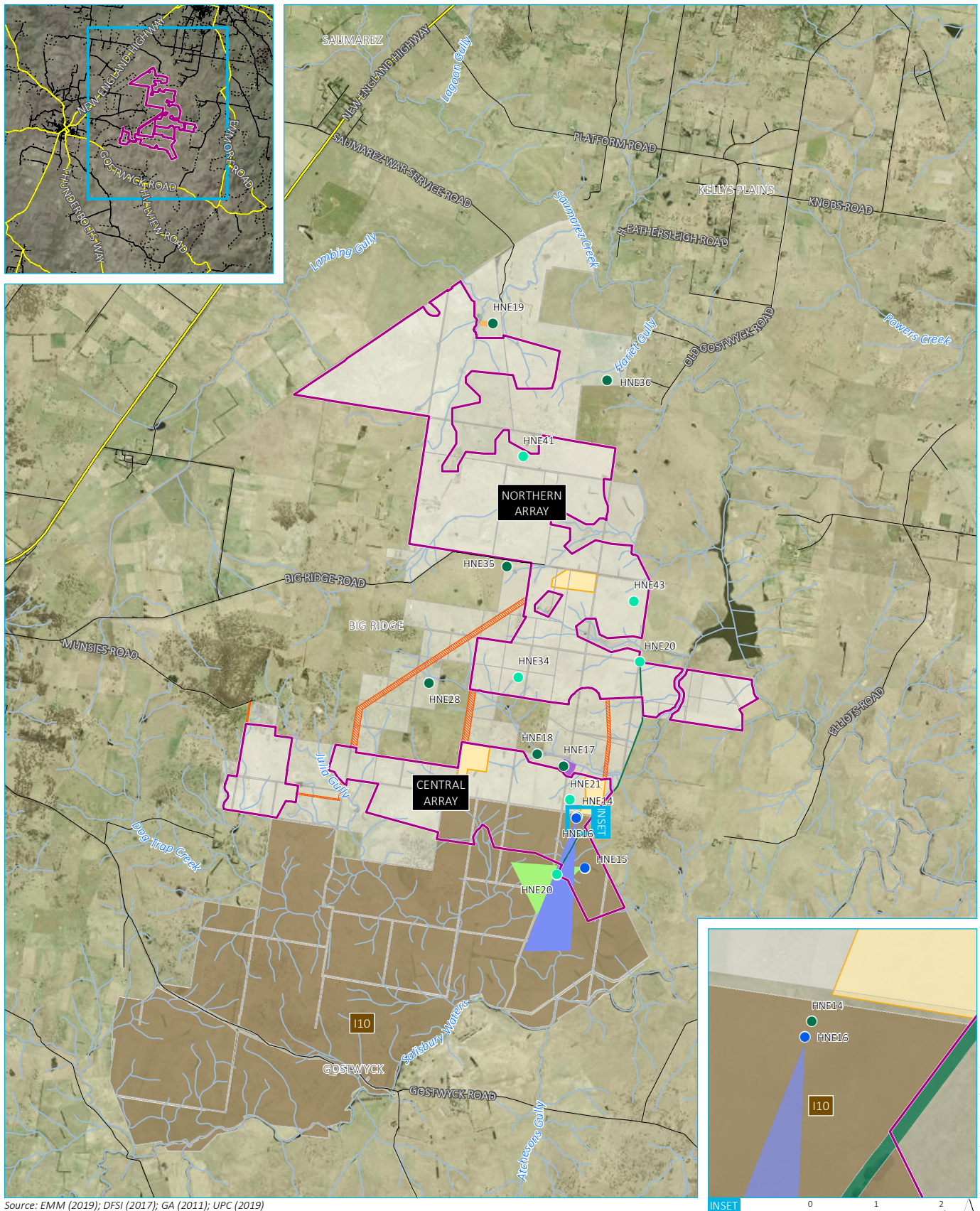
- removal of HNE21 and HNE43, two former fence lines within the development footprint for the northern array area;
- removal of HNE34, a former stockyard within the development footprint for the northern array area; and
- impacts to a small portion of HNE37, the cultural landscape in the region (including views and vistas experienced at HNE15 and HNE16) and features in the landscape, including HNE34 and some wind-breaks that contribute to the cultural landscape, but which don't possess significance outside of this context.

While Gostwyck Memorial Chapel and Precinct, a Uralla LEP listed heritage site, is within the project boundary (refer Figure 5.3), physical impacts to this site will not occur as a result of the project. Potential visual amenity impacts at Gostwyck Memorial Chapel and Precinct have been considered as part of the VIA (refer Section 5.6). As a result of the amendments to the development footprint, it is unlikely that project infrastructure will be visible from Gostwyck Memorial Chapel and Precinct (Viewpoint 7 on Figure 5.6).

Overall, it is anticipated that the project will have a low-to-moderate negative effect on the historical heritage significance of the rural character of the region and a moderate affect within the development footprint, predominantly by obscuring the significant cultural landscape rather than destroying it.

The amendments to the project, namely the reduced extent of the development footprint and subsequent reduction to the visibility of project infrastructure, have reduced the project's potential impacts on the historical heritage significance of the rural character of the region. It is noted that the majority of sites and views within the development footprint are not accessible by the general public.

The positive aspects of the project will be that the activities that commenced in the early historical period of the colony, namely wool production, will continue on the land surrounding the development footprint. Further, this project has provided opportunity to assess these early squatting runs in the field, which will provide a substantial amount of information that can be put to use to open up areas of investigation that were not available previously.



KEY

- Main road
- Local road
- Watercourse/drainage line
- Project boundary
- Development footprint
- Solar array
- Potential site access/electrical cabling
- Potential substation/BESS footprint

- Uralla LEP listing - item
- Indicative site boundaries
- HNE15
- HNE16
- HNE17
- HNE19
- HNE20

- Impact type
- None
- Physical
- Visual

Note: HNE37 is not shown as a point as it is representative of the cultural landscape

Project impacts to identified heritage values

New England Solar Farm
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Figure 5.3

5.4.4 Mitigation measures

i General mitigation measures

As noted in the EIS, following project approval and prior to any work commencing, a historic heritage management plan (HHMP) will be prepared to guide the conservation of heritage items and unexpected finds for the duration of the project. The relevant measures in the HHMP will be incorporated into the project's CEMP and OEMP to avoid accidental impacts during the construction and operational stage of the project. The HHMP will include management measures and identify locations for photographic archival recording.

Avoidance zones will be created for heritage items that will be protected. An active protection zone will be used for any item identified for protection that will be within 50 m of project activities. A passive protection zone, clearly identified during the project induction and toolbox talks as project exclusion zones, will be used for areas that are >50 m from any of the project activities.

If moveable heritage is found in the development footprint during project construction it will be protected by re-locating it to another area of the property in consultation with the landholder. Moveable heritage includes items such as farm machinery and water tanks and stands. Details on identification and actions will be included in the HHMP.

Consistent with the information presented in the HHA and SoHI, prior to any changes to the landscape and specific heritage items that may result from project activities, a digital photographic archival record will be prepared. The photographic record will focus on the development footprint for the northern and central array areas.

An unanticipated finds protocol will be refined in the HHMP to provide guidance to construction personnel should works uncover objects and fabric that may indicate relics. Work will stop if objects such as bonded bricks, timber or stones appearing in formation indicating a wall or floor are found, or if soil with artefact concentrations is excavated. A detailed materiality threshold will be determined prior to construction as part of the HHMP and staff involved in excavation work will be informed about how to apply it. The unanticipated finds protocol will include actions such as:

- if the find meets the materiality threshold defined in the HHMP, work will immediately but temporarily cease within 5 m of the find and the site supervisor or appropriate responsible person will be informed;
- an archaeologist will be contacted to assess the find, where relevant, and determine if it is clearly a relic or has moderate to high potential to be a relic (this may require additional research);
- if the find is determined to be a relic, a s146 (of the NSW *Heritage Act 1977*) is to be forwarded to the NSW Heritage Council who will be consulted on the appropriate management measure(s); and
- if the find is assessed and is not a relic, work inside the area that was made a no-go area can recommence.

Appropriate management measures range from do nothing to archaeological excavation.

Tree line wind breaks will be retained where practicable (ie where they are located to the south of PV module rows to avoid shading impacts and where they do not pose additional risks from a bushfire, pest or vegetation management perspective).

ii Site specific mitigation measures

The site-specific management measures proposed to be implemented for specific heritage sites within the amended development footprint are presented in Table 5.6. Of note, as a result of amendments to the project, mitigation measures are no longer required for HNE11, HNE12 or HNE26.

In addition, Table 8.1 of the HHA (Appendix E of the EIS) has been updated to account for the amendments to the project and a copy of the updated table has been provided as Appendix F of this report.

Table 5.6 **Site specific mitigation measures**

Site ID	Name	Mitigation measures
HNE11	Remnant of basalt wall 1	None required due to amendments to the development footprint.
HNE12	Remnant of basalt wall 2	None required due to amendments to the development footprint.
HNE17	Historical Gostwyck shepherd's hut	Detailed digital photographic archival recording. Active protection of this item with the use of sturdy bollards to protect from accidental impacts.
HNE19	Remnant house archaeological site	Include in general landscape digital photographic archival record. Active protection of this item with the use of flags close to the watercourse that separates it from the northern array area.
HNE20	Old Gostwyck Road alignment	Where the alignment can be identified, include in general landscape digital photographic archival record.
HNE21	Remnant fence line	Detailed digital photographic archival recording. Topographic survey.
HNE26*	Former stockyard	None required due to amendments to the development footprint.
HNE34	Former stockyard	Detailed digital photographic archival recording. Topographic survey. If possible, avoid this item.
HNE37 (including HNE15 and HNE16)	Cultural landscape and views	Selected archival digital photographic recording of amended development footprint and immediate surrounds will be taken prior to impacts. The amended development footprint and its surrounds are part of a larger significant cultural landscape, which will be partially physically impacted. Views will also be affected. Details of locations and subjects of photographs to be included in the HHMP.
HNE41	Rows of poplars	Include in general landscape digital photographic archival record.
HNE43	Remnant fence line	Detailed digital photographic archival recording. Topographic survey.

Notes: *Land surrounding this site underwent archaeological excavation in March 2019 as part of the ACHA with negative results.

5.4.5 Conclusion

Impacts to heritage, largely to the visual aspect of the cultural landscape, will occur. The amendments to the project have reduced the extent of the development footprint and the number of identified heritage sites that will be impacted by the project. There has also been a subsequent reduction to the level of impact to the cultural landscape. If managed carefully, impacts will not be significant as all known significant archaeological sites have been excised from the development footprint.

5.5 Land

5.5.1 Overview

An assessment of the project's potential impacts on land within the development footprint and surrounds was undertaken, which included a soil survey and review and assessment of relevant publicly available information. Consultation with the project landholders, neighbouring landholders and members of the local community was also undertaken (refer to Section 4.4.2 of the EIS).

Based on the amendments to the project described in Section 1.2 and Chapter 2, no additional assessments to the project's potential impacts on land are warranted. Potential impacts on biophysical strategic agricultural land (BSAL) and land and soil capability (LSC) have been assessed using available mapping. In addition, soil erodibility and soil erosion hazard for the amended development footprint has been assessed using data from the soil survey undertaken as part of the soil erosion assessment (SEA) (Appendix G of the EIS), site-specific slope data and rainfall erosivity (R factor) in accordance with Landcom (2004) requirements.

5.5.2 Existing environment

As a result of the amendments to the development footprint, the text provided in the EIS as it relates to the following sub-headings has been updated below:

- geology, soils and land capability;
- agricultural land;
- Crown land;
- surface water resources and flooding; and
- mining and minerals.

i Geology, soils and land capability

As noted within Section 5.5.2 of the EIS, the laboratory results from the SEA identified that the soils within the development footprint ranged from slightly acidic to neutral, with a trend of slight acidity in the surface progressing to neutral in the subsoils. Soil salinity was very low across the development footprint.

Two sites, one in the northern array and one in the central array were identified as having sodic subsoil (exchangeable sodium percentage (ESP) of greater than 6%). These soils have the greatest erosion potential due to their potential to disperse. Loch, Slater and Devoil (1998) recommend a minimum K factor (a measure of soil erodibility) of 0.06 for dispersive soils.

Of note, the central array area's tenosol soil type displays a high subsoil erodibility due to its texture and in one instance, subsoil sodicity. At this location, existing rill and gully erosion was observed where the subsoil had been exposed.

Erosion hazard for the project has been determined using the procedure described in Section 4.4.1 of *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004). As shown in Figure 5.4, there is a relationship between the slope of the land, rainfall erosivity (R factor) and subsequent erosion hazard.

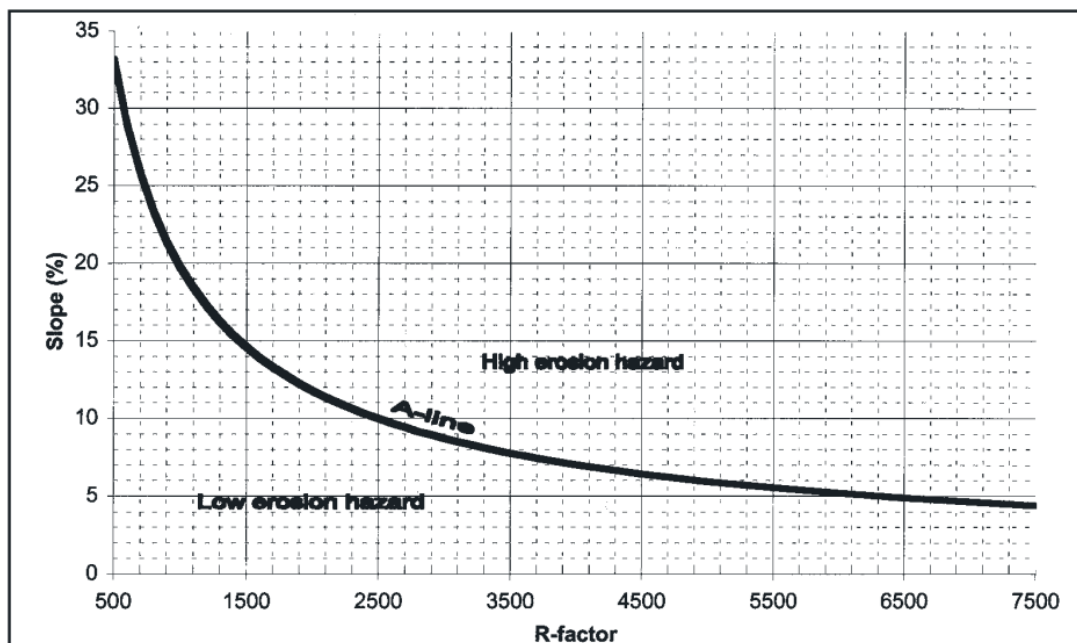


Figure 5.4 Assessment of potential erosion hazard (Source: Landcom 2004)

Slope gradient within the amended development footprint ranges from 0 to 10 degrees (refer Figure 1 of Appendix M of the EIS); however, UPC has confirmed that, generally, disturbance within the array areas will be limited to areas where slope ranges from 0 to 5.7 degrees (ie 10%). The R factor adopted for the project is 1,500. Applying these numbers to the erosion hazard nomograph shown in Figure 5.4 results in an erosion hazard of low.

Land and soil capability (including the extent of BSAL) within the amended development footprint is presented in Figure 5.5.

ii Agricultural land

As noted in the EIS, the project is within the Uralla Shire LGA, which covers an area of 3,215 km² in inner north-east NSW. The amended development footprint represents approximately 0.64% of the total land area within the Uralla Shire LGA.

The amendments to the development footprint have reduced the amount of land mapped as BSAL within the array areas to approximately 87.7 ha (northern array area only). In addition, approximately 12 ha of land mapped as BSAL intersects with the proposed electrical cabling corridor between the northern and central array areas. This represents approximately 0.0036% of the total land area mapped as BSAL in NSW.

iii Crown land

As a result of the amendments to the development footprint, the small parcel of Crown land (Crown reserve 95655 – refer Figure 1.6 of the EIS) adjacent to Salisbury Waters and the southern array is now approximately 8.4 km south-west of the amended development footprint. The project will not impact Crown reserve 95655.

Salisbury Waters has been identified as a Crown waterway. As a result of the amendments to the development footprint, at its closest location, Salisbury Waters is now 1 km from the development footprint and no project infrastructure is proposed to cross it (refer Figure 2.1).

iv Surface water resources and flooding

As a result of the amendments to the development footprint, Cook Station Creek (5th order stream) is no longer within the project boundary, which consists of the full extent of the involved landholder lots. Cook Station Creek is approximately 5 km south of the development footprint for the central array area.

Further information on surface water and flooding is presented in Section 5.9.

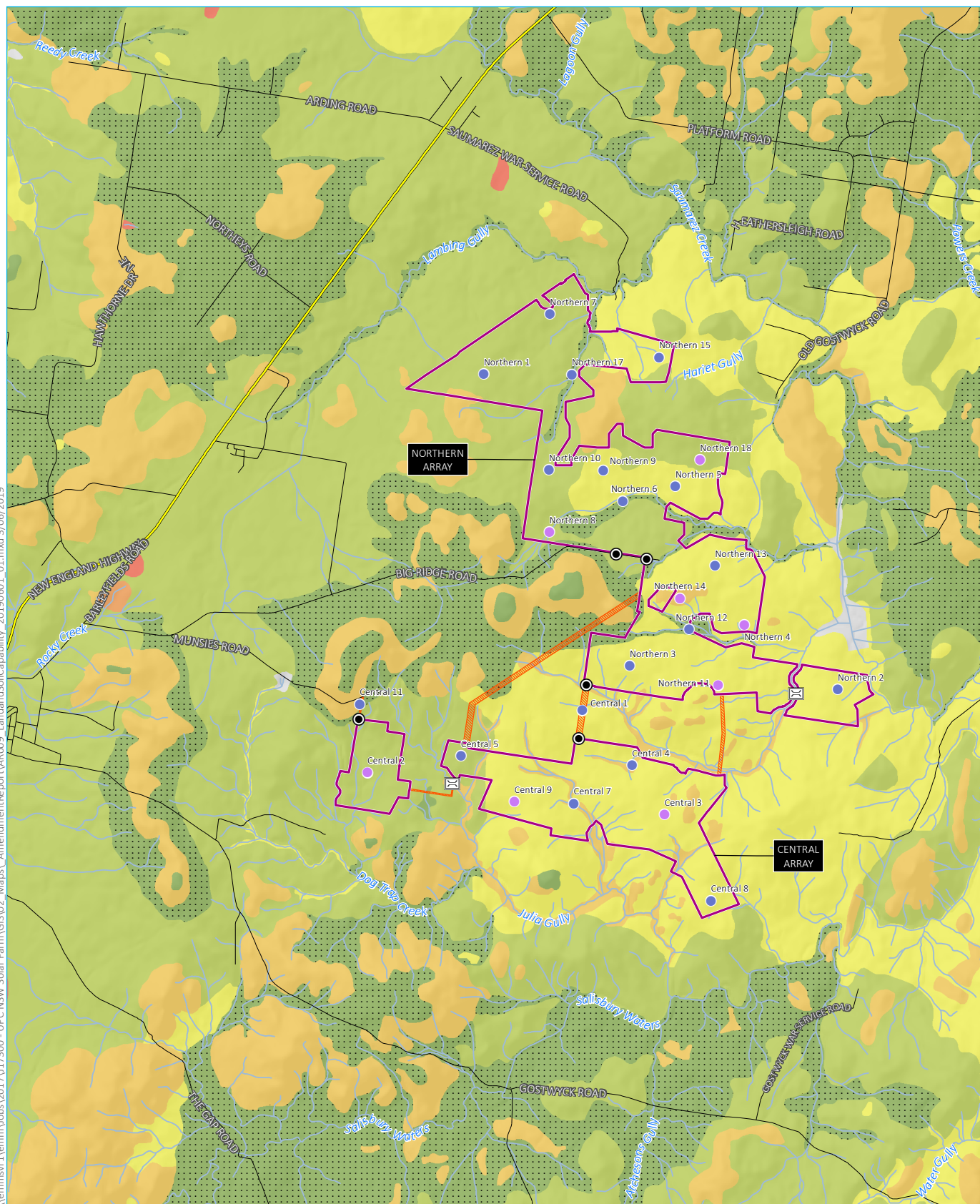
v Mining and minerals

No mining tenements within the project boundary were identified in a search of the DPE DRG's DiGS database. The closest mineral tenements are exploration licenses (ELs) issued under the NSW *Mining Act 1992*, including:

- EL6918 held by Kokong Holdings Pty Ltd, north of the township of Uralla, approximately 2.5 km west of the northern array area at its closest point; and
- EL6483 held by Biacil Holdings Pty Ltd, west of the township of Uralla, approximately 8 km west of the central array area at its closest point.

As part of the submission made by GSNSW –DRG, an area of higher mineral significance was identified within the southern area of the site presented as part of the PEA (refer to Figure 1.6 of the EIS). The project will not impact this area or exploration activities within areas outside of the project boundary.

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Source: EMM (2019); DFSI (2017); GA (2011); OEH (2013); UPC (2019)

KEY

- Main road
- Local road
- Watercourse/drainage line
- Development footprint
- Solar array
- Potential site access/electrical cabling
- Potential creek crossing
- Proposed primary site access point

- Soil survey location
- Laboratory analysed soil survey location
- Biophysical Strategic Agricultural Land

Land and soil capability class

- 3
- 4
- 5
- 6
- 7
- 8

Land and soil capability

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Figure 5.5

5.5.3 Assessment of impacts

i Rural residential development and subdivision

a Rural residential development

All land surrounding the development footprint for the two array areas is zoned RU1 Primary Production under the Uralla LEP, with associated minimum lot sizes of 200 ha, and therefore would not support rural residential development in the immediate vicinity of the development footprint under the current land zoning provisions.

The closest concentration of receptors is the township of Uralla, approximately 6 km west of the central array, and the regional city of Armidale, approximately 10 km north of the northern array. The area surrounding the two array areas is sparsely populated, with the exception of land north-east of the northern array area within the suburb of Kellys Plains.

As part of the project refinement process, the design and location of the development footprint within the project boundary has undergone a number of significant revisions in response to ongoing stakeholder engagement and environmental constraints identification. Potential impacts to the closest non-project related receptors have been considered in a number of technical assessments prepared as part of the EIS. Consideration of potential visual amenity (Section 5.6), noise (Section 5.7) and traffic (Section 5.8) impacts has also been included in this AR.

b Subdivision

The land on which the grid substation is constructed is likely to require subdivision. At the end of the operational life of the grid substation, the infrastructure on the subdivided lot will be decommissioned and the lot will be reconsolidated back into the residual lot.

All land surrounding the development footprint is zoned RU1 Primary Production under the Uralla LEP (refer Figure 2.4 of the EIS), with associated minimum lot sizes of 200 ha. As noted in Section 2.3.3, the indicative area for the grid substation covers part of the following lots:

- Lot B of DP 172594 (Label 27 in Figure 2.2);
- Lot 83 of DP 755814 (Label 30 in Figure 2.2); and
- Lot 84 of DP 755814 (Label 29 in Figure 2.2).

The subdivision of these lots may result in a lot size that is less than the minimum lot size under the Uralla LEP. Notwithstanding, in accordance with the provisions of Section 4.38 of the EP&A Act, the proposed subdivision will be permissible subject to the approval of the Minister for Planning or their delegate.

Once the final location of the grid substation within the subject lots is determined, the proposed subdivision will be the subject of further consultation with Uralla Shire Council, DPE and the project landholders.

ii Geology, soils and land capability

As noted in the EIS, the project may result in increased levels of soil erosion, primarily during construction when the ground disturbance activities take place. The project has been designed to utilise the existing topography where practical, to avoid extensive land reshaping during construction and to minimise the potential for soil erosion. Minimal cut and fill is expected to be required to achieve desired construction surfaces within the array areas and the PV solar modules are mounted on driven or screwed piles, which further minimises disturbance to more erosive subsoils and allows grass cover to be maintained.

Once construction is complete, revegetation of disturbed soils will be undertaken and significant impacts relative to existing land uses are not expected.

Soil erodibility risk has been assessed to be low across the development footprint other than areas where dispersive subsoils may be disturbed.

Management for erosion potential as well as rehabilitation will be incorporated as part of the standard ESC management practices during construction and operations and will be detailed within the EMP (refer to Section 5.5.4 and Appendix B).

iii Agricultural production and land use impacts

The project will result in a change to the current land use within the development footprint for the two array areas, being from agriculture to electricity generation. However, the majority of the landholders currently intend to continue with farming activities when the project proceeds, as the land area to be occupied by project infrastructure only accounts for a portion of their landholdings. Throughout the life of the project, the income generated through the lease agreements between UPC and the project landholders will also serve to 'drought-proof' their ongoing agricultural operations for the next generation of farmers.

The project will reduce the total area of land under agricultural production in the Uralla Shire LGA and more generally within the New England North West region through the establishment of the solar arrays and associated infrastructure. However, the loss of agricultural land represents a very small fraction of the agricultural output of both the Uralla Shire LGA and the New England North West region. Relative to its size, the project will have a relatively minor effect in terms of displacing agricultural production within the Uralla Shire LGA.

As part of the amendments to the development footprint, the area within the development footprint that is mapped as BSAL has reduced from approximately 670 ha (within the EIS development footprint) to approximately 87.7 ha (within the development footprint for the two array areas presented on Figure 5.5).

Given that the development footprint represents approximately 0.64% of the total land area within the Uralla Shire LGA, the utilisation of agricultural land by the project will only result in a temporary negligible reduction in the overall agricultural productivity of the Uralla Shire LGA and the New England North West region.

iv Land Use Conflict Risk Assessment

A LUCRA was developed for the project using DPI's *Land Use Conflict Risk Assessment Guideline* (2011) (LUCRA Guideline). The LUCRA has been updated to account for the amendments to the project and has been attached as Appendix G. The LUCRA assists with the assessment of the possibility for and potential level of future land use conflict between different parties.

As part of the preparation of the revised LUCRA (Appendix G), 37 potential conflicts have been considered, including potential for conflict as a result of:

- changes to the spread and distribution of weeds and increased presence of pest animals;
- removal of agricultural land and subsequent reduction in productivity;
- impacts to mineral resources;
- impacts to neighbouring agricultural operations, property values, council rates and local infrastructure and services;
- amenity impacts during construction and operation (eg noise, dust, visual and traffic);
- increased soil erosion and impacts to surface water resources; and
- risks associated with the project (eg security, safety, health and fire).

Under the unmitigated scenario (ie without the implementation of the proposed management strategies), the risk ranking matrix identified potential for 18 high risk conflicts (ie those with a risk ranking score of greater than 10). Through the implementation of the proposed management strategies described in Appendix G, the number of high risk conflicts reduced to seven, which reflects a reduction of greater than 60%.

Potential conflicts with a revised risk ranking of greater than 10 were limited to removal of agricultural land and subsequent reduction in productivity; visual amenity impacts during operation; and risks associated with the project (namely in relation to safety and fire). It should be noted that although the probability of potential conflicts in relation to safety and fire are considered unlikely, the major consequence that correlated with the associated events maintained the revised risk ranking score at 14.

Performance targets have been proposed to ensure that the proposed methods of control identified within the LUCRA continue to be effective at addressing the identified potential conflicts. This includes:

- to reduce potential impacts on the future agricultural productivity of the land within the development footprint, rehabilitation objectives and strategies (including performance measures) will be established in the decommissioning and rehabilitation plan;
- to reduce the extent of potential visual amenity impacts, mitigation measures (such as vegetation screening) may be implemented in consultation with neighbouring landholders;
- the TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by the local community and other roads users in relation to safety;
- the FMP will be reviewed after incidents of bushfire or other fire as well as annually at the end of each bushfire season and will be amended after the review process, if required, to increase its effectiveness; and
- the ERP will be reviewed after emergencies as well as annually and will be amended after the review process, if required, to increase its effectiveness.

v Crown land

The project will not impact Crown reserve 95655 (refer Figure 1.6 of the EIS).

Impacts to Crown roads within the development footprint will be limited to the ground disturbance activities described in Section 5.5.3 (i) of the EIS. Impacts to Crown roads outside of the development footprint but within the project boundary will be limited to installation of security fencing and creek crossings (should they be required).

Applications to close a number of these roads have already been lodged with DoI – Crown Lands and, subsequently, no further action is required for these. Crown roads that remain within the development footprint will require closing, which will be undertaken in consultation with DoI – Crown Lands in parallel with the planning assessment and approval process for the project.

vi Mining and minerals

The project will not impact the area of higher mineral significance that was identified during consultation with GSNSW –DRG (refer to Figure 1.6 of the EIS).

The project will not impact exploration activities within areas outside of the project boundary.

5.5.4 Mitigation measures

i Construction

As outlined in the EIS, an EMP will be prepared to address land management within the development footprint and will detail measures to minimise impacts to agricultural land with reference to the DPI's publication, *Infrastructure proposals on rural land* (Kovac and Briggs 2013).

The project will adopt a two-level hierarchical system for erosion and sediment control management and mitigation, consisting of a soil and water management plan (SWMP) supported by a set of progressive erosion and sediment control plans (ESCPs) for each section of the construction site. ESCPs may also be used in conjunction with site or activity specific environmental work method statements (EWMSs) or similar to provide more detailed site-specific environmental mitigation measures.

The SWMP will be included as part of the CEMP. It will provide detailed background information, erosion hazard assessments including erosion hazard mapping and soil loss calculations for all disturbed areas, overall drainage, erosion and sediment control approach, design standards and management strategies and approach for progressive rehabilitation and stabilisation of disturbed land.

ii Operation

As noted within the EIS, during the project's operations, a number of land management and mitigation measures may be implemented to reduce the potential impact of the project on:

- land and soil capability within the development footprint, including land mapped as BSAL;
- neighbouring agricultural operations;
- regional biosecurity;
- erosion; and
- surface water runoff.

As noted in Section 5.5.2, erosion hazard has been determined to be low across the development footprint. Disturbed areas will be stabilised and rehabilitated as construction is completed and the project moves into operations. Ongoing ESCPs to be implemented during operations will be detailed within the OEMP.

iii Decommissioning

As noted in Section 2.7, no changes to the description of project decommissioning, as presented in Section 2.7 of the EIS, are required as part of the amendments to the project. Once the project reaches the end of its investment and operational life, the project infrastructure will be decommissioned, and the development footprint returned to its pre-existing land use, namely suitable for grazing of sheep and cattle, or another land use as agreed by the project owner and the landholder at that time.

A project decommissioning and rehabilitation plan will be prepared prior to the end of the project's operational life and will feature rehabilitation objectives and strategies for returning the development footprint to agricultural production, as has been agreed with the project landholders.

5.5.5 Conclusion

The project will reduce the total area of land under agricultural production in the Uralla Shire LGA and more generally within the New England North West region through the establishment of the solar arrays and associated infrastructure. However, the loss of agricultural land represents a very small fraction of the agricultural output of both the Uralla Shire LGA and New England North West region.

The amendments to the development footprint have reduced the amount of land mapped as BSAL within the array areas to approximately 87.7 ha (northern array area only). In addition, approximately 12 ha of land mapped as BSAL intersects with the proposed electrical cabling corridor between the northern and central array areas. This represents a total of approximately 0.0036% of the total land area mapped as BSAL in NSW.

Land management practises will avoid or minimise potential impacts to neighbouring agricultural operations that have been identified during engagement with the local community and as part of the land use conflict risk assessment. The project will adopt a two-level hierarchical system for erosion and sediment control management and mitigation, consisting of a SWMP supported by a set of progressive ESCPs.

5.6 Visual

5.6.1 Overview

A visual impact assessment (VIA) was undertaken in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

As part of the VIA, impacts from a total of 19 representative viewpoints surrounding the development footprint were considered. The representative viewpoints were selected based on the following criteria:

- proximity to the project's three array areas;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- the location of items of local heritage significance listed within the Uralla Local Environmental Plan 2012 (Uralla LEP);
- local topography; and
- presence of remnant vegetation and wind breaks with potential to provide screening.

As noted in Section 1.2, the development footprint no longer includes the southern array area. Nine of the viewpoints (ie viewpoints, 1, 2, 3, 4, 7, 8, 9, 12 and 13) assessed as part of the VIA were selected due to their proximity to the southern array area. Further, as noted in Section 1.2, in response to feedback received from neighbouring landholders (namely N4 and N5), revisions have also been made to the northern extent of the northern array area to increase the distance between the development footprint and neighbouring residences. These amendments to the development footprint will result in changes to the extent of project infrastructure visible from the assessed viewpoints and the surrounding environment.

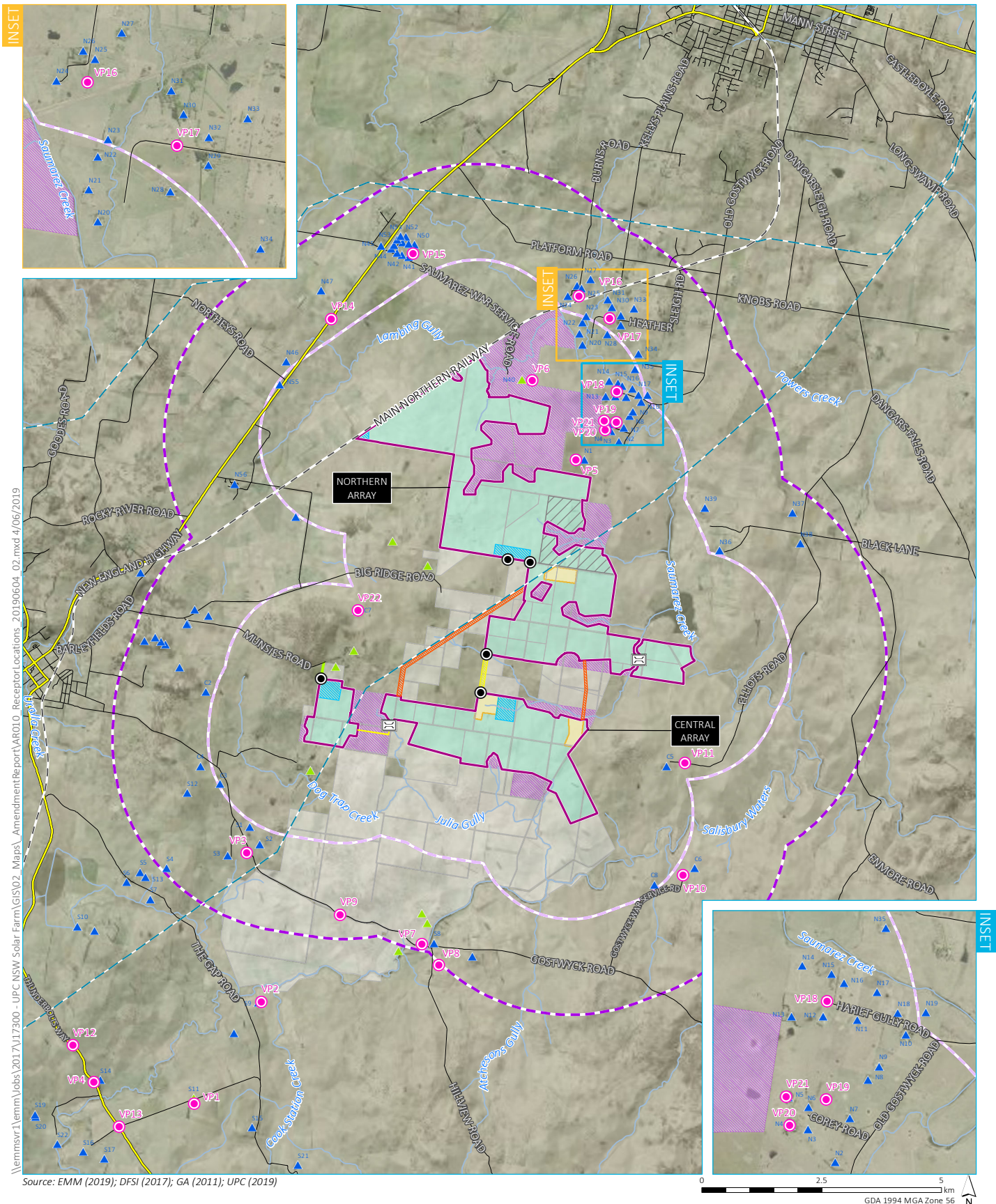
This section of the AR provides a summary of the visual amenity impacts associated with the amended project.

5.6.2 Assessment of impacts

i Assessed viewpoints

The locations of the 19 viewpoints considered as part of the VIA are illustrated on Figure 5.6, which also includes the locations of surrounding receptors and local and regional roads.

In response to submissions received during the public exhibition of the EIS and ongoing community engagement, three additional viewpoints have also been considered. The rationale for the selection of each of the additional viewpoints is presented in Table 5.7.



KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Distance from development footprint
 - Two kilometres
 - Four kilometres
- Project boundary
- Development footprint
- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint
- Potential creek crossing
- Proposed primary site access point
- Potential site for construction accommodation village
- Areas to exclude project infrastructure
- Viewpoint location
- Sensitive receptors
 - Project-related
 - Non-project related

Assessed viewpoints, sensitive receptors and project refinements

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Figure 5.6

Table 5.7 Additional assessed viewpoints, receptors and rationale for selection

Assessment location	Viewpoint type	Representative receptor	Rationale for selection
Viewpoint 20	Dwelling	N4	Views are representative of a receptor (ie dwelling) on Corey Road, N4, within proximity of the northern array area. At its closest point, the amended development footprint for the northern array area is approximately 1 km from N4.
Viewpoint 21	Dwelling	N5	Views are representative of a receptor (ie dwelling) on Corey Road, N5, within proximity of the northern array area. At its closest point, the amended development footprint for the northern array area is approximately 1.2 km from N5.
Viewpoint 22	Dwelling	C7	Views are representative of a receptor (ie dwelling) on Big Ridge Road, C7, within proximity of the central and northern array areas. At its closest point, the development footprint for the central and northern array areas are approximately 1.5 km and 2.8 km from C7, respectively.

In addition to inclusion of the three additional viewpoints referenced in Table 5.7, the following additional analyses have been undertaken in consideration of the amendments to the development footprint as part of the preparation of this AR:

- reproduced the viewshed analysis figures for Viewpoint 5 (Figure A5), Viewpoint 16 (Figure A16) and Viewpoint 17 (Figure A17) to assess potential for reduced visual amenity impacts from these locations;
- recalculated the number of sensitive receptors (ie dwellings) within 2 km of the development footprint and included consideration of potential visual impacts experienced from each receptor (Table 5.12); and
- included consideration of potential visual amenity impacts from C8 (represented by Viewpoint 10 on Figure 5.6), a residence identified within the VIA as project-related that is no longer involved in the project as a result of the amendments to the development footprint (Table 5.11).

ii Construction impacts

During construction, the landscape within the two array areas will undergo physical changes through the installation of project infrastructure. This infrastructure will add new features to the visual landscape within the two array areas.

As a result of the amendments to the project, the number of non-project related residences within 2 km of the development footprint has been significantly reduced from 41 to 28, with 3 residences within 1 km of the development footprint. Of these three residences, uninterrupted views of the amended development footprint are unlikely. Motorists travelling along the local and regional road network will also experience distant views of the array areas during construction. It is assumed the focus of these motorists will be in line with their direction of travel along the affected road corridors.

Due to their temporary nature (ie approximately 36-month construction period), the site establishment works and construction activities are considered unlikely to have any significant visual impacts on passing motorists or nearby receptors greater than those during operation. Subsequently, management measures are not proposed to mitigate visual impacts during construction.

Construction activities will be undertaken from 6am to 6pm Monday to Sunday. Exceptions to these hours may be required on limited occasions. Uralla Shire Council and surrounding landholders will be notified of any exceptions.

A temporary construction accommodation village for non-local construction employees may be established as part of the early stages of the project's construction. If constructed, the construction accommodation village would accommodate up to 500 workers (subject to demand) and would be located on part of Lot 2 of DP 174053 in the northern array area (refer Figure 2.1). The construction accommodation village will be dismantled and its footprint rehabilitated once construction is complete and the project moves into operations.

The closest viewpoint to Lot 2 of DP 174053 is Viewpoint 5, which is approximately 890 m north of the northern boundary of Lot 2 of DP 174053. Viewpoint 5 is representative of views from a rural dwelling (N1). As part of a site inspection at N1, it was noted that the primary aspect from the dwelling (including from both the front porch and garden and within the dwelling itself) is to the north. Any views from the dwelling looking south towards the proposed location of the construction accommodation village are interrupted by remnant vegetation within the landscape between this dwelling and Lot 2 of DP 174053.

This vegetation is unlikely to provide complete screening of the construction accommodation village (should it be required). However, given the distance to Lot 2 of DP 174053 and the temporary nature of this infrastructure (should it be required), no management measures are proposed to mitigate potential visual impacts resulting from the construction accommodation village during the project's 36 month construction period.

iii Operation impacts

As part of the VIA, a viewshed analysis of the dominant project infrastructure (ie PV modules at a height of 4.3 m) was undertaken to determine potential visibility of project infrastructure at viewpoint locations. This analysis was generated using a digital elevation model (DEM) and digital surface model (DSM). The viewshed analysis is used to determine the visibility of project infrastructure from the relevant viewpoints, and the use of the DSM allows the shielding effect of built structures and vegetation to be considered. The results of the viewshed analysis for the project were included in Appendix A of the VIA (Appendix I of the EIS).

Three of the existing viewshed analysis figures have been updated to demonstrate the reduced extent of project infrastructure likely to be visible from these viewpoints as a result of the amendments to the development footprint (viewpoints 5, 16 and 17 – refer Appendix H). The summary of the results of the analysis of visual impacts for each of the 19 viewpoints considered as part of the VIA (refer to Table 5.15 of the EIS) has also been updated in recognition of the amendments to the development footprint (refer Table 5.11).

When considering the topography within the development footprint, the results of the viewshed analysis indicate that project infrastructure within the amended development footprint will be visible to varying degrees from 13 of the 22 viewpoints assessed.

As identified by the 5 m contours presented on the viewshed analysis figures, the landform pattern within and surrounding the development footprint can be described as a mix of low rolling hills. At a number of the selected viewpoints, undulation within the landscape will limit the extent of the visual landscape affected by project infrastructure.

By accounting for potential shielding features within the landscape within the development footprint and surrounding area, the number of viewpoints anticipated to experience views of project infrastructure reduces from 13 to 9. However, there are limitations to relying on the results of a viewshed analysis that includes consideration of a DSM as vegetation may only provide partial shielding. The viewshed analysis indicates the potential for shielding features in the landscape to reduce the visibility of project infrastructure from a number of the selected viewpoints. This is largely due to scattered remnant vegetation, planted wind breaks and extensive vegetation screens around the boundaries of rural residential dwellings.

The presence of vegetation (including scattered and dense vegetation, and planted wind breaks) between the two array areas, rural dwellings and the local and regional road network means that views to the array areas are typically partially obstructed from most locations.

As a result of the amendments to the development footprint, it is unlikely that project infrastructure will be visible from Gostwyck Memorial Chapel and Precinct (Viewpoint 7), Deeargee Woolshed (Viewpoint 8) or Salisbury Court (Viewpoint 13). At its closest point, the central array area is approximately 4 km north of Gostwyck Memorial Chapel and Precinct and Deeargee Woolshed, and 11 km north of Salisbury Court.

As part of the preparation of the VIA and engagement with N1, photomontages were prepared for Viewpoint 5. The photomontages conservatively assume the height of the dominant project infrastructure, the PV modules, will be 4.3 m. As a result of further amendments to the development footprint for the northern array area, there will be further reductions to the visible extent of project infrastructure from Viewpoint 5 when looking north-west (refer Photograph C.6 of Appendix C of the VIA (Appendix I of the EIS)).

Based on field investigations and a review of aerial imagery, in the majority of cases, it is anticipated that views of the proposed BESSs will be at least partially screened from all of the selected viewpoints (particularly if the small enclosure or cabinet facilities are utilised). This is primarily due to undulation and remnant vegetation in the landscape combined with distance to the potential BESS footprints. Regardless of the housing selected during the detailed design stage of the project, the BESSs will be designed to integrate with existing elements in the landscape wherever possible, having regard to form, height and colour. Should they be required, the large building type of enclosures will be similar in appearance to large agricultural sheds that currently exist in the landscape within the two array areas and their surrounds.

Table 5.8 (Viewpoint 20), Table 5.9 (Viewpoint 21) and Table 5.10 (Viewpoint 22) provide the results of the visual impact assessment for the three additional viewpoints included in the VIA as part of the preparation of the RTS and AR.

Table 5.8 Viewpoint 20 – dwelling on Corey Road east of the development footprint for the northern array area

Viewpoint details	This viewpoint is within proximity of a private rural residential property east of the development footprint for the northern array area (N4). At its closest point, the development footprint for the northern array area is approximately 1 km south of N4.
View type and context	Immediate views from this location represent a typical rural residential setting with a combination of planted and remnant vegetation surrounded by a large expanse of cleared, agricultural land. Other features visible from this location include farm dams and agricultural infrastructure.
Project refinements	The exclusion of further land in the north of the northern array area has increased the buffer between this viewpoint and the development footprint for the northern array area from approximately 900 m (as presented as part of the EIS) to approximately 1 km at its closest point (Figure A20 in Appendix H). The closest part of the northern array area is now approximately 1 km south of N4. Reductions to the extent of the northern array area will have also reduced the potential visible extent of project infrastructure from other receptors close to this viewpoint (Figure A20 in Appendix H). As part of project refinement, approximately 460 ha of land in the north of the northern array area has been excluded from the development footprint.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure within the northern array area will be visible from this location (Figure A20 in Appendix H). As illustrated within Figure A20, shielding features in the landscape (including planted vegetation adjacent to the dwelling) have the potential to partially screen the extent of project infrastructure visible from this viewpoint. Based on the results of a site inspection by a representative from UPC, it is anticipated that the distant views of project infrastructure from this location would be further interrupted by scattered vegetation within the landscape between N4 and the development footprint for the northern array area.
Magnitude of change	Low – the distance to the development footprint from this location will limit the scale of change and degree of contrast for views from this location. Shielding features in the landscape (including extensive planted vegetation adjacent to the dwelling) will also reduce the extent of project infrastructure visible from this viewpoint during the operation of the project.
Visual sensitivity	Moderate – due to the presence of a rural dwelling.
Evaluation of significance	Slight/moderate – there would not be a significant impact from this viewpoint. Visual impacts from this viewpoint will continue throughout the life of the project.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Table 5.9 Viewpoint 21 – dwelling on Corey Road east of the development footprint for the northern array area

Viewpoint details	This viewpoint is within proximity of a private rural residential property east of the development footprint for the northern array area (N5). At its closest point, the development footprint for the northern array area is approximately 1.2 km west of N5.
View type and context	Immediate views from this location represent a typical rural residential setting with a combination of planted and remnant vegetation surrounded by a large expanse of cleared, agricultural land. Other features visible from this location include farm dams and agricultural infrastructure.
Project refinements	The exclusion of further land in the north of the northern array area has increased the buffer between this viewpoint and the development footprint for the northern array area from approximately 850 m (as presented as part of the EIS) to approximately 1.2 km (Figure A21 in Appendix H). Reductions to the extent of the northern array area will have also reduced the potential visible extent of project infrastructure from other receptors close to this viewpoint (Figure A21 in Appendix H). As part of project refinement, approximately 460 ha of land in the north of the northern array area has been excluded from the development footprint.
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure within the northern array area will be visible from this location (Figure A21 in Appendix H). As illustrated within Figure A21, shielding features in the landscape (including planted vegetation adjacent to the dwelling) have the potential to partially screen the extent of project infrastructure visible from this viewpoint. Based on the results of a site inspection by a representative from UPC, it is anticipated that the distant views of project infrastructure from this location would be further interrupted by scattered vegetation within the landscape between N5 and the development footprint for the northern array area.
Magnitude of change	Low – the distance to the development footprint from this location will limit the scale of change and degree of contrast for views from this location. Shielding features in the landscape (including extensive planted vegetation adjacent to the dwelling) will also reduce the extent of project infrastructure visible from this viewpoint during the operation of the project.
Visual sensitivity	Moderate – due to the presence of a rural dwelling.
Evaluation of significance	Slight/moderate – there would not be a significant impact from this viewpoint. Visual impacts from this viewpoint will continue throughout the life of the project.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

Table 5.10 Viewpoint 22 – dwelling on Big Ridge Road north of the development footprint for the central array area

Viewpoint details	This viewpoint is within proximity of a private rural residential property north of the development footprint for the central array area (C7). At its closest point, the development footprint for the central array area is approximately 1.5 km south of C7. At its closest point, the development footprint for the northern array area is approximately 2.1 km north-east of C7.
View type and context	Immediate views from this location represent a typical rural residential setting with a combination of planted and remnant vegetation surrounded by a large expanse of cleared, agricultural land. Other features visible from this location include TransGrid's 330 kV transmission line and agricultural infrastructure.
Project refinements	Although the distances to the development footprint for the central and northern array areas from this viewpoint have not changed, reductions to the extent of the development footprint are likely to have reduced the visible extent of project infrastructure within the northern array from C7 (Figure A22 in Appendix H).
Visibility baseline assessment	The results of the viewshed analysis indicate project infrastructure within the central array area will not be visible from this viewpoint. Project infrastructure within the northern array area may be partially visible from this location (Figure A22 in Appendix H) at a distance of more than 2.5 km. As illustrated within Figure A22, shielding features in the landscape are likely to effectively screen the extent of project infrastructure visible from this viewpoint. Based on the results of a site inspection, it is anticipated that the distant views of project infrastructure from this location will be interrupted by scattered vegetation within the landscape between C7 and the development footprint for the northern array area. TransGrid's 330 kV transmission line and supporting infrastructure will also interrupt views of project infrastructure from C7. It is noted that TransGrid's 330 kV transmission line is located at a distance of approximately 1.5 km from C7 (at its closest point) and project infrastructure (if visible) will be further from C7 than this existing infrastructure.
Magnitude of change	Low – the distance to the development footprint from this location will limit the scale of change and degree of contrast for views from this location. Shielding features in the landscape (including remnant vegetation) will also reduce the extent of project infrastructure visible from this viewpoint during the operation of the project.
Visual sensitivity	Moderate – due to the presence of a rural dwelling.
Evaluation of significance	Slight/moderate – there would not be a significant impact from this viewpoint. Visual impacts from this viewpoint will continue throughout the life of the project.
Additional mitigation	No additional mitigation measures are warranted based on the evaluation of significance.

iv Summary of visual assessment

A summary of the results of the analysis of visual impacts for each of the 22 viewpoints is provided in Table 5.11. In addition, Table 5.12 provides a summary of the predicted visual impact from the 28 non-project related residences identified within 2 km of the development footprint for the two array areas.

Due to the low level of reflectivity of the PV modules, they are not expected to cause a distraction to motorists travelling along the local and regional road network. Further, glint and glare are not expected to significantly impact the closest receptors.

As part of the management and mitigation measures to address the project's impacts on the cultural landscape (refer Appendix E of the EIS), detailed digital photographic archival recording is proposed to capture the setting, views and vistas that may be lost temporarily during the project's operations (including views experienced from HNE15 and HNE16 in the central array area - refer Table 5.3). Photographs will be taken from ground level and using drone photography to capture discrete areas in greater detail than current aerial imagery allows.

Table 5.11 **Summary of results of visual impacts at each viewpoint**

Viewpoint	Distance to closest array area	Closest array area	Representative receptors	Residential or public	Project infrastructure visible based on viewshed analysis	Magnitude of change	Visual sensitivity	Evaluation of significance	Significant impact	Additional mitigation proposed	Potential for cumulative impacts with Uralla Solar Farm
Viewpoint 1	7.8 km	Central	S11	Residential	No	Negligible	Moderate	Slight	No	No	No
Viewpoint 2	5.5 km	Central	S9	Residential	No	Negligible	Moderate	Slight	No	No	No
Viewpoint 3	2.9 km	Central	S3; S1; S2	Residential	No	Negligible	Moderate	Slight	No	No	No
Viewpoint 4	8.2 km	Central	S14	Residential	No	Negligible	Moderate	Slight	No	No	No
Viewpoint 5	350 m	Northern	N1	Residential	Yes	Moderate	Moderate	Moderate	No	No**	No
Viewpoint 6	380 m	Northern	N40*	Residential	Yes	Moderate	Moderate	Moderate	No	No*	No
Viewpoint 7	3.8 km	Central	Uralla LEP listing I10 S8	Public	Yes	Negligible	High	Slight	No	No	No
Viewpoint 8	4 km	Central	Uralla LEP listing I11 Motorists	Public	Yes	Negligible	High	Slight	No	No	No
Viewpoint 9	3.5 km	Central	Motorists	Public	No	Negligible	Low	Negligible	No	No	No
Viewpoint 10	2.2 km	Central	C6; C8 Motorists	Public	Yes	Low	Moderate	Slight/Moderate	No	No	No
Viewpoint 11	1.6 km	Central	C5 Motorists	Public	Yes	Low	Moderate	Slight/Moderate	No	No	No
Viewpoint 12	8 km	Central	Motorists	Public	No	Negligible	Low	Negligible	No	No	No
Viewpoint 13	8.9 km	Central	Motorists Uralla LEP listing I14 S17; S19; S20; S22	Public Residential	No	Negligible	High	Slight	No	No	No

Table 5.11 **Summary of results of visual impacts at each viewpoint**

Viewpoint	Distance to closest array area	Closest array area	Representative receptors	Residential or public	Project infrastructure visible based on viewshed analysis	Magnitude of change	Visual sensitivity	Evaluation of significance	Significant impact	Additional mitigation proposed	Potential for cumulative impacts with Uralla Solar Farm
Viewpoint 14	2.3 km	Northern	Motorists	Residential	Yes	Low	Low	Slight	No	No	Yes
Viewpoint 15	2.4 km	Northern	N41; N42; N43; N44 Motorists	Residential	Yes	Low	Moderate	Slight/Moderate	No	No	Yes
Viewpoint 16	2.5 km	Northern	N24; N25; N26; N27	Public	Yes	Low	Moderate	Slight/Moderate	No	No	No
Viewpoint 17	2.2 km	Northern	N20; N21; N22; N23; N28; N29; N30; N31; N32; N33	Public	Yes	Low	Moderate	Slight/Moderate	No	No	No
Viewpoint 18	1.4 km	Northern	N10; N11; N12; N13; N14; N15; N16; N17; N18; N19	Public	No	Negligible	Moderate	Slight	No	No	No
Viewpoint 19	1.1 km	Northern	N2; N3; N4; N5; N6; N7	Public	No	Negligible	Moderate	Slight	No	No	No
Viewpoint 20	1 km	Northern	N4	Residential	Yes	Low	Moderate	Slight/Moderate	No	No	No
Viewpoint 21	1.2 km	Northern	N5	Residential	Yes	Low	Moderate	Slight/Moderate	No	No	No
Viewpoint 22	1.5 km	Central	C7	Residential	Yes	Low	Moderate	Slight/Moderate	No	No	No

Notes: *Rural dwelling owned by one of the project landholders that is currently leased to a member of the local community.

 **Discussions between UPC and N1 are ongoing and include consideration of options for landscaping to address the potential visibility of project infrastructure from the southern aspect of the dwelling at Viewpoint 5, should it be required.

Table 5.12 Predicted visual impact from non-project related residences within 2 km of the development footprint for the two array areas

Receptor ID number (refer Figure 5.6)	Approximate distance to closest array area (m)	Closest representative viewpoint	Evaluation of significance from Table 5.11	Predicted visual impact from residence (high, moderate, low or negligible)*
N1	350 m	Viewpoint 5	Moderate	Moderate
N40**	380 m	Viewpoint 6	Moderate	Moderate
N2	965 m	Viewpoint 20	Slight/Moderate	Low
N4	1,040 m	Viewpoint 20	Slight/Moderate	Low
N3	1,057 m	Viewpoint 20	Slight/Moderate	Low
N5	1,182 m	Viewpoint 21	Slight/Moderate	Low
N13	1,187 m	Viewpoint 18	Slight	Negligible
N6	1,191 m	Viewpoint 19	Slight	Negligible
N7	1,251 m	Viewpoint 19	Slight	Negligible
N14	1,349 m	Viewpoint 18	Slight	Low
N12	1,389 m	Viewpoint 18	Slight	Negligible
N20	1,463 m	Viewpoint 17	Slight/Moderate	Negligible
N15	1,507 m	Viewpoint 18	Slight	Negligible
C7	1,520 m	Viewpoint 22	Slight/Moderate	Low
N8	1,523 m	Viewpoint 18	Slight	Negligible
N16	1,568 m	Viewpoint 18	Slight	Negligible
N11	1,603 m	Viewpoint 18	Slight	Negligible
N9	1,636 m	Viewpoint 18	Slight	Negligible
N21	1,644 m	Viewpoint 17	Slight/Moderate	Negligible
C5	1,740 m	Viewpoint 11	Slight/Moderate	Low
N17	1,760 m	Viewpoint 18	Slight	Negligible
N18	1,869 m	Viewpoint 18	Slight	Negligible
N22	1,887 m	Viewpoint 17	Slight/Moderate	Negligible
N10	1,903 m	Viewpoint 18	Slight	Negligible
C8***	1,909 m	Viewpoint 10	Slight/Moderate	Negligible – extensive vegetation around residence anticipate to screen views of project infrastructure.
N28	1,933 m	Viewpoint 17	Slight/Moderate	Negligible
N35	1,943 m	None	Not applicable	Negligible – extensive vegetation around residence anticipate to screen views of project infrastructure.
C3	1,971 m	None	Not applicable	Low

Notes: *Based on magnitude of change – refer Section 2.2.4 and Table 2.3 of the VIA.

**Rural dwelling owned by one of the project landholders that is currently leased to a member of the local community.

***Previously considered to be a project-related receptor and therefore wasn't assessed as part of the original VIA.

5.6.3 Mitigation measures

Development of the project design has included and will continue to include general measures to reduce the degree of contrast between project infrastructure and the surrounding rural landscape, having regard to the form, scale, height, colour and texture of materials incorporated as part of the project.

Discussions between UPC and N1 are ongoing and include consideration of options for landscaping to address the potential visibility of project infrastructure from the southern aspect of the dwelling at Viewpoint 5, should it be required.

As noted within the VIA, where possible, suitable colours will be chosen for project infrastructure to minimise visual impacts. All external lighting will be installed as low intensity lighting (except where required for safety or emergency purposes) and will comply with Australian Standard AS 4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting. In addition, all external lighting will not shine above the horizontal.

5.6.4 Conclusion

A visual assessment has been conducted from a number of representative viewpoints surrounding the development footprint. The representative viewpoints were selected based on the following criteria:

- proximity to the development footprint;
- the location of receptors (ie dwellings);
- the positioning of regional and local roads and potential impacts on passing motorists;
- the location of items of local heritage significance listed within the Uralla LEP;
- local topography; and
- presence of remnant vegetation and wind breaks with potential to provide screening.

The representative viewpoints have been assessed to demonstrate the potential visual impacts of the project. Due to existing mature vegetation, variable elevation and undulation in the landscape, and the height of the dominant project infrastructure, namely the PV modules, infrastructure within the two array areas will be relatively shielded from view at the majority of the viewpoints assessed as part of this assessment.

The project design, development footprint and placement of the two array areas have progressively evolved to minimise or avoid visual impacts, where possible. This has included significant revisions to the extent of the northern array area. Nonetheless, the development of the project will result in some changes to the landscape. Visual impacts will occur during the construction and operational stages of the project. The visual landscape will be altered from its current state for the duration of the operational stage of the project.

The visual assessment determined that, of the viewpoints assessed, infrastructure may be visible to varying degrees from 13 of the 22 viewpoints. Based on variable elevation and undulation in the landscape and the presence of vegetation, combined with the height of the PV modules, the impact assessment predicts:

- a negligible visual impact for viewpoints 9 and 12;
- a slight visual impact for viewpoints 1, 2, 3, 4, 7, 8, 13, 14, 18 and 19;

- a slight/moderate visual impact for viewpoints 10, 11, 15, 16, 17, 20, 21 and 22; and
- a moderate visual impact for viewpoints 5 and 6.

Visual impacts from three items of local heritage significance listed on the Uralla LEP have also been considered as part of the VIA. As a result of the amendments to the development footprint, it is unlikely that project infrastructure will be visible from these locations.

As part of the management and mitigation measures to address the project's impacts on the cultural landscape (refer Appendix C of the EIS), detailed digital photographic archival recording is proposed to capture the setting, views and vistas that may be lost temporarily during the project's operations.

Motorists travelling along the New England Highway may experience transitory and distant views of project infrastructure within the development footprint for the northern array area. As it is assumed that the focus of these motorists will be in line with their direction of travel along this road corridor and motorists will be travelling at the prescribed speed limit of 100 km/hr, any potential views are considered insignificant.

Should it proceed, the construction of the project and the proposed Uralla Solar Farm being developed by Neoen will expand the overall area within the Uralla Shire LGA that is occupied by solar infrastructure. Based on the height of the dominant project infrastructure, namely the PV modules, variable elevation and undulation in the landscape, the presence of vegetation and separation distances between the northern array area and the Uralla Solar Farm, it is anticipated that there is limited potential for significant combined views of the project and the Uralla Solar Farm. In addition, two significant transport passages, ie the New England Highway and Main Northern Railway, separate the northern array area and the proposed site for Uralla Solar Farm, both of which will further restrict potential for combined views of the two projects (should they both be constructed).

The project is not anticipated to have any significant adverse visual impacts on the locality.

5.7 Noise

5.7.1 Overview

A noise and vibration impact assessment (NVIA) was prepared by EMM as part of the EIS with reference to the methods outlined in:

- NSW Department of Environment and Climate Change (DECC) 2009, *Interim Construction Noise Guideline* (ICNG);
- NSW Environment Protection Authority (EPA) 2017, *Noise Policy for Industry* (NPfi);
- NSW Department of Environment Climate Change and Water (DECCW) 2011, *Road Noise Policy* (RNP);
- NSW Environment Protection Authority (EPA) 2013, *Rail Infrastructure Noise Guideline* (RING);
- NSW Department of Environment and Conservation (DEC) 2006, *Assessing Vibration: a technical guideline*; and
- Australian Standard AS 2436-2010 Guide to Noise and Vibration Control on Construction, Maintenance and Demolition Sites.

Importantly, the amendments to the project have:

- reduced the number of sensitive receptors (ie dwellings) within 2 km of the development footprint; and
- reduced the number of local roads that will be used by project-related light and heavy vehicle movements.

As described in Section 2.4.4, UPC is also considering the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure. Subsequently, additional assessments have been undertaken to consider potential noise impacts associated with the use of the rail line and the proposed unloading activities within and adjacent to the development footprint.

This section of the AR provides a summary of the noise and vibration impacts associated with the amended project.

5.7.2 Existing environment

i Ambient noise

Land uses within and adjacent to the development footprint are primarily agricultural as described in Section 1.4.4 of the EIS. Given the area and surrounding agricultural land uses, existing ambient noise levels at assessment locations are likely to be dominated by rural noise sources and road traffic noise. The rating background noise levels (RBLs) at assessment locations are expected to be low (30 decibels (dB) or below). Therefore, the NPfl (EPA 2017) minimum RBLs of 35 dB and 30 dB have been adopted for the assessment for the daytime and evening/night-time period, respectively.

ii Assessment locations

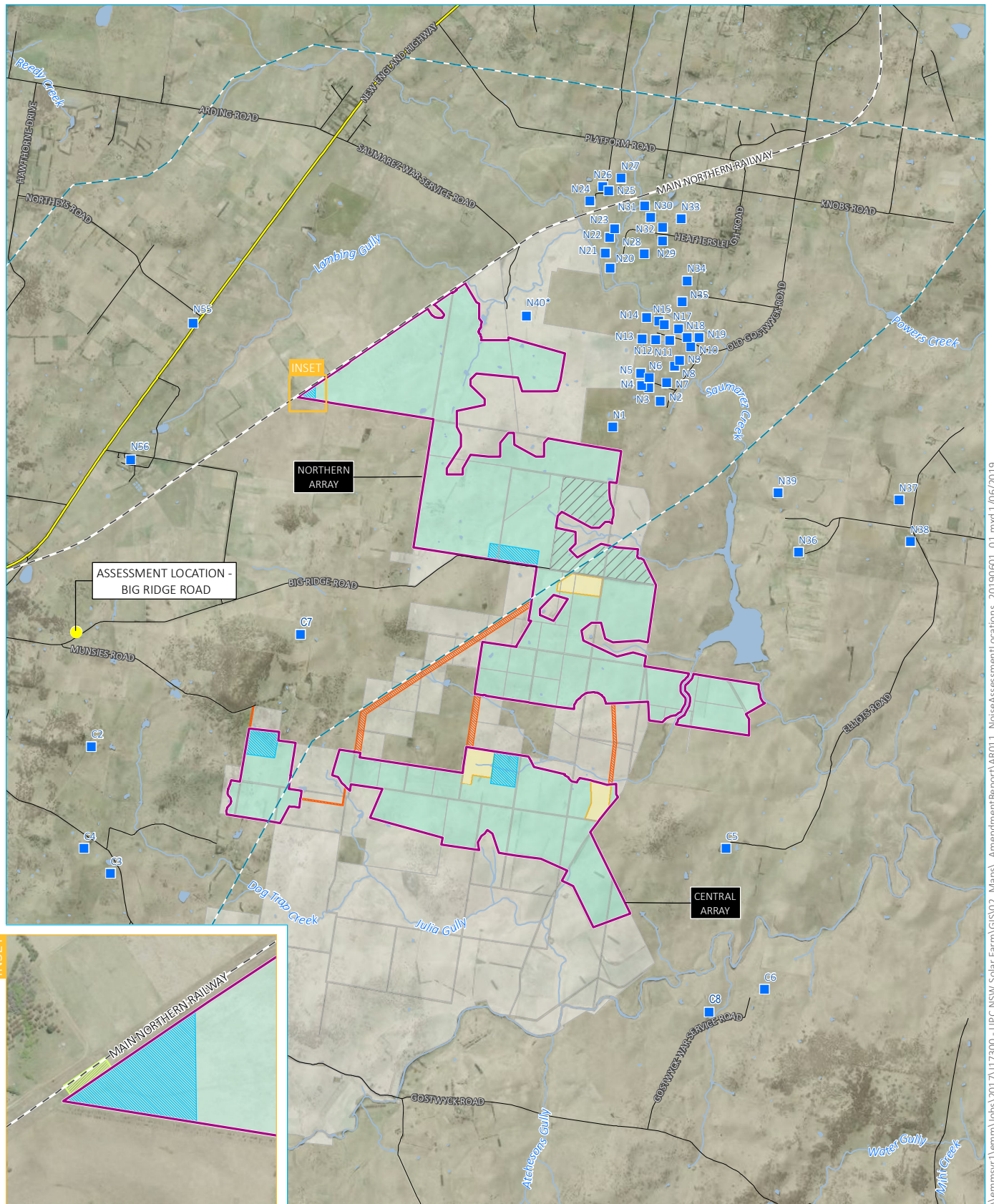
The closest assessment locations to the two array areas are residential dwellings. The closest non-project related dwelling, N1, is approximately 350 m north of the development footprint for the northern array area. A further 27 assessment locations are within approximately 2 km of the development footprint for the two array areas (refer Figure 5.7). The majority of these dwellings are within proximity of the northern array area within the suburb of Kellys Plains (refer Figure 5.7).

Two additional assessment locations have been considered as part of the construction noise assessment to account for the potential use of the Main Northern Railway line for delivery of construction materials and infrastructure (N55 and N56 – refer Figure 5.7).

As noted in the NVIA, it is considered that if noise criteria can be satisfied at the assessment locations closest to the development footprint, then noise criteria will be satisfied at other assessment locations that are further from the development footprint.

iii Meteorology

As noted in Section 5.7.2 of the EIS, no winds were found to be a feature of the area during the day, evening or night periods and therefore calm meteorological conditions were adopted for the construction noise modelling.



KEY

- 330 kV transmission line
- Main road
- Local road
- Rail line
- Watercourse/drainage line
- Waterbody
- Hardstand in rail corridor
- Project boundary
- Development footprint
- Solar array
- Potential site access/electrical cabling
- Potential site for construction accommodation village
- Potential substation/BESS footprint
- Potential laydown area / site compound

- Noise assessment location*
 - Road traffic noise assessment location
- *Noise assessment locations are rental properties owned by project landholders.

Noise assessment locations

New England Solar Farm
Amendment report
Figure 5.7

5.7.3 Assessment of impacts

i Noise and vibration criteria

a Construction noise criteria

The ICNG (DECC 2009) sets out noise management levels (NMLs) for residential and other noise-sensitive receivers and how they are to be applied. No changes to the NMLs presented in Table 5.16 of the EIS were required.

As noted in Section 5.7.4, buffer zones are proposed during out of hours (OOH) periods with the aim of minimising impacts and reducing construction noise levels to below the relevant criteria at select assessment locations. In addition, as part of the preparation of the CEMP, consideration will be given to the construction activities proposed to be undertaken during OOH periods.

b Sleep disturbance criteria

Assessment of sleep disturbance is required in accordance with the NPfI. No changes to the maximum noise level event screening criteria presented in Table 5.17 of the EIS were required.

c Construction vibration criteria

Criteria for exposure to continuous and intermittent vibration are outlined in Chapter 5 of the NVIA. Structural damage guideline values of vibration velocity are presented in Table 5.4 of the NVIA. No changes to the vibration criteria presented in Chapter 5 of the NVIA were required.

d Road traffic noise criteria

The principle guidance for assessing the impact of road traffic noise on assessment locations is the RNP (DECCW 2011). No changes to the road traffic noise assessment criteria for residential land uses (refer Table 5.19 of the EIS) were required. It should be noted that such criteria apply to permanent situations and are therefore conservative for the temporary nature of the construction activities proposed as part of the project. The RNP states that where existing road traffic noise criteria area already exceeded, any additional increase in total traffic noise level should be limited to 2 dB.

e Rail noise criteria

This assessment considers the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure. As described in Section 2.4.4, UPC propose to construct a temporary laydown area within the northern array for the storage of containers or similar (refer Figure 2.3). Within the rail corridor, UPC propose to construct a temporary hardstand to allow a forklift, reach stacker or similar to access multiple containers in each train movement (refer Figure 2.3).

Environmental noise assessment requirements for rail traffic-generating developments which utilise the public rail network are provided in the RING (EPA 2013). Notably, Appendix 2 of the RING (EPA 2013) provides the assessment procedure and defines L_{Aeq} and L_{Amax} day and night rail noise trigger levels.

RING noise trigger levels relevant to the proposed use of the rail line are provided in Table 5.13. The trigger levels apply at 1 m from the most-affected façade of residential assessment locations.

Table 5.13 Network rail line airborne rail traffic noise trigger levels for residential land uses

Development	Noise trigger levels, dB	
	Day (7:00 am to 10:00 pm)	Night (10:00 pm to 7:00 am)
Rail traffic generating development	Predicted rail noise levels exceed:	Predicted rail noise levels exceed:
	65 $L_{Aeq,15 \text{ hour}}$	60 $L_{Aeq,9 \text{ hour}}$
	OR	OR
	85 L_{Amax}^1	85 L_{Amax}^1
	AND	
	The development increases existing $L_{Aeq,period}$ rail noise levels by 2 dB or more, or existing L_{Amax} rail noise levels by 3 dB or more	

Notes: 1. 95th percentile.

ii Construction noise assessment

Construction noise levels were modelled using Brüel and Kjær ‘Predictor’ software and the model considered factors such as location, distance, ground effects, atmospheric absorption, topography, and applicable meteorological conditions. Predicted noise levels over a typical worst case 15-minute scenario were modelled and assessed for comparison against the relevant NMLs.

The revised modelling results indicate site preparation works (including preparation of the proposed rail unloading hardstand and train unloading activities within the areas identified in Figure 2.3) will have the most potential for noise impacts.

Predicted construction noise levels for the site preparation works are presented in Table 5.14. Assessment locations where the relevant NMLs are predicted to be exceeded during any time period have been highlighted in **grey** and **bolded**.

Assessment location N40 (refer to Figure 5.7) is a rental property owned by a project landholder. At the time of writing, there was no formal negotiated noise agreement in place between the tenant at N40, the relevant project landholder and UPC. As such, noise impacts on this property have been considered as part of the NVIA.

Table 5.14 Construction noise predictions

Assessment locations	Land use	Distance to the development footprint (km)	Predicted construction noise level, dB	Construction NML, dB		
				Standard hours	Out of hours	
				Day ¹	Day	Night
C2	Residential	2.1	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$
C3	Residential	2.1	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$
C4	Residential	2.2	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$
C5	Residential	1.7	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$
C6	Residential	2.3	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$
C7	Residential	1.5	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$
C8	Residential	1.9	<35 $L_{Aeq,15 \text{ minute}}$	45 $L_{Aeq,15 \text{ minute}}$	40 $L_{Aeq,15 \text{ minute}}$	35 $L_{Aeq,15 \text{ minute}}$

Table 5.14 Construction noise predictions

Assessment locations	Land use	Distance to the development footprint (km)	Predicted construction noise level, dB	Construction NML, dB		
				Standard hours	Out of hours	
				Day ¹	Day	Night
N1	Residential	0.3	45 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N2	Residential	1.0	36 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N3	Residential	1.1	35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N4	Residential	1.0	36 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N5	Residential	1.2	37 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N6	Residential	1.2	35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N7	Residential	1.2	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N8	Residential	1.5	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N9	Residential	1.6	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N10	Residential	1.9	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N11	Residential	1.6	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N12	Residential	1.4	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N13	Residential	1.2	35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N14	Residential	1.3	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N15	Residential	1.5	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N16	Residential	1.6	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N17	Residential	1.8	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N18	Residential	1.9	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N19	Residential	2.0	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N20	Residential	1.4	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N21	Residential	1.6	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N22	Residential	1.8	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N23	Residential	2.0	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N24	Residential	2.1	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N25	Residential	2.4	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N26	Residential	2.4	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N27	Residential	2.7	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N28	Residential	1.8	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N29	Residential	2.1	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N30	Residential	2.4	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N31	Residential	2.5	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N32	Residential	2.3	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N33	Residential	2.6	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N34	Residential	1.9	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N35	Residential	1.7	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N36	Residential	2.2	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N37	Residential	3.9	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N38	Residential	3.9	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}

Table 5.14 Construction noise predictions

Assessment locations	Land use	Distance to the development footprint (km)	Predicted construction noise level, dB	Construction NML, dB		
				Standard hours	Out of hours	
				Day ¹	Day	Night
N39	Residential	2.2	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N40**	Residential	0.3	43 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N55	Residential	2	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}
N56	Commercial	2.4	<35 L _{Aeq,15 minute}	45 L _{Aeq,15 minute}	40 L _{Aeq,15 minute}	35 L _{Aeq,15 minute}

Notes: 1. Standard hours only: Monday to Friday 7 am to 6 pm, Saturday 8 am to 1 pm and no construction work on Sundays or public holidays.

**The residence at this location is owned by a project landholder and rented out to members of the local community.

Construction noise levels are predicted to satisfy the recommended NMLs at all locations during ICNG standard hours. Outside of ICNG standard hours, exceedance of the recommended NMLs during the NPfI defined daytime period are predicted at two locations (N1 and N40); and five locations (N1, N2, N4, N5 and N40) during the NPfI defined night-time shoulder period (6am–7am Monday to Saturday, 6am–8am Sundays and public holidays). This is not an uncommon finding for construction projects and implies feasible and reasonable mitigation practices should be considered and applied.

Further, given that the predictions assume simultaneous operation of plant and equipment at the nearest locations to the relevant sensitive receptors, it is considered likely that actual construction noise levels may be less than those predicted. This assessment is therefore considered conservative.

iii Maximum noise level event assessment

The predicted L_{Amax} noise levels from the construction of the project at the nearest assessment locations were presented in Table 6.5 of the NVIA. A worst case maximum noise level event of L_{Amax} 125 dB was adopted to cover the typical maximum noise level events associated with construction.

In accordance with the NPfI, sleep disturbance impacts were only assessed at residential assessment locations. Noise modelling predicts that, during construction, the L_{Amax} sleep disturbance screening criteria will be satisfied at most assessment locations. The exceptions are assessment locations N1 (60 dB L_{Amax}) and N40 (54 dB L_{Amax}), which are predicted to be above the L_{Amax} sleep disturbance screening criteria.

It is of note that exceedances of the L_{Amax} screening criteria occur during the NPfI morning shoulder period (6am–7am) only. Nonetheless, noise mitigation measures and application of good practice noise management have been considered and are discussed in Section 5.7.4.

iv Road traffic noise assessment

The proposed construction works will generate traffic movements associated with the construction workforce as well as the delivery of all construction materials by road trucks. It is anticipated that road trucks will deliver all equipment and material (eg piles, frames, cables, PV modules, PCUs, etc) to the two array areas.

As noted previously, the amendments to the project have reduced the number of local roads that will be used by project-related light and heavy vehicle movements. The proposed light and heavy vehicle movement routes are described in detail in Section 5.8.2 of this AR and shown on Figure 2.1.

It is of note that throughout the construction of the project, all project-related heavy vehicles will access Big Ridge Road via the northern intersection of Barleyfields Road and the New England Highway. No heavy vehicles are proposed to utilise Barleyfields Road (south) via Wood Street to access Big Ridge Road. The only exception to this could be in the unforeseeable need to access the northern and central array areas during an emergency or other temporary road closure of Barleyfields Road (north) (eg as part of local road maintenance or improvement works), for which an alternative access approval will be sought.

The sections of the New England Highway within proximity of the two array areas are classified (as per the RNP) as freeway/arterial road and sub-arterial roads, while Barleyfields, Big Ridge, Munsies, and Hillview Roads are classified as local roads.

Construction of the project will be undertaken in two stages and take approximately 36 months from the commencement of site establishment works to commissioning of the two array areas. The road traffic noise predictions are based on peak construction traffic volumes during the concurrent construction of Stage 1 and Stage 2 of the project and, as such, provide a highly conservative assessment. Based on the staging approach considered as part of the TIA, peak construction traffic volumes are anticipated to occur across two four month periods separated by approximately six months, which is relatively short when compared to the overall project construction period. Outside of these times, it is likely that road traffic noise levels will satisfy the RNP criteria.

Daily average (and peak) traffic movements generated by construction deliveries and the construction workforce are summarised in Table 5.15. Project-related vehicle movements will travel as per the routes described in Section 5.8.2.

Table 5.15 **Daily average traffic movements during construction**

Route	Daily heavy vehicles movements		Daily workforce movements (light vehicles)		Total daily movements	
	Average	Peak	Average	Peak	Average	Peak
1A	45	60	64	129	109	189
1B	0	0	86	171	86	171
2A	9	12	12	24	21	36
2B	0	0	18	36	18	36
2C	30	40	100	200	130	240

Table 6.7 of the NVIA outlined the potentially most-affected residences on routes proposed to be utilised by project-related traffic. This table has been updated to account for the amendments to the project (refer Table 5.16).

Table 5.16 Potentially most affected residences on project routes

Road	Location	Distance from road (m)	Posted speed limit (km/h)	Location
New England Highway	North of Uralla	≥20	80	13 km north of the northern array area
New England Highway	South of Uralla	≥15	50	60 km south west of the central array area
Barleyfields Road	North of Big Ridge Road	≥90	50	4.5 km west of the central array area
Barleyfields Road	South of Big Ridge Road	≥18	50	5 km west of the central array area
Big Ridge Road	East of Munsies Road	≥60	100	3 km west of the central array area
Munsies Road	East of Big Ridge Road	≥50	100	3 km west of the central array area

Road traffic noise levels during construction works are predicted to be below the relevant criteria at the majority of the affected residential dwellings on the surrounding road network, as shown in Table 5.17. Assessment locations where the relevant noise levels are predicted to be exceeded have been highlighted in grey and **bolded**.

Table 5.17 Predicted road traffic noise during peak construction

Road	Period	Road traffic noise level, dB ²			Criteria, dB
		Calculated existing	Predicted project generated ¹	Future	
Munsies Road	Day	35 L _{Aeq,1 hour}	51 L _{Aeq,1 hour}	51 L _{Aeq,1 hour}	55 L _{Aeq,1 hour}
	Night	<30 L _{Aeq,1 hour}	41 L _{Aeq,1 hour}	42 L _{Aeq,1 hour}	50 L _{Aeq,1 hour}
Big Ridge Road	Day	42 L _{Aeq,1 hour}	57 L _{Aeq,1 hour}	57 L_{Aeq,1 hour}	55 L _{Aeq,1 hour}
	Night	35 L _{Aeq,1 hour}	47 L _{Aeq,1 hour}	47 L _{Aeq,1 hour}	50 L _{Aeq,1 hour}
Barleyfields Road North of Big Ridge Road	Day	41 L _{Aeq,1 hour}	51 L _{Aeq,1 hour}	51 L _{Aeq,1 hour}	55 L _{Aeq,1 hour}
	Night	33 L _{Aeq,1 hour}	41 L _{Aeq,1 hour}	42 L _{Aeq,1 hour}	50 L _{Aeq,1 hour}
Barleyfields Road South of Big Ridge Road	Day	50 L _{Aeq,1 hour}	54 L _{Aeq,1 hour}	55 L _{Aeq,1 hour}	55 L _{Aeq,1 hour}
	Night	43 L _{Aeq,1 hour}	45 L _{Aeq,1 hour}	49 L _{Aeq,1 hour}	50 L _{Aeq,1 hour}
New England Highway North of Uralla	Day	61 L _{Aeq,15 hour}	45 L _{Aeq,15 hour}	61 L _{Aeq,15 hour}	60 L _{Aeq,15 hour}
	Night	54 L _{Aeq,15 hour}	38 L _{Aeq,15 hour}	54 L _{Aeq,15 hour}	55 L _{Aeq,15 hour}
New England Highway South of Uralla	Day	59 L _{Aeq,15 hour}	46 L _{Aeq,15 hour}	59 L _{Aeq,15 hour}	60 L _{Aeq,15 hour}
	Night	52 L _{Aeq,15 hour}	39 L _{Aeq,15 hour}	52 L _{Aeq,15 hour}	55 L _{Aeq,15 hour}

Notes: 1. Based on the peak workforce movements and construction delivery movements.
2. For the purposes of this assessment, it is assumed that the daily traffic volumes are 90% during the daytime period (7 am-10 pm) and 10% during the night-time period (10 pm-7 am).

As shown in Table 5.17, marginal exceedances of 2 dB are predicted during the daytime period at the most affected residence on Big Ridge Road (refer Figure 5.7).

The road traffic noise predictions are based on peak construction traffic volumes during the concurrent construction of Stages 1 and 2 of the project and, as such, provide a highly conservative assessment. There is potential for approximately 12 months of concurrent construction and outside of these times, due to the considerably lower level of intensity of construction activity, it is likely that road traffic noise levels will satisfy the RNP criteria.

v Operational noise impacts

Noise impacts during operation of the project were assessed at each of the assessment locations. Consistent with the results of the operational noise assessment presented in Chapter 8 of the NVIA, the $L_{Aeq,15\text{ minute}}$ noise levels from the project are expected to satisfy the minimum daytime and evening/night-time NPfI trigger levels of 40 dB and 35 dB, respectively at all assessment locations.

vi Vibration assessment

The majority of vibration generating activities associated with the proposed construction works are those works utilising a roller and a piling rig. As a guide, safe working distances for typical items of vibration intensive plant were listed in Table 5.24 of the EIS.

The nearest receptor, N1, is approximately 350 m from the development footprint in the northern array area. Given that large vibratory rollers are not expected to be working within 100 m of N1, if at all, it is unlikely that vibration impacts will occur on sensitive receptors throughout the construction of the project.

vii Rail noise impacts

Existing rail traffic volumes on the Main Northern Railway line (which passes through the township of Uralla) have been estimated and reported in the TIA (refer Section 2.5 of Appendix K of the EIS). Existing passenger train movements on this line are approximately two per day. JHR also runs maintenance trains, as required, and hi-rail inspections every 72 hours; however, these are not timetabled. Freight trains may also operate in the harvest season using the same rail track for transportation of agricultural products.

For the purposes of assessing potential rail noise impacts along the Main Northern Railway line during construction, it has been assumed that there will be an additional train movement per day as part of the project. As described in Section 2.4.4, an average of two trains per week may be used for the delivery of construction materials and infrastructure. Subsequently, this is considered to be a conservative assumption.

Given the relatively low volumes of existing and proposed rail traffic it is likely that total rail noise will not be above the trigger levels provided in the RING (EPA 2017) at residences located near the Main Northern Railway line. As such, rail noise impacts are considered unlikely and have not been assessed further.

The daily passenger trains pass the northern array area at approximately 8:50 am and 5:20 pm. Therefore, UPC will aim to unload the train during the day between these two train services, where practical. It is noted that parking interaction with passenger services on the Main Northern Railway line will be minimised through effective scheduling and ongoing engagement with JHR and TfNSW.

5.7.4 Mitigation measures

During limited OOH periods, predicted construction noise levels and maximum event noise levels are above the relevant criteria at a number of the assessment locations considered as part of the construction noise and construction sleep disturbance assessments.

The project's CEMP will include management and mitigation measures consistent with the best practice requirements outlined in the ICNG (DECC 2009).

The site-specific noise and vibration mitigation and management measures presented in Section 5.7.4 of the EIS will be considered during construction works.

The proposed buffer zones during OOH periods to maintain compliance with relevant NMLs at surrounding assessment locations have been updated (where required) to account for the amendments to the development footprint and are presented in Table 5.18.

i Buffer zones

The use of buffer distances around five assessment locations are recommended during OOH periods. These buffer distances should be implemented during construction works with the aim of minimising impacts and reducing construction noise levels to below the relevant criteria.

Table 5.18 outlines the proposed buffer distance for each affected assessment location during periods when construction is occurring outside of ICNG standard hours and differentiates between the various stages of construction listed in Table 6.1 of the NVIA.

Table 5.18 Buffer zones for affected assessment locations

Assessment location	Period	Required buffer distances per construction stage				Criteria	
		Site preparation	Pile driving and foundations	PV module installation	Other	NML	L _{Amax}
N1	OOH Day	600 m	Nil	Nil	Nil	40 L _{Aeq,15 minute}	Nil
	OOH Night	1.15 km	600 m	470 m	Nil	35 L _{Aeq,15 minute}	52 L _{Amax}
N2	OOH Day	Nil	Nil	Nil	Nil	40 L _{Aeq,15 minute}	Nil
	OOH Night	See Note 2	Nil	Nil	Nil	35 L _{Aeq,15 minute}	52 L _{Amax}
N4	OOH Day	Nil	Nil	Nil	Nil	40 L _{Aeq,15 minute}	Nil
	OOH Night	See Note 2	Nil	Nil	Nil	35 L _{Aeq,15 minute}	52 L _{Amax}
N5	OOH Day	Nil	Nil	Nil	Nil	40 L _{Aeq,15 minute}	Nil
	OOH Night	See Note 2	Nil	Nil	Nil	35 L _{Aeq,15 minute}	52 L _{Amax}
N40**	OOH Day	600 m	Nil	Nil	Nil	40 L _{Aeq,15 minute}	Nil
	OOH Night	975 m	550 m	Nil	Nil	35 L _{Aeq,15 minute}	52 L _{Amax}

Notes: 1.OOH Day: Saturday: 1:00 pm to 6:00 pm, Sunday: 8:00 am to 6:00 pm; Night: Monday to Saturday: 10:00 pm to 7:00 am, Sunday/Public Holidays: 10:00 pm to 8:00 am.

2. If the buffer distances for nearest assessment locations are adopted, noise levels at these locations will comply with the relevant criteria.

**The residence at this location is owned by a project landholder and rented out to members of the local community.

If the proposed buffer distances outlined in Table 5.18 above are adopted during the relevant periods, noise levels during construction are predicted to comply with the relevant criteria at all assessment locations.

5.7.5 Conclusion

The results of the revised NVIA demonstrate that noise levels during peak construction are predicted to satisfy the recommended NMLs at all locations during ICNG standard hours. Outside of ICNG standard hours, construction noise levels are predicted to be above the recommended NMLs at two locations (N1 and N40) during the NPfI defined daytime period and at five locations (N1, N2, N4, N5 and N40) during limited times in the NPfI defined night-time period. Night-time maximum noise level events are predicted to be above the recommended L_{Amax} sleep disturbance screening criteria at two assessment locations (N1 and N40).

Operational noise levels are shown to satisfy the NPfI noise trigger levels at all assessment locations during the daytime, evening and night-time periods for the entirety of the project's operations.

Vibration associated with the proposed construction works is not expected to generate impacts at the nearest assessment location.

Rail noise associated with the proposed unloading activities is unlikely to cause impacts at the nearest assessment locations.

Traffic generated by the project is expected to comply with the relevant RNP criteria at the majority of the assessment locations.

Notwithstanding, with effective implementation of the mitigation and management measures proposed in Section 5.7.4 of the EIS and the buffer zones presented in Table 5.18, construction noise levels and maximum noise level events are predicted to comply with the relevant criteria at all assessment locations.

5.8 Transport

5.8.1 Overview

A traffic impact assessment (TIA) was undertaken in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with relevant government agencies. The assessment was based on the general scope for matters to consider in a TIA as defined by the *Guide to Traffic Generating Developments* (RTA 2002) and included consideration of the *Austroads Guide to Road Design* (Austroads 2015) and the *Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development* (Austroads 2016).

Importantly, the amendments to the project have reduced the number of local roads that will be used by project-related light and heavy vehicle movements.

As described in Section 2.4.4, as part of ongoing design, UPC has also been considering the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure. Deliveries via the rail network would reduce the number of project-related heavy vehicles on the local and regional road network. As this activity is still subject to further consultation with JHR and TfNSW and there are a number of factors that may influence UPC's decision on whether or not to utilise this alternative, the assumptions made as part of the TIA have not been revised. The results presented assume that the delivery of construction materials and project infrastructure will be via road only and are therefore considered a worst case scenario.

This section of the AR provides a summary of the traffic impacts associated with the amended project.

5.8.2 Traffic demands for the project

i Primary access routes

As a result of the amendment to the development footprint, the proposed vehicle routes to the access points identified on Figure 2.1 will be as follows:

- two access points to the northern array area via Barleyfields Road (north and south), then onto Big Ridge Road; and
- one access point to the central array area via Barleyfields Road (north and south), then onto Big Ridge Road and turning right onto Munsies Road.

ii Construction traffic

Construction of the project will take approximately 32–36 months from the commencement of site establishment works to commissioning of the two array areas. As noted in Section 2.4.5, Stage 1 will include complete construction of the northern array area and Stage 2 will include complete construction of the central array area. The Stage 1 and Stage 2 vehicle movement routes are described as follows:

- Stage 1:
 - Route A (1A): Barleyfields Road (north) turning onto Big Ridge Road and travelling to the primary site access points for the northern array. Light vehicles travelling south along the New England Highway from Armidale and all heavy vehicles from the north and south that require access to the northern array area will travel via Barleyfields Road (north); and
 - Route B (1B): Woods Street turning onto Barleyfields Road (south) and then onto Big Ridge Road and travelling on to the primary site access points for the northern array. Only light vehicles that require access to the northern array area travelling north along the New England Highway from Uralla will travel via Woods Street and Barleyfields Road (south).
- Stage 2:
 - Route A (2A): Barleyfields Road (north) turning onto Big Ridge Road and then onto Munsies Road for access to the central array. Light vehicles travelling south along the New England Highway from Armidale and all heavy vehicles from the north and south that require access to the central array area will travel via Barleyfields Road (north);
 - Route B (2B): Wood Street turning into Barleyfields Road (south) and then onto Big Ridge Road and Munsies Road for access to the central array. Only light vehicles that require access to the central array area travelling north along the New England Highway from Uralla will travel via Woods Street and Barleyfields Road (south); and
 - Route C (2C): Vehicle movements via Barleyfields Road (north and south) will be the same as described above for Route A (1A) and Route B (1B). Vehicles will travel from the Big Ridge Road site access points for the northern array area to the central array via an internal site access road between the northern and central array areas (this route accounts for heavy vehicle deliveries for the BESS).

The peak construction months will occur when the Stage 1 and Stage 2 construction works overlap, as is shown in Figure 5.8, which identifies the combined peak construction months for vehicle movements. These are months 13–16 and months 22–25.

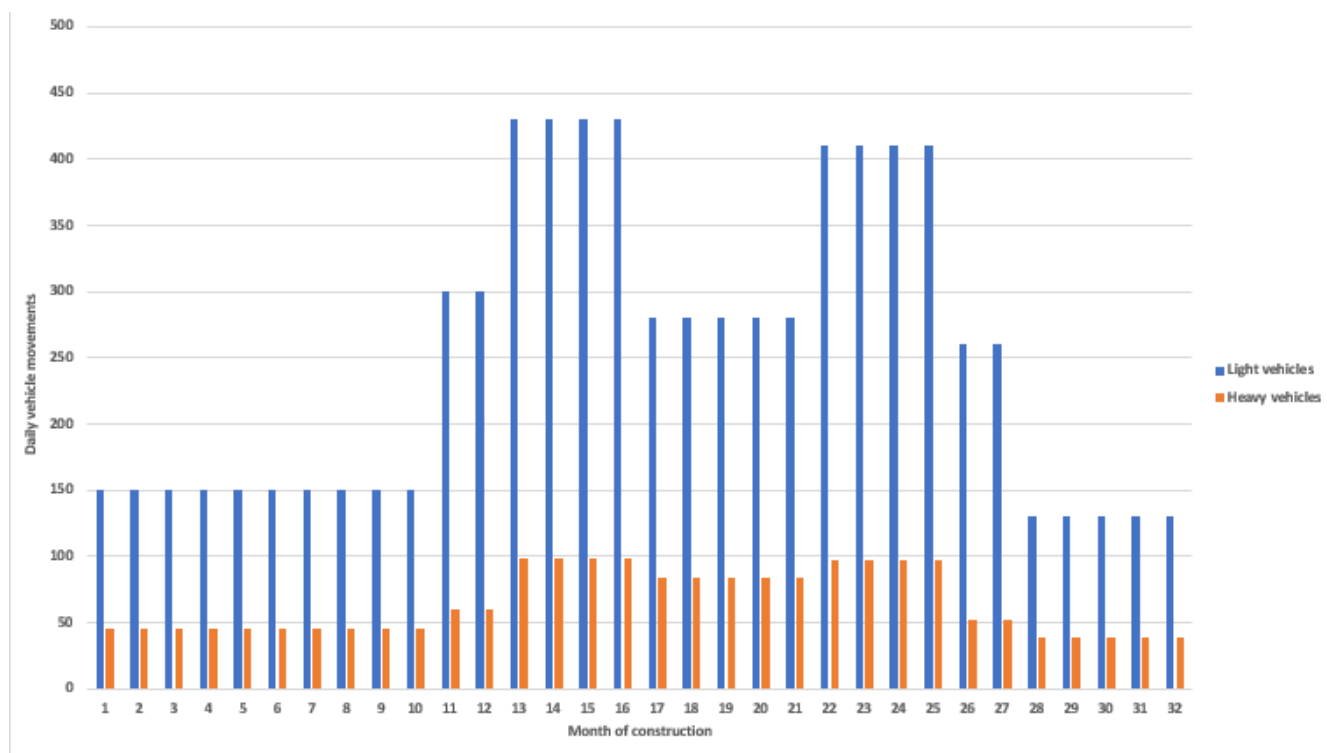


Figure 5.8 Daily traffic movements for each month of construction

In summary, it is anticipated that the maximum number of daily vehicle movements generated by the project during the peak construction periods will be in the order of 430 light vehicles, 99 heavy vehicles and approximately 6 over-dimensional vehicles.

The forecast daily light and heavy vehicle movements using each route across the two stages are shown in Table 5.19.

