ENVIRONMENTAL IMPACT STATEMENT

WALLA WALLA SOLAR FARM

October 2019

Project Number: 18-622

DOCUMENT VERIFICATION

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For submission of an Environmental Impact Statement under Part 4, Division 4.1 of the NSW E*nvironmental Planning and Assessment Act 1979*.

EIS prepared by: NGH Pty Ltd

Applicant: Walla Walla Solar Farm Pty Ltd

Proposed development:

The Walla Walla Solar Farm proposal includes the construction, operation and decommissioning of a photovoltaic solar farm that would produce up to 300 Megawatts of alternating current (AC) electricity. Associated infrastructure includes a substation, staff amenities, internal access tracks and fencing.

Land to be developed:

Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735, Lot 3 253113, Lot 1 DP 1069452, Lot 1 DP 933189 and Lot A DP 376389.

Certification:

I certify that I have prepared the contents of this Environmental Impact Statement in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulations 2000.* To the best of my knowledge, this assessment contains all available information that is relevant to the environmental assessment of the project and that information is neither false nor misleading.

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TERMS AND DEFINITIONS

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
ADG Code	Australian Dangerous Goods Code
adt	Average daily traffic
AEMO	Australian Energy Market Operator
AEP	Annual exceedance probability
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ARENA	Australian Renewable Energy Agency
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
BAM	Biodiversity Assessment Methodology
BC Act	*Biodiversity Conservation Act 2016 (NSW)*
BCC	Biobanking Credit Calculator
BCD	Biodiversity and Conservation Division (formerly OEH)
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
BLM	Bureau of Land Management
CEMP	Construction Environmental Management Plan
CIP	Community Investment Program
CIV	Capital investment value
CSEP	Community and Stakeholder Engagement Plan
CSER	Community and Stakeholder Engagement Report
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Application
Db(A)	A measure of A-weighted *(c.f.)* sound levels.
DECC	Department of Climate Change (now BCD)
DECCW	Department of Climate Change and Water (now BCD)
DOEE	Department of the Environment and Energy (Commonwealth)
DPE	Department of Planning and Environment (now DPIE)
DPIE	Department of Planning, Industry and Environment (DPIE)

DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (now DOEE)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
ELF	Extremely low frequency, in relation to Hz *(c.f.)*
EMFs	Electromagnetic fields
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000* (NSW)
EPA	(NSW) Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environment Protection Licence issued under the POEO Act *(c.f.)*
ESD	Ecologically sustainable development
ESEP	Erosion and Sediment Control Plan
FMERP	Fire Management and Emergency Response Plan
GA	Geoscience Australia
GHG	Greenhouse gas
GWh	Gigawatt hours
ha	Hectares
Heritage Act	*Heritage Act 1977* (NSW)
HAZMAT	Hazardous Materials
Hz	Hertz
ICNG	Interim Construction Noise Guideline
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
kL	Kilolitres
km	Kilometres
kV	Kilovolts
L_{A90} (15 minutes)	The A-weighted sound pressure level that is exceeded for 90% of a 15-minute measurement period, when measured in the absence of the construction works under consideration and excluding extraneous noise. This is considered to represent the background noise.
L_{Aeq} (15 minutes)	The A-weighted equivalent continuous (energy average) sound pressure level of the construction works under consideration over a 15-minute period that excludes other noise sources such as from industry, road, rail and the community.
LALC	Local Aboriginal Land Council
LCU	Landscape character unit
LEP	Local Environment Plan
LGA	Local government area
LMZ	Landscape management zone
LRET	Large-scale Renewable Energy Target
m	Metres

mm	Millimetres
MNES	Matters of National Environmental Significance, under the EPBC Act (_c.f._)
MRET	Mandatory renewable energy target
MVA	Megavolt-ampere
MW	Megawatt
MWh	Megawatt hours
NML	Noise management levels
NPI	_NSW Noise Policy for Industry_
NPW Act	_National Parks and Wildlife Act 1974_
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PANL	Project amenity noise level
PCT	Plant Community Type
PINL	Project intrusive noise level
PNTL	Project noise trigger level
POEO Act	_Protection of the Environment Operations Act 1997_ (NSW)
PMF	Probable maximum flood
PV	Photovoltaic
PVHI	Photovoltaic heat island
RBL	Rating background level - the level of background noise
RDA	Regional Development Australia
RE Act	_Renewable Energy (Electricity) Act 2000_ (Commonwealth)
REAP	Renewable Energy Action Plan (NSW)
RFS	NSW Rural Fire Service
RNP	NSW _Road Noise Policy_
Roads Act	_Roads Act 1993_ (NSW)
RMS	(NSW) Roads and Maritime Services, formerly Roads and Traffic Authority (RTA)
SEARs	Secretary's Environmental Assessment Requirements
Sensitive Receiver	A place or object that is sensitive to a particular environmental impact. e.g. school, place of worship, residence, heritage building/structure, pipeline (for vibration/blasting). These may be separately defined by government and industry policies and guidelines
SEPP	State Environmental Planning Policy (NSW)
Sound pressure level	The noise at a given distance from plant or equipment
sp/spp	Species/multiple species
SPRAT	EPBC Act Species Profiles and Threats Database
SRD SEPP	_State Environmental Planning Policy (State and Regional Development) 2011 (NSW)_

SSD	State significant development
SWOT	Strengths, weaknesses, opportunities and threats
µT	Microtesla, multiples of a unit of magnetic field
VIA	Visual Impact Assessment
V	Volts
vpd	Vehicles per day
WHO	World Health Organisation
WM Act	*Water Management Act 2000*
WMP	Waste Management Plan
ZVI	Zone of visual influence
The proposal	The construction and operation of the proposed solar farm
The proponent	FRV Services Australia Pty Ltd
Subject land	All land within the affected lot boundaries. The subject land comprises Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735, Lot 3 253113, Lot 1 DP 933189, Lot A DP 376389 and Lot 1 DP 1069452, approximately 807 ha.
Development site	The area of land that is subject to the proposal. The development site is made up of 605 ha and includes the location of the proposed transmission line outside of the subject land. The development site is the area surveyed for this assessment prior to identified constraints and exclusions.
Development footprint	The area of land that is directly impacted by the proposal including solar array design, perimeter fence, access roads, transmission line footprint and areas used to store construction materials. The development footprint is approximately 493 ha.

EXECUTIVE SUMMARY

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In particular, the EIS must include:

- *A stand-alone executive summary.*

This Environmental Impact Statement (EIS) identifies and assesses the environmental issues associated with the construction and operation of a proposed 300 Megawatt (MW) alternating current (AC) photovoltaic (PV) solar farm at Walla Walla, southern NSW. The 605 hectare (ha) development site is located on freehold rural land approximately 4.3 kilometres (km) north-east of Walla Walla and 10 km southwest of Culcairn.

NGH Pty Ltd (NGH) has prepared the EIS on behalf of the proponent, FRV Services Australia (FRV). FRV acquired the proposed development in July 2019 from the original developer, Bison Energy. The EIS has been prepared in accordance with Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). It is considered State Significant Development (SSD). The structure and content of the EIS addresses the Secretary's Environmental Assessment Requirements (SEARs) provided by NSW Department of Planning and Environment (DPE), now the Department of Planning, Industry and Environment (DPIE) on 7 March 2019.

COMMUNITY FOCUS

Community engagement is an essential part of the EIS process, required by consent authorities to ensure neighbours and the wider community are adequately informed of proposed plans and have sufficient and timely opportunity to provide input into aspects of the project that have the potential to impact their amenity or contribute to their specific interests.

To date, community engagement has primarily sought to 'provide meaningful avenues for FRV to involve community stakeholders in the development of key aspects of the project' and 'manage, minimise and mitigate any impacts to community stakeholders to the maximum extent possible'. Longer-term, FRV's goal is to generate community acceptance and trust for the Walla Walla Solar Farm – ensuring sustainable social and economic performance over the lifetime of the asset.