Table 5.19 Forecast daily light and heavy vehicle movements

Stage	Average daily light vehicle movements	Peak daily light vehicle movements	Average daily heavy vehicle movements	Peak daily heavy vehicle movements
1A	64	129	45	60
1B	86	171	0	0
2A	12	24	9	12
2B	18	36	0	0
2C	100	200	30	40

iii Traffic distribution

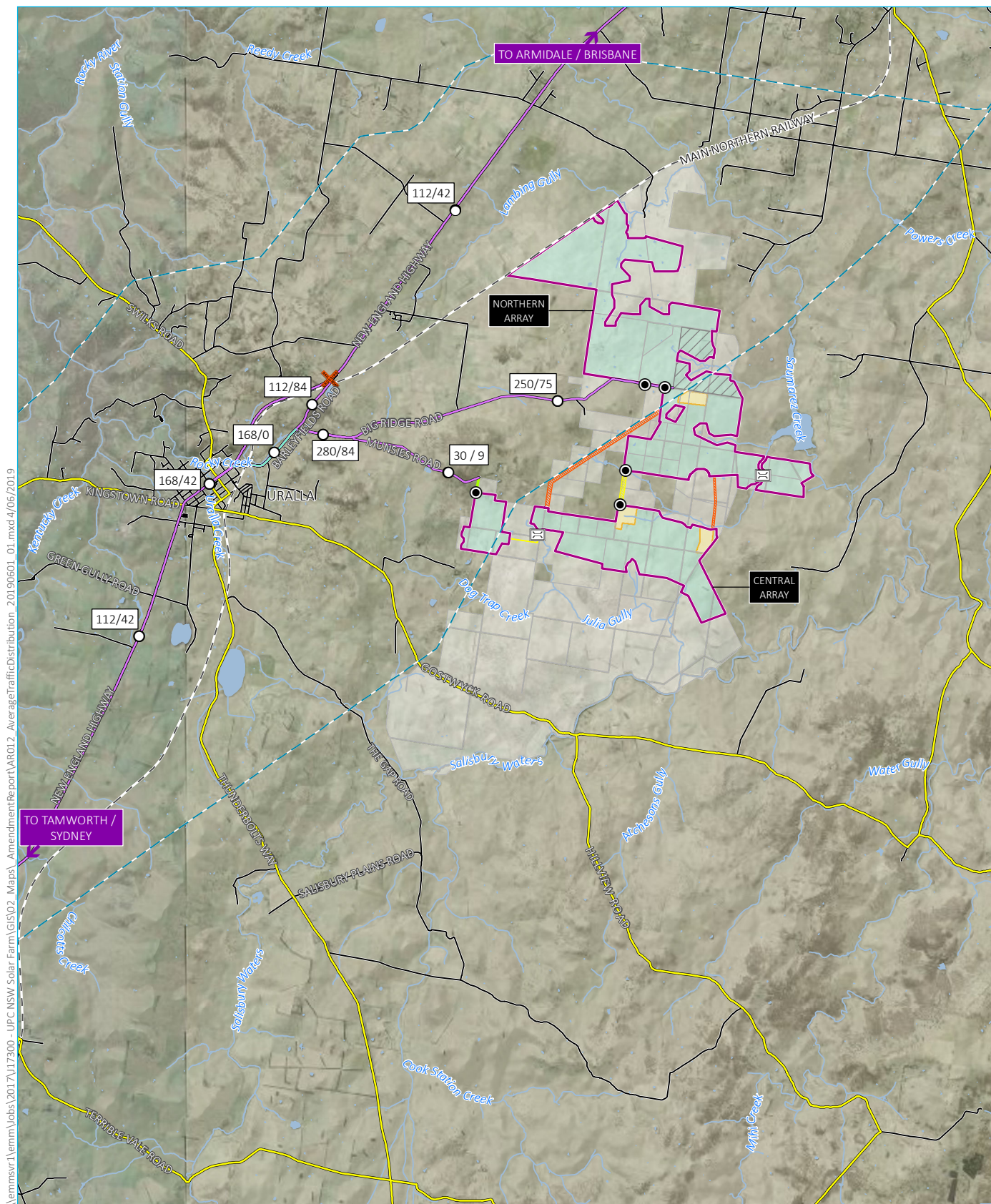
a Construction

The origins of traffic during construction will be the same as previously stated in the TIA presented as part of the EIS (refer Section 3.4.1 of Appendix K of the EIS).

The proposed traffic distribution for the project's light vehicle traffic (mainly workforce cars and shuttle buses) and heavy vehicle traffic (mainly delivery trucks) for Stage 1 and Stage 2 combined are illustrated in Figure 5.9 (average daily traffic distribution) and Figure 5.10 (peak daily traffic distribution).

b Operations

As noted in Section 2.6, it is anticipated that a workforce of up to 15 FTEs will still be required for the project. The origins of traffic during operations will be the same as previously stated in the TIA presented as part of the EIS (refer Section 3.4.2 of Appendix K of the EIS). During operations, there will be much lower daily traffic movements.



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Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)

0 2.5 5
km
GDA 1994 MGA Zone 56

KEY

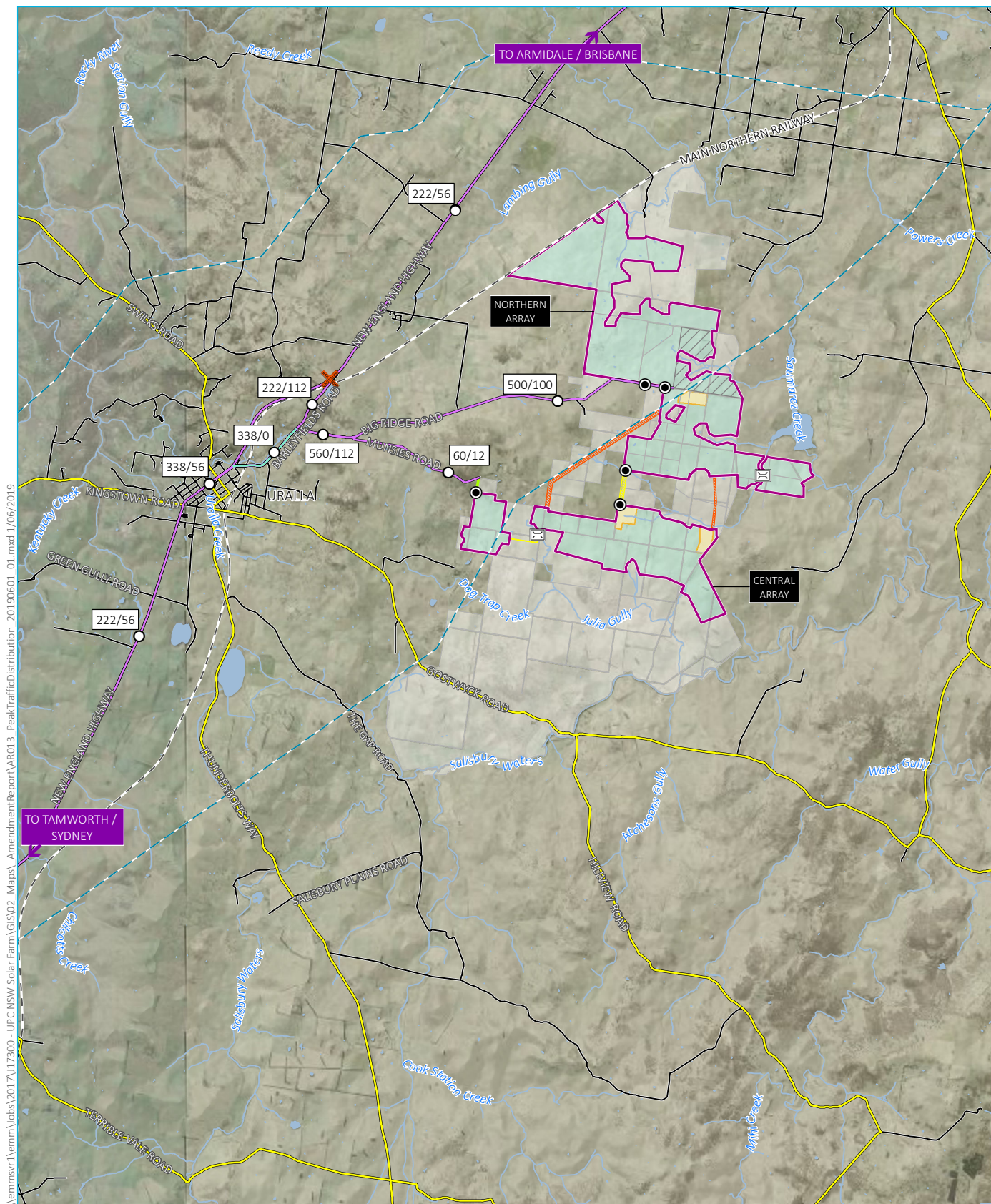
- 330 kV transmission line
- - Rail line
- Main road
- Local road
- Watercourse/drainage line
- Waterbody
- Project boundary
- Potential site for construction accommodation village

- Development footprint
- Solar array
- Potential ETL easement
- Potential site access corridor
- Potential site access/ETL easement
- Potential substation/BESS footprint
- Potential creek crossing
- Primary site access point

- ✕ Level crossing
- Light vehicle traffic route
- Light / heavy vehicle traffic route
- Traffic distribution count
- 0/0 Light/heavy vehicle count

Average daily traffic distribution for
Stage 1 and Stage 2 combined

New England Solar Farm
Amendment report
Figure 5.9



KEY

- 330 kV transmission line
- - Rail line
- Main road
- Local road
- Watercourse/drainage line
- Waterbody
- Project boundary
- Potential site for construction accommodation village

- Development footprint
- Solar array
- Potential ETL easement
- Potential site access corridor
- Potential site access/ETL easement
- Potential substation/BESS footprint
- Potential creek crossing
- Primary site access point

- Level crossing
- Light vehicle traffic route
- Light / heavy vehicle traffic route
- Traffic distribution count
- 0/0 Light/heavy vehicle count

Peak daily traffic distribution for Stage 1 and Stage 2 combined

New England Solar Farm
Amendment report
Figure 5.10

5.8.3 Assessment of impacts

i Traffic volumes on the road network

As a result of the amendments to the project, a number of the traffic routes identified in the TIA will no longer be utilised for project-related vehicle movements. This includes Gostwyck Road, Salisbury Plains Road, Hillview Road, and The Gap Road.

In addition, Thunderbolts Way may be utilised only by a proportion of the project's locally/regionally-based workforce during construction and operations, with no construction heavy vehicles anticipated to travel along this road corridor. Thunderbolts Way is a two-lane sealed country road link connecting Copes Creek, Uralla, Walcha and Gloucester. As noted in the TIA, existing traffic volumes along Thunderbolts Way are approximately 880 daily vehicle movements.

For the purposes of this assessment, it is assumed that up to 20 light vehicles (ie 40 light vehicle movements) may utilise Thunderbolts Way each day. This represents an increase of approximately 4.5% from existing traffic volumes. Subsequently, it is anticipated that Thunderbolts Way will be able to accommodate project-related light vehicle movements and impacts to existing road users will be negligible. No further assessment of potential impacts on Thunderbolts Way are warranted.

a Average construction traffic

A summary of the current baseline traffic conditions within the local road network is provided in Table 5.20, which also includes the predicted future average daily traffic during the Stage 1 and Stage 2 construction overlap period. Where the predicted future average daily traffic volume results in a change in the applicable Austroads standard, this is in **bold**.

Table 5.20 Future daily traffic assessment for project average construction traffic

Project related traffic route	Projected baseline daily traffic volume (year 2018)	Baseline Austroads rural daily traffic volume standard	Meets design standard (baseline only)	Average construction traffic			Future Austroads rural daily traffic volume standard	Road width required by Austroads (2016) design standard
				Average daily traffic from the project	Future total daily traffic	Percentage of traffic increase		
New England Highway (north of Uralla)	6,557	> 3,000 daily vehicles	Yes	154	6,711	+2.35%	> 3,000 daily vehicles	Minimum 10 m wide seal
Bridge Street (Uralla)	8,659	> 3,000 daily vehicles	Yes	210	8,869	+2.43%	> 3,000 daily vehicles	Minimum 10 m wide seal
New England Highway (south of Uralla)	3,985	> 3,000 daily vehicles	Yes	154	4,139	+3.86%	> 3,000 daily vehicles	Minimum 10 m wide seal
Barleyfields Road (north of Big Ridge Road)	645	500 – 1,000 daily vehicles	No	196	841	+30%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Barleyfields Road (south of Big Ridge Road)	740	500 – 1,000 daily vehicles	No	168	908	+23%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Big Ridge Road (east of Barleyfields Road)	175	150 – 500 daily vehicles	No	364	539	+208%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Big Ridge Road (east of Munsies Road)	115	1 – 150 daily vehicles	No	325	440	+283%	150 – 500 daily vehicles	Minimum 7.2 m wide seal
Munsies Road (east of Big Ridge Road)	25	1 – 150 daily vehicles	No	39	64	+156%	1 – 150 daily vehicles	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal

The highest proportional daily traffic increases from the project will be on Big Ridge Road, east of Munsies Road (+283%), followed by Big Ridge Road, east of Barleyfields Road (+208%) and Munsies Road (+156%).

While these increases are proportionally quite significant, they will only apply temporarily during construction and traffic volumes will subsequently decrease significantly following the completion of construction.

Big Ridge Road will move into a higher band in the Austroads rural daily traffic volume capacity standards during the average construction period.

b Peak construction traffic

A summary of the current baseline traffic conditions within the local road network is provided in Table 5.21, which also includes the predicted future peak daily traffic during the Stage 1 and Stage 2 construction overlap period.

As part of the peak construction traffic assessment in the TIA, it was assumed that a construction accommodation village would be provided within the northern array area and this would account for 5% of the total light vehicle movements. In order to assess the worst-case scenario, it is assumed that these light vehicles will be travelling on the local road network simultaneously to pick up and drop off construction workers that come from Armidale and Tamworth.

Where the predicted future total daily traffic volume results in a change in the applicable Austroads standard, this is in **bold**.

Table 5.21 Future daily traffic assessment for project peak construction traffic

Project related traffic route	Projected baseline daily traffic volume (year 2018)	Baseline Austroads rural daily traffic volume standard	Meets design standard (baseline only)	Peak construction traffic			Future Austroads rural daily traffic volume standard	Road width required by Austroads (2016) design standard
				Peak daily traffic from the project	Future total daily traffic	Percent traffic increase		
New England Highway (north of Uralla)	6,557	> 3,000 daily vehicles	Yes	278	6,835	+4.24%	> 3,000 daily vehicles	Minimum 10 m wide seal
Bridge Street (Uralla)	8,659	> 3,000 daily vehicles	Yes	394	9,053	+4.55%	> 3,000 daily vehicles	Minimum 10 m wide seal
New England Highway (south of Uralla)	3,985	> 3,000 daily vehicles	Yes	278	4,263	+6.98%	> 3,000 daily vehicles	Minimum 10 m wide seal
Barleyfields Road (north of Big Ridge Road)	645	500 – 1,000 daily vehicles	No	334	979	+51.78%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Barleyfields Road (south of Big Ridge Road)	740	500 – 1,000 daily vehicles	No	338	1,078	+45.68%	1,000 – 3,000 daily vehicles	Minimum 9 m wide seal
Big Ridge Road (east of Barleyfields Road)	175	150 – 500 daily vehicles	No	672	847	+384%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Big Ridge Road (east of Munsies Road)	115	1 – 150 daily vehicles	No	600	715	+522%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal

Table 5.21 Future daily traffic assessment for project peak construction traffic

Project related traffic route	Projected baseline daily traffic volume (year 2018)	Baseline Austroads rural daily traffic volume standard	Meets design standard (baseline only)	Peak construction traffic			Future Austroads rural daily traffic volume standard	Road width required by Austroads (2016) design standard
				Peak daily traffic from the project	Future total daily traffic	Percent traffic increase		
Munsies Road (east of Big Ridge Road)	25	1 – 150 daily vehicles	No	72	97	+288%	1 – 150 daily vehicles	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal

The highest proportional daily traffic increases from the project will be on Big Ridge Road, east of Munsies Road (+522%), followed by Big Ridge Road, east of Barleyfields Road (+384%) and Munsies Road (+288%).

While these increases are proportionally quite significant, they will only apply temporarily during the project's peak construction periods (anticipated to be months 13–16 and months 22–25). The traffic volumes will subsequently decrease after these two peak construction periods.

The southern section of Barleyfields Road and Big Ridge Road will move into a higher band in the Austroads rural daily traffic volume capacity standards during the peak construction period.

c Operational traffic

As noted in Section 2.6, it is anticipated that a workforce of up to 15 FTEs will still be required for the project. The origins of traffic during operations will be the same as previously stated in the TIA presented as part of the EIS (refer Section 3.4.2 of Appendix K of the EIS).

As described in Section 4.1.3 of the TIA, the majority of daily traffic movements are anticipated to be to and from the operations and control room that will likely be within the development footprint for the northern array area with access via Big Ridge Road.

For the purpose of assessing the worst-case scenario, it is assumed that 15 light vehicles per day (ie 30 light vehicle movements) will use local roads during operations, as presented in Table 5.22. No change to the Austroads rural daily traffic volume standard is predicted for any road during project operations.

Table 5.22 Future daily traffic assessment for project operations traffic

Project related traffic route	Projected baseline daily traffic volume (year 2018)	Baseline Austroads rural daily traffic volume standard	Meets design standard (baseline only)	Operations traffic			Future Austroads rural daily traffic volume standard	Road width required by Austroads (2016) design standard
				Average daily traffic from operation	Future total daily traffic	Percent traffic increase		
New England Highway (north of Uralla)	6,557	> 3,000 daily vehicles	Yes	10	6,567	+0.15%	> 3,000 daily vehicles	Minimum 10 m wide seal

Table 5.22 Future daily traffic assessment for project operations traffic

Project related traffic route	Projected baseline daily traffic volume (year 2018)	Baseline Austroads rural daily traffic volume standard	Meets design standard (baseline only)	Operations traffic			Future Austroads rural daily traffic volume standard	Road width required by Austroads (2016) design standard
				Average daily traffic from operation	Future total daily traffic	Percent traffic increase		
Bridge Street (Uralla)	8,659	> 3,000 daily vehicles	Yes	20	8,679	+0.23%	> 3,000 daily vehicles	Minimum 10 m wide seal
New England Highway (south of Uralla)	3,985	> 3,000 daily vehicles	Yes	10	3,995	+0.25%	> 3,000 daily vehicles	Minimum 10 m wide seal
Barleyfields Road (north of Big Ridge Road)	645	500 – 1,000 daily vehicles	No	10	655	+1.55%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Barleyfields Road (south of Big Ridge Road)	740	500 – 1,000 daily vehicles	No	20	760	+2.7%	500 – 1,000 daily vehicles	Minimum 7.2 m – 8 m wide seal
Big Ridge Road (east of Barleyfields Road)	175	150 – 500 daily vehicles	No	30	205	+17.14%	150 – 500 daily vehicles	Minimum 7.2 m – 8 m wide seal
Big Ridge Road (east of Munsies Road)	115	1 – 150 daily vehicles	No	15	130	+13.04%	1 – 150 daily vehicles	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal
Munsies Road (east of Big Ridge Road)	25	1 – 150 daily vehicles	No	15	40	+60%	1 – 150 daily vehicles	8.7 m wide total carriageway (if unsealed); or minimum 3.7 m wide seal

d Summary of the effect of project-generated traffic increases on roads

The New England Highway can accommodate the proposed daily traffic volumes including the peak construction stage traffic for the project. The inclusion of a construction accommodation village during the peak construction period will reduce the volume of light vehicles utilising the New England Highway north or south of Uralla. During the Stage 1 and Stage 2 construction overlap period, the additional average and peak daily traffic movements travelling on the rural sections of the New England Highway will be +154 and +269 vehicles, respectively. This represents an increase of +3.11% (average) and +5.43% (peak). Improvements to the New England Highway/Barleyfields Road (north) intersection are discussed in Section 5.8.4.

The amendments to the development footprint have reduced the number of local roads impacted by the project and, subsequently, potential impacts to local road users and neighbouring residents have also been reduced. Thunderbolts Way will have a reduced number of project-related light vehicles and no construction heavy vehicles are anticipated to travel along this road corridor. Gostwyck Road, Hillview Road, Salisbury Plains Road and The Gap Road will not require any project-related light or heavy vehicle movements during construction or operations (with the exception of any light vehicle movements from locally-based employees).

Daily traffic volumes during average and peak construction on Barleyfields Road will be:

- Barleyfields Road (south) - approximately +168 (+23%) during average construction and +338 (+45.68%) during peak construction; and
- Barleyfields Road (north) – approximately +196 (+30%) during average construction and +334 (+51.78%) during peak construction.

These additional traffic increases will be temporary and restrictions on heavy vehicles travelling south of Big Ridge Road will be implemented. All heavy vehicles requiring access to the northern and central array areas will be directed to use the northern end of Barleyfields Road with access direct from the New England Highway.

Throughout construction, traffic increases on Barleyfields Road (north) will not result in a change to the road's Austroads design standard. Additional light vehicle traffic will cause Barleyfields Road (south) to move into a higher band in the Austroads rural daily traffic volume classification system during the peak construction period (ie during months 13-16 and 22-25). However, during these periods, the daily vehicle volumes travelling south on Barleyfields Road will only marginally exceed the existing band level of 1,000 daily vehicles.

The proposed increase resulting from project construction traffic travelling on Big Ridge Road (east of Barleyfields Road) is approximately +208% during the average construction period (approximately 364 vehicle movements per day) and approximately +384% during the peak construction period (approximately 672 vehicle movements per day). The additional vehicle movements will cause this road to move into a higher band in the Austroads rural daily traffic volume capacity standards. However, the road itself is a low volume rural road and located away from the township of Uralla.

In relation to the unsealed section of Big Ridge Road, it is recommended that consideration be given to traffic controls such as temporary travel speed reductions and improved traffic safety, along with regular watering (for dust suppression) of the unsealed section of the road near residential dwellings. Management of the unsealed section of Big Ridge Road is discussed further in Section 5.8.4.

The proposed construction traffic volumes utilising Munsies Road will generate a high percentage increase in the traffic volumes during average (+156%) and peak (+288%) construction. Vehicle number increases will be minor at +39 and +72 daily vehicles during average and peak construction periods, respectively.

In relation to the residential dwellings on the unsealed section of Munsies Road near the corner of Big Ridge Road, it is recommended that consideration be given to temporary travel speed reduction and regular watering (for dust suppression). Traffic controls and mitigation strategies for Munsies Road are discussed Section 5.8.4.

ii Traffic impact at key intersections

As a result of the amendments to the development footprint, project-related vehicle movements will no longer need to use the intersection of Thunderbolts Way and Salisbury Plains Road.

The three relevant rural intersections in the locality of the two array areas are:

- New England Highway/Barleyfields Road (north);

- New England Highway/Barleyfields Road (south) including Wood Street; and
- Barleyfields Road/Big Ridge Road.

Potential impacts to these intersections are described in Section 4.2 of the TIA (Appendix K of the EIS).

The future peak hourly traffic at the New England Highway/Barleyfields Road (north) intersection requires additional left and right-turn traffic lanes as the combination of major road and minor road peak hourly traffic volumes are within the range for the CHR/CHL type of intersection.

RMS propose the construction of a left turn lane to Barleyfields Road from the New England Highway. This decision was based on the traffic data available under the current use of this intersection. It was noted that as part of this work, RMS will ensure that the intersection of Barleyfields Road and the New England Highway will be suitable for conversion to a CH(R) layout without significant construction work (ie implementation of a right-turn lane for traffic turning right into Barleyfields Road (north) from the New England Highway).

The New England Highway/Barleyfields Road (south) and Wood Street intersection requires additional left and right turn traffic lanes (CHR/CHL) on the New England Highway, as the combination of major road and minor road peak hourly traffic volumes are within the range of this type of intersection.

The Barleyfields Road/Big Ridge Road intersection does not require additional left or right turn traffic lanes as the peak hourly traffic volumes will continue to satisfy the standard AUR/AUL intersection design requirements without additional left or right turn traffic lanes.

5.8.4 Mitigation measures

i Traffic management plan

As described in Section 6.1 of the TIA (Appendix K of the EIS), a traffic management plan (TMP) and Driver's Code of Conduct will be prepared prior to commencement of construction.

Of note, the swept path analyses for Thunderbolts Way/Salisbury Plains Road and the New England Highway/Salisbury Street/Duke Street intersections are no longer required due to the removal of the southern array area from the DA.

No other changes are proposed to the remaining mitigation measures recommended for inclusion in the TMP. Thunderbolts Way will have a reduced number of project-related light vehicles and no construction heavy vehicles are anticipated to travel along this road corridor. The TMP and Driver's Code of Conduct will include a map of the consolidated heavy vehicle routes for access to the two array areas.

In advance of preparation of the TMP, as part of ongoing project design and planning work and in consideration of the project amendments and associated traffic-related impacts, UPC has engaged an experienced traffic consultant to further quantify and assess potential impacts to local roads and intersections and prepare concept designs for proposed road and intersection upgrades, with a view to agreeing with Uralla Shire Council prior to determination of the project, a suitable schedule of upgrade works and set of mitigation measures to address the 'roads' related items identified in Uralla Shire Council's submission on the EIS. This work includes further consideration of the most appropriate mitigation measures to be adopted for dust suppression purposes, which may include localised sealing of gravel roads in the vicinity of residences along Munsies Road and Big Ridge Road.

As part of consultation undertaken in support of the preparation of the RTS, this approach (including consideration of scope and timing) was discussed with and supported by Uralla Shire Council.

ii Intersection improvements

Thunderbolts Way will have a reduced number of project-related light vehicles and no construction heavy vehicles are anticipated to travel along this road corridor. Subsequently, intersection improvements are limited to:

- New England Highway/Barleyfields Road (north); and
- New England Highway/Barleyfields Road (south).

The recommended intersection improvements are described in Section 5.8.3.

iii Road maintenance program

The amendments to the development footprint have reduced the number of local roads impacted by the project and, subsequently, potential impacts to local road users and neighbouring residents have also been reduced.

A road maintenance program will be implemented and will be based around bi-monthly route inspections of all the affected roads (ie Barleyfields Road, Big Ridge Road and Munsies Road). As described in Section 6.3 of the TIA (Appendix K of the EIS), the program may include items such as:

- regrading of the road surface to repair potholes and road corrugations at regular intervals and in response to identified serviceability and safety concerns; and
- a commitment by UPC to restore the road surfaces to their pre-construction condition at the completion of construction.

5.8.5 Conclusion

The amendments to the project have reduced the number of local roads that will be used by project-related light and heavy vehicle movements. Access to the two array areas will be from the following local roads:

- Barleyfields Road and Big Ridge Road (northern array); and
- Barleyfields Road, Big Ridge Road and Munsies Road (central array).

To reduce the volume of project-related traffic on Munsies Road, where practicable, vehicles will travel from the Big Ridge Road site access points for the northern array to access the central array via an internal site access road between the northern and central array areas.

The peak daily project-related vehicle movements should be considered as a limited duration construction traffic impact as they are anticipated to occur across two four-month periods within the overall 36-month construction period.

Project-related peak and average construction vehicle movements will have a short-term impact on traffic conditions and usability, which is proposed to be managed by road condition inspections and maintenance procedures. These additional road maintenance procedures will be negotiated and agreed between UPC and Uralla Shire Council as part of the project's TMP.

5.9 Water

5.9.1 Overview

A surface water assessment (SWA) was undertaken in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies (including NSW Department of Industry – Lands and Water Division (Dol Lands and Water)).

The amendments to the project have reduced the extent of the development footprint, which has led to reduced water-related impacts. This section of the AR provides an update to the description of the surface water and groundwater environment presented in the SWA and a revised assessment of the water-related impacts associated with the project.

5.9.2 Existing environment

i Watercourses and riparian corridors

The amended development footprint includes several mapped 1st and 2nd order watercourses as identified in the SWA. However, the following named watercourses are no longer within or adjacent to the development footprint as a result of the removal of the southern array area and further refinements to the northern array area:

- Salisbury Waters (6th order stream);
- Cook Station Creek (5th order stream); and
- Hariet Gully (2nd order stream).

As part of consultation during preparation of the SWA and EIS, Dol Lands and Water highlighted several mapped watercourses of interest. An assessment of these watercourses was included in the SWA. It is noted that several of the watercourses identified as part of this consultation are no longer within or adjacent to the development footprint, including:

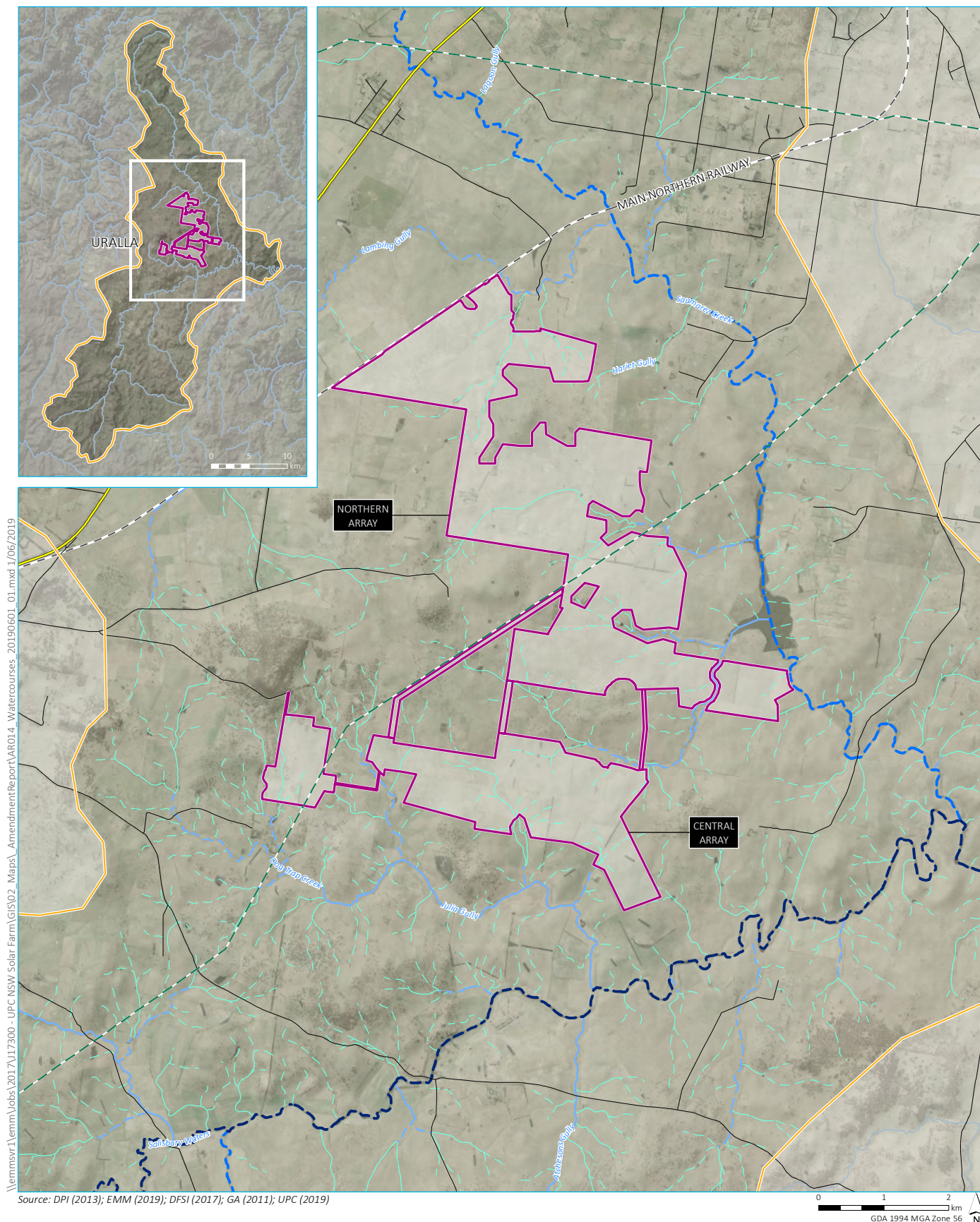
- Hariet Gully (2nd order stream); and
- several 1st and 2nd order streams within the southern array area.

Figure 5.11 shows existing watercourse alignments based on NSW Department of Finance, Services and Innovation (DFSI) data relative to the amended development footprint.

ii Groundwater

Based on a review of available groundwater level data for registered bores in the vicinity of the amended development footprint, monitored standing water levels average approximately 20 m below ground level to a minimum of approximately 3.5 m below ground level in the north of northern array area (DPI 2016).

This average value is consistent with that presented in the SWA (refer Section 4.7 of Appendix H of the EIS). The minimum value is slightly higher than that presented in the SWA, indicating that groundwater levels are likely to be slightly deeper in the northern and central array areas when compared to the southern array area, which has now been removed from the development footprint.



KEY

- | | |
|--|---|
| --- 330 kV transmission line | Strahler stream order (riparian buffer distance) |
| --- Rail line | --- 1st order (10 m) |
| --- Main road | --- 2nd order (20 m) |
| --- Local road | --- 3rd order (30 m) |
| --- Named watercourse | --- 4th order (40 m) |
| --- Development footprint | --- 5th order (40 m) |
| --- Salisbury Waters catchment | --- 6th order (50 m) |

Watercourses and riparian corridors

New England Solar Farm
Amendment report
Figure 5.11

iii Flooding

Figure 4.4 of the SWA illustrated indicative extents and depths of mainstream flooding along major watercourses (3rd order streams and higher) for the 1% annual exceedance probability (AEP) design flood event. The SWA also estimated the extent of land within the development footprint and project boundary subject to inundation for a flood of this magnitude.

As a result of the amendments to the development footprint, the total area of land subject to inundation has reduced. The area of land within the project boundary and development footprint that may be subject to mainstream inundation for a 1% AEP event is anticipated to be approximately 758 ha (9.1% of the total area) and 213 ha (7.6% of the total area), respectively.

5.9.3 Assessment of impacts

The assessment of residual impacts to surface water and groundwater as presented in the SWA remain relevant to the amended project. However, as noted previously, the reductions to the extent of the development footprint will lead to generally reduced water-related impacts from those documented in the SWA.

i Watercourses and riparian corridors

As a result of the amendments to the development footprint, Salisbury Waters, Cook Station Creek and Harriet Gully, as well as their associated riparian corridors, are no longer within or adjacent to the development footprint.

The amended development footprint still includes several mapped 1st and 2nd order watercourses; however, the number of individual watercourses and total length of mapped watercourse within the development footprint has reduced from that presented in the SWA. Table 5.23 provides the length of mapped watercourses within the amended development footprint.

Table 5.23 Watercourses within the amended development footprint

Array area	Stream order	Length of mapped watercourse
Northern	1	12.7 km
	2	4.12 km
Central	1	9.10 km
	2	3.08 km

As a result of the removal of the southern array area and refinements to the northern array area, the length of mapped 1st and 2nd order watercourses likely to be impacted by the project has been reduced.

As described in the SWA, it is proposed that placement of PV modules and ancillary infrastructure within these mapped lower order watercourses be minimised to the extent practicable, rather than strict compliance with the *Guidelines for Controlled Activities on Waterfront Land* (NOW 2012) in terms of locating infrastructure outside riparian corridors. The majority of these mapped lower order watercourses do not have a discernible channel and therefore are considered unlikely to satisfy the definition of 'waterfront land' established within the NSW *Water Management Act 2000* (WM Act). Furthermore, these watercourses exhibit little intact riparian vegetation and poor to no aquatic habitat.

The amendments to the development footprint have also removed the requirement for several of the creek crossings identified in the SWA.

ii Groundwater

Available groundwater level data suggests that average depth to groundwater across the amended development footprint will remain consistent with the information presented in the SWA. The minimum value is slightly higher than that presented in the SWA, indicating that groundwater levels are likely to be slightly deeper in the northern and central array areas when compared to the southern array area. Nonetheless, the project is unlikely to intersect nor otherwise impact groundwater during construction, operation and decommissioning.

iii Flooding

As a result of the amendments to the project, there is less risk of adverse flooding impacts. This is primarily a result of the reduced extent of the development footprint.

5.9.4 Mitigation measures

Mitigation measures proposed to manage potential surface water impacts during both construction and operations were presented in Table 6.1 of the SWA. These measures focused on minimising adverse impacts to existing watercourses and riparian corridors, water quality, flooding and water use.

The proposed mitigation measures presented in Table 6.1 of the SWA remain appropriate for the amended project and no additional or revised mitigation measures are considered necessary.

5.9.5 Conclusion

There are several first and second order watercourses in the amended development footprint; however, these are ephemeral and, in most cases, do not have a discernible channel, lack aquatic vegetation and are dominated by grass species prevalent across the development footprint.

Impacts on 1st and 2nd order watercourses within the development footprint will be minimised to the extent practicable. Watercourse crossing plans detailing the design of proposed crossings of higher order watercourses outside of the development footprint will be prepared in consultation with DoL Lands and Water.

The project is not likely to impact groundwater during construction, operation and decommissioning due to the estimated depth to groundwater within the project boundary and the limited amount and depth of subsurface disturbance activities required during the installation and decommissioning of project infrastructure.

5.10 Hazards and risks

A hazard and risk assessment was prepared as part of the EIS, which included a preliminary risk screening in accordance with State Environmental Planning Policy No.33 (SEPP 33) - Hazardous and Offensive Development. The SEPP 33 risk screening assessment concluded:

- the storage and transport of hazardous materials for the project will not exceed the relevant risk screening thresholds;
- there is no other risk factor identified that could result in significant off-site impacts; and
- the project is not considered as 'potentially hazardous' with respect to storage and transportation within the meaning of SEPP 33 and does not require a preliminary hazard analysis (PHA).

All project infrastructure will be designed in accordance with relevant industry standards.

All electrical infrastructure generates electric and magnetic fields (EMF). The hazard assessment related to EMF concluded that:

- EMF created from the project will not exceed the ICNIRP occupational exposure reference level; and
- as the strengths of EMF attenuate rapidly with distance, the ICNIRP reference level for exposure to the general public will not be exceeded and impact to the general public in surrounding land uses will be negligible.

The amendments to the project have reduced the number of sensitive receptors within 2 km of the development footprint and the number of local roads that will be used by project-related light and heavy vehicle movements.

Public safety risks, including hazards and risks associated with project infrastructure and emergency access and evacuation will be mitigated through design of buildings, construction areas and other assets to include appropriate bushfire protection standards and emergency access and evacuation protocols will be developed as part of the emergency response plan (ERP).

5.11 Bushfire

5.11.1 Overview

A bushfire hazard assessment (BHA) was prepared for the project (Appendix M of the EIS). This section of the AR addresses, where required, any residual bushfire impacts not considered as part of the EIS and supporting BHA as a result of the amendments to the development footprint.

5.11.2 Existing environment

A description of vegetation within the development footprint in accordance with the vegetation formations of *Planning for Bushfire Protection* (PBP) (RFS 2006) was provided in Section 2.3 of the BHA. Table 5.24 provides an updated list of the vegetation mapped within the amended development footprint, including the Keith (2004) classification, PBP classification and revised area (ha) of each PCT. As shown in Table 5.24, the predominant vegetation classification, as per PBP, within the amended development footprint, remains as grassland (approximately 1,998.03 ha) with small areas of woodland (approximately 41.7 ha).

Table 5.24 Vegetation within the amended development footprint

Plant community type (PCT)	Development footprint area	Vegetation formation (Keith 2004)	Condition	PBP classification
PCT 1174 - Silvertop Stringybark open forest of the New England Tableland Bioregion	5.7 ha	Grassy Woodlands	Woodland	Woodland (grassy)
510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	36 ha	Grassy Woodlands	Woodland	Woodland (grassy)
510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	1.6 ha	Grassy Woodlands	Planted	Woodland (grassy)
510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	985.1 ha	Grassy Woodlands	Pasture	Grassland
Category 1 planted vegetation	9 ha	Grassy Woodlands	Planted	Woodland (grassy)

Table 5.24 **Vegetation within the amended development footprint**

Plant community type (PCT)	Development footprint area	Vegetation formation (Keith 2004)	Condition	PBP classification
Exotic grasslands	985 ha	-	Pasture	Grassland
Exotic cropping	22.21 ha	-	Cropping	Grassland
Exotic trees (wind rows)	13.84 ha	-	Planted wind rows	Plantation (pine)

5.11.3 Assessment of impacts

Section 4 of the BHA provides an assessment of the potential sources of ignition of unplanned fires from the construction, operation and decommissioning of the project. The assessment in Section 4 of the BHA (Appendix M of the EIS) remains relevant to the amended development footprint.

5.11.4 Mitigation measures

Section 5 of the BHA outlines the key principles for fire prevention and protection for the project and recommends fire protection and prevention measures suitable for application during the construction, operation and decommissioning of the project. The below sections outline any changes to Section 5 of the BHA that are required as a result of the amendments to the development footprint.

i Access

Section 5.3 of the BHA describes the proposed access routes to the development footprint and provides recommendations for consideration as part of the detailed design of the project. The amendments to the development footprint have reduced the overall area of the project and number of access points.

The primary site access points will be from Big Ridge Road, via Barleyfields Road, and Munsies Road (refer Figure 2.1). Emergency access points may also be required and will be identified as part of the project's emergency response plan (ERP). The primary site access points, emergency access points and project roads will comprise of a combination of sealed and unsealed roads. Detailed design of the access roads will consider those design elements listed in Section 5.3 of the BHA (Appendix M of the EIS).

It is noted that there are creek crossings proposed for access to and from the two array areas. Indicative locations for higher order creek crossings (ie Strahler third order and above) for the two array areas are provided on Figure 2.1. Detailed design of the creek crossings will consider those design elements listed in Section 5.3 of the BHA (Appendix M of the EIS).

All other recommendations that relate to access, as presented in Section 5.3 of the BHA (Appendix M of the EIS), remain relevant.

ii Location and adequacy of services

All recommendations provided in Section 5.4 of the BHA (Appendix M of the EIS) in relation to the location and adequacy of services remain relevant to the amended development footprint.

iii Emergency response plan

All recommendations provided in Section 5.8.2 of the BHA (Appendix M of the EIS) in relation to the requirements for an ERP remain relevant to the amended development footprint.

5.11.5 Conclusion

This section of the AR has addressed any residual bushfire impacts not considered as part of the EIS and supporting BHA (Appendix M of the EIS) as a result of the amendments to the development footprint.

An updated list of the vegetation mapped within the development footprint shows that the predominant vegetation classification, as per PBP, remains as grassland with small areas of woodland.

The assessment of impacts within the BHA remains relevant to the amended development footprint.

The application of fire protection and prevention measures (mitigation measures) during the construction, operation and decommissioning of the project, as recommended within the BHA, remain relevant for the amended development footprint. Both the BHA (Appendix M of the EIS) and the AR should be consulted during detailed design of the project.

5.12 Social

5.12.1 Overview

A social impact assessment (SIA) was prepared as part of the EIS with reference to the methods outlined in the *Social impact assessment guideline for State Significant mining, petroleum production and extractive industry development* (DPE 2017). The SIA applied both quantitative and qualitative measures to achieve a realistic examination of how and why the project may bring positive, negative or neutral impacts to the communities in the area of social influence for the project.

As noted in Chapter 2, no changes to the following are proposed as part of the amendments to the project:

- duration of construction (ie approximately 36 months);
- size of the construction workforce (ie up to 700 people);
- duration of ongoing operations (ie in the order of 30 years); or
- number of FTEs required during ongoing operations (ie up to 15 people).

Subsequently, with the exception of potential amenity (visual, noise and traffic) impacts associated with the construction and ongoing operation of the project, the assessment of impacts presented in Section 5.12.3 of the EIS remains applicable.

5.12.2 Assessment of impacts

The assessment of social impacts associated with the project considered the availability of accommodation, flow-on effects on surrounding industries, travel and access arrangements, community benefits and the overall equity of impacts. The key impacts associated with the project will occur during construction, and predominantly relate to the presence of the construction workforce. These impacts can be reduced with the application of the mitigation measures described in Section 5.12.3.

The amendments to the project have reduced the extent of amenity impacts associated with the project. This AR, the EIS and supporting technical assessments have considered potential amenity impacts from the project's construction and operations. Construction impacts will be temporary in nature and are therefore considered unlikely to have a lasting impact on the amenity of the locality. The residual impacts associated with the ongoing operation of the project (ie after the implementation of proposed management and mitigation measures) are predicted to be minimal.

Further detail on potential impacts to the local community and amenity are provided in Section 4.6 (visual), Section 4.7 (noise) and Section 4.8 (traffic). Importantly, the amendments to the project have:

- reduced the number of sensitive receptors within 2 km of the development footprint; and
- reduced the number of local roads that will be used by project-related light and heavy vehicle movements.

5.12.3 Mitigation measures

As described in Section 2.4.5, it is still anticipated that the project will be constructed in two stages. Staging will reduce peak workforce numbers and is the most effective way to mitigate the overall impacts associated with the project's construction workforce.

Despite the staging of workforce numbers, it is anticipated that there will be a greater demand for worker accommodation than can reasonably be met by local towns and regional centres. Subsequently, a construction accommodation village may be constructed within the northern array area. The construction accommodation village could be scaled up or down, depending on the need to absorb or shed surplus demand.

Implementation of a construction workforce management plan (CWMP) is proposed as the primary means of planning and managing potential impacts to the local community (including availability of accommodation, infrastructure and services). A key aim of the CWMP will be to achieve the best mix of benefits for the local community without placing pressure on accommodation and other local services.

5.12.4 Conclusion

The amendments to the project have reduced the number of sensitive receptors within 2 km of the development footprint, along with the number of local roads that will be used by project-related light and heavy vehicles within the township of Uralla.

A construction workforce of up to 700 workers may still be required and, subsequently, there is a potential for this workforce to overwhelm the rental and temporary accommodation markets as well as community services such as GPs. However, this can be managed by the implementation of a construction schedule that avoids the peaks of the first and second stages overlapping and through the use of a construction accommodation village and ancillary services such as a medical post, management of which can be planned through implementation of a CWMP or similar prior to commencement of construction.

5.13 Economic

5.13.1 Overview

An economic impact assessment (EIA) was prepared as part of the EIS. As part of the EIA, an input-output (IO) analysis was undertaken to identify the economic impact of the project in terms of four main indicators, namely gross regional output, value-added, income and employment (refer Section 5.13.3 of the EIS).

As noted in Chapter 2, no changes to the following are proposed as part of the amendments to the project:

- duration of construction (ie approximately 36 months);
- size of the construction workforce (ie up to 700 people);
- duration of ongoing operations (ie in the order of 30 years);
- number of FTEs required during ongoing operations (ie up to 15 people); or
- the capital investment value (CIV) for the project.

As noted in Section 4.4.1 of the EIA (Appendix O of the EIS), as part of the IO analysis, it was conservatively assumed that lease payments to project landholders were not reinvested in the region. Subsequently, further assessment to calculate potential changes to economic impacts as a result of the removal of a number of project landholders (due to removal of the southern array) is not required.

5.13.2 Assessment of impacts

i Construction

No changes to the direct and indirect regional economic impacts presented in Table 5.32 (Year 1), Table 5.33 (Year 2) or Table 5.34 (Year 3) of the EIS are required as part of the amendments to the project.

ii Operations

Consistent with the information presented in Section 5.13.3 of the EIS, the project will contribute to the regional economy for up to 30 years. It is anticipated that annual contributions will be up to (in 2018 dollars):

- \$86M in annual direct and indirect regional output or business turnover;
- \$26M in annual direct and indirect regional value added;
- \$3M in annual direct and indirect household income; and
- 39 direct and indirect jobs.

iii Agricultural impacts

The amendments to the project have reduced the extent of the development footprint and, subsequently, the total area within the Uralla Shire LGA that will be removed from agricultural production as a result of the construction and ongoing operation of the project.

While there will still be some loss of agricultural activity to the region, this is a private economic decision made by the project landholders for which they are compensated. Annual foregone revenue during construction and operations was estimated within Section 4.5 the EIA to be in the order of \$1.8M and \$1.2M, respectively. Removal of the southern array from the amended project would proportionally reduce the calculated impact during both construction and operations.

Nonetheless, the regional economic activity impacts of foregone agricultural activity are less than those of the construction and operation of the project. Therefore, as well as the project landholders being better-off than they were before, in terms of economic activity, the regional economy will also be better-off.

5.13.3 Mitigation measures

A range of general economic impact management measures are proposed and will include:

- ensuring regional residents are made aware of employment opportunities and lead contractors are encouraged to hire regional residents where they have the required skills and experience and are able to demonstrate a cultural fit with the organisation;
- participation in business group meetings, events or programs in the regional community designed to make regional businesses aware of upcoming contracting opportunities and requirements;
- encouraging lead contractors to purchase local non-labour inputs to production, where local producers can be cost and quality competitive, to support local industries; and
- project design to enable continued sheep grazing within the array areas will reduce level of agricultural impacts throughout project operations.

5.13.4 Conclusion

Despite the amendments to the project, the construction and operation of the project is still expected to have a net positive impact on the level of economic activity in the study area adopted as part of the EIA. UPC will work with local stakeholders, including the local community and the relevant LGAs, to maximise benefits and minimise negative impacts.

Amendments to the project have reduced the extent of the development footprint and, subsequently, the total area within the Uralla Shire LGA that will be temporarily removed from agricultural production as a result of the construction and ongoing operation of the project.

5.14 Air quality

The two array areas are in a rural setting, with the closest concentration of receptors in the town of Uralla, approximately 6 km west of the central array; and the regional city of Armidale, approximately 8.6 km north of the development footprint for the northern array.

The area surrounding the two array areas is sparsely populated, with the exception of land north-east of the northern array area within the suburb of Kellys Plains (refer Figure 5.6). There is a cluster of rural dwellings in this location; however, as noted within the VIA (Appendix I of the EIS), visibility of the development footprint at these dwellings will be limited due to local topography and the presence of remnant and planted vegetation.

The amendments to the project have reduced the number of sensitive receptors within 2 km of the development footprint. Non-project related dwellings considered as part of this assessment are identified on Figure 5.6 and include 3 residences within 1 km of the development footprint and a further 25 residences within 2 km.

Emissions to the atmosphere from the project during construction will be temporary in nature and will be restricted to dust caused by land disturbance and vehicle, plant and equipment exhaust emissions.

Ongoing maintenance of project infrastructure and the land within the development footprint will be required during operation. Maintenance activities will result in very minor, localised vehicle emissions and generation of dust from vehicles travelling along internal, unsealed access roads.

The implementation of mitigation measures such as dust suppression and local road maintenance will reduce air quality impacts during construction and operations.

5.15 Waste management

As noted within Section 5.15 of the EIS, the project will produce a number of waste streams during the construction period. Minor quantities of waste will also continue to be generated during operations. Potential impacts from poor management of waste include contamination of land and water and human and animal health impacts.

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

A waste management plan (WMP) will be prepared and implemented in consultation with Uralla Shire Council and DPE. A key objective of the WMP will be to ensure that any use of local waste management facilities does not disadvantage local businesses and, more generally, the local community, by exhausting any available capacity at these facilities.

5.16 Cumulative impacts

5.16.1 Overview

There are a number of projects either planned or already approved within the immediate region. This includes three additional large-scale solar farm developments, namely the Uralla Solar Farm (SSD 18_9534), Metz Solar Farm (SSD 16_7931) and Tilbuster Solar Farm (SSD 18_9619). Due to the distance between the development footprint for the northern array area and the sites for the Metz and Tilbuster solar farms, an assessment of potential cumulative land use, traffic, visual and noise impacts from the concurrent construction of the Metz and Tilbuster solar farms and the project is not warranted.

Neoen is seeking to develop the Uralla Solar Farm within the Uralla Shire LGA, approximately 4.9 km north-west of the project (refer Figure 1.1 of the EIS).

There may be cumulative impacts from the concurrent construction of the project and other large-scale solar farm developments due to the size of the construction workforce and subsequent demand for short-term accommodation, local infrastructure and services and associated vehicle movements on the regional road network.

5.16.2 Potential cumulative impacts

i Agricultural production and land use impacts

Assuming that the proposed site for the Uralla Solar Farm is utilised in its entirety, the combined area of the two projects would represent approximately 1.2% of the total land area within the Uralla Shire LGA.

The utilisation of agricultural land by the project and the Uralla Solar Farm will only result in a temporary negligible reduction in the overall agricultural productivity of the Uralla Shire LGA and the New England North West region.

Land management practises will avoid or minimise potential impacts to neighbouring agricultural operations that have been identified during engagement with the local community and as part of the LUCRA. A copy of the amended LUCRA is provided in Appendix G.

ii Traffic

As part of the TIA, a cumulative assessment, which assumed the peak stage of construction for both projects may occur simultaneously was performed (Appendix K of the EIS). The only shared road network route between the project and the Uralla Solar Farm is the New England Highway. Therefore, cumulative traffic impacts have only considered potential impacts on the New England Highway.

The results of the assessment concluded the potential daily traffic increases from the concurrent construction result in a 6.98%–11.49% increase in traffic volumes on the New England Highway. These traffic increases are considered of minimal impact as the New England Highway is a well-constructed sealed 11 m wide carriageway. The New England Highway is constructed and designed to accommodate heavy vehicle movements. Furthermore, the projected peak daily traffic increase of between 6.98% to 11.49% will only occur for up to 1216 months and under a concurrent construction scenario for the two projects (which is considered unlikely). Thereafter, it will return to a peak daily traffic increase of between 4.24% to 6.98% (ie project-related construction vehicle movements only).

iii Noise

The NVIA (Appendix J of the EIS) included consideration of potential cumulative construction impacts under a concurrent construction scenario for the project and the Uralla Solar Farm. Total cumulative construction noise levels from both developments are expected to satisfy the NMLs during ICNG standard hours at the identified assessment locations. The NVIA also assessed impacts from cumulative road traffic movements from both the project and the Uralla Solar Farm with a focus on road sections potentially common to both projects (ie the New England Highway). The total cumulative road traffic noise levels are predicted to be below the relevant RNP criteria during a concurrent construction scenario for the project and the Uralla Solar Farm.

iv Social

As noted within Section 5.1 of the SIA (Appendix N of the EIS), the challenge will be in the size of the workforce during the construction period and particularly the cumulative impact given the similarity in the construction requirements, the workforce skills requirements and the materials and services required for the construction of the project and the other solar energy projects proposed in the surrounding region.

Some flexibility will be needed in developing management solutions for cumulative impacts, particularly worker accommodation, as there is a high degree of uncertainty regarding the relative timing of construction for the local renewable energy projects. The key consideration will be the extent to which the peaks in workforce numbers coincide for each project.

A cumulative impact is potentially one of accommodation for the aggregate workforces associated with the New England Solar Farm and other local projects. As noted, the capacity for accommodation at the construction accommodation village will be scalable to enable some responsiveness to accommodation issues. This is important given the number of variables which may influence the availability of accommodation at any given stage of construction for the New England Solar Farm and other local projects.

v Visual

Due to distance between the project and the other projects listed in Section 5.16.1 of the EIS, cumulative visual impacts were only considered between the project and the Uralla Solar Farm. The results of the cumulative visual impact assessment presented in Section 5.6 of the VIA (Appendix I of the EIS) will not change as a result of the amendments to the project.

Should it proceed, the construction of the project and the proposed Uralla Solar Farm will expand the overall area within the Uralla Shire LGA that is occupied by solar infrastructure. Based on the height of the dominant project infrastructure, namely the PV modules; variable elevation and undulation in the landscape; the presence of vegetation; and separation distances between the northern array area and the Uralla Solar Farm, it is anticipated that there is limited potential for significant combined views of the project and the Uralla Solar Farm. In addition, two significant transport passages, ie the New England Highway and Main Northern Railway, separate the northern array area and the proposed site for Uralla Solar Farm, both of which will further restrict potential for combined views of the two projects (should they both be constructed).

5.16.3 Mitigation measures

Mitigation measures for predicted effects are noted within this EIS; however, in summary with specific reference to potential cumulative effects, proposed mitigation measures include:

- preparation of a CWMP; and
- development and implementation of a community engagement framework as part of the project's stakeholder engagement strategy.

6 Mitigation measures

As noted in Section 2.8, an environmental management strategy will be implemented to provide the strategic framework for environmental management of the project. The strategy will:

- incorporate the EMP, all other required plans, protocols, management and mitigation measures proposed in the EIS and this AR;
- identify all relevant statutory approvals;
- establish roles, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
- establish procedures for consulting with neighbouring landholders, the local community and relevant agencies, including Uralla Shire Council, about the operation and environmental performance of the project; and
- establish procedures for handling of complaints, disputes, non-compliances and emergency response.

The mitigation measures outlined in the EIS and this AR will be incorporated into the detailed design and construction of the project and into the EMP or sub-plans as relevant.

An updated list of mitigation measures for the amended project is provided in Appendix B.

7 Conclusion

The project has been designed to avoid and minimise adverse biophysical, social and economic impacts where possible. The residual impacts have been identified and assessed. While there are some unavoidable impacts, principally during the project's construction period, a suite of design, mitigation and management measures have been proposed to address these. The project will provide a number of longer-term benefits to the local community, New England region and State.

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

- It is suitably located:
 - in a region with ideal climatic and physical conditions for large-scale solar energy generation that has been identified by the NSW Government as a priority Renewable Energy Zone;
 - within close proximity of existing infrastructure with adequate capacity to receive the energy proposed to be generated; and
 - adjacent to agricultural land uses that are compatible with large-scale solar energy generation.
- The design of the project has been an iterative design and environmental assessment process to ensure impacts have been avoided and minimised as much as possible. This has included refining the design in consultation with neighbouring landholders, local and NSW Government agencies, registered Aboriginal parties and the local community;
- The project will not result in significant biophysical, social or economic impacts, and the EIS and AR have identified that any residual impacts can be appropriately managed and/or offset in accordance with NSW Government policy;
- The benefits of the project are in the public interest and will provide renewable energy, increased energy security and direct and indirect economic benefits, through the creation of employment opportunities and benefits to the local and regional economy through income and expenditure during the life of the project; and
- UPC is committed to the long-term environmental management of the land within the development footprint. At the end of the project's investment and operational life, the development footprint will be returned to its pre-existing agricultural land use or another land use as agreed by the project owner and the landholders at that time.

The project is in line with the objects of the EP&A Act and will enable the orderly and logical use of natural, physical and human resources existing within the local area and greater New England North West region. There will be economic investment and employment benefits both locally and regionally and a realised opportunity for renewable energy generation, while minimising potential environmental and social impacts. A suite of design, mitigation and management measures are proposed to avoid, minimise and manage the biophysical, social and economic impacts of the project.

The project is consistent with the principle of inter-generational equity. The project will contribute to the sustainable transition of electricity generation in NSW to a more reliable, more affordable and cleaner energy future. Once decommissioned, the land within the development footprint can be rehabilitated to its current use if required thereby allowing for either continuation of renewable energy generation or a return to agricultural production, both of which would provide benefits for future generations.

Abbreviations

AC	alternating current
ACHAR	Aboriginal cultural heritage assessment report
AEMO	Australian Energy Market Operator
AEP	annual exceedance probability
AHIMS	Aboriginal Heritage Information Management System
AHMP	Aboriginal heritage management plan
APZ	asset protection zone
AR	amendment report
ARI	average recurrence interval
BAM	biodiversity assessment method
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BDAR	biodiversity development assessment report
BESS	battery and energy storage system
BHA	bushfire hazard assessment
BSAL	biophysical strategic agricultural land
CBSI	community benefit sharing initiative
CEMP	construction environmental management plan
CL Act	<i>NSW Crown Land Act 1989</i>
CWMP	construction workforce management plan
DA	development application
DC	direct current
DoEE	Commonwealth Department of Environment and Energy
DoI Land and Water	Department of Industry - Lands and Water Division
DPE	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DRG	NSW Department of Planning and Environment – Division of Resources and Geoscience
DRE	NSW Department Planning and Environment – Division of Resources and Energy
EIA	economic impact assessment
EIS	environmental impact statement

EMF	electric and magnetic fields
EMM	EMM Consulting Pty Limited
EMP	environmental management plan
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	NSW Environmental Planning and Assessment Regulation 2000
EPA	NSW Environment Protection Authority
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
EPC	engineering, procurement and construction
EPL	environment protection licence
ERP	emergency response plan
ESCPs	erosion and sediment control plans
ESP	exchangeable sodium percentage
ESD	ecologically sustainable development
ETL	electricity transmission line
EWMSs	environmental work method statements
FMP	fire management plan
FTE	full-time equivalent
GHG	greenhouse gas
GSNSW	Geological Survey of NSW
GWh	gigawatt hours
ha	hectares
Heritage Act	<i>NSW Heritage Act 1977</i>
HHA	historic heritage assessment
HHMP	historic heritage management plan
HV	high voltage
HVAC	heating ventilation air conditioning
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	<i>Interim Construction Noise Guideline</i>
ICNIRP	International Commission on Non-Ionising Radiation Protection
ICOMOS	Australia International Council on Monuments and Sites
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
km	kilometre

kW	kilowatt
LGA	local government area
LLS	Local Land Services
LPG	liquified petroleum gas
LPI	NSW Land and Property Information
LUCRA	land use conflict risk assessment
Mining SEPP	State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.
MNES	matters of national environmental significance
MV	medium voltage
MW	megawatt
MWh	megawatt hours
NEM	National Electricity Market
NMLs	noise management levels
NPfI	<i>Noise Policy for Industry</i>
NPW Act	<i>NSW National Parks and Wildlife Act 1974</i>
NSW	New South Wales
NVIA	noise and vibration impact assessment
OEH	NSW Office of Environment and Heritage
OEMP	operational environmental management plan
OOH	out of hours
O&M	operations and maintenance
PADs	potential archaeological deposits
PBP	<i>Planning for Bushfire Protection</i>
PCT	plant community type
PCU	power conversion unit
PEA	preliminary environmental assessment
PV	photovoltaic
RAP	registered Aboriginal party
RBL	rating background noise level
REAP	Renewable Energy Action Plan
RET	renewable energy target

REZ	renewable energy zone
RF Act	<i>NSW Rural Fires Act 1997</i>
RFS	NSW Rural Fire Service
RING	<i>Rail Infrastructure Noise Guideline</i>
RMS	NSW Roads and Maritime Services
RNP	Road Noise Policy
RTS	response to submissions
Rural Lands SEPP	State Environmental Planning Policy (Rural Lands) 2008
SCADA	supervisory control and data acquisition
SEA	soil erosion assessment
SEARs	Secretary's environmental assessment requirements
SEPP 33	State Environmental Planning Policy No 33 - Hazardous and Offensive Development
SHR	State Heritage Register
SIA	social impact assessment
SoHI	statement of heritage impact
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State significant development
STP	sewage treatment plant
SWA	surface water assessment
SWMP	soil and water management plan
TEC	threatened ecological community
TfNSW	Transport for NSW
TIA	traffic impact assessment
TMP	traffic management plan
UPC	UPC Renewables Australia Pty Ltd
Uralla LEP	Uralla Local Environmental Plan 2012
VIA	visual impact assessment
VRZ	vegetated riparian zone
WM Act	NSW Water Management Act 2000
WMP	waste management plan

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Appendix A

Updated project description

Memorandum

4 June 2019

Subject: J17300 - New England Solar Farm - Amendment Report - Appendix A - Project description

2 Project description

2.1 Overview

The project involves the development, construction and operation of a solar PV electricity generation facility and BESS, which consists of PV modules, batteries, inverters, transformers and associated infrastructure.

The amended development footprint provided on Figure 2.1 incorporates the land required for:

- the two solar array areas (northern and central);
- a single internal solar array substation (central array) and a single grid substation (northern array);
- associated BESS(s);
- operations and maintenance (O&M) infrastructure, including:
 - O&M buildings (namely meeting facilities, a temperature-controlled spare parts storage facility, supervisory control and data acquisition (SCADA) facilities, a workshop and associated infrastructure); and
 - car parking facilities;
- connection infrastructure between the two array areas (including underground or overhead cabling); and
- a new internal road network to enable access from surrounding local roads to the two array areas during construction and operations.

In addition, security fencing and creek crossings (should they be required) will be placed within the project boundary.

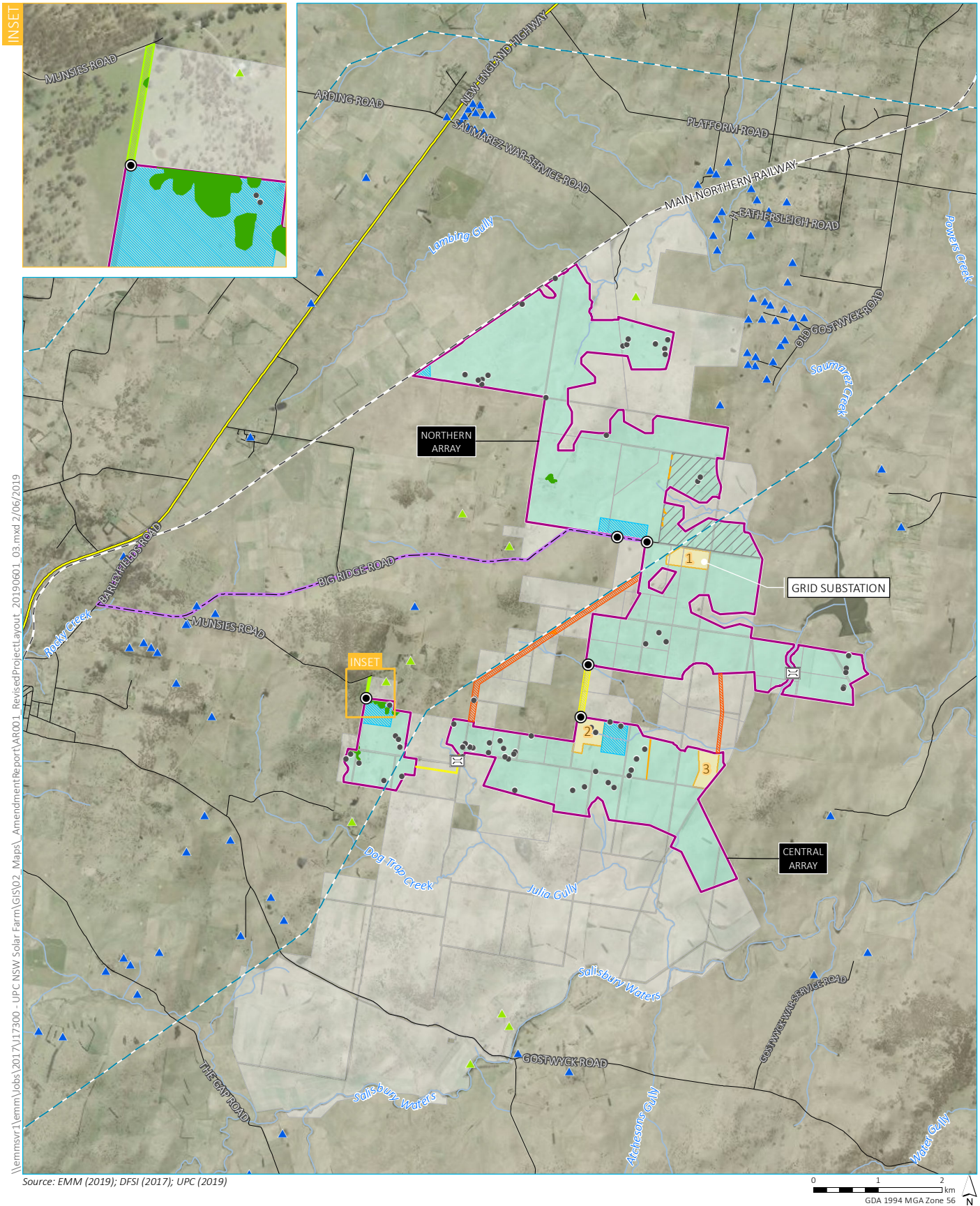
The project will have a targeted 'sent out' electricity generating capacity of up to 720 MW (AC) and up to 200 MW (AC) two-hour energy storage. The final number of PV modules within the two array areas will be dependent on detailed design, availability and commercial considerations at the time of construction.

Electricity generated by the project will be injected into the grid via a new cut-in and grid substation connected to TransGrid's 330 kV transmission line that traverses the northern and central array areas (refer Figure 2.1).

The grid substation will be constructed in the northern array (referred to as Location 1 on Figure 2.1). The solar array substation within the central array will be constructed in one of two potential locations (referred to as locations 2 and 3 on Figure 2.1). It is possible that, following detailed design, the solar array substation within the central array area could be highly reduced in size and complexity or the need for it eliminated altogether, if, for

example no intermediate transformation is needed. If this occurs, some of or all of the parcels of land identified as locations 2 and 3 on Figure 2.1 will be utilised for PV modules and ancillary infrastructure.

The exact location of the electrical cabling to connect the northern and central array areas will be determined as part of detailed design; however, it will be restricted to the three corridors presented in Figure 2.1. Electrical cabling within the three corridors may be buried underground or require the construction of new overhead electricity transmission lines (ETLs).



KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Primary vehicle access route
- Sensitive receptors
 - Project-related
 - Non-project related

- Project boundary
- Development footprint
- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint (location number)

- Potential creek crossing
- Proposed primary site access point
- Potential site for construction accommodation village
- Plant community types requiring offsets
 - PCT 510 planted
 - PCT 1174 woodland
 - Paddock trees requiring offsets

Amended project layout

New England Solar Farm
Amendment report
Figure 2.1

2.2 Site description

The project will be developed within the Uralla Shire LGA. At its closest point, the project boundary is approximately 6 km east of the township of Uralla, and the northern array area starts approximately 8.6 km south of Armidale (refer to Figure 1.1 of the EIS).

The amended project boundary for the development footprint, consisting of the full extent of the involved landholder lots, encompasses a total area of approximately 5,515 ha. The project boundary intersects land legally described and identified in Table 2.1 and Figure 2.2. Based on the current design and lease agreements between UPC and the project landholders, no subdivision is proposed on the lots identified within Table 2.1, with the exception of land required for the grid substation (refer to grey highlighted lots).

A number of Crown roads are located in the project boundary, which are currently either subject to closure or will be closed as required in consultation with the NSW Department of Industry – Lands & Water (DoI Lands and Water) in parallel with the planning assessment and approval process for the project.

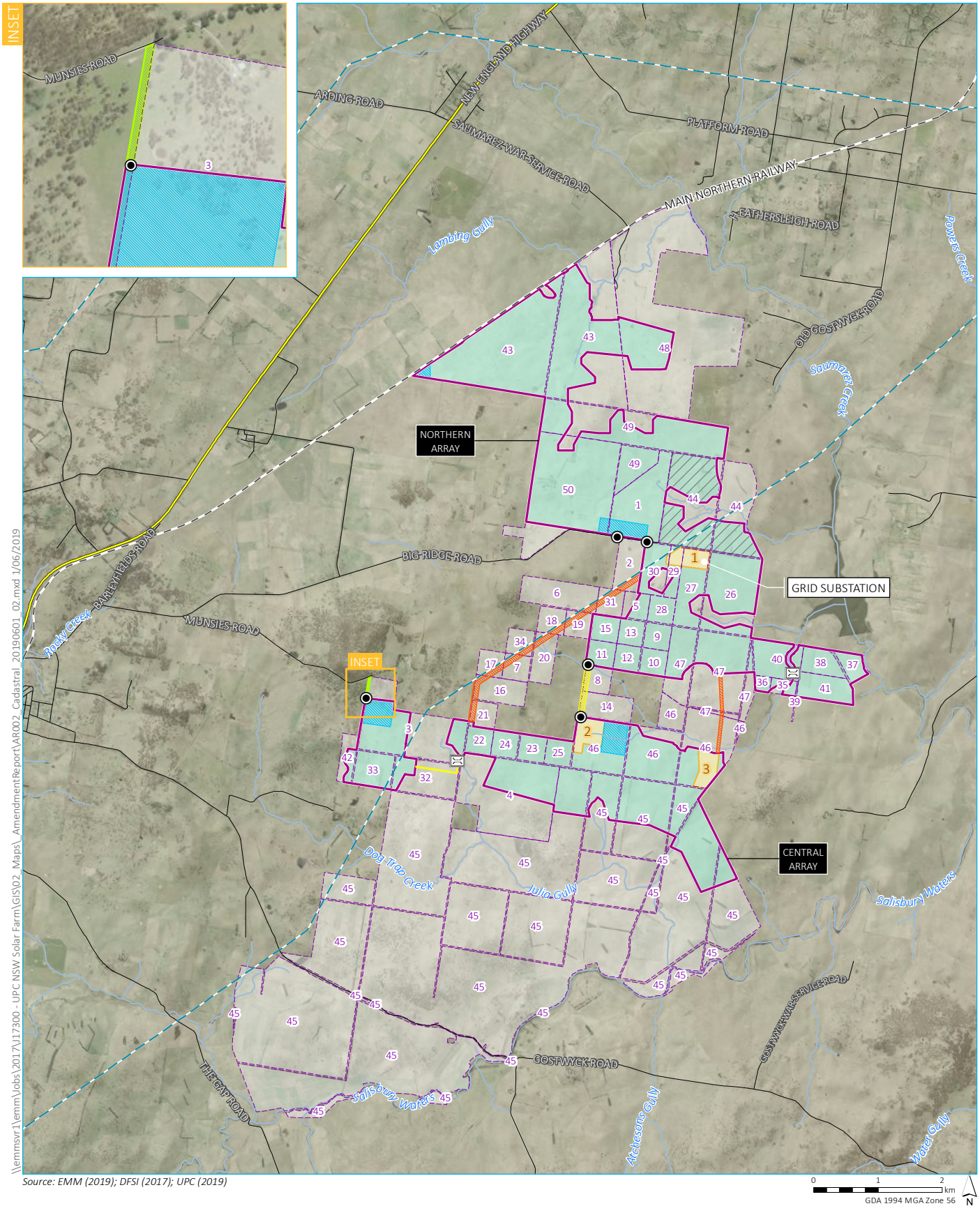
Table 2.1 Involved lots within the project boundary

Project infrastructure component	Lot	Deposited plan (DP)	Label (refer Figure 2.2)
Northern – PV module array	2	DP567937	1
Potential electrical cabling	82	DP755814	2
Central – PV module array			
Potential site access/electrical cabling	183	DP755827	3
Central – PV module array	154	DP755827	4
Northern – PV module array	79	DP755814	5
Potential electrical cabling	202	DP755814	6
Potential electrical cabling	109	DP755827	7
Potential site access/electrical cabling	108	DP755827	8
Northern – PV module array	89	DP755827	9
Northern – PV module array	103	DP755827	10
Northern – PV module array	101	DP755827	11
Northern – PV module array	102	DP755827	12
Northern – PV module array	90	DP755827	13
Potential site access/electrical cabling	113	DP755827	14
Northern – PV module array	91	DP755827	15
Potential electrical cabling	111	DP755827	16
Potential electrical cabling	110	DP755827	17
Potential electrical cabling	93	DP755827	18
Northern – PV module array			
Potential electrical cabling	92	DP755827	19
Potential electrical cabling	98	DP755827	20
Central – PV module array			
Potential electrical cabling	122	DP755827	21
Central – PV module array	123	DP755827	22
Central – PV module array	125	DP755827	23
Central – PV module array	124	DP755827	24
Central – PV module array	126	DP755827	25

Table 2.1 **Involved lots within the project boundary**

Project infrastructure component	Lot	Deposited plan (DP)	Label (refer Figure 2.2)
Northern – PV module array	4	DP172594	26
Northern – PV module array	B	DP172594	27
Northern – PV module array	78	DP755814	28
Northern – PV module array	84	DP755814	29
Northern – PV module array	83	DP755814	30
Potential electrical cabling	80	DP755814	31
Central – PV module array			
Potential site access/electrical cabling	181	DP755827	32
Central – PV module array	182	DP755827	33
Potential electrical cabling	97	DP755827	34
Northern – PV module array	2	DP127777	35
Northern – PV module array	1	DP127777	36
Northern – PV module array	39	DP755827	37
Northern – PV module array	38	DP755827	38
Northern – PV module array	5	DP127777	39
Northern – PV module array	1	DP405515	40
Northern – PV module array	37	DP755827	41
Central – PV module array	296	DP755827	42
Northern – PV module array	221	DP755814	43
Northern – PV module array	2	DP174053	44
Central – PV module array	1	DP227322	45
Central – PV module array			
Potential electrical cabling	8	DP173619	46
Northern – PV module array			
Potential electrical cabling	6	DP172594	47
Northern – PV module array	21	DP1167870	48
Northern – PV module array	23	DP1171290	49
Northern – PV module array	24	DP1171290	50

The development footprint is the area within the project boundary on which infrastructure will be located (with the exception of areas of avoidance identified in Chapter 5 of the EIS and AR and supporting technical assessments). The development footprint encompasses a total area of 2,070 ha, which includes 1,402 ha within the northern array area, 625 ha within the central array area and 43 ha associated with electrical cabling and site access corridors. Within the development footprint, approximately 1,000 ha will be required for the rows of PV modules. The remaining area is associated with power conversion units (PCUs), space between the rows, internal access tracks and associated infrastructure (including substations and BESSs). The development footprint also includes land required for connection infrastructure between the two array areas as well as land required for new internal roads to enable access to the two array areas from the surrounding road network. Subject to detailed design and consultation with the project landholders, security fencing and creek crossings may be required on land outside of the development footprint, but within the project boundary.



KEY

- 330 kV transmission line
- - Rail line
- Main road
- Local road
- Watercourse/drainage line
- Project boundary
- Development footprint
- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint (location number)

- Potential creek crossing
- Proposed primary site access point
- Potential site for construction accommodation village

Cadastral details

New England Solar Farm
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Figure 2.2

The land within the project boundary is zoned RU1 Primary Production under the Uralla LEP (refer Figure 2.5 of the EIS). As identified within Table 2.1, the project boundary encompasses 50 lots, the majority of which have been modified by historical land use practices and past disturbances associated with land clearing, cropping and intensive livestock grazing. The properties within the project boundary are currently primarily used for sheep grazing for production of wool and lambs, with some cattle grazing for beef production.

A very small part of the land within the development footprint (approximately 12 ha or 0.4%) is mapped bushfire prone by Uralla Shire Council (refer Figure 2.5 of the EIS).

The project is ideally located close to TransGrid's 330 kilovolt (kV) transmission line, which passes through the array areas (Figure 2.1). It also has access to the regional road network; including the New England Highway (Figure 2.1). The primary site access points will be from Munsies Road and Big Ridge Road (refer Figure 2.1). Emergency access points may also be required, which will be determined during detailed design.

2.3 Project infrastructure

2.3.1 Solar arrays, PV modules, medium voltage cable network and power control units

The project will involve the development of two separate arrays of PV modules and PCUs. The number of PV modules and PCUs required will be dependent on the final detailed design of the project; however, based on a 720 MW (AC) facility, 30% oversizing and 400 W panels, it is anticipated that there will be approximately 2.4 million PV modules. Should the Ingeteam 5 MW PCU block be utilised across the two array areas, it is anticipated that there will be approximately 150 PCUs.

PV modules will be installed in a series of rows to maximise the energy yield that is achievable given the solar resource and the ground area available within the array areas. The modules will be fixed to, and supported by, a ground-mounted framing structure, aligned in rows. It is highly likely that single axis tracking technology will be used for the project, based on the technology choices currently available in the market and the recent reductions in the costs associated with this technology. Assuming single axis tracking technology is implemented, the rows of PV modules will be aligned in a north-south direction and spaced out approximately 5-8 m apart. The use of single axis tracking technology would enable the PV modules to rotate from east to west during the day tracking the sun's movement. An example of rows of PV modules utilising single axis tracking technology is provided in Photograph 2.1.



Photograph 2.1 PV module row with single axis tracking technology (Source: NexTracker 2018)

An alternative configuration for the solar PV infrastructure may be considered for the project, although considered far less likely, namely a fixed tilt system, with the rows aligned east-west and the PV modules facing north. However, it is noted that single axis tracking is considered more likely due to the recent fall in technology costs and the superior energy yield associated with this technology. As part of detailed design, UPC may consider installing a section of the solar farm using fixed tilt technology in consideration of the interaction between the solar PV generating capacity of the project, the sizing of the BESS and daytime electricity pricing.

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

The height of the PV modules at their maximum tilt angle (typically up to 60 degrees) will be up to 4 m. Additional site-specific clearance of up to around 300 mm may be required to avoid flooding risk or to improve access for sheep to graze underneath the PV modules. If installed at this height, the leading edge of each PV module may be up to 1.2 m from the ground. This would enable sheep to graze fully unimpeded underneath the PV module rows and is common practice as part of the latest bifacial PV module technology (which benefits from a higher ground clearance).

It should be noted that this is a highly conservative assumption, which is based on the PV module configuration illustrated in Option A of Plate 2.1. This configuration involves either four PV modules in landscape orientation or two modules in portrait orientation. The more typical configuration using single axis tracking technology is currently a single PV module mounted on the tracker tube in portrait (refer to Photograph 2.1 and Option B of Plate 2.1). Should this configuration be selected, the height of the PV modules at their maximum tilt angle would likely be closer to 2-3 m, which includes consideration of additional clearance to allow for sheep grazing.

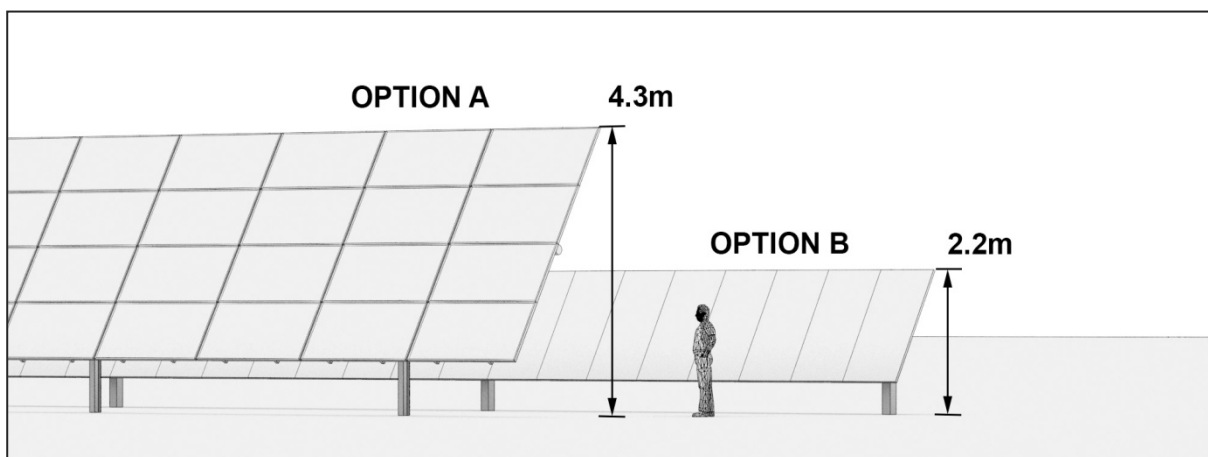


Plate 2.1 Example of PV module configurations under consideration for the project

DC cables will connect the PV modules to the PCUs.

The PCUs consist of three key components, namely inverter(s), transformer(s) and a ring main unit. The purpose of each PCU is to convert the direct current (DC) electricity generated by the PV modules into alternating current (AC) form, compatible with the electricity network. PCUs also increase the voltage of the electricity to 11-33 kV. The exact dimensions of the PCUs will be determined during detailed design; however, it is anticipated that each PCU will be approximately 8 m in length by 2.6 m wide by 2.7 m high. Photograph 2.2 has been provided as an example of what the PCUs and inverters may look like within the development footprint for the array areas. The exact model used will be determined as part of detailed design.



Photograph 2.2 Containerised inverter solution with PV module rows (Source: Ingeteam 2015)

A medium voltage (MV) cable reticulation network will be required to transport the electricity around each of the arrays. If underground, cables of either 11 kV, 22 kV or 33 kV will be installed at a depth of at least 600 millimetres (mm) and will be designed and fitted in accordance with relevant Australian industry standards. Electricity from the MV cable network will be stepped up to high voltage (HV) at either the solar array substation (if required) or the grid connection substation.

New transmission lines, with anticipated voltage of 132 kV, may be required to transport electricity from the solar array substation to the grid substation and will traverse the solar array areas (refer Section 2.3.3). The exact route of the transmission lines within the solar array areas has not yet been determined and will be dependent on the final location selected for the solar array substation (should it be required) (refer Figure 2.1).

2.3.2 Solar array substations

As noted in Section 2.1, a solar array substation may be required in the central array to step the MV up to HV. Two parcels of land that form part of Lot 8 of DP 173619 (Label 46 in Figure 2.2) are currently under consideration for the placement of the solar array substation within the central array. The indicative locations for the solar array substation are provided in Figure 2.1. A larger footprint than what will likely be required has been provided at each location to allow for flexibility for placement of this infrastructure during the detailed design stage of the project (should it be required). Subject to detailed design, PV modules and ancillary infrastructure may also be placed within the substation/BESS footprints identified on Figure 2.1.

2.3.3 Collector network and grid substation

As part of the ongoing detailed design of the infrastructure layout within the development footprint, it may be necessary to utilise either underground or overhead cabling (or a combination of the two) to connect the two array areas. This optionality differs from the description of the collector network presented in Section 2.3.3 of the EIS. Use of overhead 33 kV conductors to connect the central array to the grid substation will remove the need for intermediate transformation at the central array. Overhead conductors are more cost effective and experience less electrical losses due to the cooling effect of the air as well as involving less surface disturbance.

No changes to the alignment or extent of the three potential connection corridors between the northern and central array areas are required (refer Figure 2.1). The only change will be that, where previously, new overhead ETLs were proposed exclusively to transport electricity between the array areas, underground cabling may be installed in their place. Subsequently, no additional impact assessments are considered necessary.

Indicative alignments for each of the electrical cabling corridors that may extend between the northern and central array areas are presented in Figure 2.1. The exact route of the electrical cabling within the two solar array areas

has not yet been determined so this is not shown in the figure. This will be determined during the detailed design stage of the project.

If overhead transmission lines are utilised, the design, height and style of the structures required to support them will be determined during the detailed design stage of the project; however, it is unlikely that the height of the structures will exceed 45 m consistent with Australian standards. Based on preliminary designs, single concrete, wood, or steel poles are anticipated rather than steel lattice towers. The easement required for the overhead transmission lines would be dependent on the type of structure selected but is likely to be approximately 45 m in width. The distance between each structure would also be dependent on the type of structure selected. Where possible, structures would avoid identified constraints on the land parcels between the two array areas. Complete clearance of vegetation within each of the proposed easements may be required.

The grid substation will be adjacent to TransGrid's 330 kV transmission line, which traverses the northern and central array areas (refer Figure 2.1). At the grid substation, the electricity generated by the two solar arrays will be stepped up to 330 kV and injected into the electricity grid via an existing TransGrid 330 kV transmission line. The grid substation will be within the indicative area of 10 ha that is shown on Figure 2.1 and will require a pad area of approximately 4 ha. The indicative area provided on Figure 2.1 covers part of the following lots:

- Lot B of DP 172594 (Label 27 in Figure 2.2);
- Lot 83 of DP 755814 (Label 30 in Figure 2.2); and
- Lot 84 of DP 755814 (Label 29 in Figure 2.2).

The exact dimensions of the grid substation will be refined during the detailed design stage of the project and in consultation with TransGrid. The exact location of the grid substation will be confirmed prior to the commencement of construction.

The land on which the grid substation is constructed is likely to require subdivision as this is a typical requirement of TransGrid, the likely owner/operator of the cut-in section of the yard. At the end of the operational life of the grid substation, the infrastructure on the subdivided lot will be decommissioned and the lot will be reconsolidated back into the residual lot.

All land surrounding the development footprint is zoned RU1 Primary Production under the Uralla LEP (refer Figure 2.5 of the EIS), with associated minimum lot sizes of 200 ha. The subdivision of the lot(s) that are selected for the grid substation may result in a lot size that is less than the minimum lot size under the Uralla LEP. Notwithstanding, in accordance with the provisions of Section 4.38 of the EP&A Act, the proposed subdivision will be permissible subject to the approval of the Minister for Planning or their delegate. The proposed subdivision will be the subject of ongoing discussion with Uralla Shire Council, DPE and the project landholders.

2.3.4 Battery and energy storage system

The purpose of the BESS will be to support the network, introduce a dispatchable capability to the project's energy generation profile and allow for revenue diversification.

The BESS will be adjacent to one or more substations within the development footprint and will be housed within either a number of small enclosures/cabinets or larger battery buildings. The specific design details for the BESS and their respective enclosure types have not been confirmed; however, it is anticipated that the BESS for the project will consist of either one BESS facility at the grid substation or two BESS facilities (ie one at the grid substation and one at the internal solar array substation, should one be needed at the central array).

The small enclosures will likely be either modified shipping containers, pre-fabricated switch room structures or smaller outdoor rated cabinets. The modified shipping containers and prefabricated switch rooms will likely be mounted on concrete footings, while the cabinets will be mounted on several concrete slabs. The large buildings will be similar in appearance and construction to agricultural sheds prevalent across the project boundary.

Each of the footprints presented on Figure 2.1 provide adequate flexibility for design and siting of the applicable BESS at each location. The approximate dimensions for each of the potential BESS structures described above include:

- small enclosure facility: 218 m by 171 m by 2.9 m;
- cabinet facility: 231 m by 116 m by 2.3 m; and/or
- large buildings: 318 m by 232 m by 5.5 m.

These dimensions should be considered indicative only. Exact dimensions will be refined during the detailed design stage of the project.

The major components for each BESS include:

- Batteries – the specific battery module manufacturer and model has not been selected; however, it will likely be a type of lithium ion battery similar to the LG Chem Lithium Nickel Manganese Cobalt Oxide (NMC) 2 hour energy module or Tesla Powerpack 2 hour solution.
- Inverters – the inverters will likely be similar to those used within the array areas as part of the PCUs. An alternative arrangement may be required whereby the inverters would be positioned adjacent to the battery cabinets, with the transformers and switchgear separate to this.
- Transformers – within the BESSs, there will be two types of transformer, namely a LV to MV transformer and a MV to HV transformer. The configuration of the transformers will be subject to the type of batteries used and the BESS configuration.
- Heating ventilation air conditioning (HVACs) – one of three types of HVAC will likely be used as part of the BESS to maintain the batteries at a temperature that will optimise their lifetime and performance. This includes small package units; large chillers or a liquid cooling system (should the battery cabinet configuration be installed).
- Fire protection – the shipping container/pre-fabricated switch room structures and large building BESS configurations will have active gas-based fire protection systems. Within each of the potential enclosures, there will be thermal sensors and smoke/gas detectors connected to a fire control panel. Note that the Tesla cabinet facilities would not have this feature as the inherent design minimises risk of a fire spreading from one cabinet to another.

The components described above will be similar for each of the BESS structures likely to be constructed as part of the project. As noted above, the specific design details for the BESS have not been confirmed and will not be known until the completion of the detailed design stage of the project.

2.3.5 Construction accommodation village

A construction accommodation village for non-local construction employees may be established as part of the early stages of the project's construction. If constructed, the construction accommodation village may accommodate up to 500 workers (subject to demand). A significant proportion of the project's non-local construction workers may be required to reside at the construction accommodation village while they are rostered on so as to mitigate the potential impact on tourist accommodation in the surrounding area and reduce potential impacts on the local road network.

i Proposed site for the construction accommodation village

The construction accommodation village will be on part of Lot 2 of DP 174053 in the northern array area (refer to Figure 2.1). Photograph 2.3 and Photograph 2.4 illustrate the general condition of Lot 2 of DP 174053.



Photograph 2.3 **General condition of Lot 2 of DP 174053 looking south-west**



Photograph 2.4 **General condition of Lot 2 of DP 174053 looking south-east**

Lot 2 of DP 174053 is currently primarily used for sheep grazing for production of wool and lambs and is zoned RU1 Primary Production under the Uralla LEP. It is accessible from Big Ridge Road (refer Figure 2.1). The exact location of the construction accommodation village within Lot 2 of DP 174053 will be determined during the detailed design stage of the project.

Lot 2 of DP 174053 is mostly cleared with dominant vegetation of low diversity native pasture. A limited number of scattered native trees are present, including Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*). Historically, the vegetation present on Lot 2 of DP 174053 would have likely been representative of PCT 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion. A number of planted wind breaks are also present, mostly comprising exotic species. There is also a planted native wind break composed of both indigenous and non-indigenous species.

ii Considerations for detailed site selection

Identification of the proposed location for the construction accommodation village has considered a range of constraints and issues identified and informed by field survey and assessment work undertaken to date in support of preparation of the EIS. Further consideration in determining placement of the construction accommodation village within Lot 2 of DP 174053 will include, but not be limited to the following criteria:

- setback from watercourses and associated riparian corridors (where required);
- setback from TransGrid's existing 330 kV transmission line;
- proximity to existing services;
- setback from sensitive receptors (ie neighbouring dwellings);
- avoiding potential impacts on native vegetation, land mapped as BSAL and/or identified items of Aboriginal cultural heritage and historic heritage significance;
- accessibility from Big Ridge Road; and
- detailed design of the project, namely placement of PV modules and associated infrastructure.

iii Construction and operation requirements

To build the construction accommodation village, topsoil will be stripped where necessary, hardstand constructed and walkways and car parks constructed. The size of the carpark will be subject to demand.

It may contain facilities such as a dining hall, gym, library and games room. A sewerage treatment plant (STP) will also be installed, which may also service any nearby O&M facilities. The STP would be designed and installed in accordance with the relevant design standards and regulatory requirements, and in consultation with DPE, Uralla Shire Council, NSW Environment Protection Authority (EPA), DoI Lands and Water and NSW Office of Environment and Heritage (OEH), which may include a requirement to obtain a licence to operate.

The construction accommodation village will also include a water treatment plant (chlorine dosing) and storage tanks to the satisfaction of the requirements under the NSW *Public Health Act 2010*. Potable water for the construction accommodation village will be imported (trucked in) to site. Based on similar facilities currently operating in Australia, it is anticipated that potable water usage will be approximately 250 litres (l) per person per day.

It is anticipated that up to six diesel generator skids may be required to service the power requirements of the construction accommodation village. Each skid is likely to consume approximately 500 litres of diesel per day, which equates to a total of approximately 3,000 litres per day.

Subsequently, storage of diesel will be required within the development footprint and will likely be positioned on Lot 2 of DP 174053 as part of the construction accommodation village or within proximity of O&M facilities or the construction site office. Storage of diesel will not exceed 20,000 l and will be in a different store location/bund to other flammable materials that may be required on-site (eg gasoline). Storage of diesel within the development footprint will conform with AS 1940:2017 The storage and handling of flammable and combustible liquids and consider best practice safety measures. Diesel storage will be placed away from environmentally sensitive areas, where possible.

The construction accommodation village will be managed by an experienced operator (most likely to be a contractor to the lead contractor appointed for the construction of the project).

Provided reliability, quality and financial competitiveness can be satisfied, local businesses will be engaged to supply goods and services to the construction accommodation village. This will typically consist of laundry, cleaning and catering.

The construction accommodation village is expected to be dismantled and its footprint rehabilitated once the project is built and it moves into the operational stage. The site of the construction accommodation village may be utilised for PV modules and ancillary infrastructure once the village is removed.

Further consideration of the management of waste and wastewater generated by the construction accommodation village is provided in Section 5.15 and Section 5.9 of the EIS, respectively.

Potential bushfire hazards associated with the construction accommodation village have also been considered in Section 5.11 and Appendix A of Appendix M of the EIS.

2.3.6 Supporting infrastructure

In addition to the infrastructure described above, the project will also require:

- one or more O&M buildings (namely meeting facilities, a temperature-controlled spare parts storage facility, SCADA facilities, a workshop and associated infrastructure);
- a number of new internal roads to enable access to the array areas from the surrounding road network including Munsies Road and Big Ridge Road (refer Figure 2.1);
- emergency access points to enable access to the array areas from the surrounding road network in the case of an emergency (eg fire or flood);
- parking and internal access roads/tracks within the array areas to allow for construction and ongoing maintenance; and
- fencing and landscaping around the solar arrays, substations and BESSs.

O&M buildings and associated infrastructure will likely be constructed within the footprints nominated for the substations and BESSs; however, their exact location will be determined during detailed design (refer Figure 2.1). The locations for the emergency access points will be identified as part of the project's emergency response plan (ERP) during detailed design.

Temporary infrastructure during the construction stage of the project including laydown and storage areas and a site compound are also likely to be required in each of the solar array areas. Laydown areas will likely be in close proximity to the primary site access points and will be placed away from environmentally sensitive areas, where possible. Indicative locations for laydown areas and site compounds within each of the array areas are provided on Figure 2.1.

Chain-link (or mesh) security fencing will be installed within the project boundary to a height of up to 2.4 m high. The specific location of the security fencing will be determined in consultation with the contractors selected for the construction of the project and project landholders. Fencing will restrict public access to the development footprint. Where possible, fencing will be positioned to minimise disruption to ongoing agricultural operations on land adjacent to the development footprint.

2.4 Construction

2.4.1 Site preparation

The need for heavy civil works such as grading/levelling and compaction will be minimised as much as practicable, as the flattest land areas within the array areas, which are already mostly cleared of vegetation, have been selected. Civil works will be required to prepare the array areas, which includes installing fencing, internal access tracks, and minor earth works (such as for installation of underground electrical cabling). It is anticipated that some cutting and filling may be required in undulating areas within the development footprint; however, this will be avoided where practicable.

Some heavier earth moving will likely be required for certain project infrastructure (eg substations and BESSs) in those instances where a level pad is necessary. In addition, grading around lower order streams and drainage channels within the three array areas may also be required in order to manage erosion during construction.

As part of site establishment works, management measures will be implemented to mitigate potential impacts on the environment and receptors within close proximity of the development footprint. Where required, additional or improved drainage channels, sediment control ponds and dust control measures will be implemented. Further, laydown areas and waste handling, fuel and chemical storage areas will be strategically placed to minimise potential environmental impacts during the construction stage of the project.

Site establishment works and preparation for construction may include:

- the establishment of a temporary construction site compound in a fenced-off area within the development footprint including:
 - a site office;
 - containers for storage;
 - workshops;
 - parking areas; and
 - temporary laydown areas.
- construction of access tracks and installation of boundary fencing;
- site survey to confirm infrastructure positioning and placement; and
- ongoing geotechnical investigations to confirm the ground conditions.

Should it be required, the installation of the construction accommodation village on Lot 2 of DP 174053 may also occur as part of the site establishment works and preparation for construction.

2.4.2 Construction activities

Upon completion of the site establishment and pre-construction activities described above, construction activities will typically be rolled out as follows:

- drive or screw piles;
- install mounting structures and tracker tubes;
- secure PV modules to tracker tubes;
- installation of DC cabling, MV and (HV) cables (either underground or overhead);

- installation of PCUs;
- complete substation augmentation;
- establishment of the BESS compound; and
- test and commission project infrastructure.

2.4.3 Construction plant and equipment

The plant and equipment required for the construction of the project will include:

- earthmoving machinery and equipment for site preparation;
- cable trenching and laying equipment;
- pile-driving equipment;
- assisted material handling equipment (forklifts and cranes);
- machinery and equipment for connection infrastructure establishment and installation of battery and energy storage devices; and
- water trucks for dust suppression.

2.4.4 Delivery of construction materials and infrastructure

Construction materials and infrastructure may be transported to the array areas via road. Heavy vehicles up to 25 m in length will require access to the array areas. Construction materials and infrastructure delivered to the array areas will include:

- PV modules;
- piles;
- tracking tubes and associated tracker equipment (eg motors, bearings, drivetrains, etc);
- electrical infrastructure including cabling and PCUs;
- construction and permanent O&M buildings and associated infrastructure; and
- earthworks and lifting machinery and equipment.

Over-dimensional vehicle movements should be limited to a total of six vehicles for the delivery of the 33 kV/132 kV transformers that will be located at the solar array substation (if required) and the 33 kV/132 kV/330 kV transformers that will be located at the grid substation. The maximum estimated length of the over-dimensional vehicles is estimated to be up to 120 m. Decommissioning will require the same number of over-dimensional vehicles (ie to remove the transformers). No over-dimensional vehicle movements are anticipated during operations.

As part of ongoing design, UPC has also been considering the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure. The use of the Main Northern Railway line for deliveries to the northern array area has been the subject of consultation with John Holland Country Regional Network (JHR), Transport for NSW (TfNSW) and DPE. Additional information in relation to this activity is provided below. It should be noted that the final decision by UPC on whether the Main Northern Railway line will be used for delivery of construction materials and infrastructure will depend on a number of factors, including:

- timing and logistics;
- sequencing of works;
- cost and safety considerations; and
- engineering, procurement and construction (EPC) contractor acceptance of this alternative to using the road network.

i Location of train unloading and associated works

The proposed location of the train unloading is identified on Figure 2.3 and includes works within:

- part of Lot 221 of DP 755814 (within the development footprint for the northern array area) – this area will be used as a temporary laydown area during construction, primarily for the short-term storage of shipping containers (or similar); and
- part of Lot 2 of DP 982376 (outside of the development footprint within the rail corridor) – a temporary hardstand will be constructed in this area to facilitate safe and efficient use of a mobile forklift, reach stacker or similar during unloading activities.

A larger footprint than what will likely be required has been provided at each location to allow for flexibility for placement of this infrastructure during the detailed design stage of the project. The exact dimensions for the temporary hardstand will be refined during the detailed design stage of the project and in consultation with JHR and TfNSW.

UPC proposes to unload the trains using specific container unloading equipment such as a mobile forklift or reach stacker. The equipment will unload the train within the temporary hardstand area and transport the shipping containers (or similar) to the temporary laydown area within the development footprint for the northern array area (refer Figure 2.3). During unloading, the train will likely shunt along the track to allow for safe and efficient unloading from the full length of the temporary hardstand (approximately 100 m). This will allow UPC to unload approximately four containers with each train movement.

The existing level of the rail corridor, Main Northern Railway line and development footprint for the northern array is quite flat through the area shown in Figure 2.3 and it is anticipated that minimal ground disturbance will be required (refer Photograph 2.5 and Photograph 2.6). The level crossing visible in Figure 2.3 and Photograph 2.5 only services the property on which the northern array is located, subsequently, there will be no impacts on the users of the level crossing.

Construction materials and infrastructure delivered to the temporary laydown area will then be relocated to other areas within the development footprint using internal access roads.

All light and heavy vehicles that require access to the temporary laydown area (within the development footprint for the northern array area) and the temporary hardstand (adjacent to the Main Northern Railway line and within the rail corridor) will travel to these areas from the primary site access point for the northern array area (off Big Ridge Road) using the project's internal access roads. This includes heavy vehicles transporting gravel (or similar) to the two areas during site establishment works, as well as deliveries of construction plant and equipment. It is anticipated that this equipment will already be available on-site as it will be the same equipment that will be used during the construction of the project's internal access roads.

The location for an emergency access point will be identified as part of the project's emergency response plan (ERP) during detailed design.

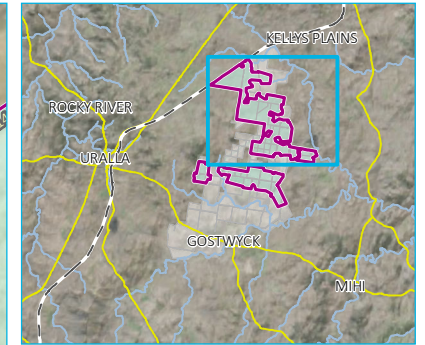
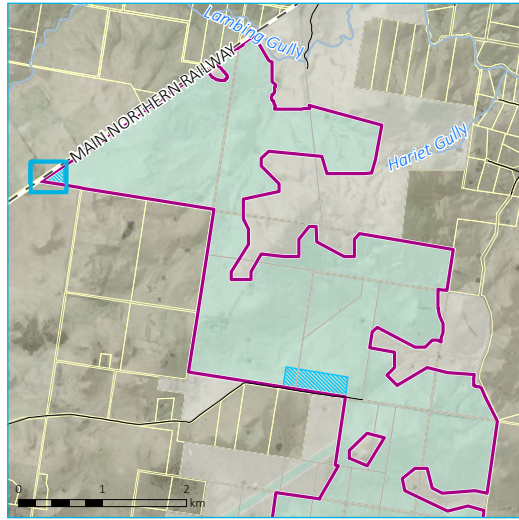


Photograph 2.5 **General condition of Lot 2 of DP 982376 at the proposed laydown area – looking south (outside of the development footprint and project boundary)**



Photograph 2.6 **General condition of Lot 2 of DP 982376 at the proposed laydown area – looking north (outside of the development footprint and project boundary)**

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KEY

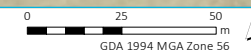
- Rail line
- Named watercourse
- Main road
- Local road
- Cadastral boundary
- Project boundary
- Hardstand in rail corridor
- Development footprint
- Solar array
- Potential laydown area/site compound

Deliveries via the
Main Northern Railway

New England Solar Farm
Amendment report
Figure 2.3



Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)



The shipping containers (or similar) will likely have a height of approximately 2.9 m. The equipment proposed for use during train unloading have limited vertical reach. Subsequently, the maximum height of infrastructure within the laydown area during the unloading activities will be approximately 8.7 m.

As noted above, the containers will only be stored within the temporary laydown area on-site for a short duration, before being unloaded or transferred elsewhere within the development footprint. Once emptied, the shipping containers (or similar) will be removed off-site during subsequent train movements.

At the completion of construction, PV modules and ancillary infrastructure may be placed within the laydown area identified on Figure 2.3. The temporary hardstand within the rail corridor will be decommissioned and rehabilitated in consultation with JHR and TfNSW.

ii Origins, timing, frequency and duration

It is anticipated that it will take approximately 4 hours to unload each train and that an average of 2 trains per week may be used for the delivery of construction materials and infrastructure.

The trains will likely originate at Port Botany in Sydney and will need to stable in Armidale to allow for passenger services to pass. The train from Sydney to Armidale passes the northern array area at approximately 8:50 am. The return train to Sydney passes the northern array area at approximately 5:20 pm. Therefore, UPC proposes to unload the train during the day between these two train services.

As part of consultation with JHR, the potential to unload at night was discussed as this would allow a longer window between passenger trains; however, this is currently not the preferred approach as it would require the use of temporary lighting plant at both the hardstand and laydown areas.

iii Consultation and approval process

UPC has been engaging with JHR and TfNSW in relation to the proposed use of the rail line. This included a site inspection of the areas identified in Figure 2.3, Photograph 2.5 and Photograph 2.6.

During this consultation, it was confirmed that JHR are the agent/operator of the Main Northern Railway line at the proposed location and TfNSW are the owner and sole approver for any proposed works within the rail corridor.

To allow for the development of the hardstand and unloading operations (ie activities outside of the development footprint), a licence from TfNSW is required. As noted during consultation with DPE, this is a separate approval process and will be undertaken in consultation with JHR and TfNSW.

As the agent/operator, JHR has provided an informal briefing to TfNSW to introduce the project and the proposed activities and it's been confirmed that the proposed unloading activities are operationally viable with sufficient siding resources available along the relevant sections of the Main Northern Railway line.

Evidence of UPC's dialogue with JHR and TfNSW in relation to the proposed activities (ie development of a temporary hardstand and performing unloading operations for a limited period) is provided in Appendix C of the AR. UPC will commence the application process directly with JHR (who handle the administrative part of the process) and TfNSW (who will be the approval authority and distribute the licence).

iv Additional assessment requirements

During consultation with DPE, it was noted that potential noise impacts from the train unloading activities required further consideration. To address this, the following additional assessments have been performed with the results summarised in Section 5.7 of the AR:

- a quantitative assessment of potential construction noise impacts from rail delivery and unloading of construction materials with respect to the NSW *Interim Construction Noise Guideline* (DECC 2009); and

- a quantitative assessment of potential sleep disturbance impacts from rail delivery and unloading of construction materials with respect to the NPfl (EPA 2017).

Based on the limited use of the Main Northern Railway line at this location, a quantitative assessment of the proposed works on existing rail use is not considered warranted.

There are no sensitive receptors (ie dwellings) within 2 km of the proposed temporary hardstand or laydown area. Due to their temporary nature (ie maximum of the 36-month construction period) and the presence of remnant vegetation and planted wind breaks within the surrounding landscape, the train unloading activities and associated works are considered unlikely to have any significant noise, dust or visual amenity impacts on the closest receptors (refer Figure 5.7). Nonetheless, the noise management and mitigation measures described in Appendix B of the AR will be implemented as part of any future unloading activities, where practical.

The use of the Main Northern Railway line for delivery of construction materials and project infrastructure would reduce the number of project-related heavy vehicles on the local and regional road network. As this activity is still subject to further consultation with JHR and TfNSW and there are a number of factors that may influence UPC's decision on whether or not to utilise this alternative, the assumptions made as part of the traffic impact assessment have not been revised. The results presented in Section 5.8 of the AR assume that the delivery of construction materials and project infrastructure will be via road only and are therefore considered a worst case scenario.

2.4.5 Construction staging, duration and hours

Construction of the project is still anticipated to take approximately 36 months from the commencement of site establishment works to commissioning of the two array areas. It is anticipated that the project will be constructed in two stages.

Stage 1 will include complete construction of the northern array area including the grid substation and is anticipated to take approximately 25 months to complete.

Stage 2 will include complete construction of the central array area and is anticipated to take approximately 20 months to complete. Stage 2 also includes the construction of the BESS, which is also anticipated to take approximately 20 months to complete.

Stage 2 will commence approximately 12 months after the commencement of site establishment works planned as part of Stage 1.

As noted within the EIS, the exact timing of each stage, including the commencement of Stage 1, the commencement of Stage 2, and the subsequent duration of the overlap between the two stages will be determined during the contracting, detailed design and financing stage of the project following project approval. Similarly, the overall duration of the project's construction will also be confirmed at this time once the preferred EPC contractor is selected and the detailed construction schedule is confirmed. The timeframes are indicative only and reflect a conservative upper limit of potential impacts from the project.

Construction activities will be undertaken from 6am to 6pm Monday to Sunday. Exceptions to these hours may be required on limited occasions. Uralla Shire Council and surrounding landholders will be notified of any exceptions.

2.4.6 Construction workforce

The project will require a peak construction workforce of up to 700 people.

As part of Stage 1, a peak workforce of approximately 350 people may be required on-site. It is anticipated that the average construction workforce throughout the 25 month construction period for Stage 1 will be approximately 180 people.

As part of Stage 2, a peak workforce of approximately 650 people may be required on-site. It is anticipated that the average construction workforce throughout the 20 month construction period for Stage 2 will be

approximately 290 people. As noted in Section 2.4.5, Stage 2 includes the complete construction of the central array area, as well as the BESS.

The origins of the project's peak construction workforce may include:

- Uralla Shire LGA – approximately 10% of the project's construction workforce;
- Tamworth LGA – approximately 20% of the project's construction workforce; and
- Armidale LGA - approximately 20% of the project's construction workforce.

During construction, there will be a preference for employment of local and regional residents where they are able to demonstrate relevant skills and experience and a cultural fit with UPC and the EPC contractor.

The remaining 50% of the project's peak construction workforce are anticipated to originate from outside of these LGAs. A significant proportion of the project's non-local construction workforce may be required to reside at the construction accommodation village during the peak period of construction.

2.5 Services

The project may require connections to the electricity, telecommunications, water and sewer networks. During construction, electricity requirements will be met by backup generators.

2.6 Operation

The operational lifespan of the project will be in the order of 30 years, unless the facility is re-powered at the end of the PV modules' technical life. The PV modules typically come with a performance warranty for 25 years from the manufacturer. The decision to re-power the plant will depend on the economics of solar PV technology and energy market conditions at that time. Should the PV modules be replaced during operations, the lifespan of the project may extend to up to 50 years. Throughout operations, a workforce of up to 15 FTEs will be required.

It is anticipated that the facility will require regular maintenance throughout its operational life. This will include the following ongoing tasks:

- site maintenance including:
 - vegetation maintenance;
 - weed and pest management;
 - fence and access road management;
 - upgrading drainage channels; and
 - landscaping;
- infrastructure maintenance including:
 - panel cleaning;
 - panel, inverter and tracker system repair (if required);
 - inverter replacement (within every 7-10 years); and
 - equipment, cabling, substation and communications system inspection and maintenance.

Regular light vehicle access will be required throughout operations. Heavy vehicles may be required occasionally for replacing larger components of project infrastructure including inverters, transformers or components of the BESS. Highly technical O&M activities will typically be undertaken by specialist subcontractors and/or equipment manufacturers whereas routine activities such as fencing maintenance and vegetation management is likely to be offered to local contractors wherever available.

UPC is currently in discussions with a number of the landholders to enable sheep grazing to resume on portions of the array areas following the completion of the construction of the project. A detailed protocol will be developed to ensure biosecurity is maintained and that grazing does not impact on the safe and efficient operation of the project or result in injury to farm workers, stock or O&M staff.

To ensure the optimal electricity production output for the project is maintained, the PV modules may need to be washed periodically to remove dirt, dust and other matter. Water for panel cleaning will be transported to the array areas via water trucks. Washing will not require any detergent or cleaning agents.

The operational workforce will also be responsible for ongoing security monitoring of the array areas and project infrastructure. Perimeter security cameras may be utilised to assist with monitoring the array areas.

2.7 Decommissioning

Once the project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and the development footprint returned to its pre-existing land use, namely suitable for grazing of sheep and cattle, or another land use as agreed by the project owner and the landholder at that time.

Project decommissioning will require disturbance of the development footprint during the removal of equipment. A significant number of FTEs, including both staff and contractors, and vehicle movements will be required during the decommissioning stage of the project.

Any underground cabling below 500 mm will remain in-situ following project decommissioning.

UPC will attempt to recycle all dismantled and decommissioned infrastructure and equipment, where possible. Structures and equipment that cannot be recycled will be disposed of at an approved waste management facility.

2.8 Environmental management

An environmental management strategy (EMS) will be implemented to provide the strategic framework for environmental management of the project. The strategy will:

- incorporate a project environmental management plan (EMP), all other required plans, protocols, management and mitigation measures proposed in the EIS and AR;
- identify all relevant statutory approvals;
- establish roles, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
- establish procedures for consulting with the local community and relevant agencies about the operation and environmental performance of the development; and
- establish procedures for handling of complaints, disputes, non-compliances and emergency response.

Appendix B of the AR provides a consolidated summary of the management measures that will be implemented during the construction and operation of the project to manage, mitigate and/or monitor potential impacts identified within the EIS and AR.

Appendix B

Updated mitigation measures

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
Biodiversity	• A biodiversity management plan (BMP) will be prepared as part of the project's construction environmental management plan (CEMP) prior to commencement of on-site construction works and will include advice regarding the effective implementation of each of the biodiversity management and mitigation measures listed in Table 6.1 of the BDAR, including: – avoid and minimise clearing impacts to PCTs, where possible; – clearing limits will be clearly marked to prevent unnecessary clearing beyond the extent of the development footprint; – appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' should be installed; – identify the location of any 'No Go Zones' in site inductions; – limit removal of trees (including dead trees) to that required within the development footprint in support of the installation of project infrastructure; – a clearing procedure will be implemented during the clearing of the development footprint, as follows: – preclearance surveys will be completed to determine if any nesting birds are present; and – a suitably trained fauna handler will be present during hollow-bearing tree (including dead hollow-bearing trees) clearing to rescue and relocate displaced fauna if found on-site; – installation of appropriate exclusion fencing around trees and woodland to be retained within the development footprint whilst construction is occurring; – the radius of TPZ is calculated for each tree by multiplying its DBH by 12 in accordance with AS 4970-2009 Protection of trees on development sites; – appropriate education should be provided to site personnel in site inductions regarding the purpose of exclusion fencing or no go zones; – speed limits within the development footprint will be limited to 40 km/hr and stated in the CEMP and OEMP; – source controls, such as mulching, matting and sediment fences, will be utilised where appropriate; – an ESC plan will be prepared in accordance with <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) prior to commencement of construction; – disturbed areas will be stabilised and rehabilitated as soon as possible to reduce the exposure period; – a specific creek crossing sub-plan will be included as part of the CEMP; and – all creek crossings are to comply with the Policy and Guidelines for Fish Friendly Waterway Crossings (DPI 2003). • The BMP will include an unexpected finds protocol for threatened species, which will include advice and photographs of key species with the potential to occur within the development footprint. The unexpected finds protocol will outline the following actions if a threatened species or suspected threatened species is found during construction or operation of the project: – stop work within the vicinity of the species; – cordon of the area in question with an appropriate buffer; – inform the management team; – seek advice from an ecologist or species expert to confirm identification; and if a threatened species is confirmed, consult with the relevant agencies to determine appropriate management, mitigation measures and additional approvals (if required).

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	• Additional measures to avoid and minimise indirect impacts will be outlined in the CEMP and OEMP and will include: – appropriate wash down facilities will be available to clean vehicles and equipment prior to arrival and when leaving site. In particular, ensure soils and seed material isn't transferred in accordance with the measures outlined in the CEMP; and – lighting to comply with Australian standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting.
Aboriginal cultural heritage	• An Aboriginal Heritage Management Plan (AHMP) will be developed in consultation with DPE, the RAPs and OEH. It will provide details of: – all Aboriginal sites identified during the archaeological investigation for the project; – management measures and their progress towards completion; – measures to ensure ongoing consultation and involvement of project RAPs; – RAP access arrangements for a selection of significant sites for educational purposes; – protocols for newly identified sites; – protocols for educating staff and contractors of their obligations relating to Aboriginal cultural heritage values through a site induction process; – protocols for suspected human skeletal materials; – protocols for the ongoing care of salvaged Aboriginal objects within a keeping place; and – provisions for review and updates of the AHMP. The AHMP will be prepared after project approval, and in addition to the points above, will address all relevant conditions of approval. The AHMP will provide the details of the management measures outlined in full in Appendix D. • Aboriginal sites identified as part of archaeological investigations will be managed in accordance with the management strategies presented in Table 7.3 of the ACHAR Addendum (refer Appendix E). • A total of 65 sites will be completely avoided by the project. Additionally, two sites investigated during test excavation (NE27 and NE70) will have their significant areas avoided by the project with only peripheral impacts expected to areas of low to negligible archaeological potential. The anticipated archaeological deposit associated with NE83 will be avoided. The required minimum setbacks/avoidance areas for the relevant sites investigated through test excavation are presented on figures in chapter 4 of the ACHAR amendment report. • Generally, sites designated for avoidance within the development footprint or within 20 m of the development footprint will be avoided with protection during the construction phase of the project to avoid inadvertent impacts. This may involve the installation of treated timber poles (or similar) painted with high visibility paint around the visible extent of the sites and/or the PAD areas prior to construction. Unless specified otherwise for individual sites, a construction buffer of at least 20 m will be applied to the demarcated boundaries of avoided sites. A suitably qualified archaeologist accompanied by a RAP representative will demarcate site locations and where the poles should be erected. • A construction buffer of at least 100 m will be applied to the site boundaries of NE09 and NE68 (also meaning at least a 50 m buffer from the PAD boundary that extends beyond the physical site contents). The boundaries of these sites will also be demarcated prior to construction. • A semi-permanent or permanent boundary fence will be erected around site NE09 to protect it from livestock or other accidental damage. UPC will explore opportunities to employ RAPs for vegetation, weed and pest management of NE09 after fencing is erected. The details of fencing and maintenance will be discussed as part of consultation

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	with the RAPs during the preparation of the AHMP. • All sites identified within the ETL options surveyed as part of the ACHAR will be avoided during detailed design. • Sites that occur over 20 m from the development footprint will be passively avoided without protection. • All surface artefact sites (artefact scatters and isolated finds) impacted by the project will be collected. This will involve collecting the entire visible contents of 26 isolated artefacts and six artefact scatters. The collection will be undertaken by qualified archaeologists and RAP representatives in accordance with the methodology provided in Section 9.2.4 of the ACHAR (Appendix D). • The ACHAR details the special procedures to be followed as part of the management of Aboriginal cultural heritage, including: – Aboriginal keeping place - RAPs have nominated that the recovered objects be kept at the Armidale and Region Aboriginal Cultural Centre and Keeping Place. UPC are committed to working with the RAPs to accommodate the requests for storage and curation of collected objects. It is noted that the final locations for specific objects and details of curation, storage, display and interpretation of recovered objects will be developed and resolved during consultation with the RAPs as part of the preparation of the AHMP. – RAP site access arrangements – subject to further discussion on protocols, RAP access arrangements for a selection of significant sites (including NE09 and NE68) for educational purposes will be detailed within the AHMP (refer Section 9.3.2 of Appendix D). – Aboriginal ancestral remains – In the event that known or suspected human remains are encountered during the project's construction, the procedure detailed in Section 9.3.3 of Appendix D will be followed as soon as the suspected remains are discovered. – Discovery of new Aboriginal sites – In the event of discovery of new Aboriginal sites within the development footprint, the procedure detailed in Section 9.3.4 of Appendix D will be followed. Newly identified sites that are not at risk of impact (ie over 50 m from the approved development footprint) will be avoided through passive protection. In the event that newly identified sites will be impacted by the construction of the project and cannot be avoided, they will be managed in a manner commensurate with their assessed significance. • The 13 standing Aboriginal scar trees discussed in the ACHAR amendment report will be avoided and will receive the same general avoidance methods as described in in Section 9.2.3 of the ACHAR (Appendix D of the EIS). However, they may require additional management to address their long-term preservation given that most examples are on highly deteriorated trees. The project's AHMP will detail long-term preservation options for the trees in consultation with RAPs, the project archaeologist and OEH. The duration of UPC's management commitments for the trees would be limited to the estimated 25-30 years of the project's operation prior to decommissioning. Note that Aboriginal scar tree NE35 is no longer within the development footprint and therefore UPC will not employ long-term preservation measures for this site. • The felled and sawn in half Aboriginal scar tree, NE49, will be salvaged prior to project construction and placed in an Aboriginal keeping place as discussed in Section 9.3.1 of the ACHAR (Appendix D of the EIS). The project's AHMP will detail the methods for salvage, curation and presentation of the tree.
Historic heritage	• Following project approval and prior to any work commencing, a historic heritage management plan (HHMP) will be prepared to guide the conservation of heritage items, unexpected finds and human remains including skeletal material, for the duration of the project. The relevant measures in the HHMP will be incorporated into the project CEMP and OEMP to avoid accidental impacts during the construction and operation of the project. The HHMP will include the management measures in this document and identify the minimum locations for photographic archival recording. • Where construction and operation activities are within 10 m of identified items with heritage values, all efforts will be made to avoid impacts; this includes active protection of items through the use of high visibility rope, flags or sturdy bollards and total exclusion zones for construction activities and placement of infrastructure.

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	• If moveable heritage is found in the development footprint during project construction it will be protected by re-locating it to another area of the property in consultation with the landholder. Moveable heritage includes items such as farm machinery and water tanks and stands. Details on identification and actions will be included in the HHMP. • Prior to any changes to the landscape and specific heritage items that may result from project activities, a digital photographic archival record will be prepared. The digital photographic record will be prepared in accordance with the Heritage Manual guidelines, <i>Photographic Recording Of Heritage Items Using Film or Digital Capture</i> (Heritage Office 2006). • The discovery of human remains including skeletal material will halt work in a 10 m radius and the remains will not be tampered with. Personnel with the appropriate level of authority will contact the police and the coroner for investigation, which may include the involvement of OEH and advice from a physical anthropologist. A detailed protocol will be developed for the HHMP. • Tree line wind breaks will be retained where practicable (for example, where they are located to the south of PV module rows, so that they do not create shading issues). • An unanticipated finds protocol will be refined in the HHMP to provide guidance to construction personnel should works uncover objects and fabric that may indicate relics. Work will stop if objects such as bonded bricks, timber or stones appearing in formation indicating a wall or floor for instance are found, or if soil with artefacts concentrations, is excavated. A detailed materiality threshold will be determined prior to construction as part of the HHMP and staff involved in excavation work will be informed about how to apply it. The unanticipated finds protocol will include actions such as: – if the find meets the materiality threshold defined in the HHMP, work will immediately but temporarily cease within 5 m of the find and the site supervisor or appropriate responsible person will be informed; – an archaeologist will be contacted to assess the find, where relevant, and determine if it is clearly a relic or has moderate to high potential to be a relic (this may require additional research); – if the find is determined to be a relic, a s146 (of the Heritage Act) is to be forwarded to the Heritage Council who will be consulted on the appropriate management measure; and – if the find is assessed and is not a relic, work inside the area that was made a no-go area can re-commence. Appropriate management measures range from do nothing to archaeological excavation.
Land	• As part of the CEMP, a soil and water management plan (SWMP) will be prepared prior to commencement of on-site construction works in consultation with Council and DoI – Lands and Water as required and will incorporate all soil and water related commitments outlined this table. • The SWMP will provide detailed background information, erosion hazards assessments including erosion hazard mapping and soil loss calculations for all disturbed areas, overall draining, erosion and sediment control approach, design standards and management strategies and approach for progressive rehabilitation and stabilisation of disturbed land. • The SWMP will set out the framework for preparation and implementation of an erosion and sediment control plan (ESCP), which will be prepared in accordance with <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) and will include: – a set of progressive erosion and sediment control plans (ESCPs) for each section of the construction site. Where particular sensitivities or erosion risks are identified, ESCPs may be used in conjunction with site or activity specific ESCPs or similar to provide more detailed site-specific mitigation measures; – erosion and sediment controls (ESCs) will be installed, with priority given to sloped areas and areas adjacent to drainage lines;

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	– all construction and operational activities will be planned and carried out to ensure that damage to soil and vegetation outside the area designated for clearing (ie the development footprint) is minimised; – where practicable, consideration will be given to the timing of disturbance and vegetation clearing ahead of project activities to ensure disturbed areas are exposed for the shortest possible time; – where practicable, UPC will minimise the disturbance of soils (especially subsoil) or stockpiles at times immediately following significant rainfall events (eg 25 mm in 24 hours); – disturbed areas will be stabilised and progressively rehabilitated as quickly as possible; and – ameliorants (such as gypsum and fertiliser) will be applied at recommended rates during construction and as part of decommissioning and rehabilitation activities (in consultation with project landholders) and will assist with erosion management. • Where temporary crossings of watercourses are necessary to provide construction access over these features, temporary stabilised crossings may be utilised. • The project's CEMP and OEMP will include weed management protocols, such as measures for the identification, management and ongoing monitoring of weeds on-site. • If pest control is considered necessary, it will generally involve a routine baiting program in consultation with the project landholders and neighbouring landholders. Other control methods such as shooting or trapping may also be used if deemed necessary or appropriate. • A project decommissioning and rehabilitation plan will be prepared prior to the end of the project's operational life and will feature rehabilitation objectives and strategies for returning the development footprint to agricultural production or alternative uses as has been agreed with the project landholders. As part of the decommissioning and rehabilitation, UPC would remove any underground cabling within 0-500 mm of the ground surface, and will attempt to reuse, resell or recycle all dismantled and decommissioned infrastructure and equipment, where possible. Structures and equipment that cannot be reused or recycled will be disposed of at an approved waste management facility. • The CEMP will incorporate the following measure to address concerns raised by surrounding landholders in relation to security during construction: – a zero tolerance policy on theft will be implemented on-site throughout the project's construction period; – criminal background checks on all staff, contractors, sub-trades and security guards will be performed; – surrounding landholders, project landholders and law enforcement will be provided with the primary contractor's contact information; – surveillance cameras and signs will be implemented to deter vandalism and theft; – the temporary construction site compound will be established in a fenced-off area within the development footprint; – chain mesh security fencing will be installed within the project boundary around the perimeter of the array areas to control access; and – should it be required, surveillance cameras and signs will be implemented at the construction accommodation village to deter vandalism and theft and security fencing will be installed around the construction accommodation village to control access.
Visual	• Landscaping to mitigate views of project infrastructure at Viewpoint 5 will be considered in consultation with the property owner of N1. • Where possible, suitable colours will be chosen for project infrastructure to minimise visual impacts. Buildings and materials will be designed to blend in with the local rural/farming landscape and will not be dissimilar to existing farm sheds and agricultural infrastructure in the area surrounding the two arrays.

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
Noise	• All external lighting will be installed as low intensity lighting (except where required for safety or emergency purposes) and will comply with Australian Standard AS 4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor. • The following measures are recommended to be implemented during construction works with the aim of minimising impacts and reducing construction noise levels below the relevant goals: – a letter box drop for residences in close proximity of the proposed works to inform residents of planned construction activities, time periods and expected durations, potential impacts and proposed mitigation measures; – minimise the number of plant items operating concurrently when in close proximity to surrounding receivers; – planning deliveries and access to occur quietly and efficiently and organising parking only within designated areas away from nearby receivers (where possible); and – appropriate respite periods to be implemented after high noise and vibration-generating activities are carried out in continuous blocks. • Universal works practices during construction will include: – regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration; – regular identification of noisy activities and adoption of improvement techniques; – developing locations for parking of vehicles to minimise noise; – minimising the movement of materials and plant and unnecessary metal-on-metal contact; – minimising truck movements; and – scheduling respite periods for intensive works including consultation with potentially affected neighbours. • Additional measures for plant and equipment will include: – choosing quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks; – operating plant and equipment in the quietest and most efficient manner; and – regularly inspecting and maintaining plant and equipment to minimise noise and vibration level increases and to ensure that all noise and vibration reduction devices are operating effectively. • Additional measures for work scheduling include: – scheduling high noise-generating work to coincide with less sensitive periods, where possible (for example, where residents in close proximity could be expected to be at work); – scheduling work during OOH periods to exclude work within OOH buffer zones outlined in Section 5.7 (refer Table 5.18); – undertaking risk assessment of potential noise impacts on surrounding residential receivers if plant and equipment quantities are proposed to vary significantly from those assumed in Table 6.1 of Appendix J of the EIS; and – optimising the number of deliveries to site by amalgamating loads where possible.

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
Transport	• A TMP and Driver Code of Conduct will be prepared prior to commencement of on-site construction works and in consultation with Council and RMS. The TMP will include the following requirements: – a dilapidation survey to be conducted to assess condition of the proposed vehicle routes; – concept designs for recommended intersection improvement works for the following intersections, including assessment of sight distances, swept path analysis and access treatment arrangements: – New England Highway/Barleyfields Road (primarily for vehicles turning right onto Barleyfields Road); and – Barleyfields Road/Big Ridge Road; – details of traffic management treatments and traffic control plans (TCPs) as required, which will include consideration of regulatory signs and devices that require endorsement of the Local Traffic Committee and Council approval; – consideration of measures to limit the impact on school bus routes and safety initiatives for transport through residential areas and/or school zones, which will include avoidance of peak hour and school bus times for the project's construction material deliveries and other heavy vehicle movements, whenever possible; – a map of the primary access routes highlighting critical locations; – the framework for handling/approval of exceptions (for emergency or other unforeseen circumstances) to the exclusion of heavy vehicles utilising the Barleyfields Road (south) intersection via Wood Street to access Big Ridge Road during construction of the array areas; – safety initiatives for transport through residential areas and/or school zones; – consideration for coordination of construction traffic with seasonal agricultural haulage; – an induction process for vehicle operators and regular toolbox meetings; – a complaint resolution and disciplinary procedure; and – community consultation measures for the peak construction period. • Potential seasonal/campaign-based agricultural transport activities will be identified during further consultation with project landholders and nearby landholders and any required mitigation measures (eg temporary alternate construction vehicle access routes and/or revisions to construction scheduling) will be identified in consultation with landholders and included in the TMP. • Potential stock crossing locations will be identified through further consultation with project-related and nearby landholders and any required mitigation measures (eg direct line of communications between landholder and site construction manager and/or temporary traffic control at stock movement locations) will be identified in consultation with landholders and included in the TMP. • UPC is also mindful of the safety of drivers at level crossings in the Uralla Shire LGA and, subsequently, additional RMS tips and safety guidelines will be included in the Driver Code of Conduct as part of the TMP. • Temporary traffic control will be considered at the level crossing at Barleyfields Road (north) during peak construction and reference to this level crossing will be included in driver inductions and the Driver Code of Conduct. • Access to the rail corridor is not anticipated as required and would only be undertaken in accordance with the written permission of TfNSW.

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	• In addition to the identified primary site access points, emergency access points may be required and will be identified as part the project's ERP in consultation with JHR and TfNSW. • Temporary traffic control arrangements may be required at the proposed primary access intersections during the peak stages of construction traffic activity and/or on days when deliveries by over-dimensional vehicles are required for the delivery of larger construction items such as transformers. These will be delivered under permit and in consultation with RMS and Uralla Shire Council. • The following road and intersection improvement works, which will be confirmed in consultation with RMS and Uralla Shire Council, are proposed to maintain the safety of the road network and to accommodate the swept paths of the largest trucks that are proposed to require access to the array areas: – New England Highway/Barleyfields Road (north) and New England Highway/Barleyfields Road (south) including Wood Street intersections require left and right turn traffic lanes (CHR/CHL), particularly during periods of peak construction activity. The TMP will also consider the temporary conversion of the New England Highway/Barleyfields Road (north) intersection to seagull type operation to ease right turning movements by large trucks entering and departing from Barleyfields Road (north). – Consider implementation of temporary traffic control at the Barleyfields Road level crossing, particularly during the peak construction period. • UPC will be required to lodge a Section 138 Certificate (Work on Public Lands) for approval before any future road work for the intersection improvement is carried out. • Consideration will be given to temporary travel speed reduction and regular watering of the unsealed section of Big Ridge Road and Munsies Road. UPC may consider speed limits, dust suppression with water spraying or localised sealing or treatment of the road with dust suppression polymers adjacent to the residential properties along these roads. • During construction, a road maintenance program will be implemented for the affected local roads near the development footprint for the array areas. The program will be based around bi-monthly route inspections of all the affected roads and may include items such as: – regrading of the road surface to repair potholes and road corrugations at regular intervals and in response to identified serviceability and safety concerns; and – a commitment by UPC to restore the road surfaces to their pre-construction condition at the completion of construction. – The road maintenance program will be prepared in consultation with Uralla Shire Council and its effectiveness will be reviewed during the construction period. • Should it be required, UPC will also regularly treat the road surface of the unsealed sections of a number of local roads to reduce potential dust impacts by project-related traffic during the construction period. • The CEMP and OEMP to be prepared for the project will be prepared in consultation with TfNSW (or its agent) to ensure that any potential impacts or risks on the rail corridor during construction, operation or decommissioning are identified and appropriate mitigation measures put in place to adequately manage the identified risks. • Boundary fences within the northern array area adjacent to the rail corridor will be installed and remain installed during construction and operation of the facility in accordance with John Holland Rails (JHR's) engineering standards, and suitable protection arrangements will be put in place for construction of the boundary fence adjacent to the rail corridor. • Any requirement for work access to the rail corridor would only be undertaken following assessment and endorsement by JHR for the proposed access and would be undertaken in accordance with the relevant JHR rules and procedures.

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
Water	• Prior to commencement of on-site construction work, UPC will consult with TfNSW to confirm requirements for further assessment of the Barleyfields Road active level crossing in consideration of the Australian Level Crossing Assessment Model.
	• Watercourse crossing plans consistent with NOW (2012b) and DPI (2003) detailing the design of proposed crossings of any higher order stream (ie 3rd order and above) will be prepared in consultation with DoI Lands and Water prior to commencement of construction. • Placement of PV modules and ancillary infrastructure (ie footings and pilings) within 1st and 2nd order streams will be minimised to the extent practicable. • Watercourse crossings of 1st and 2nd order streams for internal access tracks and electrical cabling will be minimised to the extent practicable. • Implementation of ESC measures in accordance with Landcom (2004). Proposed measures will be considered further and formalised as part of detailed design and documented in the CEMP. • Progressive revegetation or stabilisation of disturbed areas to minimise exposed soils to the extent possible. • Implementation of procedures for hazardous material storage and spill management to be prepared and documented within the CEMP. • Construction site planning to consider flood risk and locate temporary site works, compounds, storage areas and plant/equipment away from flood prone areas where practicable. • Detailed design and placement of key project infrastructure (eg substations and BESSs) will consider location-specific flood levels when setting floor levels and flood protection levels and will avoid flood prone areas where practicable. • Water contained within existing farm dams to be removed will be used for non-potable construction purposes, in accordance with harvestable rights provisions, to minimise use of imported water where practicable. • Appropriate potable water supply will be identified in the CEMP in consultation with NSW Health and will satisfy the requirements of the NSW <i>Public Health Act 2010</i>. • Monitoring of watercourse and vegetated riparian zone (VRZ) condition for all retained watercourses that meet the definition of 'waterfront' land in accordance with the NSW <i>Water Management Act 2000</i> (WM Act) and where these run through or immediately adjacent to the development footprint will be undertaken, with maintenance undertaken as required to minimise scouring and erosion and ensure waterway health and stability. • Monitoring and maintenance of ground cover vegetation and other stabilised surfaces throughout operation to limit erosion and transport of sediment to watercourses. • Implementation of procedures for hazardous material storage and spill management to be prepared and documented within the OEMP. • If required, a sewerage treatment plant (STP) to service the construction accommodation village would be designed and installed by the lead contractor in accordance with the relevant design standards and regulatory requirements, and in consultation with DPE, Council, the EPA, DoI Lands and Water and OEH. If an STP is required, it will be located outside of 'waterfront land' as defined by the <i>Water Management Act 2000</i>. Any required licence to operate would also be obtained.
Hazards and risks	• An emergency response plan (ERP) will be prepared for the project and will incorporate all relevant safety procedures and normative management recommendations detailed in the relevant acts, regulations and Australian Standards. The ERP will be prepared to address Fire & Rescue NSW recommendations and as a minimum (but not necessarily limited to) will: – include the requirements for pre-bushfire season and continual fire awareness of staff and contractors; – include the requirements for immediate notification to the local RFS and FRNSW of accidental ignition of surrounding grassland;

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	– include the mechanisms for notification of neighbouring landholders and the community more generally of accidental ignition of surrounding grassland leading to bushfire that may impact upon them; – detail the appropriate risk control measures that would need to be implemented in order to safely mitigate potential risks to the health and safety of fire fighters and other first responders; – detail measures including the PPE required to be worn, the minimum level of respiratory protection required, minimum evacuation zone distances and a safe method of shutting down and isolating the PV system (either in its entirety or partially, as determined by risk assessment); – identify the circumstances under which different evacuation types are to be implemented, in response to a bushfire or fire emergency; – include a mechanism for the early relocation of staff in the event of a bushfire in the locality; – contain detailed plans of all Emergency Assembly Areas including ‘on-site’ and ‘off-site’ arrangements; – include requirements for appropriate on-site refuge area signage and communications; – contain details of infrastructure layout within the two array areas that show all relevant information (ie access points, fences, locked gates, water supply, areas of electrical hazard); – include transportation arrangements (eg number of vehicles required), designated assembly points and time required to have transportation available; – identify the specific structure and role of emergency control on-site (eg fire wardens); – include the requirements for training in preparation for response to an emergency; – include the requirements for clarifying a safe egress route and an understanding of the extent/spread of local fires before allowing the evacuating persons to leave the site; – include the requirements for egress and communication in the scenario that persons are leaving the project as emergency services are attending; – include details on appropriate egress routes from the different array areas; – consider emergency access/egress arrangements in the scenario that a fully loaded fire fighting vehicle cannot cross the proposed creek crossings proposed for access into parts of the two array areas; – include mechanisms for communication with RFS, FRNSW and neighbouring communities on suitable egress routes and an understanding of the impacts that the egress of high numbers of project staff may have on the local road network and the local community’s ability to safely egress from the locality; and – two copies of the ERP are to be stored in a prominent ‘Emergency Information Cabinet’ which is in a position directly adjacent to each of the main entry points for the two array areas. The hazards and risks assessment prepared by Sherpa Consulting (refer Appendix L) also provides recommendations that should be considered during preparation of the ERP. Where applicable, the ERP should be developed to be consistent with the requirements and approach of: – <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i> (NSW RFS 2014); and – Australian Standard 3745-2010 Planning for emergencies in facilities (Standards Australia 2010).

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
Bushfire	• A minimum 10 m defensible space should be provided around the perimeter of each solar array area and around substations, BESSs and O&M infrastructure that permits unobstructed fire vehicle access and is maintained to the standard of an IPA. This will be in the form of mown or grazed grass or similar suitable ground cover. As a guide, grass within an IPA should be kept to no more than 100 mm in height, with leaves and vegetation debris removed (RFS 2018). • The fuel load within the development footprint will be monitored and mechanically slashed, sprayed or grazed in liaison with project landholders to reduce the risk of grass fires starting within the development footprint and ensure that fires originating from outside the development footprint do not intensify as a consequence of entering the development footprint. • The primary site access points will be from Big Ridge Road and Munsies Road. Emergency access points may also be required and will be identified as part of the project's ERP in consultation with relevant agencies, including Fire & Rescue NSW and TfNSW/JHR. The primary site access points, emergency access points and project roads will comprise of a combination of sealed and unsealed roads, detailed design of which will consider: – minimum carriageway width of 4 m; – the capacity for fire fighting vehicles to pass by; – avoiding grades greater than 15 degrees (°) if sealed and 10° if unsealed; – minimum vertical clearance of 4 m to any overhanging obstructions, including tree branches; – will not have a cross fall of more than 10°; – the capacity to carry a fully loaded fire fighting vehicle (which may be up to 28 tonne); – appropriate drainage and erosion controls; and – all weather access is provided. • A Fire Management Plan (FMP) will be developed in consultation with the New England Fire Control Centre. • The FMP for the project will detail the specifications and maintenance of dedicated fire water sources to assist in fire suppression, as well as the appropriate vegetation management procedures (in relation to the ETL corridors) to prevent fires igniting during the construction, operation and decommissioning of the project. • The FMP for the project will include the provisions for diesel generators and associated fuel storage tanks to be designed, housed and maintained so as not serve as an unacceptable risk to surrounding grassland and the provisions for specific measures and procedures to prevent ignition of grassland from hot works or from vehicles driving over long grass. • Each building will have fully compliant fire safety systems. In addition, they will be constructed and routinely serviced to comply with the specific requirements, as relevant to each building. • Specific management actions will be undertaken to ensure suitable bushfire preparedness is undertaken as part of the project and ahead of the bushfire season, as well as specific procedures to limit the risk of ignition of surrounding grassland resulting from the project, including: – maintenance of buildings, roads, fuel levels and water supply; – appropriate work procedures, so as to limit the potential of ignition of surrounding grassland; – monitoring and review of the FMP to maintain its effectiveness; and

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	– maintenance of fire awareness through inductions, briefings, pre bushfire season drills, formal meetings, standard operating procedures and ongoing monitoring. • Should the construction accommodation village be required: – a 50 m wide APZ around the perimeter of the construction accommodation village, with specific vegetation management measures within the construction accommodation village site, associated APZ, and corridors on both sides of the access driveway and any internal service roads to reduce the potential for grass fires; – buildings will be constructed to comply with AS 3959 – 2009 Construction of Buildings in Bushfire Prone Areas and Addendum Appendix 3 of PBP (RFS 2006) and will incorporate non-combustible external cladding and specific measures to reduce the potential for ember attack; – construction of the main entrance road and internal road network to cater for fire fighting equipment and activities; – provision of a static water supply within the construction accommodation village; and – preparation of an ERP that provides advice and protocols on the evacuation of the construction accommodation village during emergencies that may impact the construction accommodation village and its occupants.
Social	• Shuttle bus services, operated by or on behalf of UPC, between the array areas and Uralla, and between Uralla and other centres for worker accommodation such as Armidale and Tamworth may be provided for the construction workforce subject to demand. • UPC proposes to procure goods and services, as far as possible, from local businesses. • A publicly accessible feedback system will be created, utilising a website facility and telephone hotline, for any feedback, positive or negative, to be registered. This will be supported by a policy and mechanism by which any legitimate grievance can be investigated and resolved. • A construction workforce management plan (CWMP), or similar, will be prepared, which will likely include (but not be limited to): – local workforce numbers and locations; – transient workforce accommodation locations; – consultation mechanisms with Uralla Shire Council, Armidale Regional Council and Tamworth Regional Council to avert pressure on local resources and ensure a reasonable approach to planning transient worker housing; – consultation frameworks with local providers to ensure fairness, open communication and forward planning, and grievance mechanisms; – plans for medical and other needs to ensure appropriate spread of workforce needs across all local resources and to avoid heavy pressure on a small number of local GPs; – a Code of Conduct for the project’s workers (particularly to avoid anti-social behaviour at peak construction times); – procedures or management measures to address all other identified issues relating to construction, operation or decommissioning of the worker accommodation facility, including management of water supply, sewer and waste, and rehabilitation objectives and requirements; and – how the CWMP will be managed and audited. • The potential demand on medical and well-being services in Uralla can be alleviated by the provision of medical support within the construction accommodation village (should it be required) or on-site.
Economic	• Employment of regional residents preferentially where they have the required skills and experience and are able to demonstrate a cultural fit with the organisation. • Participating, as appropriate, in business group meetings, events or programs in the regional community.

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
Air quality	Locally source non-labour inputs to production where local producers can be cost and quality competitive, to support local industries.
	- Water trucks will be used during construction for dust suppression along internal, unsealed access roads and disturbed areas. - Vehicle movements will be minimised where possible. - All vehicles, plant and equipment will be cleaned and washed regularly. - All vehicles, plant and equipment will be regularly inspected and maintained to ensure that they are operating efficiently. - Regular maintenance of unsealed access roads will be undertaken to minimise wheel generated dust. - Dust suppression requirements during construction will take into consideration weather and the likelihood of extended dry periods which could exacerbate impacts.
Waste management	- All waste will be managed in accordance with the NSW <i>Protection of the Environment Operations Act 1997</i> (POEO Act), the NSW <i>Waste Avoidance and Resource Recovery Act 2001</i> and the following hierarchy, which is listed in order of preference: – reduce waste production; – recover resources; and – dispose of waste appropriately. - All wastes produced by the project will be classified, stored and handled in accordance with the <i>Waste Classification Guidelines – Part 1: Classifying Waste</i>. - A detailed WMP will be prepared prior to commencement of construction in consultation with Council as required. This plan will identify waste management measures to ensure that waste is effectively managed in accordance with relevant legislative requirements and guidelines, and will include consideration of the following: – measures to reduce the types and volumes of waste generated during construction; – measures to maximise reuse and recycling and reduce the volume of waste generated by the project and subsequently disposed of at licensed waste management facilities; – a breakdown of anticipated waste streams and volumes; – evidence of consultation with Uralla Shire Council, neighbouring councils and licensed waste management facilities to confirm the capacity of nearby facilities, their availability to accept/manage the project’s waste, along with any requirements (including waste separation requirements or comingling limitations for example); – on-site waste management measures in line with relevant guidelines; and – commitments around disposal of project assets at the completion of operations.
Cumulative impacts	- Preparation of a CWMP. - Development and implementation of a community engagement framework as part of the project’s stakeholder engagement strategy.
Environmental management	- UPC will prepare and implement an environmental management strategy (EMS) to govern the avoidance, minimisation and management of impacts during the construction and ongoing operation of the project and will be set out to ensure the responsibilities and accountabilities for environmental performance are clear. The strategy will: – incorporate project environmental management plans for both construction (CEMP) and operational (OEMP) phases, all other required plans, protocols, management and mitigation measures proposed in the EIS (as amended in this report and the accompanying AR). Chapter 6 of the EIS and Appendix B of the AR provide a consolidated

Table B.1 **Summary of management and mitigation measures**

Key issue	Proposed management and mitigation measure
	summary of the specific management measures that will be implemented for each of the key environmental aspects considered as part of the EIS as part of the EMP and its associated sub-plans; – identify all relevant statutory approvals; – establish roles, responsibility, authority and accountability of all key personnel involved in the environmental management of the project; – establish procedures for consulting with the local community and relevant agencies about the operation and environmental performance of the development; and – establish procedures for handling of complaints, disputes, non-compliances and emergency response. The EMS will be prepared in consultation with Council as required, and to the satisfaction of the Secretary of DPE.

Appendix C

Stakeholder engagement materials

Summary of the consultation register (following EIS submission)

Note: Outcomes of consultation, including meeting minutes have been kept confidential, but can be made available on request and subject to consent from the stakeholders involved.

Agency/stakeholder	Date	Form of consultation	Purpose/content
Community member	Thursday, 7 February 2019	Email	Raised concerns about the project location and traffic.
Multiple	Monday, 18 February 2019	Email	Advise of public exhibition and Facebook page.
N1	Monday, 18 February 2019	Email	Advise of public exhibition and how to access EIS.
S9	Monday, 18 February 2019	Email	Advise of public exhibition and how to access EIS.
Local community (near neighbours)	Wednesday, 20 February, 2019	Letter	Advise of public exhibition and Facebook page.
S12	Wednesday, 20 February, 2019	Face to face	Project update.
S3	Wednesday, 20 February, 2019	Face to face	Project update.
S12	Wednesday, 20 February, 2019	Face to face	Project update.
S17	Wednesday, 20 February, 2019	Face to face	Project update.
C2	Thursday, 21 February, 2019	Face to face	Project update and discuss concerns.
S11	Thursday, 21 February, 2019	Face to face	Project update and discuss concerns.
S14	Thursday, 21 February, 2019	Face to face	Project update.
USC Councillor	Thursday, 21 February, 2019	Email Phone call	Provide further information on assessment of potential visual impacts.
Adam Marshall (Member for Northern Tablelands)	Thursday, 21 February, 2019	Email Phone call	Project update.
Community member	Friday, 22 February 2019	Email	Response to concerns about the project location and traffic.
Community member	Friday, 22 February 2019	Email	Expression of interest for upcoming work.
Secretary (DPE)	Monday, 25 February 2019	Email Letter	Introduce the project.
S9	Monday, 25 February 2019	Email	Address concerns about potential impacts on birdlife.
Secretary (DPE)	Monday, 25 February 2019	Email Letter	Introduce the project.
Minister for Planning	Tuesday, 26 February 2019	Email Letter	Introduce the project and provide a copy of the fact sheet and media release.
Community member	Wednesday, 27 February 2019	Phone call	Project update.
Community member	Wednesday, 27 February 2019	Phone call	Project update.
S18	Thursday, 28 February 2019	Email	Request an opportunity to discuss the project.
S18	Thursday, 28 February 2019	Email	Response to enquiry.
Action Group Representative	Friday, 1 March 2019	Meeting	Discuss the methodology utilised in technical assessments as part of the EIS.
S18	Tuesday, 5 March 2019	Email	Response to enquiry.
Action Group	Wednesday, 6 March 2019	Meeting	Discuss the Action Group's key concerns with the southern array area (following review of the EIS)
Local community (mailing list)	Thursday, 7 March 2019	Email	Advise of upcoming drop in session.
Local community (near neighbours)	Thursday, 7 March 2019	Letter	Advise of upcoming drop in session.
LLS	Thursday, 7 March 2019	Phone call Email	Project introduction and offer to meet.
Uralla Shire Council - Elected councillors	Monday, 11 March 2019	Email	Advise of upcoming drop in session.
Community member	Monday, 11 March 2019	Phone call	Project introduction.
Community member	Monday, 11 March 2019	Phone call	Coordinate a meeting.
S14	Monday, 11 March 2019	Email	Provide photomontage.
DPE	Tuesday, 12 March 2019	Phone call	Project update.
Uralla Shire Council - Elected councillors - March meeting	Tuesday, 12 March 2019	Presentation	Project update.
OEI	Wednesday, 13 March 2019	Site inspection	Inspect areas of interest within the development footprint to inform review of technical assessments
S18	Wednesday, 13 March 2019	Meeting	Project update.
C7	Thursday, 14 March 2019	Meeting	Project update and discuss concerns.
Uralla Neighbourhood Centre	Thursday, 14 March 2019	Meeting	Request input in current and proposed programmes.
Community member	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
N4	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
USC Councillor	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
N35	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
Community member	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
S17	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
Community member	Thursday, 14 March 2019	Drop-in session	Project update and discuss concerns.
USC Councillor	Tuesday, 19 March 2019	Email	Provide a copy of comments within submission on EIS.
N4 and N5	Tuesday, 19 March 2019	Meeting Property inspection	Follow-up discussions following drop in session and inspection of property.
Uralla Neighbourhood Centre	Monday, 1 April 2019	Meeting	Update on funding support.
Community member	Monday, 1 April 2019	Email Phone call Meeting	Project introduction.

C7	Monday, 1 April 2019	Email Meeting	Project update.
N4 and N5	Tuesday, 2 April 2019	Meeting	Project update - refinement to the northern array.
LLS	Tuesday, 2 April 2019	Meeting	Project update.
Department of Industry - Lands & Water	Friday, 5 April 2019	Email	Request clarification on DoI Land and Water submission on EIS/SWA (particularly in relation to watercourse crossings)
DPE	Monday, 8 April 2019	Email	Provide supplementary information for Sunhill Dairy Goats submission
TfNSW / JHR	Monday, 8 April 2019	Email	Clarification of definition of the rail corridor
DPE	Tuesday, 9 April 2019	Face to face	Project update, discuss proposed amendments and approach to response to submissions.
Department of Industry - Lands & Water	Wednesday, 10 April 2019	Email	Request clarification on DoI Land and Water submission on EIS/SWA (particularly in relation to watercourse crossings)
Uralla Shire Council	Thursday, 11 April 2019	Face to face	Project amendments - removal of southern array.
Adam Marshall (Member for Northern Tablelands)	Thursday, 11 April 2019	Phone call	Project amendments - removal of southern array.
Project landholders (southern array)	Thursday, 11 April 2019	Face to face	Project amendments - removal of southern array.
DPI	Thursday, 11 April 2019	Phone call Email	Removal of buried infrastructure from land mapped as BSAL.
Action Group	Friday, 12 April 2019	Phone call	Project amendments - removal of southern array.
Federal Wind Farm Commissioner	Friday, 12 April 2019	Phone call	Project amendments - removal of southern array.
TfNSW / JHR	Friday, 12 April 2019	Email	Clarification of definition of the rail corridor
Uralla Shire Council	Friday, 12 April 2019	Email	Project amendments - removal of southern array.
RMS	Friday, 12 April 2019	Phone call Email	Project update and discuss the submission provided by RMS on the EIS.
Local community (mailing list)	Friday, 12 April 2019	Email	Project amendments - removal of southern array.
RMS	Monday, 15 April 2019	Email	Project update and discuss the submission provided by RMS on the EIS.
DPI	Tuesday, 16 April 2019	Email	Removal of buried infrastructure from land mapped as BSAL.
Department of Industry - Lands and Water (Crown)	Wednesday, 17 April 2019	Email	Crown roads within the northern and central array areas.
John Holland - Country Regional Network	Thursday, 18 April 2019	Email	Potential interactions within/adjacent to the rail corridor
Department of Industry - Lands & Water	Thursday, 18 April 2019	Phone call Email	Request clarification on DoI Land and Water submission on EIS/SWA (particularly in relation to watercourse crossings).
DPE	Friday, 26 April 2019	Email	Provide supplementary information for UWG submission.
C8	Wednesday, 1 May 2019	Phone call	Project amendments - removal of southern array.
DPE	Thursday, 2 May 2019	Email	Provide a copy of the draft amendment report guideline.
John Holland - Country Regional Network	Thursday, 2 May 2019	Email	Potential interactions within/adjacent to the rail corridor
DPE	Friday, 3 May 2019	Phone call	Project update and discuss potential use of the Main Northern Rail Line for construction deliveries
DPE	Sunday, 5 May 2019	Email	Potential use of the Main Northern Rail Line for construction deliveries
DPE	Monday, 6 May 2019	Email	Potential use of the Main Northern Rail Line for construction deliveries
RMS	Tuesday, 7 May 2019	Email	Road works/upgrades on the New England Highway.
Uralla Shire Council	Tuesday, 7 May 2019	Face to face	Project amendments - removal of southern array and TIA additional assessments.
RMS	Tuesday, 7 May 2019	Email	Road works/upgrades on the New England Highway.
Uralla Shire Council	Wednesday, 8 May 2019	Email	Project amendments - removal of southern array and TIA additional assessments.
DPE	Wednesday, 8 May 2019	Email	Additional submission for inclusion in RMS
DPE	Wednesday, 8 May 2019	Email	Potential use of the Main Northern Rail Line for construction deliveries
Community member	Wednesday, 8 May 2019	Phone call Email	Provide contact details for agronomist.
N1	Friday, 10 May 2019	Email	Project update - refinement to the northern array.
N1	Monday, 13 May 2019	Email	Project update - refinement to the northern array.
John Holland - Country Regional Network	Monday, 13 May 2019	Email	Potential interactions within/adjacent to the rail corridor
John Holland - Country Regional Network	Tuesday, 14 May 2019	Phone call Email	Potential interactions within/adjacent to the rail corridor.
Uralla Shire Council	Wednesday, 15 May 2019	Email	Subdivision of land for the grid substation.
Community member	Wednesday, 15 May 2019	Phone call	Discuss potential involvement in the project.
John Holland - Country Regional Network	Thursday, 16 May 2019	Email	Potential interactions within/adjacent to the rail corridor
John Holland - Country Regional Network	Thursday, 16 May 2019	Email	Potential interactions within/adjacent to the rail corridor
John Holland - Country Regional Network	Thursday, 16 May 2019	Email	Potential interactions within/adjacent to the rail corridor
DPI	Tuesday, 28 May 2019	Email	Removal of buried infrastructure from land mapped as BSAL.

Copies of government and regulatory agencies consultation

David Richards

From: Bryson Lashbrook [bryson.lashbrook@nrar.nsw.gov.au]
Sent: Thursday, 18 April 2019 4:23 PM
To: David Richards
Subject: Re: J17300 - New England Solar Farm - Interactions with watercourses

D'day David,
As discussed earlier;

In regards to the first point - *The proponent should confirm the ability to obtain the necessary water volumes from a viable source, via an indication of an agreement from a water supplier, confirmed availability of sources on-site or access to alternate authorised sources.* A response from a water supplier is required prior to project determination, a letter or email from the supplier should state that the volumes required are available for use for the proposal.

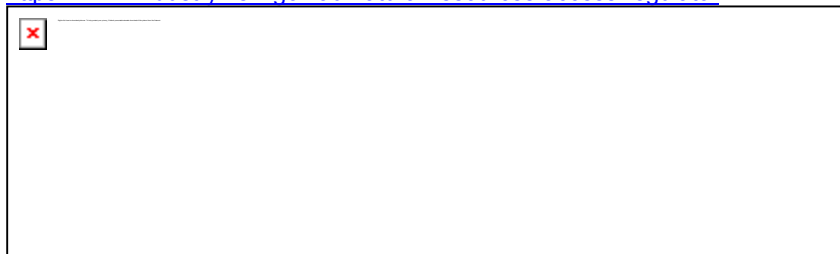
The requirement for the consideration of *watercourse crossings of 1st and 2nd order streams to be undertaken in accordance with the Guidelines for watercourse crossings on waterfront land (NRAR 2018)* has been included as a guide. As it has been discussed within the EIS, the proposed crossings not located within waterfront land (in accordance with the WM Act) do not need further approvals from the department, however the guidelines should still be considered when designing these crossing.

If you have any further questions or comments I would be happy to discuss.

Cheers,
Bryson.

Bryson Lashbrook | Water Regulation Officer | Licencing and Approvals
Natural Resources Access Regulator | West
26-28 Johnston Street | Wagga Wagga NSW 2650
T: 02 6937 2708 **M**
: 0448 917 414
E: bryson.lashbrook@nrar.nsw.gov.au

W:
<https://www.industry.nsw.gov.au/natural-resources-access-regulator>



On Tue, 16 Apr 2019 at 13:50, Landuse Enquiries <landuse.enquiries@dpi.nsw.gov.au> wrote:
Hi Bryson and Rachel

Is there someone in your team who can deal with this please (in Tim's absence)?

Cheers, Simon

On Wed, 10 Apr 2019 at 13:53, David Richards <drichards@emmconsulting.com.au> wrote:

Hi Tim,

Just confirming receipt of the email below in relation to the Department of Industry's submission on the New England Solar Farm EIS?

It would be great if we could arrange a time to discuss this further.

Many thanks and kind regards,

David

David Richards
Environmental Scientist



T 02 4907 4800

M 0405 593 675

D 02 4907 4803



Connect with us

NEWCASTLE | Level 1, 146 Hunter Street, Newcastle 2300

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From: David Richards

Sent: Friday, 5 April, 2019 3:33 PM

To: tim.baker@dpi.nsw.gov.au

Cc: landuse.enquiries@dpi.nsw.gov.au; cburnes@emmconsulting.com.au; simon.francis@dpi.nsw.gov.au

Subject: J17300 - New England Solar Farm - Interactions with watercourses

Hi Tim,

Hope you're well.

We received the Department of Industry's response to the public exhibition of the New England Solar Farm EIS (OUT19/2305), which is available at the link below:

https://majorprojects.accelo.com/public/430c7bd5927b45d579fa8112779d6634/321433_New%20England%20Solar_%20DoI%20L&W%20submission_2019Mar29_1729.pdf

Within the submission, there are two comments made in relation to watercourse crossings.

The first falls under *Prior to Project Determination* and reads:

The EIS states that watercourse crossings of 1st and 2nd order streams for internal access tracks and electrical cabling will be minimised to the extent practicable. The proponent should prepare these crossings in accordance with the Guidelines for watercourse crossings on waterfront land (NRAR 2018).

The second falls under *Post Project Determination* and reads:

The proponent should ensure that watercourse crossing plans detail the design of proposed crossings of any higher order stream (ie 3rd order and above). Please prepare these in consultation with Department of Industry - Lands and Water prior to commencement of construction.

The second comment is understood and is consistent with the messaging and discussions with the Department of Industry in September 2018; however, the first comment is not in line with previous discussions or the findings presented in the EIS.

As noted in the surface water impact assessment, the majority of the mapped lower order watercourses do not have a discernible channel and therefore are considered unlikely to satisfy the definition of ‘waterfront land’ established within the WM Act. Furthermore, riparian zones and associated vegetation adjacent to the 1st and 2nd order watercourses that traverse the development footprint have been modified and degraded by historical land use practices and past disturbances associated with land clearing, cropping and intensive livestock grazing. Several of these lower order watercourses have been modified or flows diverted altogether by project landholders through the construction of contour banks.

Would it be possible to speak with either yourself or another representative from the Department in regards to the first comment? Where there is no discernible channel and a mapped watercourse is unlikely to satisfy the definition of ‘waterfront land’ established within the WM Act, we do not believe that a crossing should need to be in accordance with the guidelines referenced above.

I look forward to hearing from you soon.

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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--

Alistair Drew | Policy Officer Assessments

NSW Department of Industry | Lands & Water | Strategic Relations

Level 3 | 26 Honeysuckle Drive | Newcastle | NSW 2300

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E: landuse.enquiries@dpi.nsw.gov.au

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David Richards

From: Tim Kirk [tim.kirk@upcrenewables.com]
Sent: Tuesday, 28 May 2019 10:50 AM
To: andrew.scott@dpi.nsw.gov.au
Cc: David Richards
Subject: New England Solar Farm - proposed EIS condition
Attachments: 321433_New England Solar_DoI L&W submission_2019Mar29_1729[1].pdf; EIS - Figure 5.5 - EIS015_LandandSoilCapability_20181024_05[1].pdf

Hi Andy,

Hope you are well.

I am following up on a phone call I had with you on the 17th April 2014⁹ where we discussed DPI-Agriculture's submission on UPC's New England Solar Farm. This conversation was subsequent to the correspondence you had with David Richards throughout the EIS process.

Just for clarity's sake, I have copied in your condition below, which can also be found in the attached submission from DPI.

DPI – Agriculture

- All below ground cabling and infrastructure on Biophysical Strategic Agricultural Land (BSAL) should be removed by the proponent at the end of the project. This position is not reflected in the New England Solar Farm EA (Section 5.5.4 Mitigation measures iv. Decommissioning p. 142) stating that "any underground cabling below 500 mm will remain in-situ following project decommissioning".

As we discussed, I have outlined below several reasons for why I do not think the condition of consent proposed by DPI Agriculture is appropriate for the New England Solar Farm. In short, the project site is of low agricultural quality and the shape of the limited areas of land mapped BSAL would likely require full excavation of the BSAL land to a depth of one meter to enable removal of underground cables.

UPC has made a conscious decision to reduce the project's impact on BSAL land as far as viable for the project. This is demonstrated by the removal of large areas of land mapped BSAL, which align with creeks and streams, as well as the removal of the southern array (which contained more than 85% of the land mapped BSAL that was identified within the development footprint described in the EIS).

Although identified as BSAL, the quality of the land within the amended development footprint is poor and vegetation has been degraded from generations of grazing. This is supported in the EIS, which describes the land and soil capability class between Class 3 (moderate limitations) through to Class 6 (very severe limitations).

The remaining areas of BSAL across within the amended development footprint (refer attached figure) are now very limited, representing less than 5% of the development footprint and approximately 0.0036% of land mapped BSAL across NSW. The shape of the narrow 'fingers' of BSAL running across the site presents a challenge if the project were required to comply with the proposed condition referenced above for the following reasons:

- there will be hundreds of cables running across each of the 'narrow' areas of land mapped as BSAL rather than along the length of the mapped areas; and
- arguably, there will be significant disturbance required to excavate all BSAL land to approximately 1 meter to remove any previously installed underground power cables.

Please let me know if you have any questions, otherwise I look forward to hearing from you.

Kind Regards,

Tim Kirk | Project Development Manager
UPC Renewables Australia
A UPC Renewables and AC Energy Company



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E: tim.kirk@upcrenewables.com

Hobart: Suite 2, Level 2, 15 Castray Esplanade, Battery Point, TAS, 7004

Melbourne: Level 23, HWT Tower, 40 City Road, Southbank, VIC 3006

Sydney: Level 14, 77 King Street, Sydney, NSW 2000

Please note that the Sydney office has moved.

www.upcrenewables.com/australia

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David Richards

From: David Richards
Sent: Monday, 15 April 2019 10:01 AM
To: 'SCIFFER Greg'
Subject: RE: J17300 - New England Solar Farm - RMS NTH18/00058

Thanks, Greg – hope you enjoyed your weekend!

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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From: SCIFFER Greg <Greg.SCIFFER@rms.nsw.gov.au>
Sent: Monday, 15 April, 2019 9:58 AM
To: David Richards <drichards@emmconsulting.com.au>
Subject: RE: J17300 - New England Solar Farm - RMS NTH18/00058

David

Discussions noted and recorded on file for future reference.

Regards
Greg Sciffer
Development Assessment Officer Northern

From: David Richards [<mailto:drichards@emmconsulting.com.au>]
Sent: Friday, 12 April 2019 11:08 AM
To: SCIFFER Greg
Cc: Tim Kirk; Development Northern
Subject: J17300 - New England Solar Farm - RMS NTH18/00058

Hi Greg,

Thanks for your time earlier this morning to discuss the submission provided by RMS on the New England Solar Farm.

As discussed, UPC has removed the southern array from the development application. This has consolidated the number of haulage routes required and will also reduce the number of intersections utilised by heavy vehicles.

The primary intersection requiring detailed investigation will be the intersection of the New England Highway and Barleyfields Road (North).

We note that RMS are interested in discussing potential improvements to this intersection and that the safety of motorists will be the governing factor in any future improvement works.

As discussed, concept designs for recommended intersection improvements to allow for the safe passage of light and heavy vehicles will be provided as part of a construction and operational traffic management plan (TMP).

The focus of any future improvement works will be on general construction heavy vehicles (ie semi-trailers) with any over-sized vehicle movements controlled through implementation of temporary traffic control measures.

We agree that the TMP will need to be an active document that responds to traffic-related matters throughout the construction and ongoing operation of the New England Solar Farm.

UPC or the preferred construction contractor will liaise directly with RMS once further details are available in relation to the required intersection improvements.

In the interim, as part of the response to submissions (RTS) report, we will make reference to this morning's call and include a commitment to prepare a TMP in consultation with Uralla Shire Council and RMS.

Please do not hesitate to contact me if you'd like to discuss this further.

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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Memorandum



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6 May 2019

Subject: J17300 - New England Solar Farm - Project amendments

1 Purpose

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (the project).

The purpose of this memorandum is to provide an update to Uralla Shire Council (Council) on the following:

- the proposed amendments to the project;
- a summary of the traffic impacts associated with the amended project; and
- proposed additional assessment works to be undertaken by UPC as part of the Response to Submissions (RTS) phase of works (in response to Council's submission on the Environmental Impact Statement (EIS)).

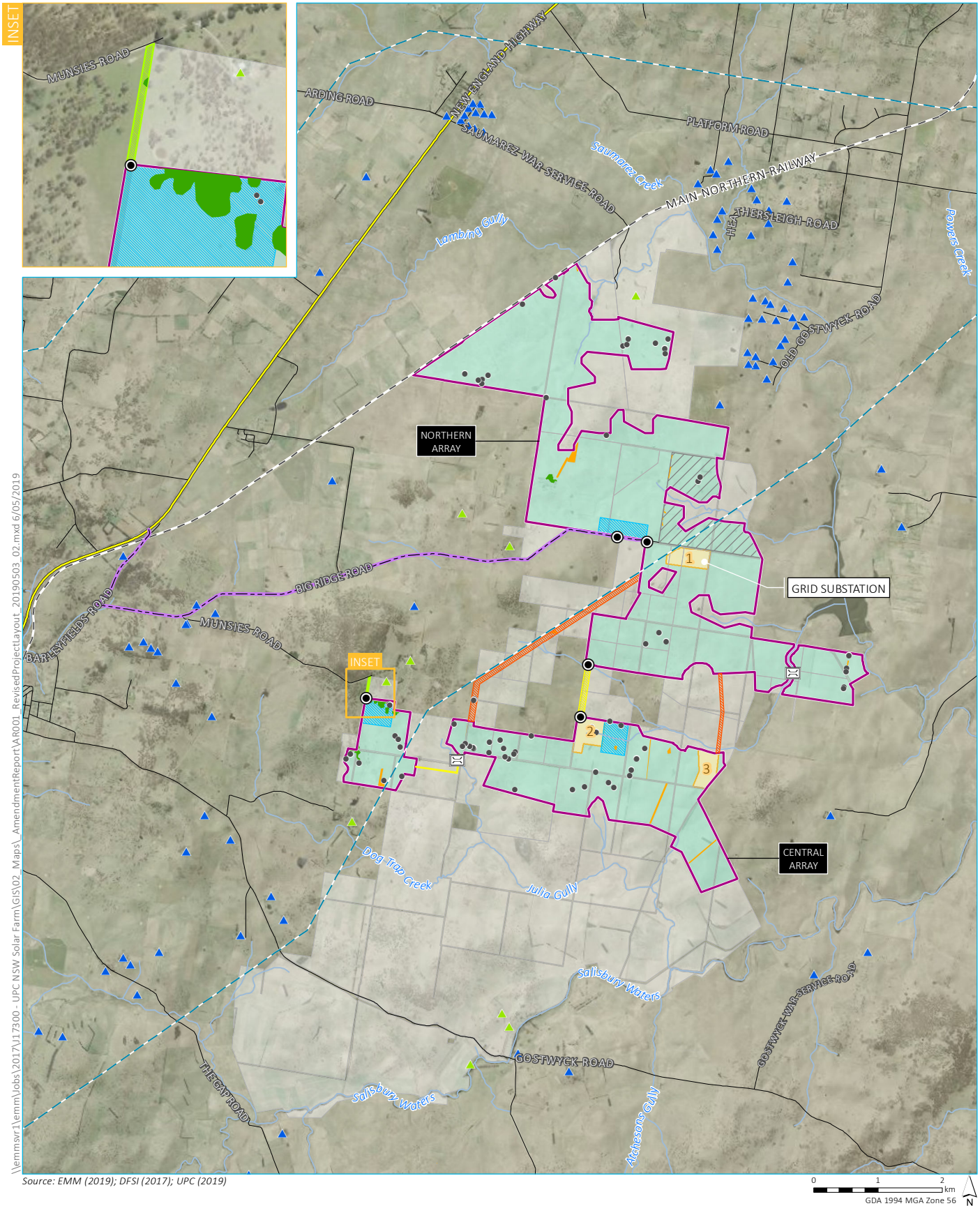
2 Project overview

As a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has performed a number of further amendments to the development footprint that was the subject of the development application (DA) and EIS, including the removal of the southern array area.

PV module technology is continuing to improve and the modules that are likely to be utilised for the project have a higher watt rating than was originally anticipated during the preliminary design stages of the project. In addition, UPC will maximise the extent of project infrastructure within the development footprint for the northern and central array areas, where practicable. As a result of these efficiencies, the project will be able to achieve the targeted generating capacity of up to 720 MW through development across the northern and central array footprints only and consistent with the information presented in the EIS, the project will still produce enough clean renewable electricity to power the equivalent of approximately 250,000 homes.

In addition to changes to the development footprint, there have also been revisions to connection infrastructure between the northern and central array areas and substation configuration. The amended project layout is shown on Figure 1.

UPC are currently preparing an amendment report (AR) to outline the changes to the project that have been made since the public exhibition of the EIS and provide a summary of the impacts associated with the amended project. This report will be submitted to NSW Department of Planning and Environment (DPE) in conjunction with the RTS report.



KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Primary vehicle access route
- Sensitive receptors
 - ▲ Project-related
 - ▲ Non-project related

- Project boundary
- Development footprint
- Solar array
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential laydown area/site compound
- Potential substation/BESS footprint (location number)

- Potential creek crossing
- Proposed primary site access point
- Potential site for construction accommodation village
- Plant community types requiring offsets
 - PCT 510 planted
 - PCT 1174 woodland
 - Paddock trees requiring offsets

Amended project layout

New England Solar Farm
Figure 1

3 Construction staging and duration

Construction of the project is still anticipated to take approximately 36 months from the commencement of site establishment works to commissioning of the two array areas. It is anticipated that the project will be constructed in two stages.

Stage 1 will include complete construction of the northern array area including the grid substation and is anticipated to take approximately 25 months to complete.

Stage 2 will include complete construction of the central array area and is anticipated to take approximately 20 months to complete. Stage 2 also includes the construction of the BESS, which is also anticipated to take approximately 20 months to complete.

Stage 2 will commence approximately 12 months after the commencement of site establishment works planned as part of Stage 1.

As noted within the EIS, the exact timing of each stage, including the commencement of Stage 1, the commencement of Stage 2, and the subsequent duration of the overlap between the two stages will be determined during the contracting, detailed design and financing stage of the project following project approval. Similarly, the overall duration of the project's construction will also be confirmed at this time once the preferred engineering, procurement and construction (EPC) contractor is selected and the detailed construction schedule is confirmed. The timeframes are indicative only and reflect a conservative upper limit of potential impacts from the project.

4 Traffic

4.1 Overview

The amendments to the project have reduced the number of local roads that will be used by project-related light and heavy vehicle movements. As a result of the amendment to the development footprint, the proposed vehicle routes to the access points identified on Figure 1 will be as follows:

- two access points to the northern array area via Barleyfields Road (north and south), then onto Big Ridge Road; and
- one access point to the central array area via Barleyfields Road (north and south), then onto Big Ridge Road and turning right onto Munsies Road.

4.2 Primary access routes

The Stage 1 and Stage 2 vehicle movement routes are described as follows:

- Stage 1:
 - Route A (1A): Barleyfields Road (north) turning onto Big Ridge Road and travelling to the primary site access points for the northern array. Light vehicles travelling south along the New England Highway from Armidale and all heavy vehicles from the north and south that require access to the northern array area will travel via Barleyfields Road (north); and
 - Route B (1B): Woods Street turning onto Barleyfields Road (south) and then onto Big Ridge Road and travelling on to the primary site access points for the northern array. Only light vehicles that require access to the northern array area travelling north along the New England Highway from Uralla will travel via Woods Street and Barleyfields Road (south).
- Stage 2:

- Route A (2A): Barleyfields Road (north) turning onto Big Ridge Road and then onto Munsies Road for access to the central array. Light vehicles travelling south along the New England Highway from Armidale and all heavy vehicles from the north and south that require access to the central array area will travel via Barleyfields Road (north);
- Route B (2B): Wood Street turning into Barleyfields Road (south) and then onto Big Ridge Road and Munsies Road for access to the central array. Only light vehicles that require access to the central array area travelling north along the New England Highway from Uralla will travel via Woods Street and Barleyfields Road (south); and
- Route C (2C): Vehicle movements via Barleyfields Road (north and south) will be the same as described above for Route A (1A) and Route B (1B). Vehicles will travel from the Big Ridge Road site access points for the northern array area to the central array via an internal site access road between the northern and central array areas (this route accounts for heavy vehicle deliveries for the BESS).

4.3 Construction traffic estimates

The forecast daily light and heavy vehicle movements using each route across the two stages of construction are shown in Table 1.

Table 1 Forecast daily light and heavy vehicle movements

Stage	Average daily light vehicle movements	Peak daily light vehicle movements	Average daily heavy vehicle movements	Peak daily heavy vehicle movements
1A	64	129	45	60
1B	86	171	0	0
2A	12	24	9	12
2B	18	36	0	0
2C	100	200	30	40

4.4 Assessment of impacts

4.4.1 Traffic impacts on roads

The New England Highway can accommodate the proposed daily traffic volumes including the peak construction stage traffic for the project. The inclusion of a construction accommodation village during the peak construction period will reduce the volume of light vehicles utilising the New England Highway north or south of Uralla. During the Stage 1 and Stage 2 construction overlap period, the additional average and peak daily traffic movements travelling on the rural sections of the New England Highway will be +154 and +269 vehicles, respectively. This represents an increase of +3.11% (average) and +5.43% (peak).

The amendments to the development footprint have reduced the number of local roads impacted by the project and, subsequently, potential impacts to local road users and neighbouring residents have also been reduced. Thunderbolts Way will have a reduced number of project-related light vehicles and no construction heavy vehicles are anticipated to travel along this road corridor. Gostwyck Road, Hillview Road, Salisbury Plains Road and The Gap Road will not require any project-related light or heavy vehicle movements during construction or operations (with the exception of any light vehicle movements from locally-based employees).

Daily traffic volumes during average and peak construction on Barleyfields Road will be:

- Barleyfields Road (south) - approximately +168 (+23%) during average construction and +338 (+45.68%) during peak construction; and

- Barleyfields Road (north) – approximately +196 (+30%) during average construction and +334 (+51.78%) during peak construction.

These additional traffic increases will be temporary and restrictions on heavy vehicles travelling south of Big Ridge Road will be implemented. All heavy vehicles requiring access to the northern and central array areas will be directed to use the northern end of Barleyfields Road with access direct from the New England Highway.

Throughout construction, traffic increases on Barleyfields Road (north) will not result in a change to the road's Austroads design standard. Additional light vehicle traffic will cause Barleyfields Road (south) to move into a higher band in the Austroads rural daily traffic volume classification system during the peak construction period (ie during months 13-16 and 22-25). However, during these periods, the daily vehicle volumes travelling south on Barleyfields Road will only marginally exceed the existing band level of 1,000 daily vehicles.

The proposed increase resulting from project construction traffic travelling on Big Ridge Road (east of Barleyfields Road) is approximately +208% during the average construction period (approximately 364 vehicle movements per day) and approximately +384% during the peak construction period (approximately 672 vehicle movements per day). The additional vehicle movements will cause this road to move into a higher band in the Austroads rural daily traffic volume capacity standards. However, the road itself is a low volume rural road and located away from the township of Uralla.

The proposed construction traffic volumes utilising Munsies Road will generate a high percentage increase in the traffic volumes during average (+156%) and peak (+288%) construction. Vehicle number increases will be minor at +39 and +72 daily vehicles during average and peak construction periods, respectively.

4.4.2 Traffic impacts at key intersections

As a result of the amendments to the development footprint, project-related vehicle movements will no longer need to use the intersection of Thunderbolts Way and Salisbury Plains Road.

The three relevant rural intersections in the locality of the two array areas are:

- New England Highway/Barleyfields Road (north);
- New England Highway/Barleyfields Road (south) including Wood Street; and
- Barleyfields Road/Big Ridge Road.

The future peak hourly traffic at the New England Highway/Barleyfields Road (north) intersection requires additional left and right-turn traffic lanes as the combination of major road and minor road peak hourly traffic volumes are within the range for the CHR/CHL type of intersection.

RMS propose the construction of a left turn lane to Barleyfields Road from the New England Highway. This decision was based on the traffic data available under the current use of this intersection. It was noted that as part of this work, RMS will ensure that the intersection of Barleyfields Road and the New England Highway will be suitable for conversion to a CH(R) layout without significant construction work (ie implementation of a right-turn lane for traffic turning right into Barleyfields Road (north) from the New England Highway).

The New England Highway/Barleyfields Road (south) and Wood Street intersection requires additional left and right turn traffic lanes (CHR/CHL) on the New England Highway, as the combination of major road and minor road peak hourly traffic volumes are within the range of this type of intersection.

The Barleyfields Road/Big Ridge Road intersection does not require additional left or right turn traffic lanes as the peak hourly traffic volumes will continue to satisfy the standard AUR/AUL intersection design requirements without additional left or right turn traffic lanes.

4.5 Additional assessment works

In response to Council's submission on the EIS, SCT Consulting has been engaged to assist UPC and EMM with additional investigations along the proposed primary vehicle access route to the northern and central array areas. It should be noted that UPC had already committed to the inclusion of these items as part of the traffic management plan (TMP), which will still be prepared prior to the commencement of construction in consultation with Council, DPE and RMS. The scope of the additional assessment works listed below will be detailed in the RTS report and the works will be carried out in consultation with Council in the coming weeks. The additional investigations include:

- intersection assessments at New England Highway/Barleyfields Road (north) and New England Highway/Barleyfields Road (south) including Wood Street, to assist with:
 - understanding the impact of alternate vehicle access paths and associated impacts on these intersections;
 - determination of the need and scope of any potential upgrades to these intersections to address capacity and safety requirements to accommodate the proposed construction traffic; and
 - understanding of the potential impact, with regards to queuing of construction vehicles on the existing rail crossing near the New England Highway/Barleyfields Road (north) intersection;
- intersection design at New England Highway/Barleyfields Road (north) and Barleyfields Road/Big Ridge Road, including:
 - a swept path assessment to determine the ability for construction vehicles to safely access the array areas utilising these intersections; and
 - preparation of strategic concept designs.

The technical memo used to present the results of the works described above will also include consideration of:

- performance of the existing railway crossing on Barleyfields Road (north);
- use of speed zone changes to manage potential impacts along construction vehicle routes;
- carriageway sealing requirements and end state operations for impacted roads compared against construction related traffic volumes and requirements; and
- dilapidation assessment methodologies.

5 Next steps

As noted in Section 4.5, the additional assessment works will be carried out in consultation Council and DPE in the coming weeks. The scope of works will be described in the RTS report; however, the results will form part of a separate technical memo to be presented to both Council and DPE. The additional assessment works will inform UPC's approach to intersection and road upgrades, which will be the subject of continued engagement with Council, RMS, DPE and neighbouring landholders.

New England Solar Farm Uralla Shire Council Project Update

12 March 2019



Overview

- New England Solar Farm Overview
 - Quick facts
 - Progress since the last Council Presentation
- Planning and Environmental Assessments
 - State Significant Development process
 - Impact assessment
 - bushfire hazard
 - traffic on local roads
- Construction Readiness
 - Employment opportunities
 - Pre-construction management plan



New England Solar Farm Overview

Project size:

- 720MW (AC) solar PV farm + battery storage system
- Up to 2,700 hectares in total

Solar resource:

- Elevation and cooler temperatures help efficiency
- Generator can achieve capacity factor of ~ 30%

Project Layout & Staging Approach:

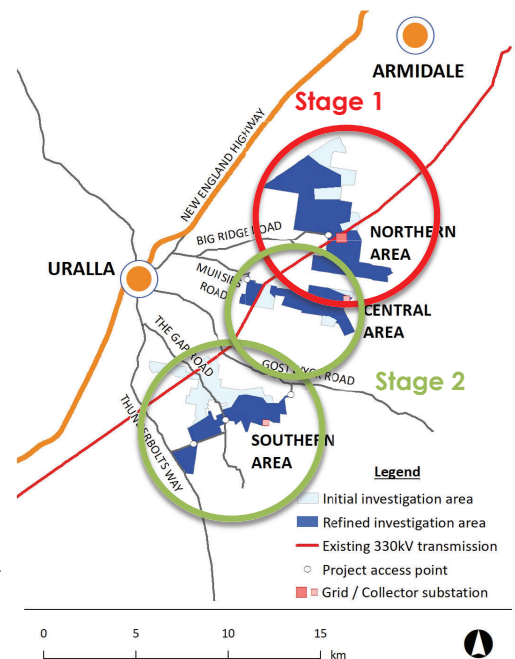
- Three distinct areas - Northern, Central, Southern
- Significant project refinements

Grid Connection:

- Cut-in on existing 330kV line from Armidale to Tamworth

Community Benefit Sharing Initiative:

- \$250 per installed MW/year for 25 years equivalent to \$180,000/year for 720MW. Minimum of \$50,000 from the start of construction.



Progress since the last Council Presentation (30th October)

Planning:

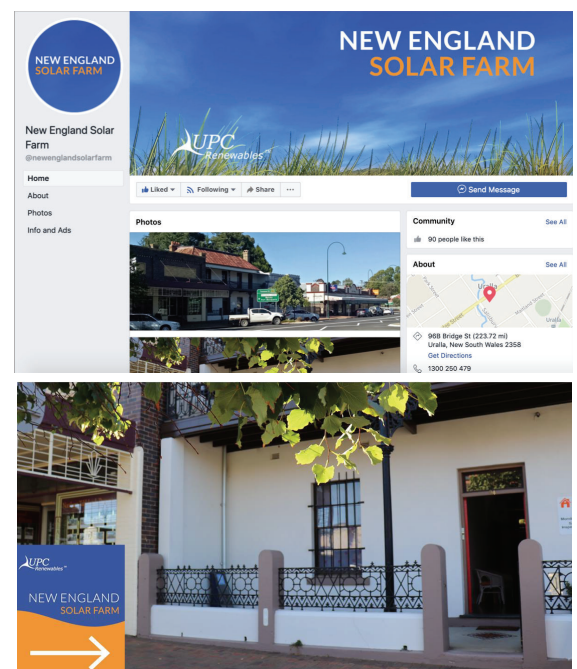
- EIS is currently on public exhibition until 20 March
- Site investigations have continued, including Aboriginal cultural heritage

Resource and Engineering:

- First stage of geotechnical investigations completed
- Solar monitoring system installed

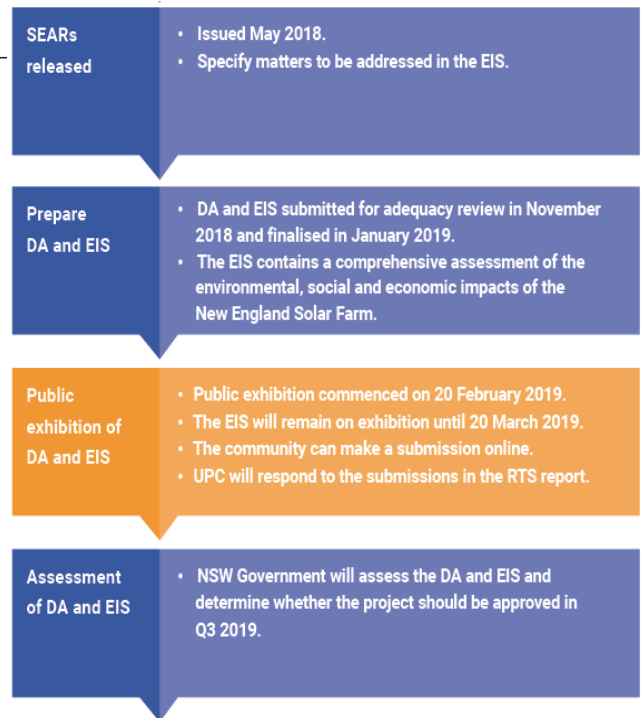
Stakeholder Engagement:

- Project Facebook page created
- Uralla office established – 96B Bridge Street
- Continuing to meet and discuss with members of the community
- Fifth community drop-in session will be held this Thursday 14th



Planning and Environmental Assessment

- The community and other stakeholders have the opportunity to provide comments on the EIS and supporting documents until 20 March.
- Submissions may comment on the content of the EIS or the methods used to assess the project's potential impacts.
- Matters raised as part of submissions on the EIS will be addressed in the Response to Submissions or RTS report.

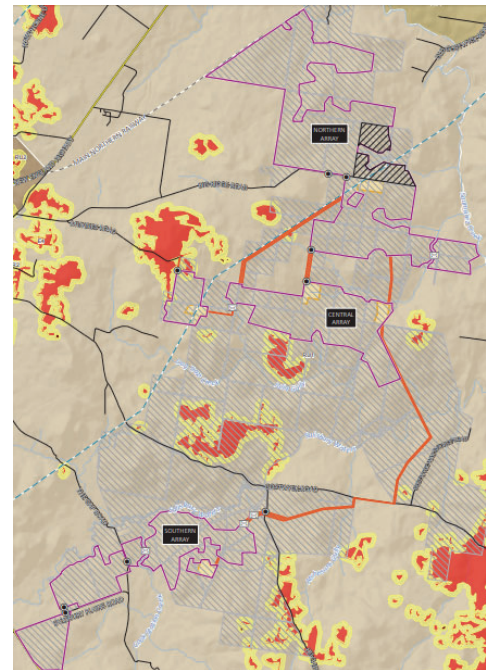


Planning and Environmental Assessment

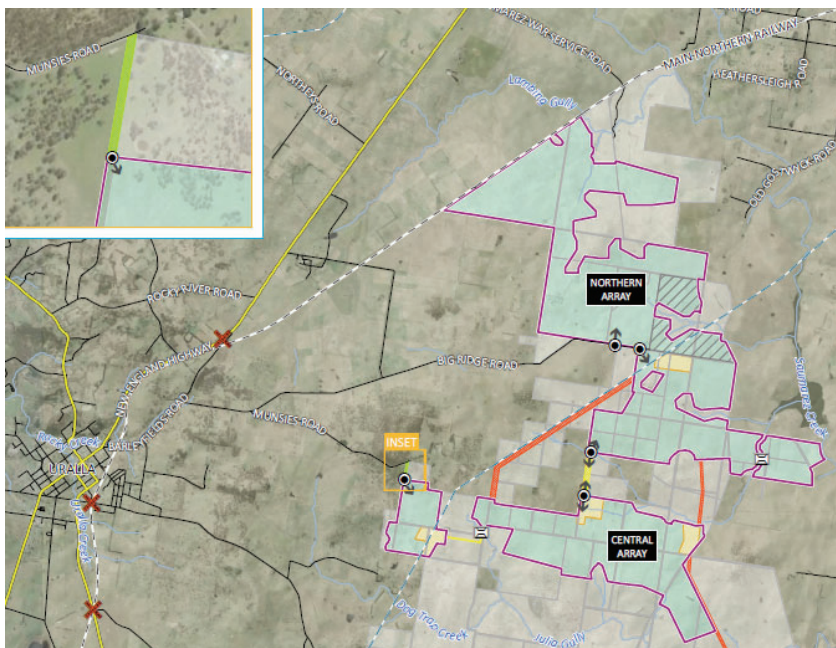
- DPE will review the RTS, prepare their assessment report and provide a recommendation to the Independent Planning Commission (IPC).
- The IPC plays an important role in strengthening transparency and independence in the decision-making processes for major projects in NSW.
- The IPC will review DPE's assessment report and may request that a public meeting is held to provide the public with an opportunity to present on their concerns about the project.
- The IPC will provide their determination.
- Following determination and prior to construction, UPC will be required to prepare a suite of management plans in consultation with relevant stakeholders (eg Council, NSW Roads and Maritime Services and NSW Rural Fire Service).

Impact assessment – bushfire hazard

- Approximately 0.4% of the development footprint is mapped bushfire prone.
- The project will be exposed to bushfire threat in the form of grassfire and has the potential to cause unplanned ignition of surrounding grassland.
- Bushfire risks associated with the project have been assessed in accordance with *Planning for Bushfire Protection* (PBP) (RFS 2006).
- Risks will be mitigated through implementation of appropriate bushfire protection standards and development of a emergency response plan (ERP) and fire management plan (FMP).



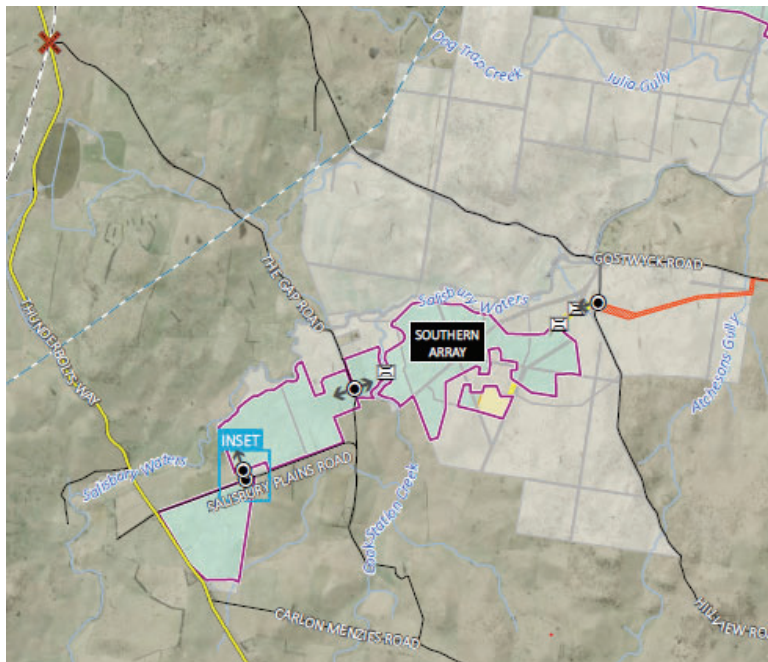
Impact assessment – traffic on local roads



Access to the northern and central array areas will be from the following local roads:

- Barleyfields Road and Big Ridge Road (northern array); or
- Barleyfields Road, Big Ridge Road and Munsies Road (central array).

Impact assessment – traffic on local roads



Access to the southern array area will be from the following local roads:

- Gostwyck Road and Hillview Road; or
- Thunderbolts Way, Salisbury Plains Road and The Gap Road.

Impact Assessment – traffic on local roads

- Project-related construction vehicle movements for will have a short-term impact on traffic conditions and usability.
- Impacts will be managed as part of the traffic management plan to be negotiated and agreed between UPC and Council. The TMP will include measures such as:
 - a road maintenance program;
 - safety initiatives in residential areas;
 - driver training and inductions;
 - dilapidation survey requirements;
 - intersection upgrades; and
 - temporary traffic control measures.

Construction Readiness

- Scheduling – continuing to refine the construction schedule based on new information
- Construction Market Engagement – has commenced, inspections of the project site continue to be undertaken
- Local Contractors and Local Employment opportunities
- Prior to commencement of construction, detailed management plans will be produced for approval –
 - Traffic management plan
 - Biodiversity management plan
 - Fire management plan and emergency response plan
 - Aboriginal heritage management plan
 - Historic heritage management plan
 - Construction environmental management plan
 - Construction workforce management plan
 - Waste management plan
 - Project decommissioning and rehabilitation plan

Thank you!

Contact us:

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NEW ENGLAND SOLAR FARM



Memorandum



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Subject: J17300 - New England Solar Farm - Meeting minutes 7-May-2019

Date and location

Tuesday 7 May 2019 at Uralla Shire Council Office

Attendees

Matt Clarkson (Council); Terry Seymour (Council); Tim Greenaway (UPC); Tim Kirk (UPC); Seamus Christley (SCT); David Richards (EMM)

Meeting minutes

i Project refinements

Utilising areas within the two array areas that were intended for avoidance previously (eg due to slope/gradient) and PV module technology updates will allow UPC to achieve a 720 MW project within the amended development footprint.

Discussed revisions to the electrical cabling and substation configuration.

Discussed refinement to the extent of the northern array area to minimise visibility of project infrastructure.

Also noted that the location of the CAV hasn't changed as a result of amendments to the project.

ii Construction staging

Stage one – Northern array – 25 months

Stage two – Central array – 20 months

Stage two likely to commence 12 months after commencement of stage one

Question: Is the intent to have stage one operational before commencement of stage two? No, refer to overlap of the two stages and overall 36 month timeframe.

iii Next steps

EMM and UPC preparing the AR and RTS report for lodgement with DPE in May.

DPE planning to meet with Council and other key stakeholders in May.

Question: Has the community been kept in the loop about the project amendments? Yes – emails, Facebook, Armidale Express and Uralla Wordsworth and looking to have another drop in session in the future to provide further project updates to the local community. This will be organised after the AR and RTS report have been submitted to DPE.

Amendments to the project have reduced the number of local roads that will be impacted during construction.

Identified the primary vehicle access route (including internal road between the two array areas).

SCT Consulting have been engaged to further quantify and assess impacts along BFR, BRR and, to a lesser extent, MR. This will include:

Concept designs and swept path analyses of key intersections

Quantifying impacts on the BFR level crossing

Discussion of dilapidation methodologies

Considering applicable road design standards in terms of sealing/carriageway

Proposing additional tube counts and intersection counts to inform this work and any future SIDRA analysis.

Terry noted general support for the scope. Terry will review the scope for the additional works and provide feedback on any additional assessments that may be required from Council's perspective.

Technical matters will not need to be communicated to Council as a whole (unlikely to have any further role in the project). These should instead be presented to the relevant Council staff – ie planning, engineering, infrastructure, etc.

Question: Will Council and other stakeholders have an opportunity to review/provide comments on the amendment report? Noted that the project will not be re-exhibited; however, DPE intend to meet with Council and key stakeholders later this month to discuss the project, including the amendments.