Via targeted engagement involvement, the region's community have played a fundamental role in shaping the detailed design for the Walla Walla Solar Farm, particularly the location of infrastructure and visual screening. This outcome is fundamentally positive, as – via community involvement - FRV has identified opportunities for biodiversity and social-economic gains that will deliver greater biodiversity enhancements, options for job creation and means of contributing to community programs via a long-term community investment programme.

FRV acknowledges that considerable concerns have been raised during the consultation process. Where practical, FRV has sought to address environmental and economic concerns via direct mitigation measures and via the provision of additional, factual information to counter broader apprehensions. FRV wishes to demonstrate both its commitment to genuine engagement throughout the process and if the development proceeds, its willingness to operate as a responsible business within the local community over the longer term.

PROPOSAL DESCRIPTION

The proposed Walla Walla Solar Farm would have a total installed capacity of up to 300 MW (AC), and would include:

- Single axis tracker PV solar panels mounted on steel frames over most of the site (approximately 900,000 PV solar panels).
- Electrical conduits and transformers.
- New TransGrid substation.
- Operation and maintenance building (O&M building), switchroom parking and security fencing.
- Electrical transmission infrastructure and overhead transmission line to connect the proposal to the existing 330 kilovolt (kV) transmission line.
- Underground cables.
- Internal access roads and access points.
- Onsite vegetative screening.

The existing TransGrid Jindera to Wagga Wagga 330 kV transmission line runs across the western side of the development site, which is part of the electricity distribution network that originates at TransGrid's North Wagga Wagga Substation. The proposed solar farm will connect directly to the transmission line where it crosses the site, with a new substation proposed near this location.

The development site would be accessed from Benambra Road, which runs along the northern boundary and intersects with Olympic Highway (A41). Olympic Highway provides access to the region's transport network.

The proposal will require the amalgamation of Lot 1 1069452, Lot A DP 376389 and Lot 1 DP 933189. This land would then be subdivided into three lots as only part of this property will be leased for the life of the proposal. A 3.2 ha subdivision would be required for the TransGrid substation, which would become the freehold property of TransGrid at the completion of construction.

An internal road system would be established for the construction and maintenance of the solar farm infrastructure.

The proposal is expected to operate for 30 years. The construction phase of the proposal is expected to take 16 to 20 months and is anticipated to commence early 2021, subject to approvals. After the operating phase, the proposal would either be decommissioned, removing all infrastructure and returning the site to its existing land capability, or upgraded with new photovoltaic equipment subject to modification of the Conditions of Approval (CoA).

PROJECT NEED

Human activity is resulting in the release of large amounts of greenhouse gasses (GHGs) which trap the sun's heat in our atmosphere and upset the balance of the Earth's climate. This threat is acknowledged by scientists and politicians around the world, as illustrated by the United Nations Paris Agreement on Climate Change (DEE 2017). Australia has committed to reducing its emissions to 5% below 2000 levels by 2020, and 26-28% below 2005 levels by 2030 (DEE 2017). Renewable energy helps to reduce emissions of GHGs associated with electricity generation.

Electricity generation is the largest individual contributor of greenhouse gas emissions in Australia (DEE 2017). Once constructed, the proposal would provide around 740,000 megawatt hours (MWh) per year of

GHG emission-free electricity. This represents the annual power consumption of about 90,000 homes. Generation figures may change subject to final site design and technology selection. The proposal would save about 520,000 tonnes of GHG emissions per year compared to brown coal.

In 2013, the NSW Government released the NSW Renewable Energy Action Plan to guide NSW's renewable energy development (NSW Government 2013). The Government's vision is for a secure, affordable and clean energy future for NSW. The Plan positions the state to increase energy from renewable sources by attracting investment, building community support and growing expertise in renewable energy at the least cost to the energy customer and with the maximum benefits to NSW. Furthermore, the Plan recognises that energy storage can increase the value of renewable energy to individuals, network operators and investors.

The proposal would assist in reducing GHG emissions from electricity generation and contribute to renewable energy targets committed to by the NSW and Federal Governments.

The proposal would contribute to the NSW Renewable Energy Action Plan (NSW Government 2013), which supports the achievement of the national target of 20% renewable energy by 2020 (NSW Government 2013). The proposal would also further the three goals of the Action Plan:

1. Attract renewable energy investment and projects.
2. Build community support for renewable energy.
3. Attract and grow expertise in renewable energy.

PROJECT BENEFIT

In addition to reduced greenhouse gas emissions and meeting government energy policies, local social and economic benefits associated with the construction and operation of the proposal include:

- Direct and indirect employment opportunities during construction and operation of the solar farm. This includes up to 250 employees for the 8 to 12-month peak of construction and approximately 21 FTE operational staff for the life of the project. Maintenance contracts for panel cleaning, fence repair, road grading, etc. would also be required and would likely be met by local contractors.
- Direct business volume benefits for local services, materials and contracting (e.g. accommodation, food and other retail).
- Increased economic security to rural economies through diversification of employment opportunities and income streams.

It is estimated that the solar farm would require around $10 million per year of operational spending to maintain. This would mostly be spent on local wages, local contractors, and materials. Over the life of the project, this could provide around $300 million of additional economic activity in NSW. According to a confidential economic analysis for the proposal completed by Ernst and Young (2019), the estimated proportion that would provide a direct benefit to the Albury/Greater Hume economy is $4.8 million per year or $144 million over 30 years.

To minimise the environmental costs of achieving the above benefits, the proposal would respond appropriately to the environmental constraints of the site. It would be designed to:

- Preserve biodiversity features through minimising native vegetation removal.
- Minimise impacts on items of Aboriginal significance.
- Minimise impacts on soil and water resources through pile driven panel mounts rather than extensive soil disturbance and excavation.

- Retain existing site topography.
- Minimise visual impacts to neighbours, incorporating vegetation screenings and setbacks.
- New plantings would connect to existing vegetation to create biodiversity corridors.
- Retain approximately 85% agricultural grazing value through managed stock grazing during operation.
- Preserve future agricultural production values, being highly reversible at the end of the project's life.

SITE SUITABILITY

The proposal would help reduce Australia's GHG emissions and help meet future energy demands. It would contribute to Australia's renewable energy targets and support a global reduction in GHG emissions. It would contribute to economic development in Walla Walla and the surrounding region.

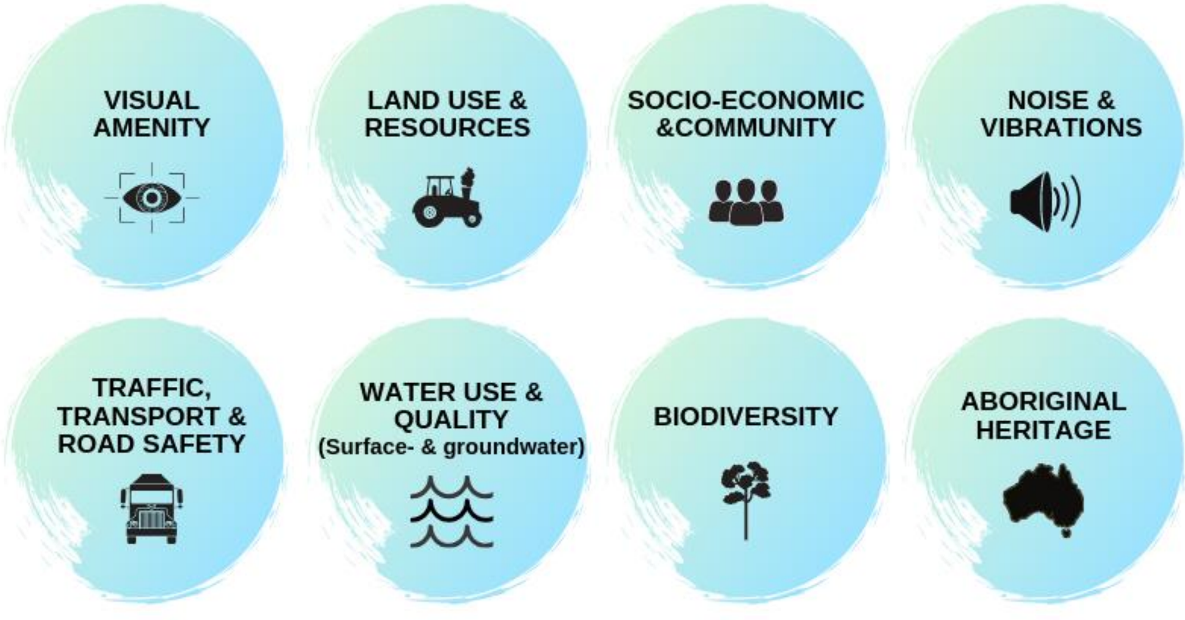
Key considerations for site selection are detailed within the *NSW Large-scale Solar Energy Guideline for State Significant Development* (DPE, 2018), including:

- Minimal impacts to biodiversity are expected due to historical disturbance and agricultural activities.
- There would be no land use conflicts due to zoning.
- Visual impact on surrounding direct neighbours can be managed through mitigation measures. A landscaping plan with significant buffers has been proposed for each non-involved resident with a dwelling/business within 1km of the project.
- As per the applicable documentation, it states that the proposal is not located on Strategic Agricultural Land and according to the Land and Soil Capability Scheme (OEH, 2012) is located on Class 4 and Class 6 agricultural land:
    - The proposal is not expected to adversely affect the biophysical nature of the land.
    - The proposal would positively affect soils by providing many of the benefits of long-term fallow, including increasing soil moisture, building soil carbon levels, allowing structural recovery and improving soil biota.
    - The proposal would not result in the permanent removal of agricultural land.
    - The proposal would not result in rural fragmentation given it will not permanently alter the existing or surrounding environment.
    - Adjacent farming operations are compatible.
    - Strategic sheep grazing would be used within the development site. Grazing would be used to reduce vegetation biomass and put grazing pressure on weeds in and around the solar farm.
- Flood modelling has been undertaken for the development site and indicated that flood risk would not be exacerbated on adjoining properties.
- The development site is not mapped as bushfire prone land. Detailed management measures would be put in place in accordance with statutory requirements.
- The proposal is not located on prospective resource developments.
- The proposal is not located on Crown land with the freehold lots belonging to two private landholders.

KEY ENVIRONMENTAL ASSESSMENT ISSUES

A detailed investigation of risks and impacts was undertaken specific to the construction, operation and decommissioning phases of the proposal. In addition to addressing the project-specific SEARs, a risk assessment was carried out to identify key environmental risks of the proposal in order to guide the depth of investigation that would be undertaken in this EIS. The risk assessment identified eight environmental assessment aspects as key risks, and detailed investigations were subsequently undertaken in these areas:

- Visual amenity.
- Land use and resources.
- Socioeconomic and community.
- Noise and vibration impacts.
- Traffic, transport and road safety.
- Water use and quality, including groundwater.
- Biodiversity.
- Aboriginal heritage.



Socioeconomic and community

The Greater Hume Community Strategic Plan 2030 (Greater Hume Shire, 2017) identifies the community's main priorities and aspirations for the future. It is considered that the proposed solar farm meets the principles of the Community Strategic Plan, with reference to supporting economic development.

Extensive community engagement, involving multiple one-on-one meetings were conducted during the development of the project. A dedicated Community Liaison Officer and Project Manager were appointed for the project who directly engaged with members of the community, local groups and adjacent property owners. A communications log has been maintained throughout the preparation of this EIS.

Formal community feedback has been sought through four community drop in information sessions and direct engagement through letters, emails, phone calls and face to face meetings. A dedicated website and email address were created for the provision of information and for seeking feedback from for the general public. The community information sessions were advertised in local newspapers, community noticeboards, emails to registered interested parties and on the Greater Hume Shire's newsletter and social media page. A total of 106 individuals provided feedback on the proposal. This feedback was both positive and negative. Key concerns raised have been addressed in this EIS and resulted in significant changes to the proposal design and mitigation measures for implementation in construction and operations.

Near neighbours including directly adjoining landowners and residential dwellings with views of the development site were engaged between March 2019 up until lodgement of the EIS particularly regarding visual, noise, flooding and local traffic impacts. FRV have disclosed likely impacts and proposed mitigation measures with near neighbours on a one-on-one basis.

Positive socio-economic impacts from the proposal include a boost to the local and regional economy through the employment of around 250 staff during peak construction and approximately 21 full time equivalent (FTE) jobs during operations. Jobs provided during the construction and operation are expected to increase demand for accommodation, goods and services in Walla Walla, Culcairn and surrounding townships.

The most contentious adverse impacts include those associated with increased traffic on local roads, a change in the rural landscape and visual amenity of the area. These potential impacts have been minimised and mitigated significantly following detailed discussions with adjoining landholders and logistical arrangements to reduce traffic numbers required during these stages.

Quantitative negative socio-economic impacts from the proposal are considered to be minimal and manageable, whereas qualitative impacts relating to the change of rural landscape and cultural values are fully recognised and acknowledged but are immeasurable and therefore unable to be assessed or mitigated.

Visual amenity

Two landowners who are involved with the proposal and 30 uninvolved residences are located within 3 km of the subject land. Four Landscape Character Units (LCU) were identified:

- Rural (including agricultural lands).
- Residential (viewpoints near rural residents/homes).
- Industrial (major roads, electrical and other built infrastructure).
- Commercial (businesses, town centre).

The operational visual impact assessment was undertaken considering:

- The proposed solar farm components.
- Their potential impact on landscape character units and representative viewpoints.
- The degree of contrast the development would have and if these are considered acceptable.
- The potential impact from glare.

NGH completed a Visual Impact Assessment (VIA). This involved detailed assessment of the potential impacts on near neighbours with views of the development site. Representative viewpoints of public areas including local roads were also assessed. Panoramic photos were taken from three residential premises, including the Orange Grove Gardens wedding venue. Existing views were compared to the visual impact of the original layout design, completed by Bison Energy. Mitigation options were then explored resulting in relocation of key infrastructure, significant setbacks and extensive vegetation screening plans, ranging up to 50m in width. The construction access to the development site was also relocated to the north eastern corner of the development site where it would have the least impact on near neighbours.

Existing native vegetation along Benambra Road would now be retained and provide fragmented views of solar infrastructure for passing motorists. This is due to FRV changing the location of the proposed security fencing. Security fencing would no longer run along the property boundary as originally proposed by the previous developer, it would now be setback within the development footprint and largely shielded with existing boundary vegetation and in the longer term, also the proposed vegetation screening.

The potential for glare associated with non-concentrating photovoltaic systems which do not involve mirrors or lenses, such as that proposed, is relatively limited. Solar panels are designed to absorb sun light, not reflect it and have an antireflective coating, whilst galvanised framing oxidises and becomes dull over time reducing the likelihood of creating glare or reflectivity to motorists or aircraft.

The operational view of the solar farm may generate visual impact being in direct contrast with the surrounding agricultural views. Generally, adverse visual impacts are anticipated to be manageable due to the ability to effectively screen infrastructure in this low relief landscape.

Land use and resources

The current land use of the development site is for agriculture. The site is not mapped as being Biophysical Strategic Agricultural Land (BSAL).