David Richards

From: Tim Greenaway [tim.greenaway@upcrenewables.com]
Sent: Friday, 31 May 2019 10:43 AM
To: David Richards
Cc: Tim Kirk
Subject: FW: Container dimensions

David

Please find below correspondence with JHG that outlines the approvals required for the operation and loading/unloading of the train for the project.

Regards

Tim

Tim Greenaway | NESF Project Director
UPC Renewables Australia



M: +61 413 625 097

E: tim.greenaway@upcrenewables.com

Hobart: Suite 2, Level 2, 13-17 Castray Esplanade, Battery Point, TAS, 7004

Melbourne: Level 23, HWT Tower, 40 City Road, Southbank, VIC 3006

Sydney: Level 14, 77 King Street, Sydney NSW, 2000

Please note that the Sydney office has moved.

www.upcrenewables.com

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From: David Ginns <David.Ginns@jhg.com.au>
Date: Monday, 11 February 2019 at 8:35 am
To: Tim Greenaway <tim.greenaway@upcrenewables.com>
Subject: RE: Container dimensions

Two matters to cover FYI.

The first is the high degree of sensitivity the network owner (TfNSW) has toward potential delays to the Armidale passenger service. Some initial negativity toward the possibility of main line loading was received. These can be assuaged by ensuring that any rail operator is aware of operational restrictions that would be imposed. The network owner would expect significant consultation (via John Holland) with any rail operator planning the proposed services.

To allay these concerns, the following is worthy of consideration;

1. There will need to be consideration made during your discussions with potential rail service providers about maximum train lengths. To allay the passenger service concerns voiced by the network owner, the length of freight services may have to be limited to the crossing capacity available within West Tamworth yard. Subject to

confirmation, this would be 511 m (gross). I will be in Tamworth next Monday and will measure the exact siding capacity. Limiting services to this length will allow us to ensure a freight service can be locked away clear of the main line to cross a passenger service, if required. This wouldn't limit longer services running ex port. For example a 900 m service could be split at Werris Creek and run to Uralla in two lots.

2. Given there is an eight and 15 hour window between passenger services, it may be advisable to unload at night. That is, following the passenger service on the down run to Armidale, which runs through Uralla at 1900. Doing this could remove the need to run the ~500 m length restriction.
3. Given the multitude of options possible, we will do some graphing to take account of running times. But any potential rail operator would need to be aware of the restrictions imposed by short sidings and the passenger schedule.

Second is preparation for your **Third Party Works (TPW) applications**; which are likely to be;

- A. A Licence to a defined area of the rail corridor (within which the hard stand will be located), allowing for access to the rail corridor.
- B. Permission to construct the temporary hard stand.
- C. A Licence to carry out the unloading / loading activities.

In the case of A) you will request from TPW a standard property Licence. This can be for a limited period. The Property department has been made aware of the potential for this to occur.

In the case of B), Carina, the manager of the TWP process, suggests you apply for construction permission, rather than apply for Approval in Principal. This is because the works will be minor in nature and are relatively non-intrusive. When you request an application from her, request the former, not the latter.

For the temporary hard stand construction application, the following will be information required.

- A survey of the site.
 - Note the surveyor will need to apply via TPW for access to the corridor. It may be appropriate to work with a surveyor experienced with the CRN. Mitchell Hanlon in Tamworth have done a lot of work on the CRN.
- Any Geotech information that is relevant.
 - The information gathered for the main construction should apply to the land within the corridor (your geotech could provide this advice).
- A design for the hard stand will need to be provided. This would be a detailed design, issued for construction.
 - A range of Standards are on the JH CRN web site. E.g. <http://www.jhrcrn.com.au/media/2170/crn-cs-410-v1-1.pdf> and <http://www.jhrcrn.com.au/media/2172/crn-cs-330-v1-1.pdf>
- Your design will need to be independently verified by a suitably qualified party who is not the designer. This is to ensure the design meets the relevant Standards.
- It is likely an approver will ask for a removal/restoration plan for the temporary hard stand. This would detail the method to be used for removal of the hard stand material and restoration of the site to original condition.
- With regard to environmental matters, it is likely that relevant sections of your EIS would be applicable. If possible, that information should be made available.
 - However, it may be argued by an approver that because the rail operation is not an ongoing component of the proposed development, and not part of the planning consent, some form of REF may be required for the loading operation.
- Insurances.
 - You will need public liability insurance for \$250 million.

- The insurance has to name both Transport for NSW and John Holland Rail as co-insured.
- As there will be construction, you will also need \$20 million professional indemnity.
- Construction methodologies, safe work method statements, etc. will need to be included in the application for construction.
 - You will also need to include the details of the rail protection officer(s) who will be managing rail safety during construction.

In the case of C), to undertake main line unloading / loading, you will also have to apply via TPW for an Infrastructure Licence with Permitted Loading/Unloading.

However, if your rail operator already has a Licence of this sort, you would not need to enter into a new Licence, the unloading/loading activities would be covered under their Licence. Currently only SSR have such a Licence. If you were to contract them to provide rail services, we would need to amend their licence to include container handling at the Uralla location.

Regards

David Ginns
Business Development Manager
Country Regional Network

**JOHN
HOLLAND**

117-119 Maitland Rd Mayfield, NSW 2304
P. 02 40289416 | M. 0417 14 72 26

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David Richards

From: Joanne Cheoung [Joanne.Cheoung@jhgc.com.au]
Sent: Thursday, 16 May 2019 1:24 PM
To: David Richards
Cc: David Ginns; Tim Kirk; tim.greenaway@upcrenewables.com; Teena Renes
Subject: RE: J17300 - New England Solar Farm - CD19/01755

Hi David,

I trust that you have received today's email from David Ginns of JHR as below.

I now recommend to state JHR's views on the issues discussed herein in your Response to Submission (RtS) and to forward it to Department of Planning and Environment (DP & E).

DP & E will then forward your RtS to JHR for further review.

Should you require any questions regarding the above, please contact the writer.

David – Thank you again for liaising with the proponent again.

Kind regards,

Joanne Cheoung
Commercial Property Analyst
Country Regional Network

**JOHN
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W. johnholland.com.au



From: David Ginns <David.Ginns@jhgc.com.au>
Sent: Thursday, 16 May 2019 12:48 PM
To: David Richards <drrichards@emmconsulting.com.au>
Cc: Tim Kirk <tim.kirk@upcrenewables.com>; tim.greenaway@upcrenewables.com; Joanne Cheoung <Joanne.Cheoung@jhgc.com.au>; Teena Renes <Teena.Renes@jhgc.com.au>
Subject: RE: J17300 - New England Solar Farm - CD19/01755

David.

I had a discussion with Michael Wright, our principal track and civil engineer, about the content of your email, and forwarded the email to him for consideration. His response is as follows

I see no concern from my perspective for the proposed piles at an offset of 10m from the rail corridor boundary.

I also see no concern for the potential impact on rail operations at the offset they will be working.

They will require suitable protection arrangements for the construction of the new fence. We will also need to review their proposed fencing to ensure that it meets our minimum standard (which I am 100% confident it will)

Hopefully this should be sufficient assurance that the restrictions relating to excavation or pile driving within the nominated distance from the rail corridor should not apply, and that the activities proposed, based on the feedback noted above, do not concern the relevant internal stakeholders within John Holland.

I note your observation about the proposed boundary fence, and with reference to the comment made above by Michael, refer you to the attached Standard and section six.

Regards

David Ginns
Business Development Manager
Country Regional Network



117-119 Maitland Rd Mayfield, NSW 2304
P. 02 40289416 | M. 0417 14 72 26

From: David Richards <drichards@emmconsulting.com.au>

Sent: Thursday, 16 May 2019 10:33 AM

To: David Ginns <David.Ginns@jhg.com.au>

Cc: Tim Kirk <tim.kirk@upcrenewables.com>; tim.greenaway@upcrenewables.com; Joanne Cheoung <Joanne.Cheoung@jhg.com.au>; Teena Renes <Teena.Renes@jhg.com.au>

Subject: RE: J17300 - New England Solar Farm - CD19/01755

Hi David,

Thanks for your email.

Please refer below for additional information to assist with your conversations with Mr Wright. We'd be more than happy to provide any additional information as required or jump on a phone call to discuss further. I'm unavailable tomorrow, but in the office all of next week.

Describe the dimension of the material being driven (array uprights), the equipment being used to drive the posts in and the distribution of the posts within the area relevant to the rail corridor.

The pile dimensions will be subject to final geotechnical design. However, as a guide UPC used the following piles for the pile tests installed on site – 150UB14 and 150UC23 steel sections.

For ease of description, please find below photos of example piling equipment.

The distribution of piles will be subject to final layout design. As a guide, the solar modules will be installed on trackers that run directly north/south. Trackers will be located approximately 6 m apart (between 5.4 m and 6.5 m). UPC expect to have a 10 m setback from the site boundary, which includes a 4 m wide perimeter internal roadway. So the first piles will be located approximately 10 m from the rail corridor. Piles are spaced approximately 8 m apart along the length of the tracker.

The pile lengths are expected to be no more than 5 m. Therefore, in the unlikely event of an accident and machinery falling, or the uninstalled pile falling, they will fall wholly within the site.



Location of boundary fencing

UPC's preference is to construct the perimeter fencing on the lot /DP boundary. We note your comments regarding future access to the rail corridor. However, if UPC construct the fence within the site, this will leave a narrow corridor between the site boundary and the security fence which will be difficult to maintain. UPC are happy to discuss further with John Holland Country Rail Network to resolve.

Let me know if any further information is required.

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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M 0405 593 675
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From: David Ginns <David.Ginns@jhg.com.au>

Sent: Tuesday, 14 May, 2019 12:36 PM

To: David Richards <drichards@emmconsulting.com.au>

Cc: Tim Kirk <tim.kirk@upcrenewables.com>; tim.greenaway@upcrenewables.com; Joanne Cheoung <Joanne.Cheoung@jhg.com.au>; Teena Renes <Teena.Renes@jhg.com.au>

Subject: RE: J17300 - New England Solar Farm - CD19/01755

David. Following our discussion, it would be appropriate to raise the matter of the penetration and the application of the 2 m within 25 m requirement with our principal track and civil engineer, Michael Wright, for his view.

Logically, some consideration should be given to the nature of the penetration, in particular the size/diameter of the material being driven into the ground, and the likelihood of an effect on the formation of the rail line. Noting that you are not proposing any excavation as described in the correspondence from TfNSW.

Perhaps if you can describe the dimension of the material being driven (array uprights), the equipment being used to drive the posts in and the distribution of the posts within the area relevant to the rail corridor, that will allow Mr Wright to assess the possible effects on the line.

With regard to cranes, operating in the airspace above the rail corridor would require a licence. Consideration should be given to the height of any crane operating adjacent to the corridor and the distance of the crane from the line. That is; if a crane operating adjacent to the corridor is tall enough to foul the line should it fall toward the corridor, a track possession will be required, unless the crane is located in a manner that would prevent it falling onto the track. A risk assessment of this hazard would be essential.

With regard to the fencing, a boundary fence already exists in that location. I would anticipate the new security fencing excluding people from the arrays would not need to be installed on the rail corridor boundary if its installed within the proponents property. Location of this fence away from the boundary will allow you to maintain the fence without having to enter the rail corridor.

I am happy to follow up with Mr Wright when you forward the abovementioned (and any other relevant) information.

Regards

David Ginns
Business Development Manager
Country Regional Network

**JOHN
HOLLAND**

117-119 Maitland Rd Mayfield, NSW 2304
P. 02 40289416 | M. 0417 14 72 26

From: David Richards <drichards@emmconsulting.com.au>
Sent: Monday, 13 May 2019 5:01 PM
To: David Ginns <David.Ginns@jhgc.com.au>
Cc: Tim Kirk <tim.kirk@upcrenewables.com>; tim.greenaway@upcrenewables.com; Joanne Cheoung <Joanne.Cheoung@jhgc.com.au>
Subject: J17300 - New England Solar Farm - CD19/01755

Hi David,

Hope you had a great weekend!

Thanks again for taking the time out last week to discuss the approval process for the proposed activities for the New England Solar Farm.

We received a copy of the attached submission from Transport for NSW on the New England Solar Farm (Objective Reference CD19/01755) following their review of the EIS during the public exhibition period.

Within the submission there are a number of references to potential works within and adjacent to the rail corridor for the Main Northern Rail Line.

Would it be possible to further discuss the responses provided by another representative from JHR in the below email?

Ideally, now that UPC are liaising with JHR in relation to the potential use of the rail line, it would be good to cover off on all matters with the one point of contact.

Within the email below, it is noted that JHR will require clarification that piles will not penetrate more than 2m below ground level within 25 m of the rail corridor. If installation of piles does involve penetration of more than 2 m below ground level, a geotechnical and structural engineering assessment will be required. We'd like to clarify whether this activity would also need to be described in the license application or whether there has been some confusion around the actual level of disturbance required for the piles and therefore no further action is required.

I'd be happy to jump on a call to discuss further at a time that suits you.

Many thanks and kind regards,

David

David Richards
Environmental Scientist



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From: Joanne Cheoung <Joanne.Cheoung@jhgc.com.au>
Sent: Thursday, 2 May, 2019 11:37 AM
To: David Richards <drichards@emmconsulting.com.au>
Subject: RE: J17300 - New England Solar Farm - CD19/01755

Hi David,

I apologise for the late response to your email below.

Please see my response in red.

Kind regards,

Joanne Cheoung
Commercial Property Analyst
Country Regional Network

**JOHN
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Parramatta NSW 2150
P. +61 2 9685 5092
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W. johnholland.com.au



From: David Richards <drichards@emmconsulting.com.au>
Sent: Tuesday, 30 April 2019 4:01 PM
To: Joanne Cheoung <Joanne.Cheoung@jhgc.com.au>
Subject: FW: J17300 - New England Solar Farm - CD19/01755

Hi Joanne,

Just confirming receipt of the email below in relation to the New England Solar Farm?

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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From: David Richards

Sent: Thursday, 18 April, 2019 6:56 PM

To: Joanne Cheoung <Joanne.Cheoung@jhg.com.au>

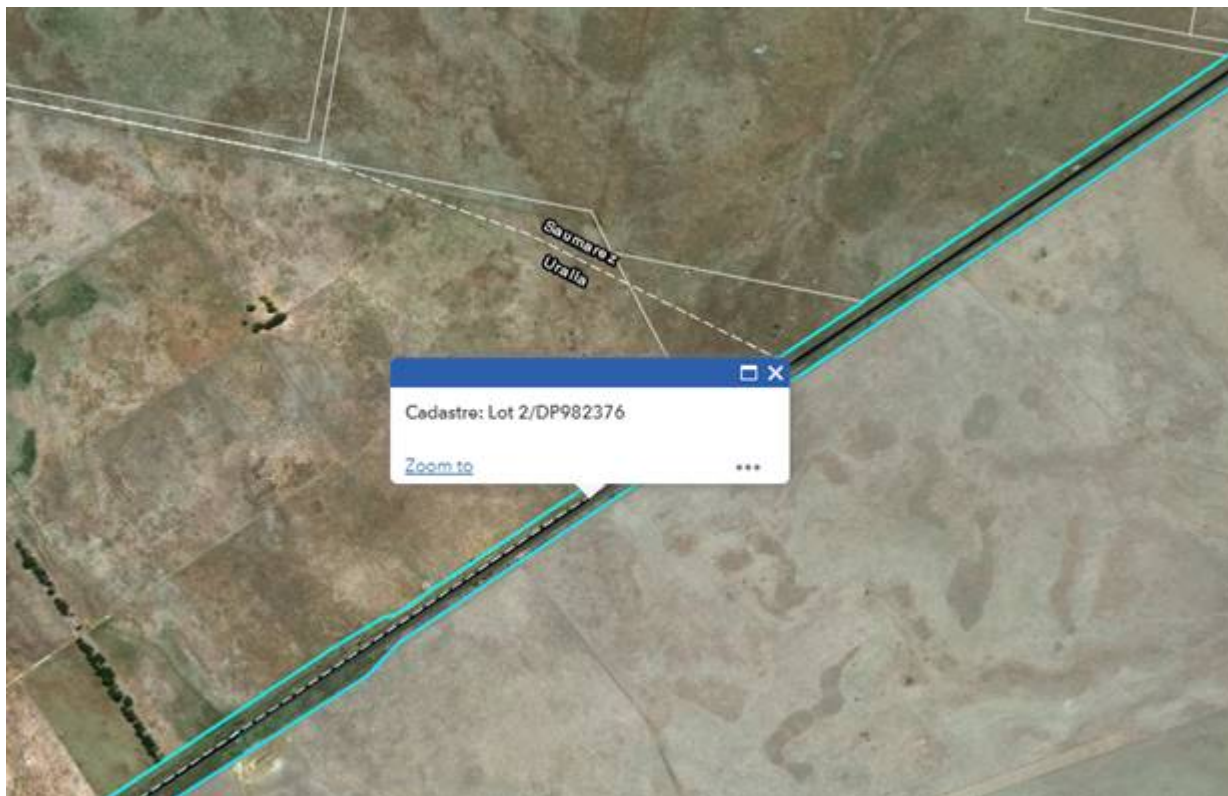
Cc: Ansari, Halima <halima.ansari@transport.nsw.gov.au>; Tim Kirk <tim.kirk@upcrenewables.com>

Subject: RE: J17300 - New England Solar Farm - CD19/01755

Hi Joanne,

Further to Halima's email below, it would be great to get further clarification on the following:

- To clarify, the response provided in relation to the definition of the rail corridor indicates that all land within Lot 2 DP 982376 is classified as rail land and therefore forms part of the rail corridor. Is this correct? **Correct**



- If so, does the comment provided in relation to works on land within 25 m of the rail corridor apply to any ground penetration work performed within 25 m of the boundary of Lot 2 DP 982376? **The comment is for the**

works which involve the penetration of more than 2m below ground level in addition to being within 25 m of the rail corridor. Refer screenshot below where markers indicate a distance of 25 m



- Security fencing will be required around the perimeter of the solar farm including along the northern boundary of part of Lot 221 DP 755814, which is adjacent to Lot 2 DP 982376. From the security fencing, it is anticipated that there will be at least a 10 m defendable space to permit unobstructed vehicle access.
- It is not anticipated that any significant earthworks or excavation will be required within proximity of the rail corridor. Works within 25m of Lot 2 DP 982376 will likely include the installation of security fencing, forming a perimeter access road and installation of PV modules. The PV modules will be supported on mounting frames consisting of vertical posts ('piles') and horizontal rails ('tracking tubes'). Rows of piles will be driven or screwed into the ground, depending on the geotechnical conditions, and the supporting racking framework will be mounted on top. Pre-drilling and/or cementing of foundations will be avoided if allowed by the geotechnical conditions. Refer images provided below for an example of the piles required.



- Based on the description of works likely to occur within 25m of Lot 2 DP 982376, would concurrence from JHR be required? **JHR will require your clarification that piles will not penetrate more than 2m below ground level prior to further assessment. If installation of piles does involve penetration of more than 2 m below ground level, a geotechnical and structural engineering assessment will be required. Please refer to a letter dated 28 March 2019 from TfNSW.**
- Could you please also confirm which watercourse the comment in relation to stormwater management is referring to? **Our records indicate that there are existing watercourses including Lambing Gully, Harriet Gully and Saumarez Creek in the and adjacent to the project land. However, JHR do not have records for unknown or unnamed watercourses.**

Tim Kirk (UPC) and I would also be happy to jump on a call with you to discuss the project in further detail.

Enjoy your Easter break!

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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From: Ansari, Halima <halima.ansari@transport.nsw.gov.au>
Sent: Friday, 12 April, 2019 11:01 AM
To: David Richards <drichards@emmconsulting.com.au>
Cc: Joanne Cheoung <Joanne.Cheoung@jhg.com.au>
Subject: RE: J17300 - New England Solar Farm - CD19/01755

Hi David,

Thanks for your email.

Rail corridor is a term commonly used in the rail industry to indicate ordinarily fence line to fence line or 15 metres from the outside rail where there are no fences.

Alternatively, rail corridor is also used broadly to indicate rail land. The references to rail corridor in the Transport for NSW (TfNSW) letter are made to give the latter meaning.

The rail land to which the project land (in particular, the north array area) is immediately adjacent to, is Lot 2 DP 982376.

As such, if the Proponent wishes to carry out any works requiring access to the rail land, the Proponent must contact John Holland Rail (JHR) first prior to commencement of any works.

Should you require any further clarification, please do not hesitate to contact our JHR contact, Joanne Cheoung, who is copied in this email.

Kind Regards,

Halima Ansari
Cadet
Land Use Planning & Development
Freight, Strategy & Planning
Transport for NSW

Level 26, 477 Pitt Street, Haymarket NSW 2008



Use public transport... plan your trip at transportnsw.info
Get on board with Opal at opal.com.au

From: David Richards [<mailto:drichards@emmconsulting.com.au>]
Sent: Monday, 8 April 2019 5:47 PM
To: Ho, Ken
Cc: Tim Kirk
Subject: J17300 - New England Solar Farm - CD19/01755

Hi Ken,

We received a copy of the submission from Transport for NSW on the New England Solar Farm (Objective Reference CD19/01755).

Within the submission there are a number of references to potential works within and adjacent to the rail corridor for the Main Northern Rail Line.

Would you be able to provide a clear definition for the rail corridor (ie what is the extent of the rail corridor from the edge of the rail itself)?

Happy to discuss further.

Many thanks and kind regards,

David

David Richards

Environmental Scientist



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Selection of community consultation materials and media coverage

- Community facts sheets
- Email to the mailing list
- Posters
- Flyers
- Articles
- Example content from Facebook
- Uralla office location

NEW ENGLAND SOLAR FARM COMMUNITY FACTSHEET

UPC Renewables Australia is developing the New England Solar Farm, a major grid-connected solar farm within the Uralla Shire.

Proposed site

The New England Solar Farm is proposed on a site located approximately 6km east of the township of Uralla and will cover a development footprint of up to 2,700 hectares across three areas of land currently used for grazing. There is high potential for the continuation of sheep grazing within the development footprint of the New England Solar Farm.

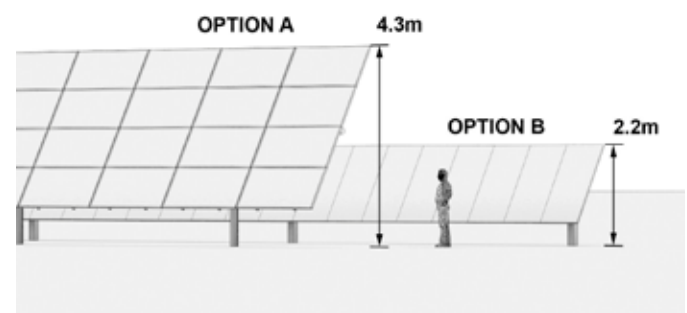
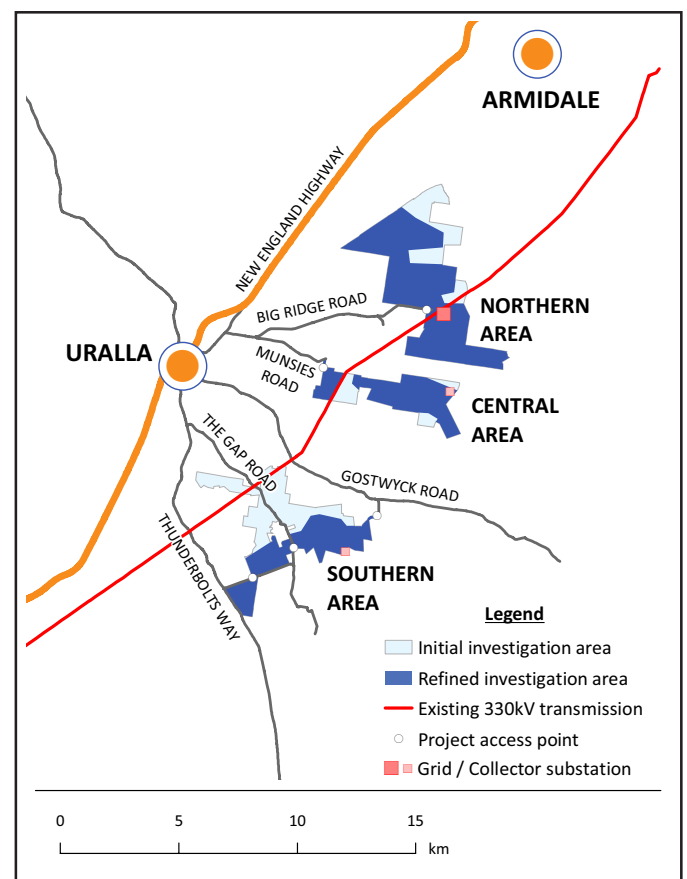
The area under investigation has been refined in response to feedback from the local community and the results of a number of key assessments, including flooding, Aboriginal cultural heritage, historic heritage and biodiversity.

Project overview

The New England Solar Farm will utilise ground-mounted solar photovoltaic (PV) panels similar to those used on rooftops around Australia. Based on preliminary designs, the project will involve:

- three separate solar fields of PV modules, either on a fixed tilt or single axis tracking system, inverters and an underground cable network;
- new overhead transmission lines and a solar farm substation at each of the three solar fields;
- a grid substation to connect the project to TransGrid's electricity transmission network;
- access roads from the local road network and internal access tracks; and
- stock-proof security fencing around each of the solar fields.

UPC is also considering the integration of a battery energy storage system (BESS) as part of the project.



Benefits of the project

The project will provide a number of benefits including:

- community benefit sharing contributions of \$250 per megawatt per year for 25 years;
- direct and indirect business opportunities for the local and regional economy;
- employment opportunities for up to 700 employees during construction and up to 15 ongoing jobs during operations;
- helping meet the NSW and Commonwealth government renewable energy targets;
- annual reductions in greenhouse gas emissions and generation of enough clean renewable electricity to power more than 250,000 NSW homes; and
- increasing energy security by replacing ageing fossil fuel generators when they retire from service.

Assessment process

UPC has prepared a development application and environmental impact statement (EIS) for the project and this has been submitted to the NSW Department of Planning and Environment. The EIS contains a comprehensive assessment of the environmental, social and economic impacts of the New England Solar Farm.

The public can review the EIS from Wednesday the 20th of February at Uralla Shire Council Chambers (32 Salisbury Street, Uralla) or online via the link provided on the project website (refer below).



Smiths Falls Solar Farm, Canada

About UPC Renewables

Originating from the United States, UPC is a leading renewable energy development company that has been operating internationally since the 1990s and in Australia since 2016. To date, UPC has developed more than 3,500 MW of operating wind and solar projects in North America, Europe, Africa and Asia. UPC is focused on supplying renewable energy at the lowest possible price in a socially and environmentally responsible way.

MORE INFORMATION

For more information about the New England Solar Farm please visit:

www.newenglandsolarfarm.com.au

You can also visit our Facebook page to ask a question or make a comment:

 [@newenglandsolarfarm](https://www.facebook.com/newenglandsolarfarm)

Alternatively you can email us as at

info@newenglandsolarfarm.com.au

or contact us via phone on **1300 250 479**.

Local businesses can also use the email address to register their interest in upcoming contracting opportunities.

UPC Renewables believes that the Uralla community should benefit from hosting solar developments.

To help guide its support for this principle, UPC commissioned the not for profit group Community Power Agency to lead the development of the New England Solar Farm Community Benefit Sharing Initiative.

The Community Power Agency gathered ideas and feedback on this plan via one on one meetings, a community workshop and online feedback. A Community Reference Group (CRG) reviewed and considered these ideas to develop a list of recommended projects for the Community Benefit Sharing Initiative to be included as part of the development application for the New England Solar Farm.

Projects would be open to applicants from the Uralla Shire and the Kelly's Plain and Dangarsleigh areas.

As part of its proposal, UPC will support community projects by providing funding of \$250 for every megawatt of power generating capacity installed at the New England Solar Farm, or around \$150,000 and \$200,000 a year over the 25 year working life of the solar farm. The contribution will start at a baseline of \$50,000 during construction and increase as the solar farm is installed and becomes operational.

The CRG recommended that if the solar farm is approved that a Discretionary Trust would be established to oversee the initiative and the long term delivery of the community projects.

The feasibility of each project will be investigated if the application for the New England Solar Farm is approved, with continual oversight from a local community representative group.

Vision

The community adjacent to the solar farm and the broader Uralla Shire community share in the benefits from the New England Solar Farm.

Principles

- Delivers a broad range of benefits to the local community
- Enhances the unique nature of Uralla Shire particularly its history and high levels of community involvement and connection
- Showcases Uralla region as a sustainable energy leader
- Delivers ongoing and lasting financial, social and environmental benefits to the community by:
 - › Supporting community groups and initiatives
 - › Helping to resource education and skill development
 - › Supporting local business and local job creation
 - › Building local sustainability and resilience such as climate change readiness
 - › Seeking to address social equity issues such as youth opportunities and supporting indigenous culture; and
 - › Reducing energy costs for households, community groups and local businesses.

Proposed projects

The Community Reference Group recommended the following types of projects to be explored as part of the Community Benefit Sharing Initiative.



Revolving Loan Program

To fund no-interest loans for energy efficiency and solar fit outs, energy audits and advice.

A revolving fund of between \$750,000 and \$1.5 million would be built up over time to provide no-interest loans to local households, not-for-profit community groups, public buildings and businesses. The loans would be used for energy efficiency retrofitting, solar PV installation, solar hot water & water efficiency improvements. Loan re-payments are returned to the funding pool and new funding is allocated each year until it reaches the desired level. The loans would continue to be offered each year, even after the 25 year life of the solar farm.

The first year of the Revolving Loan Fund could prioritise solar PV for community buildings, in order to have the broadest and most immediate impact. This could include sporting clubs or community buildings like halls or preschools. The fund would also support energy education via energy audits and advice.



Grants Program

Funding for easy to access grants for local projects and activities that promote education, arts, sustainability, active lifestyles and community development. The program would focus on grants for:

- Schools particularly in STEM and creative and active learning.
- Scholarships that support local people undertaking apprenticeships, short-courses, workshops, TAFE diplomas and University degrees.
- General projects such as bush regeneration, sporting equipment for clubs, street tree planting, electric vehicle charging stations and more.



Community Program

The CRG has recommended that a part-time Community Coordinator be employed to administer the Community Benefit Sharing Initiative and coordinate activities for young people and other community members. For example, working with existing local clubs to arrange sporting activities such as tennis coaching or swimming program or support for after school activities.

The Community Coordinator would also publish a monthly community newsletter to showcase community news and events, help publicize funding opportunities and update the community on projects, the solar farm and energy education.

Next Steps

UPC is now considering the CRG's recommendations and will incorporate the outcomes of its work into the planning application for the New England Solar Farm to be submitted in November 2018.

From: New England Solar Farm <info@newenglandsolarfarm.com.au>

Sent: Friday, 12 April 2019 10:50

To: undisclosed-recipients:

Subject: Changes to the New England Solar Farm Proposal

Dear All,

We wanted to inform you that we will be making an important change to our New England Solar Farm proposal.

As a result of our ongoing discussions with our local neighbours, landowners and other stakeholders, we have decided to remove the southern section from our current application to the NSW Government for the New England Solar Farm.

We are confident that the solar farm can still produce enough clean renewable electricity to power around 250,000 homes. Solar PV technology is continuing to improve. The panels that we are likely to use for the project now have a higher watt rating and with greater use of the Northern and Central areas of the development footprint we are still targeting a generating capacity of around 700 MW.

We submitted our Environmental Impact Statement (EIS) and Development Application (DA) for the solar farm development to the NSW Government earlier this year. We are now preparing our response to submissions report, following an exhibition period for public submissions.

We are continuing with our plans to develop the Northern and Central arrays under the current EIS and DA and we hope to begin site works by the end of the year.

We will continue to discuss and refine our plans for the Southern Array with the community and we hope to submit a separate proposal for this section in the future if the issues can be resolved.

The New England Soar Farm will continue to make a major contribution to the local economy, helping to generate up to 700 jobs and inject millions of dollars into the local and regional economy.

It will also help provide a more secure and reliable energy supply for NSW and help our country meet its international climate change obligations.

We look forward to moving forward on the current DA for the Northern and Central arrays.

You can find more information about our [project on our website](#), including a map of the revised area for our proposal.

Click [here](#) to access to our latest project fact sheet.

You can ask a question or stay up to date about our project on our Facebook Page @newenglandsolarfarm or email us info@newenglandsolarfarm.com.au

If you do not wish to receive any further correspondence in relation to the New England Solar Farm, please let me know via return email.

Kind regards,

Tim

New England Solar Farm

Ph: 1300 250 479

www.newenglandsolarfarm.com.au



- Only you can see this (<https://www.powr.io/knowledge-base/139>)
- Edit on Live Site
- Edit in Draft Mode
- View Form Submissions

You added paid features to your Form Builder.

Upgrade your plan to publish Form Builder with paid features.
Remove paid features to publish Form Builder for free.

Contractor Enquiries

New England Solar Farm encourages local contractors and service providers to tender for the supply of goods and services during construction and operation of the solar farm

***Company Name**

***Contact Name**

Email

Phone

Address

Street Address

Address line 2

City

State

Postal / Zip Code

Country

- Country -



Website

*Work type

Other information such as distance to site and experience?

▲ 0 out of 250 characters

How did you hear about the project?

▲ Please fill in required fields.

▲ Braintree doesn't recognize these keys.

▲ You've already submitted a response

▲ Please wait for your uploads to finish.

▲ Payments have not been connected for this form. If you're testing this form, you may need to refresh the page.

▲ Whoa! This form has detected unusual activity, which might be spam. Please contact support (<https://powr-support.zendesk.com/hc/en-us/requests/new>) for help if you continue to see this message.

Received. Thank you!



Contact Us



We're here to answer questions you have.

Email: info@newenglandsolarfarm.com.au
Community Information Line: 1300 250 479
Facebook page: [@newenglandsolarfarm](https://www.facebook.com/newenglandsolarfarm)

Subscribe For Updates



Email Address

[Subscribe Now](#)

What is an EIS?

The project is State Significant Development, and therefore UPC has prepared a Development Application (DA) and Environmental Impact Statement (EIS). The EIS assesses the project's potential impacts on the environment, including consideration of the following key matters:

- biodiversity
- Aboriginal cultural heritage
- historic heritage
- visual
- surrounding land uses
- noise
- transport
- surface water and flooding
- socio-economics
- soil erosion

The EIS was submitted to the NSW Department of Planning and Environment (DPE) in late 2018 and is currently on public exhibition.

Our engagement with the local community and our assessments and analyses have given us valuable insights and helped us produce a detailed and comprehensive EIS.

The project design presented in the EIS includes a number of significant improvements based on the feedback provided to us by the local community at four community briefings and more than forty one-on-one meetings.

Have your say

All members of the community will have the opportunity to provide comments on the EIS and supporting documents until Wednesday the 20th of March (inclusive).

The public can review the EIS at Uralla Shire Council Chambers (32 Salisbury Street, Uralla) or online via the link provided on the project website (www.newenglandsolarfarm.com.au).

Matters raised by the community as part of their submissions on the EIS will be addressed in the Response to Submissions or RTS report that UPC will start to prepare at the conclusion of the public exhibition period.

The RTS will be submitted to DPE in Q2 2019.

Preliminary environmental assessment

- Constraints analysis and site investigations commenced in 2017.
- Preliminary environmental assessment submitted April 2018.

SEARs released

- Issued May 2018.
- Specify matters to be addressed in the EIS.

Prepare DA and EIS

- DA and EIS submitted for adequacy review in November 2018 and finalised in January 2019.
- The EIS contains a comprehensive assessment of the environmental, social and economic impacts of the New England Solar Farm.

Public exhibition of DA and EIS

- Public exhibition commenced on 20 February 2019.
- The EIS will remain on exhibition until 20 March 2019.
- The community can make a submission online.
- UPC will respond to the submissions in the RTS report.

Assessment of DA and EIS

- NSW Government will assess the DA and EIS and determine whether the project should be approved in Q3 2019.

Grid connection with TransGrid

- An application has been submitted to TransGrid to allow the project to connect to the electricity network. An Offer to Connect is expected prior to the start of construction in 2019.

Financial close

- Financial institutions will complete a due diligence process to lend against the project. This is expected to conclude prior to the start of construction in 2019.





NEW ENGLAND SOLAR FARM COMMUNITY INFORMATION

*We invite you to join us at our office in Uralla
to find out more about the
New England Solar Farm (east of Uralla).*

The environmental impact statement (EIS) is currently on public exhibition and contains a comprehensive assessment of the environmental, social and economic impacts of the New England Solar Farm.

This session is an opportunity for you and other members of the community to meet with the project team, find out more about the project and discuss the content of the EIS.

COMMUNITY INFORMATION AND FEEDBACK SESSION

Call in on Thursday 14 March anytime from 3:00 pm – 8:00 pm

Venue: UPC's New Office Space – 96B Bridge Street, Uralla

MORE INFORMATION

More information about the New England Solar Farm is available at:

www.newenglandsolarfarm.com.au

 [@newenglandsolarfarm](https://www.facebook.com/newenglandsolarfarm)

If you can't make it to the session and you'd like to discuss the content of the EIS with a member of the project team:

info@newenglandsolarfarm.com.au

1300 250 479

NEW ENGLAND SOLAR FARM



Join the conversation



@newenglandsolarfarm





The New England Solar Farm will take the power of the sun and turn it into clean renewable electricity for more than 250,000 households throughout NSW.

We've been talking to the Uralla community about this important local project for the past year, answering questions and listening to your ideas and feedback.

We have now created a Facebook page to help keep this conversation going so that we can become a good neighbour and a valued part of the Uralla community for many years to come.



Ask a question,
make a comment
or find out more information:

 **@newenglandsolarfarm**

You can also reach us at
info@newenglandsolarfarm.com.au
or **1300 250 479**

February 21 2019 - 2:00PM

New England Solar Farm's environmental impact statement goes public



[Nicholas Fuller](#)



LOOKING AHEAD: UPC Renewables' solar development head Killian Wentrup and landowner Richard Munsie. Photo: Nicholas Fuller

The public has a month to read and make submissions on the proposed New England Solar Farm, near Uralla.

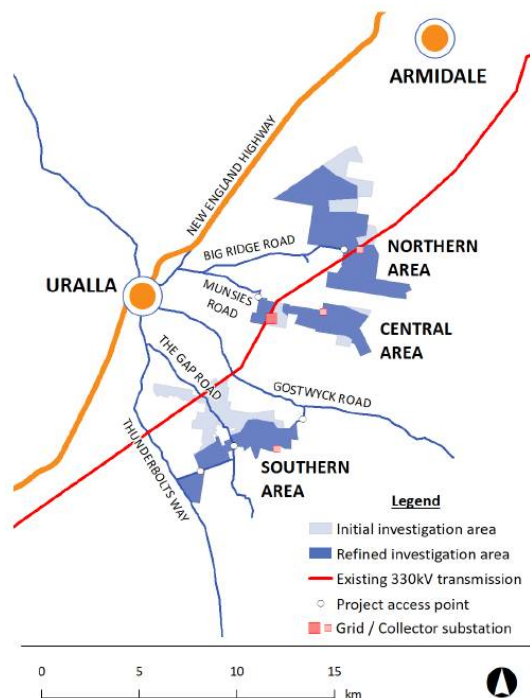
The NSW Department of Planning and Environment this week approved public exhibition of UPC Renewables Australia's development application and environmental impact statement (EIS), prepared by planning and environmental consultants EMM.

The solar farm is expected to help state and federal governments meet renewable energy and greenhouse gas emission reduction targets, and increase energy security.

The state Minister for Planning, Anthony Roberts, must approve the project for it to go ahead.

READ MORE: [New England Solar Farm: benefit to the region, or hidden costs?](#)

The 2700 hectare installation, spread across three arrays, would power 250,000 homes across NSW; create more than 500 jobs locally; and bring up to \$200,000 into the community each year over its 25 to 30-year lifecycle.



UPC also plan to build one of the world's biggest battery energy storage systems on the arrays. It could provide up to 200 megawatts of capacity for two hours of stored renewable energy during peak demand times.

The EIS is on exhibition at DPE and the Solar Farm's websites until Wednesday, March 20, while the government seeks submissions from council, agencies, and the community.

UPC will hold a public meeting halfway through this period.

After March 20, UPC will consider and respond to submissions, before the Department of Planning and Environment makes its assessment report.

A planning hearing panel will consider this report before making a final determination.

UPC has operated in North America, Europe, Asia, and Africa since the 1990s. It is also developing the Robbins Island Wind Farm and Jim's Plain Wind Farm in Tasmania.

Community feedback

UPC's solar development head Killian Wentrup said the Uralla regional community had helped to improve the proposal.

"We've met with local residents, land owners, neighbours, and business and community leaders for the past nine months to hear their views on the solar farm.

"The feedback from the local community has helped us refine our plans, and make the solar farm the best it can be."

Richard Munsie is a keen supporter of the solar farm. He is one of fourteen landholders who would have solar panels on his land for a fee.

"Instead of farming sheep and cattle, we've given up a third of our property to farm the sun," he said.

The guaranteed income from UPC, Mr Munsie believes, would help drought-proof landowners, taking much stress and worry out of modern day farming.

"We're benefiting, but our benefit will also be the town's," Mr Munsie said. He expected the project to have an enormous flow-back into Uralla, as money would go directly back into the community. "We can plan ahead; we know we'll have money coming in."

Some locals, like the Uralla/Walcha Community Responsible Solar/Wind Action Group, worry it could have hidden costs, however.

Economic benefits

The solar farm project is expected to create 500 jobs during peak construction; 200 more if a battery energy storage system is installed; and 15 full-time ongoing jobs, including maintaining fencing, drains, and channels for managing weeds and pests.

"Economic modelling conducted as part of the EIS suggests the flow-on effects could be substantial," Mr Wentrup said.

Gillespie Economics estimate the solar farm will contribute \$408 million in output; \$159 million in value added; \$88 million in household income; and 1071 jobs to the region's economy in the peak construction year (Year 2).

Proportionally less impact would be felt in the first and third years of the construction phase, according to the report.

"The money spent by workers during construction will boost household incomes in the region," Mr Wentrup said, "and this will continue over the life of the solar farm as a result of activities related to operations and maintenance."

The operations phase, Gillespie Economics estimated, would contribute \$86 million in regional output or business turnover; \$26 million in regional value added; \$3 million in household income; and 39 direct or indirect jobs each year for 30 years.

Refinements to project

UPC Renewables, Mr Wentrup said, had refined their original design to reduce noise and visibility of the solar farm, and avoid or mitigate environmental damage, based on independent studies and consultation with local residents.

They reduced the intended size of the solar farm by more than 35 per cent, from 4200 to 2700 hectares.



+5

Views of the northern array from Richard Munsie's farm

Photos: Nicholas Fuller

The southern array had been halved, based on feedback from residents in Gap Road and Gostwyck Road. This includes the north side of Salisbury Waters.

The central and northern arrays also shrank by 20 to 30 per cent, to avoid inconveniencing Kelly Plains residents.

Most of the solar farm will be based in cleared areas, with limited visibility from residences.

It would avoid important native vegetation like Blakely's Red Gum and Yellow Box grassy woodland.

The landscape, Mr Wentrup said, was heavily modified; most of the trees were planted European poplars used as windrows, while native gum trees had died off.

The project boundaries had also been revised to avoid streams and wetlands.

Four Aboriginal grinding grooves sites were found in the project areas.

UPC would work with local Aboriginal groups, the Department of Planning and Environment, and the NSW Office of Environment and Heritage to develop an Aboriginal heritage management plan.

UPC did not expect the project to affect rural heritage buildings like Gostwyck Memorial Chapel, Deeargee Woodshed, or Salisbury Court.

Construction

If UPC gets development consent, it will need a connection agreement (an offer to connect to the grid from TransGrid and the Australian Energy Market Operator); final contracts for construction; and final financing agreements with shareholders and lenders.

Mr Wentrup hopes to start construction by the fourth quarter of this year, and to finish within three years.

Work would start on the northern area first (Stage One), then on the central and southern array (Stage Two).

To avoid disrupting the community, UPC would start Stage Two before Stage Two was finished, and rollover workers.

Mr Wentrup expected employees and supplies to come from Armidale, Uralla, and towns as far south as Tamworth.

UPC are not proposing a mining-style development (flying in workers), but will seek approval for a temporary workers' village if necessary.

April 12 2019 - 2:20PM

Plans for New England Solar Farm revised as discussions continue

• Steve Green



DISCUSSIONS: Landowner Peter Munsie with UPC Renewables head of solar development Killian Wentrup and Jarrah Hicks from the Community Power Agency.

Any opponents of the New England Solar Farm being constructed about six kilometres east of Uralla had a slight win this week when UPC Renewables announced the southern section of the development was deferred from the current development application.

UPC submitted its Environmental Impact Statement (EIS) and Development Application (DA) for its 720 megawatt (MW) solar farm to the NSW Government earlier this year, proposing a project across three solar fields.

We think it is the right thing to do by the community ...

Killian Wentrup

Head of solar development Killian Wentrup said the change would allow the rest of the project to progress, while further discussions with neighbouring land owners took place.

"We've been talking with the community for over a year now, and we've also recently had the public exhibition period for the EIS," he said.

"The feedback we've received has indicated that while the community, I would say, is broadly supportive of the project, the majority of the concerns that have been raised are in relation to the southern array.

ALSO READ:

- [Walcha/Uralla community groups worried about solar farms](#)
- [New England Solar Farm EIS submitted goes public](#)

"We think it is the right thing to do by the community to move forward with the northern and central array, and effectively take the southern array and put it on a different track."

Mr Wentrup said the company would continue to work with the community to try to allay its concerns, and if that was successful it would submit a new DA for a solar proposal in the southern area at a later time.

However, while it was talking to the community, UPC had a slight win too. Improvements during the last year saw solar panel output rise from 340 to 390 watts. So, even without the 400 hectare southern array, the farm will still target a generating capacity of about 700 MW which was very close to the original target.

Mr Wentrup said there had been a range of concerns raised.

"The most common concerns tend to be around proximity to nearby residences, potential impacts on property values and there have been concerns raised about visual impacts, along Thunderbolt's Way, for example," he said.

"In my experience with solar farms, the sorts of issues that we've just mentioned that have been raised tend to be limited to a small number of nearby residences.

"If you can work through those issue and find solutions such as set-backs and visual screening and so on, usually you can mitigate those issues."

Expressions of Interest

It's expected that up to 700 jobs will be generated from the New England Solar Farm during the three year construction period, and an additional 15 ongoing jobs during its 25 to 30 year life. There will also be a number of contracting opportunities for local businesses to help us prepare the site, install electrical and supporting equipment and deliver the important infrastructure to support the solar farm. Solar farms are generally low impact developments, however this is a large project that will require a sizeable workforce and support from sub-contractors.

It is our hope that many of these jobs can come from Uralla and the New England region. The income earned by workers and the money spent by local landholders who are directly involved in the project will boost the local economy and improve its resilience to drought and other climatic changes. The types of activities that will require local and regional workers, tradespeople and suppliers include fencing and civil contractors, solar PV panel installers, providers of vegetation management and pest control services, as well as catering and accommodation to service the broader workforce. The NSW Department of Planning and Environment is the process of assessing our application for the New England Solar Farm. However, local people and businesses can now let us know about their interest to participate in the project. This can be done by completing the form on the Contact Us page on our website www.newenglandsolarfarm.com.au/contact. Or you can find the form via our Facebook page @newenglandsolarfarm. We hope to begin work on the 700 megawatt solar farm towards the end of the year.

Killian Wentrup, Head of Solar Development
UPC Renewables Australia

2019 Candidates for the Federal Election in Ballot Paper Order

Natasha Ledger, Independent
Julie Collins, Christian Democratic Party (Fred Nile Group)
Yvonne Langenberg, Australian Labour Party
Barnaby Joyce, The Nationals
Tony Loneragan, Greens
Adam Blakester, Independent
Rob Taber, Independent
Cindy Anne Duncan, United Australia Party

Source- ABC Website :

<https://www.abc.net.au/news/elections/federal/2019/guide/neng/>

Federal Election is on Saturday 18th May
Early voting for the federal election is available at 122 Faulkner St, Armidale, check the AEC website below for opening times.

Source - AEC Website :

<https://www.aec.gov.au/election/voting.htm#voting>

NOTICE TO MEMBERS OF THE URALLA CLUB



The Uralla Club will be meeting in the usual place at the usual time



Express your interest for work

Our solar farm project is expected to generate up to 700 jobs and work for contractors and suppliers.

NEW ENGLAND SOLAR FARM

Register your interest for work on our website or go to our Facebook Page

www.newenglandsolarfarm.com.au/contact

[@newenglandsolarfarm](https://www.facebook.com/newenglandsolarfarm)

Uralla Wordsworth Monday 6th May 2019 P6

Changes to New England Solar Farm

The southern section of the proposed New England Solar Farm has now been deferred from the current development application to allow the rest of the project to progress while further discussions with neighbouring land owners take place. UPC Renewables Australia submitted its Environmental Impact Statement (EIS) and Development Application (DA) for the solar farm development to the NSW Government earlier this year, proposing a 720 megawatt (MW) solar farm across three solar fields about six kilometres east of Uralla. It is currently in the process of preparing its response to submissions report, following an exhibition period for public submissions, which ended last month. UPC Renewables Australia Head of Solar Development Killian Wentrup said the NSW Department of Planning and Environment had been informed that the southern array – the smallest of the three sections - would be removed from the current development application. "UPC intends on being a long term investor and a good neighbour and we recognise that there are still some concerns from a small number of neighbouring land owners near the Southern Array," he said. "We will take the time to discuss the concerns relating to the Southern Array with the community and try to resolve the key issues."

"A separate application for a solar development involving the Southern Array area may be lodged at a future point in time once this has taken place." "We are continuing with our plans to develop the Northern and Central arrays under the current EIS and DA and we hope to begin site works by the end of the year. "Solar PV technology is continuing to improve. The panels that we are likely to use for the project now have a higher watt rating and with greater use of the remaining areas within the project's development footprint we are still targeting a generating capacity of around 700 MW in the Northern and Central arrays."

Killian Wentrup, Head of Solar Development, UPC

Update from Z-NET Uralla on New England Solar Farm Proposal

Z-NET Uralla is a community group with the mission of assisting the people of the Uralla Shire transition to 100% renewable energy and to allow our community to confidently participate in the unfolding revolution in energy technologies. The solar farm east of Uralla, proposed by UPC Renewables (UPC), is a State Significant Development under review by the State Planning and Heritage Department. Recently our community had the opportunity to give feedback on the project through public submissions that closed on 20 March 2019. There were over 100 submissions, principally from locals, however some from as far afield as Denver and Los Angeles. And there were 15 submissions from a diverse group of organisations, including Uralla Shire Council, Trans Grid and Uralla Business Chamber. All are publically available on the NSW Planning website (http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=9255)

The next step is for UPC to prepare a Response to the Submissions, where feedback will be grouped into common themes and UPC must outline how they propose to address the issues. As a result of this feedback, UPC has already made the decision to withdraw development in the Southern Array (the section accessed from Gostwyck Road and Thunderbolts Way). The Department's assessment (covering the Northern and Central Arrays) will be referred to the Independent Planning Commission (IPC, <https://www.ipcn.nsw.gov.au/our-processes>) for a final decision, and this may involve public meetings. Z-NET Uralla will keep you posted over the next 4-5 months on the progress and if public meetings will be held.

Sandra Eady, President, ZNET Uralla

Please send any editorial, public notices, letters to the editor, community calendar entries or advertising to urallawordsworth@gmail.com by 5pm on the Thursday before the publication date of the next edition.

The next edition will be published on Tuesday 6th May, the deadline for contributions is

5pm on Thursday 2nd May

Past editions and advertising guidelines, including costs, is available at www.urallawordsworth.com.au



NEW ENGLAND SOLAR FARM

UPC
Renewables™

 Liked ▾

 Following ▾

 Share

...



 Send Message



New England Solar Farm

May 22 at 8:52 AM · 🌐

A big thank you during National Volunteer Week to the hundreds of volunteers who help around Uralla's sporting fields, community centres, schools, events, at McCrossin's Mill Museum, in service organisations, aged and health care facilities and more. We're glad to provide our support ZNet Uralla, Can Assist Uralla, Uralla Tennis Club, Uralla Tigers Senior League 2019 #NVW2019



👍 You and 10 others



New England Solar Farm shared a post.



May 8 at 1:35 PM · 🌐

We're very happy to support local students develop an interest in STEM and renewable energy. Thank you ZNet Uralla for helping to make it happen.



ZNet Uralla

May 8 at 1:09 PM · 🌐

Recently UPC Renewables heard of the work Z-NET Uralla is doing with local schools in energy education. They then generously donated some money for energy meter...
[See More](#)



You, Anthony O'Brien and 5 others



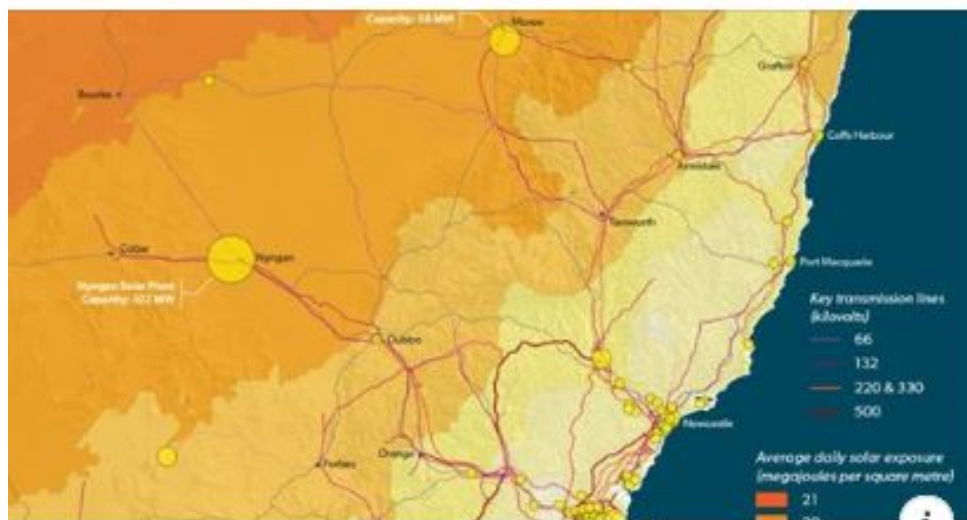
New England Solar Farm

March 12 · 🌐

What makes Uralla a great site for a solar farm?

1. High solar irradiance (1,830 kWh/m²)
2. 1000m above sea level which reduces heat losses and improves energy yield
3. Close to electricity transmission network and load centres of New England and Mid North Coast
4. Close to labour markets and contractors around Uralla, Armidale and Tamworth
5. Can co-exist with agricultural activity on already cleared land

Read more in the Environmental Impact Statement (EIS)



NEWENGLANDSOLARFARM.COM.AU

New England Solar Farm EIS released for public exhibition |
newenglandsolarfarm

👍❤️ 8

3 Shares



New England Solar Farm

30 May at 15:20 · 🌐

Extensive research and assessment of the solar farm site turned up a number of findings related to past land use by squatters and farmers dating back to the mid-1880s. These include remnants of huts, stockyards and lengths of basalt wall. We'll be developing management plans that detail how we should avoid or protect heritage items such as these.



👍 6



New England Solar Farm

...

March 11 · 🌐

This short TED-Ed video from solar energy researcher Richard Komp provides a good overview of how solar panels convert the energy of the sun into clean, renewable electricity.



YOUTUBE.COM

How do solar panels work? - Richard Komp

View full lesson: <https://ed.ted.com/lessons/how-do-solar-panels-work-richard-komp> The Earth intercepts a lot of solar power: 173,000 terawatts. That's 10,00...



8



New England Solar Farm added an event.

...

March 7 · 🌐



NEW ENGLAND SOLAR FARM COMMUNITY INFORMATION SESSION



THU, MAR 14

Community Information Session - New England Solar Farm

✓ Interested ▼



You like New England Solar Farm



You and 10 others



New England Solar Farm

May 17 at 6:00 AM · 🌐

...

Native flowers are being encouraged to grow under solar farms in Minnesota. These flowers, along with the use of beehives, enable honey production while supporting bee and butterfly populations. Sweet!



ENSIA.COM

How land under solar panels can contribute to food security

In place of conventional turf grass or gravel, some solar farms are growing...

👍 6

1 Share



New England Solar Farm

...

April 15 · 🌐

Jobs Alert: Our solar farm will generate up to 700 jobs and work for contractors and suppliers. We would be looking for help in the following areas:

- civil works
- fencing installation
- internal access road construction
- site preparation... [See More](#)



NEWENGLANDSOLARFARM.COM.AU

Enquiry Form | newenglandsolarfarm



4

2 Comments



Appendix D

Addendum to the biodiversity development assessment report

Memorandum



Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500

E info@emmconsulting.com.au

www.emmconsulting.com.au

4 June 2019

Subject: J17300 – New England Solar Farm – Addendum to the Biodiversity Development Assessment Report

1 Introduction

1.1 Project overview

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (the project).

The project is classed as State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). A development application (DA) and environmental impact statement (EIS) was submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The DA and EIS for the project were publicly exhibited from 20 February to 20 March 2019.

As a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has performed a number of further amendments to the development site that was the subject of the DA and EIS, including the removal of the southern array area.

An amendment report (AR) has been prepared by EMM Consulting Pty Ltd (EMM) to outline the changes to the project that have been made since the public exhibition of the EIS and provide a summary of the impacts associated with the amended project. This report will be submitted to DPE in conjunction with the response to submissions (RTS) report.

The project was originally assessed under the *Biodiversity Assessment Method* (BAM) (OEH 2017). A biodiversity development assessment report (BDAR) was prepared as part of the EIS (Appendix C of the EIS) and a summary of the project's potential impacts on biodiversity was included in Section 5.2 of the EIS. This memorandum details the updates to the BDAR that were required as a result of the amendments to the project and has been prepared as an addendum to the BDAR. This memorandum will be appended to the AR.

In addition, the NSW Office of Environment and Heritage (OEH) provided a submission relating to the BDAR (Reference: DOC19/132679-23) as part of their review of the EIS during the public exhibition period. A number of the matters raised in this submission have been incorporated into this memorandum to avoid unnecessary duplication (eg where a change to the offset calculations was required). Responses to matters raised by OEH that did not affect the credit calculations, along with response to community submissions on biodiversity-related issues have been addressed in the RTS report.

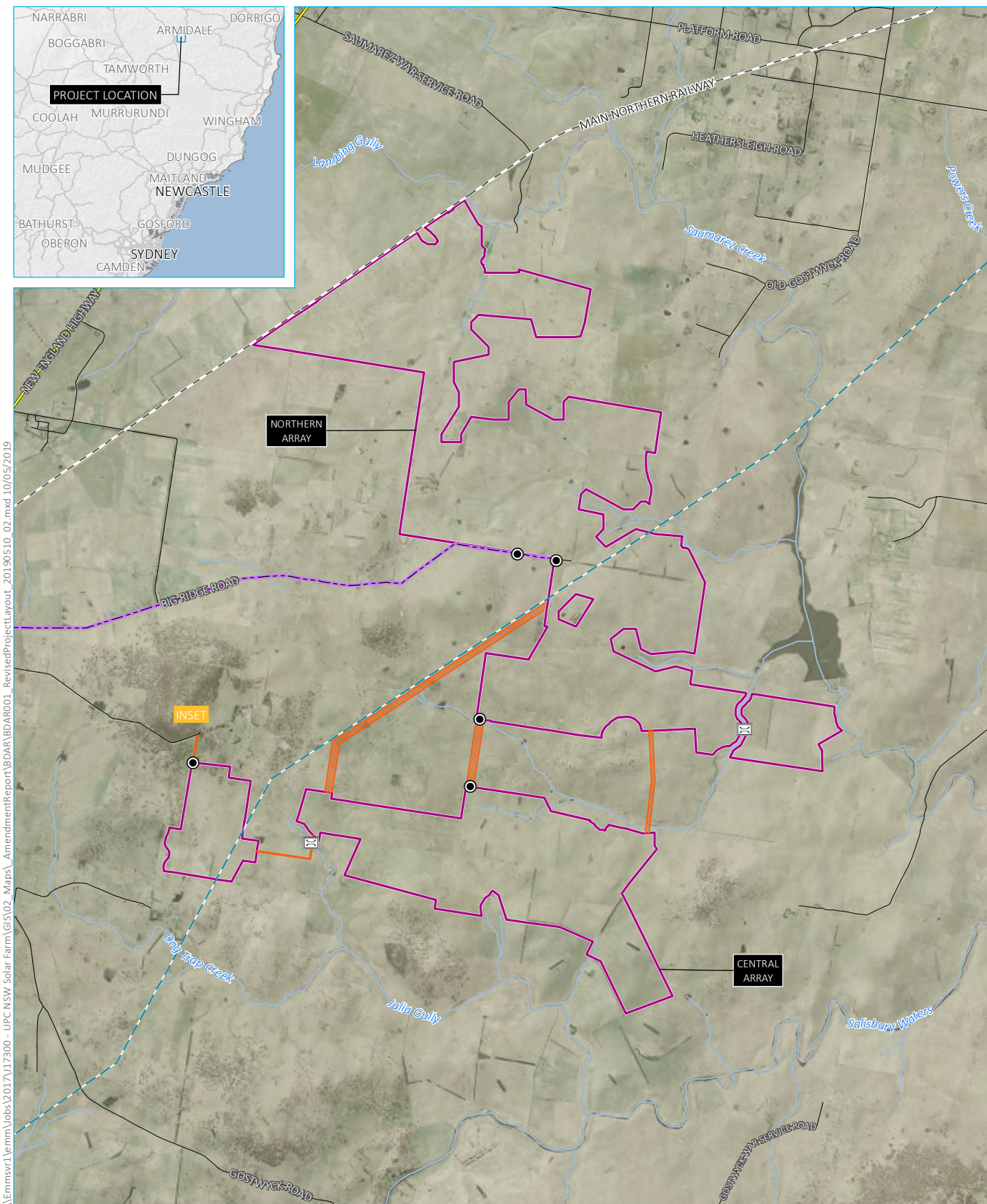
1.2 Project refinement

Since the public exhibition of the EIS, amendments to the project have included:

- removal of the southern array area;
- revisions to the extent of the northern array area;
- revisions to connection infrastructure between the northern and central array areas and substation configuration; and
- consideration of the potential use of the Main Northern Railway line for delivery of construction materials and project infrastructure.

The amended development site referred to in this report is shown on Figure 1.1 and represents the potential disturbance footprint of the two solar array areas and associated infrastructure. A detailed description of the amendments to the project is provided in Section 1.2 and Chapter 2 of the AR.

The amendments will lead to reduced biodiversity impacts from those documented in the BDAR (Appendix C of the EIS) as described in Sections 5 and 6.



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Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Primary vehicle access route

- Development site
- Solar array
- Potential site access/electrical cabling
- Potential creek crossing
- Proposed primary site access point

Project locality

New England Solar Farm
Biodiversity development assessment
Addendum
Figure 1.1

2 Landscape assessment

This section of the memorandum provides an update on the description of landscape features provided in Chapter 3 of the BDAR (Appendix C of the EIS).

2.1 Landscape features

2.1.1 Bioregions and landscapes

The bioregion and subregion remain unchanged for the amended development site. A total of three Mitchell landscapes intersect with the development site, including:

- Moonbi - Walcha Granites (45%);
- Niangala Plateau and Slopes (42%); and
- Uralla Basalts and Sands (13%).

For the purposes of the BAM assessment, the Moonbi - Walcha Granites Mitchell landscape was selected, given it occupies the largest area of the development site (refer Figure 2.1).

2.1.2 Waterways and wetlands

As a result of the amendments to the project, the development site is no longer within close proximity of Salisbury Waters or Cook Station Creek (sixth and fifth order streams, respectively). At its closest point, the central array is approximately 1 km from Salisbury Waters and approximately 5 km from Cook Station Creek.

The removal of the southern array has also increased the distance between Dangars Lagoon and the development site. At its closest point, Dangars Lagoon is approximately 5.6 km from the central array area.

2.1.3 Connectivity

The removal of the southern array area and other project amendments does not alter connectivity significantly. The southern array was already situated on predominately cleared land and did not provide any landscape connectivity.

2.2 Native vegetation extent

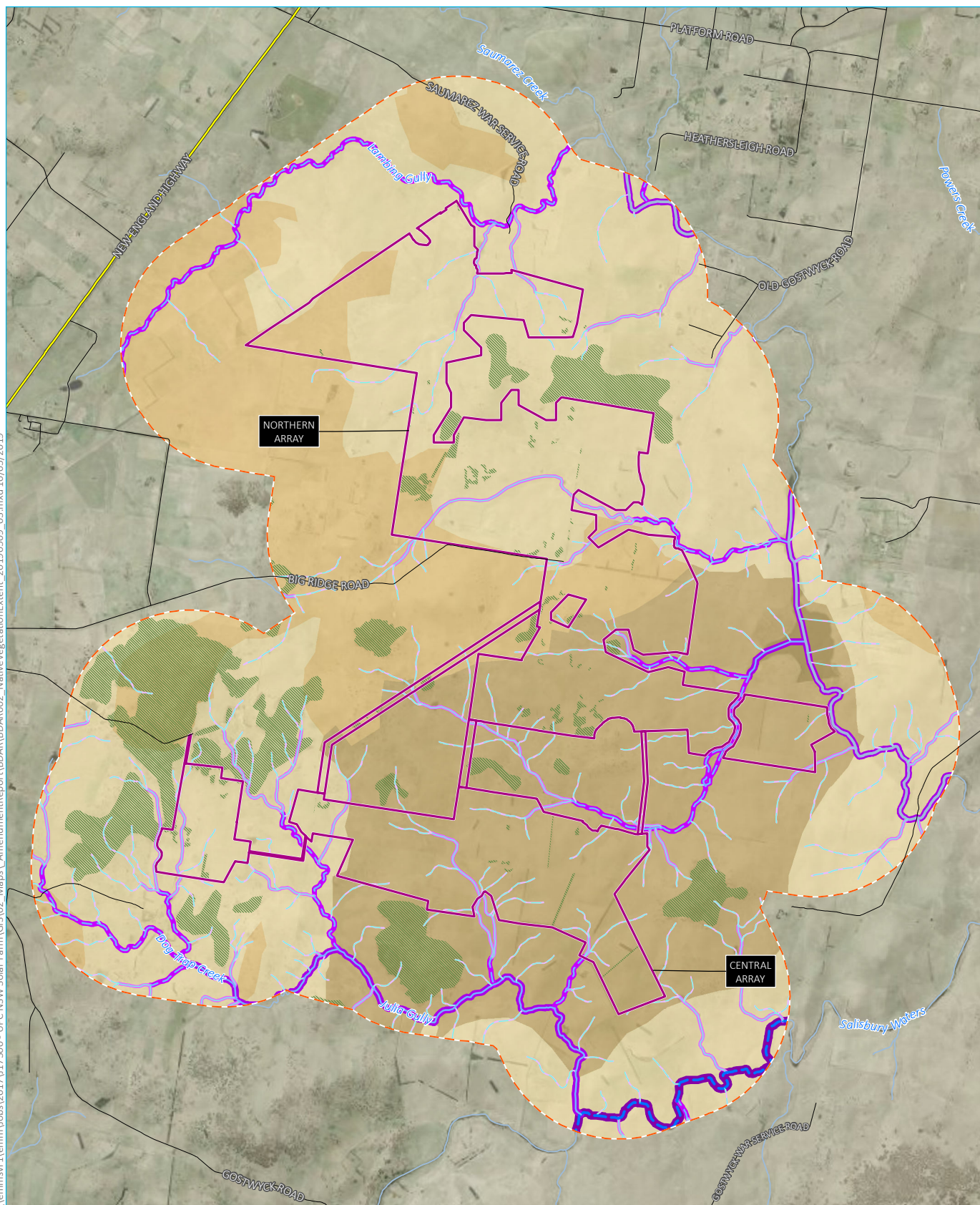
Mapping of native vegetation within a 1,500 metre (m) buffer of the development site was undertaken using Northern River Catchment Management Authority Native Vegetation Mapping (VIS map 524 – Ecological Australia 2005).

Regional mapping of plant community types (PCTs) within the 1,500 m buffer includes:

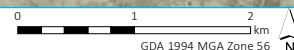
- Broad-leaved Stringybark;
- Yellow Box-Blakely's Red Gum; and
- Yellow Box-Broad-leaved Stringybark.

The native vegetation extent within the amended development site is 52.34 hectares (ha). When combined with the 1,500 m buffer, the native vegetation extent is 772.09 ha (refer to Figure 2.1). Given that the combined area of the amended development site and 1,500 m buffer is 11,092.91 ha, the percentage native vegetation cover is approximately 7%.

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Source: EMM (2019); DFSI (2017); UPC (2019)



KEY

Development site	Riparian buffer	Strahler stream order	Main road
1500 m buffer	10 m	1st order	Local road
Native vegetation	20 m	2nd order	Watercourse/drainage line
Mitchell landscape	30 m	3rd order	
Moonbi - Walcha Granites	40 m	4th order	
Niangala Plateau and Slopes	50 m	5th order	
Uralla Basalts and Sands		6th order	

Native vegetation extent

New England Solar Farm
Biodiversity development assessment
Addendum
Figure 2.1

3 Native vegetation

This section of the memorandum provides an update on the description of native vegetation provided in Chapter 4 of the BDAR (Appendix C of the EIS).

3.1 Plant community types

As part of OEH's submission on the BDAR and EIS, it was noted that clearing of planted vegetation does not require impact assessment or offsetting, other than consideration of biodiversity impacts specified in Clause 6.1 of the NSW Biodiversity Conservation Regulation 2017, providing that the vegetation was not established with assistance of public funds or forestry purposes. Vegetation that meets this description is classed as Category 1 exempt land, which allows for vegetation clearing to occur without approval. Consequently, planted vegetation within the development site has been split into two zones:

- Category 1 planted vegetation, which is exempt from assessment; and
- PCT 510 planted, those areas where public funding assistance occurred.

The extent of the relevant zones in the amended development site are summarised in Table 3.1 and identified on Figure 3.1.

Table 3.1 also details how many and which plots are included within the BAM offset calculations. The removal of the southern array has led to five plots (Plots 1, 2, 10, 23 and 24) being geographically separated from the amended development site. These plots have subsequently been removed from the BAM analysis and are not listed in Table 3.1 or shown on Figure 3.1; however, they are included within Figure 4.1 of the BDAR (EMM 2018).

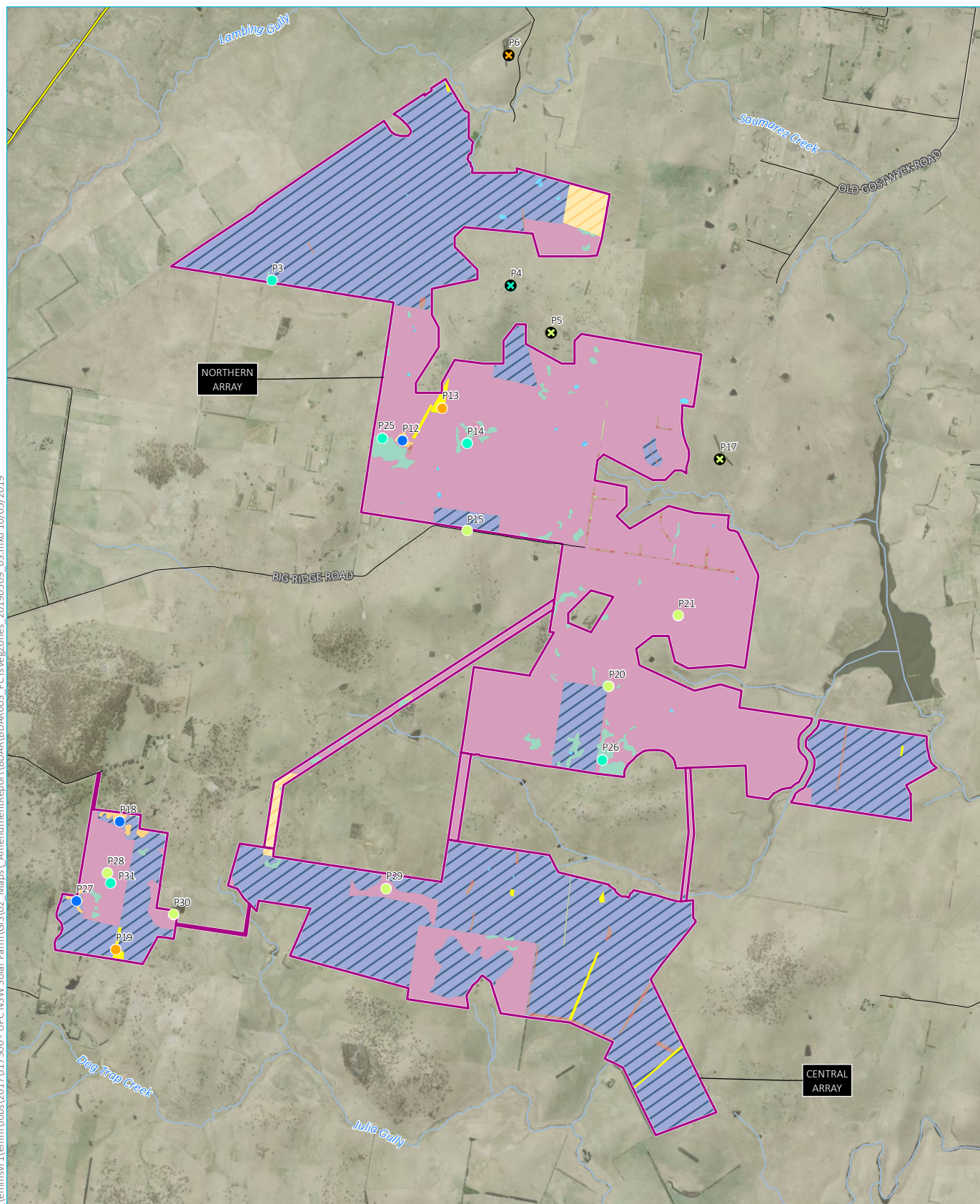
Despite the removal of these plots there is still a sufficient number to satisfy the requirements of the BAM. This is a result of additional plots undertaken for the original BDAR than what was required, along with a reduction in the number of plots required for the smaller area of potential impact associated with the amended project. The removal of some plots has resulted in minor changes to the vegetation integrity scores presented in Table 4.2 of the BDAR. The updated values are presented in Table 3.1. Areas of each zone have also been recalculated based on the amendments to the development site.

Table 3.1 **Vegetation zones mapped within the amended development site**

Vegetation zone	Plant community type (PCT)	Condition	Area (ha)	Number of plots used for the BAM calculator	Vegetation integrity score
1	510 - <i>Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion</i>	woodland	36	Five plots (3, 14, 25, 26 and 31).	11.0
2	510 - <i>Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion</i>	pasture	985.1	Seven plots/transects within the development site (15, 17, 20, 21, 28, 29 and 30).	13.6
3	510 - <i>Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion</i>	planted	1.6	Three plots/transects within the development site (6, 13 and 19).	43.9
4	1174 - <i>Silvertop Stringybark open forest of the New England Tableland Bioregion</i>	woodland	5.7	Three plots (12, 18 and 27)	29.1
N/A	Category 1 planted vegetation	N/A	9.0	N/A	N/A
N/A	Exotic - cropped	N/A	22.2	N/A	N/A
N/A	Exotic - trees	N/A	13.8	N/A	N/A
N/A	Exotic – grassland	N/A	985.0	N/A	N/A

*Areas of land use which are not assigned to PCTs do not require inputting to the BAM calculator and therefore do not require plots, a condition description or generate a vegetation integrity score.

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Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

- Development site
- Main road
- Local road
- Watercourse/drainage line

Plant community type and vegetation zone

- Category 1 - planted vegetation
- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam

Plots included

- PCT 510 woodland
- PCT 510 planted
- PCT 510 pasture
- PCT 1174 woodland

Plots not included

- ✕ PCT 510 woodland
- ✕ PCT 510 planted
- ✕ PCT 510 pasture

Plant community types and vegetation zone mapping within the development site, including plot locations

New England Solar Farm
Biodiversity development assessment
Addendum
Figure 3.1

3.2 Paddock trees

As part of the BDAR, a total of 93 paddock trees were assessed (refer Section 4.3.7 of the BDAR). The amendments to the project removed 21 paddock trees from the development site. Subsequently, a total of 72 paddock trees have been considered as part of the revised paddock tree assessment, comprising 12 different species.

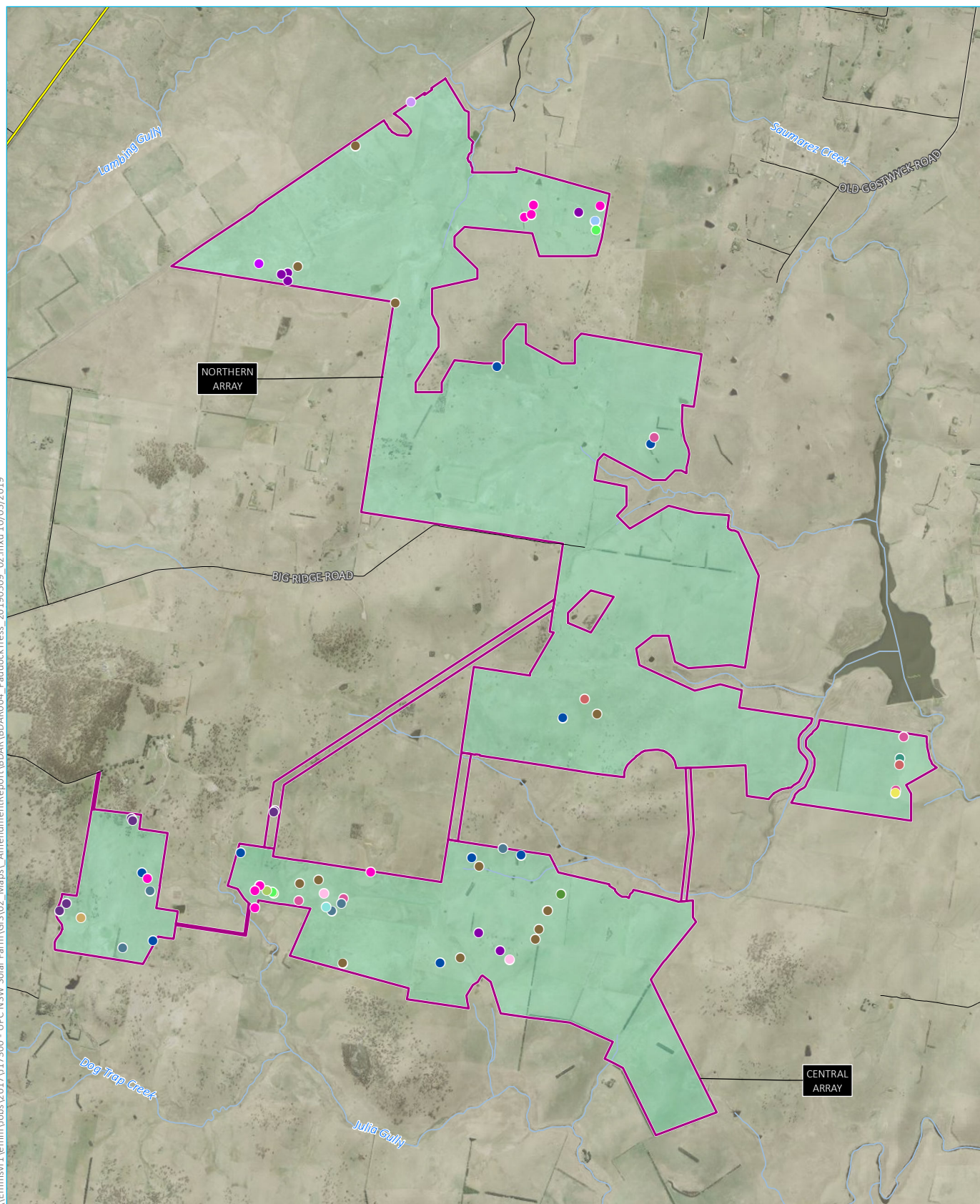
The majority (65) of the paddock trees were assigned to PCT 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion, with 7 trees assigned to PCT 1174 Silvertop Stringybark open forest of the New England Tableland Bioregion. The large tree benchmark for both PCTs is 50 centimetres (cm) diameter at breast height (DBH).

A summary of the paddock trees categorised according to the BAM (OEH 2017) is provided in Table 3.2, with the full results provided in Appendix A of this memorandum and displayed on Figure 3.2.

Table 3.2 Paddock trees assigned in accordance with Appendix 1 of the BAM

Category	Non-hollow bearing	Hollow bearing trees	Total
PCT 510			
1 (0-<20cm DBH)	0	0	0
2 (20- <50 cm DBH)	16	0	16
3 (> 50 cm DBH)	45	4	49
PCT 1174			
1 (0-<20cm DBH)	1	0	1
2 (20- <50 cm DBH)	0	0	0
3 (>50 cm DBH)	6	0	6
Total	68	4	72

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Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

- Development site
- Main road
- Local road
- Watercourse/drainage line

Species (category)

- *Angophora floribunda* (2)
- *Angophora floribunda* (3)
- *Banksia integrifolia subsp. monicola* (3)
- *Eucalyptus blakelyi* (2)
- *Eucalyptus blakelyi* (3)
- *Eucalyptus bridgesiana* (3)
- *Eucalyptus conica* (2)
- *Eucalyptus conica* (3)
- *Eucalyptus dalrympleana subsp. heptantha* (3)

- *Eucalyptus dives* (2)
- *Eucalyptus dives* (3)
- *Eucalyptus laevopinea* (1)
- *Eucalyptus laevopinea* (3)
- *Eucalyptus melliodora* (2)
- *Eucalyptus melliodora* (3)
- *Eucalyptus nova-anglica* (3)
- *Eucalyptus pauciflora* (2)
- *Eucalyptus pauciflora* (3)
- *Eucalyptus stellulata* (2)

Paddock trees within the development site

New England Solar Farm
Biodiversity development assessment
Addendum
Figure 3.2

4 Threatened species

This section of the memorandum provides an update on the description of threatened species habitat and targeted survey effort provided in Chapter 5 of the BDAR (Appendix C of the EIS).

4.1 Fauna habitat assessment

The fauna habitat assessment presented in Section 5.1 of the BDAR is still applicable to the amended development site. The development site is primarily used for sheep and cattle grazing. Native vegetation is highly modified by both historical and ongoing management practices. Where woodland occurs, it is either limited to planted native wind breaks or patchy remnant woodland with an entirely absent midstorey and disturbed groundcover. Assessment of fauna and flora habitat concluded that the development site is only likely to support species that are able to persist in highly modified agricultural landscapes.

The most prominent change to the fauna habitat assessment is a reduction in the number of potential watercourse crossing points (listed in Section 5.1 of the BDAR). Watercourse crossings at the following locations are no longer required as a result of the amendments to the project:

- Cook Station Creek (fifth order stream), which is adjacent to two land parcels that formed part of the southern array area;
- two unnamed third order streams that are tributaries to Salisbury Waters and intersected the proposed site access corridor and electricity transmission line (ETL) easement for the southern array area within proximity of the Hillview Road site access location; and
- Salisbury Waters (sixth order stream), which was proposed to be crossed as part of a potential ETL alignment between the central and southern array areas.

Watercourses described within the original BDAR, which may require crossings include:

- an unnamed third order stream adjacent to two land parcels that form part of the northern array area; and
- an unnamed third order stream that is a tributary to Julia Gully and intersects the proposed site access corridor and ETL easement between two land parcels that form part of the central array area.

As noted within the BDAR, any crossings proposed as part of the amended project should comply with the *Policy and Guidelines for Fish Friendly Waterway Crossing* (DPI undated).

4.1.1 Targeted survey methods and results

Species credit species have been considered and assessed in Section 5.3 of the BDAR, with five candidate species considered:

- Bluegrass (*Dicanthium setosum*);
- Northern Blue Box (*Eucalyptus magnificata*);
- Narrow-leaved Black Peppermint (*Eucalyptus nicholii*);
- Hawkweed (*Picris euae*); and
- Koala (*Phascolarctos cinereus*)

As noted in Section 5.3.4 of the BDAR, no threatened species were recorded within the development site opportunistically or during targeted surveys.

The survey effort and approach for the majority of the species credit species remains appropriate, given that the amended development site is simply a reduction in the size of the original development site. The only target species which received additional survey effort as a result of the amendments is the Koala. Anecdotal records of Koala were raised as part of stakeholder engagement with neighbouring landholders who own properties west of the central array. The additional surveys were completed to address concerns from these landholders over potential impacts to local Koala populations as a result of the project's construction.

i Targeted Koala survey methods and results

Targeted surveys for Koala (*Phascolarctos cinereus*) (Spot Assessment Technique (SAT)) as part of the preparation of the BDAR (refer Figure 5.2 of Appendix C of the EIS) were originally focused on the southern array area where the habitat and connectivity were considered most optimal across the development site. The removal of the southern array area as part of the amendments to the project led to a lack of SATs in the amended development site.

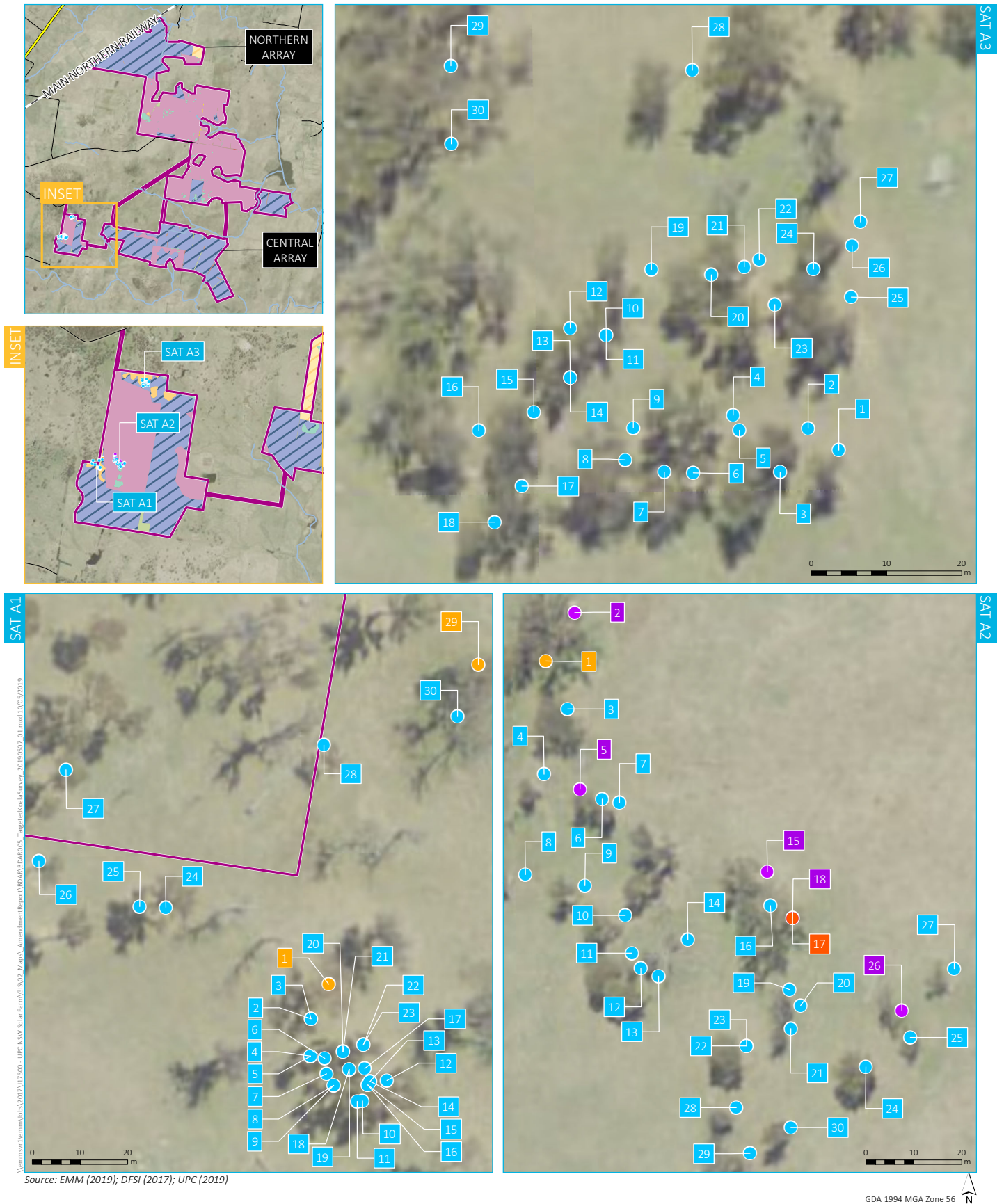
Subsequently, three additional SATs were conducted in the western portion of the central array area (refer to Figure 4.1). The SAT locations were selected based on their relatively good connectivity to woodland areas to the west of the development site. Furthermore, as noted above, anecdotal records of Koala were raised as part of stakeholder engagement with neighbouring landholders who own properties west of the central array.

It should be noted that woodland connectivity between the development site for the western section of the central array area and large patches of woodland to the north is provided by Silver-topped Stringybark woodland, which is not dominated by primary or secondary feed trees for Koala as described in the Koala recovery plan for Koala management area 4 – Northern Tablelands (NSW DECC 2008). Silver-topped Stringybark is considered a supplementary species.

Searches for Koala scats were based on the SAT Koala Survey Methodology (Phillips and Callaghan 2011) and were undertaken on 24 April 2019. No Koala scats were observed in any of the three SAT areas (90 trees searched), nor were any Koala or distinctive 'poc' marks recorded. Common Brushtail Possum (*Trichosurus vulpecula*) scats were found at six trees within SAT A1 (refer Figure 4.1) and based on this, scratches found on several trees in SAT A1 and SAT A2 were possibly also from Brushtail Possum.

Of the 90 trees surveyed, 81 (90%) were composed of Silver-topped Stringybark (*Eucalyptus laevopinea*), which is considered a supplementary tree species for Koala. No primary feed tree species were present, with 9 secondary feed trees recorded consisting of 5 Blakely's Red Gum (*Eucalyptus blakelyi*), 3 Apple Box (*Eucalyptus bridgesiana*), and 1 Yellow Box (*Eucalyptus melliodora*). Given the paucity of preferred feed tree species within the development site, the lack of records and the poor connectivity between woodland patches, the development site is not considered to contain important habitat for Koala, confirming the findings of the original assessment (refer Table 4.6 of the BDAR).

In summary, no important koala habitat is present in the amended development site based on lack of species occurrence and habitat assessment.



KEY

Development site

Spot Assessment Technique (SAT) locations (by species)

- *Eucalyptus blakelyi*
- *Eucalyptus bridgesiana*
- *Eucalyptus laevopinea*
- *Eucalyptus melliodora*

Plant community type and vegetation zone

- Category 1 - planted vegetation
- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted

■ PCT 510 woodland

■ Exotic - trees

■ Exotic - grassland

■ Exotic - cropping

■ Dam

Targeted survey effort for Koala
(*Phascolarctos cinereus*)

New England Solar Farm
Biodiversity development assessment
Addendum
Figure 4.1

5 Impact assessment (biodiversity values)

This section of the memorandum provides an update on the assessment of impacts to biodiversity values provided in Chapter 6 of the BDAR (Appendix C of the EIS).

5.1 Potential direct, indirect and prescribed impacts

The potential direct, indirect and prescribed impacts discussed in Section 6.1 of the BDAR remain relevant to the amended project. As described in Section 4.1, a number of the watercourse crossings considered as part of the BDAR will no longer be required as a result of the amendments to the project.

As noted in Section 1.2, since the public exhibition of the EIS, UPC has made revisions to the connection infrastructure between the northern and central array areas and the proposed substation configuration.

No changes to the alignment or extent of the three potential connection corridors between the northern and central array areas are required (refer Figure 1.1). The only change will be that, where previously, new overhead ETLs were proposed exclusively to transport electricity between the array areas, underground cabling may be installed in their place.

No additional direct, indirect or prescribed impacts to those considered in Section 6.1 of the BDAR are anticipated as a result of these amendments.

5.2 Serious and irreversible impacts

Section 6.3 of the BAM considers the potential for White Box Yellow Box Blakely's Red Gum Woodland to meet the serious and irreversible impacts (SII) principle. Two zones of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion (PCT510_woodland and PCT510_pasture) meets the threatened ecological community (TEC) listing of White Box Yellow Box Blakely's Red Gum Woodland.

The BDAR provided as part of the EIS concluded that as PCT 510_pasture and PCT 510_woodland had a vegetation integrity score of 11.7 and 11 respectively, they were both below the threshold condition regarding SII and therefore needed no further consideration.

As a result of the exclusion of plots from the southern array area, the vegetation integrity score has increased from 11.7 to 13.6 for PCT 510_pasture and remained at 11 for PCT 510_woodland. These vegetation integrity scores remain below threshold and therefore no SII are anticipated to occur despite the amendments to the project.

5.3 Measures to avoid, minimise and mitigate impacts

As described in the BDAR, the original project assessment area presented as part of the preliminary environmental assessment (PEA) occupied approximately 4,244 ha, for which a biodiversity constraints assessment was completed, including vegetation mapping, habitat mapping and BAM plots.

The development was then refined to an area of 2,787 ha based on several factors including avoidance of areas of key biodiversity constraint, as detailed in the BDAR (Appendix C of the EIS).

As a result of further amendments to the project, this memorandum considers a further reduced development site of approximately 2,070 ha (refer Figure 1.1).

As noted in Section 6.2 of the BDAR, a site-specific construction environmental management plan (CEMP) will be prepared prior to the commencement of construction or clearing works to ensure that impacts are minimised.

In addition to the measures listed in the BDAR the following updates are provided to address the Office of Environmental and Heritage (OEH) project submissions:

- a biodiversity management plan (BMP) will be prepared which will contain advice regarding the effective implementation of each of the biodiversity management and mitigation measures listed in Table 6.1 of the BDAR;
- the BMP will include an unexpected find procedure for threatened species, providing advice and photographs of key species with the potential to occur within the development site. If a threatened species or suspected threatened species is found during construction or operation of the project the following actions are recommended:
 - stop work within the vicinity of the species;
 - cordon off the area in question with an appropriate buffer;
 - inform the management team;
 - seek advice from an ecologist or species expert to confirm identification; and
 - consult with the relevant agencies to determine appropriate management, mitigation measures and additional approvals (if required).

5.4 Identification of impacts requiring offsets

This section provides an updated assessment of the impacts requiring offsetting in accordance with Section 10 of the BAM (OEH 2017).

5.4.1 Impacts on native vegetation

Impacts to native vegetation requiring offsets include:

- direct impacts on 1.6 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted;
- direct impacts on 5.7 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland;
- direct impacts to 65 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion; and
- direct impacts to 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (noting this is exclusive of one paddock tree which did not require offsets as it was assigned to Class 1).

A summary of the ecosystem credits required for all vegetation zones and paddock trees, including changes in vegetation integrity score, is provided in Table 5.1.

A total of 162 ecosystem credits are required to offset the residual impacts of the project. A credit report for area offsets and paddock trees is provided in Appendix B and Appendix C, respectively.

Table 5.1 Summary of ecosystem credits required for all vegetation zones for the development site

PCT	Vegetation zone name	Area (ha)	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	510_planted	1.6	49.3	0.0	-49.3	35
1174-Silvertop Stringybark open forest of the New England Tableland Bioregion	1174_woodland	5.7	29.1	0.0	-29.1	73
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Paddock trees	-	-	-	-	49
1174-Silvertop Stringybark open forest of the New England Tableland Bioregion	Paddock trees	-	-	-	-	5

5.4.2 Impacts not requiring offsets

A number of vegetation zones were found to be in degraded condition. In line with the requirements of Section 10.3.2.2 of the BAM (OEH 2017), impacts to the vegetation zones in Table 5.2 do not require offsets. In addition, planted vegetation which did not receive any public funding input does not require offsets (refer to Section 3.1).

A single paddock tree with a DBH of less than 20 cm was recorded, which owing to its small size class does not require offsets under the BAM (OEH 2017).

Table 5.2 Summary of impacts not requiring offsets – native vegetation

PCT/entity	Zone	Area (ha)	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	510_pasture	985.1	13.6	0.0	-13.6	0
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	510_woodland	36.0	11	0.0	-11	0
Category 1 planted vegetation	-	8.97	-	-	-	0
Paddock tree (<20cm DHB)	-	-	-	-	-	0

5.5 Biodiversity offset framework

As described in Section 6.5 of BDAR (Appendix C of the EIS), there are several methods which can be used to compensate the project's impacts. The amendments to the project have not changed the methods available to UPC to offset the project's impacts.

The BAM calculator provides a current credit price for the ecosystem credits required. If UPC elects to pay into the Biodiversity Conservation Trust (BCT), both PCTs have an identical credit price of \$6,009.29 (as of 7 May 2019). Note that these credit prices are market-based and may fluctuate and are typically updated on a quarterly basis (next update will be due 1 August 2019). Based on the requirement to offset a total of 162 credits, the total payment required is \$973,504.98 (exclusive of GST).

6 Assessment of biodiversity legislation

6.1 Environment Protection and Biodiversity Conservation Act 1999

An assessment of the impacts of the project on matters of national environmental significance (MNES) within the development site was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required (refer Section 7.1 of the BDAR).

All assessments concluded that no significant impacts on threatened entities are predicted to result from the project. The reduction in size of the development site will further reduce impacts and referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

6.2 Environmental Planning and Assessment Act 1979

6.2.1 State Environmental Planning Policy 44 Koala Habitat Protection

Following the public exhibition of the EIS, an additional three SAT surveys (90 trees) were undertaken to expand survey effort for Koala (refer to Section 4.1.1.i).