The development site is located in an area that has not been mapped for Important Agricultural Land by the NSW Government. The land capability class system is currently under review and adjacent land uses have been used for additional guidance on what the agricultural capability is for the site. As per the applicable documentation, the land capability of the site is classified as Class 4 and 6 (OEH, 2012). The Land and Soil Capability Scheme defines Class 4 land as having "moderate to severe limitations where pasture improvement relies on minimum tillage techniques. While productivity of Class 4 land may be seasonally high, the overall result tends to be low due to major environmental constraints. Class 6 is considered low capability land that has very high limitations for high-impact land uses, restricted to low-impact land uses such as grazing, forestry and nature conservation."

The development site is zoned RU1 for primary production. The land surrounding the development site is also RU1. Surrounding agricultural land consists of cropping and grazing activities. Benambra National Park is approximately 9.5 km east of the site.

There are no mineral titles and no mineral applications relevant to the development site.

A land use conflict risk assessment was undertaken to consider potential conflicts between the solar farm and surrounding land uses. Potential construction conflicts such as the impacts of contaminated surface water runoff, fire/bushfire, traffic generation, dust and visual amenity had moderate to high risk rankings. These potential conflicts have been addressed with appropriate management strategies, such as substantial screening and setbacks, and now have low revised risk ratings.

During operation of the proposal it is considered that all potential land use conflicts could be adequately managed through the implementation of land management mitigation measures.

Noise and vibration

Construction activities are proposed to be progressive and would occur at several locations simultaneously. Modelling is carried out as a worst case scenario and does not take into consideration natural buffers within the landscape such as existing background noise, screening, topography or the installation from being within your dwelling. Noise emissions were modelled for the following scenarios:

- Earthworks e.g. internal road construction and trenching for cabling.
- Piling of panel supports.
- Assembly of frames panels.

Daytime construction noise levels were assessed for 6 neighbouring residences. Two residences owned by the landowner (R1a and R1b) would experience construction noise management level (NML) exceedances. R1a would likely experience exceedances of the NML by 23 dB(A), 8 dB(A) and 6 dB(A) under scenarios 1, 2 and 3 respectively. R1b would likely experience one exceedance of 4 dB(A) under scenario 1.

The predicted operational noise levels were assessed for the same six nearby residences within 1 km and have been demonstrated to comply with the Project Intrusive Noise Levels (PNTLs) at all residences. Two intermittent operational activity scenarios would likely be clearly audible (over 40 dB(A)) at nearby residences:

- Grass slashing and panel cleaning (scenario 3) may be clearly audible at R1a, R1b and R3.
- Replacing broken/worn equipment may be clearly audible at R1a only.

The predicted construction road traffic noise levels satisfy the NSW Road Noise Policy (RNP) criteria for assessed residences.

The results of the noise assessment demonstrate that construction noise levels satisfy relevant regulatory construction and operational noise levels for all bar one nearby residence. R1 have been notified of these results and it was agreed specific mitigation measures would be identified through consultation with R1 within the construction management plan, prior to construction, if the proposal proceeds.

Traffic, transport and road safety

Vehicle movements generated by the proposal can be separated into cars, buses, utility vehicles, trucks, standard articulated trucks and oversized and/or over-mass vehicles. Vehicle access to the site during construction would generally be confined to the standard hours of construction. Exceptions would occur as staff arrive and leave the site, before and after shifts. Additionally, the delivery of large components may take place outside normal working hours for safety and logistical reasons.

FRV, taking into consideration the surrounding neighbours have redesigned the project access points. One main entrance for the project is proposed, located at the north eastern corner of the development site, with two auxiliary access points crossing Schneiders Road east to west and west to east. Construction vehicles would not use the road itself as part of the transport route. A separate entrance would be provided for TransGrid to access their substation. The Olympic Highway/Benambra Road intersection is already suitable for 26m B-Double semi-trailers. Benambra Road is already sealed from Olympic Highway to Weeamera Road, beyond the main site entrance. Maintenance of the access route has been agreed in principle with Greater Hume Shire.

Internal access tracks would remain unsealed but would be sheeted with gravel or crushed stone to maintain their condition during the construction phase.

Overall, the additional traffic associated with the construction and decommissioning of the solar farm would be a small component of the existing traffic loads on local and state roads. No substantive increased collision risk, damage to road infrastructure, noise or dust impacts, disruption to existing services or reduced level of service is expected to accompany construction or decommissioning.

During operation, vehicles would use the designated road network to access the site and travel within the site during the operational phase. A small number of light vehicles would be expected during normal operation of the proposal. Activities undertaken during the operation phase would include travelling to the O&M building and carrying out land management or maintenance activities.

Overall, traffic impacts from the proposal are considered to be well within the capacity of the local road network and manageable.

Water use and quality, including groundwater

The site is located within the Murray River catchment. The large open drainage known as Back Creek runs through the property from the eastern border and exits via the north western site corner. Back Creek is fed by both Middle Creek and Mountain Dam Creek. Middle Creek, fed by Snake Gully and Hermitage Creek, runs into the site from the south and drains into Back Creek in the centre of the property. The confluence of Billabong Creek and Back Creek is approximately 7.4 km to the north northwest of the site.

17 farm dams are present across the site, holding varying volumes of water, in varying condition. Many man-made drains have been formed in the lower lying areas of the property, designed to shed water to the drainages and assumed to abate waterlogging in the paddocks. FRV have designed the proposal to have the ability to retain 15 out of the 17 dams on site.

The development site is not located in an area identified as having groundwater vulnerability. The WaterNSW database of groundwater lists two bores within 1 km of the development site (GW088562 and GW503220). GW088562 is located within the development site. This bore is listed on the database as abandoned.

A patch of low potential aquatic groundwater dependent ecosystem (GDE) is present within the development site along the northern boundary. This patch was been avoided by the development footprint. High potential terrestrial GDE includes the vegetated Back Creek, which is also excluded from the development footprint. Additional patches of high and low potential terrestrial GDE occur within the development site, most of this vegetation would be preserved but a portion would be removed.

The site is not mapped in the Greater Hume Shire's Flood Studies (Greater Hume Shire, n.d) as flood prone land. Flood modelling of the subject land carried out in the preparation of this EIS identified the 5% AEP is expected to inundate approximately 15% of the site over Back Creek and Middle Creek at an approximate water level height of 0.3 m. The 1% AEP is estimated to inundate 32% of the site extending outwards from Back Creek and Middle Creek. The approximate depth of this flooding would also be 0.3 m. The PMF is estimated to inundate approximately 74% of the development site. The substation would be located outside these flood prone areas.

The assessment and consultation with community members regarding local flooding knowledge found that the proposed solar farm is unlikely to increase any impacts of flood behaviour that could be detrimental to the development, land or surrounding land.

Water during construction could be sourced from several sources including standpipes operated by Greater Hume Shire Council, the Hurricane Hill Quarry or directly from the Riverina Water County Council (RWCC) pipeline running through the development site. The anticipated amount of non-potable water required during construction is 25,000 kL. This water is predominantly used for dust control.

During operation, water for panel washing and other maintenance activities would similarly be sourced from the available standpipes. It is expected 600 kL of potable water would be required each year.

The proposal would not directly affect the surface water quality. Indirectly, the proposed works would involve a range of activities that could disturb soils though impacts are considered low and can be appropriately managed.

No construction or operational activities would affect the groundwater. It is considered that this project would have negligible impact on groundwater.

Biodiversity

A Biodiversity Development Assessment Report (BDAR) was prepared to investigate and assess the potential impacts of the proposal on biodiversity. The development site is located in the Lower Slopes subregion of the NSW South West Slopes Bioregion. Cleared and highly modified agricultural land occupies about 85% of the development site. Four Plant Community Types (PCTs) were identified in the development site:

- PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the Eastern Riverina Bioregion.
- PCT 76 – Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions.
- PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.
- PCT 278 – Riparian Blakely's Red Gum – box – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion.

The development site has been designed to minimise impact on these communities. Three *Biodiversity Conservation Act 2016* (NSW) (BC Act) listed communities (PCT 76, PCT 277 and PCT 278) were present within the development site. None of these communities met the condition threshold to be listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act).

Targeted surveys were undertaken for 27 candidate credit species. One of these species, the Squirrel Glider (*Petaurus norfolcensis*) was detected within the development site. Three species were unable to be surveyed during the appropriate survey period and were assumed to be present within suitable habitat. These were:

- Little Eagle (*Hieraaetus morphnoides*).
- Southern Myotis (*Myotis Macropus*).
- Pine Donkey Orchid (*Diuris tricolor*).

Seven threatened species listed under the EPBC Act were considered likely to occur in the development site, although none were recorded during the field surveys. Assessments of Significance (AoS) were completed for these species. These concluded that a significant impact was unlikely.

No referral is considered necessary to the Australian Government's Department of Environment and Energy (DEE).

The development site has been selected to avoid or minimise impacts to biodiversity where possible. Most areas of Endangered Ecological Community (EEC) in the development site have now been avoided through the iterative design process. Where biodiversity impacts could not be avoided, an offset credit requirement has been generated:

- Ecosystem credits – 169 ecosystem credits were generated from the removal of 13.83 ha of native vegetation and 53 paddock trees.
- Species credits – 209 species credits were generated from potential impacts to four threatened species.

Potential direct and indirect impacts to the biodiversity values of the site could result from the proposal and have been considered. A range of mitigation measures such as connecting segmented vegetation and enhancing existing woodland along the entire length of Back Creek. Additional planting of native vegetation including food plants together with enhancing further areas would also be implemented to ensure that impacts on biodiversity are minimised and improved. FRV have placed careful consideration into this area of the project and made design changes from the original developer to reduce the biodiversity impact on the proposal.

Aboriginal heritage

An Aboriginal Cultural Heritage Assessment (ACHAR) was conducted to provide an assessment of the Aboriginal cultural values associated with the proposal area and to assess the cultural and scientific significance of any Aboriginal heritage sites recorded. The assessment was undertaken in consultation with Aboriginal stakeholders.

Walla Walla is in an area identified as part of the Wiradjuri language group. The topography of the region features low-gradient undulating and hilly ranges, wide valleys and isolated peaks (Goldsmith, Barker & Johnston, 1985). Two ephemeral water courses run through the proposal area: Back Creek and Middle Creek.

Twenty-three Aboriginal sites have been previously recorded in the general locality. None of these occur within the proposal area.

A series of pedestrian survey transects were undertaken across the proposal area. The survey was undertaken by an archaeologist from NGH with representatives of the Aboriginal community.

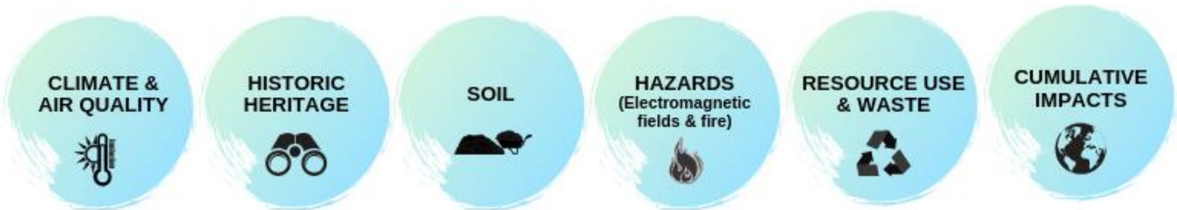
Despite the variable visibility encountered during the survey a total of 39 artefacts were found across the proposal area. This includes 23 isolated finds, 11 artefact scatters, two modified trees and three cultural trees identified by Aboriginal representatives. Two areas of potential deposits were also identified.

Based on the land use history and an appraisal of the results from the field survey, there is potential for the presence of high density, intact, subsurface deposits or cultural material within the proposal area. The survey identified potential artefact deposits that would be avoided by the proposed development footprint. Management safeguards would be implemented to ensure that areas of potential deposits are not impacted.

Direct impacts are likely to be most extensive where earthworks are to occur. Impacts could result from grading for access tracks and the installation of piles into the ground for the solar arrays. The two scarred trees and three cultural trees would not be impacted. Overall, impacts on Aboriginal cultural heritage have been assessed as low. An Unexpected Finds Protocol (UFP) would be prepared and followed should there be an inadvertent discovery of Aboriginal objects during construction.

LOWER RISK ISSUES

The following lower risk issues were assessed for the proposal and are briefly outlined below:



Climate and air quality

The air quality at the development site is generally expected to be good. Existing sources of air pollution at the site include vehicle emissions, dust from surrounding unsealed roads, and agricultural activities.

During construction and decommissioning there could be an increase in dust generation and air emissions from earthwork activities and vehicles.

Earthworks associated with construction and decommissioning are relatively minor and would not be likely to cause significant dust emissions. The piling machine used for the installation of the solar arrays is designed to reduce soil disturbance and corresponding dust pollution. It is expected that existing groundcover vegetation would remain largely intact during construction to assist in minimising dust and amelioration activities would also be implemented.

Operation of the proposed solar farm would generate minimal emissions and air quality impacts. Vehicle use at the site during operation would be minimal. The impacts on local and regional air quality are expected to be negligible.

No substantive impact for any of these aspects is expected from the solar farm.

Historic heritage

In the Greater Hume Local Government Area there are four listed items on the NSW State Heritage Register and 15 listed items/places on the NSW State Agency Heritage Register. There are 172 listed items/places in the *Greater Hume Local Environment Plan (LEP) 2012*. None of these are located on the development site. Two items of heritage are located within 5 km of the development site, Walla Walla homestead and Morgan's Lookout. No other items were located within 10 km of the development site.

No items listed on the Commonwealth Heritage List are present within the local government area (LGA).

No impacts are considered likely on heritage values by the proposed solar farm development.

Soil

A soil assessment was conducted to provide an assessment of the existing landforms, and the soil types and characteristics of the proposed development site. This was intended to confirm land capability and characteristics that may affect design, construction or rehabilitation of disturbed soils. It included a desktop and field study for the development site.

Two soil landscapes were identified at the development site. The soils were classified as Chromosols. These soils have a high risk of erosion, a moderate salinity risk, and a moderate risk of waterlogging.

The proposed activities for the construction, operation and decommissioning stages of the solar farm have the potential to increase soil erosion during rainfall events. Proposed activities could lead to the removal of vegetation and groundcover, increased compacted surfaces and decreased permeability.

Impact on soils during operation would be minimal, as maintenance activities and vehicles would be mostly confined to internal roads.

These potential impacts have been addressed with specific mitigation measures. Overall, the risk of erosion impacts resulting in soil loss is considered very low during construction, operation and decommissioning.

Hazards

The proposal does not exceed the screening thresholds for potentially hazardous or offensive development, in accordance with SEPP 33 Hazardous and Offensive Development. A Preliminary Hazard Assessment is not required.

Bushfire hazards include remnant native vegetation along Benambra Road, on both sides of Back Creek and several other patches that would not be impacted by the proposal. The subject land is not mapped as bushfire prone (RFS, 2019). The design of the proposal incorporates significant bushfire mitigation measures including a clear 10 m asset protection zone (APZ).

Specific construction and operational activities may cause or increase the risk of bushfire. Grazed grass cover over much of the development site is considered a low fuel zone. This together with further mitigation measures established through consultation with the local RFS, such as setbacks, additional emergency access points and access to water stored onsite, means that it is unlikely that construction or operation of the solar farm would pose an uncontainable bushfire risk. The bushfire hazard associated with the activities listed above is considered highly manageable.

Electric Magnetic Fields (EMFs) consist of electric and magnetic fields and are produced whenever electricity is used. EMF sources will be contained within the proposal. Typical and maximum EMF levels for these types of infrastructure are expected to be low. Adverse health impacts from EMFs are therefore unlikely as a result of the proposal.