No evidence of Koala were detected, supporting the previous findings, that the vegetation within the development site is not considered potential Koala habitat as defined under State Environmental Planning Policy (SEPP) 44 Koala Habitat Protection (SEPP 44).

Of the 90 trees surveyed during the additional survey effort, no primary feed trees were recorded. Therefore, the vegetation within the development site is not considered potential Koala habitat as defined under SEPP 44.

7 Conclusion

This memorandum forms an addendum to the BDAR that was prepared as part of the EIS (Appendix C of the EIS) and provides an updated assessment of biodiversity values within the amended development site in accordance with the BAM (OEH 2017). The reduction in the development site is largely due to the removal of the southern array and associated transmission line infrastructure between the central and southern array.

Two native vegetation zones (ie PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland and PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture) were below the vegetation integrity score threshold and offsets are not required for impacts to this vegetation.

Impacts to native vegetation requiring offsets include:

- 1.6 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion planted, generating 158 credits;
- 5.7 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion woodland, generating 68 credits; and
- direct impacts to 71 paddock trees (excluding 1 below threshold), generating 54 credits, including:
 - 65 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion planted; and
 - 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion woodland.

The total number of ecosystem credits required to offset the project is 162.

Based on both habitat assessments and field surveys, the development site is not likely to be important habitat for either threatened flora or fauna species and no species credits would be required to offset the project.

One TEC and candidate for SII, namely White Box Yellow Box Blakely's Red Gum Woodland, was recorded within the development site; however, the vegetation integrity score for this community was below threshold, hence the vegetation zone does not meet the criteria for SII.

An assessment of the impacts of the project on MNES within the development site was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required. The assessment concluded that no significant impacts on threatened entities are predicted to result from the project. Referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

8 References

NSW Department of Environment and Climate Change (DECC) 2008, Approved Recovery Plan for the Recovery plan for the Koala (*Phascolarctos cinereus*).

NSW Department of Primary Industries (DPI) undated, *Policy and Guidelines for Fish Friendly Waterway Crossing*.

NSW Office of Environment and Heritage (OEH) 2017, *Biodiversity Assessment Method* (BAM).

Appendix A

Paddock tree results

Number	Identifier	Scientific name	Common name	BAM Category	DBH	Hollow bearing tree	Latitude	Longitude
1	7	Angophora floribunda	Rough-barked Apple		3	69	no	-30.608459 151.603089
2	38	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum		3	70	yes	-30.595681 151.611196
3	48	Eucalyptus melliodora	Yellow Box		3	87	no	-30.595142 151.613264
4	49	Eucalyptus blakelyi	Blakely's Red Gum		2	28	no	-30.596401 151.612731
5	50	Eucalyptus blakelyi	Blakely's Red Gum		2	35	no	-30.596407 151.612749
6	51	Angophora floribunda	Rough-barked Apple		2	35	no	-30.59715 151.612818
7	57	Eucalyptus melliodora	Yellow Box		3	55	no	-30.595979 151.605939
8	58	Eucalyptus melliodora	Yellow Box		3	81	no	-30.595806 151.606586
9	59	Eucalyptus melliodora	Yellow Box		3	71	no	-30.594997 151.606834
10	64	Eucalyptus blakelyi	Blakely's Red Gum		3	54	no	-30.603054 151.593371
11	65	Eucalyptus blakelyi	Blakely's Red Gum		3	70	no	-30.599894 151.58399
12	66	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum		3	77	no	-30.600411 151.583038
13	67	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum		3	71	yes	-30.601047 151.583006
14	68	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum		3	73	no	-30.600525 151.582403
15	69	Eucalyptus melliodora	Yellow Box		2	48	no	-30.599608 151.580242
16	70	Eucalyptus blakelyi	Blakely's Red Gum		3	55	no	-30.589906 151.589713
17	71	Eucalyptus nova-anglica	New England Peppermint		3	72	no	-30.586296 151.595102
18	79	Eucalyptus laevopinea	Silver Top Stringybark		3	109	no	-30.645231 151.581163
19	80	Eucalyptus laevopinea	Silver Top Stringybark		3	74	no	-30.645395 151.581028
20	86	Eucalyptus pauciflora	Snow Gum		3	51	no	-30.657922 151.603611
21	90	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum		3	76	no	-30.657188 151.60271
22	100	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum		3	92	no	-30.655652 151.600651
23	110	Angophora floribunda	Rough-barked Apple		3	76	yes	-30.658133 151.596883
24	114	Eucalyptus blakelyi	Blakely's Red Gum		3	52	no	-30.657717 151.598835
25	115	Banksia integrifolia subsp. monicola	White Mountain Banksia		3	74	no	-30.652523 151.608667
26	116	Eucalyptus blakelyi	Blakely's Red Gum		3	63	no	-30.653869 151.607305
27	117	Eucalyptus blakelyi	Blakely's Red Gum		3	80	no	-30.653874 151.607364
28	118	Eucalyptus blakelyi	Blakely's Red Gum		3	76	no	-30.65542 151.606472
29	119	Eucalyptus blakelyi	Blakely's Red Gum		3	63	no	-30.656249 151.606121
30	120	Angophora floribunda	Rough-barked Apple		3	68	no	-30.649224 151.604852
31	121	Eucalyptus conica	Fuzzy Box		3	105	no	-30.648636 151.60309
32	122	Angophora floribunda	Rough-barked Apple		3	50	no	-30.649422 151.600082
33	123	Eucalyptus blakelyi	Blakely's Red Gum		3	77	no	-30.650113 151.600789
34	124	Eucalyptus melliodora	Yellow Box		3	78	no	-30.650498 151.590279
35	125	Eucalyptus blakelyi	Blakely's Red Gum		3	65	no	-30.658068 151.587481
36	126	Eucalyptus dives	Broad-leaved Peppermint		2	36	no	-30.652688 151.587651
37	127	Eucalyptus conica	Fuzzy Box		3	62	no	-30.653048 151.587448
38	128	Eucalyptus conica	Fuzzy Box		3	56	no	-30.65368 151.586517
39	129	Eucalyptus dives	Broad-leaved Peppermint		3	51	no	-30.653358 151.585972
40	130	Eucalyptus pauciflora	Snow Gum		3	111	no	-30.652228 151.585748
41	131	Eucalyptus blakelyi	Blakely's Red Gum		3	51	no	-30.65108 151.585237
42	132	Eucalyptus dives	Broad-leaved Peppermint		2	38	no	-30.652771 151.583344
43	133	Eucalyptus blakelyi	Blakely's Red Gum		3	75	no	-30.651363 151.583458
44	134	Eucalyptus conica	Fuzzy Box		2	41	no	-30.652154 151.580888
45	135	Angophora floribunda	Rough-barked Apple		2	42	no	-30.652038 151.580769
46	136	Eucalyptus conica	Fuzzy Box		2	48	no	-30.651898 151.580262
47	137	Eucalyptus melliodora	Yellow Box		2	34	no	-30.651478 151.579555
48	138	Eucalyptus melliodora	Yellow Box		3	90	no	-30.651484 151.579576
49	139	Angophora floribunda	Rough-barked Apple		3	66	no	-30.648733 151.577756
50	140	Eucalyptus melliodora	Yellow Box		3	89	no	-30.651887 151.579116
51	141	Eucalyptus melliodora	Yellow Box		3	92	no	-30.65333 151.579087
52	147	Angophora floribunda	Rough-barked Apple		3	76	no	-30.650275 151.568221
53	148	Eucalyptus melliodora	Yellow Box		3	76	no	-30.650764 151.568728
54	150	Angophora floribunda	Rough-barked Apple		3	80	no	-30.655964 151.569179
55	151	Eucalyptus conica	Fuzzy Box		3	56	no	-30.656513 151.566274
56	153	Eucalyptus laevopinea	Silver Top Stringybark		1	18	no	-30.654002 151.562268
57	154	Eucalyptus laevopinea	Silver Top Stringybark		3	76	no	-30.653389 151.560204
58	155	Eucalyptus laevopinea	Silver Top Stringybark		3	84	no	-30.652741 151.560883
59	162	Eucalyptus laevopinea	Silver Top Stringybark		3	59	no	-30.645769 151.567274
60	163	Eucalyptus laevopinea	Silver Top Stringybark		3	59	no	-30.645933 151.56739
61	189	Angophora floribunda	Rough-barked Apple		3	65	no	-30.615066 151.61782
62	190	Eucalyptus dives	Broad-leaved Peppermint		2	35	no	-30.614494 151.618215
63	200	Eucalyptus conica	Fuzzy Box		3	55	no	-30.651811 151.568964
64	229	Angophora floribunda	Rough-barked Apple		3	89	no	-30.637796 151.609049
65	230	Eucalyptus bridgesiana	Apple Box		3	68	no	-30.636269 151.61119
66	231	Eucalyptus blakelyi	Blakely's Red Gum		3	88	yes	-30.637527 151.612357
67	232	Eucalyptus dives	Broad-leaved Peppermint		2	26	no	-30.639769 151.641926
68	233	Eucalyptus dives	Broad-leaved Peppermint		2	21	no	-30.639775 151.641934
69	238	Eucalyptus stellulata	Black Sally		2	29	no	-30.641565 151.641556
70	239	Eucalyptus bridgesiana	Apple Box		3	51	no	-30.64211 151.641501
71	240	Eucalyptus dives	Broad-leaved Peppermint		2	29	no	-30.644182 151.641109
72	241	Eucalyptus pauciflora	Snow Gum		2	29	no	-30.644404 151.64104

Appendix B

BAM credit report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00010375/BAAS17009/19/00015320	J17300 NESF BDAR Addendum	14/04/2019
Assessor Name	Report Created	BAM Data version *
Eugene Dodd	03/06/2019	7
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17009		

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAI	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion								
1	510_pasture	13.6	985.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
2	510_planted	43.9	1.6	0.25	High Sensitivity to Potential Gain	2.00	TRUE	35
3	510_woodland	11.0	36.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
							Subtotal	35



BAM Credit Summary Report

Silvertop Stringybark open forest of the New England Tableland Bioregion

4	1174_woodland	29.1	5.7	0.25	High Sensitivity to Potential Gain	1.75		73
							Subtotal	73
							Total	108

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAI	Species credits
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Appendix C

Paddock tree credit report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00010375/BAAS17009/19/00015334	J17300 NESF Paddock Tree Addendum	14/04/2019
Assessor Name	Report Created	BAM Data version *
Eugene Dodd	03/06/2019	7
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17009		

Paddock Trees Credit Requirement

Class	Contains hollows	Number of trees	Ecosystem credits
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			
2	False	2.0	1
3	False	8.0	6
3	True	1.0	1
3	False	1.0	1
2	False	2.0	1
3	False	12.0	9
3	True	1.0	1
3	False	2.0	2
2	False	2.0	1
3	False	5.0	4
3	False	4.0	3
3	True	2.0	2
2	False	6.0	3
3	False	1.0	1
2	False	2.0	1
3	False	9.0	7
3	False	1.0	1
2	False	1.0	1
3	False	2.0	2
2	False	1.0	1
			49



BAM Credit Summary Report

1174-Silvertop Stringybark open forest of the New England Tableland Bioregion			
3	False	6.0	5
			5
			54

Appendix E

Addendum to the Aboriginal cultural heritage assessment report



New England Solar Farm

Addendum to the Aboriginal cultural heritage assessment report

Prepared for UPC Renewables Australia Pty Ltd
June 2019





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New England Solar Farm

Addendum to the Aboriginal cultural heritage assessment report

Report Number

J17300 RP1

Client

UPC Renewables Australia Pty Ltd

Date

3 June 2019

Version

v1 Final

Prepared by



Ryan Desic

Senior Archaeologist - Heritage Team Leader

3 June 2019

Approved by



Claire Burnes

Associate

3 June 2019

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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Executive Summary

ES1 Overview

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (the project).

The project is classed as a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). A development application and environmental impact statement (EIS) and supporting Aboriginal cultural heritage assessment report (ACHAR) was submitted for public exhibition in February 2019 which received submissions from government agencies, the public and other organisations. Since the public exhibition of the EIS, a number of project refinements have been made including the removal of the southern array area. These refinements are described in detail in the amendment report (AR).

EMM has prepared this addendum to ACHAR in consultation with the registered Aboriginal parties (RAPs) to:

- address several additional assessment commitments that were made as part of the ACHAR (Appendix D of the EIS);
- respond to the submission from NSW Office of Environment and Heritage (OEH) in relation to the ACHAR; and
- provide updated impact assessment and management measures in response to the amendments to the project and the findings of the additional assessments.

ES2 Assessment scope

As part of the preparation of this addendum to the ACHAR, the following has been completed:

- **Additional tree survey and management** – EMM identified that the survey undertaken in 2018 for the ACHAR did not include inspection of every tree in the development footprint. Accordingly, further survey targeting all trees within the development footprint was recommended in the ACHAR and completed in March 2019.
- **Scar tree verification and management** – there were four scarred trees (sites NE45, NE61, NE47 and NE67) that had ambiguous features that could not be discerned between being natural scars or scars created by Aboriginal people. There were an additional two trees of the same nature identified during the additional tree survey in March 2019 (NE101 and NE102). These six trees received expert verification to determine if the scars are natural or of Aboriginal origin.
- **Archaeological test excavation** – UPC further investigated five sites with potential archaeological deposit (PAD) identified during archaeological survey to determine the significance of these sites and to establish appropriate project avoidance buffers, if warranted. Test excavation was conducted at sites NE15, NE27, NE33, NE70, and NE83 over 10 days from 8 to 18 March 2019.
- **Updated impact assessment and management measures** – the impact assessment and management measures described in the ACHAR have been revised to account for the additional assessments and project refinements.

ES3 Results

ES3.1 Scar tree survey and determination

The survey team identified one Aboriginal scar tree (NE97) and two tree scars that required expert determination (NE101 and NE102). In the process of the targeted tree survey, three additional stone artefact sites were identified and recorded. NE98 and NE99 are both isolated silcrete artefacts within the central array and were identified in paddock plough lines. NE100 is a small artefact scatter outside of the central array area on a crest landform.

UPC engaged archaeologist and scar tree specialist Andrew Long to make an independent determination on the six trees requiring verification (NE45, NE61, NE47, NE67, NE101 and NE102). Andrew inspected each tree on 1 May 2019. On the balance of evidence available, it was Andrew Long's professional opinion that four scarred trees (NE47, NE45, NE67 and NE102) are of Aboriginal origin and should be treated as Aboriginal objects under the NSW *National Parks and Wildlife Act 1974* (NPW Act). However, sites NE61 and NE101 were not considered to be of Aboriginal origin and would not constitute Aboriginal objects under the NPW Act.

ES3.2 Archaeological test excavation

Test excavation identified archaeological deposit at sites NE27, NE70 and NE83. The results at NE70 and NE83 further support the prediction of relatively intact archaeological sites situated on elevated rocky crest landforms but that there was a stark drop off in artefact frequency beyond the anticipated potential archaeological deposit (PAD) boundaries. The archaeological value at NE27 is limited by the relatively sparse results and the effects of post-settlement clearing, cultivation, grazing and associated ground disturbance and erosion. However, the sporadic evidence of knapping events holds some value to demonstrate utilitarian activities in local area.

No archaeological deposit was identified at NE15 and NE33 and these sites are considered to have low to negligible archaeological potential.

ES4 Impacts and management

Based on the outcomes of the additional investigations and refinements to the project, EMM has prepared a revised impact assessment and significance assessment.

Out of the 100 sites determined to be Aboriginal objects in the ACHAR (including the additional assessment undertaken and described in this report), 65 sites will be avoided and 35 sites will be impacted to some degree. Of the impacted sites:

- 28 sites will be totally disturbed;
- 2 sites will be partially disturbed; and
- 3 sites will be subject to total loss.

Note that the trees NE61 and NE101 will also be removed but are not considered to be Aboriginal scar trees and therefore are not Aboriginal objects—refer to Section 3.1.2 of this report.

As described in Section 8.2 of the ACHAR, two of the sites listed as being impacted (NE10 and NE13) will not be impacted by the project elements; however, RAPs have raised concern that they may be inadvertently impacted by project landholder vehicle movements in the future. During consultation, RAPs noted that they would prefer it if their surface contents are collected to ensure the artefacts are not lost.

As a result of the removal of the southern array area, a total of 11 sites previously designated for impact will now be avoided by the project as they are no longer within the development footprint.

All of the 13 standing Aboriginal scar trees will be avoided. A felled and sawn Aboriginal scar tree (NE49) will be salvaged prior to project construction and placed in an Aboriginal keeping place.

All surface artefact sites (artefact scatters and isolated finds) impacted by the project will be collected. This will involve collecting the entire visible contents of 26 isolated artefacts and six artefact scatters. This includes the surface stone artefacts at site N15 that was investigated through test excavation.

Two sites investigated during test excavation (NE27 and NE70) will have their significant areas avoided by the project with only peripheral impacts expected to areas of low to negligible archaeological potential. The anticipated archaeological deposit associated with NE83 will be avoided. Minimum setbacks/avoidance areas for the relevant sites investigated through test excavation have been proposed in this report.

UPC is committed to providing ongoing management opportunities and access for Aboriginal people to NE09, and access to NE68 following completion of construction. The details of site access for NE09 and NE68 will be developed during consultation with the RAPs as part of the development of the Aboriginal heritage management plan (AHMP).

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1 Introduction

1.1 Project background

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (the project) (Figure 1.1).

The project is classed as a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). A development application (DA) and environmental impact statement (EIS) was submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The DA and EIS for the project were publicly exhibited from 20 February to 20 March 2019.

As part of the EIS, EMM Consulting Pty Limited (EMM) prepared an Aboriginal cultural heritage assessment report (ACHAR) for the project, which included Aboriginal community consultation and an archaeological survey program (refer Appendix D of the EIS).

Following the public exhibition of the DA and EIS, over 100 submissions were received by NSW Department of Planning and Environment (DPE), including submissions from government, agency and other organisations and public feedback. A response to submissions (RTS) report will be submitted to DPE to respond to the matters raised in these submissions.

As a result of ongoing discussions with the local community, project landholders and other stakeholders, UPC has performed a number of revisions to the development footprint that was the subject of the DA and EIS, including the removal of the southern array area. A detailed description of these refinements is provided in an amendment report (AR) which has been prepared to outline the changes to the project that have been made since the public exhibition of the EIS. This report will be submitted to DPE in conjunction with the RTS.

1.2 Purpose of this report

1.2.1 Overview

EMM has prepared this addendum to ACHAR to:

- address several assessment commitments that were presented in Section 9.4 of the ACHAR (Appendix D of the EIS);
- respond to a submission from NSW Office of Environment and Heritage (OEH) in relation to the ACHAR; and
- provide updated impact assessment and management measures in response to the amendments to the project and the findings of the additional archaeological investigations.

A summary of the key items that this addendum report addresses is provided below.

1.2.2 Additional assessment requirements

In summary, the additional assessment requirements were:

- **Additional tree survey and management** – EMM identified that the survey undertaken in 2018 for the ACHAR did not include inspection of every tree in the development footprint. Accordingly, further survey

targeting all trees within the development footprint was recommended in the ACHAR and completed in March 2019 so that any newly identified Aboriginal scar trees could be assessed and have management measures ascribed prior to project determination.

- **Scar tree verification and management** – there were four scarred trees (sites NE45, NE61, NE47 and NE67) that had ambiguous features that could not be discerned between being natural scars or scars created by Aboriginal people. There were an additional two trees of the same nature identified during the additional tree survey in March 2019 (NE101 and NE102). These six trees were marked for expert verification to determine if the scars are natural or of Aboriginal origin so that they could be assessed and have management measures ascribed prior to project determination.
- **Archaeological test excavation** – UPC further investigated five sites with potential archaeological deposit (PAD) identified during archaeological survey to determine the significance of these sites and to establish appropriate project avoidance buffers, if warranted. Test excavation was conducted at sites NE15, NE27, NE33, NE70, and NE83 over 10 days from 8 to 18 March 2019.

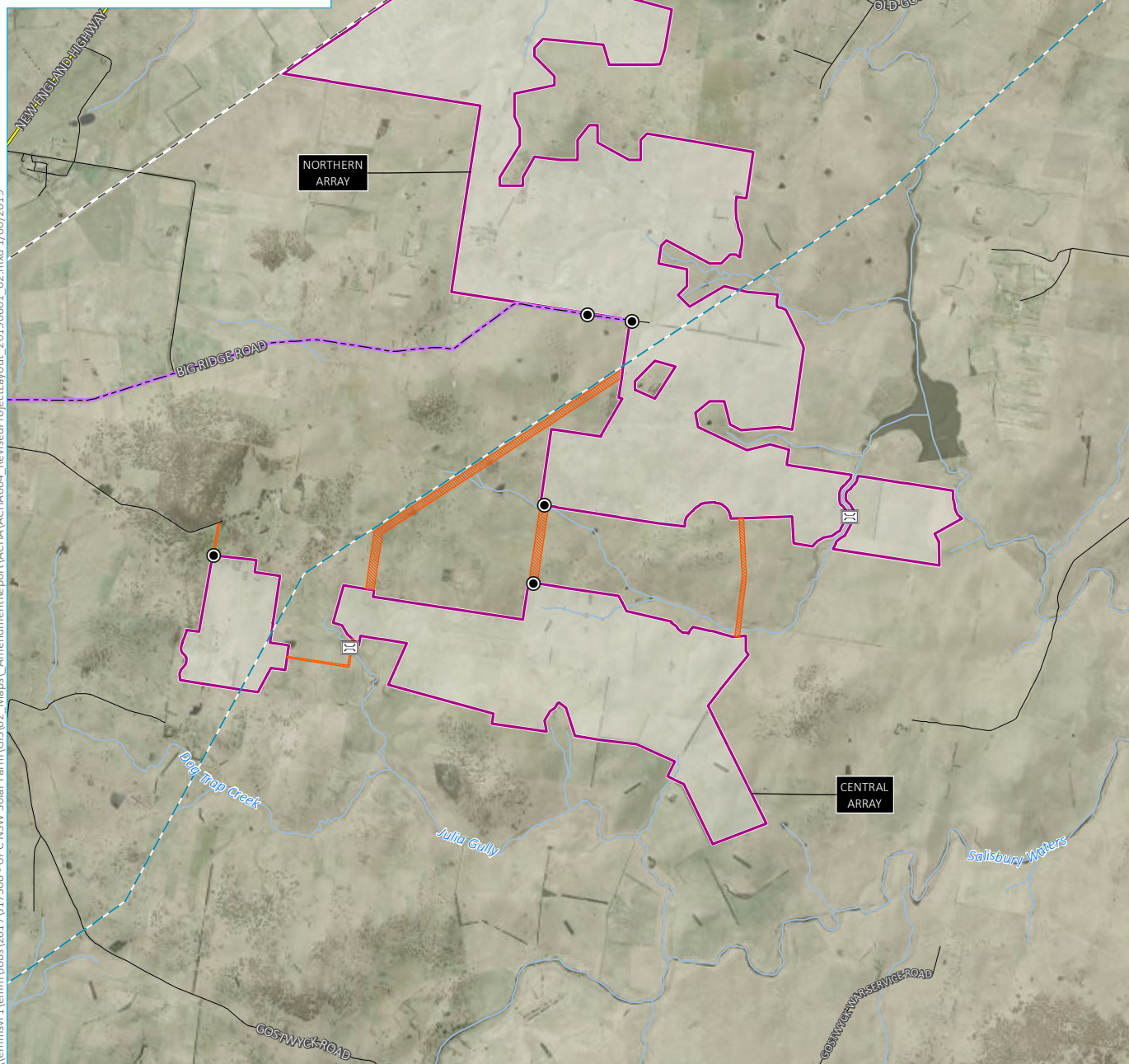
1.2.3 Response to OEH submission

OEH provided a submission on the EIS and supporting documents on 21 March 2019 which included comments on the ACHAR prepared by EMM. The submission included a number of recommendations, which have been included in Table 1.1. A response and cross-references to the section of this addendum report where these matters have been addressed are provided in Table 1.1.

Table 1.1 OEH recommendations for the ACHAR

OEH recommendation	Response summary	Section where addressed
Retain and protect all [standing]* Aboriginal scar trees and quarry sites on the subject land	All standing Aboriginal scar tree and quarry sites will be avoided. Notably, the sites identified and/or verified during additional investigations will be avoided.	Sections 3, 4, 6 and 7.
Engage a qualified arborist to assess the nature of tree scars and determine which trees are Aboriginal objects.	Scar tree expert and consultant Andrew Long assessed the nature of six tree scars that were previously unverified. Four sites were determined to be probable Aboriginal scar trees: NE45, NE47, NE67 and NE102. Sites NE61 and NE101 were determined to not be Aboriginal scar trees.	Section 3.2 and Appendix B
Ensure management of both immediate harm and long-term preservation of Aboriginal scar trees, either in-situ [standing]* or off-site [fallen trees]*, be determined by the project RAPs in consultation with the project archaeologist and OEH.	All standing Aboriginal scar trees will be avoided and managed in-situ, except for NE65 which is in the now-removed southern array area and will not be managed as part of the project. One site, NE49, is a felled tree and will be salvaged and managed off-site.	Section 7.2
Amend the ACHMP to incorporate the applicant's commitment to provide ongoing management opportunities and access for Aboriginal people to Site NE09, and access to NE68 following project construction.	UPC are committed to incorporating Aboriginal community access arrangements into the proposed Aboriginal Heritage Management Plan (AHMP) which will be prepared post-project approval. This commitment is presented in Section 9.3.2 of the ACHAR (Appendix D of the EIS).	Section 7.2.6

Note: * Text in [] verified during follow-up consultation with OEH archaeologist.



Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

- 330 kV transmission line
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Primary vehicle access route

- Development footprint
- Solar array
- Potential site access/electrical cabling
- Potential creek crossing
- Proposed primary site access point

Project locality

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 1.1

1.2.4 Revised impact assessment and management

Since the public exhibition of the EIS, amendments to the project have included:

- removal of the southern array area;
- revisions to the extent of the northern array area;
- delivery of construction materials and infrastructure via the Main Northern Railway line (if required); and
- revisions to connection infrastructure between the northern and central array areas and substation configuration.

The amended development footprint referred to in this report is shown on Figure 1.1 and represents the potential disturbance footprint of the two solar array areas and associated infrastructure. A detailed description of the amendments to the project is provided in Section 1.2 and Chapter 2 of the AR.

This report provides a revised impact assessment and management measures which respond to:

- the amendments to the development footprint and project description;
- the additional Aboriginal cultural heritage sites identified during the tree survey exercise;
- the determination of tree scars; and
- the outcomes of the archaeological test excavation and their implications for impact assessment and management of Aboriginal cultural heritage sites.

1.3 Consultation

EMM initially presented the proposed assessment methodology for the project to registered Aboriginal parties (RAPs) in May 2018. This outlined: the assessment process; a survey strategy; and that test excavation may have been required as part of ACHA. EMM stated that the test excavation would follow the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code) (DECCW 2010). No feedback was provided by RAPs in response to the methodology presented at this stage.

RAPs were notified about the additional assessment requirements for scar tree tasks and archaeological test excavation as outlined in Section 1.2.2 of this report on 28 September 2018. This was discussed further on 19 October 2018 during a consultation meeting between representatives from UPC, EMM and RAPs. Although no comments were provided in writing, all RAPs at the meeting supported the proposed methods.

On 18 February 2019, RAPs were issued a letter detailing the upcoming scar tree and test excavation fieldwork, including fieldwork and reporting methodologies. As part of requesting expertise on tree scar verification, RAPs nominated archaeologist Mal Ridges (OEH) for assistance. Mal Ridges attended a site inspection on 12 March 2019 with RAP representatives and EMM archaeologist Ryan Desic. The outcome of this exercise is discussed in Section 3.1.

On 18 February 2019, OEH were issued with a notification letter about the proposed test excavation and sampling strategy in accordance with requirement 15c of the Code. OEH responded on 21 March 2019 generally supporting the test excavation method. Furthermore, OEH's archaeologist and assessing officer, Roger Mehr, attended a site visit on 13 March 2019 and was shown parts of the development footprint and sites of interest.

In response to OEH's submission recommending specialist determination of select tree scars, EMM contacted Andrew Long and Associates on behalf of UPC to request an inspection for NE45, NE61, NE47, NE67 and the two

additional trees (NE101 and NE102) identified during further tree survey. EMM sent an email to RAPs on 24 April 2019 explaining the proposed approach and rationale for additional assessment of the tree scars.

A consultation log and relevant correspondence is provided in Appendix A.

This addendum to the ACHAR was sent to RAPs for review and comment on 4 June 2019. Considering that there are timing constraints associated with lodgement of the overall AR to DPE, any RAP responses received for this report will be addressed during the development of the project Aboriginal heritage management plan (AHMP). The proposed management measures presented in this report are consistent with the approach communicated and supported by RAPs throughout this investigation (refer to letters dated 18 February 2019 and 24 April 2019 in Appendix A). As such, the anticipated RAP responses are likely to relate to specific details around management methods and therefore the AHMP would be a more appropriate forum to resolve any such items.

1.4 Authorship and acknowledgements

This report was prepared by EMM Senior Archaeologist Ryan Desic (BA Hons Prehistoric and Historical Archaeology) and reviewed by David Richards (EMM Environmental Scientist) and Claire Burnes (EMM Associate). The test excavation and stone artefact analysis were directed by Ryan Desic with assistance from Taylar Reid (EMM archaeologist). EMM would like to thank Steven Ahoy for contacting Mal Ridges for assistance with tree scar verification and to Mal Ridges for his generous contribution and time. EMM would also like to thank Andrew Long for his assistance in the tree scar assessment. EMM would like to thank the fieldwork team involved in survey and test excavation, comprising:

- Steven Ahoy;
- Colin Ahoy Junior;
- Bruce Cohen;
- Rhonda Kitchener;
- Jocelyn Blair;
- Blear Ahoy; and
- Tyson Ahoy.

2 Archaeological context

2.1 Overview of previous investigations

As part of the ACHA, EMM archaeologists conducted a targeted archaeological survey over 19 days with the support of RAP representatives. GPS track log data indicates that each survey participant walked approximately 247 km, which represents the total length of the survey transects.

The survey focused on the proposed development footprint at the time and on areas likely to feature Aboriginal sites, but also extensively sampled areas and landscapes less likely to feature sites to test the survey predictions. The survey coverage results indicated that the ground surface visibility conditions during the survey were generally effective to characterise the distribution of archaeological sites across the survey area.

The survey team identified 96 sites during the 19 days of archaeological field survey. Sites were labelled sequentially, with an NE prefix standing for 'New England'. The 96 sites comprise 95 Aboriginal sites and a historical dry wall site that was originally thought to have potential to be an Aboriginal stone arrangement (NE57).

The archaeological investigation provided an informative and representative example of the widespread occupation of Aboriginal people in the survey area. The site types identified support the notion of the landscape being used by Aboriginal people more intensively and in more utilitarian ways when compared to earlier theories that suggested mainly ceremonial use (McBryde 1974). The frequent distribution of open camp sites on elevated crests near watercourses, along with grinding groove sites, quarries and scarred trees show that the survey area was part of the landscape utilised by Aboriginal people for its natural resources. The high frequency and variation in local raw material types (namely silcrete, basalt, greywacke and chert) would have allowed Aboriginal people to be relatively selective in what raw materials they used for stone tool manufacture and this may be why stone quarries were relatively rare when compared to the extent of outcropping raw material. Notwithstanding, widespread historical disturbance (eg clearing, ploughing and rock-picking) may have affected their current representation in the landscape.

Aboriginal grinding grooves were only found on outcropping silcrete boulders and pavements. The extensive site at NE09 represents a location distant to flowing water but may have attracted use after rain when rock pools filled on the outcropping pavement. The remaining grinding groove sites are in locations more typical for grinding groove sites, being as close to water as the location of the outcropping material permitted.

There is a clear indicator that Aboriginal people were targeting crests with outcropping material, not only for raw materials (eg quarries on silcrete and basalt), but for camping amongst areas of granite and/or silcrete boulders and granite tors. These locations represent relatively flat land in elevated areas with good outlook over the surrounding landscape. This would have provided safety and visibility over the landscape and rocks for sitting or standing. As such, it is likely that these sites exist today not only because they have been less disturbed from historical land management practices, but also because they were specifically targeted for occupation and used more intensively than the broader landscape. It is probably only by coincidence that these are also the best-preserved areas as they are unsuitable for intensive cultivation and livestock grazing.

Further details of the survey results and their implications are presented in Chapter 6 of the ACHAR (Appendix D of the EIS).

3 Scar tree survey and verification

3.1 Scar tree survey

3.1.1 Aims and method

Not every mature native tree within the development footprint was inspected during the surveys performed as part of the ACHAR. However, the previous survey did identify eight Aboriginal scar trees and five possible Aboriginal scar trees. EMM acknowledged this survey limitation and has conducted further targeted survey to comprehensively account for all Aboriginal scar trees within the development footprint.

Planning for the scar tree survey fieldwork involved:

- reviewing previous survey transects representing survey coverage using GIS mapping, which allowed areas already inspected for scar trees to be excluded from the targeted survey;
- using high-resolution imagery, isolated paddock trees and clusters of trees were identified and marked using GIS polygons; and
- the GIS polygons representing survey target zones were uploaded onto hand-held devices using ArcGIS Collector and used in the field to guide the survey.

The survey team (EMM archaeologist Ryan Desic, accompanied by three RAP site officers) conducted the targeted tree survey over two days on 6 and 7 March 2019. The survey involved driving to target zones and inspecting trees by foot if the trees were native and mature. The attributes of potential Aboriginal scars were discussed amongst the field team before it was decided if a scar would be recorded or not. Tree scars were marked for further expert verification in instances where scars were ambiguous examples.

3.1.2 Results

i Overview

The survey team identified one Aboriginal scar tree (NE97) and two tree scars that required expert determination (NE101 and NE102). In the process of the targeted tree survey, three additional stone artefact sites were identified and recorded. NE98 and NE99 are both isolated silcrete artefacts within the central array and were revealed in paddock plough lines. NE100 is a small artefact scatter outside of the central array area on a crest landform. The newly recorded sites are described in this chapter and identified on Figure 7.1.

ii Scar trees

Aboriginal scar tree NE97 was identified on the western boundary of the central array on a hill slope. The scar has an elongated oval shape with considerable regrowth and a present, but deteriorated, dry face. The tree is standing but dead and therefore its age is particularly difficult to discern. NE97 is shown in Plate 3.1 and Plate 3.2.



Plate 3.1 Scar tree NE97 context (view west)



Plate 3.2 Scar tree NE97 close-up

NE101 was identified near the southern boundary of the northern array on a gentle hill slope. The scar is on a dead and fallen tree and is highly deteriorated from rot and insect activity. The scar is an elongated oval shape with regrowth and evidence of a bare dry face. However, the level of existing damage made aspects of the scar margins difficult to discern from natural damage. NE101 is shown in Plate 3.3 and Plate 3.4.



Plate 3.3

NE101 context (view west)



Plate 3.4

NE101 close-up

NE102 was identified in the southern portion of the northern array on a broad hill crest. The scar is of considerable width (up to 40 cm), generally ovaloid but with irregular margins and considerable regrowth. The tree is dead and has experienced limb tears and has been partially sawn on one side, most likely to remove another fallen limb. The scar was ambiguous on initial inspection as it features no dry face and has considerable regrowth extending deep into the hollow cavity. Subsequent specialist inspection identified NE102 to be an Aboriginal scar tree (refer Section 3.2). NE102 is shown in Plate 3.5.



Plate 3.5 NE102 context (view south-west)

iii Open artefact sites

Isolated silcrete artefacts NE98 and NE99 were identified in recently ploughed paddocks on gentle plain landforms. Both sites were over 200 m from ephemeral or permanent watercourses and their landscape context does not indicate that they are the product of any focused camp site activity. These sites are likely to represent transitory movement and sporadic events across the broader landscape.

Open artefact scatter NE100 is on a spur crest and comprises four stone artefacts featuring quartz, silcrete and basalt. The crest has been historically cleared but now features regrowth vegetation. Examination of nearby exposures indicate a highly eroded soil deposit with minimal topsoil present. The site is bordered by two first order ephemeral drainage depressions and is likely to represent a sporadic open camp site. Examples of the newly recorded open artefact sites are shown in Plate 3.6 to Plate 3.9. This site is outside of the development footprint.



Plate 3.6 Silcrete flake NE98



Plate 3.7 Silcrete flake NE99



Plate 3.8 Open artefact scatter context NE100 (view south)



Plate 3.9 Basalt flake and silcrete core at NE100

3.2 Scar tree verification

The scar tree verification exercise involved two separate site visits from scar tree experts. The first visit was by an OEH representative, Mal Ridges, who attended a site inspection on 12 March 2019 with RAP representatives and Ryan Desic. Mal was escorted to previously recorded tree sites NE45, NE61, NE49, NE47 and NE67, along with the two recently identified trees (NE101 and NE102). Mal provided comment on each of the trees and guided group discussion around tree and scar attributes with the aim of educating the attendees about Aboriginal scar trees and issues around identification. Notwithstanding, Mal did not provide a determination on the nature of the scars because of his position as an OEH representative and the potential for presenting a conflict of interest.

In response to OEH's submission to the ACHA regarding scar tree verification (refer Section 1.2.3), UPC engaged archaeologist and scar tree specialist Andrew Long to make an independent determination on the six trees requiring verification (NE45, NE61, NE47, NE67, NE101 and NE102). Andrew inspected each tree on 1 May 2019. On the balance of evidence available it was Andrew Long's professional opinion that four scarred trees (NE47, NE45, NE67 and NE102) are of Aboriginal origin and should be treated as Aboriginal objects under the NSW *National Parks and Wildlife Act 1974* (NPW Act). However, sites NE61 and NE101 were not considered to be of Aboriginal origin and would not constitute Aboriginal objects under the NPW Act.

4 Test excavation

4.1 Background and aims

EMM identified that 21 of the Aboriginal sites identified during the project archaeological survey were considered to have PAD. The term PAD was ascribed to the predicted extent of concentrated subsurface Aboriginal objects in an area of potential conservation value. PAD areas were assigned to landforms that are distinguishable from the surrounding landscape (eg elevated areas with good outlook overlooking watercourses, protected from disturbance) as being likely to retain higher artefact densities than the assumed 'background scatter' of archaeological material in the broader landscape. Furthermore, EMM established criteria and rationale behind the designation of PAD areas which was aligned with the predictive model. This information is presented in Section 6.3.4 of the ACHAR (Appendix D of the EIS).

EMM identified PAD surrounding quarries (n=5), artefact scatters (n=9), isolated finds (n=3) and grinding grooves with artefact scatters (n=4). Given the somewhat limited amount of previous archaeological investigations in the region, EMM were conservative with predicted areas of PAD. Part of the rationale behind assigning PAD to sites was to have a trigger for archaeological investigation in the event that impacts were proposed. The trigger for test excavation would allow any site with PAD to be explored to establish its actual archaeological potential and significance.

UPC committed to avoiding 17 of the 21 sites with PAD which is documented in the ACHAR. The remaining five sites with PAD (NE15, NE27, NE33, NE70, and NE83) presented considerable constraints to project design and therefore UPC decided to explore options to develop in and around these areas. In response, EMM recommended test excavation to establish the nature, significance and extent of these sites to better inform project design and establish suitable areas for avoidance and disturbance.

Considering the above, the primary aim of the test excavation at each site was to differentiate between areas of high and low archaeological potential. The simplest method to address this was through establishing drop-off in subsurface artefact frequencies so that significant areas could be marked for avoidance.

4.2 Test excavation method

The test excavation program was undertaken over 10 days from 8 to 18 March 2019. The program involved two EMM archaeologists and up to four RAP representatives on each day.

The test excavation involved the following method:

- A series of 50 cm x 50 cm test pits were set out along linear transects at NE15, NE27, NE33, NE70, and NE83.
- The test pits were spaced at 10-20 m intervals across the PADs but also extended beyond the previously demarcated PAD area to establish artefact concentrations and drop-off in artefact frequencies.
- The first test pit at each site was dug manually with hand tools in 5 cm spits to identify the nature of the soils and to identify if a stratigraphic sequence existed. The remaining pits were dug in 10 cm spits.
- Each pit was excavated until basal clay or impenetrable parent rock (eg granite or weathered chert) was reached, or to 10 cm below the artefact bearing level identified at each transect.
- All excavated soil was sieved on-site using a dry sieving technique. The soil was sieved through a mix of 3 mm and 5 mm aperture mesh.

- All test pits were backfilled by the excavation team after each pit was recorded.
- Each test pit was photographed and a soil profile/section drawn.

Basic recording and analysis was completed for all artefacts recovered from the excavation. A catalogue of the artefacts is provided in Appendix C.

General photos of the excavation are shown in Plate 4.1 to Plate 4.4. The results of the test excavation activities at each location are presented below.



Plate 4.1 **Excavating pits at NE15 (view west)**



Plate 4.2 **Excavating pits at NE70 (view east)**



Plate 4.3 **Excavating pits at NE15 (view east)**



Plate 4.4 **Excavating pits at NE83 (view west)**

4.3 NE15

4.3.1 Location and context

NE15 was identified across a hill crest and hill slope landform on the Fairfield A soil landscape and Sandon Beds geology between 1,035 m and 1,040 m height Australian Height Datum (AHD). The recorded surface artefacts

comprised six silcrete cores and one retouched flake. The site is within a cleared grazing paddock. The crest and upper slope landform units feature a high-frequency of outcropping grey mottled chert presenting in gravel and small angular boulder form; however, the quality of these materials is very poor with frequent fracture planes.

This site was chosen for test excavation primarily because of its proximity to NE14 (100 m north-east on a hill crest), which is a quarry site featuring numerous large silcrete cores in cobble and small boulder form and outcropping red jasper of generally poor quality but with some evidence of attempted modification. The rationale was to establish if NE15 was of similar significance to NE14 or if it represented only the peripheral discard of artefacts from NE14. It was also an opportunity to sample the soil deposit and gauge archaeological potential for crests and slopes on the Fairfield A soil landscape which spans across the northern and central array areas.

4.3.2 Test pit layout and depth

Four linear transects were placed across NE15 targeting crest, saddle and hill slope landforms (Figure 4.1). Due to the high level of outcropping chert bedrock and boulders and immediate identification of skeletal soils and impenetrable gravels, a total of three test pits were excavated at each transect, spaced at 10 m intervals.

Transect 1 was set out on a north-west axis, extending from the south-east end of a rounded crest which slopes down about 50 m onto a flat, grassy plain. Transect 2 was placed on a north-west axis along the saddle between the two crest summits. The saddle is approximately 60 m long and 60 m wide before gently sloping down to low rises on either side. Transect 3 was placed on a north-east axis extending perpendicular from the primary test pit excavated in Transect 2 and extending downslope for 60 m before terminating at the base of a gentle low rise on the other side. Transect 4 was set out on a north-east axis extending from the north-east side of the second northern-most crest at the site. The crest extends for 80 m before terminating at the base of a gentle low rise comprising another crest landform on the other side.

Overall, the team excavated 13 individual 50 cm x 50 cm test pits, amounting to 3.25 m². The test pits excavated in Transect 1 were dug down to the second spit (10-20 cm); however, due to the abrupt inclusion of almost impenetrable chert gravel and boulders at 10 cm increasing in size and frequency with depth, the majority of the remaining transects were excavated to the first spit (0-10 cm). Plate 4.5 and Plate 4.6 show the site and landscape context for NE15.

4.3.3 Soils

Soil across NE15 generally comprised a very shallow (<10 cm depth) silty loam A soil horizon with frequent chert gravel inclusions. The chert gravels were of poor quality, often chalky, with frequent fracture planes. Generally, by 10 cm depth the degraded chert bedrock and gravel layer became impenetrable and excavation could not continue past this point. Soils excavated on a mid-hill slope (Transect 3) revealed slighter deeper A horizon soil (20 cm depth), which represents accumulation of soil downslope from the highly eroded crest. A sample of test pits are shown in Plate 4.7 and Plate 4.8.



KEY

1 m contours

Rail line

Main road

Local road

Development footprint

Solar array

Potential site access/electrical cabling

Test pit/artefact frequency

0

NE15 excavation layout and results

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 4.1



Plate 4.5 View east over the crest of NE15 onto the floodplain below



Plate 4.6 View north over the second crest of NE15 onto the crest of NE14



Plate 4.7 Soil profile of typical shallow test pit NE15 T4.20 E



Plate 4.8 Soil profile of deeper test pit NE15 T3.60 W

4.3.4 Summary of NE15

No stone artefacts were recovered from the test excavation at NE15. It was almost immediately apparent that the highly eroded nature of the crest (with minimal to no soil deposit) had low to negligible subsurface archaeological potential. The surface artefacts found at NE15 better characterise the site and, if further artefacts occur at NE15, they would likely be found at surface level rather than subsurface. The slightly deeper soils downslope from the

crest represent more favourable soil depths to retain artefacts; however, the steeper landform would not represent an ideal location for camping or stone tool manufacture.

The surface artefacts at NE15 comprising mainly silcrete cores suggest that these objects are likely to have been transported from the nearby NE14 where silcrete cobbles have been found to be outcropping. NE14 is located at between 1,030 m and 1,035 m AHD is on a crest landform at a slightly lower elevation to NE15. The elevation of NE14 is closer to the geological band of silcrete that is found outcropping at roughly 1,030 m AHD throughout the development footprint and broader region. In this instance, NE14 is on a crest that has eroded at the right level to expose silcrete cobbles which has resulted in raw material gathering by Aboriginal people; however, NE15 does not share this unique characteristic.

4.4 NE27

4.4.1 Location and context

NE27 was identified at the edge of a very broad crest spur crest landform within the Gostwyck soil landscape, occurring over Gostwyck Adamellite geology. The site occurs at between 1,000 m and 1,005 m AHD and is adjacent to a third order stream with a deeply incised channel. This site is on a cleared grazing paddock. The recorded surface artefacts comprised a silcrete flake, a quartz core and a retouched basalt axe blank. The landscape is cleared with evidence of past cultivation.

This site was chosen for test excavation primarily because of its prominence above a surrounding undulating plain and its proximity to a watercourse with evidence of perennial (if only chains of ponds in dry weather) water supply. It was predicted that the site and PAD was likely to represent a former Aboriginal campsite, possibly with evidence of stone tool manufacture. It was also an opportunity to sample soils within the Gostwyck soil landscape in an area representative of broadscale vegetation clearance and cultivation.

4.4.2 Test pit layout and depth

Four linear transects were set out across the site, extending both away (east) from and parallel to the adjacent watercourse (Figure 4.2). The transects extended to the north past the crest and downslope towards a plain and east past the defined curvature of the crest into continuous plain landform. Overall, the team excavated 21 individual 50 cm x 50 cm test pits, amounting to 5.25 m².

Ten test pits were excavated for Transect 1, which runs perpendicular to the creek in an east-west direction and nine pits were excavated along Transect 2, which runs in a north-south direction parallel to the creek line. A number of test pits were offset from these two primary transects to further explore artefact frequencies near concentrations or other areas of interest.

As no basal clay (B horizon) soil layer was identified, (or bedrock layer) the excavated depth of each test pit was determined by digging one 10 cm spit below the archaeological deposit. This generally involved excavating to 40 cm depth as no artefacts were identified below spit 3 (20-30 cm depth) across the site.

Plate 4.9 and Plate 4.10 show the site and landscape context for NE27.



KEY

- 1 m contours
- Main road
- Local road
- Watercourse/drainage line
- Development footprint
- Solar array
- Potential site access/electrical cabling

Modified PAD boundary
(established following testing)
and minimum impact
avoidance area

Test pit/artefact frequency

- 0
- 1
- 3
- 5
- 10
- 11

NE27 excavation layout and results

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Figure 4.2

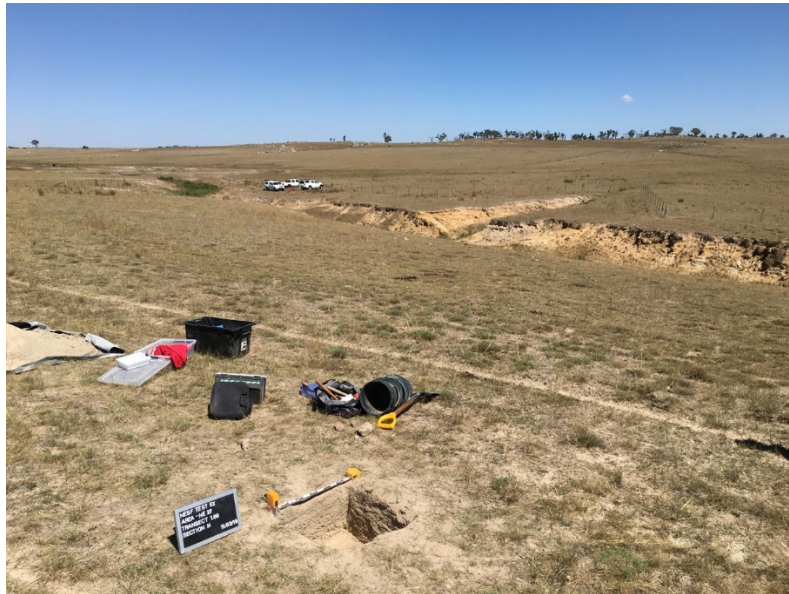


Plate 4.9 Viewing south-west over NE27 Transect 1.00 towards the adjacent watercourse



Plate 4.10 Looking north over NE27 Transect 1.60 onto a continuous plain landform

4.4.3 Soils

Soil across NE27 were observed to comprise a truncated or missing A1 soil horizon with a relatively deep A2 horizon of grey loamy sand up to 45 cm deep. Locally significant layers of ironstone gravels were present in a number of test pits starting around 20 cm and increasing with depth.

Despite the signs of ploughing on the ground surface, there was no distinct plough layer shown in the soil profiles. The upper 40 cm of soil was generally homogenous which extends past the potential depth of plough equipment (which is typically 10-15 cm depth). A sample of test pits are shown in Plate 4.11 and Plate 4.12.



Plate 4.11 Soil profile of test pit NE27 T1.20 N



Plate 4.12 Soil profile of test pit NE27 T3.00 E showing band of ironstone at its base

4.4.4 Artefact frequency and distribution

A total of 41 stone artefacts were recovered from the test excavation of NE27. Stone artefacts were recovered from 10 of the 20 50 m x 50 m test pits. Artefact frequencies per test pit ranged from 1 to 11 for the pits that contained artefacts. Figure 4.2 illustrates the artefact frequencies across the site. If all pits across NE27 are calculated on an artefact density per square meter, the average artefact density is 2 artefacts/m².

The majority of artefacts (n=24, 58%) were recovered from Transect 2, which ran in a north-south direction parallel to the adjacent watercourse. There was a distinct clustering of artefacts in pit T2.-20 (n=10), which prompted the excavation of two more pits 10 m to the east and west of T2.-20 to determine the extent of the artefact cluster. No artefacts were recovered from T3.00, which was located 10 m to the west on a gentle downward slope and closer to the watercourse, while 11 artefacts were recovered from pit T3.20, which was located 10 m to the east and on the top of the gentle rise.

Overall, clustering of artefacts at NE27 was highly sporadic but more likely to occur within approximately 50-60 m of the watercourse. There was a notable drop-off in artefact frequencies as the distance from the watercourse increased whereby most test pits along Transect 1 had either one or no artefacts.

Artefact frequencies per spit level are shown in Plate 4.13. Most of the artefacts were recovered from spits 2 (10-20 cm) and 3 (20-30 cm) and occurred in similar overall frequencies (n=22 from spit 2 and n=18 from spit 3). There was only one artefact recovered from 0-10 cm and no artefacts were located below 30 cm depth.

It is possible that disturbance from vegetation clearance and cultivation influenced the near absence of artefacts from 0-10 cm; or simply that most artefacts have permeated through the upper soil layer and settled within the lower portions of the A2 soil horizon. No stratigraphy was observed and therefore no site chronology could be ascertained.

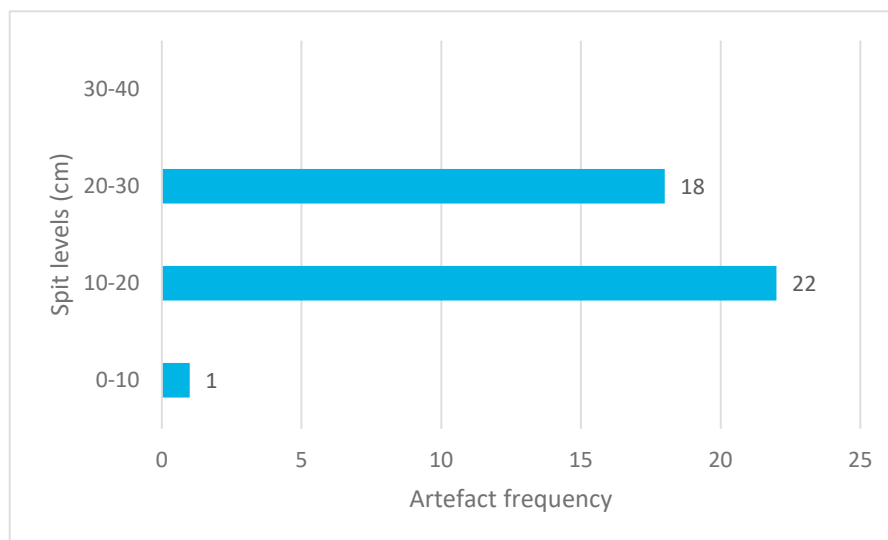


Plate 4.13 Artefact frequency per spit level showing number of artefacts recovered from each spit across NE27

4.4.5 Raw materials

A sample of the various raw materials from NE27 is presented in Plate 4.14.

A summary of the raw materials and their percentage of the site assemblage are shown in Plate 4.15. The majority of stone artefacts recovered from NE27 were composed of silcrete (58%) followed by chert (22%). The remaining materials comprised quartz (10%) and quartzite (10%).



Plate 4.14 A sample of raw material types, including silcrete (1), basalt (2), quartzite (3) and crystal quartz (4)

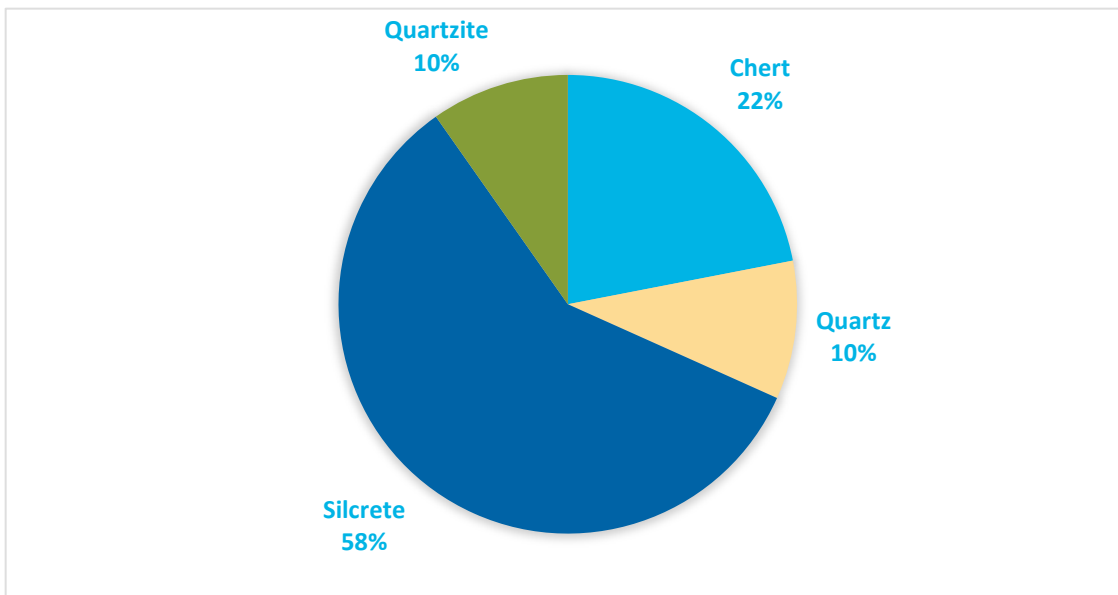


Plate 4.15 **Raw material types and their percentages**

4.4.6 Artefact types

The 41 artefacts recovered from NE27 were divided into 7 artefact types, which are represented in Plate 4.16. The majority of artefacts recovered from the site were broken fragments of flakes (including proximal, medial and distal portions), representing 46% of the assemblage. This high level of breakage post-deposition suggests that the flakes were initially broken soon after they were deposited or by more recent events such as ploughing or trampling by livestock.

The next most dominant type of artefact represented in the assemblage were complete flakes (n=10, 24%). Flakes are unbroken stone artefacts with clear conchoidal fracture characteristics (resembling the rippling, gradual curves of a mussel shell) including a ring crack, bulb of percussion, and termination. The complete flakes ranged in size from 8 mm to 27 mm and weighed from 0.16 g to 2.8 g. The average flake length was 15.3 mm long and the average weight was 0.82 g. The two retouched flakes are featured in Plate 4.17.

Two silcrete cores were recovered during the test excavations (refer Plate 4.18). These ranged in size from 31 mm to 43 mm and weighed from 9.6 g to 21 g. The average length was 37 mm and the average weight was 15.3 g.

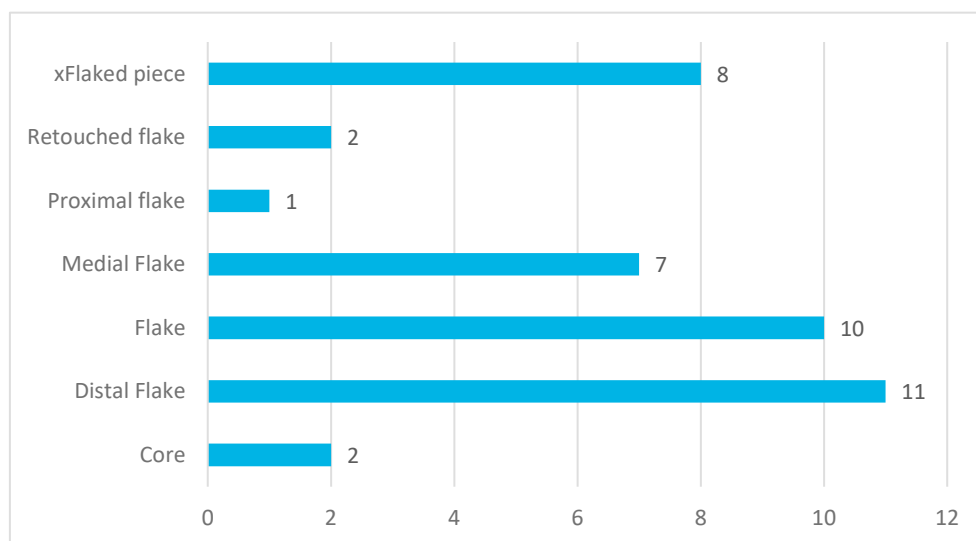


Plate 4.16 **Artefact types and their frequencies**



Plate 4.17 **Two retouched silcrete flakes from NE27**



Plate 4.18 Silcrete cores (one in two pieces) from NE27

4.4.7 Summary of NE27

The results of test excavation together with the identified surface artefacts provides a glimpse into an Aboriginal open camp site with evidence of stone tool manufacture, established adjacent to a third order stream with a near-perennial source of water.

The silcrete dominated assemblage probably reflects locally sourced material, which is found in abundance throughout the landscape (at approximately the 1,030 m contour) or the nearest identified quarry with visibly similar material (NE22), which is only 3 km south of N27. The quartzite recorded at NE27 may actually be the coarser grade of silcrete identified across the landscape (such as at NE09) and was recorded separate to the finer grade of silcrete typically used to produce stone flakes.

The artefact densities recovered suggest the focus of Aboriginal activities were approximately 50-80 m from the watercourse and on a relatively flat elevated area. The landscape beyond approximately 100 m is flat and blends into the continuum of a plain landscape. It is very likely that proximity to water was the main influence on artefact densities in the area and there are no topographical features that would suggest camping further from the watercourse would be more favourable.

Despite the landmark grinding groove site NE09 being over 1.5 km from NE27, it is still visible in the distance (although probably was not with pre-colonial vegetation). However, the stream adjacent to NE27 was probably visible from NE09 and represents one of the closest locations for reliable water. Speculatively, there is likely to be some connectivity between NE27 and NE09, and the presence of an axe blank at NE27 is possibly just one example of axes being flaked at camp sites prior to being taken to NE09 for further refinement through grinding.

Overall, the archaeological value at NE27 is limited by the relatively sparse results and the effects of post-settlement clearing, cultivation, grazing and associated ground disturbance and erosion. However, the sporadic evidence of knapping events holds some value to demonstrate utilitarian activities in the local area.

4.5 NE33

4.5.1 Location and context

NE33 was identified on a floodplain terrace landform within the Kellys Plains soil landscape overlying Sandon Beds geology. The site is at approximately 1,005 m AHD and approximately 200 m from a sixth order stream, Salisbury Waters, and is on a cleared grazing paddock. The recorded surface artefacts comprised a silcrete flake and a number of basalt fragments surrounding two large basalt boulders conspicuously located in an area otherwise free from stone outcrop (Plate 4.19 and Plate 4.20).

The site was chosen for test excavation primarily to further explore the nature of the basalt material in an elevated terraced area above the lower floodplain of Salisbury Waters. Upon revisiting the site for the test excavation, the team had time to examine the basalt fragments in more detail. Further inspection of the impact points on many of the basalt fragments indicate that they are unlikely to be Aboriginal stone artefacts and are more likely to represent breakage from historical or modern farm machinery. This observation teamed with the results of the excavation presented below suggest that the basalt boulders and fragments in this area are not Aboriginal objects.



Plate 4.19 Silcrete flake surface find at NE33



Plate 4.20 **Conspicuous basalt boulders found at NE33 (view north-east)**

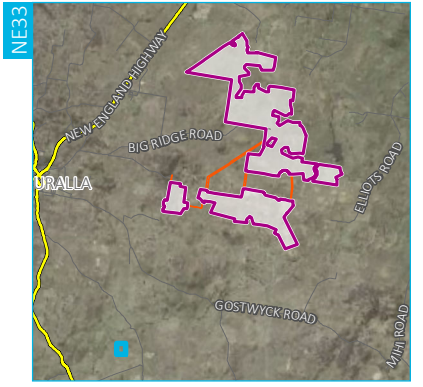
4.5.2 Test pit layout and depth

Five linear transects were placed across NE33 which focused on the elevated terrace landform (Transects 1, 3, 4 and 5), but also extended closer to Salisbury Waters along the floodplain below the terrace (Transect 2) (Figure 4.3).

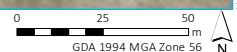
Transect 1 was set out on a north-west/south-east axis, perpendicular to the crest of the terrace, extending 100 m before the land slopes down onto river flat. Transect 2 continued this line of test pits perpendicular to the crest of the terrace in a north-westerly direction along the floodplain. Seven test pits were excavated in Transect 1 and seven test pits were excavated in Transect 2.

Transects 3 to 5 were placed across Transect 1 on the elevated terrace, running in a north-east-south-west direction parallel to the crest. Overall, a total of 30 50 cm x 50 cm test pits were excavated for NE33, amounting to 7.5 m²

Despite locating one small silcrete flake on the surface of the ground near Transect 5, no other artefacts were identified during the test excavations. Plate 4.21 and Plate 4.22 show the site and landscape context for NE33.



Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)



KEY

- 1 m contours
- Main road
- Local road
- Watercourse/drainage line
- Development footprint
- Solar array
- Potential site access/electrical cabling

PAD boundary
(established prior to testing)

Test pit/ artefact frequency
■ 0

NE33 excavation layout and results

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Figure 4.3



Plate 4.21 **View north-west at NE33 towards the lower floodplain of Salisbury Waters**



Plate 4.22 **View south-west at NE33 from Transect 3**

4.5.3 Soils

Soils across NE33 comprise basalt-related colluvium. This presented as a very shallow clay loam A horizon of less than 5 cm depth overlying a diffuse boundary of medium heavy clay which transitions into a B horizon of very heavy clay. Attempts were made to excavate the medium clays and heavy clays, with a number of test pits excavated between 20-30 cm; however, these soils were almost impenetrable with hand tools and the high clay component would have formed an impermeable layer for stone artefacts to migrate into. After the poor nature of the soil was established, most test pits were excavated to only 10 cm to capture the clay loam A horizon.

A sample of test pits are shown in Plate 4.23 and Plate 4.24.



Plate 4.23 Soil profile of test pit NE33 T3.40 NE



Plate 4.24 Soil profile of test pit NE33 T4.20 NW

4.5.4 Summary of NE33

No stone artefacts were recovered from the test excavation. This further supports the recent observation that the basalt fragments at the site are likely to be the product machine breakage and not Aboriginal stone tool manufacture. The basalt fragments are related to the cluster of basalt boulders that may have been conspicuously gathered by farmers during European settlement and mounded at this location. The absence of any artefactual material in test pits immediately surrounding the basalt boulders and fragments suggests there is very low to negligible archaeological potential in this area. The shallow A horizon of less than 5 cm depth allows minimal deposit for any artefact accumulation.

The presence of one silcrete flake on the ground surface is evidence of Aboriginal presence in the area, but there is no further evidence to suggest that it was an open camp site or quarry. This site equally may be the product of transitory movement by Aboriginal people or a temporary camp site. In either scenario, there is a lack of information to make further assumptions. The soils in this area are shallow and of poor quality and it is possible that longstanding agricultural practices have affected the current archaeological character in this area.

4.6 NE70

4.6.1 Location and context

NE70 was identified on a locally unique rocky knoll/hill crest landform within the Gostwyck soil landscape overlying Sandon Beds geology. The site is approximately 1,045 m AHD and directly south of a partially spring-fed second order stream. Over 20 surface artefacts were recorded on exposed soils amongst outcropping granite boulders and bedrock expanses. A range of raw materials were identified including silcrete, chert, greywacke and a retouched basalt axe blank.

The surface expression of artefacts did not extend beyond the limit of the rocky knoll feature. It was clear that this landform feature had experienced less disturbance from agricultural practices because it was inaccessible for machinery. An area of PAD was ascribed to this landform focused on the rocky outcrop with a buffer of up to 30 m in some areas. The limit of PAD was represented by a break in landform unit from the rocky knoll to a surrounding simple hill slope and stream channel.

This site was chosen for excavation to verify the limit of significant material (predicted to be within the PAD area) and to explore the suitability of developing an access track to the west of the PAD area. The rationale for excavation was also that it would be informative for predicting the subsurface character of other open camp sites situated on rocky crests with ascribed PAD; a number of these were identified during survey (eg NE38, NE78, NE73 and NE17) but UPC has committed to avoiding these sites and their PAD boundaries.

4.6.2 Test pit layout and depth

The test pit layout at NE70 aimed to firstly test whether the soils adjacent and amongst the rocky granite knoll feature had high archaeological potential (Figure 4.4). There was not extensive testing within the PAD boundary because the aim was to establish areas of significance and determine a suitable avoidance buffer. It was therefore unnecessary to impose excessive impacts to a significant portion of the site through test excavation. Over half of the pits excavated were outside of areas predicted to have significant deposit to establish a suitable area to develop.

Two linear transects were set out perpendicular to one another with Transect 1 aligned on an east-west axis parallel to the creek and on the northern side of the granite knoll, while Transect 2 ran parallel to the fence line in a north-south direction. A third transect consisting of two test pits was excavated on the eastern side of the granite outcrop, to better distinguish the extent of the area of high archaeological potential around the land feature. A total of 14 50 cm x 50 cm test pits were set out on NE70, totalling 3.5 m². Plate 4.25 and Plate 4.26 show the site and landscape context for NE33.



KEY

- 1 m contours
- Main road
- Local road
- Watercourse/drainage line
- Development footprint
- Solar array
- Potential site access/electrical cabling

— PAD boundary
(established prior to testing)
and minimum impact
avoidance boundary

Test pit/artefact frequency

- 0
- 1
- 3
- 5
- 20
- 28
- 31
- 44
- 60

NE70 excavation layout and results

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Figure 4.4



Plate 4.25 View of NE70 from initial test pit T1.00, looking north towards the creek



Plate 4.26 NE70: view north-east across Transect 3 showing main granite knoll feature to the right

4.6.3 Soils

Soils at NE70 comprised a sandy clay loam of variable depth onto an underlying B horizon of medium heavy clay. Excavation of the rocky knoll established that in some instances there are pockets of relatively deep soil adjacent to granite boulders, while other locations have very shallow soil directly overlying granite boulders. The A horizon soil deposit was typically around 35 cm but extended to 60 cm depth in once instance (Transect 1.00). There was a notable change in soil compaction between test pits dug within the protected area of the rocky knoll when compared to open paddock examples to the west. Test pits within the rocky knoll landform had a soft consistency and deeper soils outside of granite obstructions. Test pits in open paddocks were significantly more compacted and truncated as a result of soil mixing and compaction through livestock movements and repeated ploughing events.

Overall, the areas protected by granite boulders presented the most intact soil examples and with sufficient depth to feature stone artefacts. A sample of test pits are shown in Plate 4.27 to Plate 4.29.



Plate 4.27 Soil profile of test pit NE70 T1.00 N



Plate 4.28 Soil profile of test pit NE70 T1.40 featuring the basalt axe resting on granite boulder



Plate 4.29 Top-down view of NE70 T1.40 featuring basalt axe blank in situ

4.6.4 Artefact frequency and distribution

NE70 featured the highest frequency of artefacts for sites sampled in the test excavation program. A total of 195 stone artefacts were recovered from 11 of the 14 50 cm x 50 cm test pits. The frequency of artefacts ranged from 1 to 60 for the pits that contained artefacts. Figure 4.4 illustrates the artefact frequencies across the site. If all pits across NE70 are calculated on an artefact density per square meter, the average artefact density is 14 artefacts/m². However, the average artefact density for test pits within the NE70 PAD area, more specifically, is 31 artefacts/m² and the average density for test pits outside of the PAD area is 0.9 artefacts/m².

There is a significant concentration of artefacts clustered around the rocky knoll landform that dominates the site, suggesting the foci of Aboriginal activity. The boundary of this landform is outlined in Figure 4.4. There is a significant drop-off in artefact frequency as the land slopes away from the rocky knoll towards the south and west, with pits containing 20-60 artefacts abruptly decreasing to pits containing either one or no artefacts outside the PAD boundary.

Artefact frequencies per spit level are shown in Plate 4.30. Most artefacts were recovered from 10-20 cm (n=68) and 20-30 cm (n=80). Test pit T1.00 contained the highest artefact frequency (31%, n=60), with artefact frequencies occurring throughout a relatively deep deposit from 0–50 cm depth; however not between 50-60 cm depth. The test pits beyond the PAD area (rocky knoll) featured either one or no artefacts. Artefacts were not found below the 20-30 cm spit level in this area, except in T1.100 where one artefact was recovered between 30-40 cm depth and was sterile below this level.

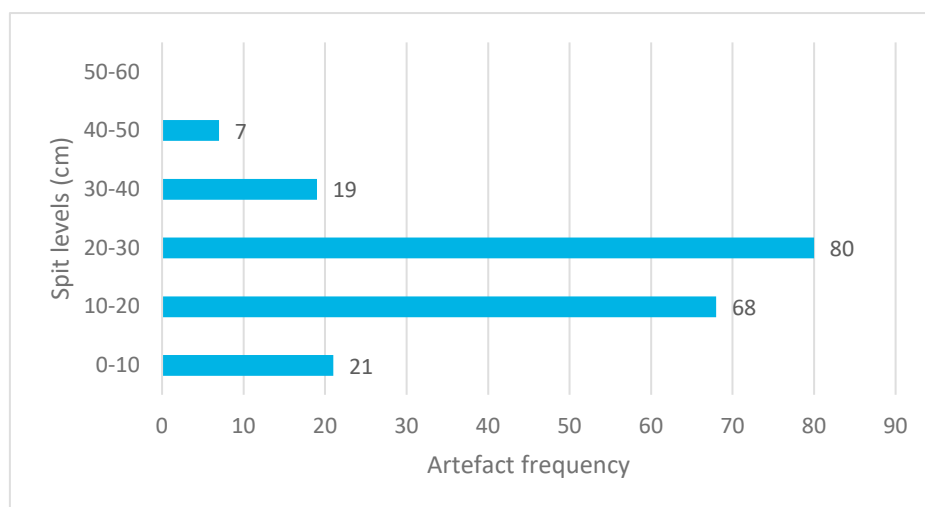


Plate 4.30 Artefact frequency per spit level showing number of artefacts recovered from each spit across NE70

4.6.5 Raw materials

A sample of the various raw materials from NE70 is presented in Plate 4.31.

A summary of the raw materials and their percentage of the site assemblage are shown in Plate 4.32. The dominant material type is silcrete (84%). There were a number of other material types in much smaller frequencies, which included quartz (11%), chert (2%), basalt (1%), quartzite (1%), and jasper (1%).

4.6.6 Artefact types

The 195 artefact types recovered from NE70 were divided into seven artefact types, which are represented in Plate 4.33. The highest percentage of artefacts are classed as complete flakes (n=109, 56%) and broken fragments of flakes (n=59) represented 30% of the assemblage. Flakes ranged in size from 4 mm to 55 mm and weighed from 0.01 g to 20 g. The flakes have an average length of 17 mm and an average weight of 1.4 g. Some examples are shown in Plate 4.34.

Three silcrete cores were recovered (2% of the assemblage). These ranged in size from 24 mm to 47 mm in length and 5.3 g to 42 g in weight. Their average length was 33 mm and their average weight was 18.4 g.

A total of five definable implements were recovered from NE70. This comprises two Bondi points, one undefined backed artefact, a basalt axe blank and one scraper. Additionally, five generally-retouched flakes were recorded. Examples of implements from NE70 are included in Plate 4.34 to Plate 4.36.

The axe blank is 103 mm x 73 mm and weighs 322 g. There is bifacial flaking along all margins but no evidence of grinding. It has a heavy light grey patina with signs of dark grey basalt underneath (Plate 4.35).

A notable occurrence was the high frequency of blade flakes recovered from excavation. Blade flakes are defined as artefacts that are over twice as long as they are wide. There were 20 blades recovered and they were exclusively made from silcrete raw material. A sample is shown in Plate 4.34 and Plate 4.36.



Plate 4.31 A sample of raw materials from NE70 - jasper (1), silcrete (2), basalt (3), chert (4), crystal quartz (5) and milky quartz (6)

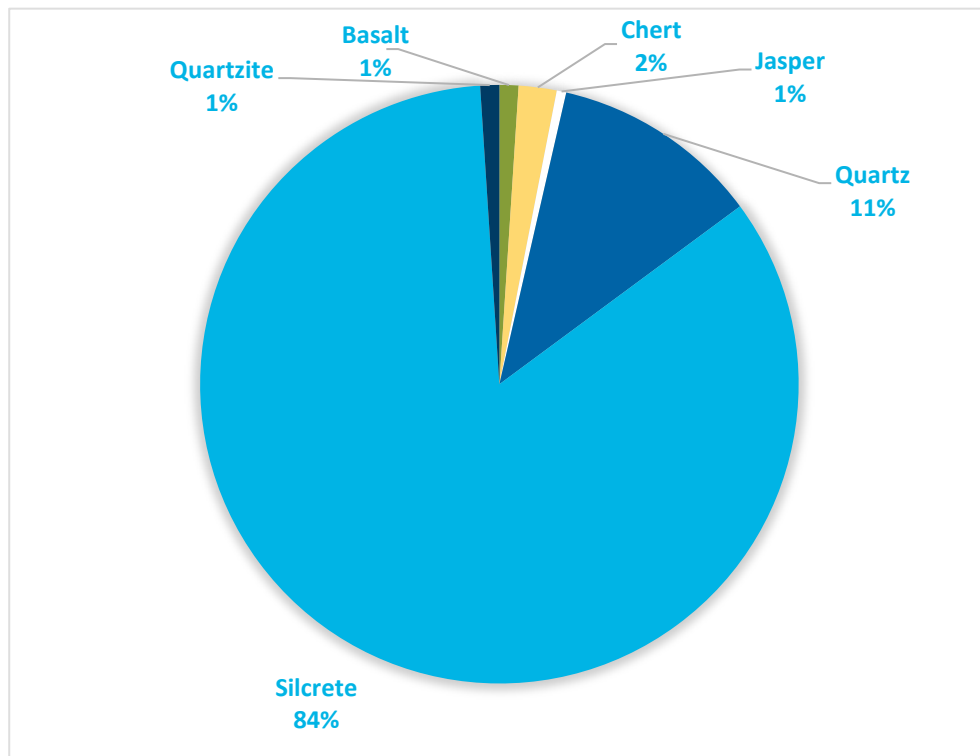


Plate 4.32 Raw material types and their percentages

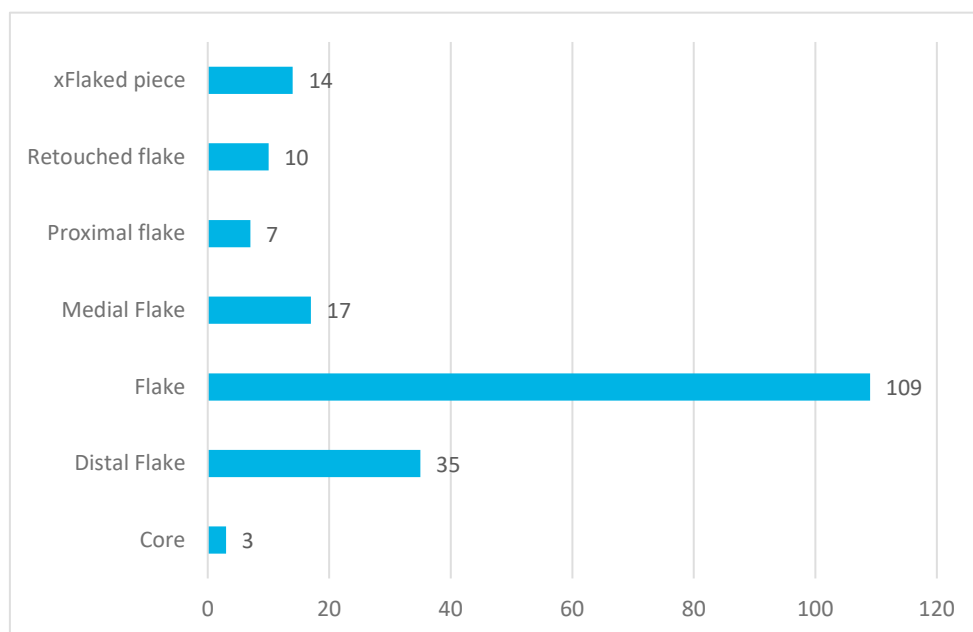


Plate 4.33 Artefact types and their frequencies



Plate 4.34 A sample blade flakes and retouched flakes recovered from NE70



Plate 4.35 The basalt axe blank recovered from NE70 T1.40N



Plate 4.36 NE:70: a sample of blade flakes and a Bondi Point (far right)

4.6.7 Summary of NE70

NE70 is a locally significant open campsite that is clearly demarcated by a discrete landform and geological features of outcropping granite. The high frequency of artefacts within the PAD area and the range of tools recovered from a relatively small sample indicates that there would be a rich resource available for further research at this site. The site is only 1 km away from the significant grinding groove site NE09 and features evidence of basalt axe blank preparation which may have been transported to NE09 and other grinding groove sites for shaping and polishing. Apart from the larger axe blanks, there are numerous examples of backed small tools and blade flakes which attests to the industrious nature of the site. NE70 maintains the trend that silcrete was the dominant and favoured local resource.

4.7 NE83

4.7.1 Location and context

NE83 was identified on a unique landform feature of outcropping small to large basalt boulders that has formed a small crest. The crest comprises a relatively flat platform with sporadic boulders, surrounded by a concentration of boulders that slope west, downhill towards a first order ephemeral stream. The site is approximately 1,050 m AHD and within the Ironstone soil landscape on Sandon beds geology. One retouched basalt axe blank was recorded amongst other basalt boulders during the archaeological survey but there was no further surface evidence.

An area of PAD was ascribed to this landform because it featured a unique platform with a good outlook over the landscape suitable for camping; and it was the only identified site where a basalt axe blank had been identified amongst naturally outcropping basalt, suggesting that the axe blank was sourced from this basalt outcrop.

The site was chosen for excavation to establish if the site represented an open camp site and for any further indications to whether the site was a basalt quarry. The excavation aimed to verify the limit of significant material (predicted to be within the PAD area) and to explore the suitability of developing the landscape outside of the unique landform in which the PAD area occurs.

4.7.2 Test pit layout and depth

Testing at NE83 firstly focused on the discrete crest platform that was predicted to have high archaeological potential. Two linear transects intersected through the middle of the landform leading parallel and towards the ephemeral first order stream to the west.

Transect 1 was oriented on a east-west axis with four test pits positioned on the crest platform and six pits extending beyond the basalt outcrop downslope into a cleared and cultivated paddock leading towards the first order stream. Spacing between test pits varied amongst the crest platform to avoid outcropping basalt boulders.

Transect 2 was oriented on a north-south axis on the crest platform (T2.-20, T2.00 and T2.20) and beyond it on either side into the cleared and cultivated paddock hill slope.

Overall, a total of 19 50 cm x 50 cm test pits were set out on NE83, totalling 4.75 m². Plate 4.37 to Plate 4.39 shows the site and landscape context for NE83.



Plate 4.37 View west down Transect 1 towards the stream from the crest platform at NE83



KEY

- 1 m contours
- Main road
- Local road
- Watercourse/drainage line
- Development footprint
- Solar array
- Potential site access/electrical cabling

- PAD boundary (established prior to testing) and minimum impact avoidance boundary

Test pit/artefact frequency

- 0
- 1
- 2
- 6
- 88

NE83 excavation layout and results

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Figure 4.5



Plate 4.38 NE83: view north-west across Transect 1 featuring the crest platform on the right hand side



Plate 4.39 NE83: view east from T1.100 featuring the crest platform in the background

4.7.3 Soils

Soil across NE83 are generally silty, sandy loam with frequent ironstone nodule inclusions and an A horizon of approximately 0-10 cm depth, which continues onto shallow B horizon or bedrock. The test pits on the crest platform reveal a shallow A1 soil horizon of approximately 5-10 cm depth with small basalt boulders and inclusions occurring either immediately or by approximately 10 cm depth. Basalt inclusions increased with depth until forming an impenetrable layer and therefore most pit depths on the crest platform varied between 10 cm and 20 cm. Away from the stony crest, soils were highly truncated with a missing A1 horizon and an A2 horizon with frequent ironstone nodules throughout the deposit overlying either basalt bedrock identified by 30 cm or a red-brown B horizon of clay. It is very likely that agricultural practices outside of the stony crest have caused extensive erosion and loss of the upper soil profile. A sample of test pits are featured in Plate 4.40 and Plate 4.41.



Plate 4.40 Soil profile of test pit NE83 T2.00 which produced the majority of the artefacts recovered from NE83



Plate 4.41 Soil profile of test pit NE83 T1.140 E

4.7.4 Artefact frequency and distribution

A total of 109 stone artefacts were recovered from 8 of the 19 50 cm x 50 cm test pits dug at NE83 (Plate 4.42). The frequency of artefacts ranged from 1 to 88 for the pits that contained artefacts. If all pits across NE83 are calculated on an artefact density per square metre, the average artefact density is 6 artefacts/m² across the site. However, this is not representative of what is occurring at the site as the majority of the artefacts were recovered from one test pit (T2.00, n=88 or 80%). The artefacts are confined to the platform on the outcropping basalt crest and are absent on the surrounding hill slopes in both Transect 1 and Transect 2.

Artefact frequencies per spit level are shown in Plate 4.42. Most artefacts were recovered from spit 2 (10–20 cm, n=67) and the layers remained sterile below 30 cm. A total of 18 artefacts were recovered from spit 1 (0–10 cm) and 24 artefacts were recovered from spit 3 (20–30 cm) for test pits across the site. Overall, the results indicate that stone artefacts are concentrated within the upper 20 cm of the soil profile (typically A1 horizon) and dissipate in frequency amongst basalt inclusions until 30 cm depth.

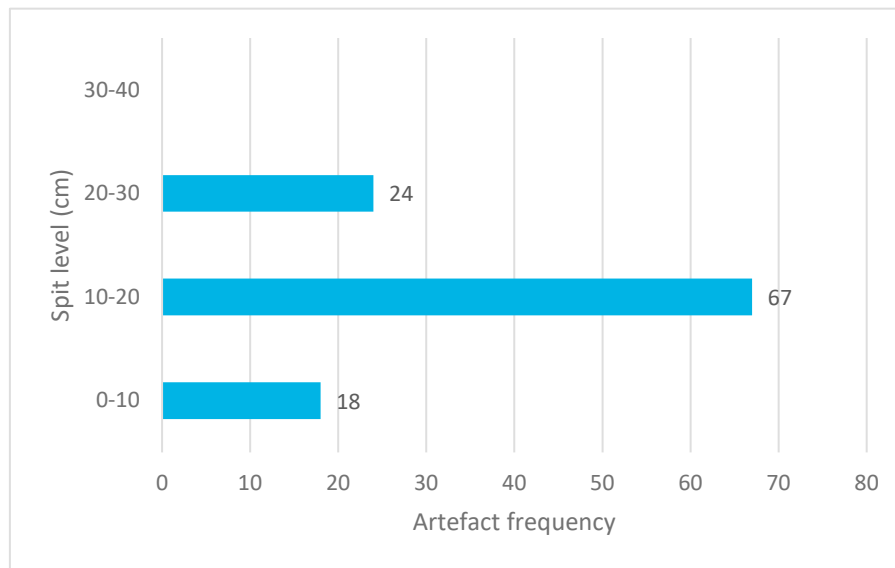


Plate 4.42 Artefact frequency per spit level showing number of artefacts recovered from each spit across NE83

4.7.5 Raw materials

There were only two types of raw materials present at the site; the dominant material being silcrete (96%) and basalt representing the remaining 4% (n=4) assemblage. A summary of the raw materials and their percentage of the site assemblage are shown in Plate 4.43. Some examples of raw materials recovered from NE83, are shown in Plate 4.44.

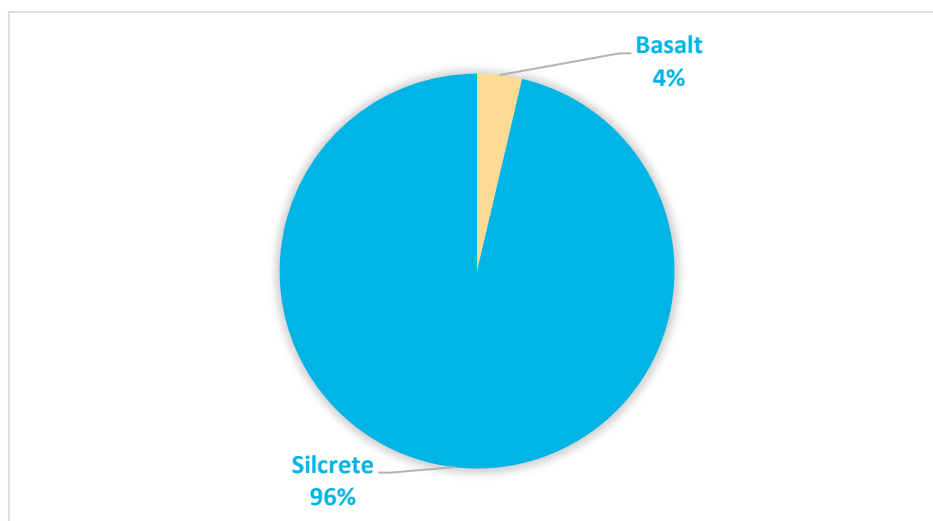


Plate 4.43 Raw material types and their percentages

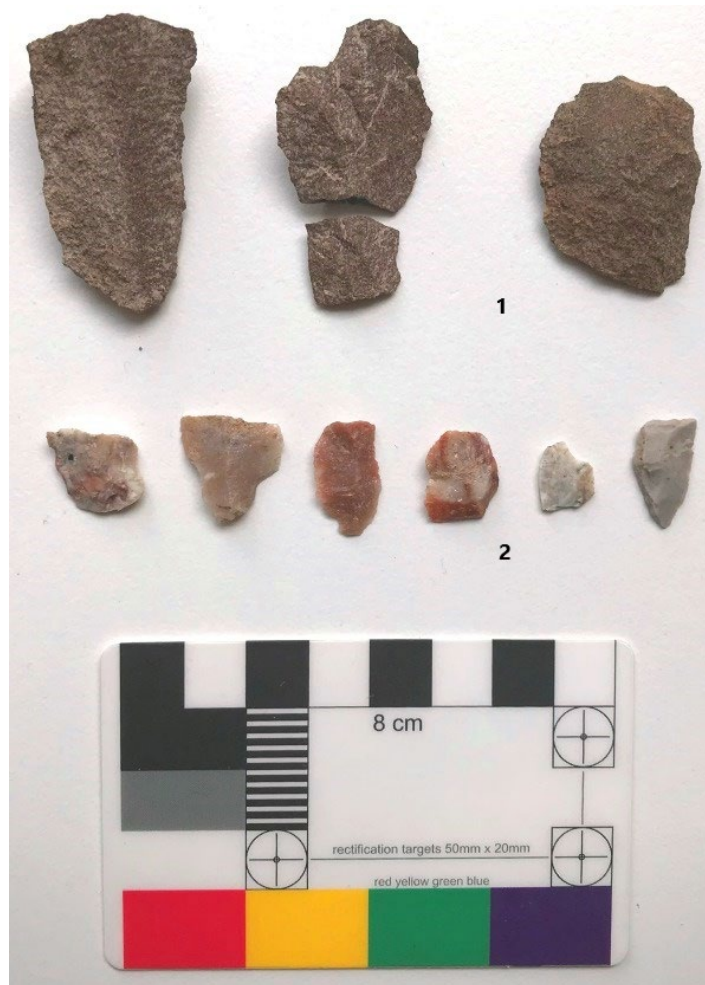


Plate 4.44 A sample of raw materials from NE83 - basalt (1) and silcrete (2)

4.7.6 Artefact types

The 109 artefacts recovered from NE83 were divided into 7 artefact types, which are represented in Plate 4.45. There is a distinctly high percentage of complete flakes ($n=63$), representing 58% of the artefact assemblage. The next most frequent type of artefacts are broken fragments of flakes (including proximal, medial and distal portions) accounting for 28% of the artefact assemblage ($n=31$), while cores ($n=3$, 3%), flaked pieces ($n=11$, 10%), and a single retouched basalt axe blank (1%) identified as a retouched flake in the data, comprise the remaining artefact types recovered from the site.

Flakes range in size from 8 mm to 42 mm and weighed from 0.04 g to 14 g (Plate 4.47). The flakes have an average length of 18 mm and weight of 1.28 g.

The three cores are silcrete and ranged in size from 34 mm to 42 mm in length and 18 g to 30 g in weight (Plate 4.47). Three silcrete blade flakes, as represented by complete flakes in the data, were identified at the site and range in size from 30 mm to 40 mm and weigh from 1.6 g to 3.5 g. A sample of flakes including the blade flakes recovered from the site are featured in Plate 4.46.

A basalt hatchet (retouched flake) was recovered from the test pit T2.00 in spit 1. It has bifacial retouch around the whole margin and the platform of the flake has been retained. It is 116 mm long and 66 mm wide and weighs 288 g (Plate 4.48).

The recovery of the hatchet and the discrete, high-density artefact knapping floor increase the significance of the site and supports the likelihood that this location is a basalt axe quarry.

4.7.7 Summary of NE83

Similar to NE70, NE83 represents an open camp site that is clearly demarcated by its discrete landform and outcropping geological material. The results suggest that the site was not only used to procure and shape basalt axe blanks but was also used as an open camp site. Possibly a reason for this site’s selection as a quarry was its favourable landscape features that would also support camping and associated stone tool manufacture activities. The bulk of the assemblage retrieved from one test pit (n=88) indicates that the protected landform of this site has relatively high archaeological integrity and that the artefacts possibly reflect one intensive knapping event whereby one or more silcrete cores were heavily reduced.

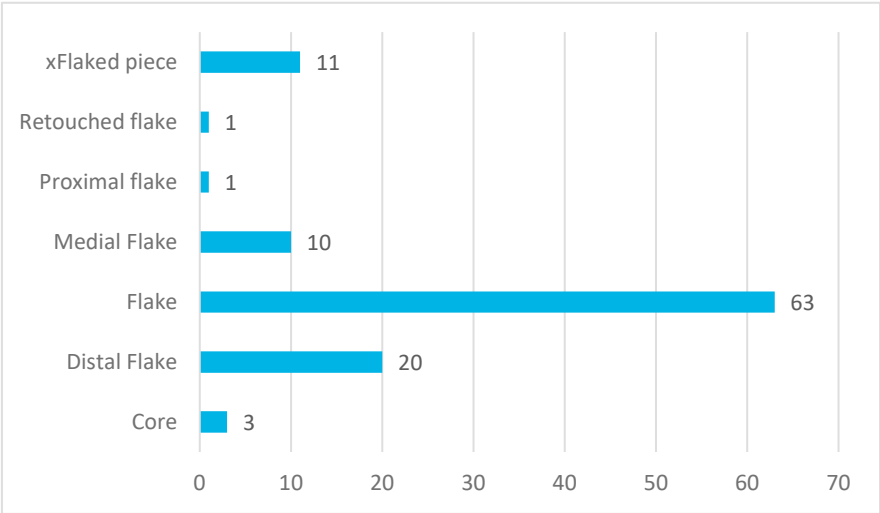


Plate 4.45 Artefact types and their frequency

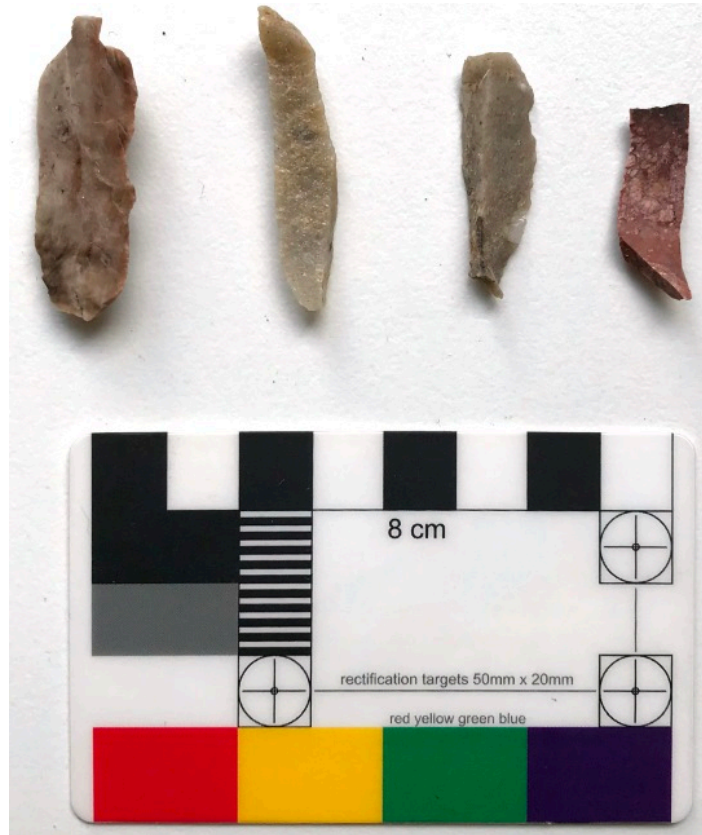


Plate 4.46 A sample of flakes including the three blade flakes recovered from NE83



Plate 4.47 The three silcrete cores recovered from NE83



Plate 4.48 **The basalt axe blank recovered from NE83 T2.00**

5 Test excavation discussion

The test excavation results build on the archaeological survey results in characterising the archaeological landscape of the development footprint and its surrounds. The test excavation has provided a window into the subsurface nature of archaeological sites. In some areas, the window has revealed a rich archaeological deposit much more complex than surface traces can provide. However, in other areas surface artefact distributions are equally, if not more, characteristic of a site than the subsurface results.

The primary aim of the test excavation was to identify suitable areas for project development and establish appropriate avoidance buffers. Therefore, the most significant areas of sites were not extensively explored; rather, once indicated during the fieldwork, testing would then radiate beyond significant areas to establish areas of low potential through drop-off in artefact frequencies. Accordingly, the results are limited in providing any robust characterisation of the more significant sites such as NE70 and NE83.

Notwithstanding, the results further support the prediction of relatively intact archaeological sites situated on elevated rocky crest landforms (refer Section 6.6.1 of the ACHAR – Appendix D of the EIS). This acknowledges that historical vegetation clearance, erosion and animal (namely livestock) disturbance has affected these sites, but they have been protected from intensive cultivation and the accelerated erosion and soil movement that is associated with this practice. Approximately 20 of the sites with PAD identified during the ACHA have similar characteristics that suggest archaeological deposit of potential conservation value. These sites include crests amongst outcropping granite, basalt and silcrete some of which are quarry sites and grinding groove sites; in particular NE09 which is likely to feature significant archaeological deposit. The commitment by UPC to avoid these sites will allow preservation of potentially significant archaeological deposits across the development footprint.

The stark drop-off in archaeological material beyond the rocky crests at NE70 and NE83 further support the notion that Aboriginal people targeted these landforms not only for raw materials (ie silcrete and basalt) and ground axe manufacture, but for utilitarian camping activities including the manufacture of not only large implements such as axe blanks, but small tool manufacture including backed implements for composite weapons, blades and scraping implements to create wooden and/or animal-based items. The reasons behind the significant artefact drop-off away from the rocky crests are likely because such areas are more disturbed and also would have represented either non-occupied or peripheral occupation areas.

Based on the predictive model employed for the ACHA, NE27 had arguably the highest archaeological potential out of open artefact sites within a cleared landscape (ie cultivated paddocks not associated with protected, rocky crests). NE27 has favourable landscape characteristics including being adjacent to perennial water on an elevated flat crest and within 1.5 km of the significant grinding groove NE09. However, although there is evidence of Aboriginal camping and stone tool manufacture, even the most sensitive areas closest to the watercourse are met with patchy results and low to moderate artefact frequencies per test pit (between 0 and 11 artefacts per test pit) when compared to NE70 (up to 60 artefacts per test pit). The most superficial reason for this contrast is that NE27 has been subject to repeated ploughing and cultivation, which although is likely to have affected only the top 10-15 cm of soil during each plough event, is likely to have increased erosion and movement of soils downslope as a result of the destabilised landscape. The overall implication of this small sample is that the other open camp sites in less favourable contexts on cleared and cultivated paddocks are likely to have low archaeological potential.

The additional evidence that NE83 represents a basalt axe quarry provides a significant connection to the broader archaeological landscape. Quarries for procuring axes were identified through an AHIMS search (#21-4-007 which is 1.6 km east of the northern array area and AHIMS#21-4-0004 which is 1.5 km west of the now-removed southern array area) but not elsewhere within the development footprint and surrounds. NE83 indicates that basalt material for axe grinding was sourced locally and was possibly used at nearby grinding groove sites such as NE09 (4.3 km south-east), NE68 (2.7 km south-east), and NE79 and NE80 (3 km south). However, the high frequency and scale of grinding groove sites locally (over 10 including those recorded on AHIMS) suggests that

there are likely to be far more quarries locally in unsurveyed areas, but also that axes were probably imported inter-regionally. Sites featuring basalt axes therefore have research potential for topics such as study into material provenance.

The raw materials recovered from the test excavation were generally expected. Silcrete dominates assemblages across the development footprint in surface and subsurface examples. There are two silcrete quarries in the development footprint (NE22 and NE14) and superficial observation of these materials suggest that open camp sites feature silcrete gathered across the local landscape. The use of basalt for finer implements (not axes) is also likely to have been sourced locally and possibly from within sites in the development footprint (eg NE21 and NE43). The source of quartz and chert for stone tools was not identified locally. Although chert is found throughout the Fairfield soil landscape in the development footprint, none of it was of suitable quality for stone tool manufacture. However, finer quality outcrops may exist outside the development footprint.

6 Significance assessment

6.1 Overview

The Aboriginal sites addressed in this report have been assessed for their cultural heritage significance which includes socio-cultural and historical values and archaeological or scientific values. This includes newly identified scar tree sites (NE97 and NE102) and open artefact sites (NE98, NE99 and NE100). The previously recorded scar tree sites (NE45, NE47, NE49, NE61 and NE67) have been reassessed based on the additional investigations. Furthermore, NE15, NE27, NE33, NE70 and NE83 have been reassessed based on the outcomes of the test excavation program.

6.2 Socio-cultural and historical value: significance for the Aboriginal community

Socio-cultural and historical values with Aboriginal sites are discussed in the significance assessment chapter of the ACHAR (refer Section 7.2 of Appendix D of the EIS). The Aboriginal community has identified that heritage values in the development footprint and its surrounds are directly linked with the Aboriginal sites identified during the survey and explored through excavation. No specific historical connection has been linked to the identified sites, but the community has expressed that the development footprint and broader Gostwyck and Uralla localities are likely to have formed part of what was known as Oorala, which is a local Anaiwan word meaning “a camp”, “meeting place” or “a place where people come together”. This refers to a meeting place between several bordering Aboriginal groups. The township of Uralla was named by European settlers based on the word Oorala.

With this notion in mind, the sites within the development footprint and project boundary should be viewed as part of a broader cultural and archaeological landscape whereby individual sites are connected to form a greater complex of Aboriginal cultural heritage values. Notwithstanding, EMM has attributed individual levels of archaeological significance for each site, but this is not aimed to detract from the value of a site, rather it is used as a practical tool to guide the level of management appropriate in response to potential impacts, including measures such as conservation.

6.3 Scientific value

6.3.1 Overview

The following scientific values are identified as ‘low’, ‘moderate’ or ‘high’ for each identified Aboriginal site with an overall rating identified based on the results of each individual assessment. The significance criteria are outlined below:

Research potential: the potential of a site to contribute to the present understanding of society and the human past. This is commonly linked to rarity, representativeness, site integrity, research themes and the potential extent of data retrievable for further analysis and interpretation. The research potential of archaeological sites is often only realised through archaeological investigation methods. A site with high research potential would be able to provide information about the past that is not obtainable from any other source, or supplements written and oral sources.

Rarity and representativeness: the frequency of a site type and how the sites relate to the wider archaeological record. The significance may be due to sites being uncommon because of the related activity that created them, or preservation, or they are uncommon now because of ongoing site destruction through development and change. Sites with high representative value would typically need to be a pivotal example of its type that demonstrates the principle characteristics of a site.

Integrity: the level of disturbance or intactness of a site and how this may affect research potential. For example, artefacts identified in heavily cultivated areas would be unsuited to addressing research questions of site structure, but it may still be useful to characterise the artefact types and raw materials used in the region.

Educational value: the potential of a site to be used as an educational tool. This usually includes sites with easily identifiable and accessible characteristics that are good representative examples. Sites with high educational value can have aesthetically distinctive or iconic qualities.

6.3.2 Scientific values

The scientific values for each site that are addressed in detail within this report are shown in Table 6.1. Statements of significance for all remaining Aboriginal sites can be found in Appendix D of the ACHAR (refer to Appendix D of the EIS).

Table 6.1 **Assessment of significance**

Site name	Site type	Research potential	Rarity	Representativeness	Integrity	Educational value	Overall significance
NE15	Artefact scatter	Low: Test excavation of NE15 indicates there is negligible archaeological potential due to skeletal soil profile and absence of artefacts in test areas. Surface artefacts have limited potential and the main resource of silcrete is to the north at NE14.	Low: This site is likely to be peripheral to NE14, which is relatively rare for featuring worked outcropping silcrete material. However, the silcrete material at NE15 alone is peripheral to NE14 and not uncommon locally or regionally.	Low: This site is not a good example of an open artefact scatter as its contents are sporadically distributed over the landform and only features larger cores.	Low: This site is moderately disturbed from vegetation clearance and pasture improvement. Outcrops and test excavation results indicate that the landform is highly eroded and the larger surface artefacts are likely to have been moved across the landscape by farming equipment.	Low: The site features some clear and good examples of larger cores and demonstrates the initial sequences in the stone tool manufacture process.	Low: Although this site features several silcrete cores on the ground surface, it has negligible archaeological potential and is likely to only represent the periphery of NE14.
NE27	Artefact scatter, confirmed deposit, PAD	Moderate: Landform is on a small crest overlooking a deeply incised third order stream. Test excavation of this site reveals sporadic low to moderate concentrations of stone artefacts which may represent discrete knapping events. Areas of moderate artefact frequencies are confined to within approximately 70 m of the watercourse.	Moderate: The site contents and landform are common for the local and regional area. However, an axe blank was found, which is rarer. The site is relatively rare in being a site with some archaeological potential in a cleared and unprotected landscape as opposed to deposits on rocky crests.	Low: Sparse assemblage and artefact types are not exceptional examples of this site type. Apart from the retouched basalt axe blank on the surface, the test excavation didn't identify any implements.	Moderate: Although landscape has been cleared and historically ploughed, some subsurface material exists, and clustering of artefacts may represent some discrete activity areas.	Low: The site has few example artefacts which are not easily identifiable examples of stone artefacts.	Moderate: Although a relatively common site type with common elements, its proximity to water and landform reveals an open camp site with areas of low to moderate archaeological potential.

Table 6.1 **Assessment of significance**

Site name	Site type	Research potential	Rarity	Representativeness	Integrity	Educational value	Overall significance
NE33	Isolated find	Low: The results of test excavation and additional inspection of basalt material has demonstrated that this is not a basalt quarry site. The site has negligible subsurface archaeological potential. Only one silcrete flake has been identified in this area.	Low: This site comprises a single silcrete flake which is very common locally and regionally.	Low: Single artefact is not a good representation of an open stone artefact site.	Low: Test excavation has revealed that soils are very shallow (less than 5 cm depth) before reaching medium to heavy clays.	Low: The site contains only one common silcrete artefact, which does not have easily identifiable characteristics.	Low: Test excavation and further inspection of surface material has revealed that this site is not a quarry and only features a single silcrete flake.
NE45	Modified tree	Low: The site has limited research potential apart from its landscape context and superficial characteristics.	Moderate: Relatively rare site type locally and regionally due to widespread vegetation clearance. Resource extraction scar (smoke hole) is a rare example in the local area.	Moderate: Scar has evidence of deliberate tool use and is a unique example of a resource extraction scar.	Low: Tree is highly decayed and dead. Scar regrowth ring has partially detached from tree trunk. Dry face missing.	Moderate: Unique educational example of resource extraction scar which represents smoking trees to flush out animals.	Moderate: Tree is in very poor condition but represents a unique scar type representative of a resource extraction scar.
NE47	Modified tree	Low: The site has limited research potential apart from its landscape context and superficial characteristics.	Moderate: Relatively rare site type locally and regionally due to widespread vegetation clearance.	Moderate: Scar is not a good or clear example of an Aboriginal scar tree.	Low: Tree is partially felled and dry face is missing. No extant dry face, though the overgrowth structure was clearly visible both within and on the outer surface of the trunk.	Moderate: Example of a tree that has been partially felled but has retained evidence of Aboriginal use.	Moderate: Partially felled tree and decaying tree scar. Relatively rare site type.
NE49	Modified tree	Low: The site has limited research potential apart from its landscape context and superficial characteristics.	Moderate: Relatively rare site type locally and regionally due to widespread vegetation clearance.	Moderate: Site is a good representative example of how Aboriginal scar trees have been removed through vegetation clearance.	Low: Tree is felled and has no locational context. This tree may have been imported to its current location.	Moderate: Unique example of a scar tree that has been felled. Example of post-contact damage to trees from agriculture.	Moderate: Tree is felled and scar is cut in half. However, the remaining scar form is a good example of a scar tree damaged by settler clearing practices.

Table 6.1 **Assessment of significance**

Site name	Site type	Research potential	Rarity	Representativeness	Integrity	Educational value	Overall significance
NE61	Modified tree	Not an Aboriginal scar tree: Scar likely product of European ringbarking activity.	Not an Aboriginal scar tree: Scar likely product of European ringbarking activity.	Not an Aboriginal scar tree: Scar likely product of European ringbarking activity.	Not an Aboriginal scar tree: Scar likely product of European ringbarking activity.	Not an Aboriginal scar tree: Scar likely product of European ringbarking activity.	Not an Aboriginal scar tree: Scar likely product of European ringbarking activity.
NE67	Modified tree	Low: The site has limited research potential apart from its landscape context and superficial characteristics.	Moderate: Relatively rare site type locally and regionally due to widespread vegetation clearance.	Low: Ambiguous scars with no dry face makes poor example of a scar tree.	Low: Tree is cracked and highly decayed. Crown branches are causing continual movement of tree which is likely to fall during storms in the future.	Low: Poor example of scars and tree.	Moderate: Although tree is highly weathered and damaged, the site type is rare and it is a testament to Aboriginal occupation of the area.
NE70	Artefact scatter, confirmed deposit, PAD	High: The site is a landform directly adjacent to a stream with outcropping granite serving as a protectant to disturbance. Test excavation results reveal high artefact densities including identifiable stone implement types including axe blanks and backed artefacts. Further testing of this site would provide a robust sample of stone artefacts from an open camp site.	High: Relatively unique instance of crest/knoll occurring directly adjacent to a stream and potentially a freshwater spring that may have provided more reliable water. Although there are approximately 20 other sites in the development footprint and surrounds with similar landscape contexts, this site remains a rare example of an extensive subsurface deposit until other examples are explored.	High: Site is a good example of an open camp site adjacent to a watercourse. The site features a representative landform element, a variety of stone artefacts and an aesthetically pleasing context amongst outcropping stone.	High: Although site has been historically cleared, it is unlikely to have been subject to repeated farming disturbance such as ploughing. Test excavation results reveal that area of integrity is limited to rocky knoll landform and does not extend into the cleared and cultivated paddock to the west of the PAD area.	High: The site is aesthetically pleasing by representing a site contained within a defined knoll landform with outcropping granite material. The site contains a large sample of a variety of stone artefacts which could be used as educational material for stone artefact identification and analysis.	High: A good example of an open stone artefact site with easily identifiable features and good examples of artefacts. This site has high research potential.

Table 6.1 **Assessment of significance**

Site name	Site type	Research potential	Rarity	Representativeness	Integrity	Educational value	Overall significance
NE83	Isolated find, confirmed deposit, PAD	High: The presence of two basalt axe blanks amongst outcropping basalt material indicates that this site is a quarry along with being an open camp site as indicated by test excavation. Avenues of research include provenance analysis of the basalt raw material with the attempt to link stone axes in the locality and region to the type of basalt in this area.	High: This is the only example of a potential small basalt axe quarry in the development footprint. It has high connectedness to nearby grinding groove sites.	High: The site features good examples of an axe blanks and the artefacts recovered from test excavation provide a good example of an open camp site on a clearly defined landform.	Moderate: Basalt outcrop is in good condition but the subsurface nature of the site is limited by being on skeletal soils with high basalt rock content.	Moderate: Although the site contains easily identifiable artefact types, they are limited in number and there are much better examples of the same artefact types amongst greater artefacts.	High: NE83 provides a unique example of potential basalt axe quarry and an open camp site with smaller (mainly silcrete) implements. The site is significant as it has research potential for provenance analysis and may have connectedness to nearby grinding groove sites.
NE97	Scarred tree	Low: The site has limited research potential apart from its landscape context and superficial characteristics.	Moderate: Relatively rare site type locally and regionally due to widespread vegetation clearance.	Moderate: Good example of scar with extensive scar overgrowth.	Moderate: The tree is dead but in relatively good condition except for degraded dry face.	Moderate: Good example of typical scar tree shape.	Moderate: Good example of a scar tree; however, tree is dead and will continue to deteriorate.
NE98	Isolated find	Low: Common site type, isolated artefact.	Low: Site contents and landform are very common for this site type.	Low: Sparse assemblage and artefact types are not exceptional examples of this site type.	Low: Site is moderately disturbed in a visibly ploughed paddock.	Low: The site has few example artefacts, which are not easily identifiable examples of stone artefacts.	Low: Common site type and characteristics in moderately disturbed context.
NE99	Isolated find	Low: Common site type, isolated artefact.	Low: Site contents and landform are very common for this site type.	Low: Sparse assemblage and artefact types are not exceptional examples of this site type.	Low: Site is moderately disturbed in a visibly ploughed paddock.	Low: The site has few example artefacts which not easily identifiable examples of stone artefacts.	Low: Common site type and characteristics in moderately disturbed context.

Table 6.1 **Assessment of significance**

Site name	Site type	Research potential	Rarity	Representativeness	Integrity	Educational value	Overall significance
NE100	Open artefact scatter	Low: Common site type, low artefact frequency, eroded crest on rocky and skeletal soils.	Low: Site contents and landform are very common for this site type.	Low: Sparse assemblage and artefact types are not exceptional examples of this site type.	Low: Site is moderately disturbed from vegetation clearance and erosion.	Low: The site has few example artefacts, which are not easily identifiable examples of stone artefacts.	Low: Common site type and characteristics.
NE101	Not an Aboriginal scar tree	Not an Aboriginal scar tree: Scar likely product of insect activity.	Not an Aboriginal scar tree: Scar likely product of insect activity.	Not an Aboriginal scar tree: Scar likely product of insect activity.	Not an Aboriginal scar tree: Scar likely product of insect activity.	Not an Aboriginal scar tree: Scar likely product of insect activity.	Not an Aboriginal scar tree: Scar likely product of insect activity.
NE102	Scarred tree	Low: The site has limited research potential apart from its landscape context and superficial characteristics.	Moderate: Relatively rare site type locally and regionally due to widespread vegetation clearance.	Moderate: Good example of scar shape with extensive scar overgrowth. However, missing features (ie dry face) and current damage to tree reduces its potential to be exemplary of its class.	Moderate: The tree is dead but scar is in relatively good condition; however, scar dry face is missing and damage elsewhere on tree detracts from this criterion.	Moderate: Decent example of typical scar tree shape for bark slab removal and is easily observable due to its large size. It demonstrates how Aboriginal people constructed temporary shelters.	Moderate: Although the tree is in relatively poor condition; the scar shape and level of regrowth provide good example of a scar possibly created in the process of bark slab shelter construction.

7 Impact assessment and management

7.1 Impact assessment

The impact assessment for the project was previously completed during the EIS as part of the ACHAR (Appendix D of the EIS). Chapter 8 of the ACHAR details the potential sources of impact from the project, measures to minimise harm and alternatives, cumulative impacts and intergenerational equity considerations. The focus of this section is to provide a summary of the revised impact assessment based on the outcomes of the additional investigation and significance assessment and the refinements to the project that are described in detail within Chapter 2 of the AR.

A breakdown of the degree of impact by project element on each site type is presented in Table 7.1.

Out of the 100 sites determined to be Aboriginal objects in the ACHAR (including the additional assessment undertaken and described in this report), 65 sites will be avoided and 35 sites will be impacted to some degree. Of the impacted sites:

- 28 sites will be totally disturbed;
- 2 sites will be partially disturbed; and
- 3 sites will be subject to total loss.

Note that the trees NE61 and NE101 will also be removed but are not considered to be Aboriginal scar trees and therefore are not Aboriginal objects – refer to Section 3.1.2 of this report. These sites are not accounted for in Table 7.1.

As described in Section 8.2 of the ACHAR, two of the sites listed as being impacted (NE10 and NE13) will not be impacted by the project elements; however, RAPs have raised concern that they may be inadvertently impacted by project landholder vehicle movements in the future. These sites are currently on existing farm access tracks outside the development footprint but within the project boundary. The project landholders are aware of their existence and are avoiding the sites; however, during consultation, RAPs noted that they would prefer it if their surface contents are collected to ensure the artefacts are not lost. Accordingly, this report has set out surface collection as management for these sites and therefore they are noted as being impacted from this particular activity.

As a result of the removal of the southern array area, a total of 11 sites previously designated for impact will now be avoided by the project as they are no longer within the development footprint. However, UPC may seek an Aboriginal Heritage Impact Permit (AHIP) separate to the development application to permit the collection of surface stone artefacts which would allow landholders to continue with agricultural production activities (namely grazing).

As a result of the additional scar tree survey and verification exercise and OEH's submission regarding tree scars, UPC has committed to avoiding all 13 standing probable Aboriginal scar trees identified for this project.

One felled probable Aboriginal scar tree (NE49) will be impacted; however, this tree will be salvaged (refer to Section 7.2). This site is already out of context and would continue to deteriorate at an accelerated pace in contact with the ground, unless removed through salvage. NE61 and NE101 are not considered to be Aboriginal scar trees and therefore will be impacted through the development of the solar arrays.

The test excavation results at NE27 and NE70 have assisted in characterising the extent and nature of subsurface archaeological material. UPC will avoid the significant portions of these sites by applying minimum impact avoidance boundaries which are shown on Figure 4.2 (NE27), Figure 4.4 (NE70) and Figure 4.5 (NE83) and described in Section 7.2. These sites will receive peripheral impacts in areas of low to negligible archaeological potential

(generally in areas where test pits recovered either one or no stone artefacts) through project development. The proposed impact areas adjacent to these sites are areas where it is acknowledged that the subsurface material may have been peripheral to the main camp areas once occupied by Aboriginal people, or that the material may have been dispersed through post-depositional disturbance and soil movement.

NE83 is likely to be a basalt quarry and will be avoided. Test excavation extending away from the site and PAD boundary did not identify archaeological material and therefore it is unlikely that the project will impact archaeological material associated with NE83.

NE15 may be impacted by the construction of the northern array area. No archaeological deposit was identified during test excavation and, therefore, the primary impacts will be to the surface artefacts associated with this site.

NE33 is outside of the amended development footprint; however, test excavation did not identify archaeological deposit at NE33 and it would hypothetically be suitable for future development.

Table 7.1 Degree of impact by project element

Impact type/site type	Level of impact					Total
	None	Partial disturbance	Total disturbance	Total loss	Other	
None						65
Artefact scatter	10					10
Artefact scatter, PAD	7					7
Dry stone wall (historical site)	1					1
Grinding groove	1					1
Grinding groove, artefact scatter, PAD	4					4
Grinding groove, PAD	1					1
Isolated find	21					21
Isolated find, PAD	1					1
Quarry, artefact scatter, PAD	4					4
Scarred tree	13					13
Isolated find, confirmed deposit, PAD	1					1
Open artefact scatter	1					1
Array impact						29
Artefact scatter			5			5
Isolated find			23			23
Scarred tree				1		1
Substation/BESS footprint				2		2
Isolated find				2		2
Other						2

Table 7.1 Degree of impact by project element

Impact type/site type	Level of impact					Total
	None	Partial disturbance	Total disturbance	Total loss	Other	
Artefact scatter					1	1
Isolated find, PAD					1	1
<i>Peripheral impact by array</i>						1
Artefact scatter, confirmed deposit, PAD		1				1
<i>Peripheral impact by access road</i>						1
Artefact scatter, confirmed deposit, PAD		1				1
Total	65	2	28	5	2	100

7.2 Management measures

7.2.1 Overview

This section aims to provide a revised summary of Aboriginal cultural heritage management measures presented in Section 9.2 of the ACHAR (Appendix D of the EIS) in response to the outcomes of the additional investigations described in this report and the amendments to the project. The management measures to be applied to each identified site are illustrated in Figure 7.1 and figures 7.1A to 7.1H and a summary of the number of sites addressed by each proposed management measure is provided in Table 7.2. The management measures and methods described in Chapter 9 of the ACHAR remain relevant, except where revised and updated below. Table 7.3 provides a revised summary of all Aboriginal sites, significance ratings, impact types and management measures for the project. A consolidated summary of management and mitigation measures are provided in Table B.7.1 of the AR.

Table 7.2 Site management summary

Management measure/site type	Count
Avoidance	65
Artefact scatter	10
Artefact scatter, PAD	7
Dry stone wall (historical site)	1
Grinding groove	1
Grinding groove, artefact scatter, PAD	4
Grinding groove, PAD	1
Isolated find	21
Isolated find, confirmed deposit, PAD	1
Isolated find, PAD	1

Table 7.2 **Site management summary**

Management measure/site type	Count
Open artefact scatter	1
Quarry, artefact scatter, PAD	4
Scarred tree	13
No management required (not an Aboriginal scarred tree)	2
Not an Aboriginal scarred tree	2
Salvage (remove and relocate)	1
Scarred tree	1
Surface collection	32
Artefact scatter	6
Isolated find	25
Isolated find, PAD	1
Avoid significant area (unmitigated impact to peripheral area with low to negligible artefact densities)	2
Artefact scatter, confirmed deposit, PAD	2
Total	102

7.2.2 Avoidance

A total of 65 sites will be completely avoided by the project. Additionally, two sites investigated during test excavation (NE27 and NE70) will have their significant areas avoided by the project with only peripheral impacts expected to areas of low to negligible archaeological potential. The anticipated archaeological deposit associated with NE83 will be avoided. The required minimum setbacks/avoidance areas for the relevant sites investigated through test excavation are shown on Figure 4.2 (NE27), Figure 4.4 (NE70) and Figure 4.5 (NE83). Details around avoidance methods for these sites (eg demarcation and temporary fencing) along with the avoidance methods described in Section 9.2.3 of the ACHAR (Appendix D of the EIS) will be detailed in the project's AHMP.

7.2.3 Surface collection

All surface artefact sites (artefact scatters and isolated finds) impacted by the project will be collected. This will involve collecting the entire visible contents of 26 isolated artefacts and six artefact scatters. The collection methods described in Section 9.2.4 of the ACHAR (Appendix D of the EIS) will be detailed in the project's AHMP. This includes the surface stone artefacts at site NE15 that was investigated through test excavation.

7.2.4 Aboriginal scar tree management

The felled and sawn in half Aboriginal scar tree, NE49, will be salvaged prior to project construction and placed in an Aboriginal keeping place as discussed in Section 9.3.1 of the ACHAR (Appendix D of the EIS). The project's AHMP will detail the methods for salvage, curation and presentation of the tree.

The 13 standing Aboriginal scar trees will be avoided and will receive the same general avoidance methods as described in Section 9.2.3 of the ACHAR (Appendix D of the EIS). However, they may require additional management to address their long-term preservation given that most examples are on highly deteriorated trees.

The project's AHMP will detail long-term preservation options for the trees in consultation with RAPs, the project archaeologist and OEH. The duration of UPC's management commitments for the trees would be limited to the estimated 25-30 years of the project's operation prior to decommissioning.

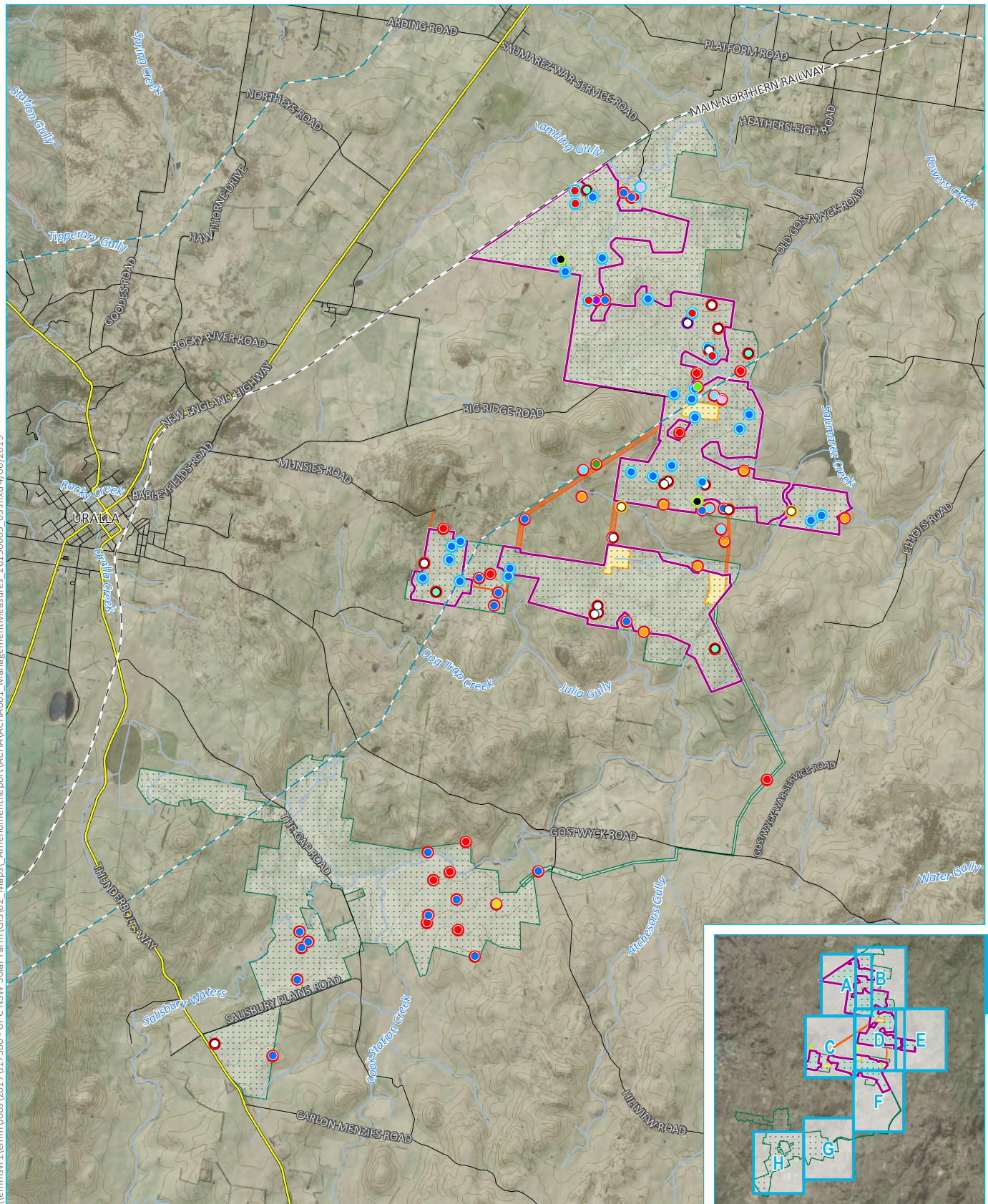
Note that Aboriginal scar tree NE35 is no longer within the development footprint and therefore UPC will not employ long-term preservation measures for this site.

7.2.5 RAP site access arrangements

As described in Section 9.3.2 of the ACHAR (Appendix D of the EIS), UPC is committed to providing ongoing management opportunities and access for Aboriginal people to NE09, and access to NE68 following completion of construction. The details of site access for NE09 and NE68 will be developed during consultation with the RAPs as part of the development of the AHMP.

It is understood that the University of New England (UNE) has been awarded a research grant to further investigate site NE09. The grant may also include provisions for site fencing and protection. UPC will continue to consult with UNE to ensure appropriate access and site management measures are in place.

\\lemmsvr1\emms\Jobs\2017\U17300 - UPC NSW Solar Farm\GIS\02_Maps\AmendmentReport\ACHA\ACHA001_ManagementMeasures_20190603_03.mxd 4/06/2019



Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)

KEY

- 330 kV transmission line
- Main road
- Local road
- Rail line
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/electrical cabling
- Potential substation/BESS footprint

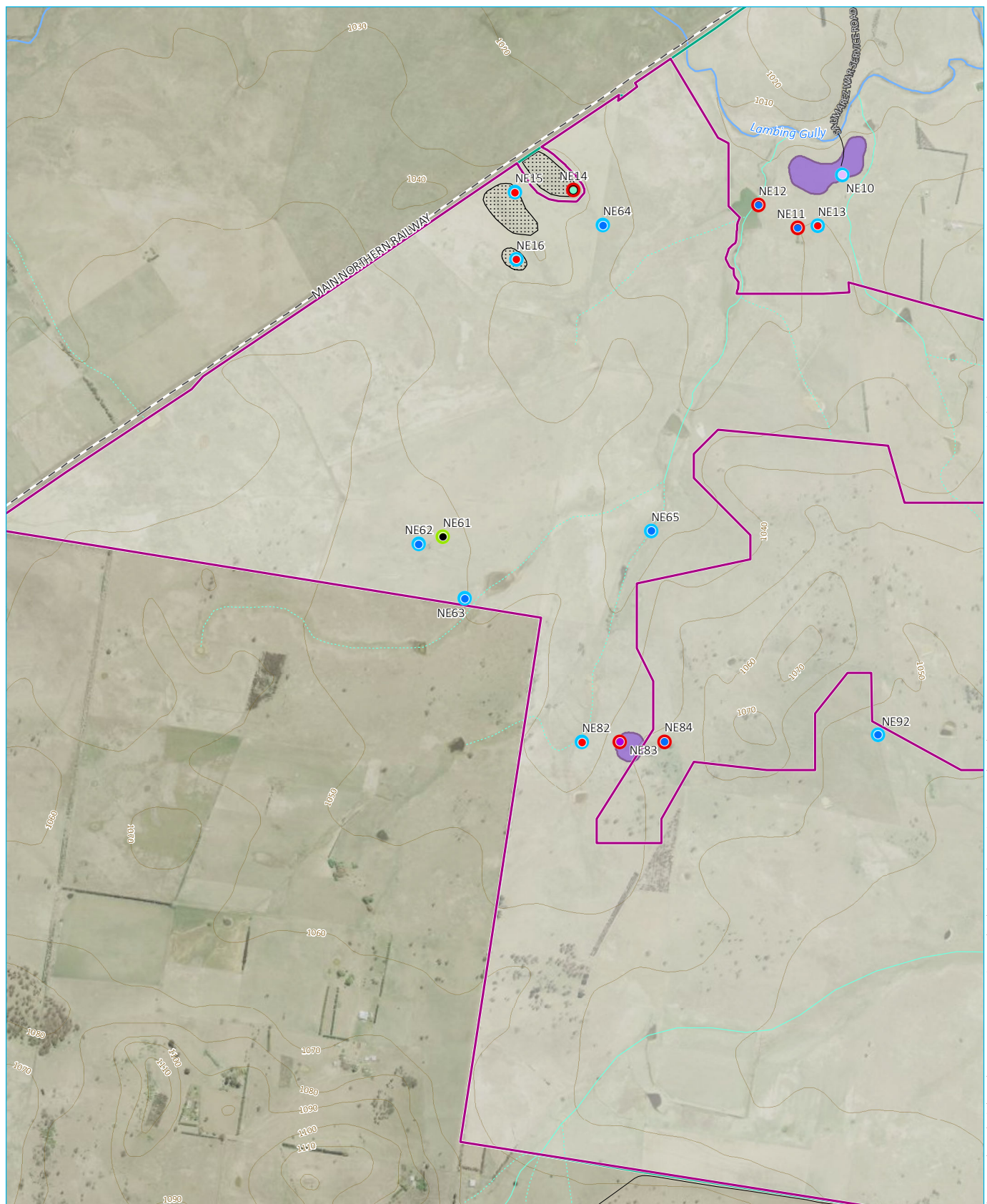
Management measure

- Avoidance
- Avoid significant area
- Surface collection
- Salvage: remove and relocate
- No management required
- Site type
- Artefact scatter
- Artefact scatter, PAD
- Artefact scatter, confirmed deposit, PAD

- Dry stone wall
- Grinding groove
- Grinding groove, PAD
- Grinding groove, artefact scatter, PAD
- Isolated find
- Isolated find, PAD
- Isolated find, confirmed deposit, PAD
- Quarry, artefact scatter, PAD
- Scarred tree
- Not an Aboriginal scar tree

Revised management and mitigation measures – overview

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1



Source: EMM (2019); DFSI (2017); UPC (2019)

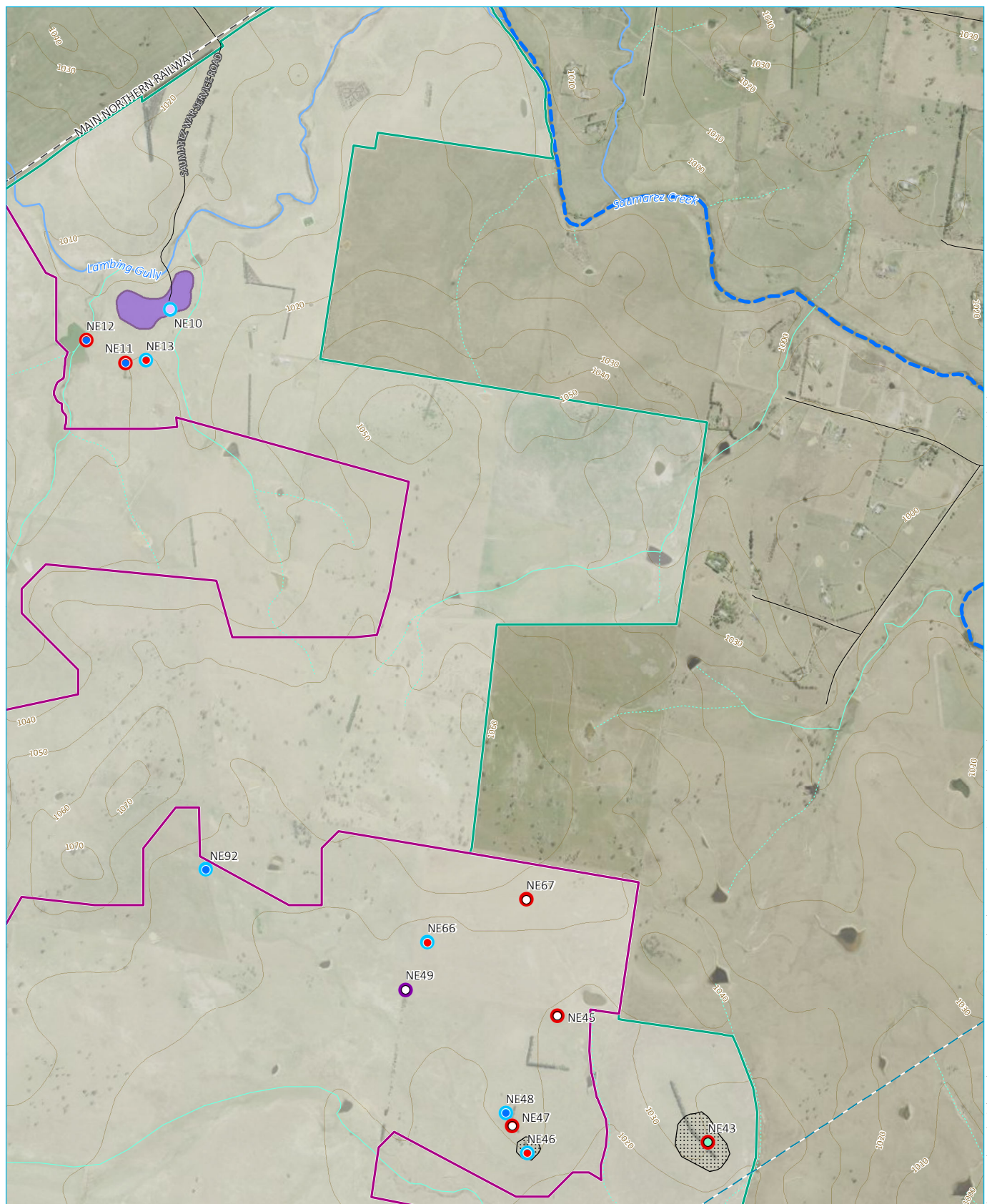
0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

Local road	PAD/minimum avoidance area	Site type	Management measure
Rail line	Site	Artefact scatter	Avoidance
Contour (10 m)	Strahler stream order	Isolated find	Surface collection
Study area	1st order	Isolated find, PAD	No management required
Development footprint	2nd order	Isolated find, confirmed deposit, PAD	
Solar array	3rd order	Quarry, artefact scatter, PAD	
		Not an Aboriginal scar tree	

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1A



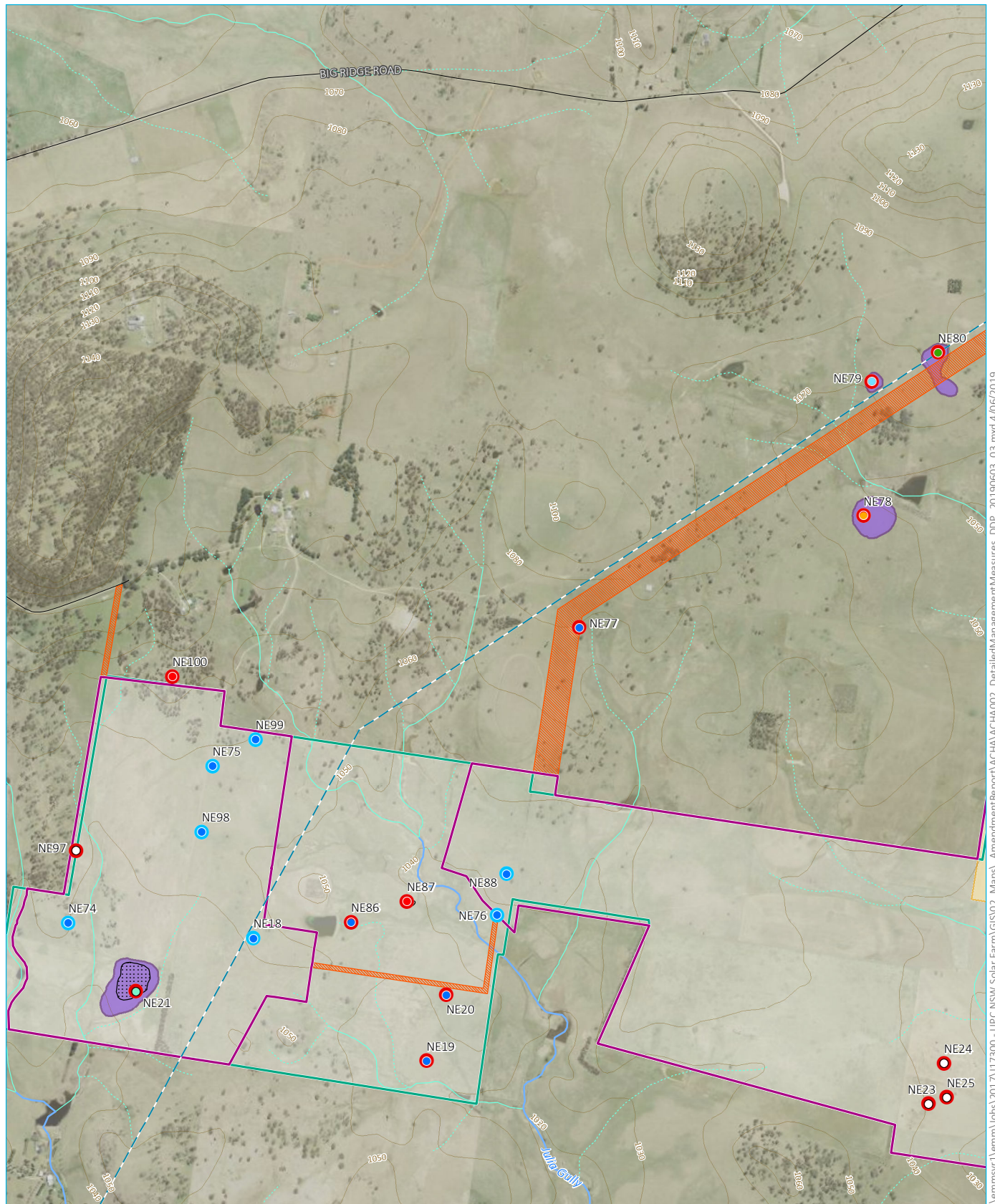
Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

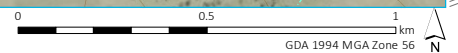
— 330 kV transmission line	■ PAD/minimum avoidance area	● Site type	● Management measure
— Local road	■ Site	● Artefact scatter	● Avoidance
— Rail line	— Strahler stream order	● Isolated find	● Surface collection
— Contour (10 m)	— 1st order	● Isolated find, PAD	● Salvage: remove and relocate
■ Study area	— 2nd order	● Quarry, artefact scatter, PAD	
■ Development footprint	— 3rd order	○ Scarred tree	
■ Solar array	— 5th order		

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1B



Source: EMM (2019); DFSI (2017); UPC (2019)

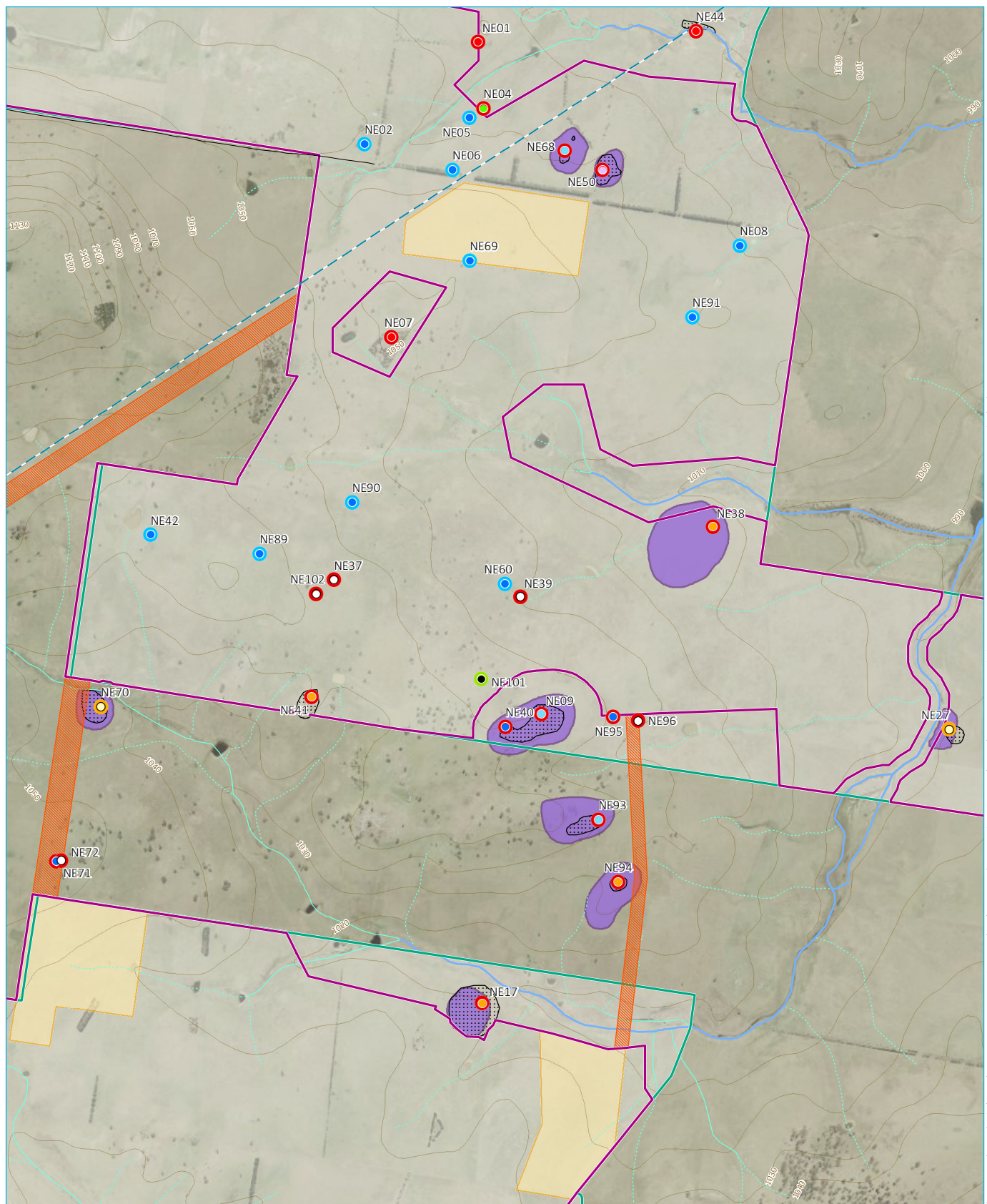


KEY

- | | | | |
|--|----------------------------|--|---------------------------|
| — 330 kV transmission line | PAD/minimum avoidance area | Site type | Management measure |
| — Local road | Site | Artefact scatter | Avoidance |
| — Contour (10 m) | Strahler stream order | Artefact scatter, PAD | Surface collection |
| Study area | — 1st order | Grinding groove, PAD | |
| Development footprint | — 2nd order | Grinding groove, artefact scatter, PAD | |
| Solar array | — 3rd order | Isolated find | |
| Potential site access/electrical cabling | | Quarry, artefact scatter, PAD | |
| Potential substation/BESS footprint | | Scarred tree | |

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1C



Source: EMM (2019); DFSI (2017); UPC (2019)

0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

- 330 kV transmission line
- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/electrical cabling
- Potential substation/BESS footprint

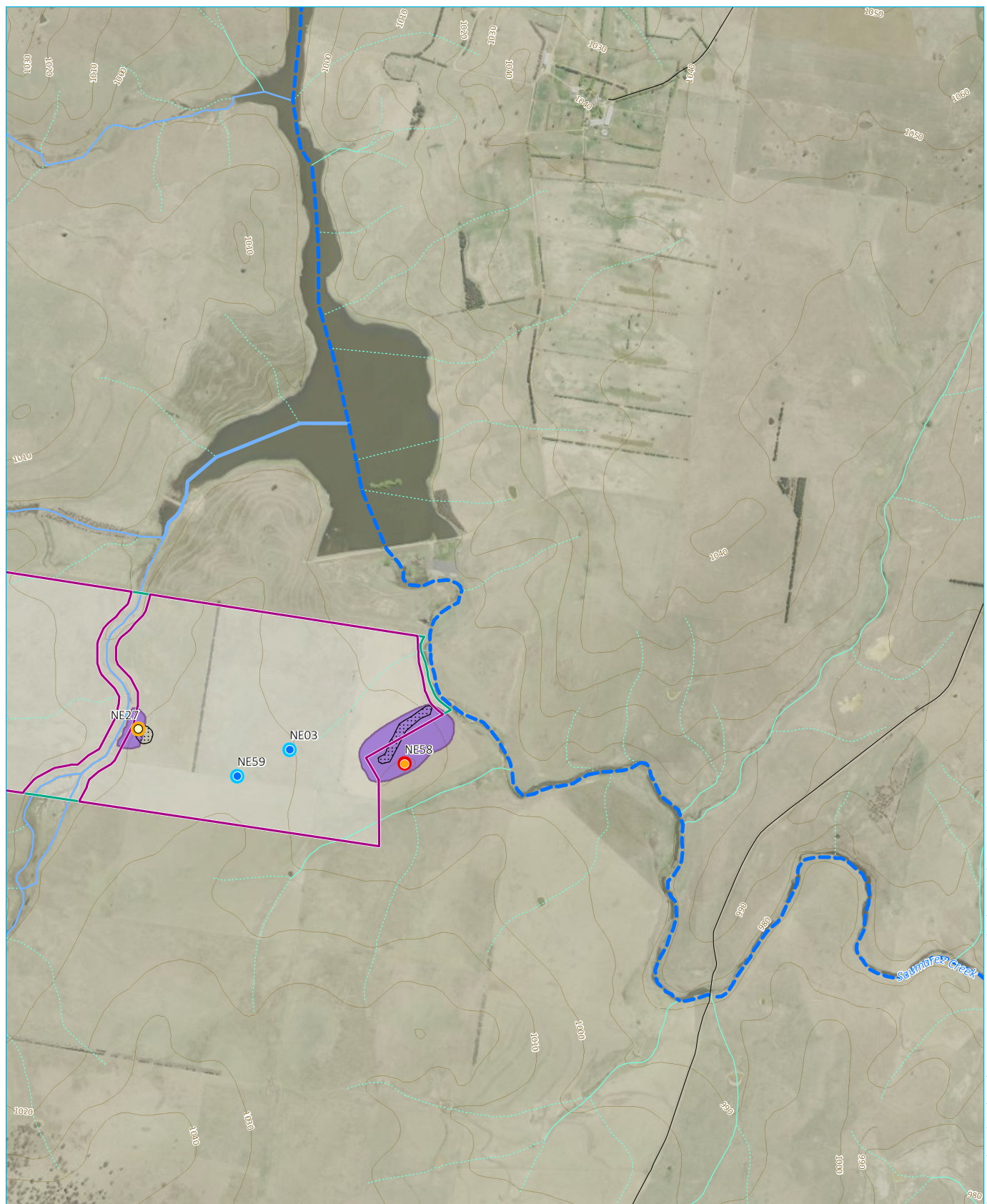
- PAD/minimum avoidance area
- Site
- Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order

- Site type
- Artefact scatter
- Artefact scatter, PAD
- Artefact scatter, confirmed deposit, PAD
- Grinding groove
- Grinding groove, artefact scatter, PAD
- Isolated find
- Isolated find, PAD
- Scarred tree
- Not an Aboriginal scar tree

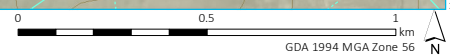
- Management measure
- Avoidance
- Avoid significant area
- Surface collection
- No management required

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1D



Source: EMM (2019); DFSI (2017); UPC (2019)

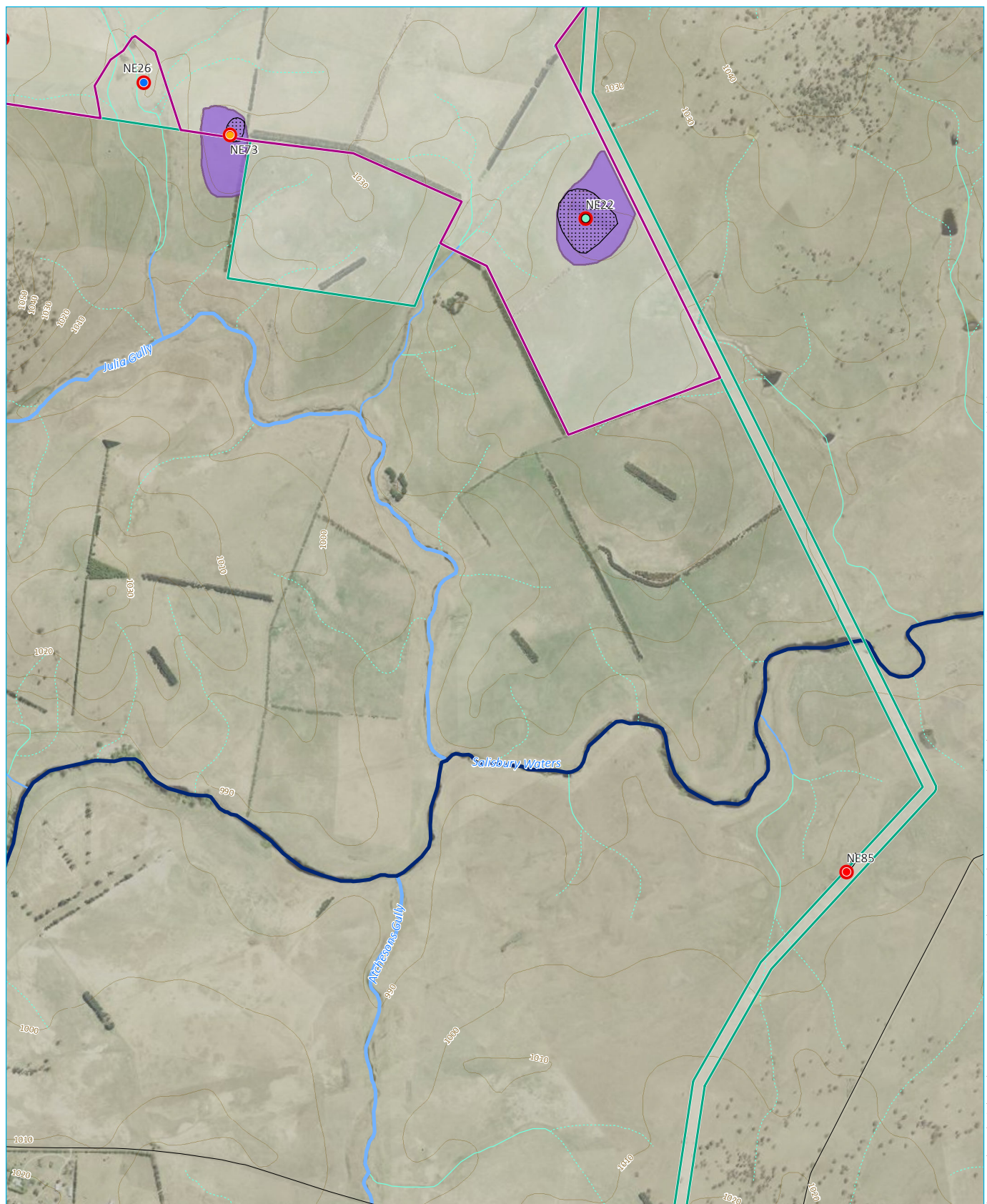


KEY

— Local road	PAD/minimum avoidance area	Site type	Management measure
— Contour (10 m)	Site	● Artefact scatter, PAD	● Avoidance
Study area	Strahler stream order	● Artefact scatter, confirmed deposit, PAD	● Avoid significant area
Development footprint	1st order	● Isolated find	● Surface collection
Solar array	2nd order		
	3rd order		
	4th order		
	5th order		

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1E



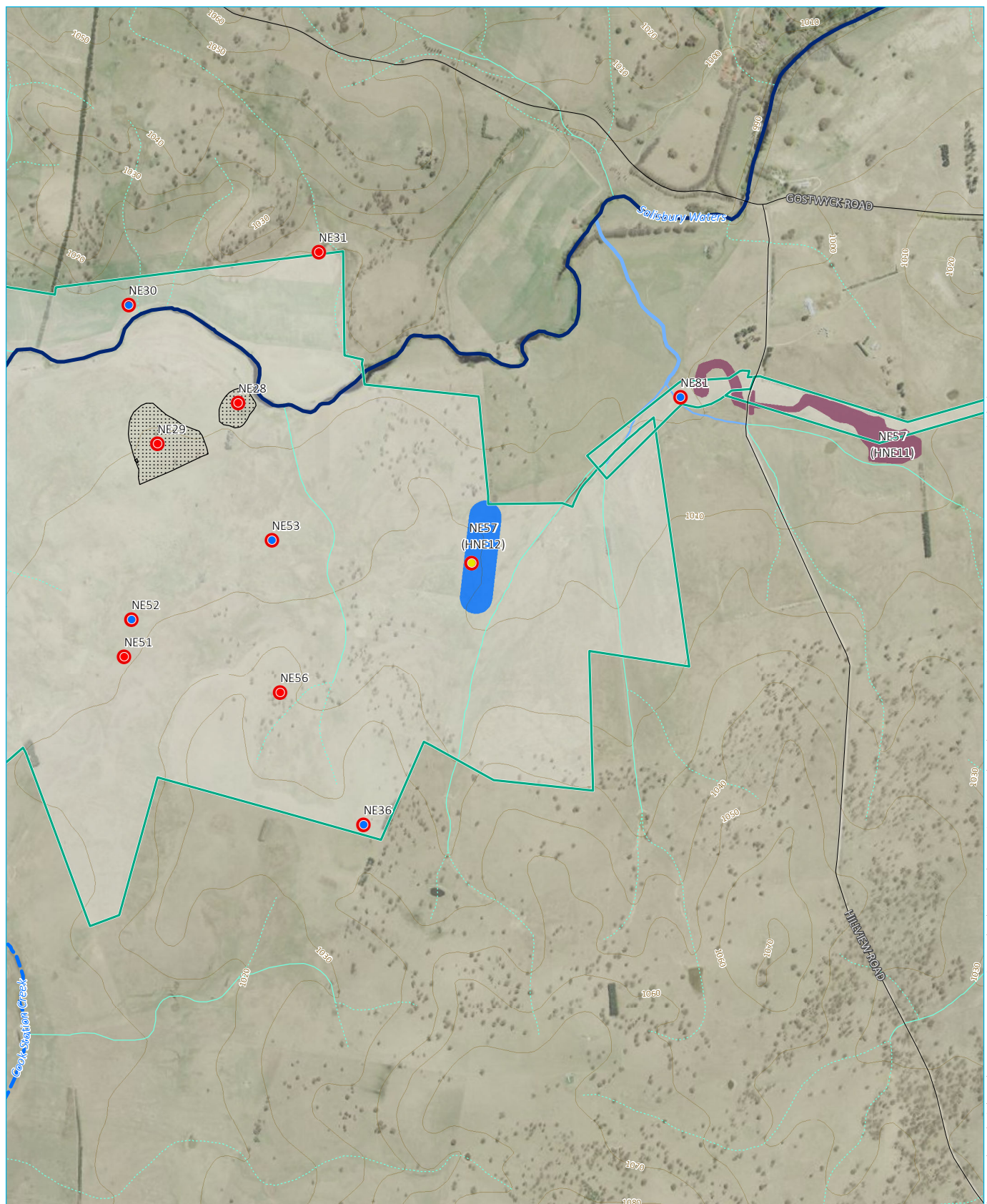
Source: EMM (2019); DFSI (2017); UPC (2019)

KEY

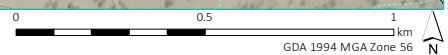
— Local road	PAD/minimum avoidance area	Site type	Management measure
— Contour (10 m)	Site	● Artefact scatter	○ Avoidance
Study area	Strahler stream order	● Artefact scatter, PAD	
Development footprint	1st order	● Isolated find	
Solar array	2nd order	● Quarry, artefact scatter, PAD	
	3rd order	○ Scarred tree	
	4th order		
	6th order		

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1F



Source: EMM (2019); DFSI (2017); UPC (2019)

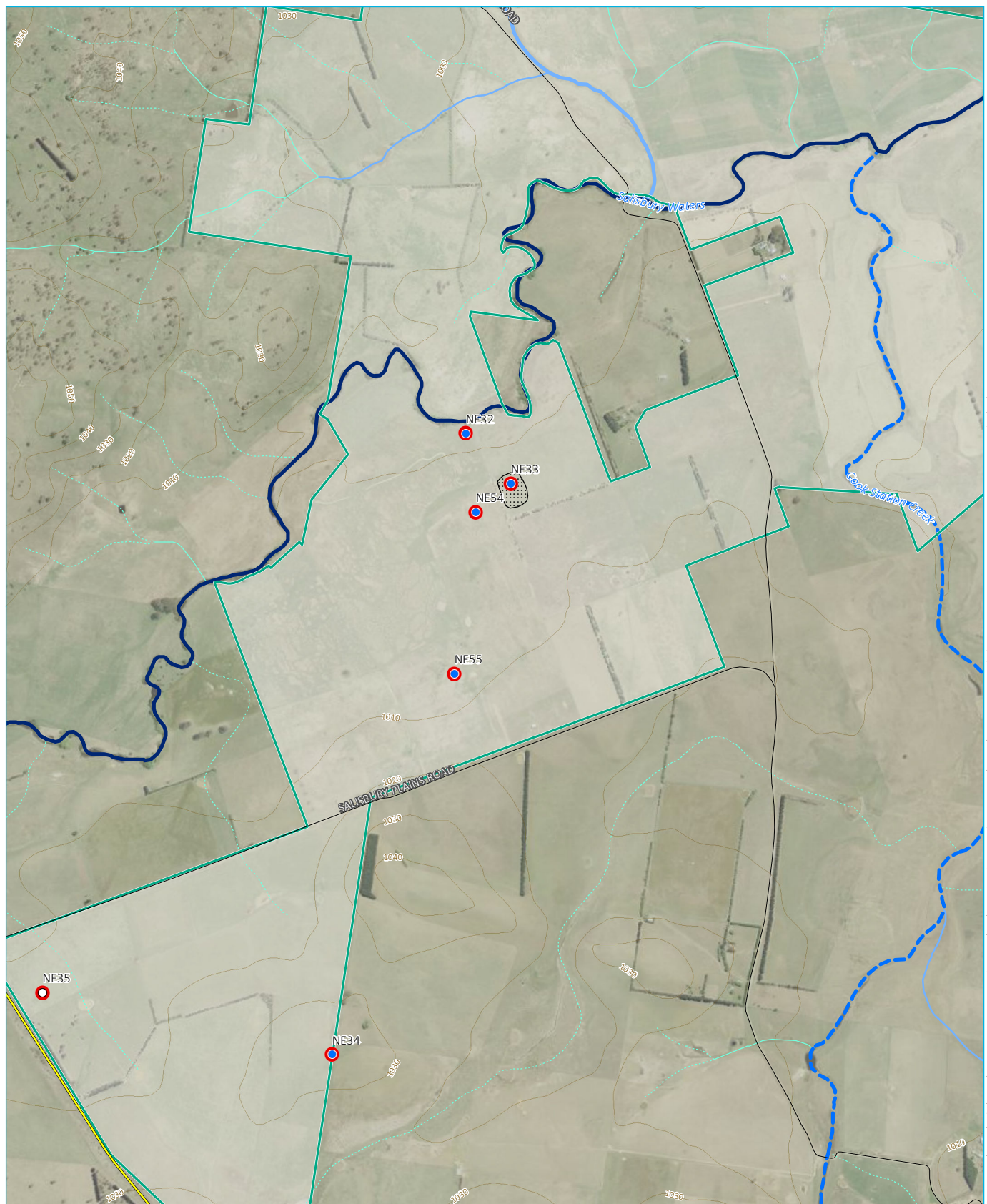


KEY

Local road	Site type	Management measure
Contour (10 m)	Artefact scatter	Avoidance
Study area	Dry stone wall	Identified in historic heritage assessment
Site	Isolated find	NE57 (HNE11)
Strahler stream order		NE57 (HNE12)
1st order		
2nd order		
3rd order		
4th order		
5th order		
6th order		

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1G



Source: EMM (2019); DFSI (2017); UPC (2019)

0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

Main road	Strahler stream order	Site type	Management measure
Local road	1st order	Isolated find	Avoidance
Contour (10 m)	2nd order	Scarred tree	
Study area	3rd order		
Site	4th order		
	5th order		
	6th order		

Revised management and mitigation measures

New England Solar Farm
Aboriginal cultural heritage
assessment addendum report
Figure 7.1H

Table 7.3 Site significance, impact and management summary

Site name:	Site type	Significance rating	Array area (north, central or south)	Level of impact	Impact Type	Management
NE01	Artefact scatter	Low	Northern	None	None	Avoidance
NE02	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE03	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE04	Grinding groove	Moderate	Northern	None	None	Avoidance
NE05	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE06	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE07	Artefact scatter	Moderate	Northern	None	None	Avoidance
NE08	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE09	Grinding groove, artefact scatter,	High	Northern	None	None	Avoidance
NE10	Isolated find, PAD	Moderate	Northern	Other	Other	Surface collection
NE11	Isolated find	Low	Northern	None	None	Avoidance
NE12	Isolated find	Low	Northern	None	None	Avoidance
NE13	Artefact scatter	Low	Northern	Other	Other	Surface collection
NE14	Quarry, artefact scatter, PAD	Moderate	Northern	None	None	Avoidance
NE15	Artefact scatter	Low	Northern	Total disturbance	Array impact	Surface collection
NE16	Artefact scatter	Low	Northern	Total disturbance	Array impact	Surface collection
NE17	Artefact scatter, PAD	Moderate	Central	None	None	Avoidance
NE18	Isolated find	Low	Central	Total loss	Substation/BESS footprint	Surface collection
NE19	Isolated find	Low	Central	None	None	Avoidance

Table 7.3 Site significance, impact and management summary

Site name:	Site type	Significance rating	Array area (north, central or south)	Level of impact	Impact Type	Management
NE20	Isolated find	Low	Central	None	None	Avoidance
NE21	Quarry, artefact scatter, PAD	Moderate	Central	None	None	Avoidance
NE22	Quarry, artefact scatter, PAD	Moderate	Central	None	None	Avoidance
NE23	Scarred tree	Moderate	Central	None	None	Avoidance
NE24	Scarred tree	Moderate	Central	None	None	Avoidance
NE25	Scarred tree	Low	Central	None	None	Avoidance
NE26	Isolated find	Low	Central	None	None	Avoidance
NE27	Artefact scatter, confirmed deposit, PAD	Moderate	Northern	Partial disturbance	Peripheral impact by array	Avoid significant area; unmitigated impact to peripheral area with low to negligible artefact densities.
NE28	Artefact scatter	Low	Southern (now removed)	None	None	Avoidance
NE29	Artefact scatter	Low	Southern (now removed)	None	None	Avoidance
NE30	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE31	Artefact scatter	Low	Southern (now removed)	None	None	Avoidance
NE32	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE33	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE34	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE35	Scarred tree	Moderate	Southern (now removed)	None	None	Avoidance

Table 7.3 Site significance, impact and management summary

Site name:	Site type	Significance rating	Array area (north, central or south)	Level of impact	Impact Type	Management
NE36	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE37	Scarred tree	Moderate	Central	None	None	Avoidance
NE38	Artefact scatter, PAD	Moderate	Northern	None	None	Avoidance
NE39	Scarred tree	Moderate	Northern	None	None	Avoidance
NE40	Isolated find	Moderate	Northern	None	None	Avoidance
NE41	Artefact scatter, PAD	Moderate	Northern	None	None	Avoidance
NE42	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE43	Quarry, artefact scatter, PAD	Moderate	Northern	None	None	Avoidance
NE44	Artefact scatter	Moderate	Northern	None	None	Avoidance
NE45	Scarred tree	Moderate	Northern	None	None	Avoidance
NE46	Artefact scatter	Low	Northern	Total disturbance	Array impact	Surface collection
NE47	Scarred tree	Moderate	Northern	None	None	Avoidance
NE48	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE49	Scarred tree	Moderate	Northern	Total loss	Array impact	Salvage: remove and relocate.
NE50	Isolated find, PAD	Moderate	Northern	None	None	Avoidance
NE51	Artefact scatter	Low	Southern (now removed)	None	None	Avoidance
NE52	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE53	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE54	Isolated find	Low	Southern (now removed)	None	None	Avoidance

Table 7.3 Site significance, impact and management summary

Site name:	Site type	Significance rating	Array area (north, central or south)	Level of impact	Impact Type	Management
NE55	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE56	Artefact scatter	Low	Southern (now removed)	None	None	Avoidance
NE57 - Historical	Dry stone wall (historical site)	Undetermined	Southern (now removed)	None	None	Avoidance
NE58	Artefact scatter, PAD	Moderate	Northern	None	None	Avoidance
NE59	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE60	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE61	Not an Aboriginal scar tree	Not applicable	Northern	Total loss	Array impact	No management required: not an Aboriginal scar tree.
NE62	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE63	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE64	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE65	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE66	Artefact scatter	Low	Northern	Total disturbance	Array impact	Surface collection
NE67	Scarred tree	Low	Northern	None	None	Avoidance
NE68	Grinding groove, artefact scatter,	High	Northern	None	None	Avoidance
NE69	Isolated find	Low	Northern	Total loss	Substation/BESS footprint	Surface collection

Table 7.3 Site significance, impact and management summary

Site name:	Site type	Significance rating	Array area (north, central or south)	Level of impact	Impact Type	Management
NE70	Artefact scatter, confirmed deposit, PAD	High	Central-North	Partial disturbance	Peripheral impact by access road	Avoid significant area; unmitigated impact to peripheral area with low to negligible artefact densities.
NE71	Isolated find	Low	Central-North	None	None	Avoidance
NE72	Scarred tree	Low	Central-North	None	None	Avoidance
NE73	Artefact scatter, PAD	Moderate	Central	None	None	Avoidance
NE74	Isolated find	Low	Central	Total disturbance	Array impact	Surface collection
NE75	Isolated find	Low	Central	Total disturbance	Array impact	Surface collection
NE76	Isolated find	Low	Central	Total disturbance	Array impact	Surface collection
NE77	Isolated find	Low	Central-North	None	None	Avoidance
NE78	Artefact scatter, PAD	Moderate	N/A	None	None	Avoidance
NE79	Grinding groove, artefact scatter,	High	Central-North	None	None	Avoidance
NE80	Grinding groove, PAD	High	Central-North	None	None	Avoidance
NE81	Isolated find	Low	Southern (now removed)	None	None	Avoidance
NE82	Artefact scatter	Low	Northern	Total disturbance	Array impact	Surface collection
NE83	Isolated find, confirmed	High	Northern	None	None	Avoidance
NE84	Isolated find	Low	Northern	None	None	Avoidance
NE85	Artefact scatter	Low	ETL South to Central (now removed)	None	None	Avoidance

Table 7.3 Site significance, impact and management summary

Site name:	Site type	Significance rating	Array area (north, central or south)	Level of impact	Impact Type	Management
NE86	Isolated find	Low	ETL Central	None	None	Avoidance
NE87	Artefact scatter	Low	ETL Central	None	None	Avoidance
NE88	Isolated find	Low	Central	Total disturbance	Array impact	Surface collection
NE89	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE90	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE91	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE92	Isolated find	Low	Northern	Total disturbance	Array impact	Surface collection
NE93	Grinding groove, artefact scatter,	Moderate	Central-North	None	None	Avoidance
NE94	Artefact scatter, PAD	Moderate	Central-North	None	None	Avoidance
NE95	Isolated find	Low	Central-North	None	None	Avoidance
NE96	Scarred tree	Moderate	Central-North	None	None	Avoidance
NE97	Scarred tree	Moderate	Central	None	None	Avoidance
NE98	Isolated find	Low	Central	Total disturbance	Array impact	Surface collection
NE99	Isolated find	Low	Central	Total disturbance	Array impact	Surface collection
NE100	Open artefact scatter	Low	Central	None	None	Avoidance
NE101	Not an Aboriginal scar tree	Not applicable	Northern	Total loss	Array impact	No management required: not an Aboriginal scar tree.
NE102	Scarred tree	Moderate	Northern	None	None	Avoidance

References

EMM Consulting Pty Limited 2018, *New England Solar Farm: Aboriginal cultural heritage assessment report*, report prepared for UPC Renewables Australia Pty Ltd, November 2018.

McBryde, I. 1974, *Aboriginal prehistory in New England*, Sydney University Press, Sydney.



Appendix A

Consultation documentation



Aboriginal Consultation Log: New England Solar Farm Consultation log	Contact type	Date	Comment
Post EIS Exhibition: Scar tree survey and archaeological test excavation: notice of survey and test excavation methods			
Organisation	Contact type	Date Sent	Comments
Nunawanna Aboriginal Corporation (NAC)	Email	18-Feb-19	Colin Ahoy replied requesting involvement in fieldwork (18/02/2019)
Armidale Local Aboriginal Land Council	Email	18-Feb-19	
Armidale and New England Gumbaynggirr Descendants	Email	18-Feb-19	Bruce Cohen replied requesting involvement in fieldwork (19/02/2019)
Aaron Broad	Email	18-Feb-19	No response provided
Les Townsend	Letter	18-Feb-19	No response provided
Steven Ahoy	Email	18-Feb-19	Steve Ahoy replied requesting involvement in fieldwork (26/02/2019)
Culturally Aware	Email	18-Feb-19	No response provided
Nyakka Aboriginal Culture Heritage Corporation Archaeological and Cultural Heritage Consultants	Email	18-Feb-19	No response provided
Nganyawana Clan Group	Email	18-Feb-19	Les Ahoy replied requesting involvement in fieldwork (20/02/2019)
Post EIS Exhibition: Scar tree verification update and approach email			
Organisation	Contact type	Date Sent	Comments
Nunawanna Aboriginal Corporation (NAC)	Email	24-Apr-19	
Armidale Local Aboriginal Land Council	Email	24-Apr-19	
Armidale and New England Gumbaynggirr Descendants	Email	24-Apr-19	
Aaron Broad	Email	24-Apr-19	
Les Townsend	Letter	24-Apr-19	
Steven Ahoy	Email	24-Apr-19	Ryan Desic talked to Steve Ahoy about the proposed approach as described in the email. Steve indicated that RAPs would wait until the report detailing the results was issued before making comment.
Culturally Aware	Email	24-Apr-19	
Nyakka Aboriginal Culture Heritage Corporation Archaeological and Cultural Heritage Consultants	Email	24-Apr-19	
Nganyawana Clan Group	Email	24-Apr-19	
Issue of ACHA amendment report to RAPs			
Organisation	Contact type	Date Sent	Comments
Nunawanna Aboriginal Corporation (NAC)	Email	04-Jun-19	
Armidale Local Aboriginal Land Council	Email	04-Jun-19	
Armidale and New England Gumbaynggirr Descendants	Email	04-Jun-19	
Aaron Broad	Email	04-Jun-19	
Les Townsend	Letter	04-Jun-19	
Steven Ahoy	Email	04-Jun-19	
Culturally Aware	Email	04-Jun-19	
Nyakka Aboriginal Culture Heritage Corporation Archaeological and Cultural Heritage Consultants	Email	04-Jun-19	
Nganyawana Clan Group	Email	04-Jun-19	

18 February 2019

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Re: J17300 - New England Solar Farm - Aboriginal cultural heritage assessment - Proposed scar tree survey and test excavation

Dear Registered Party,

1 Introduction and background

Thank you for your continued involvement in Aboriginal community consultation for the New England Solar Farm Project (the project), a photovoltaic (PV) solar development proposed by UPC Renewables Australia Pty Ltd (UPC). This letter provides information about a proposed program of archaeological test excavation and additional surveys to inspect trees within the development footprint. EMM Consulting Pty Limited (EMM) on behalf of UPC welcomes your feedback on the content of this letter prior to **Friday 1 March 2019**.

The proposed fieldwork was discussed in Section 9.4 of the Aboriginal cultural heritage assessment report (ACHAR) and during a meeting with registered Aboriginal parties (RAPs) on 19 October 2018.

EMM plans to conduct the fieldwork with the assistance of representatives from RAPs starting on **Wednesday 6 March 2019**. The fieldwork will start with the additional scar tree survey and will continue into a test excavation program. The exact dates of the fieldwork including a roster for RAP fieldworker representatives will be provided closer to the proposed start date.

2 Scope

2.1 Scar tree survey

The additional tree survey and scar tree verification will involve the following:

- An EMM Archaeologist accompanied by three representatives from RAPs will conduct the survey over three days. The team of four will be split equally into two vehicles with a navigator and a driver that will travel together but regularly separate to examine clusters of trees within visual and UHF radio distance of each other. All potential Aboriginal scar trees will be inspected by the archaeologist with RAP consultation prior to recording.
- EMM will report to UPC on any newly identified scar trees. The priority will be for these to be avoided. If they cannot be avoided, then they will be added to the list of scar trees requiring additional expert verification. This list currently comprises the following sites: NE45; NE61; NE49; NE47; and NE67 (refer to Section 9.4.1 of the ACHAR).
- EMM will organise for a scar tree specialist to examine the scar trees requiring verification. Based on RAP advice, either Mal Ridges or John Appleton will be engaged to assist with this task (subject to their availability). EMM and UPC will consult RAPs on the outcomes of this exercise and develop appropriate management measures.

2.2 Test excavation

2.2.1 Background

EMM initially presented proposed assessment methodology for the project to RAPs in May 2018. This outlined that test excavation may be required as part of the project ACHA. EMM stated that the test excavation would follow the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code) (DECCW 2010).

RAPs were notified about the potential requirement for test excavation at five sites identified as part of the ACHA (ie NE15, NE27, NE70, NE83 and NE33 – refer Section 9.4.2 of the ACHAR, which is Appendix D of the EIS). Notification was provided as part of RAPs review of draft ACHAR on 28 September 2018. The potential requirement for test excavation was discussed further on 19 October 2018 during a meeting between representatives from UPC, EMM and RAPs. Although no comments were provided in writing, all RAPs at the meeting acknowledged and supported the possibility of test excavation.

2.2.2 Sampling strategy

2.2.3 Overview

UPC are exploring opportunities to maximise their project development footprint by developing the land where five Aboriginal sites warranting test excavation occur (sites NE15, NE27, NE70, NE83 and NE33 – refer Section 9.4.2 of the draft ACHAR). EMM proposes to undertake test excavation at these sites in accordance with the Code to characterise the archaeological deposit in these locations. The results of the test excavation will determine the significance of these sites and provide the basis to form suitable management measures.

The primary aim of the proposed test excavation at each site is to establish drop-off in subsurface artefact frequencies and establish site boundaries and/or subsurface artefact concentrations.

A small portion of the proposed test excavation program will also focus on verifying predictions of low archaeological potential. If this aim is not met through the testing of potential archaeological deposits (PADs), then excavation may occur in areas of low potential within the development footprint but away from the sites designated for excavation.

UPC may decide to exclude one or more of the sites from the development footprint in the period between when this letter is issued to RAPs and the commencement of the proposed test excavation. If this occurs, test excavation will not be completed at the sites designated for avoidance. Alternatively, if one or more sites with PAD are included in the development footprint, they would be added to the program.

2.2.4 Method

The proposed excavation method will follow the Code (DECCW 2010) and will generally be as follows:

- Linear transects made of up of 50 cm by 50 cm test pits will be excavated at sites NE15, NE27, NE70, NE83 and NE33 (refer to Figure 1A (NE15 and NE83), Figure 1D (NE27 and NE70) and Figure 1H (NE33) in Appendix A).
- The test pit transects will follow a grid system. Test pit locations in each transect will be spaced at a minimum of 5 m apart and up to 20 m apart. The exact spacing at each site may vary based on observations in the field and artefact density results as they come to hand.
- The first test pit at each site will be dug manually with hand tools in 5 cm levels termed ‘spits’ to identify the nature of the soils and to identify any stratigraphic sequence. All subsequent test pits will be excavated in 10 cm spits or in stratigraphic sequence (whichever is smaller).

- Each pit will be excavated until basal clay is reached, or to at least one spit (10 cm) below the artefact bearing level identified at each test area.
- Each test pit will be photographed and a soil profile/section drawn.
- All excavated soil will be dry-sieved through a 5 mm aperture mesh.
- All pits will be backfilled after recording.
- Soil samples may be taken for laboratory analysis.

2.2.5 Storing recovered material

The temporary location for the storage of artefacts will be in a lockable room at EMM's Sydney Office:

Ground Floor, Suite 1
20 Chandos Street
St Leonards NSW 1590

Artefacts will eventually be stored in an agreed keeping place or returned to country as agreed by RAPs. All excavated artefacts will be transferred back to the general area at the earliest reasonable opportunity.

2.2.6 Artefact analysis

Basic recording and analysis will be undertaken for the artefact assemblage recovered from the test excavation with the aim to form a baseline characterisation of the excavated material. Analysis of excavated stone artefacts will include:

- initial sorting and cleaning of excavated material;
- establishment of a computer database using Microsoft Access or Microsoft Excel (depending on the size of the assemblages) to record all provenance information;
- measuring and recording the attributes of stone artefacts; and
- statistical analysis of the data to explore the frequency, distribution, raw material type, implement type and size of the of the artefacts in the assemblage.

2.2.7 Test pit analysis

Landscape and soil information is important in understanding the integrity, nature, and distribution of the archaeology. Provenance analysis includes the recording, drawing and analysis of soil profiles to inform the integrity and potentially the date of the archaeological record.

3 Reporting

Aboriginal Heritage Information Management System (AHIMS) site cards will be completed for each Aboriginal site and an Aboriginal Site Impact Recording Form prepared for each site impacted by the test excavation.

The results of the scar tree survey and verification exercise, excavation and subsequent management measures derived from the results will be formulated in consultation with RAPs and will be provided prior to or as part of the response to submissions (RTS) report so that NSW Department of Planning and Environment (DPE) and NSW Office of Environment and Heritage (OEH) can consider any new information prior to project approval.

This information will likely form an addendum to the ACHAR. RAPs will be provided with a draft of the report for their review prior to finalisation and submission to DPE and OEH.

4 Closing

Thank you for your time. We appreciate the opportunity to consult with RAPs to decide on the most appropriate assessment methods. We will be contacting RAPs shortly with further details about fieldwork, including a fieldwork roster and logistics. If you have any queries in regard to the content of this letter, please do not hesitate to contact me on my details below.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Ryan Desic', with a stylized flourish at the end.

Ryan Desic

Senior Archaeologist - Heritage Team Leader

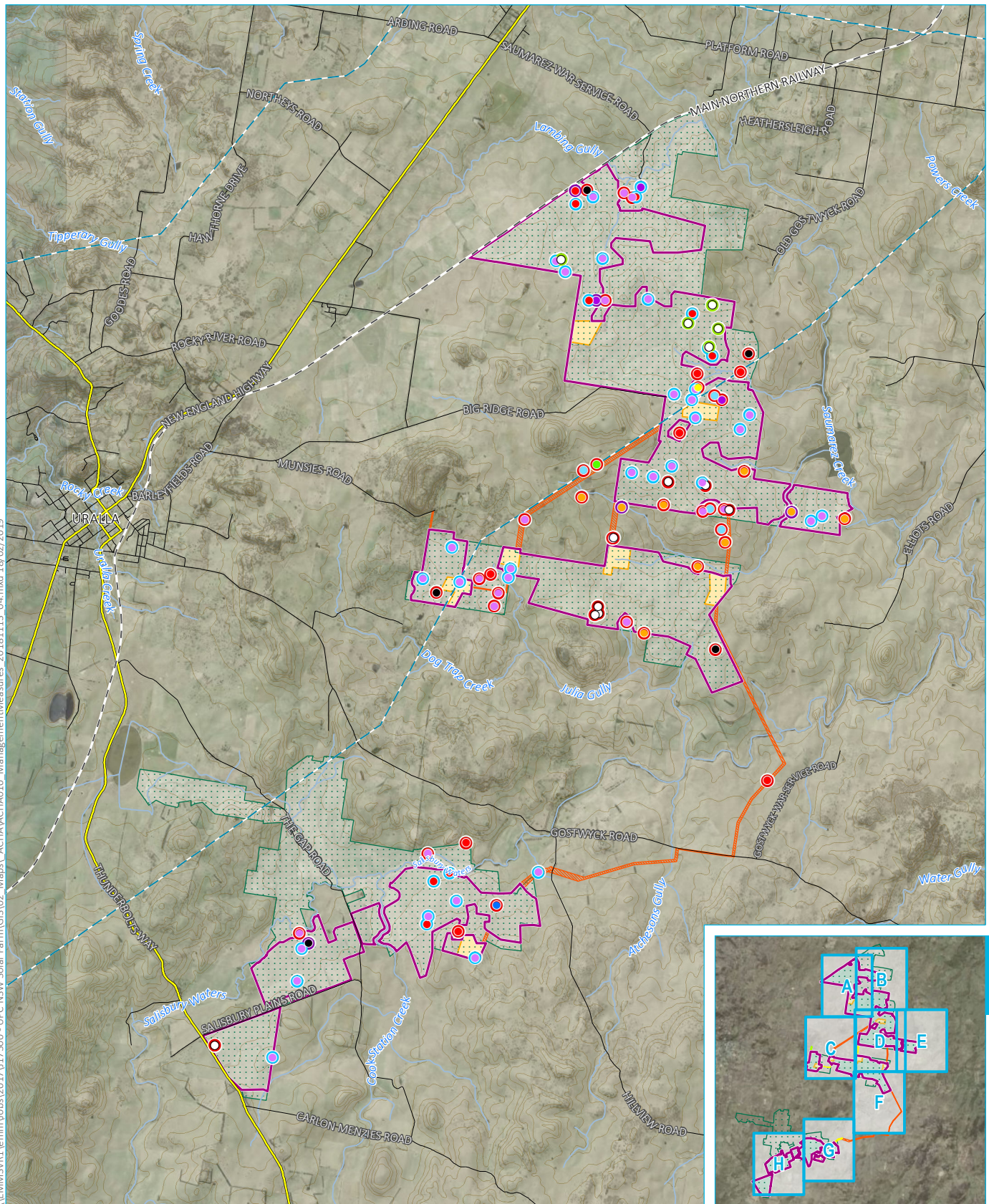
rdesic@emmconsulting.com.au

0411 329 712

Appendix A

Identified sites and proposed management measures

\\EMMSVR1\emm\Jobs\2017\U17300 - UPC NSW Solar Farm\GIS\02 Maps\ACHA\ACHA010 ManagementMeasures 20181113 04.mxd 18/02/2019



Source: EMM (2018); DFSI (2017); UPC (2018)

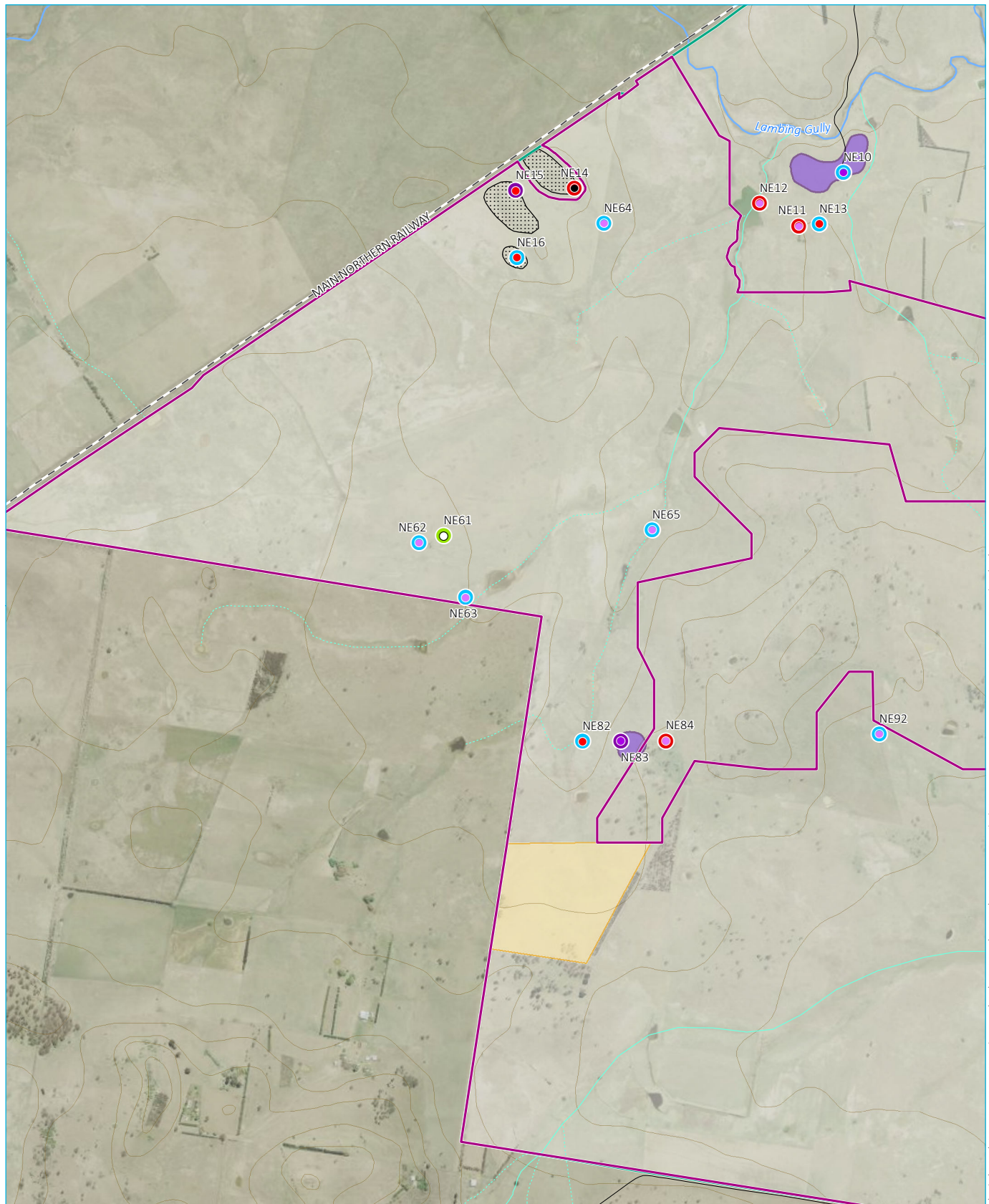
KEY

- | | |
|--|---|
| <ul style="list-style-type: none"> 330 kV transmission line Main road Local road Rail line Contour (10 m) Study area | <ul style="list-style-type: none"> Development footprint Solar array Potential site access/ETL easement/electrical cabling Potential substation/BESS footprint Management measure Avoidance Expert assessment/possible relocation Surface collection Potential test excavation |
|--|---|

- Site type
- Artefact scatter
 - Artefact scatter, PAD
 - Grinding groove
 - Grinding groove, PAD
 - Grinding groove, artefact scatter, PAD
 - Historical site - unverified
 - Isolated find
 - Isolated find, PAD
 - Quarry, artefact scatter, PAD
 - Scarred tree

Identified sites and proposed management measures – overview

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1



KEY

- Local road
- - Rail line
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential substation/BESS footprint

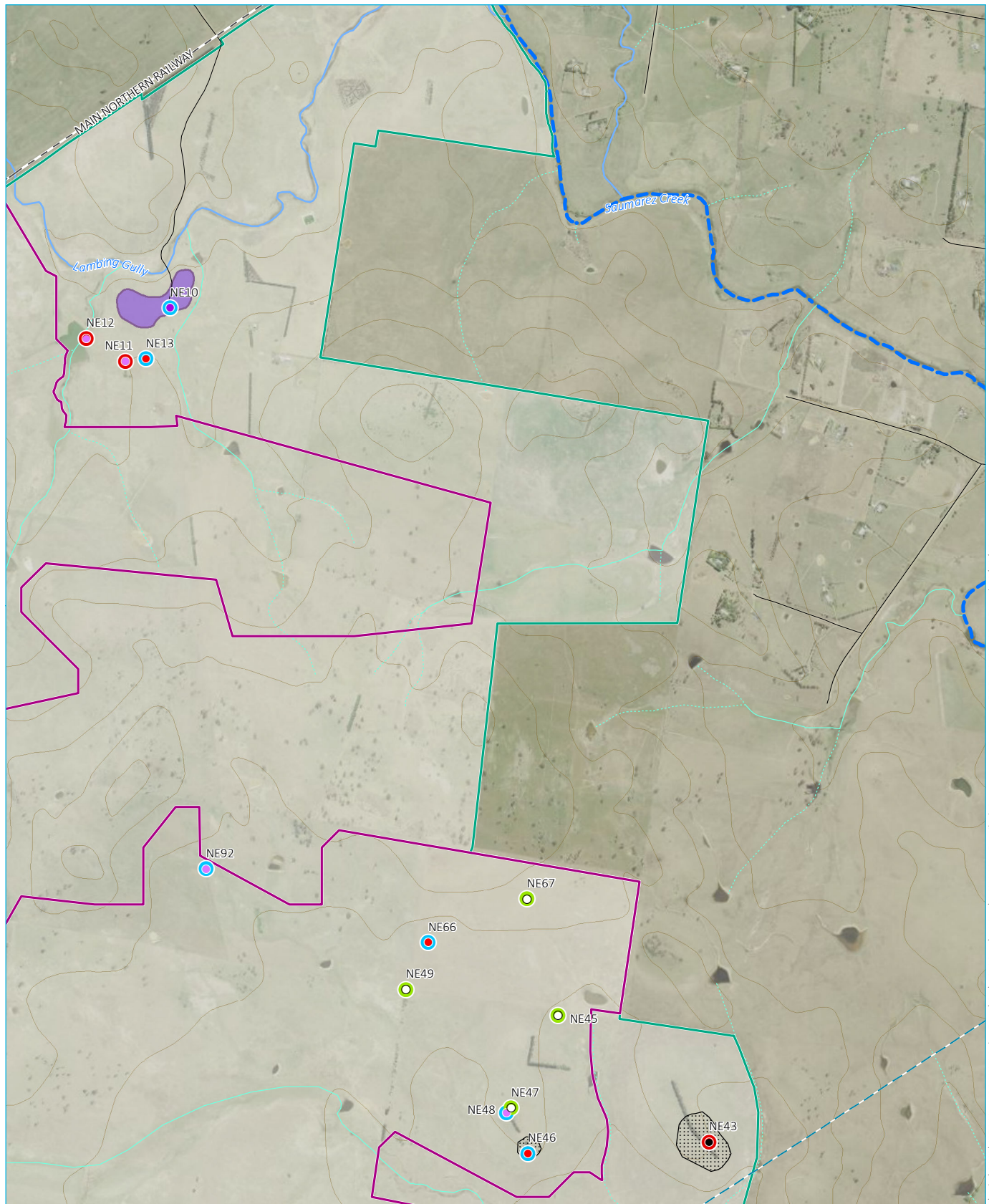
- Strahler stream order
- 1st order
- 2nd order
- 3rd order

- PAD
- Site
- Site type
- Artefact scatter
- Isolated find
- Isolated find, PAD
- Quarry, artefact scatter, PAD
- Scarred tree

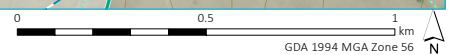
- Management measure
- Avoidance
- Expert assessment/possible relocation
- Surface collection
- Potential test excavation

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1A



Source: EMM (2018); DFSI (2017); UPC (2018)



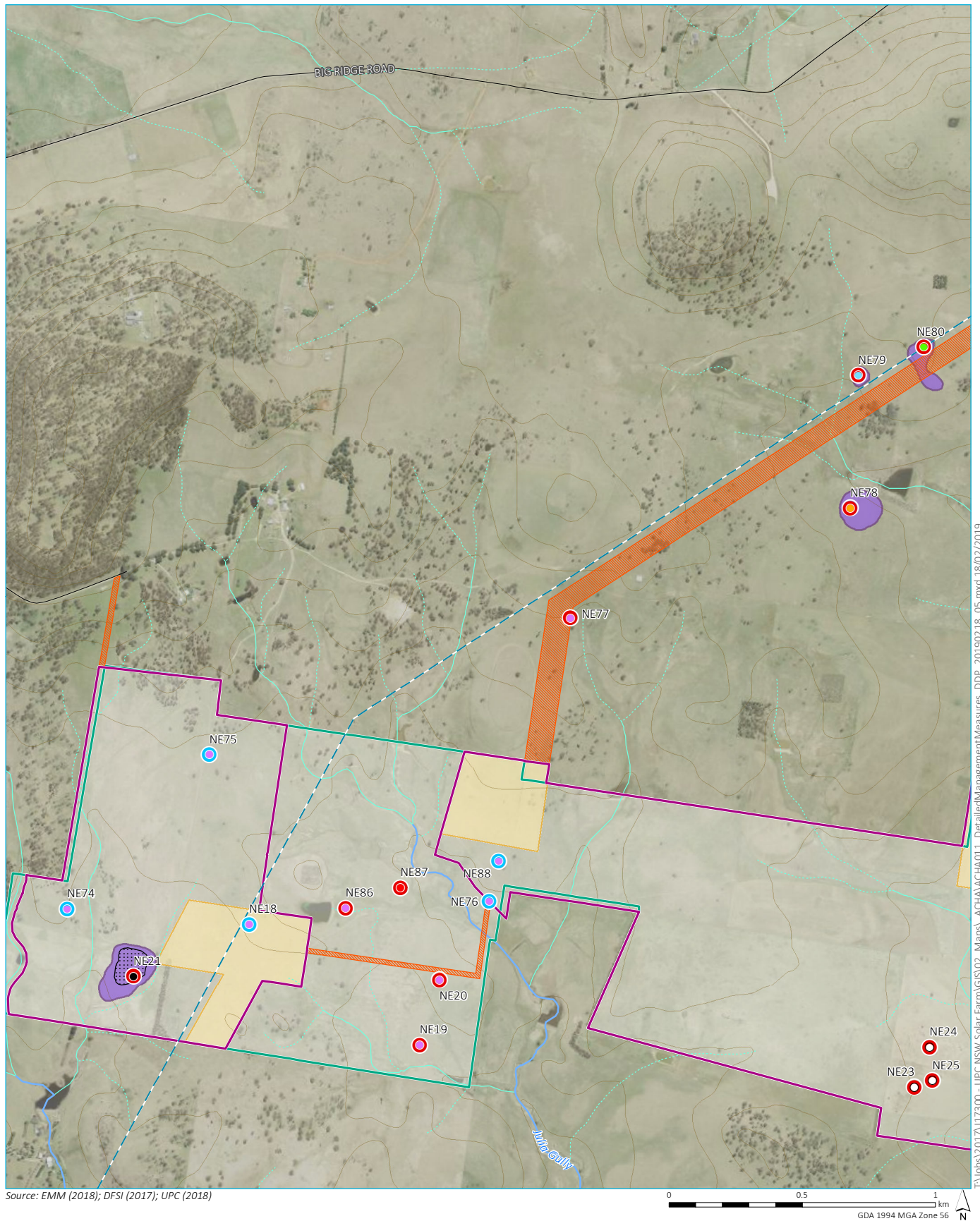
KEY

- | | | |
|----------------------------|-----------------------|---------------------------------|
| — 330 kV transmission line | Strahler stream order | PAD |
| — Local road | 1st order | Site |
| — Rail line | 2nd order | Site type |
| — Contour (10 m) | 3rd order | ● Artefact scatter |
| Study area | 5th order | ● Isolated find |
| Development footprint | | ● Isolated find, PAD |
| Solar array | | ● Quarry, artefact scatter, PAD |
| | | ○ Scarred tree |