Resource use and waste generation

The resource management options of the proposal would be considered against the principles of avoidance of unnecessary resource consumption, resource recovery and disposal. These principles would act as a guide to achieve efficient use of resources and reduce costs and environmental harm.

Waste generated during the construction would be subject to a strict recycling protocol involving segregation of materials e.g. packaging of panels. FRV have also committed to using bio-degradable packaging, where practicable. During operation, waste materials would be fuels, lubricants and metals. Items that cannot be reused or recycled would be disposed of in accordance with the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). The majority of the solar farm infrastructure is built from valuable recyclable materials including steel framing, copper wire, silicon, aluminium and glass.

No substantive impact for any of these aspects is expected from the solar farm.

Cumulative impacts

An adverse cumulative impact can occur when the proposal activities exacerbate the negative impacts on other infrastructure or activities occurring nearby.

During construction and decommissioning, the greatest potential for cumulative impacts is from biodiversity, visual, noise, traffic, increased pressure on local facilities, goods and services, and local agriculture impacts.

There are four other Major Projects listed on the Major Projects Register within the Greater Hume LGA including three other large-scale solar farms:

- Glenellen Solar Farm – Prepare EIS.
- Jindera Solar Farm – Under Assessment.
- Culcairn Solar Farm – Prepare EIS.
- Rockley Falls Quarry – Determination.

Cumulative impacts may have varying impacts to SSD proposals occurring within the LGA. Of the three solar farm proposals listed above, Culcairn Solar Farm is located approximately 2 km from the proposal, whereas Jindera Solar Farm and Glenellen Solar Farm are too far away to contribute to cumulative visual, noise and traffic impacts in conjunction to the proposal. This EIS has assessed the cumulative impacts of the proposal and Culcairn Solar Farm, although uncertainty remains surrounding details such as the planned construction timeframe, worker accommodation and construction transport route for Culcairn Solar Farm as the EIS for this proposal has not yet been submitted.

Cumulative impacts are not guaranteed as they depend on both projects obtaining the necessary project requirements to allow each proposal to proceed and also on each other's timeframes. The identified cumulative impacts in this EIS are considered manageable. Each component should be assessed individually and using the most up-to-date information available at the time of pre-construction.

MANAGEMENT OF IMPACTS

The solar farm has been designed to minimise adverse environmental impacts, including:

- Retaining majority of native vegetation, including threatened biota.
- Respecting known Aboriginal heritage items.
- Incorporating screening and landscaping elements to reduce visual impact.
- Clear setbacks from adjoining property boundaries.
- Selection of technologies that minimise noise and vibration outputs.

A range of additional management and mitigation measures have been developed to further reduce any residual impact. These strategies centre on the development of management plans and protocols to minimise impacts and manage identified risks and include the following key measures:

- A range of management measures to minimise risk of potential bushfire events.
- Traffic management measures during construction.
- A range of standard construction mitigation measures to minimise dust, soil erosion, waste and noise impacts.
- Adopted protocols in place to manage Aboriginal heritage and biodiversity.
- A plan to enhance retained biodiversity values.
- All stages of the development would be designed and operated in accordance with Australian Standards to minimise risks to the health and safety of the public, employees and the environment.

CONCLUSION

Overall, the proposal would represent an important contribution to Australia's transition to a low emission energy generation economy and will provide substantial economic benefits to the local area. It is considered compatible with existing land uses and highly reversible upon decommissioning, returning the site to its current agricultural capacity.

A suite of carefully considered management measures has been developed to address environmental impacts and risks to these and other physical, social and environmental impact areas.

The impacts and risks identified are deemed manageable with the effective implementation of the measures stipulated in this EIS. The impacts are considered justifiable and acceptable.

1 INTRODUCTION

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS for the development must comply with the requirements in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

a full description of the development, including:

- *details of construction, operation and decommissioning.*
- *a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process).*
- *a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development.*

OFFICE OF ENVIRONMENT AND HERITAGE REQUIREMENTS

The EIS should fully describe the proposal, the existing environment (including threatened species habitat not associated with vegetation communities - e.g. paddock trees) and impacts of the development including the location and extent of all proposed works that may impact on ACH and biodiversity. The scale and intensity of the proposed development should dictate the level of investigation. It is important that all conclusions are supported by adequate data. The assessment must include all ancillary infrastructure associated with the project such as roads, water and power supplies, and Rural Fire Service requirements for asset protection.

1.1 PURPOSE AND SCOPE OF THIS DOCUMENT

This Environmental Impact Statement (EIS) identifies and assesses the potential environmental impacts associated with the construction, operation and decommissioning of the proposed 300 MW AC Walla Walla Solar Farm State Significant Development (SSD) 9874 ('the proposal'). NGH Pty Ltd (NGH) has prepared this EIS on behalf of FRV Services Australia (herein 'the proponent' or 'FRV').

This EIS has been prepared in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to support a Development Application (DA) to be lodged with NSW Department of Planning, Industry and Environment (DPIE), formerly the Department of Planning and Environment (DPE).

The objective of this EIS is to fulfil the requirements of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) and Section 79C of the EP&A Act. The structure and content of the EIS address the Secretary's Environmental Assessment Requirements (SEARs), provided by NSW DPE on 7 March 2019 (Appendix A).

The EIS also addresses the assessment requirements of the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

FRV has conscientiously provided transparent and factual information to enable near neighbours and members of the public to participate meaningfully in the engagement process. Community feedback provided has been considered and utilised by the project development team to shape and enhance the proposed design.

The proponent has engaged NGH to prepare the EIS. Other independent consultants were contracted to carry out specialist technical assessments as required. This EIS will be independently evaluated by the NSW Government, considering input from the community provided during the public exhibition period. The development assessment process places the onus on the proponent to provide the information required for the State Government to make an informed decision. The process provides for public transparency, accountability and participation in development approval decision-making.

1.2 PROJECT OVERVIEW

1.2.1 The proponent

FRV is a global company with over 40 operational renewable energy projects across the world including four operational utility solar farms across Australia and an additional project under construction near Parkes, NSW. FRV aims to be at the forefront of the global energy transition to renewables, while setting the highest standards of quality, community engagement, technical innovation and commitment to service delivery, from planning to operations of assets for single and portfolios of customers, suppliers and investors.

FRV pioneered Australia's first ever utility-scale solar farm in the Australian Capital Territory (ACT) (Royalla Solar Farm) and as a global operator of renewable assets, FRV has a clear strategy to manage its projects through design, construction and the full operational lifecycle. Numerous other projects are under development and consideration by FRV.

FRV acquired the proposed development in July 2019 from the original developer, Bison Energy. From inception, FRV have been engaging with local stakeholders, working to accommodate concerns where possible. As a result, FRV has implemented significant design changes to the proposal.

1.2.2 Development site location

The subject land is located within the Greater Hume Local Government Area (LGA) and is legally identified as the following Lots (Figure 1-1):

- Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735.
- Lot 3 DP 253113.
- Lot 1 DP 1069452.
- Lot A DP 376389.
- Lot 1 DP 933189.

The solar farm would have one primary access point at the north-eastern corner of the project, off the Benambra Road, approximately 2.6 km west of Olympic Highway. Schneiders Road runs between the land parcels of the development site and would be used for auxiliary access to the proposal. Both are local roads managed and maintained by Greater Hume Shire Council. An existing quarry is located on Weeamera Road, off Benambra Road, and the intersection of Benambra Road and the Olympic Highway has already been upgraded to facilitate turning heavy vehicles.

The Olympic Highway is a major regional highway servicing the communities of the central western and south-eastern Riverina including the LGAs of Cowra, Hilltops, Cootamundra-Gundagai, Wagga Wagga, Greater Hume and Albury. The Olympic Highway is an important link between the towns in this productive region and connecting these areas with the national highway network. The region supports a diverse economy associated with agriculture, tourism, large commercial centres, residential facilities, health centres, railroad activities, energy generation (gas and solar), energy distribution, road freight and intermodal logistics.

Aerial imagery and a preliminary site inspection identified six residences situated within 1 km of the proposal (R1a, R1b, R2, R3, R4, R5a). The closest dwelling is approximately 80 m to the north (R1a). The TransGrid Wagga Wagga to Jindera 330 kV transmission line is located on the development site's western boundary (refer to Figure 1-2).

Walla Walla is the closest town to the proposal, approximately 4.3 km south-west of the proposal. Its population in 2016 was recorded as 836 persons (ABS, 2016) and the town hosts a number of historic buildings, churches, a grain storage facility and a community sports ground. The closest services are located in the regional centre of Albury, around 35 km south of the proposal. The population for Albury's urban locality in June 2018 was recorded as 53,289 persons (Population Australia, 2019). It supports supermarkets, post offices, service stations, accommodation, restaurants, medical services and recreation facilities.

The Murray River and Lake Hume are located approximately 36 km south and 20 km south-east, respectively, of the proposal. Lake Hume is one of the major water storage areas for the Murray River and is also used as a recreational facility. The Benambra National Park and Tabletop Nature Reserve are located approximately 9.5 km east and 13.7 km south-east, respectively, of the proposed.

1.2.3 Key components of the proposed Walla Walla Solar Farm

The development footprint would occupy around 493 hectares (ha) of the 605 ha development site. The proposal would involve the construction of a ground-mounted photovoltaic (PV) solar tracking array generating around 300 MW AC of renewable energy. The power generated would be exported to the national electricity grid.

Key development and infrastructure components would include:

- Approximately 900,000 PV solar arrays mounted on single axis tracking systems.
- Electrical cables and conduits.
- Approximately 72 modular inverter units.
- New TransGrid substation and connection point comprising transformers, associated switchgear, control and protection equipment.
- 33 kV/330 kV transformer and protection.
- Operations and maintenance (O&M) building, parking and perimeter fencing.
- Primary access point on Benambra Road.
- Emergency/maintenance access points off Benambra and Schneiders Roads.
- Internal access tracks.
- Reactive lighting, CCTV system, security fencing.
- Vegetative screening and setbacks.

The proposed infrastructure map (Figure 1-3) illustrates the indicative layout, including a concept development footprint for the solar arrays. Detailed design would allow for avoidance of sensitive features on the site. A native vegetation buffer would be established to minimise visual impacts in specific locations.

In total, the construction phase of the proposal is expected to take 16 to 20 months, and the facility would be expected to operate for around 30 years or extended pending further approvals. Approximately 21 fulltime equivalent operations and maintenance staff and service contractors would operate the facility. At the end of its operational life, the facility would be decommissioned. All infrastructure would be removed and returned to its existing agricultural land capability.

1.2.4 Capital investment

The proposal would have a capital investment of around $399 million.

1.2.5 Land ownership

The subject land is owned by two title holders:

Table 1-1 Land ownership

Property Description	Landowner
Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735 and Lot 3 DP 253113	1
Lot 1 DP 1069452, Lot A DP 376389 and Lot 1 933189	2

The use of the site is based on a lease agreement between the proponent and the landowners.

The proponent has signed an Option Deed with the owners of these properties to lease the land for the purpose of a solar farm.

1.2.6 Development history

An Informal Access Application under the *Government Information Public Access Act 2009* was submitted to Greater Hume Shire Council on 28 May 2019. It was determined that no Development Applications of relevance were recorded within the proposal area (Appendix B.1).

A search for State Significant Development on the Major Projects website (accessed 28 May 2019) of Greater Hume LGA did not indicate any Development Applications on the affected lots (subject land).