- Management measure
- Avoidance
 - Expert assessment/possible relocation
 - Surface collection

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1B



KEY

- 330 kV transmission line
- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/ electrical cabling
- Potential substation/BESS footprint

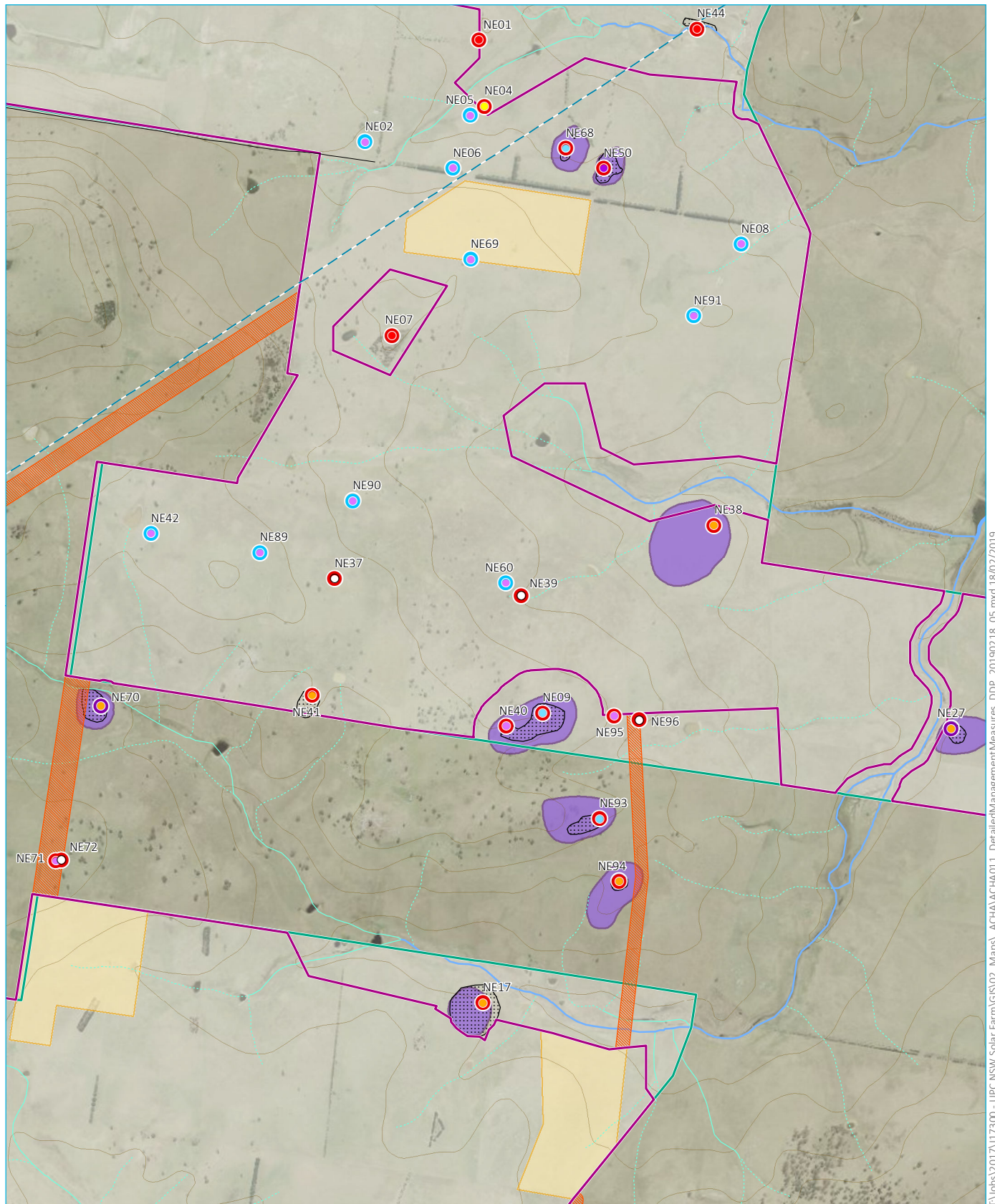
- Strahler stream order
- 1st order
- 2nd order
- 3rd order

- PAD
- Site
- Site type
- Artefact scatter
- Artefact scatter, PAD
- Grinding groove, PAD
- Grinding groove, artefact scatter, PAD
- Isolated find
- Quarry, artefact scatter, PAD
- Scarred tree

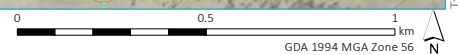
- Management measure
- Avoidance
- Surface collection

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1C



Source: EMM (2018); DFSI (2017); UPC (2018)



KEY

- 330 kV transmission line
- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/ electrical cabling
- Potential substation/BESS footprint

- Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order

PAD

Site

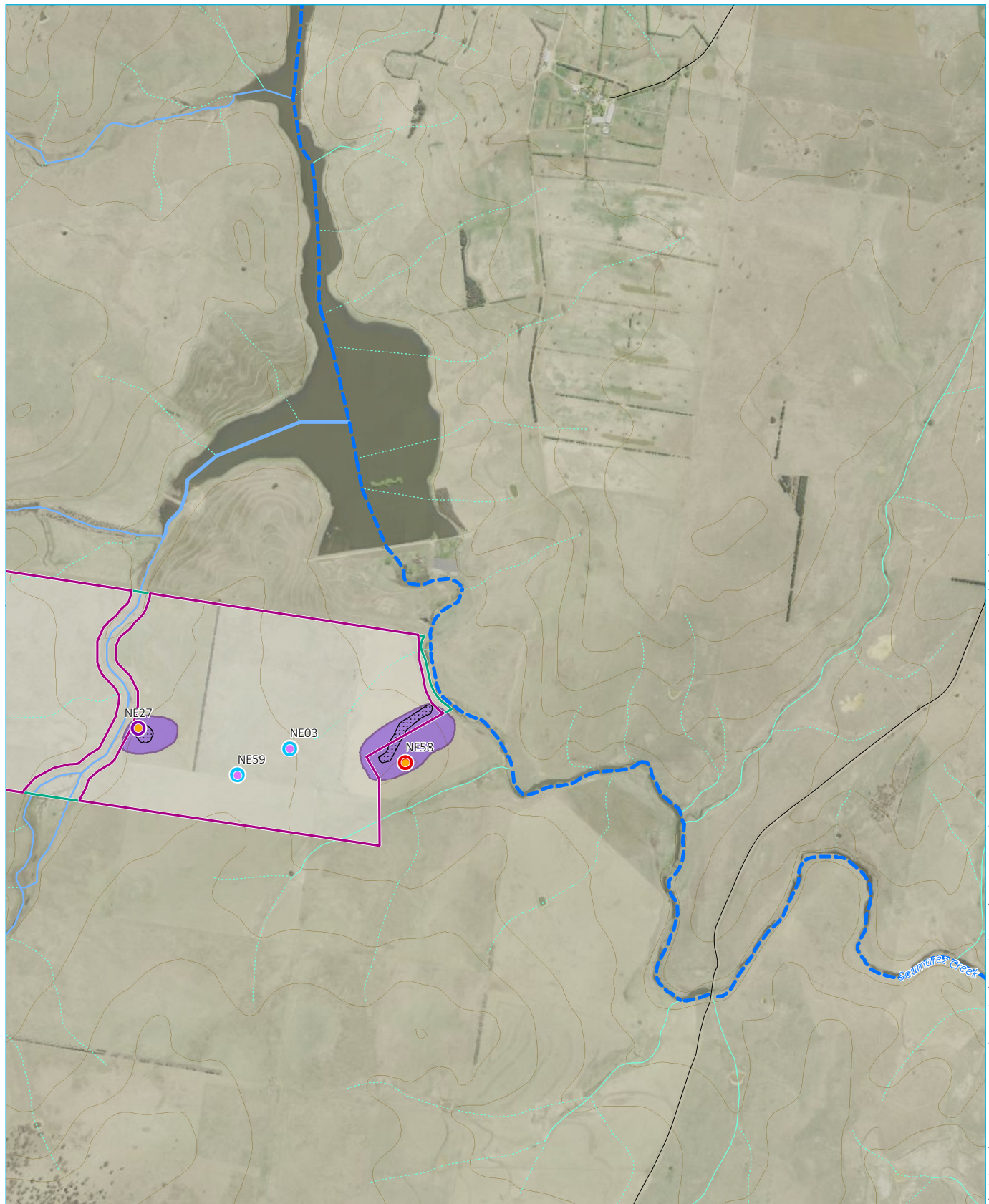
- Artefact scatter
- Artefact scatter, PAD
- Grinding groove
- Grinding groove, artefact scatter, PAD
- Isolated find
- Isolated find, PAD
- Scarred tree

Management measure

- Avoidance
- Surface collection
- Potential test excavation

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1D



Source: EMM (2018); DFSI (2017); UPC (2018)

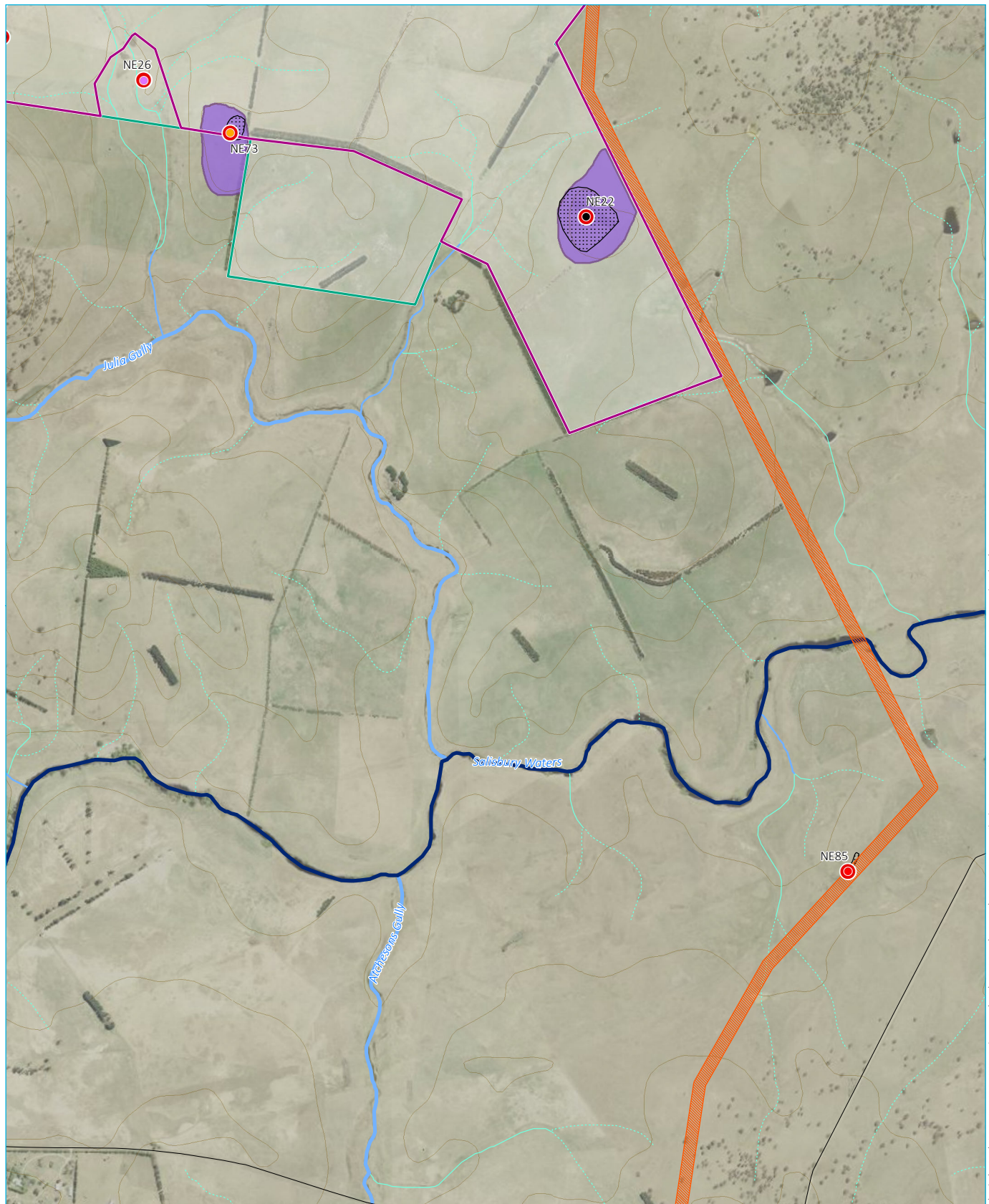
0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

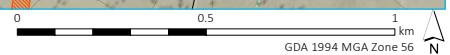
Local road	Strahler stream order	PAD	Management measure
Contour (10 m)	1st order	Site	Avoidance
Study area	2nd order	Site type	Surface collection
Development footprint	3rd order	Artefact scatter, PAD	Potential test excavation
Solar array	4th order	Isolated find	
	5th order		

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1E



Source: EMM (2018); DFSI (2017); UPC (2018)



KEY

- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/electrical cabling

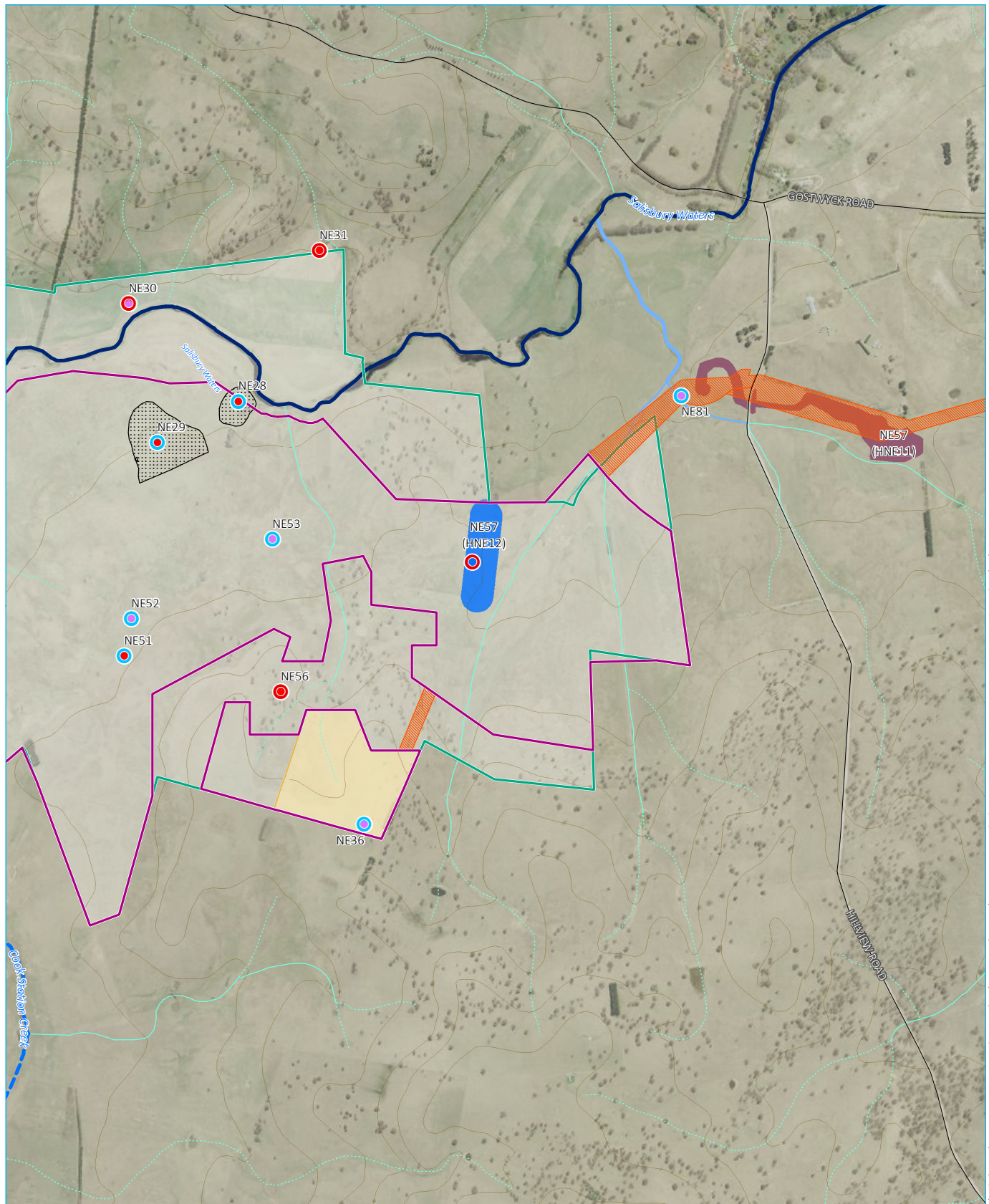
- Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order
- 6th order

- PAD
- Site
- Site type
- Artefact scatter
- Artefact scatter, PAD
- Isolated find
- Quarry, artefact scatter, PAD
- Scarred tree

- Management measure
- Avoidance

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1F



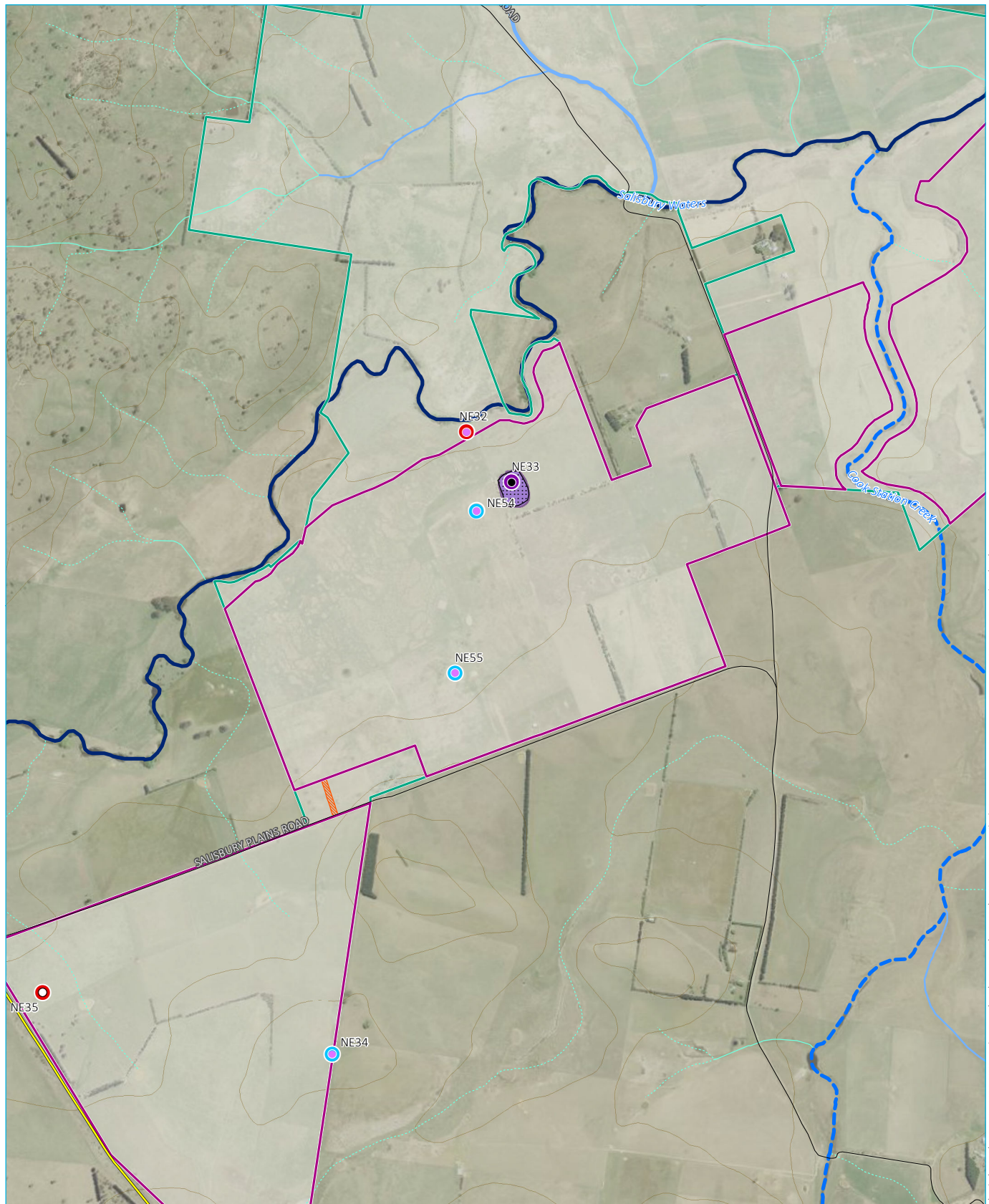
KEY

- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/electrical cabling
- Potential substation/BESS footprint
- Strahler stream order
 - 1st order
 - 2nd order
 - 3rd order
 - 4th order
 - 5th order
 - 6th order
- Site
 - Site type
 - Artefact scatter
 - Historical site - unverified
 - Isolated find

- Management measure
 - Avoidance
 - Surface collection
- Identified in historic heritage assessment
 - NE57 (HNE11)
 - NE57 (HNE12)

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1G



Source: EMM (2018); DFSI (2017); UPC (2018)

0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

Main road	Strahler stream order	PAD	Management measure
Local road	1st order	Site	Avoidance
Contour (10 m)	2nd order	Site type	Surface collection
Study area	3rd order	Isolated find	Potential test excavation
Development footprint	4th order	Quarry, artefact scatter, PAD	
Solar array	5th order	Scarred tree	
Potential site access/ETL easement/ electrical cabling	6th order		

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1H

18 February 2019

Dimitri Young
Senior Team Leader Planning - North East Branch
NSW Office of Environment and Heritage
Via email: Dimitri.Young@environment.nsw.gov.au

T 02 9493 9500
F 02 9493 9599
E info@emmconsulting.com.au
www.emmconsulting.com.au

Re: J17300 - New England Solar Farm - Notice of test excavation and sampling strategy

1 Notice of test excavation

1.1 Overview

We are writing to you in relation to the New England Solar Farm (the project), a photovoltaic (PV) solar development proposed by UPC Renewables Australia Pty Ltd (UPC). The project is State Significant Development (SSD) under the NSW *Environmental Planning and Assessment Act 1979*.

This letter provides notice of the proposed test excavation to be conducted within the development footprint for the project. This letter has been prepared in accordance with Requirement 15c of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (the Code) (DECCW 2010). A sampling strategy has also been provided to satisfy Requirement 15b of the Code.

1.2 Project location

At its closest point, the development footprint for the New England Solar Farm is approximately 6 km east of the township of Uralla (refer Figure 1 in Appendix A). The locations for the proposed test excavation are identified in the figures provided in Appendix A.

1.3 Responsible entity

The responsible legal entity is UPC. Contact details for a representative from UPC are provided below:

Tim Kirk
Project Development Manager
T: +61 403 857 079
E: tim.kirk@upcrenewables.com

1.4 Person carrying out excavations

The excavation will be directed by Ryan Desic (BA Hons Prehistoric and Historical Archaeology) from EMM Consulting Pty Ltd (EMM). Ryan's contact details are provided below:

Ryan Desic
Senior Archaeologist – Heritage Team Leader
T: +61 411 329 712
E: rdesic@emmconsulting.com.au

1.5 Date and duration of excavation

The estimated start date is Monday 11 March 2019. The excavation is anticipated to run for up to ten days. These dates may vary, and if so, NSW Office of Environment and Heritage (OEH) will be advised.

1.6 Temporary storage location for Aboriginal objects

The temporary location for the storage of artefacts will be in a lockable room at EMM's Sydney Office:

Ground Floor, Suite 1
20 Chandos Street
St Leonards NSW 1590

1.7 Consultation

EMM initially presented the proposed assessment methodology for the project to registered Aboriginal parties (RAPs) in May 2018. This outlined that test excavation may be required as part of the project Aboriginal cultural heritage assessment (ACHA). EMM stated that the test excavation would follow the Code (DECCW 2010). No feedback was provided by RAPs in response to the methodology.

RAPs were notified about the potential requirement for test excavation at five sites identified as part of the ACHA (ie NE15, NE27, NE70, NE83 and NE33 – refer Section 9.4.2 of the ACHAR, which is Appendix D of the EIS). Notification was provided as part of the RAPs review of draft ACHAR on 28 September 2018. The potential requirement for test excavation was discussed further on 19 October 2018 during a meeting between representatives from UPC, EMM and RAPs. Although no comments were provided in writing, all RAPs at the meeting acknowledged and supported the possibility of test excavation.

RAPs have been issued the sampling strategy presented in Section 2 of this letter and will be contacted to request any feedback prior to the commencement of the proposed excavation. EMM will inform OEH of any changes to the sampling strategy that arises from this consultation.

2 Sampling strategy

2.1.1 Overview

UPC are exploring opportunities to maximise the development footprint presented in Figure 1 by developing the land where five Aboriginal sites warranting test excavation occur (ie NE15, NE27, NE70, NE83 and NE33 – refer Section 9.4.2 of the ACHAR).

EMM proposes to undertake test excavation at these sites in accordance with the Code (DECCW 2010) to characterise the archaeological deposit in these locations. The results of the test excavation will determine the significance of these sites and provide the basis to form suitable management measures.

The primary aim of the proposed test excavation at each site is to establish drop-off in subsurface artefact frequencies and establish site boundaries and/or subsurface artefact concentrations.

A small portion of the proposed test excavation program will also focus on verifying predictions of low archaeological potential. If this aim is not met through the testing of potential archaeological deposits (PADs), then excavation may occur in areas of low potential within the development footprint but away from the sites designated for excavation.

UPC may decide to exclude one or more of the sites from the development footprint in the period between when this letter is issued to OEH and the commencement of the proposed test excavation. If this occurs, test

excavation will not be completed at the sites designated for avoidance. Alternatively, if one or more sites with PAD are included in the development footprint, they would be added to the program.

2.1.2 Method

The proposed excavation method will follow the Code (DECCW 2010) and will generally be as follows:

- Linear transects made of up of 50 cm by 50 cm test pits will be excavated at sites NE15, NE27, NE70, NE83 and NE33 (refer to Figure 1A (NE15 and NE83), Figure 1D (NE27 and NE70) and Figure 1H (NE33) in Appendix A).
- The test pit transects will follow a grid system. Test pit locations in each transect will be spaced at a minimum of 5 m apart and up to 20 m apart. The exact spacing at each site may vary based on observations in the field and artefact density results as they come to hand.
- The first test pit at each site will be dug manually with hand tools in 5 cm levels termed 'spits' to identify the nature of the soils and to identify any stratigraphic sequence. All subsequent test pits will be excavated in 10 cm spits or in stratigraphic sequence (whichever is smaller).
- Each pit will be excavated until basal clay is reached, or to at least one spit (10 cm) below the artefact bearing level identified at each test area.
- Each test pit will be photographed and a soil profile/section drawn.
- All excavated soil will be dry-sieved through a 5 mm aperture mesh.
- All pits will be backfilled after recording.
- Soil samples may be taken for laboratory analysis.

2.2 Storing recovered material

Artefacts will be retained temporarily by EMM (refer Section 1.6) for the required analysis of technological attributes and eventually stored in an agreed keeping place or returned to country as agreed by RAPs. All excavated artefacts will be transferred back to the general area at the earliest reasonable opportunity.

2.3 Post-fieldwork analysis

2.3.1 Artefact analysis

Basic recording and analysis will be undertaken for the artefact assemblage recovered from the test excavation with the aim to form a baseline characterisation of the excavated material. Analysis of excavated stone artefacts will include:

- initial sorting and cleaning of excavated material;
- establishment of a computer database using Microsoft Access or Microsoft Excel (depending on the size of the assemblages) to record all provenance information;
- measuring and recording the attributes of stone artefacts; and
- statistical analysis of the data to explore the frequency, distribution, raw material type, implement type and size of the of the artefacts in the assemblage.

2.3.2 Test pit analysis

Landscape and soil information is important in understanding the integrity, nature, and distribution of the archaeology. Provenance analysis includes the recording, drawing and analysis of soil profiles to inform the integrity and potentially the date of the archaeological record.

2.3.3 Reporting

Aboriginal Heritage Information Management System (AHIMS) site cards will be completed for each Aboriginal site and an Aboriginal Site Impact Recording Form prepared for each site impacted by the test excavation.

The results of excavation and subsequent management measures derived from the results will be formulated in consultation with RAPs and will be provided prior to or as part of the response to submissions (RTS) report so that NSW Department of Planning and Environment (DPE) and OEH can consider any new information prior to project approval.

3 Closing

If you have any queries in regard to this letter and the proposed test excavation please do not hesitate to contact me on the details provided in Section 1.4.

Yours sincerely,



Ryan Desic

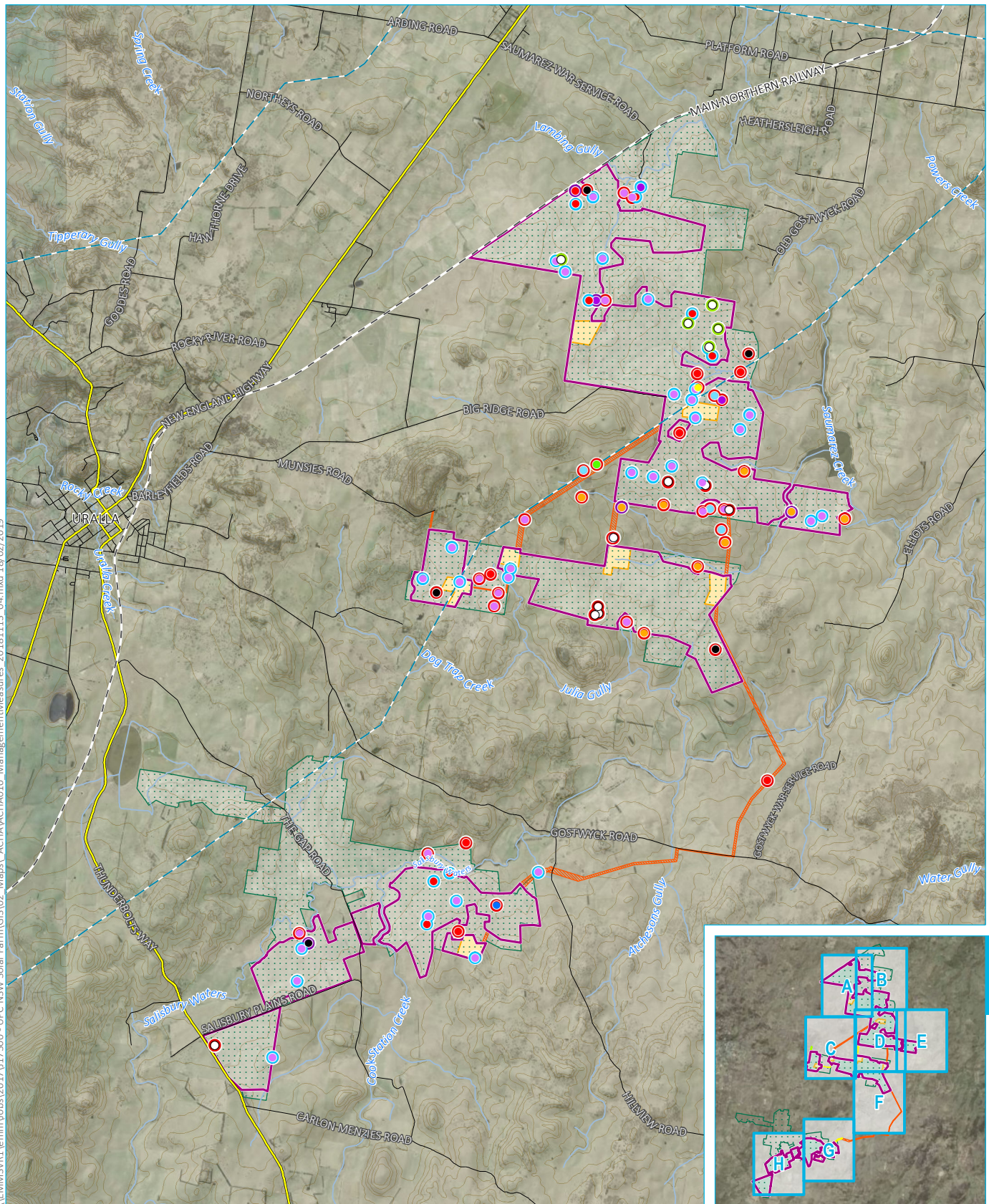
Senior Archaeologist - Heritage Team Leader

rdesic@emmconsulting.com.au

Appendix A

Identified sites and proposed management measures

\\EMMSVR1\emm\Jobs\2017\U17300 - UPC NSW Solar Farm\GIS\02 Maps\ACHA\ACHA010 ManagementMeasures 20181113 04.mxd 18/02/2019



Source: EMM (2018); DFSI (2017); UPC (2018)

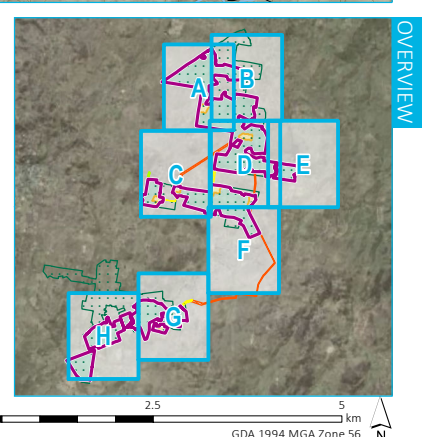
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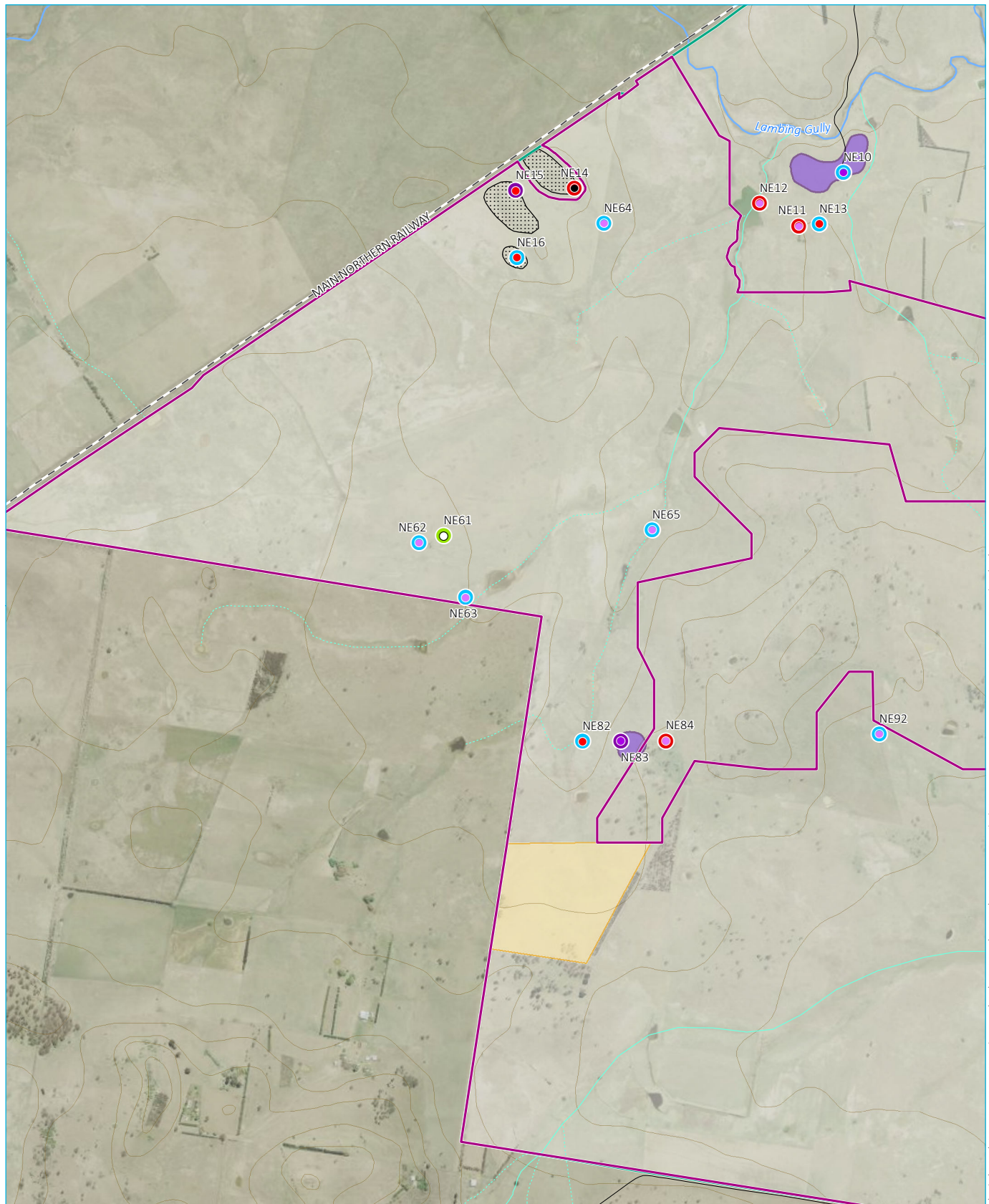
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|--|---|
| <ul style="list-style-type: none"> 330 kV transmission line Main road Local road Rail line Contour (10 m) Study area | <ul style="list-style-type: none"> Development footprint Solar array Potential site access/ETL easement/electrical cabling Potential substation/BESS footprint Management measure Avoidance Expert assessment/possible relocation Surface collection Potential test excavation |
|--|---|

- Site type
- Artefact scatter
 - Artefact scatter, PAD
 - Grinding groove
 - Grinding groove, PAD
 - Grinding groove, artefact scatter, PAD
 - Historical site - unverified
 - Isolated find
 - Isolated find, PAD
 - Quarry, artefact scatter, PAD
 - Scarred tree

Identified sites and proposed management measures – overview

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1





KEY

- Local road
- - Rail line
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential substation/BESS footprint

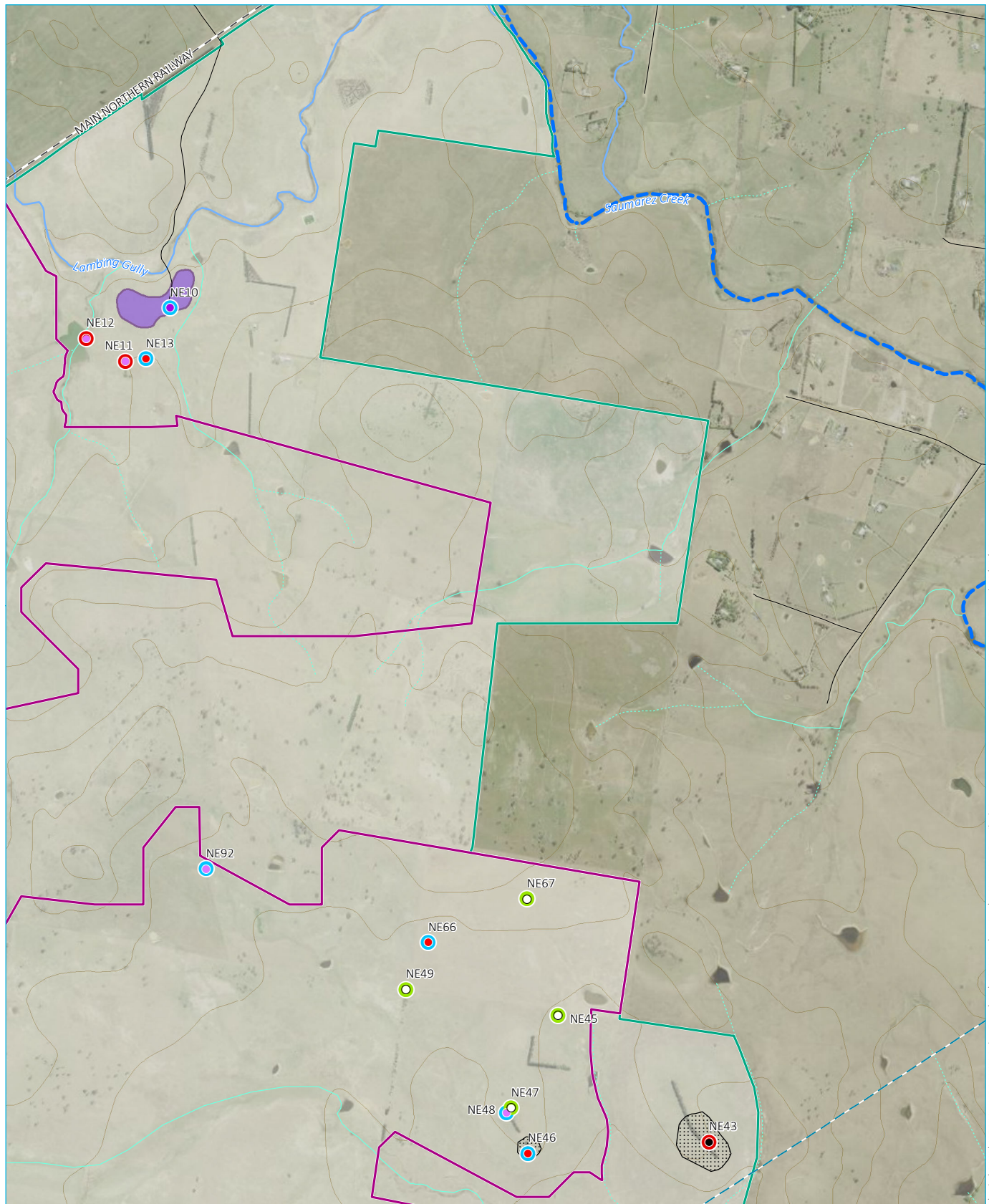
- Strahler stream order
- 1st order
- 2nd order
- 3rd order

- PAD
- Site
- Site type
- Artefact scatter
- Isolated find
- Isolated find, PAD
- Quarry, artefact scatter, PAD
- Scarred tree

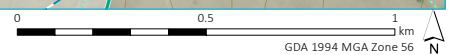
- Management measure
- Avoidance
- Expert assessment/possible relocation
- Surface collection
- Potential test excavation

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1A



Source: EMM (2018); DFSI (2017); UPC (2018)



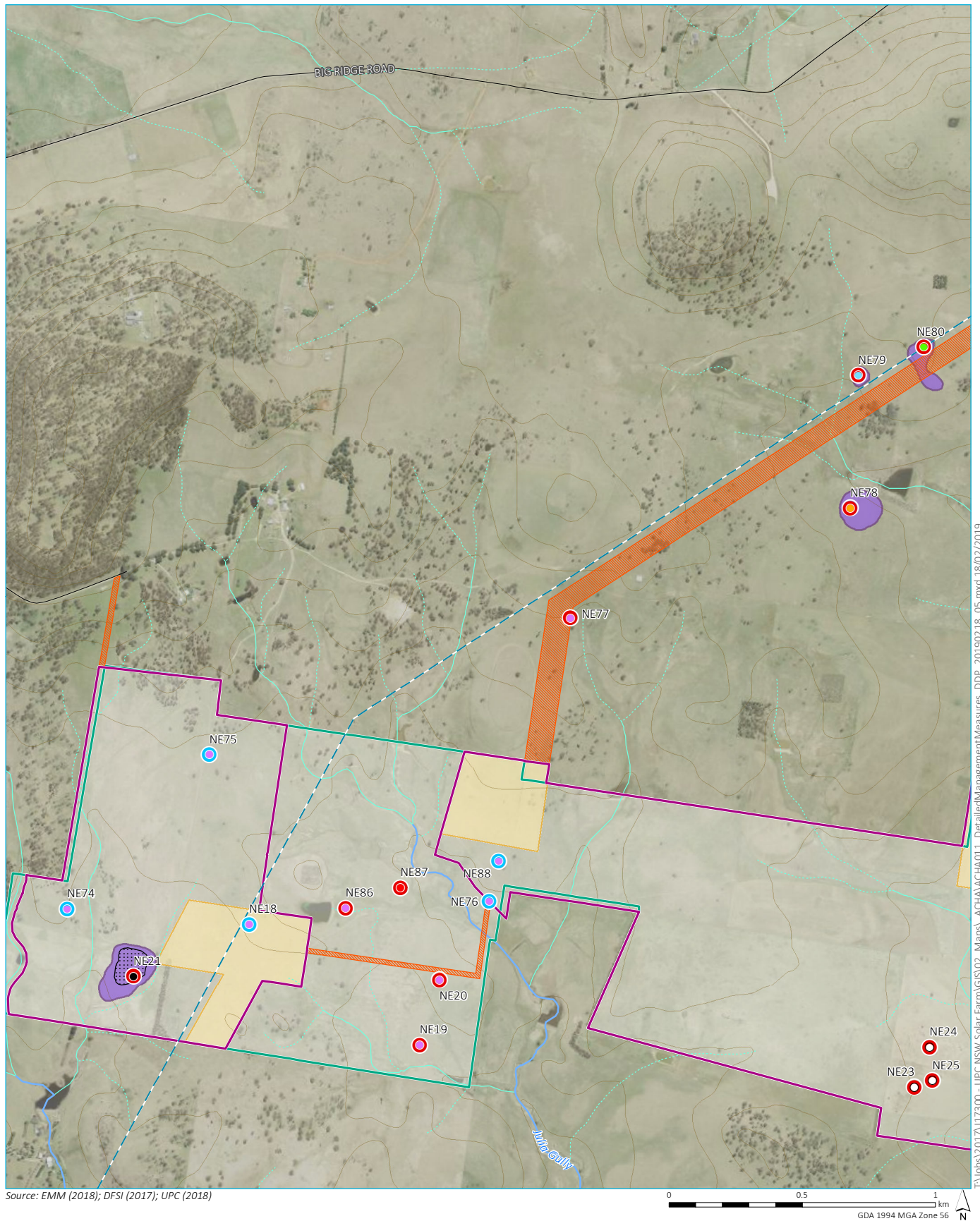
KEY

- | | | |
|----------------------------|-----------------------|---------------------------------|
| — 330 kV transmission line | Strahler stream order | PAD |
| — Local road | 1st order | Site |
| — Rail line | 2nd order | Site type |
| — Contour (10 m) | 3rd order | ● Artefact scatter |
| Study area | 5th order | ● Isolated find |
| Development footprint | | ● Isolated find, PAD |
| Solar array | | ● Quarry, artefact scatter, PAD |
| | | ○ Scarred tree |

- Management measure
- Avoidance
 - Expert assessment/possible relocation
 - Surface collection

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1B



KEY

- 330 kV transmission line
- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/electrical cabling
- Potential substation/BESS footprint

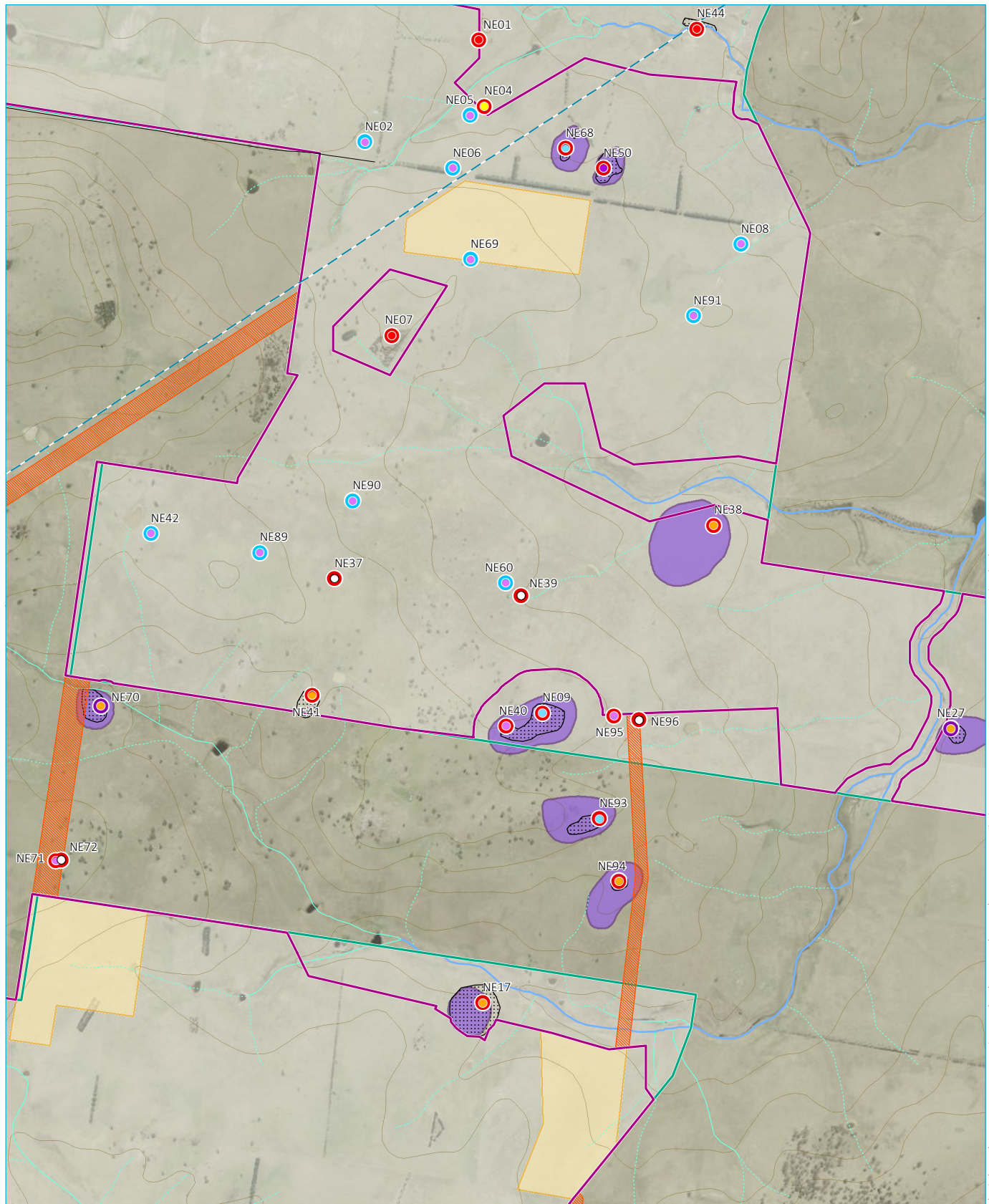
- Strahler stream order
- 1st order
- 2nd order
- 3rd order

- PAD
- Site
- Site type
- Artefact scatter
- Artefact scatter, PAD
- Grinding groove, PAD
- Grinding groove, artefact scatter, PAD
- Isolated find
- Quarry, artefact scatter, PAD
- Scarred tree

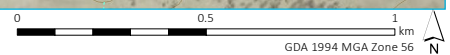
- Management measure
- Avoidance
- Surface collection

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1C



Source: EMM (2018); DFSI (2017); UPC (2018)



KEY

- 330 kV transmission line
- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/ electrical cabling
- Potential substation/BESS footprint

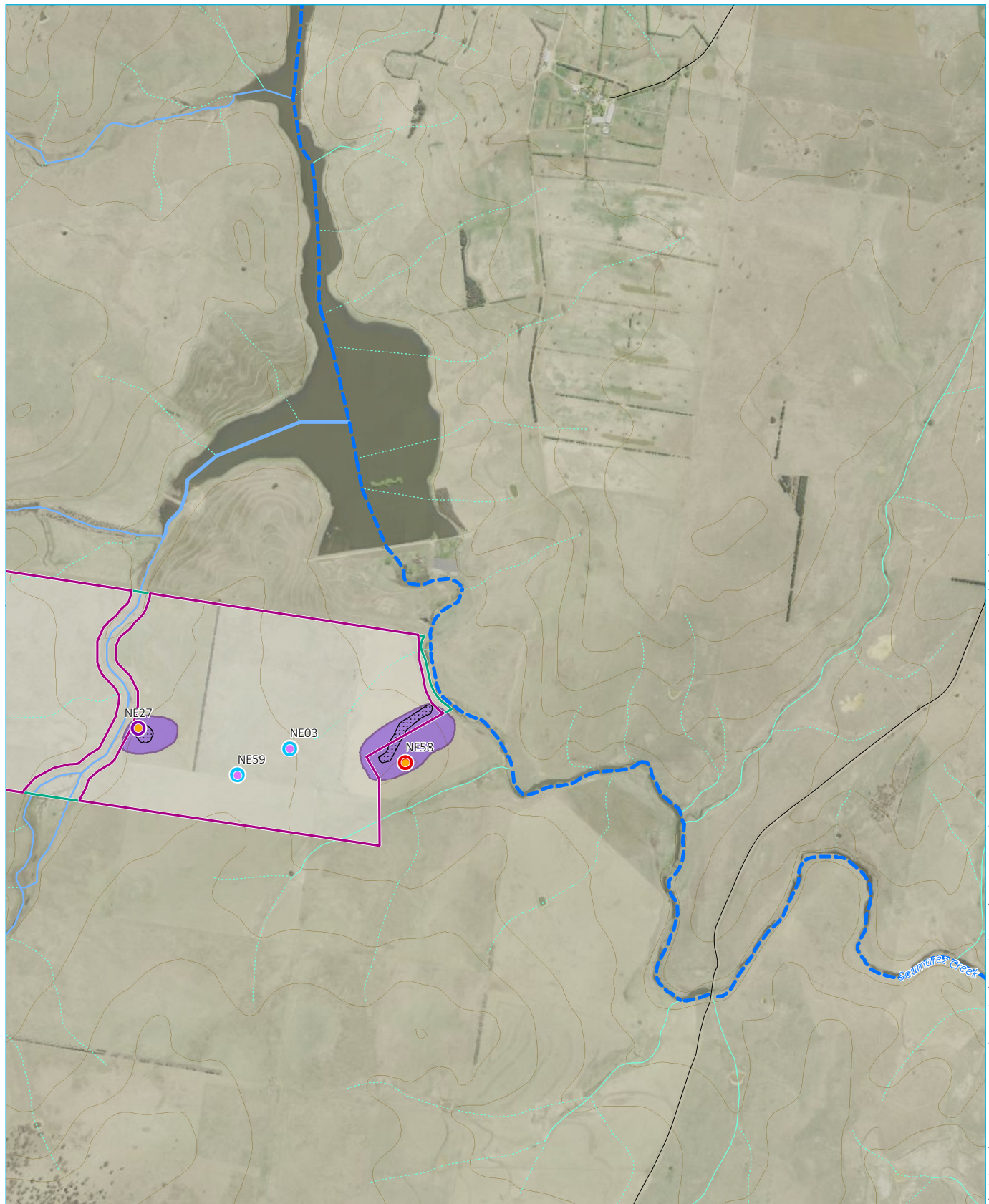
- Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order

- PAD
- Site
- Site type
- Artefact scatter
- Artefact scatter, PAD
- Grinding groove
- Grinding groove, artefact scatter, PAD
- Isolated find
- Isolated find, PAD
- Scarred tree

- Management measure
- Avoidance
- Surface collection
- Potential test excavation

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1D



Source: EMM (2018); DFSI (2017); UPC (2018)

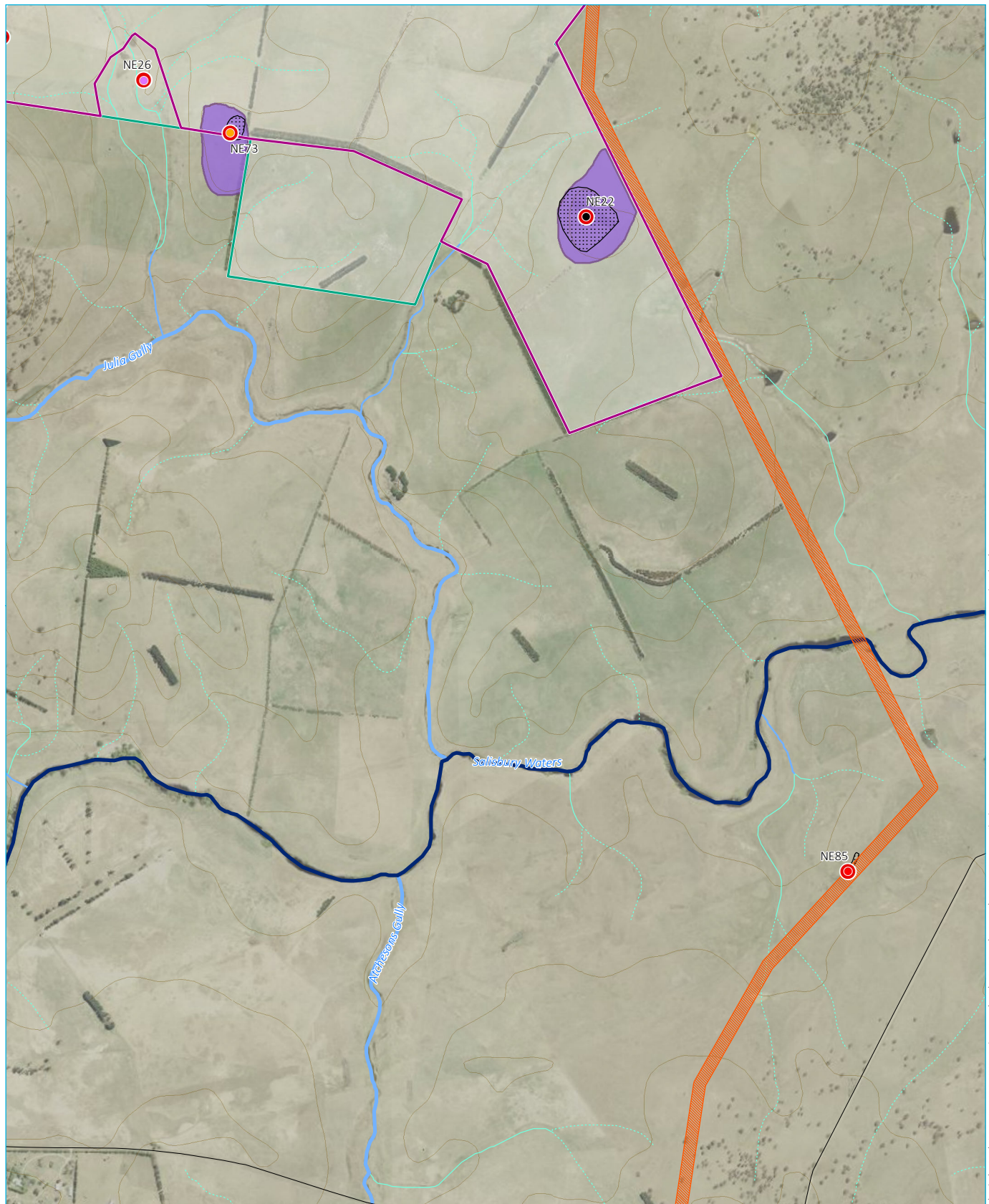
0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

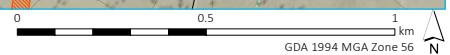
Local road	Strahler stream order	PAD	Management measure
Contour (10 m)	1st order	Site	Avoidance
Study area	2nd order	Site type	Surface collection
Development footprint	3rd order	Artefact scatter, PAD	Potential test excavation
Solar array	4th order	Isolated find	
	5th order		

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1E



Source: EMM (2018); DFSI (2017); UPC (2018)

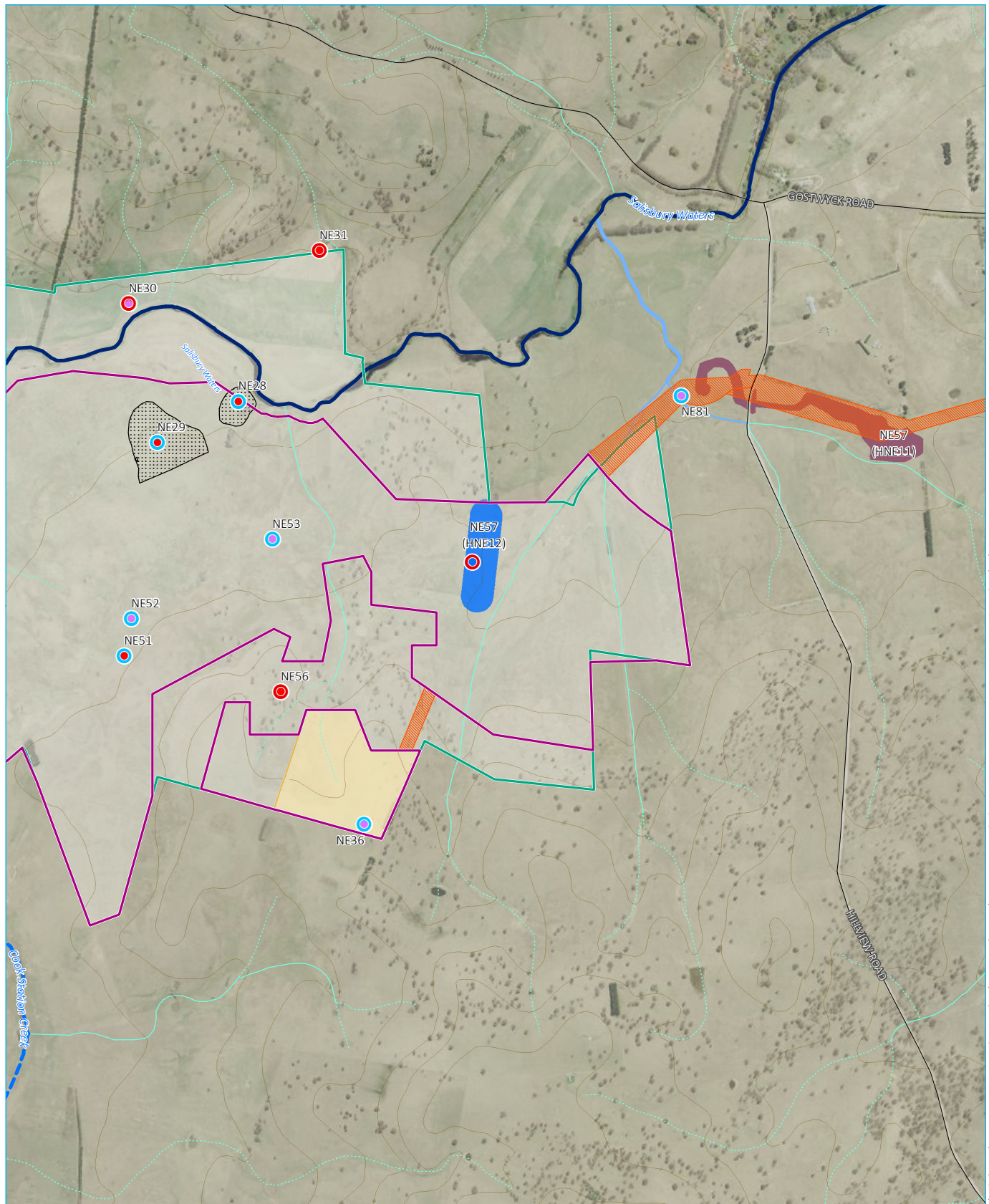


KEY

- | | | | |
|---|-----------------------|---------------------------------|--------------------|
| — Local road | Strahler stream order | PAD | Management measure |
| — Contour (10 m) | 1st order | Site | ● Avoidance |
| Study area | 2nd order | Site type | |
| Development footprint | 3rd order | ● Artefact scatter | |
| Solar array | 4th order | ● Artefact scatter, PAD | |
| Potential site access/ETL easement/
electrical cabling | 6th order | ● Isolated find | |
| | | ● Quarry, artefact scatter, PAD | |
| | | ○ Scarred tree | |

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1F



Source: EMM (2018); DFSI (2017); UPC (2018)

0 0.5 1 km
GDA 1994 MGA Zone 56

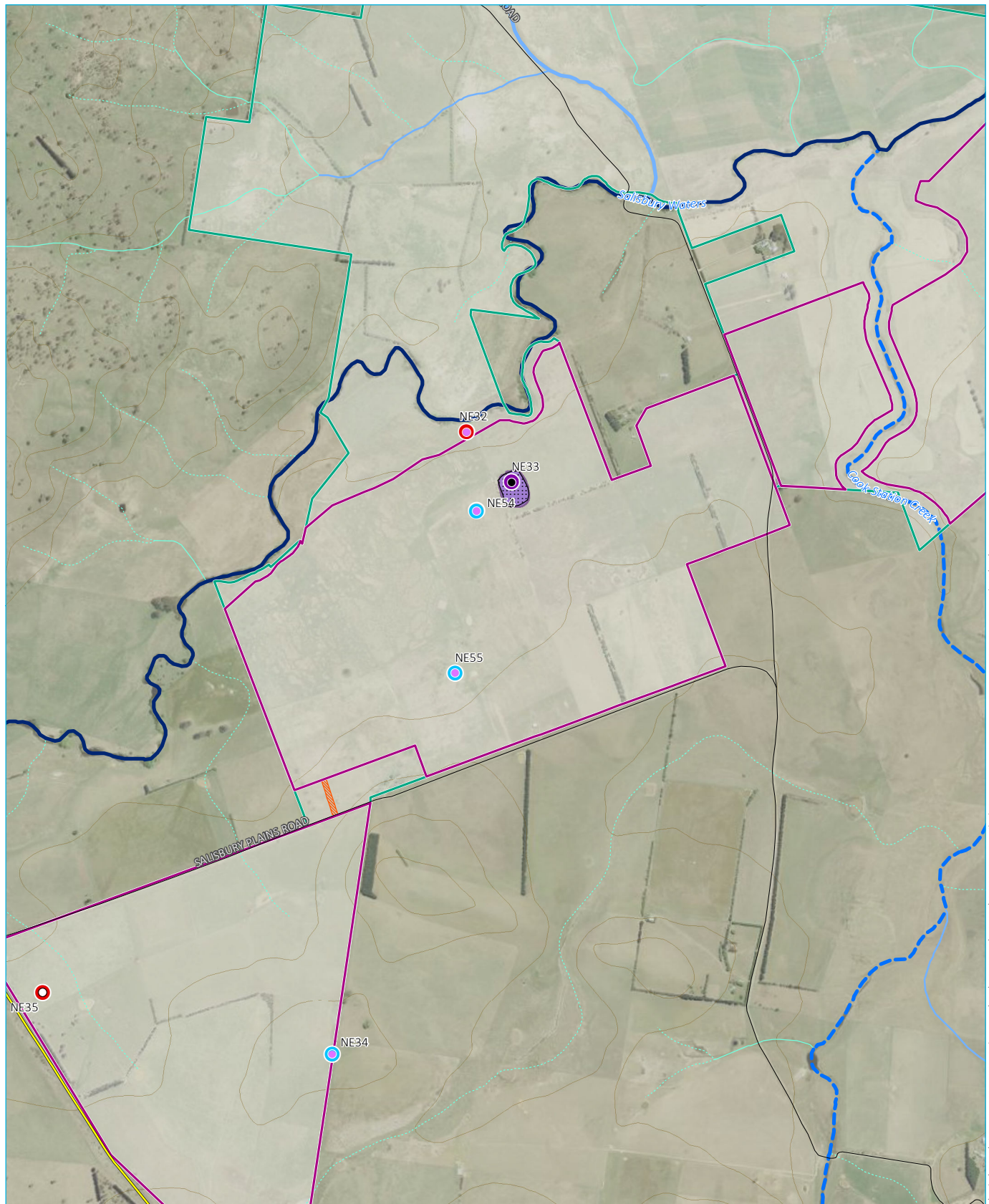
KEY

- Local road
- Contour (10 m)
- Study area
- Development footprint
- Solar array
- Potential site access/ETL easement/electrical cabling
- Potential substation/BESS footprint
- Strahler stream order
 - 1st order
 - 2nd order
 - 3rd order
 - 4th order
 - 5th order
 - 6th order
- Site
 - Site type
 - Artefact scatter
 - Historical site - unverified
 - Isolated find

- Management measure
 - Avoidance
 - Surface collection
- Identified in historic heritage assessment
 - NE57 (HNE11)
 - NE57 (HNE12)

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1G



Source: EMM (2018); DFSI (2017); UPC (2018)

0 0.5 1 km
GDA 1994 MGA Zone 56

KEY

Main road	Strahler stream order	PAD	Management measure
Local road	1st order	Site	Avoidance
Contour (10 m)	2nd order	Site type	Surface collection
Study area	3rd order	Isolated find	Potential test excavation
Development footprint	4th order	Quarry, artefact scatter, PAD	
Solar array	5th order	Scarred tree	
Potential site access/ETL easement/ electrical cabling	6th order		

Identified sites and proposed management measures

New England Solar Farm
Aboriginal cultural heritage assessment
Figure 1H



Office of
Environment
& Heritage

Our Ref: DOC19/155818
Your Ref: J17300

EMM Consulting Pty Ltd
PO Box 21
St Leonards NSW 1590

Attention: Mr Ryan Desic

Dear Mr Desic

Re: J17300 – New England Solar Farm (SSD 9255) – Notice of test excavation and sampling strategy.

Thank you for your letter dated 18 February 2019 about the archaeological test excavation and sampling strategy for the proposed New England Solar Farm project seeking comments from the Office of Environment and Heritage (OEH). I appreciate the opportunity to provide input.

The OEH has reviewed the proposed test excavation and sampling strategy and considers that it is appropriate for the project area and should return adequate results to inform the further management of tangible Aboriginal cultural values within the project area. The OEH does not consider any changes to the proposed test excavation and sampling strategy to be necessary.

If you have any further questions about this issue, Mr Roger Mehr, Archaeologist, Conservation and Regional Delivery, OEH, can be contacted on 6773 7005 or at Roger.Mehr@environment.nsw.gov.au.

Yours sincerely

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Conservation and Regional Delivery

Contact officer: ROGER MEHR
6773 7005

cc: Mr Tim Kirk – UPC Renewables; Mr Iwan Davies DPE

Ryan Desic

From: Ryan Desic
Sent: Wednesday, 24 April 2019 5:12 PM
To: 'nganyawana@gmail.com'; 'steven1ahoy@gmail.com'; 'minnamunnung@gmail.com'; 'ceo@alalc.org.au'; Bruce Cohen; Colin Ahoy; colinahoy57@gmail.com; Green, Kevin; Cheryl Kitchener; rhonda kitchener; 'Bruce.Cohen@hnehealth.nsw.gov.au'; Colin Ahoy; colinahoy57@gmail.com
Subject: New England Solar Farm Project: notification of additional scar tree verification by scar tree specialist.
Attachments: 321455_New England Solar_ OEH submission_2019Mar29_1746.pdf

Dear Registered Party,

The public exhibition period for the New England Solar Farm (NESF) Environmental Impact Statement (EIS) ended on 20 March 2019. EMM are currently in the process of preparing a response to submissions (RTS) report to address all government and public submissions for the EIS. The NSW Office of Environment and Heritage (OEH) provided a submission on 21 March 2019 which included comments on the Aboriginal cultural heritage assessment prepared by EMM (refer attached). In summary, OEH made the following recommendations in relation to the management of Aboriginal cultural heritage:

8. Retain and protect all [standing]* Aboriginal scar trees and quarry sites on the subject land.
9. Engage a qualified arborist to assess the nature of tree scars and determine which trees are Aboriginal objects.
10. Ensure management of both immediate harm and long-term preservation of Aboriginal scar trees, either in-situ [standing trees]* or off-site [fallen trees]*, be determined by the project RAPs in consultation with the project archaeologist and OEH.
11. Amend the ACHMP to incorporate the applicant's commitment to provide ongoing management opportunities and access for Aboriginal people to Site NE09, and access to NE68 following project construction.

*Note: Text in [] confirmed during follow-up consultation with OEH representatives.

This email is notify your party regarding the next steps proposed for the trees that still require official verification, being NE61, NE47, NE45, NE67 and two new potential scar trees (see photos below).

In accordance with OEH recommendations, UPC will be engaging scar tree specialist Andrew Long to make a determination on the status of these trees.

The outcomes will be one of the following:

- If any of these trees are determined not to be Aboriginal scar trees, UPC will seek to remove them after project approval. RAPs will still be offered to take these trees after their removal.

- If any of the standing trees are determined to be Aboriginal scar trees, they will likely be conserved in-situ on-site.
- If the potential scar tree that has fallen (ie New Scar 2) is determined to be an Aboriginal scar tree, UPC will seek to remove the tree and transfer it to RAPs for long-term management.

<u>NE61</u>	<u>NE47</u>	<u>NE45</u>	<u>NE67</u>	<u>New scar 1 – northern array (close to NE37)</u>	<u>New scar 2 – northern array (close to NE40)</u>
					

Additionally, UPC will seek to remove the fallen and cut in half tree NE49 (see photo below). This tree will be transferred to RAPs for long-term management.



Once this exercise is complete, EMM will aim to finalise an addendum to the ACHAR documenting the additional scar tree survey and verification exercise along with the results of the test excavation. The addendum to the ACHAR will include updated management measures for each site (as required). RAPs will be given the opportunity to review the addendum.

Thank you for your time.

Regards,

Ryan Desic

Senior Archaeologist – Heritage Team Leader



T 02 9493 9500

M 0411 329 712

D 02 9493 9541

 Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards 2065

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Appendix B

Scar tree assessment



Potential Aboriginal Scarred Trees

New England Solar Farm, Uralla

Report on an Inspection and Discussion of Likely Origin, Significance and Management Options

A Report to EMM Consulting

by Andrew Long

Andrew Long & Associates Pty Ltd

12th May 2019

Introduction

This report presents a specialist appraisal of six potential Aboriginal scarred trees at Uralla, NSW, on land proposed for development as the New England Solar Farm. The trees were identified as part of Aboriginal cultural heritage surveys undertaken for the project in 2018 and 2019 with registered Aboriginal parties (RAPs) as part of the Aboriginal Cultural Heritage Assessment (ACHA) for the project (EMM Consulting 2018).

The objectives of this specialist study are to provide an expert opinion on the likely origin of the six potential scarred trees, with particular reference to the *NSW Scarred Tree Manual* (Long 2005), and whether they qualify as Aboriginal cultural heritage (ACH) in accordance with the NSW *National Parks and Wildlife Act 1974*. These instructions were confirmed by email and in discussions with Ryan Desic (Heritage Team Leader – EMM Consulting).

Methodology

An inspection of the trees was undertaken by the consultant on 1st May 2019 during which the scars and the local context of five of the trees were documented. Detailed background studies have not been undertaken, and this opinion relies upon the ACHA (EMM Consulting 2018) and verbal information provided by UPC Renewables (Australia) Pty Ltd.

Some comment is also provided on a sixth potential scar on a fallen tree (NE101). The tree was not inspected in the field and the assessment is based on examination of photographic information only.

Description

The trees are located across an extensive area of undulating plains to the east of Uralla on the New England Tablelands. The landscape is characterised by shallow gullies, weathered basaltic plains and low angle slopes capped with silcrete and granitic outcrops. The original native vegetation has been almost entirely cleared, with the exception of dead standing and/or fallen trees, and limited stands of eucalypts. The land use is exclusively agricultural, with extensive degraded pasture and occasional cultivation and modern windbreaks.

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Aboriginal cultural heritage surveys have documented a widespread pattern of extensive archaeological sites consisting of artefact scatters, grinding grooves, quarrying and scarred trees, focused on rocky outcrops and hill crests. Other scarred trees recorded as part of the project reflect a diversity of small to large bark removal scars on dead standing and fallen trees of unknown species, generally measuring 1–3 m in length and typically extending to within 0.5 m of the ground surface, with occasional incidences of multiple scarring incidences on the same tree.

The five scars inspected on 1st May 2019 were likewise all located on dead standing, mature specimens of unknown eucalypts, possibly yellow box (*E. Melliodora*), blakeley's red gum (*E. Blakeleyi*) or manna gum (*E. viminalis*). Precise species identification is not possible through visual inspection alone given the fragmentary and decayed state of the subject trees, however these species commonly occur elsewhere in the area and are known to be associated with Aboriginal tree scarring and bark use both in the local area and elsewhere in New South Wales.

The trees occur as a remnant of scattered eucalypt woodland that would have extensively covered the landscape before clearance. Other than occasional modern windbreaks there is no evidence for mature exotic trees in the area and it is reasonable to assume the trees form part of the pre-European landscape, rather than a post-European planting programme. It is apparent from a visual inspection that these trees are the oldest component of the regional tree landscape, though given their fragmentary nature it is hard to assess either the age of the trees at death, and precisely when this occurred. On the basis of the regional history, it is probable that the landscape was largely cleared by the late 19th century, and if so it is possible the trees have been dead standing for 100–150 years, a timeframe within which Aboriginal people are likely to have still been undertaking some form of traditional activity in the area.

For more background information, the ACHA (Appendix D of the EIS) should be consulted.

The trees are described in the order in which they were inspected.

1. NE47 – an *in situ* stump of a mature tree (approx. 1.2 m in height) with adjacent fallen, highly weathered upper limb of trunk section (Photo 1). The girth at breast height was measured to be 1.6 m. The stump had considerable internal decay, with extensive hollowing throughout the trunk, but was externally in good condition, barring the total loss of bark and some minor surface cracking and fretting. A chainsaw cut on the upper surface of the stump occurred after the death of the tree, and strongly suggests dead timber getting/clearing, rather than the cause of death itself, which may have occurred considerably earlier, given the decay of the residual adjacent upper trunk section.

This scar consisted of a single irregular oval aperture (0.57 m L x 0.1 m max. W), extending to 0.28 m above ground level (Photo 2). The scar dryface had entirely decayed, with the total loss of any potential evidence of tool marks or other signs of cultural intervention.

The extent of overgrowth on both left and right margins was clearly apparent through lateral creasing on the exposed trunk surface, measuring 0.1–0.2 m wide and 0.15 m deep, with a larger section of appressed overgrowth callus extending 0.4 m above the aperture, and clearly visible on the inside of the hollow trunk. The total measured extent of overgrowth indicates an original rectangular scarred area an approx. 0.97 m L x 0.4 m W in dimensions.

Given its fragmentary nature a definitive cause cannot be determined for the scar, however given several similar other recorded scarred trees within the project area, it is

probably the remains of an Aboriginal bark removal scar, possibly for use in shelter or container construction. NE67 scar 2 shows similar characteristics, amongst others.

2. NE45 – an *in situ* dead standing mature tree bole (c. 8 m H), with no surviving crown or fallen limbs (Photo 3). The girth at breast height was approx. 2.0 m. The bole was internally decayed, with extensive hollowing throughout the trunk, but was externally in good condition, barring the total loss of bark and some minor surface cracking and fretting. This hollowing was probably a historical feature of the tree when living, rather than simply accelerated decay since death.

This scar consisted of a single irregular diamond aperture (0.3 m L x 0.35 m max. W), extending to 0.36 m above ground level on the south east face of the trunk (Photo 4). Sections of residual scar dryface survive on the left and right margins of the scar, with a central cavity revealing the hollow interior. Much of the remaining dryface was highly weathered, however two small tool marks (each c. 50 mm L), were present on the upper left section, probably from the use of a steel hatchet. It is unclear whether these are original features of the scar, or later additions.

The aperture is surrounded by a narrow but pronounced, regular ring of overgrowth callus (c. 0.15 m W and 0.15 m D), demonstrating that the scar was created before the death of the tree.

Unlike the other recorded scars inspected or previously recorded, this feature represents a deliberate cut through both the bark and timber to access the hollow pipe in the centre of the trunk. Typically, small cuts of this nature were used to build small fires at the base of a tree to ‘smoke’ game animals, such as possums, out of hollow trunks so that they could be captured for food. It is a practice highly typical of traditional culture and has been documented extensively in early European accounts and archaeological evidence across eastern Australia. As such, this tree is a probable Aboriginal scarred tree.

3. NE67 – an *in situ* dead standing mature tree bole (c. 15 m H), with some surviving major crown elements (Photo 5). The girth at breast height was approx. 2.5m. The bole was internally decayed, with extensive hollowing throughout the trunk, but was externally in good condition, barring the total loss of bark and some minor surface cracking and fretting.

Scar 1 consisted of a large rectilinear aperture (3.0 m L x 0.28 m max. W), extending to 0.65 m above ground level on the south east face of the trunk (Photo 5). The scar dryface had entirely decayed, with the total loss of any potential evidence of tool marks or other signs of cultural intervention.

The extent of overgrowth on both left and right margins was clearly apparent through lateral creasing on the exposed trunk surface, measuring 0.2–0.3 m wide and 0.25 m deep, with a similar areas of appressed overgrowth callus extending 0.2 m above and below the aperture. The total measured extent of overgrowth indicates an original rectangular scarred area approx. 3.4 m L x 0.8 m W in dimensions.

An open fracture in the trunk at the top of the scar connected with another higher scar of probable natural or incidental origin, creating the appearance of a single aperture. However, this is of probable later date, and other evidence of subsequent scarring was present on the trunk to the left of the scar.

Scar 2 consisted of a medium oval aperture (1.0 m L x 0.5 m max. W), extending to 0.2 m above ground level on the northern face of the trunk (Photo 6). The scar dryface had almost entirely decayed, with the exception of some largely dislodged fragments within the scar aperture. There was no evidence of tool marks or other signs of cultural intervention.

The extent of overgrowth on both left and right margins was clearly apparent through lateral creasing on the exposed trunk surface, measuring 0.1–0.25 m wide and 0.1 m deep, with a similar areas of appressed overgrowth callus extending 0.2 m above the aperture. The total measured extent of overgrowth indicates an original rectangular scarred area approx. 1.2 m L x 0.85 m W in dimensions.

Given their fragmentary nature a definitive cause cannot be determined for the scars, however given several similar other recorded scarred trees within the project area, it is probably the remains of an Aboriginal bark removal scar, possibly for use in shelter or container construction. NE37 is similar to scar 1, while NE47 shows similar characteristics to scar 2, amongst others.

4. NE102 – an *in situ* dead standing mature tree bole (c. 10 m H), with no surviving crown other than several major fallen limbs (Photo 7). The girth at breast height was approx. 4m. The bole was internally decayed, with extensive hollowing at the base of the trunk, but was externally in fair condition, barring the total loss of bark, some structural cracking and fretting.

The scar consisted of a large rectilinear aperture (1.4 m L x 0.46 m max. W), extending to 0.15 m above ground level on the western face of the trunk (Photo 7). The scar dryface had entirely decayed, with the total loss of any potential evidence of tool marks or other signs of cultural intervention.

The extent of overgrowth on both left and right margins was clearly apparent through lateral creasing on the exposed trunk surface, measuring 0.25 m wide and 0.3 m deep, with a similar areas of appressed overgrowth callus extending 0.48 m above the aperture. The total measured extent of overgrowth indicates an original rectangular scarred area approx. 1.98 m L x 0.96 W in dimensions.

A major subsidiary limb immediately to the right of the aperture has fractured and either fallen, or been removed by chainsaw at some point in the modern period, further revealing the hollow interior of the trunk (Photo 8). Although the evidence is fragmentary, its morphology suggests that this subsidiary trunk section is an epicormic triggered by the scarring event, which subsequently grew so large to the extent that it occluded the right hand section of the scar, indicating a much wider original scar than that exposed today, and of potentially considerable age.

Given its fragmentary nature a definitive cause cannot be determined for the scar, however given several similar other recorded scarred trees within the project area, it is probably the remains of an Aboriginal bark removal scar, probably for use in shelter, comparable to the adjacent NE37.

5. NE61 – an *in situ* dead standing mature tree (c. 15 m H), with bifurcated trunk and some surviving crown and minor limbs (Photo 9). The girth at breast height of the scarred trunk was approx. 3.5 m. There was no visible evidence of internal hollowing, and the tree was

externally in good condition, barring the almost total loss of bark, some surface cracking and fretting.

The scar consisted of a small heart-shaped aperture (0.43 m L x 0.3 m max. W), extending to 0.9 m above ground level on the south west face of the trunk (Photo 9). The scar dryface was present, with some surface cracking and fretting, and evidence of a single large, deep cut, or series of cuts, extending along the upper margin of the scar (0.3 m L), probably made by a steel axe (Photo 10).

Relatively minor overgrowth around all margins measured approx. 0.1 m wide and 0.1 m deep, suggesting that the original scarred area was similar to the current aperture.

There are several attributes that distinguish this particular scar from the previously assessed scars, and I conclude that it is most probably of European or incidental origin. Given that bark is still present on the trunk it is unlikely that the tree has been dead for an extended time (perhaps 50 years or less), and the scarring event did not occur much time prior to this, given the small extent of overgrowth and the intact dryface. The cause of the scar is the deep cut along the top of the dryface, resulting from the use of a large axe to cut through both bark and timber in making a survey blaze or an attempt at ringbarking. As such this is not considered to be an Aboriginal scarred tree.

Photographic Assessment

The following tree was assessed through photographic evidence only and was not inspected in the field.

6. NE101 - a fallen mature tree (c. 15 m H), with some surviving crown and minor limbs (Photo 11). The girth at breast height of the scarred trunk was estimated to be approx. 3 m. There was no visible evidence of internal hollowing, and the tree was externally in good condition, with almost complete bark retention on the lower section of the bole.

The scar consists of a small elongated oval aperture, extending close to ground level. The scar dryface was present, with some surface cracking and fretting, and with possible bark still adhering to the surface.

While there appears to be an estimated 0.20 m W of overgrowth around both left and right margins, this appears relatively shallow (50–100 mm) and recent, given the young appearance of the bark in relation to the adjacent trunk.

Based on the likely recent age and character of the scar, I am of the opinion that this is not an Aboriginal scarred tree, but the likely outcome of a degenerative process, such as may be caused by sub-bark insect activity, or stress due to damage to the crown or root system, which can manifest in sections of the cambium sleeve drying and dying, thus causing areas of bark to slowly peel away.

Conclusions

It is noted that the scope of my expert assessment has been limited to a small number of potential scarred trees of uncertain origin, that occur within a landscape containing known Aboriginal scarred trees, as well as other types of Aboriginal heritage. From my examination of EMM

Consulting site recordings, I concur that the other recorded scarred trees are most likely of Aboriginal origin, and the characteristics of these features are important for comparative purposes when reviewing the evidence from the six subject trees in this assessment. The previously recorded scars fall into two main categories, namely:

- large, rectilinear bark removal scars approx. 2–3 m H on the lower to middle section of dead standing or fallen tree boles; and
- smaller bark removal scars approx. 1 m H towards the butt of the trees.

This diversity of form, placement and by inference, function, is typical of a traditional Aboriginal use landscape. Unlike European bark gathering for constructional purposes, which tended to either denude an area of trees totally or result in many examples of the same type of large bark sleeve scar, where as much bark was gathered for a single purpose from the lower bole of a single tree that was practically possible. It is also noted that in at least one instance (NE35), multiple scarring of a single tree has occurred in the project area, which is also a characteristic of traditional Aboriginal bark gathering, where the conservation of the bark resource was a key objective.

On the balance of evidence, it is my professional opinion that four scarred trees (NE47, NE45, NE67 and NE102) are Aboriginal objects, and as such receive protection from the NPW Act and must be managed in accordance with the provisions of the NPW Act and the Aboriginal heritage management plan (AHMP) relevant to the development and management of the property (EMM Consulting 2018). This opinion is based on my assessment of the likely age of the scarring and their consistency in size, shape, position and morphology, albeit fragmentary, with Aboriginal bark slab removal scars recorded across the project area and elsewhere in New South Wales generally.

The one scar type that has not been previously identified within the project area is the resource extraction scar (NE45), but these features are well documented in traditional Aboriginal culture through both the archaeological and ethnohistorical record elsewhere in New South Wales, and this one example highlights the diversity of activities that would have been practiced by Aboriginal people in both the pre- and post-contact periods.

While the three bark removal scars are more fragmentary and decayed, the surviving evidence display the same overall morphological elements to the other recorded scarred trees in the project area, and no other natural or incidental cause can be identified. If anything, the fragmentary nature of these scars illustrates the fragility of the Aboriginal scarred tree landscape within the local area, which has been extensively cleared, and highlights the potential high significance of the surviving Aboriginal modified trees.

However, it is my opinion that NE61 and NE101 are not Aboriginal objects, and as such do not receive protection from the NPW Act. This assessment is based on the comparatively recent age of the scars, and the identification of other natural and/or incidental causes for the scarring. Therefore there are no compelling grounds for these two trees to be preserved *in situ*, which could, subject to any other relevant environmental and planning conditions, be removed from their natural position.

Note that the outcome of this assessment has not included consultation with the project RAPs, or with the NSW Office of Environment and Heritage (OEH), and it would be prudent to ensure that my interpretation of the scarring origin is accepted by any other interested party before proceeding with an activity which may harm any of the trees.

References

EMM Consulting Pty Ltd. (EMM) 2018. New England Solar Farm Project. Aboriginal Cultural Heritage Assessment, prepared for UPC Renewables (Australia) Pty Ltd.

Long, A. 2005. Aboriginal Scarred Trees in New South Wales. A Field Manual. Department of Environment and Conservation (NSW), Hurstville.



Photo 1: General view of NE47 showing the scarred stump and highly weathered, fallen trunk section. Facing south east



Photo 2: Close-up view of NE47, showing the residual scar aperture and surrounding overgrowth extending up to just below the chainsaw cut, indicating the approximate original dimensions of the bark removal scar.



Photo 3: NE45, showing the partly overgrown cut through into the hollow trunk, near the base of the tree. Facing north west.



Photo 4: Close-up of NE45 showing the weathered hollow and overgrowth. Note the tool marks at the top of the remnant dry face.



Photo 5: General view of NE67, showing the Scar 1 hollow aperture and overgrowth. Note the split trunk section at the top of the scar, physically connecting the aperture to an unrelated natural or incidental scar on a higher section of trunk. Scar 2 is located at the base of the tree on the opposite surface to this view. Facing north west.



Photo 6: NE 67, scar 2 showing the aperture, overgrowth upper margins and dislodged internal dry face fragments. Facing south east.



Photo 7: NE102 showing the scar aperture, surrounding overgrown margins and stub of a lopped/fallen secondary stem. Facing east.



Photo 8: Close-up of NE102, showing the relationship between the scar aperture (L) and the hollow created by the lopping/falling of a secondary stem on its right margin, possibly an epicormic triggered by the original removal of the bark sheet, which may have extended the greater width around the trunk as visible in this view.



Photo 9: The position of scar NE61. Facing north east. Note bark adhering to the trunk above the scar, suggesting that the tree has not been dead for an extended period.

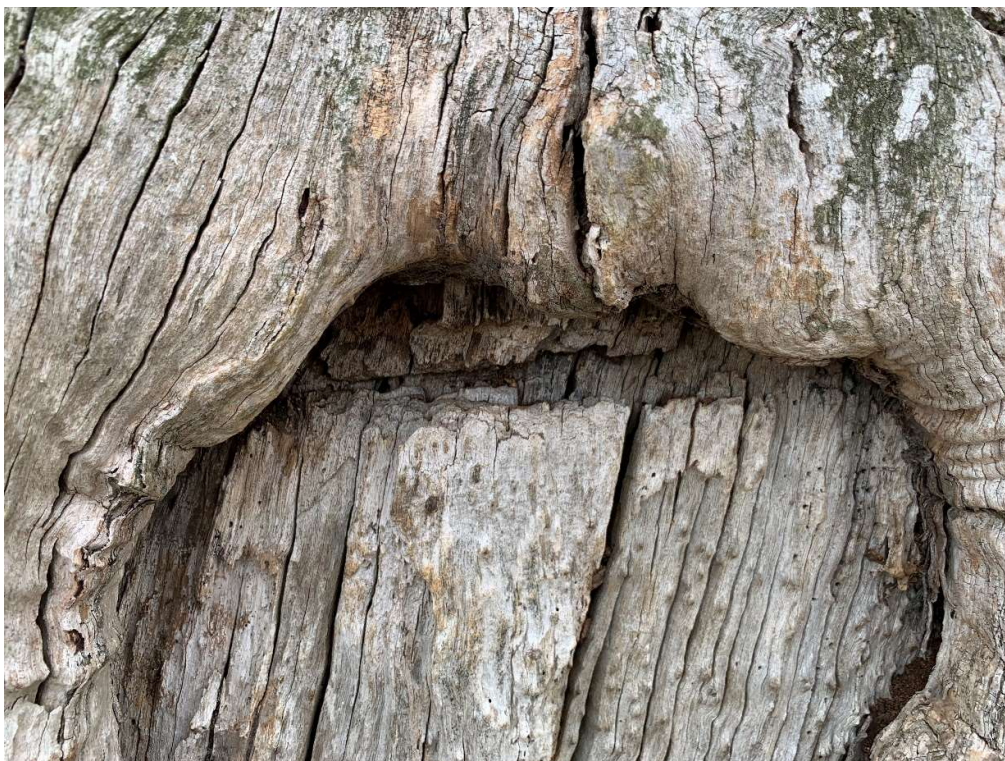


Photo 10: NE61 close-up view, showing extensive, deep cut along upper margin.



Photo 11: NE101 - Scar on fallen tree, showing unweathered dry face with remnant bark adhering to its surface, surrounded by relatively recent, well defined overgrowth characterised by fresh bark.



Appendix C

Artefact catalogue



Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
69	NE 70	864	2	2.60	Spit 3	20-30	20-30								
69	NE 70	850	1	1.100	Spit 5	40-50	40-50								
69	NE 70	851	1	1.120	Spit 1	0-10	0-10								
69	NE 70	852	1	1.120	Spit 2	10-20	10-20								
69	NE 70	853	1	1.120	Spit 3	20-30	20-30	116	Distal Flake		Silcrete	33	2.62	Orange	
69	NE 70	854	1	1.120	Spit 4	30-40	30-40								
69	NE 70	855	2	2.00	Spit 1	0-10	0-10								
69	NE 70	856	2	2.00	Spit 2	10-20	10-20								
69	NE 70	857	2	2.00	Spit 3	20-30	20-30	148	Flake		Quartz	17	14.3	Crystal	Fragments may have been from breakage during excavation.
69	NE 70	858	2	2.00	Spit 4	30-35	30-40								
69	NE 70	859	2	2.40	Spit 1	0-10	0-10								
69	NE 70	860	2	2.40	Spit 2	10-20	10-20								
69	NE 70	861	2	2.40	Spit 3	20-30	20-30								
69	NE 70	849	1	1.100	Spit 4	30-40	30-40	115	Flake		Silcrete	28	3.5	Orange red	
69	NE 70	863	2	2.60	Spit 2	10-20	10-20								
69	NE 70	870	2	2.00	Spit 3	20-30	20-30								
69	NE 70	865	2	2.80	Spit 1	0-10	0-10								
69	NE 70	866	2	2.80	Spit 2	10-20	10-20								
69	NE 70	867	2	2.80	Spit 3	20-30	20-30								
69	NE 70	868	2	2.00	Spit 1	0-10	0-10								
69	NE 70	869	2	2.00	Spit 2	10-20	10-20								
69	NE 70	871	2	2.00	Spit 4	30-35	30-40								
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	149	Flake		Silcrete	37	17.9	Mottled grey	
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	150	Flake		Silcrete	22	1.4	Mottled grey	
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	151	Flake		Silcrete	22	2.6	Light Grey	
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	152	Flake		Basalt	30	3.4	Light Grey	
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	153	Core		Silcrete	28	7.9	Light Grey	
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	154	Distal Flake		Silcrete	17	0.6	Light Grey	
69	NE 70	874	3	3.00	Spit 2	10-20	10-20	155	Distal Flake		Silcrete	14	0.7	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	156	Flake		Silcrete	38	2.1	Mottled pink	Blade flakes
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	157	Flake		Silcrete	32	0.9	Light Grey	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	158	Flake		Silcrete	23	0.9	Mottled pink	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	159	Flake		Silcrete	26	5.2	Light Grey	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	160	Flake		Silcrete	11	0.1	Light Grey	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	161	Flake		Silcrete	13	0.15	Light Grey	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	162	Flake		Silcrete	30	1.7	Mottled pink	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	163	Flake		Silcrete	20	1	Grey	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	164	Flake		Silcrete	32	1.6	Light Grey	Blade flake
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	165	Flake		Silcrete	28	1.8	Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	166	Flake		Silcrete	20	1.99	Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	167	Flake		Silcrete	22	0.8	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	168	Flake		Silcrete	19	1.4	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	169	Flake		Silcrete	18	0.8	Light Pinky Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	170	Flake		Silcrete	16	0.7	Light Pinky Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	171	Flake		Silcrete	12	0.3	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	172	Proximal flake		Silcrete	10	0.3	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	173	Proximal flake		Silcrete	12	0.16	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	174	Proximal flake		Silcrete	12	0.2	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	175	Proximal flake		Silcrete	24	3	Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	176	Medial Flake		Silcrete	25	1.2	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	177	Medial Flake		Silcrete	19	1.6	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	178	Medial Flake		Silcrete	11	0.3	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	179	Distal Flake		Silcrete	19	0.6	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	180	Distal Flake		Silcrete	11	0.1	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	181	Distal Flake		Silcrete	13	0.1	Light Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	182	Distal Flake		Silcrete	17	0.3	Pinky Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	183	xFlaked piece		zQuartzite	28	7.8	Grey	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	184	xFlaked piece		Silcrete	24	3.2	Red Brown	
69	NE 70	875	3	3.00	Spit 3	20-30	20-30	185	Distal Flake		Silcrete	8	0.5	Light Grey	
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	186	Flake		Silcrete	19	0.5	Grey	
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	187	Flake		Silcrete	16	0.6	Grey	
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	188	Flake		Silcrete	12	0.1	Grey	
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	189	Flake		Silcrete	9	0.1	Grey	
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	190	Proximal flake		Silcrete	15	0.6	Grey	
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	191	Flake		Quartz	16	0.4	Crystal	

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
69	NE 70	876	3	3.00	Spit 4	30-40	30-40	192	xFlaked piece		Silcrete	13	0.6	Grey	
69	NE 70	877	3	3.20	Spit 1	0-10	0-10								
69	NE 70	878	3	3.20	Spit 2	10-20	10-20	193	Flake		Silcrete	11	0.3	Mottled Pink	
69	NE 70	879	3	3.20	Spit 3	20-30	20-30	194	Flake		Silcrete	11	0.1	Yellow Brown	
69	NE 70	879	3	3.20	Spit 3	20-30	20-30	195	Flake		Silcrete	12	0.1	Yellow Brown	
69	NE 70	880	3	3.20	Spit 4	30-40	30-40								
69	NE 70	862	2	2.60	Spit 1	0-10	0-10								
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	43	Flake		Silcrete	23	1.1	Light Grey	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	44	Flake		Silcrete	11	0.3	Light Grey	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	45	Flake		Quartz	13	0.45	Crystal	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	46	Medial Flake		Silcrete	13	0.3	Light Grey	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	47	Distal Flake		Silcrete	22	0.4	Light Grey	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	48	Distal Flake		Silcrete	11	0.1	Light Grey	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	49	Distal Flake		Silcrete	10	0.1	Light Grey	
69	NE 70	825	1	1.00	Spit 7	30-35	30-40	50	xFlaked piece		Quartz	8	0.2	Crystal	
69	NE 70	873	3	3.00	Spit 1	0-10	0-10								
69	NE 70	848	1	1.100	Spit 3	20-30	20-30								
69	NE 70	819	1	1.00	Spit 1	0-5	0-10								
69	NE 70	820	1	1.00	Spit 2	5-10	0-10	1	Flake		Silcrete	13	0.23	Light Grey	
69	NE 70	820	1	1.00	Spit 2	5-10	0-10	2	Flake		Silcrete	10	0.17	Light Grey	
69	NE 70	820	1	1.00	Spit 2	5-10	0-10	3	Flake		Silcrete	11	0.12	Light Grey	
69	NE 70	820	1	1.00	Spit 2	5-10	0-10	4	Flake		Silcrete	7	0.01	Light Grey	
69	NE 70	820	1	1.00	Spit 2	5-10	0-10	5	Flake		Silcrete	7	0.01	Light Grey	
69	NE 70	821	1	1.00	Spit 3	10-15	10-20	6	Flake		Silcrete	14	0.18	Light Grey	
69	NE 70	821	1	1.00	Spit 3	10-15	10-20	7	Proximal flake		Silcrete	10	0.25	Light Grey	
69	NE 70	821	1	1.00	Spit 3	10-15	10-20	8	Medial Flake		Silcrete	9	0.04	Light Grey	
69	NE 70	821	1	1.00	Spit 3	10-15	10-20	9	Distal Flake		Silcrete	13	0.18	Light Grey	
69	NE 70	821	1	1.00	Spit 3	10-15	10-20	10	xFlaked piece		Quartz	10	0.24	Crystal	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	11	Flake		Silcrete	41	2.7	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	12	Flake		Silcrete	15	0.7	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	13	Flake		Silcrete	17	1	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	14	Flake		Silcrete	26	1.02	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	15	Flake		Silcrete	11	0.35	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	16	Medial Flake		Silcrete	14	0.7	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	17	Distal Flake		Silcrete	19	1.64	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	18	Distal Flake		Silcrete	12	0.05	Light Grey	
69	NE 70	822	1	1.00	Spit 4	15-20	10-20	19	xFlaked piece		Quartz	16	0.51	Crystal	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	35	Flake		Silcrete	12	0.3	Light Grey	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	36	Flake		Silcrete	8	0.01	Light Grey	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	37	Flake		Silcrete	8	0.01	Light Grey	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	38	Flake		Silcrete	8	0.01	Light Grey	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	39	Flake		Silcrete	8	0.01	Light Grey	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	40	Flake		Silcrete	15	0.04	Light Grey	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	41	Distal Flake		Quartz	5	0.07	Crystal	
69	NE 70	824	1	1.00	Spit 6	25-30	20-30	42	xFlaked piece		Quartz	5	0.07	Crystal	
69	NE 70	826	1	1.00	Spit 8	35-40	30-40	51	Flake		Silcrete	18	0.7	Light Grey	
69	NE 70	826	1	1.00	Spit 8	35-40	30-40	52	Flake		Silcrete	11	0.2	Light Grey	
69	NE 70	826	1	1.00	Spit 8	35-40	30-40	53	Distal Flake		Silcrete	19	0.2	Light Grey	
69	NE 70	827	1	1.00	Spit 9	40-45	40-50	54	Flake		Jasper	55	20	Red brown	
69	NE 70	828	1	1.00	Spit 10	45-50	40-50	55	Flake		Silcrete	22	2.2	Light Grey	
69	NE 70	828	1	1.00	Spit 10	45-50	40-50	56	Flake		Silcrete	23	0.3	Light Grey	blade flake
69	NE 70	828	1	1.00	Spit 10	45-50	40-50	57	Flake		Silcrete	10	0.05	Light Grey	blade flake
69	NE 70	828	1	1.00	Spit 10	45-50	40-50	58	Flake		Silcrete	18	1.27	Light Grey	
69	NE 70	828	1	1.00	Spit 10	45-50	40-50	59	Medial Flake		Silcrete	10	0.1	Light Grey	
69	NE 70	828	1	1.00	Spit 10	45-50	40-50	60	xFlaked piece		Silcrete	5	0.2	Light Grey	
69	NE 70	829	1	1.00	Spit 11	50-55	50-60								
69	NE 70	830	1	1.20	Spit 1	0-10	0-10								
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	61	Flake		Silcrete	14	0.4	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	62	Flake		Silcrete	19	0.5	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	63	Flake		Silcrete	18	0.1	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	64	Flake		Silcrete	10	0.2	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	65	Flake		Silcrete	11	0.2	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	66	Flake		Silcrete	10	0.1	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	67	Distal Flake		Chert	29	6.1	Light Brown	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	68	Distal Flake		Chert	20	0.8	Dark grey	blade flake
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	69	Distal Flake		Chert	13	0.5	Light Grey	
69	NE 70	831	1	1.20	Spit 2	10-20	10-20	70	xFlaked piece		Chert	10	0.1	Light Grey	

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	71	Flake		Silcrete	23	1.1	Red	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	72	Flake		Silcrete	10	1	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	73	Flake		Silcrete	12	0.4	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	74	Medial Flake		Silcrete	23	1.9	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	75	Medial Flake		Silcrete	9	0.1	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	76	Distal Flake		Silcrete	14	0.8	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	77	Distal Flake		Silcrete	15	0.06	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	78	Flake		Silcrete	19	2.3	Light Grey	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	79	Core		Silcrete	24	5.3	Red	
69 NE 70		832	1	1.20	Spit 3	20-30	20-30	80	xFlaked piece		Silcrete	14	1.5	Light Grey	
69 NE 70		842	1	1.60	Spit 4	30-40	30-40								
69 NE 70		847	1	1.100	Spit 2	10-20	10-20								
69 NE 70		846	1	1.100	Spit 1	0-10	0-10								
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	20	Flake		Silcrete	32	3.03	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	21	Flake		Silcrete	22	1.4	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	22	Flake		Silcrete	16	0.13	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	23	Flake		Silcrete	8	0.9	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	24	Flake		Silcrete	10	0.1	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	25	Flake		Silcrete	8	0.1	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	26	Flake		Silcrete	4	0.05	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	27	Flake		Silcrete	5	0.05	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	28	Proximal flake		Silcrete	11	0.37	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	29	Medial Flake		Silcrete	16	0.4	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	30	Medial Flake		Silcrete	10	0.14	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	31	Medial Flake		Silcrete	8	0.13	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	32	Distal Flake		Silcrete	15	0.2	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	33	Distal Flake		Silcrete	17	0.3	Light Grey	
69 NE 70		823	1	1.00	Spit 5	20-25	20-30	34	Distal Flake		Silcrete	8	0.08	Light Grey	
69 NE 70		833	1	1.40	Spit 1	0-10	0-10	81	Flake		Silcrete	36	3.8	Mottled yellow grey	
69 NE 70		833	1	1.40	Spit 1	0-10	0-10	82	Flake		Quartz	13	0.3	Crystal	
69 NE 70		833	1	1.40	Spit 1	0-10	0-10	83	Distal Flake		Quartz	14	0.5	Crystal	
69 NE 70		833	1	1.40	Spit 1	0-10	0-10	84	Retouched flake	Bondi Point	Silcrete	24	1.08	Light Grey	Bondi point retouched along right lateral margin
69 NE 70		845	1	1.80	Spit 3	20-30	20-30								
69 NE 70		844	1	1.80	Spit 2	10-20	10-20	109	Core		Silcrete	47	42	Red	Core shattered during excavation, represents 1 artefact.
69 NE 70		843	1	1.80	Spit 1	0-10	0-10								
69 NE 70		841	1	1.60	Spit 3	20-30	20-30	113	Distal Flake		Quartz	12	0.3	Crystal	
69 NE 70		841	1	1.60	Spit 3	20-30	20-30	114	Distal Flake		Quartz	13	0.5	Crystal	
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	117	Retouched flake	Hatchet	Basalt	103	322	Light Grey	Width: 103mm x 73mm, bifacial flaking along entire margins, no sign of grinding. Heavy patina of light grey, signs of dark grey basalt beneath surface.
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	118	Retouched flake	Scraper	Silcrete	44	2.6	Light Grey	Blade flake that has the proximal platform retouched to make a curved edge. Possible scraper.
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	119	Retouched flake	Backed	Silcrete	26	2	Light Grey	Blade flake
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	120	Flake		Silcrete	41	5.2	Yellow grey	
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	121	Retouched flake	Retouched	Silcrete	39	6.5	Red	Retouched along upper portion of left margin.
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	122	Flake		Silcrete	35	3.2	Red	
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	123	Flake		Silcrete	21	0.7	Light Grey	
69 NE 70		837	1	1.40N	Spit 2	10-20	10-20	124	Distal Flake		Silcrete	16	0.3	Light Grey	
69 NE 70		840	1	1.60	Spit 2	10-20	10-20	110	Flake		Silcrete	10	0.1	Light Grey	
69 NE 70		840	1	1.60	Spit 2	10-20	10-20	111	Distal Flake		Quartz	11	0.2	Crystal	
69 NE 70		840	1	1.60	Spit 2	10-20	10-20	112	xFlaked piece		Silcrete	12	0.3	Light Grey	
69 NE 70		834	1	1.40	Spit 2	10-20	10-20	85	Flake		Silcrete	23	4	Light Grey	
69 NE 70		834	1	1.40	Spit 2	10-20	10-20	86	Flake		Silcrete	20	1.5	Light Grey	
69 NE 70		834	1	1.40	Spit 2	10-20	10-20	87	Flake		Silcrete	23	1.7	Light Grey	
69 NE 70		834	1	1.40	Spit 2	10-20	10-20	88	Flake		Silcrete	17	0.6	Light Grey	
69 NE 70		834	1	1.40	Spit 2	10-20	10-20	89	Flake		Silcrete	22	1.2	Light Grey	
69 NE 70		834	1	1.40	Spit 2	10-20	10-20	90	Flake		Silcrete	15	0.3	Light Grey	

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	91	Flake		Silcrete	18	0.6	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	92	Flake		Silcrete	15	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	93	Flake		Silcrete	11	0.2	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	94	Flake		Silcrete	13	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	95	Flake		Silcrete	10	0.1	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	96	Flake		Silcrete	8	0.01	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	97	Flake		zQuartzite	12	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	98	Flake		Quartz	10	0.3	Crystal	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	99	Flake		Quartz	7	0.1	Crystal	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	100	Medial Flake		Silcrete	8	0.2	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	101	Medial Flake		Silcrete	16	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	102	Medial Flake		Silcrete	14	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	103	Distal Flake		Silcrete	9	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	104	Distal Flake		Silcrete	11	0.2	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	105	xFlaked piece		Silcrete	9	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	106	xFlaked piece		Silcrete	7	0.3	Light Grey	
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	107	Retouched flake	Retouched	Silcrete	33	5.2	Light Grey	Three negative scars along right lateral margin
69	NE 70	834	1	1.40	Spit 2	10-20	10-20	108	Retouched flake	Retouched	Silcrete	23	0.56	Light Grey	Signs of retouch, crescent shape retouch, possibly Bondi point in production
69	NE 70	835	1	1.40	Spit 3	20-30	20-30								
69	NE 70	839	1	1.60	Spit 1	0-10	0-10								
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	137	Flake		Silcrete	21	1.1	Light Grey	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	138	Flake		Silcrete	14	0.2	Light Grey	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	139	Flake		Quartz	22	1.8	Crystal	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	140	Flake		Quartz	10	0.1	Crystal	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	141	Medial Flake		Silcrete	15	0.5	Light Grey	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	142	Distal Flake		Silcrete	14	1	Light Grey	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	143	Distal Flake		Quartz	8	0.2	Crystal	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	144	Distal Flake		Silcrete	6	0.05	Light Grey	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	145	xFlaked piece		Quartz	10	0.2	Crystal	
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	146	Retouched flake	Retouched	Silcrete	26	0.8	Light Pinky Grey	Possible backing along right lateral margin.
69	NE 70	838	1	1.40N	Spit 3	20-30	20-30	147	Retouched flake	Retouched	Silcrete	12	0.3	Light Grey	Rounded retouch platform side, possibly scraper.
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	125	Flake		Silcrete	23	1.9	Pinky grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	126	Flake		Silcrete	13	0.2	Pinky Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	127	Flake		Silcrete	9	0.06	Pinky Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	128	Flake		Quartz	28	5.4	Crystal	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	129	Flake		Quartz	12	0.4	Crystal	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	130	Flake		Quartz	13	0.2	Crystal	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	131	Flake		Silcrete	22	1.2	Light Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	132	Flake		Silcrete	14	0.4	Light Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	133	Flake		Silcrete	13	0.17	Light Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	134	Medial Flake		Silcrete	13	0.4	Light Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	135	Distal Flake		Silcrete	15	0.3	Light Grey	
69	NE 70	836	1	1.40N	Spit 1	0-10	0-10	136	Retouched flake	Bondi Point	Silcrete	20	1	Light Grey	Backing along right lateral margin, crescent shape.
70	NE 27	914	1	1.160	Spit 2	10-20	10-20								
70	NE 27	913	1	1.160	Spit 1	0-10	0-10								
70	NE 27	912	1	1.140	Spit 3	20-30	20-30								
70	NE 27	909	1	1.120	Spit 3	20-30	20-30								
70	NE 27	910	1	1.140	Spit 1	0-10	0-10								
70	NE 27	907	1	1.120	Spit 1	0-10	0-10								
70	NE 27	915	1	1.160	Spit 3	20-30	20-30								
70	NE 27	906	1	1.100	Spit 3	20-30	20-30								
70	NE 27	922	2	2.-60	Spit 1	0-10	0-10								
70	NE 27	908	1	1.120	Spit 2	10-20	10-20								
70	NE 27	911	1	1.140	Spit 2	10-20	10-20								
70	NE 27	916	1	1.180	Spit 1	0-10	0-10								
70	NE 27	917	1	1.180	Spit 2	10-20	10-20								
70	NE 27	918	1	1.180	Spit 3	20-30	20-30								
70	NE 27	919	2	2.-80	Spit 1	0-10	0-10								
70	NE 27	921	2	2.-80	Spit 3	20-30	20-30								
70	NE 27	923	2	2.-60	Spit 2	10-20	10-20	311	Flake		Silcrete	20	2	Mottled Grey	
70	NE 27	923	2	2.-60	Spit 2	10-20	10-20	312	Flake		Silcrete	12	0.2	Mottled Grey	

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
70	NE 27	923	2	2.-60	Spit 2	10-20	10-20	313	xFlaked piece		Silcrete	15	0.8	Light Grey	
70	NE 27	923	2	2.-60	Spit 2	10-20	10-20	314	xFlaked piece		Silcrete	10	0.8	Light Grey	
70	NE 27	923	2	2.-60	Spit 2	10-20	10-20	315	xFlaked piece		Silcrete	6	0.1	Light Grey	
70	NE 27	905	1	1.100	Spit 2	10-20	10-20	310	xFlaked piece		Silcrete	7	0.25	Light Grey	
70	NE 27	886	1	1.20	Spit 2	5-10	0-10								
70	NE 27	924	2	2.-60	Spit 3	20-30	20-30								
70	NE 27	925	2	2.-60	Spit 4	30-40	30-40								
70	NE 27	920	2	2.-80	Spit 2	10-20	10-20								
70	NE 27	892	1	1.20	Spit 8	35-40	30-40								
70	NE 27	900	1	1.60	Spit 4	30-40	30-40								
70	NE 27	926	2	2.-40	Spit 1	0-10	0-10								
70	NE 27	881	1	1.00	Spit 1	0-10	0-10								
70	NE 27	882	1	1.00	Spit 2	10-20	10-20	305	Proximal flake		Silcrete	9	0.3	Light Grey	
70	NE 27	882	1	1.00	Spit 2	10-20	10-20	306	Distal Flake		Silcrete	7	0.2	Light Grey	
70	NE 27	883	1	1.00	Spit 3	20-30	20-30	307	Medial Flake		Silcrete	12	0.15	Light Grey	
70	NE 27	884	1	1.00	Spit 4	30-40	30-40								
70	NE 27	885	1	1.20	Spit 1	0-5	0-10								
70	NE 27	887	1	1.20	Spit 3	10-15	10-20								
70	NE 27	889	1	1.20	Spit 5	20-25	20-30								
70	NE 27	888	1	1.20	Spit 4	15-20	10-20								
70	NE 27	891	1	1.20	Spit 7	30-35	30-40								
70	NE 27	904	1	1.100	Spit 1	0-10	0-10								
70	NE 27	893	1	1.40	Spit 1	0-10	0-10	308	Distal Flake		Silcrete	14	0.08	Light Grey	
70	NE 27	894	1	1.40	Spit 2	10-20	10-20								
70	NE 27	895	1	1.40	Spit 3	20-30	20-30								
70	NE 27	896	1	1.40	Spit 4	30-40	30-40								
70	NE 27	897	1	1.60	Spit 1	0-10	0-10								
70	NE 27	899	1	1.60	Spit 3	20-30	20-30								
70	NE 27	901	1	1.80	Spit 1	0-10	0-10								
70	NE 27	902	1	1.80	Spit 2	10-20	10-20								
70	NE 27	903	1	1.80	Spit 3	20-30	20-30	309	xFlaked piece		zQuartzite	25	2.3	Brown	
70	NE 27	890	1	1.20	Spit 6	25-30	20-30								
70	NE 27	954	4	4.20	Spit 1	0-10	0-10								
70	NE 27	956	4	4.20	Spit 3	20-30	20-30								
70	NE 27	927	2	2.-40	Spit 2	10-20	10-20								
70	NE 27	898	1	1.60	Spit 2	10-20	10-20								
70	NE 27	953	3	3.20	Spit 4	30-40	30-40								
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	335	Flake		Chert	10	0.4	White	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	336	xFlaked piece		Chert	33	7.7	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	337	Distal Flake		Chert	15	0.5	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	338	Distal Flake		Chert	12	0.7	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	339	Distal Flake		Chert	9	0.12	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	340	Distal Flake		Chert	8	0.08	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	341	Distal Flake		Silcrete	13	0.7	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	342	Distal Flake		Silcrete	15	0.6	Light Grey	
70	NE 27	952	3	3.20	Spit 3	20-30	20-30	343	Distal Flake		Silcrete	13	0.3	Light Grey	
70	NE 27	951	3	3.20	Spit 2	10-20	10-20	344	Retouched flake	Backed	Silcrete	10	0.5	Mottled grey	Large inclusions
70	NE 27	951	3	3.20	Spit 2	10-20	10-20	345	Flake		Chert	8	0.16	White	
70	NE 27	950	3	3.20	Spit 1	0-10	0-10								
70	NE 27	948	3	3.00	Spit 3	20-30	20-30								
70	NE 27	947	3	3.00	Spit 2	10-20	10-20								
70	NE 27	946	3	3.00	Spit 1	0-10	0-10								
70	NE 27	945	2	2.80	Spit 3	20-30	20-30								
70	NE 27	944	2	2.80	Spit 2	10-20	10-20								
70	NE 27	943	2	2.80	Spit 1	0-10	0-10								
70	NE 27	942	2	2.60	Spit 3	20-30	20-30								
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	316	Core		Silcrete	43	21	Mottled grey	Broken in half.
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	317	Core		Silcrete	31	9.6	Mottled grey	
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	318	Retouched flake	Retouched	Silcrete	30	1.9	Mottled grey	Blade flake
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	319	Medial Flake		Silcrete	13	0.8	Mottled grey	
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	320	Medial Flake		Silcrete	12	0.7	Mottled grey	
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	321	Distal Flake		Silcrete	14	0.1	Mottled grey	
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	322	xFlaked piece		Quartz	11	0.3	Crystal	
70	NE 27	930	2	2.-20	Spit 2	10-20	10-20	323	xFlaked piece		Quartz	10	0.2	Crystal	
70	NE 27	955	4	4.20	Spit 2	10-20	10-20								

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
70	NE 27	941		2 2.60	Spit 2	10-20	10-20	331	Flake		zQuartzite	27	2.8	Red Browns	
70	NE 27	928		2 2.-40	Spit 3	20-30	20-30								
70	NE 27	929		2 2.-20	Spit 1	0-10	0-10								
70	NE 27	931		2 2.-20	Spit 3	20-30	20-30	324	Flake		Quartz	11	0.3	Crystal	
70	NE 27	931		2 2.-20	Spit 3	20-30	20-30	325	Flake		Quartz	12	0.2	Crystal	
70	NE 27	932		2 2.-20	Spit 4	30-40	30-40								
70	NE 27	933		2 2.00	Spit 1	0-10	0-10								
70	NE 27	935		2 2.00	Spit 3	20-30	20-30	334	Medial Flake		zQuartzite	19	1.8	Dark grey	
70	NE 27	936		2 2.40	Spit 1	0-10	0-10								
70	NE 27	937		2 2.40	Spit 2	10-20	10-20	326	Distal Flake		Silcrete	17	0.5	Light Grey	
70	NE 27	938		2 2.40	Spit 3	20-30	20-30	327	Medial Flake		Silcrete	20	1.5	Light Grey	
70	NE 27	938		2 2.40	Spit 3	20-30	20-30	328	Medial Flake		Silcrete	13	0.6	Light Grey	
70	NE 27	938		2 2.40	Spit 3	20-30	20-30	329	Medial Flake		Silcrete	13	0.4	Light Grey	
70	NE 27	938		2 2.40	Spit 3	20-30	20-30	330	Flake		zQuartzite	14	0.7	Brown	
70	NE 27	934		2 2.00	Spit 2	10-20	10-20	332	Flake		Chert	21	1.1	Dark grey	
70	NE 27	934		2 2.00	Spit 2	10-20	10-20	333	Flake		Chert	18	0.3	Dark grey	
70	NE 27	940		2 2.60	Spit 1	0-10	0-10								
70	NE 27	939		2 2.40	Spit 4	30-40	30-40								
71	NE 83	984		2 2.-60	Spit 3	20-30	20-30								
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	225	Flake		Silcrete	30	6	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	226	Flake		Silcrete	22	1.7	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	227	Flake		Silcrete	15	0.9	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	228	Flake		Silcrete	15	0.7	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	229	Flake		Silcrete	16	0.8	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	230	Flake		Silcrete	24	1	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	231	Flake		Silcrete	21	1.3	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	232	Flake		Silcrete	17	0.4	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	233	Flake		Silcrete	25	1.5	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	234	Flake		Silcrete	16	0.7	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	235	Flake		Silcrete	13	0.7	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	236	Flake		Silcrete	12	0.6	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	237	Flake		Silcrete	13	0.5	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	238	Flake		Silcrete	18	0.6	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	239	Flake		Silcrete	13	0.6	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	240	Flake		Silcrete	20	0.7	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	241	Flake		Silcrete	17	0.7	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	242	Flake		Silcrete	14	0.4	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	243	Flake		Silcrete	16	0.5	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	244	Flake		Silcrete	12	0.1	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	245	Flake		Silcrete	11	0.3	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	246	Flake		Silcrete	10	0.1	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	247	Flake		Silcrete	10	0.3	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	248	Flake		Silcrete	10	0.2	Red Brown	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	249	Flake		Silcrete	40	1.6	Red Brown	Quartzite appearance. Blade flake.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	250	Flake		Silcrete	33	1.8	Red Brown	Quartzite appearance. Blade flake.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	251	Flake		Silcrete	30	3.5	Red Brown	Quartzite appearance. Blade flake.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	252	Flake		Silcrete	17	0.5	Light Grey	
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	253	Flake		Basalt	35	6	Brown	
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	254	Medial Flake		Silcrete	18	0.7	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	255	Medial Flake		Silcrete	17	0.7	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	256	Medial Flake		Silcrete	15	0.9	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	257	Medial Flake		Silcrete	11	0.5	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	258	Medial Flake		Silcrete	12	0.5	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	259	Medial Flake		Silcrete	12	0.3	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	260	Distal Flake		Silcrete	16	0.9	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	261	Distal Flake		Silcrete	19	0.8	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	262	Distal Flake		Silcrete	12	0.4	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	263	Distal Flake		Silcrete	12	0.3	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	264	Distal Flake		Silcrete	6	0.1	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	265	Distal Flake		Silcrete	9	0.1	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	266	Distal Flake		Silcrete	12	0.4	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	267	Distal Flake		Silcrete	8	0.2	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	268	Distal Flake		Silcrete	8	0.2	Light Grey	Quartzite appearance.
71	NE 83	991		2 2.00	Spit 2	10-20	10-20	269	xFlaked piece		Silcrete	18	0.8	Light Grey	Quartzite appearance.

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	270	xFlaked piece		Silcrete	15	1	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	271	xFlaked piece		Silcrete	11	0.4	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	272	xFlaked piece		Silcrete	11	0.3	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	273	xFlaked piece		Silcrete	10	0.5	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	274	xFlaked piece		Silcrete	7	0.3	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	275	xFlaked piece		Silcrete	7	0.3	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	276	xFlaked piece		Silcrete	7	0.3	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	277	xFlaked piece		Silcrete	7	0.3	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	278	Core		Silcrete	40	28	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	279	Core		Silcrete	42	30	Light Grey	Quartzite appearance.
71	NE 83	991	2	2.00	Spit 2	10-20	10-20	280	Core		Silcrete	34	18	Light Grey	Quartzite appearance.
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	217	Flake		Silcrete	11	0.3	Mottled light brown	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	218	Flake		Silcrete	11	0.2	Mottled light brown	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	219	Flake		Silcrete	10	0.2	Mottled light brown	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	220	Distal Flake		Silcrete	12	0.2	Mottled light brown	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	221	Distal Flake		Silcrete	11	0.3	Mottled light brown	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	222	Distal Flake		Silcrete	10	0.2	Mottled light brown	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	223	xFlaked piece		Silcrete	24	2.2	Light Grey	
71	NE 83	990	2	2.00	Spit 1	0-10	0-10	224	Retouched flake	Hatchet	Basalt	116	288	Brown	Size: 116 cm x 66cm, 288g. Bifacial retouch around whole margin, platform of the flake still retained.
71	NE 83	989	2	2.-20	Spit 2	10-20	10-20	208	Flake		Silcrete	22	1	Light Grey	
71	NE 83	989	2	2.-20	Spit 2	10-20	10-20	209	Flake		Silcrete	14	0.5	Light Grey	
71	NE 83	989	2	2.-20	Spit 2	10-20	10-20	210	Proximal flake		Silcrete	13	0.4	Light Grey	
71	NE 83	989	2	2.-20	Spit 2	10-20	10-20	211	Medial Flake		Silcrete	16	0.4	Light Grey	
71	NE 83	989	2	2.-20	Spit 2	10-20	10-20	212	Medial Flake		Silcrete	10	0.2	Light Grey	
71	NE 83	988	2	2.-20	Spit 1	0-10	0-10	207	Flake		Silcrete	14	0.04	Light Grey	
71	NE 83	987	2	2.-40	Spit 3	20-30	20-30								
71	NE 83	983	2	2.-60	Spit 2	10-20	10-20								
71	NE 83	985	2	2.-40	Spit 1	0-10	0-10								
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	281	Flake		Silcrete	27	3.3	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	282	Flake		Silcrete	25	0.6	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	283	Flake		Silcrete	23	1.6	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	284	Flake		Silcrete	24	1.7	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	285	Flake		Silcrete	13	0.6	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	286	Flake		Silcrete	15	0.7	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	287	Flake		Silcrete	18	1.6	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	288	Flake		Silcrete	14	0.3	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	289	Flake		Silcrete	12	0.4	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	290	Flake		Silcrete	15	0.8	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	291	Flake		Silcrete	12	0.7	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	292	Flake		Silcrete	13	0.2	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	293	Flake		Silcrete	13	0.2	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	294	Flake		Silcrete	8	0.1	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	295	Flake		Silcrete	12	0.2	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	296	Flake		Silcrete	9	0.1	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	297	Flake		Silcrete	8	0.1	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	298	Medial Flake		Silcrete	12	0.5	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	299	Medial Flake		Silcrete	12	0.4	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	300	Distal Flake		Silcrete	14	0.4	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	301	Distal Flake		Silcrete	11	0.3	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	302	Distal Flake		Silcrete	15	0.5	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	303	Distal Flake		Silcrete	13	0.3	Grey	Quartzite appearance.
71	NE 83	992	2	2.00	Spit 3	20-30	20-30	304	xFlaked piece		Silcrete	15	1.3	Grey	Quartzite appearance.
71	NE 83	1001	2	2.60	Spit 3	20-30	20-30								
71	NE 83	982	2	2.-60	Spit 1	0-10	0-10								
71	NE 83	986	2	2.-40	Spit 2	10-20	10-20								
71	NE 83	993	2	2.20	Spit 1	0-5	0-10								
71	NE 83	994	2	2.20	Spit 2	5-10	0-10	213	Distal Flake		Silcrete	17	0.9	Mottled Grey	
71	NE 83	995	2	2.20	Spit 3	10-15	10-20	214	Flake		Basalt	40	5.2	Dark grey	Broken into 2 pieces.
71	NE 83	996	2	2.40	Spit 1	0-10	0-10								
71	NE 83	997	2	2.40	Spit 2	10-20	10-20								
71	NE 83	998	2	2.40	Spit 3	20-30	20-30								
71	NE 83	1000	2	2.60	Spit 2	10-20	10-20								
71	NE 83	1002	2	2.80	Spit 1	0-10	0-10								
71	NE 83	1003	2	2.80	Spit 2	10-20	10-20								

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
71	NE 83	1004	2	2.80	Spit 3	20-30	20-30								
71	NE 83	981	2	2-.80	Spit 3	20-30	20-30								
71	NE 83	972	1	1.140	Spit 1	0-10	0-10								
71	NE 83	999	2	2.60	Spit 1	0-10	0-10	216	Flake		Silcrete	24	2	Yellow and red	
71	NE 83	962	1	1.70	Spit 1	0-10	0-10								
71	NE 83	1088	1	1.30	Spit 1	0-10	0-10	200	Flake		Silcrete	17	0.6	Yellow Brown	
71	NE 83	1088	1	1.30	Spit 1	0-10	0-10	201	Flake		Silcrete	19	1.9	Mottled red brown	
71	NE 83	1088	1	1.30	Spit 1	0-10	0-10	202	Distal Flake		Silcrete	13	0.2	Yellow Brown	
71	NE 83	1089	2	2.20	Spit 4	15-20	10-20	215	Flake		Basalt	42	14	Dark grey	
71	NE 83	957	1	1.00	Spit 1	0-10	0-10	196	Flake		Silcrete	13	0.5	Grey	
71	NE 83	958	1	1.00	Spit 2	10-20	10-20	197	Distal Flake		Silcrete	27	3.5	Light Grey	
71	NE 83	959	1	1.20	Spit 1	0-10	0-10	198	Flake		Silcrete	12	0.9	Mottled grey	
71	NE 83	959	1	1.20	Spit 1	0-10	0-10	199	Distal Flake		Silcrete	10	0.2	Mottled grey	
71	NE 83	974	1	1.140	Spit 3	20-30	20-30								
71	NE 83	961	1	1.40	Spit 1	0-10	0-10	206	Flake	Blade	Silcrete	26	0.8	Mottled Red	
71	NE 83	980	2	2-.80	Spit 2	10-20	10-20								
71	NE 83	963	1	1.70	Spit 2	10-20	10-20								
71	NE 83	964	1	1.70	Spit 3	20-30	20-30								
71	NE 83	965	1	1.80	Spit 1	0-10	0-10								
71	NE 83	966	1	1.80	Spit 2	10-20	10-20								
71	NE 83	978	1	1.160	Spit 3	20-30	20-30								
71	NE 83	960	1	1.30	Spit 2	10-20	10-20	203	Flake	Blade	Silcrete	40	4	Light Grey	
71	NE 83	960	1	1.30	Spit 2	10-20	10-20	204	Flake		Silcrete	16	0.3	Light Grey	
71	NE 83	960	1	1.30	Spit 2	10-20	10-20	205	Flake		Silcrete	11	0.3	Grey	
71	NE 83	979	2	2-.80	Spit 1	0-10	0-10								
71	NE 83	967	1	1.100	Spit 1	0-10	0-10								
71	NE 83	977	1	1.160	Spit 2	10-20	10-20								
71	NE 83	976	1	1.160	Spit 1	0-10	0-10								
71	NE 83	975	1	1.140	Spit 4	30-40	30-40								
71	NE 83	973	1	1.140	Spit 2	10-20	10-20								
71	NE 83	971	1	1.120	Spit 3	20-30	20-30								
71	NE 83	970	1	1.120	Spit 2	10-20	10-20								
71	NE 83	969	1	1.120	Spit 1	0-10	0-10								
71	NE 83	968	1	1.100	Spit 2	10-20	10-20								
72	NE 15	1031	4	4.20	Spit 2	5-10	0-10								
72	NE 15	1022	3	3.40	Spit 1	0-5	0-10								
72	NE 15	1023	3	3.40	Spit 2	5-10	0-10								
72	NE 15	1024	3	3.40	Spit 3	10-15	10-20								
72	NE 15	1025	3	3.60	Spit 1	0-5	0-10								
72	NE 15	1026	3	3.60	Spit 2	5-10	0-10								
72	NE 15	1027	3	3.60	Spit 3	10-15	10-20								
72	NE 15	1028	4	4.00	Spit 1	0-5	0-10								
72	NE 15	1032	4	4.40	Spit 1	0-5	0-10								
72	NE 15	1030	4	4.20	Spit 1	0-5	0-10								
72	NE 15	1021	3	3.20	Spit 3	10-15	10-20								
72	NE 15	1033	4	4.40	Spit 2	5-10	0-10								
72	NE 15	1006	1	1.00	Spit 2	5-10	0-10								
72	NE 15	1029	4	4.00	Spit 2	5-10	0-10								
72	NE 15	1007	1	1.00	Spit 3	10-15	10-20								
72	NE 15	1020	3	3.20	Spit 2	5-10	0-10								
72	NE 15	1008	1	1.00	Spit 4	15-20	10-20								
72	NE 15	1005	1	1.00	Spit 1	0-5	0-10								
72	NE 15	1009	1	1.10	Spit 1	0-10	0-10								
72	NE 15	1010	1	1.10	Spit 2	10-20	10-20								
72	NE 15	1011	1	1.20	Spit 1	0-10	0-10								
72	NE 15	1012	1	1.20	Spit 2	10-20	10-20								
72	NE 15	1014	2	2.00	Spit 2	10-20	10-20								
72	NE 15	1015	2	2.20	Spit 1	0-10	0-10								
72	NE 15	1016	2	2.20	Spit 2	10-20	10-20								
72	NE 15	1017	2	2.40	Spit 1	0-10	0-10								
72	NE 15	1013	2	2.00	Spit 1	0-10	0-10								
72	NE 15	1019	3	3.20	Spit 1	0-5	0-10								
72	NE 15	1018	2	2.40	Spit 2	10-20	10-20								
73	NE 33	1058	2	2.80	Spit 1	0-10	0-10								
73	NE 33	1051	2	2.00	Spit 2	10-15	10-20								
73	NE 33	1052	2	2.20	Spit 1	0-10	0-10								
73	NE 33	1053	2	2.20	Spit 2	10-20	10-20								

Site ID	Site	SITE COMPONENT ID	Transect	Square	Level	Depth of spit (Actual)	DepthRange	ARTEFACT ID	Type	Implement	Raw material	Length	Weight	Colour	Comment
73	NE 33	1054	2	2.20	Spit 3	20-30	20-30								
73	NE 33	1055	2	2.40	Spit 1	0-10	0-10								
73	NE 33	1060	2	2.100	Spit 1	0-10	0-10								
73	NE 33	1057	2	2.60	Spit 2	10-20	10-20								
73	NE 33	1059	2	2.80	Spit 2	10-20	10-20								
73	NE 33	1050	2	2.00	Spit 1	0-10	0-10								
73	NE 33	1042	1	1.40	Spit 2	10-20	10-20								
73	NE 33	1056	2	2.60	Spit 1	0-10	0-10								
73	NE 33	1049	1	1.100	Spit 1	0-10	0-10								
73	NE 33	1048	1	1.80	Spit 1	0-10	0-10								
73	NE 33	1047	1	1.60	Spit 5	20-25	20-30								
73	NE 33	1046	1	1.60	Spit 4	15-20	10-20								
73	NE 33	1045	1	1.60	Spit 3	10-15	10-20								
73	NE 33	1061	2	2.100	Spit 2	10-20	10-20								
73	NE 33	1043	1	1.60	Spit 1	0-5	0-10								
73	NE 33	1070	3	3.40	Spit 1	0-10	0-10								
73	NE 33	1041	1	1.40	Spit 1	0-10	0-10								
73	NE 33	1040	1	1.20	Spit 2	10-20	10-20								
73	NE 33	1039	1	1.20	Spit 1	0-10	0-10								
73	NE 33	1038	1	1.00	Spit 2	10-20	10-20								
73	NE 33	1037	1	1.00	Spit 1	0-10	0-10								
73	NE 33	1036	2	1.-20	Spit 3	20-25	20-30								
73	NE 33	1044	1	1.60	Spit 2	5-10	0-10								
73	NE 33	1076	3	3.100	Spit 1	0-10	0-10								
73	NE 33	1035	2	1.-20	Spit 2	10-20	10-20								
73	NE 33	1034	1	1.-20	Spit 1	0-10	0-10								
73	NE 33	1087	5	5.100	Spit 1	0-10	0-10								
73	NE 33	1086	5	5.80	Spit 1	0-10	0-10								
73	NE 33	1085	5	5.60	Spit 1	0-10	0-10								
73	NE 33	1084	5	5.20	Spit 1	0-10	0-10								
73	NE 33	1083	5	5.00	Spit 1	0-10	0-10								
73	NE 33	1082	4	4.100	Spit 1	0-10	0-10								
73	NE 33	1081	4	4.80	Spit 1	0-10	0-10								
73	NE 33	1080	4	4.60	Spit 1	0-10	0-10								
73	NE 33	1079	4	4.20	Spit 1	0-10	0-10								
73	NE 33	1068	3	3.20	Spit 1	0-10	0-10								
73	NE 33	1077	3	3.100	Spit 2	10-20	10-20								
73	NE 33	1062	2	2.120	Spit 1	0-10	0-10								
73	NE 33	1075	3	3.80	Spit 2	10-20	10-20								
73	NE 33	1074	3	3.80	Spit 1	0-10	0-10								
73	NE 33	1073	3	3.60	Spit 2	10-20	10-20								
73	NE 33	1072	3	3.60	Spit 1	0-10	0-10								
73	NE 33	1071	3	3.40	Spit 2	10-20	10-20								
73	NE 33	1069	3	3.20	Spit 2	10-20	10-20								
73	NE 33	1067	3	3.00	Spit 2	10-20	10-20								
73	NE 33	1066	3	3.00	Spit 1	0-10	0-10								
73	NE 33	1065	3	3.00	Spit 2	10-20	10-20								
73	NE 33	1064	3	3.00	Spit 1	0-10	0-10								
73	NE 33	1063	2	2.120	Spit 2	10-20	10-20								
73	NE 33	1078	4	4.00	Spit 1	0-10	0-10								





Appendix F

Updated site management measures for historic heritage

Table F.1 **Revised list of management measures for historic heritage items identified as part of the historic heritage assessment (Appendix E of the EIS)**

Site ID	Site name	Site type	Significance / grading	Impact type	Project modifications	Management or mitigation options
HNE01	Demolition rubble	Built/archaeological	None/NA	None	None required.	None required.
HNE02	View to Dangars Lagoon	Landscape/aesthetic	None/High	None	None required.	None required.
HNE04	Deeargee Woolshed	Built/archaeological	State	None	None required.	None required.
HNE05	Old Gostwyck platform 1	Built/archaeological	State (potentially)/High	None	None required.	None required.
HNE06	Old Gostwyck platform 2	Built/archaeological	State (potentially)/High	None	None required.	None required.
HNE07	Toongabbie Station	Built/archaeological	State (potentially)/Exceptional	None	None required.	None required.
HNE08	Remnant stockyard	Built/archaeological	Local (potentially)/Moderate	None	None required.	None required.
HNE09	Old Gostwyck Woolshed	Built/archaeological	State/Exceptional	None	None required.	None required.
HNE10	Brick-making site	Built/archaeological	Local/High	None	None required.	None required.
HNE11	Remnant basalt wall 1	Built/archaeological	State/High	None	Will be avoided as the southern array has now been removed from the project.	None required.
HNE12	Remnant basalt wall 2	Built/archaeological	State/High	None	Will be avoided as the southern array has now been removed from the project.	None required.
HNE14	Granite tors	Landscape/aesthetic	None/High	None	Will be avoided.	Include in general landscape digital photographic archival record.
HNE15	View through Gostwyck Station	Landscape/aesthetic	None/High	Visual	None possible.	Include in general landscape digital photographic archival record.
HNE16	View from granite tors	Landscape/aesthetic	None/Moderate	Visual	None possible.	Include in general landscape digital photographic archival record.
HNE17	Historical Gostwyck shepherd's hut	Archaeological	State/Exceptional	None	Development footprint for central array area modified to avoid this site.	Detailed digital photographic archival recording. Active protection of this item with the use of sturdy bollards to protect from accidental impacts.

Table F.1 **Revised list of management measures for historic heritage items identified as part of the historic heritage assessment (Appendix E of the EIS)**

Site ID	Site name	Site type	Significance / grading	Impact type	Project modifications	Management or mitigation options
HNE18	Stockyard (recent, disused)	Built	None/Moderate	None	None required.	Include in general landscape digital photographic archival record. Passive protection of this item.
HNE19	Remnant house archaeological site	Archaeological	Local (potentially)/High	None	Development footprint for northern array area modified to avoid this site.	Include in general landscape digital photographic archival record. Active protection of this item with the use of flags close to the watercourse that separates it from the northern array area.
HNE20	Old Gostwyck Road alignment inside the development footprint and as part of the landscape.	Landscape	None/Little	None	None possible.	Include in general landscape digital photographic archival record.
HNE21	Remnant fence line	Landscape/aesthetic	None/Moderate	Physical	None possible.	Detailed digital photographic archival recording. Topographic survey of fence line.
HNE26	Former stockyard	Built/archaeological	None/Moderate (potentially)	None	Will be avoided as the southern array has now been removed from the project.	Investigated as part of the Aboriginal archaeological excavation with negative results. None required.
HNE28	Spring Camp house site	Built/archaeological	Local (potentially)/High	None	None required.	Include in general landscape digital photographic archival record. Passive protection of this site to avoid accidental impacts.
HNE31	Farmhouse	Built/archaeological	Local (potentially)/High	None	None required.	None required.
HNE34	Former stockyard	Built/archaeological	None/Moderate	Physical	None possible.	Detailed digital photographic archival recording. Topographic survey. If possible, avoid this item.
HNE35	Old Gostwyck Platform 3	Built/archaeological	State (potentially)/High	None	None required.	Include in general landscape digital photographic archival record. Passive protection of this site to avoid accidental impacts.
HNE36	Saumarez Hut	Built/archaeological	State/Exceptional	None	Development footprint for northern array area	Include in general landscape digital photographic archival record.

Table F.1 **Revised list of management measures for historic heritage items identified as part of the historic heritage assessment (Appendix E of the EIS)**

Site ID	Site name	Site type	Significance / grading	Impact type	Project modifications	Management or mitigation options
HNE37	Cultural landscape	Overall cultural landscape and views	State/Exceptional	Physical/visual	modified to avoid this site. Modifications to the development footprint made in a number of locations (refer Section 7.2 of Appendix E of the EIS and Chapter 2 of this report).	Passive protection of this site to avoid accidental impacts. Will require full archival digital photographic recording of development footprint and immediate surrounds prior to impacts. The development footprint and its surrounds are part of a larger significant cultural landscape, which will be partially physically impacted. Views will also be affected. Details of locations and subjects of photographs to be included in the HHMP.
HNE38	Gostwyck Hall	Building	Local/Moderate	None	None required.	None required
HNE39	Grave site	Two graves	Unknown/Moderate (potentially)	None	None required.	None required
HNE40	Site of two dwellings	Two dwellings	Local (potentially)/High	None	None required.	None required
HNE41	Rows of poplars	Poplar wind break	None/Moderate	Physical	None possible.	Include in general landscape digital photographic archival record.
HNE43	Former fence line	Landscape/aesthetic	None/High	Physical	None possible.	Detailed digital photographic archival recording. Topographic survey of fence line.

Appendix G

Updated Land Use Conflict Risk Assessment

Activity	Identified potential conflict	Probability (P)	Consequence (C)	Risk ranking	Management strategy (method of control)	Revised risk ranking (P; C)	Performance target
Weed and pest management	Increased distribution of weeds during construction as a result of increased vehicle and pedestrian movements.	B	4	12	To manage the transfer of weeds and pathogens to and from work areas, appropriate wash down facilities will be available to clean vehicles and equipment prior to arrival and when leaving the work areas. The focus will be to minimise the transfer of soil and seed material. This will occur during vegetation clearing and construction. The project's construction environmental management plan (CEMP) and operational environmental management plan (OEMP) will include weed management protocols, such as measures for the identification, management and ongoing monitoring of weeds on-site. In addition, if implemented, sheep grazing would put pressure on any increases to weed levels while maintaining a multi-purpose land use throughout the life of the project.	5 (D; 4)	Effectiveness will be measured as part of the CEMP and OEMP.
	Increased presence of pest animals during construction as a result of increased food waste.	C	4	8	Pest animals may be encouraged by food sources from construction works and general disturbance. If pest control is considered necessary, it will generally involve a routine baiting program in consultation with the project landholders and neighbouring landholders. Other control methods such as shooting or trapping may also be used if deemed necessary or appropriate. Baiting programs would include methods to minimise the possibility of affecting non-target fauna species.	5 (D; 4)	Effectiveness will be measured as part of the CEMP and OEMP.
Agricultural land and productivity	Removal of high quality agricultural land from production.	A	5	11	The project is considered to be a temporary and reversible change in land use and the land within the development footprint can be returned to its former use (ie grazing) upon decommissioning. The project boundary incorporates a mix of large-scale and small-scale farms from within the local community, with high potential for continuation of sheep grazing activities within the array areas during operations, as well as continuation of farming activities on land in between the northern and central arrays. The two array areas have been strategically placed so that primary production can continue within the immediate surrounds and to reduce potential impacts on the use of neighbouring farm lands for primary production purposes. In addition, it is anticipated that the development footprint will only require minimal site preparation and civil works (such as grading/levelling and compaction). No large areas of reshaping or excavation are anticipated, aside from digging of electrical cabling trenches and formation of level pads for substations. The integrity of the land and soil capability within the development footprint is expected to be retained throughout the project's operations. A project decommissioning and rehabilitation plan will be prepared prior to the end of the project's operational life and will feature	11 (A; 5)	Rehabilitation objectives and strategies (including performance measures) will be established in the decommissioning and rehabilitation plan.
	Reduced agricultural productivity of land under project infrastructure during operations.	A	5	11	The anticipated use of single axis tracking PV modules involves a typical row spacing of 5-8 m, which would result in a significant area of land within the project's development footprint that could still be utilised for sheep grazing during the project's operations. It is noted that resting the land within the development footprint from significant grazing pressure during operations may improve the future agricultural productivity potential of the land following decommissioning.	11 (A; 5)	Rehabilitation objectives and strategies (including performance measures) will be established in the decommissioning and rehabilitation plan.
Mineral resources	Impacts to areas of higher mineral significance.	D	5	2	An area identified by Geological Survey of NSW (GSNSW) – Division of Resources and Geosciences (DRG) as an area of higher mineral significance has been removed from the development footprint. All project infrastructure (with the exception of underground cables below 500 mm) will be removed upon decommissioning and the development footprint will be returned to its pre-existing land use. No long-term impacts to mineral deposits are expected and the land within the development footprint could be explored upon decommissioning.	2 (D; 5)	No action required.
Neighbouring agricultural operations	Impacts on the operation of the solar farm from neighbouring agricultural operations (eg dispersal of dust and/or agricultural products on to PV modules).	D	4	5	No significant impacts on the operation and functionality of the project are anticipated as a result of neighbouring agricultural operations. Standard maintenance of the PV modules and other project infrastructure will likely address any potential impacts generated by dust or spray drift from neighbouring agricultural and/or land management practices.	5 (D; 4)	No action required.
Noise	Construction noise and associated impacts on residents.	B	3	17	Construction noise impacts have been assessed as part of the noise and vibration impact assessment (refer to Appendix J of the EIS). During limited out of hours (OOH) periods, predicted construction noise levels and maximum event noise levels are above the relevant criteria at a number of the assessment locations. The use of buffer distances around these assessment locations has been recommended during OOH periods with the aim of minimising impacts and reducing construction noise levels to below the relevant criteria. Buffer zones for affected assessment locations are detailed in Section 5.7.4 of the amendment report. Noise generated during construction will also be minimised through implementation of best practice requirements outlined in the <i>Interim Construction Noise Guideline</i> (DECC 2009). Construction noise management and mitigation will be addressed in the CEMP.	9 (D; 3)	Effectiveness will be measured as part of the CEMP, which will include reference to relevant noise criteria.
	Construction noise and associated impacts on livestock.	C	4	8	Potential construction noise impacts on livestock, in particular during key lambing periods will be identified during further consultation with involved landholders and adjacent landholders. Noise generated during construction will also be minimised through implementation of several measures from the <i>Interim Construction Noise Guideline</i> (DECC 2009), which have been listed in the noise and vibration impact assessment (refer to Appendix J of the EIS and Section 5.7.4 of the amendment report). Any required mitigation measures will be identified in consultation with landholders and included in the CEMP for the project.	8 (C; 4)	Effectiveness will be measured as part of the CEMP, which will include reference to relevant noise criteria.
	Operational noise and associated impacts on residents.	D	5	2	Operational noise impacts have been assessed as part of the noise and vibration impact assessment (refer to Appendix J of the EIS). Noise levels for all assessment locations considered as part of the operational noise impact assessment will satisfy the minimum daytime and evening/night-time trigger levels established by the <i>Noise Policy for Industry</i> (EPA 2017).	2 (D; 5)	No action required.

Activity	Identified potential conflict	Probability (P)	Consequence (C)	Risk ranking	Management strategy (method of control)	Revised risk ranking (P; C)	Performance target
	Noise from increased vehicle movements on local roads during construction and associated impacts on residents and livestock.	B	3	17	Road traffic noise impacts have been assessed as part of the noise and vibration impact assessment (refer to Appendix J of the EIS and Section 5.7 of the amendment report). As per the NSW Government's <i>Voluntary Land Acquisition and Mitigation Policy</i> (VLAMP), a noise level of, or less than, 2 dB above the relevant noise goal is considered to have negligible impacts and would not be discernible by the average listener. As such, impacts identified as part of the road traffic noise assessment do not warrant receiver based treatments or controls. No heavy vehicles will be turning onto Barleyfields Road (south) at the intersection with Wood Street and the New England Highway. Implementation of best practice requirements outlined in the <i>Interim Construction Noise Guideline</i> (DECC 2009) will also minimise noise impacts. Construction noise management and mitigation will be addressed in the CEMP.	9 (D; 3)	Effectiveness will be measured as part of the CEMP, which will include reference to relevant noise criteria.
Air quality	Dust from vehicle movements along access roads and unsealed local roads.	B	4	12	UPC will apply appropriate mitigation strategies to reduce potential dust generation by project-related vehicle movements during construction. This may include measures within the traffic management plan (TMP) such as dust suppression with water spraying or localised sealing or treatment of the road (with dust suppression polymers) adjacent to residential properties along local roads.	8 (C; 4)	Effectiveness of mitigation strategies will be measured as part of the TMP.
	Dust from sheep moving across paddocks on-site once operational.	C	5	4	No significant impacts on the operation and functionality of the project are anticipated as a result of dust from sheep moving across paddocks on-site once operational. Sheep grazing within the development footprint would be a continuation of an existing land use. No management strategy is proposed to address this potential conflict.	4 (C; 5)	No action required.
Visual amenity	Visibility of project infrastructure from residences and the local road network.	B	3	17	The visibility of project infrastructure from 23 viewpoints has been assessed as part of the visual impact assessment (refer to Appendix I of the EIS and Section 5.6 of the amendment report). The mitigation measures required to alleviate visual impacts are listed in Section 4.5 of the visual impact assessment and include consideration of the colour of materials and night lighting.	13 (C; 3)	Effectiveness will be measured as part of the CEMP, which will include reference to mitigation measures required to alleviate visual impacts.
	Inadequacy of vegetation at screening project infrastructure during ongoing operations.	C	3	13	Landscaping to mitigate views of project infrastructure at Viewpoint 5 will be considered in consultation with the property owner of N1. Any required vegetation screening would be installed in accordance with a detailed landscaping plan prepared in consultation with DPE, project landholders and affected landholders to the satisfaction of the Secretary. Vegetation screening would be planted prior to the commencement of operations and consist of vegetation species that facilitate the best possible outcome in terms of visual screening and would be designed to be effective at screening views of project infrastructure within three years of the commencement of construction. The plan would include a program to monitor and report on the effectiveness of the vegetation screening and include details of who would be responsible for monitoring, reviewing and implementing the plan. It would also detail the appropriate course of action should affected landholders or relevant agencies consider the planted vegetation screening to be inadequate.	9 (D; 3)	If required, the landscaping plan will include a program to monitor and report on the effectiveness of the proposed landscaping.
	Glare/reflectivity from PV modules and other project infrastructure.	D	4	5	Based on the findings of previous assessments prepared for PV solar energy facilities, glint and glare from the project's PV modules and other project infrastructure are not expected to significantly impact receptors within the vicinity of the development footprint for the two array areas or motorists travelling along the local and regional road network. No management strategy is proposed to address this potential conflict.	5 (D; 4)	No action required.
	Potential for night lighting from the project to impact neighbouring properties.	D	5	2	Any external lighting associated with the project will: - be installed as low intensity lighting (except where required for safety or emergency purposes); - be installed so that it does not shine above the horizontal; and - comply with Australian Standard AS4282 (INT) 1997 - Control of Obtrusive Effects of Outdoor Lighting, or its latest version.	5 (D; 4)	Compliance will be measured as part of the CEMP and OEMP.
	Change in land use resulting in increased pedestrian and vehicle traffic on-site during the project's construction period and potential for theft and vandalism at neighbouring properties.	C	3	13	A zero tolerance policy on theft will be implemented on-site throughout the project's construction period. Criminal background checks on all staff, contractors, sub-trades and security guards will be performed. Surrounding landholders, project landholders and law enforcement will be provided with the primary contractor's contact information. The construction workforce management plan (CWMP) will include a Code of Conduct for the project's workers (particularly to avoid anti-social behaviour at peak construction times).	9 (D; 3)	The CWMP will include details on how the plan will be managed and audited.
Security	Change in land use resulting in vandalism and theft at the construction accommodation village.	D	4	5	A zero tolerance policy on theft will be implemented on-site throughout the project's construction period. Surveillance cameras and signs will be implemented at the construction accommodation village to deter vandalism and theft. Security fencing will be installed around the construction accommodation village to control access.	5 (D; 4)	No action required.
	Change in land use resulting in vandalism and theft of project infrastructure and construction materials.	C	4	8	A zero tolerance policy on theft will be implemented on-site throughout the project's construction period. Surveillance cameras and signs will be implemented to deter vandalism and theft. The temporary construction site compound will be established in a fenced-off area within the development footprint. Chain mesh security fencing will be installed within the project boundary around the perimeter of the array areas to control access.	5 (D; 4)	No action required.
	Safety of children due to increased vehicle movements along the local road network.	D	2	14	The project's TMP and Driver Code of Conduct will be prepared prior to commencement of construction and will include: - safety initiatives for transport through residential areas and/or school zones (if required); - an induction process for vehicle operators and regular toolbox meetings; and - a complaint resolution and disciplinary procedure. No heavy vehicles will be turning onto Barleyfields Road (south) at the intersection with Wood Street and the New England Highway. Delivery scheduling will take school bus runs into account.	14 (D; 2)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by the local community and other road users.

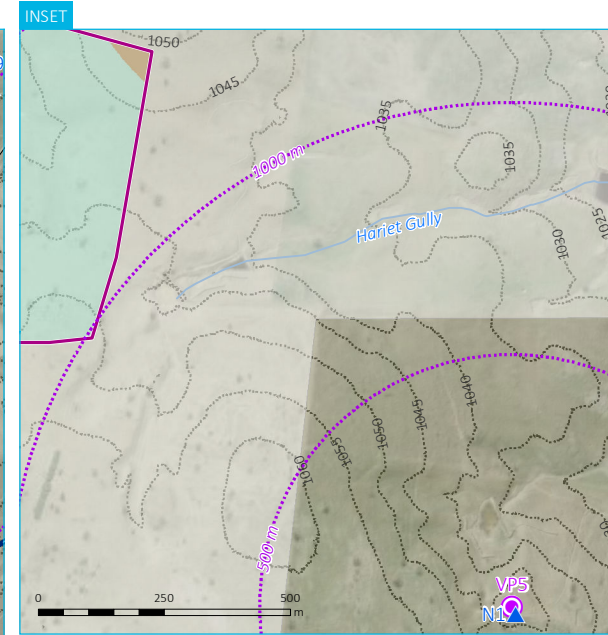
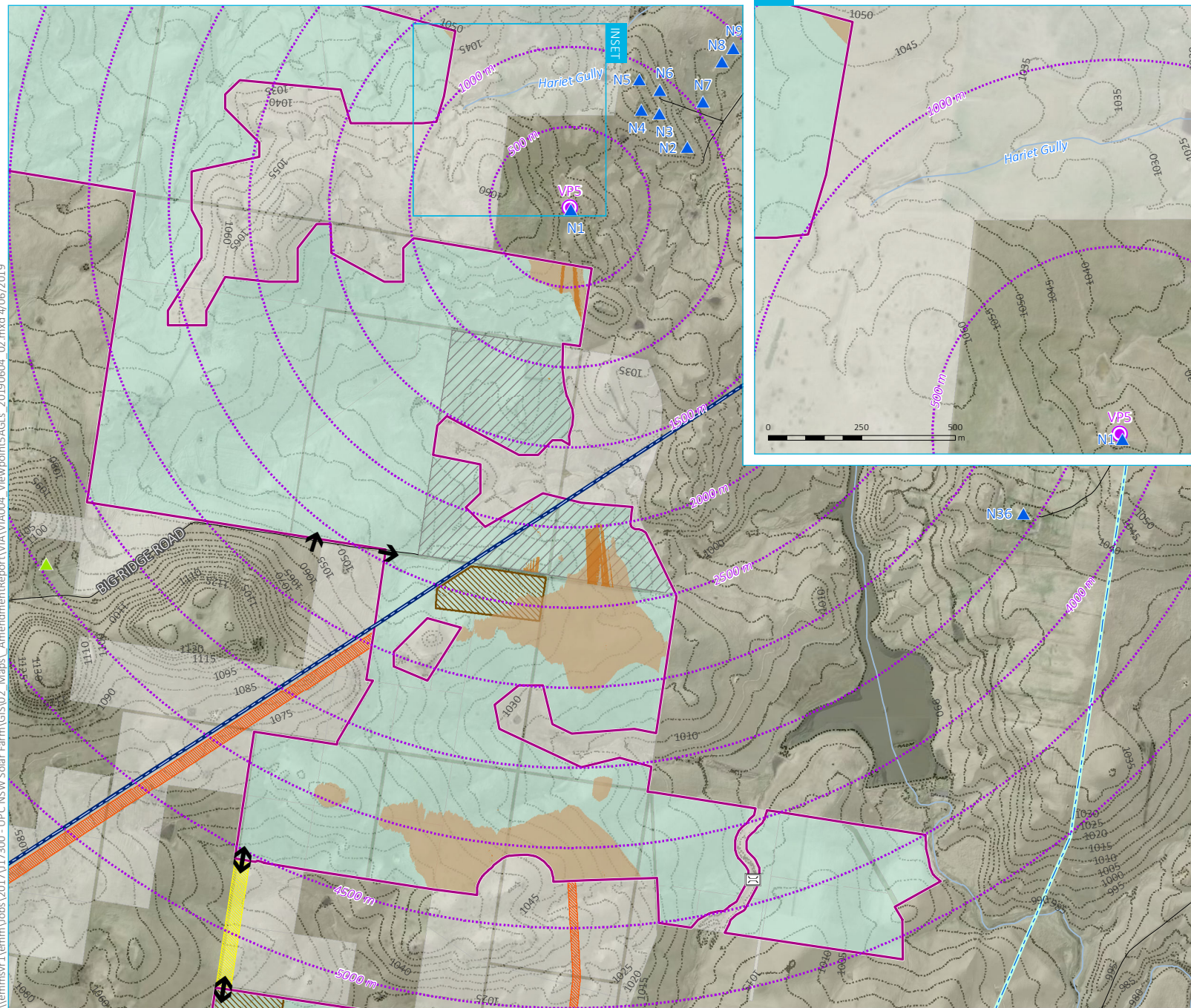
Activity	Identified potential conflict	Probability (P)	Consequence (C)	Risk ranking	Management strategy (method of control)	Revised risk ranking (P; C)	Performance target
	Safety of horses, wildlife and livestock due to increased vehicle movements along the local road network.	D	2	14	Speed limits within the development footprint will be limited to 40 km/hr during construction and operations to minimise potential vehicle collisions with fauna within the development footprint. Temporary travel speed reduction may also be implemented on local roads as part of the TMP.	14 (D; 2)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by the local community and other road users.
Property values and council rates	Devaluation of neighbouring properties due to proximity to project infrastructure.	D	3	9	While economic analyses for the industry in relation to valuation and pricing of land is not yet existing, and there are many factors that influence land values, inference can be drawn from one key factor, which is amenity and specifically, the impacts to the amenity of neighbouring properties and the locality. The EIS and supporting technical assessments have considered potential amenity impacts from the project's construction and operations. Construction impacts will be temporary in nature and are therefore considered unlikely to have a lasting impact on the amenity of the locality. The residual impacts associated with the ongoing operation of the project (ie after the implementation of proposed management and mitigation measures, such as landscaping) are predicted to be minimal.	9 (D; 3)	No action required.
	Impacts to the council rates of neighbouring properties due to the change in land use within the development footprint.	D	3	9	The rating category for the land within the development footprint will likely need to change from 'farmland' to 'business' in accordance with the NSW Local Government Act 1993. This could result in some increase in land value and subsequent increases in rates; however, it is not anticipated that this will impact land value or council rates on neighbouring agricultural properties. No management strategy is proposed to address this potential conflict.	9 (D; 3)	No action required.
Health	Potential health impacts due to proximity to project infrastructure.	E	2	10	As the strengths of electric and magnetic fields (EMFs) attenuate rapidly with distance, the ICNIRP reference level for exposure to the general public will not be exceeded and impact to the general public and neighbouring agricultural operation will be minimal or negligible. Location selection for project infrastructure (namely the solar array and grid substations) and fencing within the project boundary will limit exposure to EMFs for the general public. Outside of exposure to EMFs, there are no known potential health impacts associated with proximity to the project infrastructure.	10 (E; 2)	No action required.
Traffic	Increased vehicle movements along the local road network during construction and subsequent impacts on accessibility and commute times.	B	4	12	In order to minimise impacts on traffic flow along the local road network, deliveries and other vehicle movements will avoid peak hour times, whenever possible. The project's TMP will also include consideration for coordination of construction traffic with seasonal agricultural haulage. No heavy vehicles will be turning onto Barleyfields Road (south) at the intersection with Wood Street and the New England Highway.	8 (C; 4)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by the local community and other road users.
	Impacts on seasonal/campaign-based agricultural transport activities during construction (eg livestock or product cartage).	C	4	8	Potential seasonal/campaign-based agricultural transport activities will be identified during further consultation with project landholders and nearby landholders. Any required mitigation measures (eg temporary alternate construction vehicle access routes and/or revisions to construction scheduling) will be identified in consultation with landholders and included in the TMP.	5 (D; 4)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by neighbouring landholders.
	Increased vehicle movements along the local road network during operation and subsequent impacts on accessibility and commute times.	D	4	5	Vehicle movements during operations will be much lower than during the project's construction and are estimated to be an average of 30 daily vehicle movements which would generally all be light vehicle movements. Impacts on accessibility and commute times as a result of the project operations traffic are predicted to be negligible.	5 (D; 4)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by neighbouring landholders.
	Impact of vehicle movements on school bus route accessibility and commute times.	C	4	8	To minimise impacts on traffic flow in the township of Uralla and surrounds during the operation of school bus services, the project's construction material deliveries and other heavy vehicle movements will avoid school bus times, whenever possible. Delivery scheduling will take school bus runs into account.	8 (C; 4)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by neighbouring landholders.
	Potential conflicts between project-related construction vehicle movements and stock movements.	C	5	4	Project-related and nearby landholders may move stock between paddocks and across roads proposed to be utilised for access to the two array areas, therefore there is potential for conflict with project-related construction traffic movements. Potential stock crossing locations will be identified through further consultation with project-related and nearby landholders. Any required mitigation measures (eg direct line of communications between landholder and site construction manager and/or temporary traffic control at stock movement locations) will be identified in consultation with landholders and included in the TMP for the project.	5 (D; 4)	The TMP will include a complaint resolution and disciplinary procedure as a mechanism to address any issues identified by neighbouring landholders.
Soil erosion	Soil erosion leading to land and water pollution.	C	3	13	An erosion and sediment control plan will be prepared in accordance with <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) prior to commencement of construction. Disturbed areas will be stabilised and rehabilitated as quickly as possible to reduce the exposure period. Proposed measures will be considered further and formalised as part of detailed design and documented in the CEMP and OEMP.	5 (D; 4)	Effectiveness will be measured as part of the CEMP and OEMP.
Water	Change to surface water flows and water quality as a result of construction and operations of the project.	C	3	13	Monitoring of watercourse and VRZ condition for all retained watercourses where these run through or immediately adjacent to the development footprint will be undertaken, with maintenance as required to minimise scouring and erosion and ensure waterway health and stability. Implementation of ESC measures in accordance with Landcom (2004). Proposed measures will be considered further and formalised as part of detailed design and documented in the CEMP and OEMP. Monitoring and maintenance of ground cover vegetation and other stabilised surfaces throughout operation to limit erosion and transport of sediment to watercourses. Implementation of procedures for hazardous material storage and spill management to be prepared and documented within the OEMP.	8 (C; 4)	Effectiveness will be measured as part of the CEMP and OEMP.

Activity	Identified potential conflict	Probability (P)	Consequence (C)	Risk ranking	Management strategy (method of control)	Revised risk ranking (P; C)	Performance target
	Inadequate availability of sufficient water for neighbouring properties during construction and operation of the project.	D	4	5	The project will not impact licensed water users. The water needs of the project will be met via water trucked to the array areas. Water contained within existing farm dams to be removed may be used for non-potable construction purposes, in accordance with harvestable rights provisions, to minimise use of imported water where practicable. Water supply arrangements for the project will be the subject of further consultation with the project landholders, neighbouring landholders, Uralla Shire Council and relevant agencies.	5 (D; 4)	No action required.
	Potential loss of access to water within dams for livestock due to the project's construction.	B	3	17	Further consultation between project landholders and UPC may be required in consideration of lease arrangements and legislative requirements for construction of replacement farm dams for stock watering. Water contained within existing farm dams to be removed may be used for non-potable construction purposes, in accordance with harvestable rights provisions, to minimise use of imported water where practicable. The income for the project landholders will serve to drought-proof their ongoing farming operations for the next generation of farmers. There are not expected to be any constraints on the current or potential agricultural uses of nearby land.	9 (D; 3)	No action required.
Local infrastructure and services	Inadequate availability of waste management facilities within the local community during construction and operations of the project.	C	3	13	A waste management plan (WMP) will be prepared prior to commencement of construction in consultation with Uralla Shire Council and DPE. The plan will include consideration of the following: - measures to reduce the types and volumes of waste generated during construction; - measures to maximise reuse and recycling and reduce the volume of waste generated by the project and subsequently disposed of at licensed waste management facilities; - a breakdown of anticipated waste streams and volumes; - evidence of consultation with Uralla Shire Council, neighbouring councils and licensed waste management facilities to confirm the capacity of nearby facilities and their availability to manage the project's waste; - on-site waste management measures in line with relevant guidelines; and - commitments around disposal of project assets at the completion of operations. The WMP will also include appropriate consultation frameworks with Uralla Shire Council, neighbouring councils and licensed waste management facilities to maintain communication and forward planning and provide a grievance mechanism through which any identified adverse impacts can be addressed.	5 (D; 4)	The WMP will include a grievance mechanism through which any identified adverse impacts can be addressed.
	Inadequate availability of existing services and infrastructure in the local community.	C	4	8	Through the provision of additional economic stimulus, employment opportunities and benefits and investment in infrastructure and services, the net community benefit of the project is considered to be positive. The proposed staging approach for the construction of the two array areas is the most effective way to mitigate the overall impact of the project's construction workforce and demand for existing services and infrastructure in the local community. The deliberate separation of peaks in demand for the two stages has been proposed to mitigate the impact on local communities. The potential demand on medical and well-being services in Uralla can be alleviated by the provision of medical support within the construction accommodation village (should it be required) or on-site. A primary means of planning and managing potential impacts to the local community (including availability of accommodation, infrastructure and services) will be through implementation of a CWMP or similar.	5 (D; 4)	The CWMP will include details on how the plan will be managed and audited.
Fire	Impacts on land surrounding the solar farm from structural fires generated from within the development footprint.	D	2	14	Fire emergency management procedures are proposed that include fire awareness, emergency response and evacuation, and monitoring and review procedures. The fire management plan (FMP) for the project will detail measures and procedures to prevent fires igniting during the construction, operation and decommissioning of the project. In addition, the emergency response plan (ERP) for the project will address potential fire events associated with electrical hazards.	14 (D; 2)	The FMP will be reviewed after incidents of bushfire or other fire as well as annually at the end of each bushfire season. The FMP will be amended after the review process, if required, to increase the effectiveness of the FMP. The ERP will be reviewed after emergencies as well as annually. The ERP will be amended after the review process, if required, to increase the effectiveness of the ERP.
	Impacts on the operation of the solar farm from bushfires in the immediate vicinity of the project.	D	2	14	The key principles for bushfire prevention and protection for the project will be: - the provision of clear separation between structures and bushfire hazards in the form of fuel-reduced APZs and/or defensible space; - appropriate access and egress for staff, contractors, visitors and emergency services; - adequate water supply; - suitable location of services and other infrastructure that pose potential ignition risk; - suitable construction standards and design of buildings; and - suitable management plans for the provision and maintenance of mitigation measures as well as for appropriate emergency response. The key principles for fire prevention and protection listed above will be applied as fire protection and prevention measures during the construction, operation and decommissioning of the project. The project's FMP will detail the management measures to mitigate impacts on the operation of the project from bushfires.	14 (D; 2)	The FMP will be reviewed after incidents of bushfire or other fire as well as annually at the end of each bushfire season. The FMP will be amended after the review process, if required, to increase the effectiveness of the FMP.

Appendix H

Viewshed analysis figures

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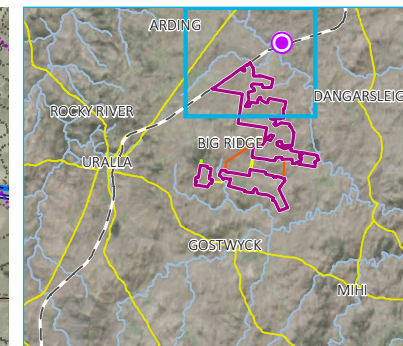
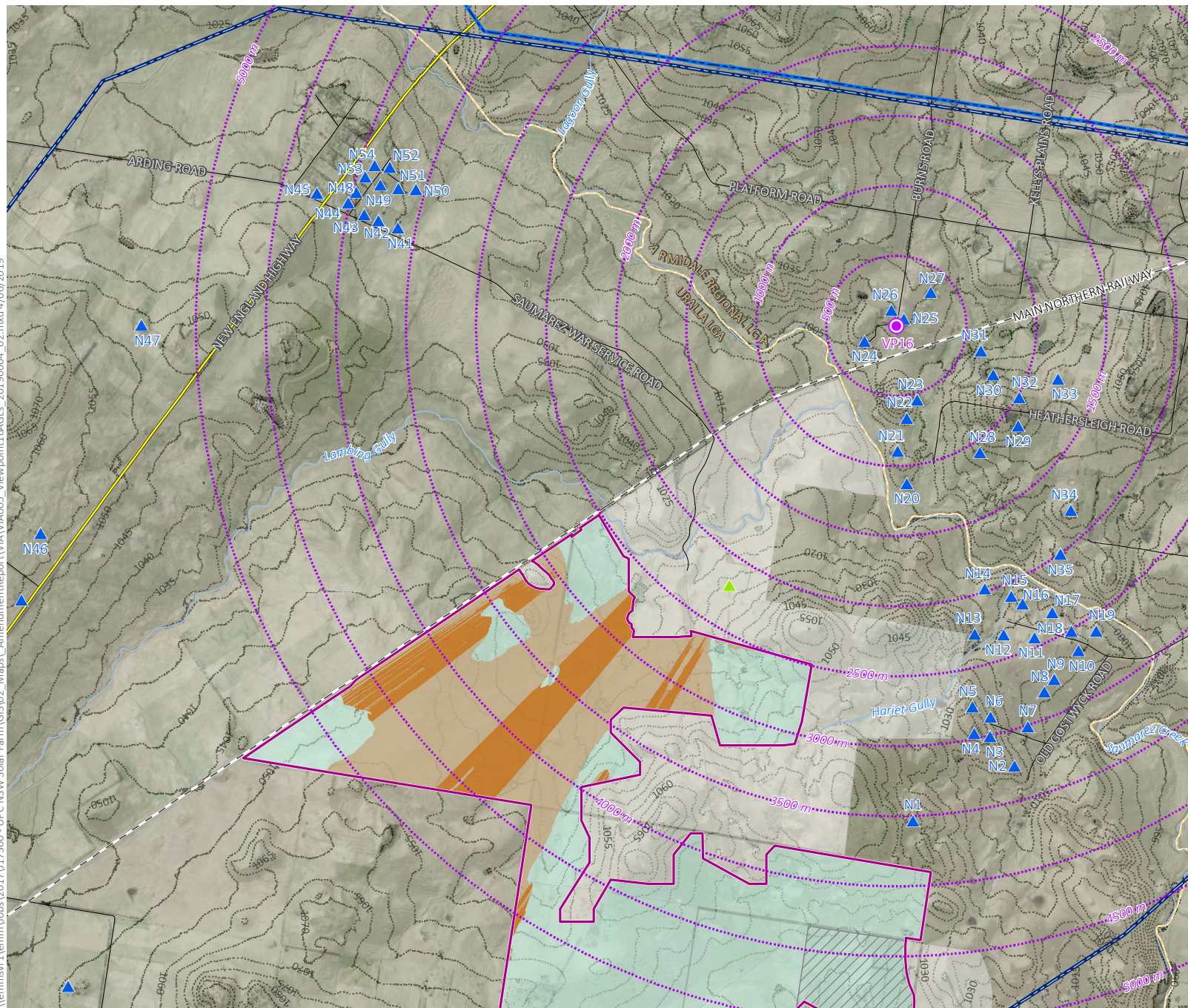
KEY

- Existing 330 kV transmission line
- Existing 66 kV transmission line
- Main road
- Local road
- Named watercourse
- Contour (5 m)
- Project boundary
- Development footprint
- Solar array
- Potential substation/BESS footprint
- Potential electrical cabling
- Potential site access corridor
- Potential site access/electrical cabling
- Potential site for construction accommodation village
- Potential creek crossing
- Proposed site access
- Primary site access point
- Sensitive receptors
- Project-related
- Non-project related
- Viewshed analysis
- Viewpoint location
- Viewpoint buffer (500 m increments)
- Visible project infrastructure (assumed 4.3 m height)
 - bare earth surface
 - accounting for shielding features in the landscape (eg vegetation)

Viewshed analysis - Viewpoint 5

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Figure A5

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KEY

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- Existing 132 kV transmission line
- Rail line
- Main road
- Local road
- Named watercourse
- Contour (5 m)
- Local government area
- Project boundary
- Development footprint
- Solar array
- Potential ETL easement
- Potential site access corridor
- Potential site access/ETL easement
- Potential site for construction accommodation village
- Sensitive receptors
- Project-related
- Non-project related
- Viewshed analysis
- Viewpoint location
- Viewpoint buffer (500 m increments)
- Visible project infrastructure (assumed 4.3 m height) - bare earth surface
- Visible project infrastructure (assumed 4.3 m height) - accounting for shielding features in the landscape (eg vegetation)

Viewshed analysis - Viewpoint 16

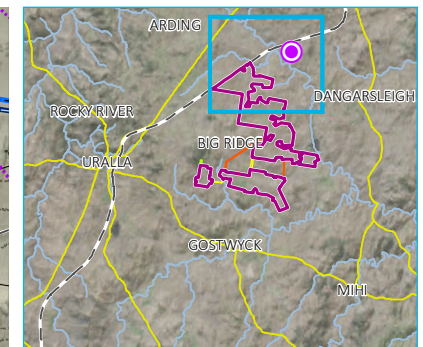
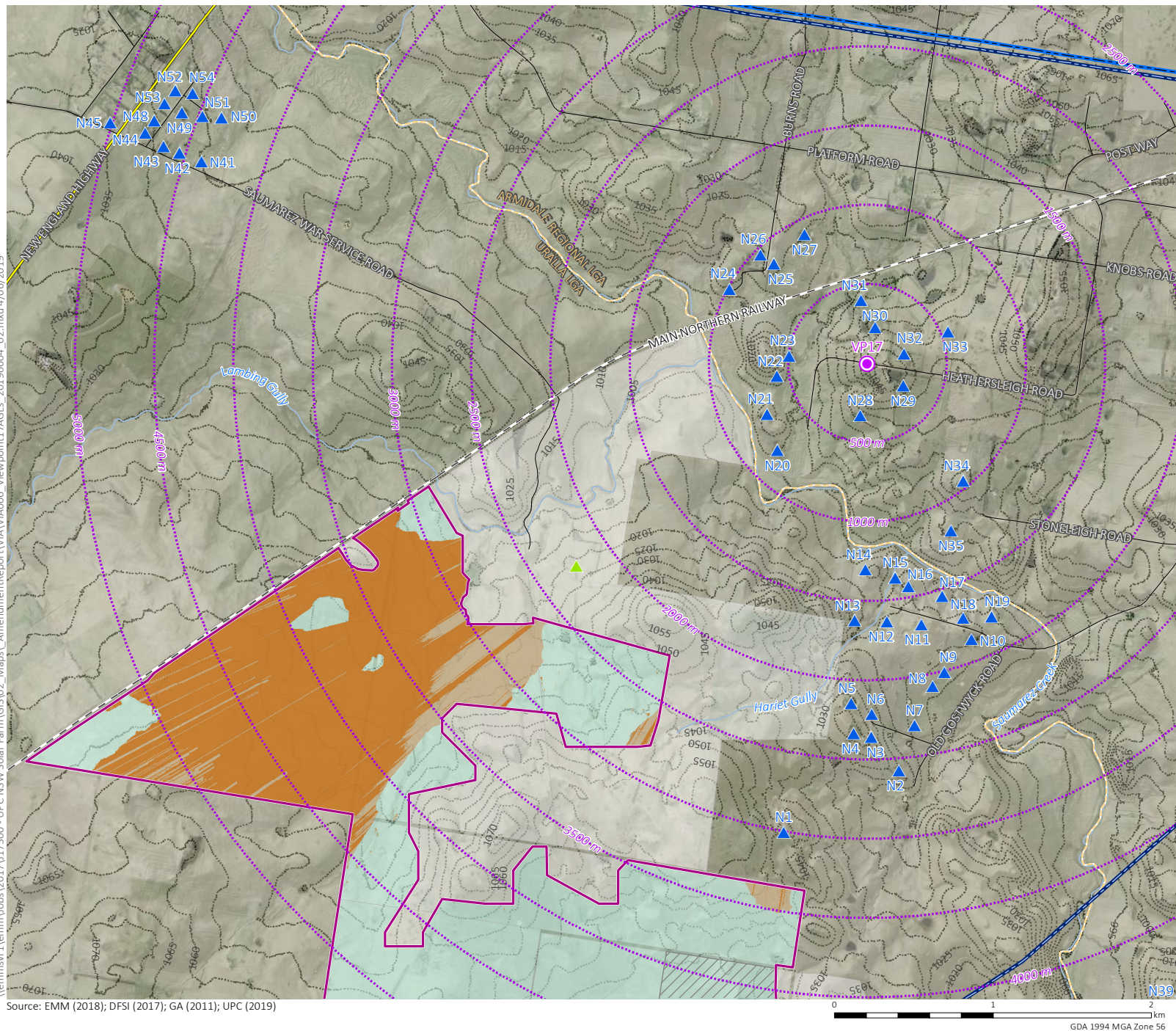
New England Solar Farm
Amendment report
Figure A16



Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)

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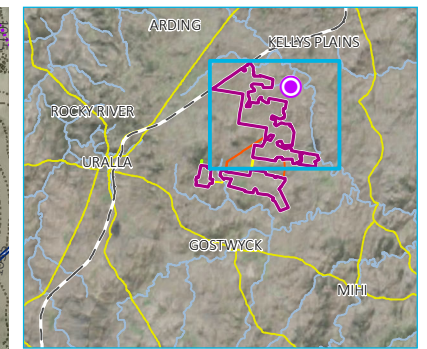
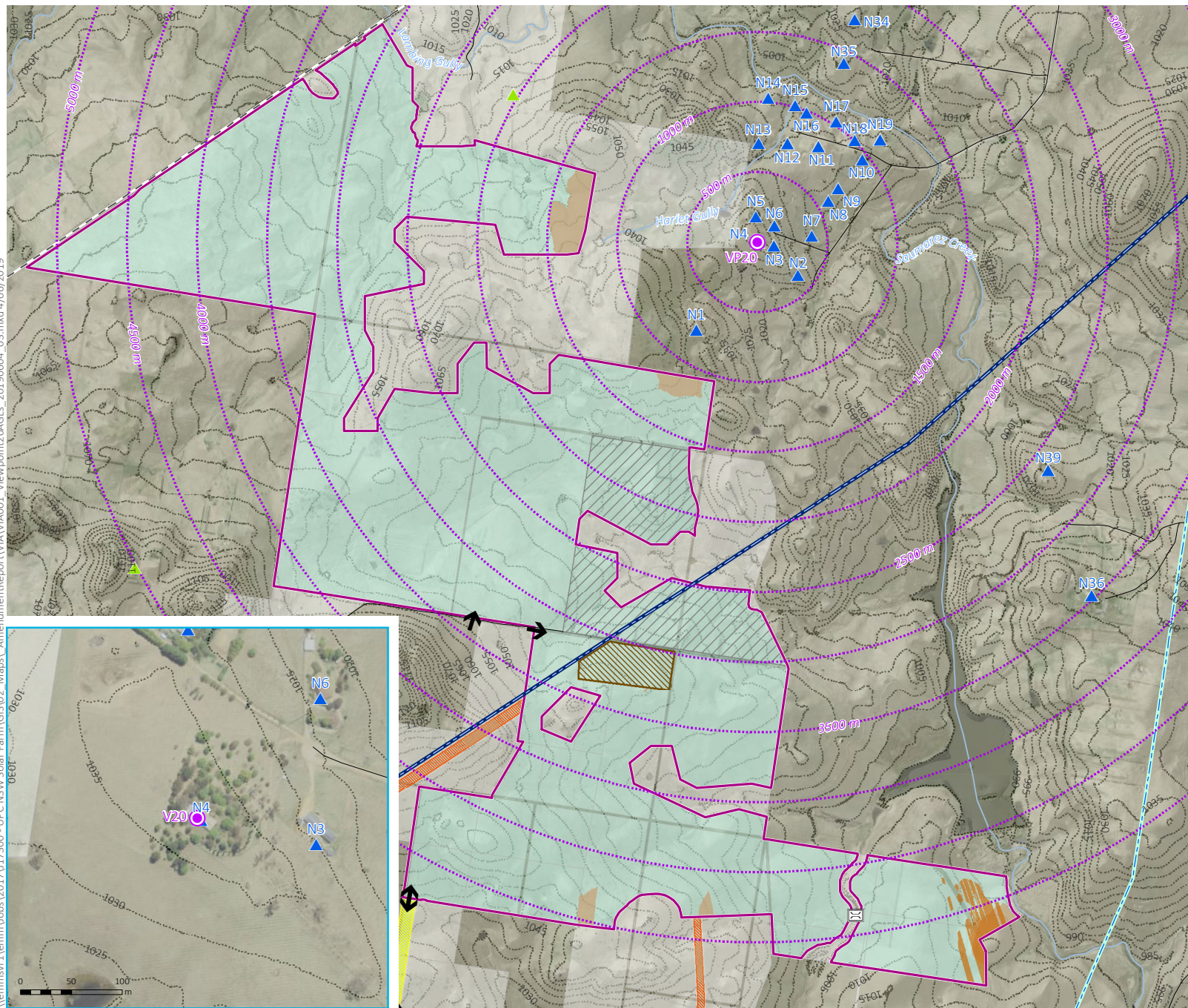
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- Rail line
- Main road
- Local road
- Named watercourse
- Contour (5 m)
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- Sensitive receptors
- Project-related
- Non-project related
- Viewshed analysis
- Viewpoint location
- Viewpoint buffer (500 m increments)
- Visible project infrastructure (assumed 4.3 m height) - bare earth surface
- Visible project infrastructure (assumed 4.3 m height) - accounting for shielding features in the landscape (eg vegetation)

Viewshed analysis - Viewpoint 17

New England Solar Farm
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Figure A17

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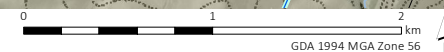
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 - Potential creek crossing
 - Proposed primary site access point
- Sensitive receptors
 - Project-related
 - Non-project related
- Viewshed analysis
 - Viewpoint location
 - Viewpoint buffer (500 m increments)
 - Visible project infrastructure (assumed 4.3 m height)
 - bare earth surface
 - accounting for shielding features in the landscape (eg vegetation)

Viewshed analysis - Viewpoint 20

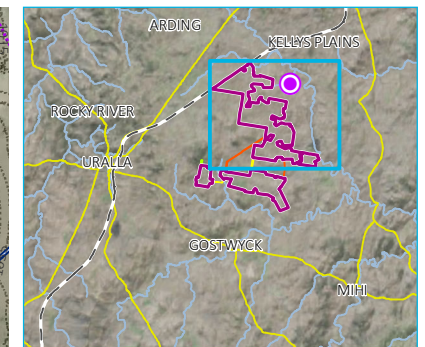
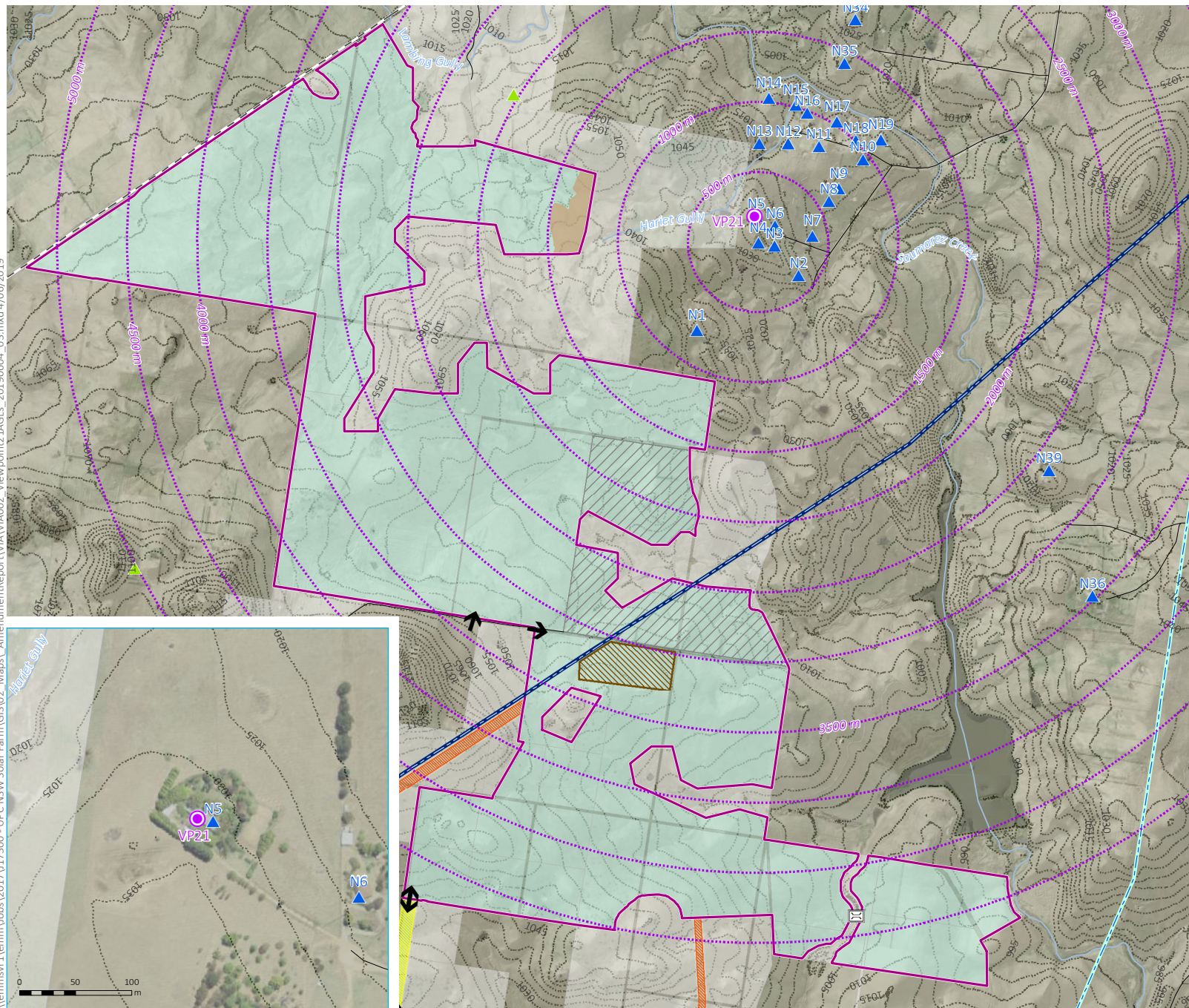
New England Solar Farm
Amendment report
Figure A20



Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)



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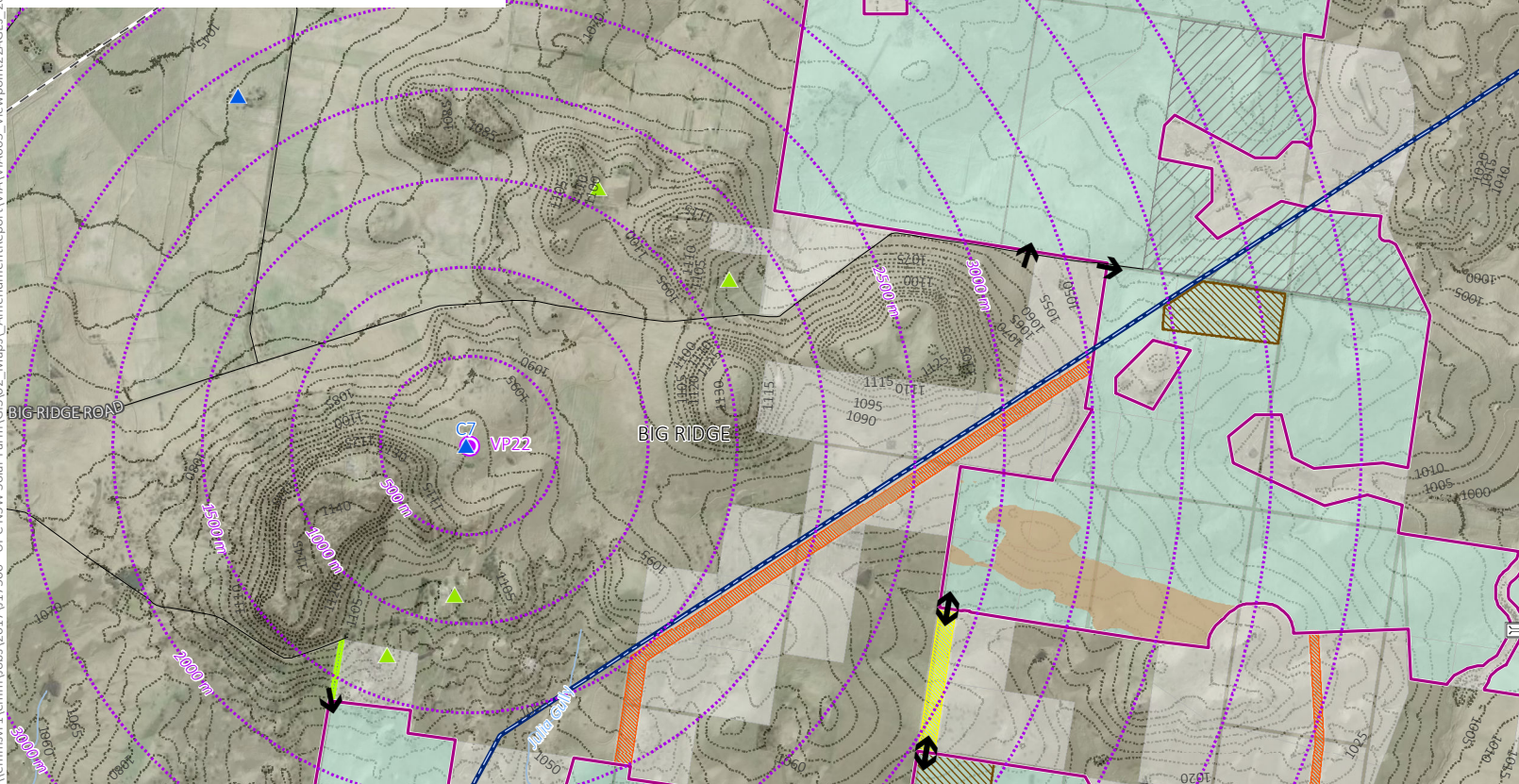
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- Main road
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- Development footprint
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 - Potential creek crossing
 - Proposed primary site access point
- Sensitive receptors
 - Project-related
 - Non-project related
- Viewshed analysis
 - Viewpoint location
 - Viewpoint buffer (500 m increments)
 - Visible project infrastructure (assumed 4.3 m height)
 - bare earth surface
 - accounting for shielding features in the landscape (eg vegetation)

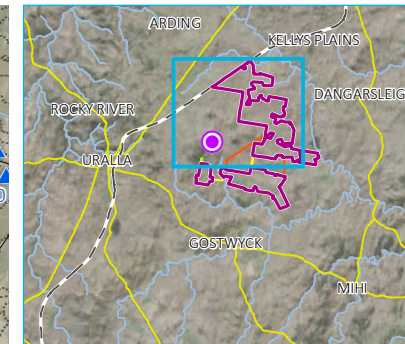
Viewshed analysis - Viewpoint 21

New England Solar Farm
Amendment report
Figure A21

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Source: EMM (2019); DFSI (2017); GA (2011); UPC (2019)



- KEY**
- Existing 330 kV transmission line
 - Rail line
 - Main road
 - Local road
 - Named watercourse
 - Contour (5 m)
 - Project boundary
 - Development footprint
 - Solar array
 - Potential substation/BESS footprint
 - Potential electrical cabling
 - Potential site access corridor
 - Potential site access/electrical cabling
 - Potential site for construction accommodation village
 - Potential creek crossing
 - Proposed primary site access point
 - Sensitive receptors
 - Project-related
 - Non-project related
 - Viewshed analysis
 - Viewpoint location
 - Viewpoint buffer (500 m increments)
 - Visible project infrastructure (assumed 4.3 m height)
 - bare earth surface
 - accounting for shielding features in the landscape (eg vegetation)

Viewshed analysis - Viewpoint 22





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