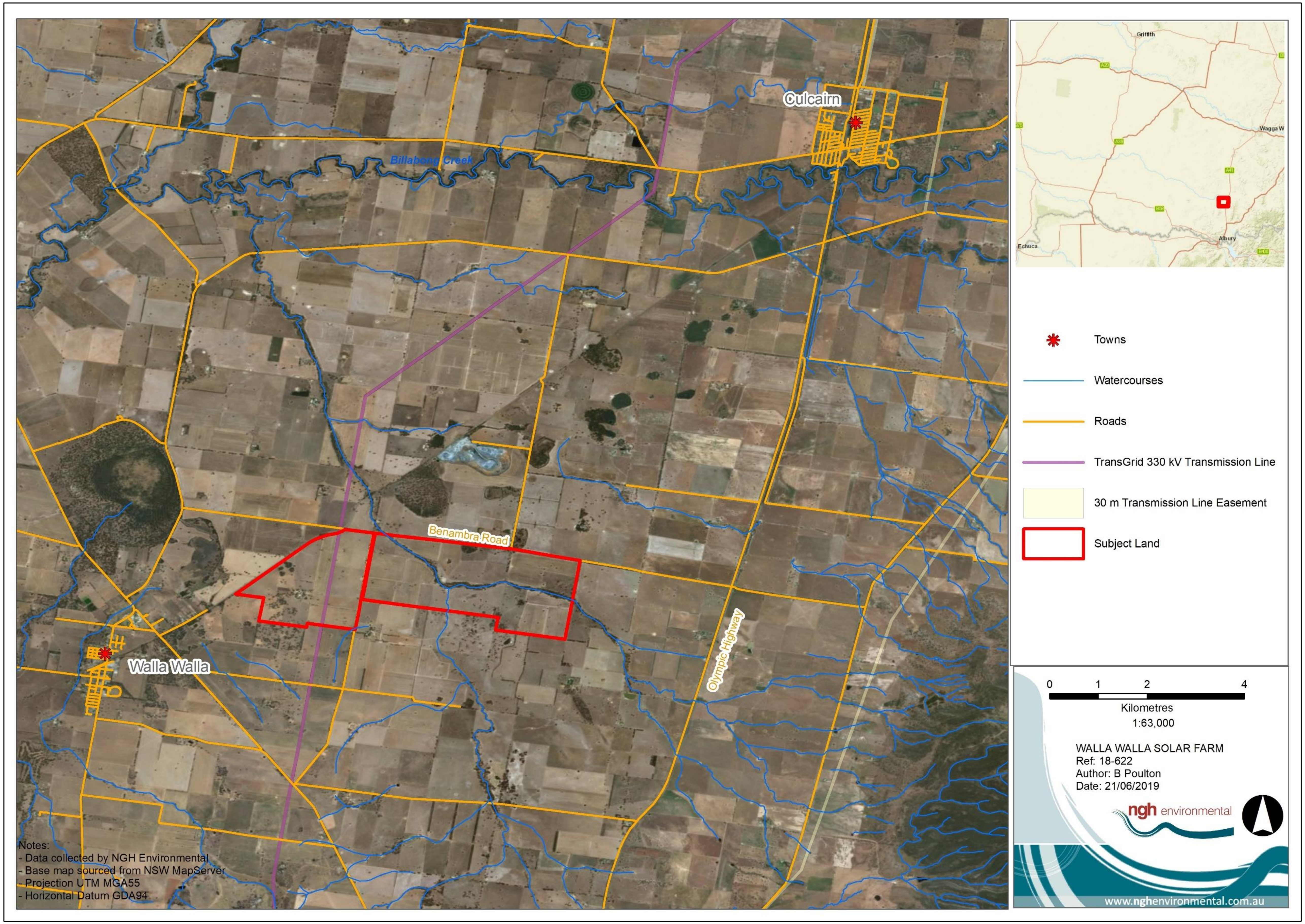


Figure 1-1 General location of the subject land

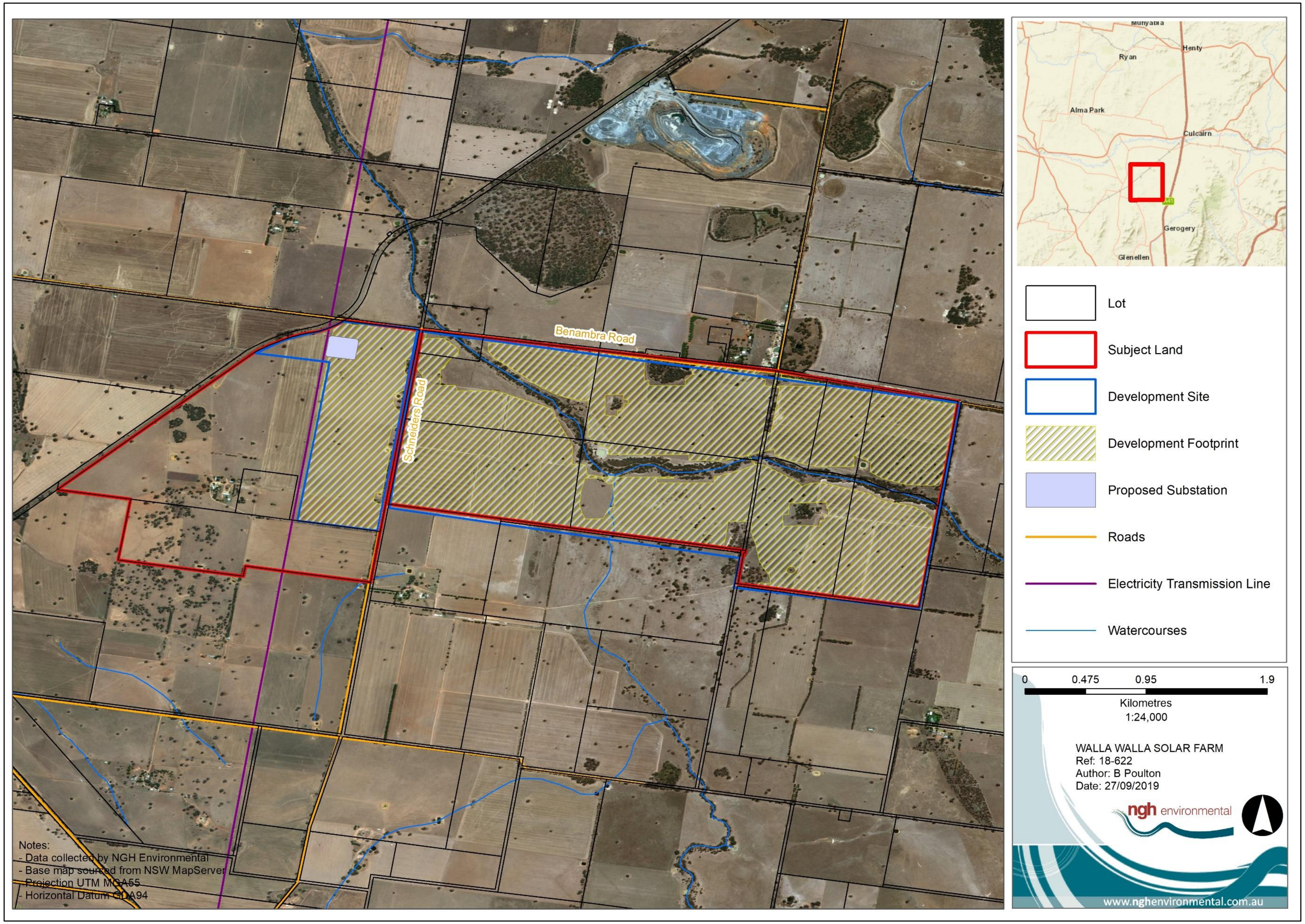


Figure 1-2 Development site within the subject land

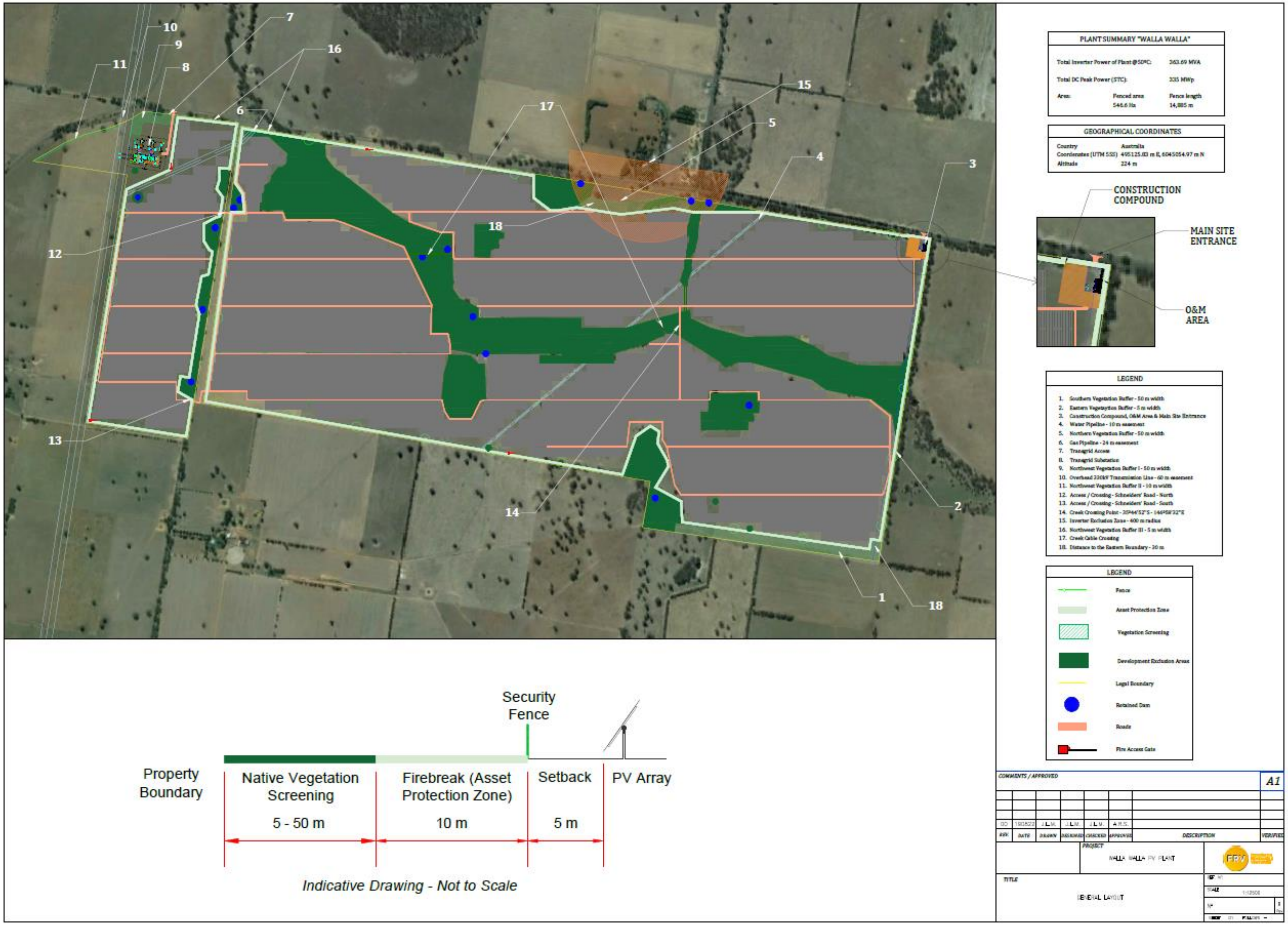


Figure 1-3 Proposed infrastructure

2 STRATEGIC JUSTIFICATION AND ALTERNATIVES CONSIDERED

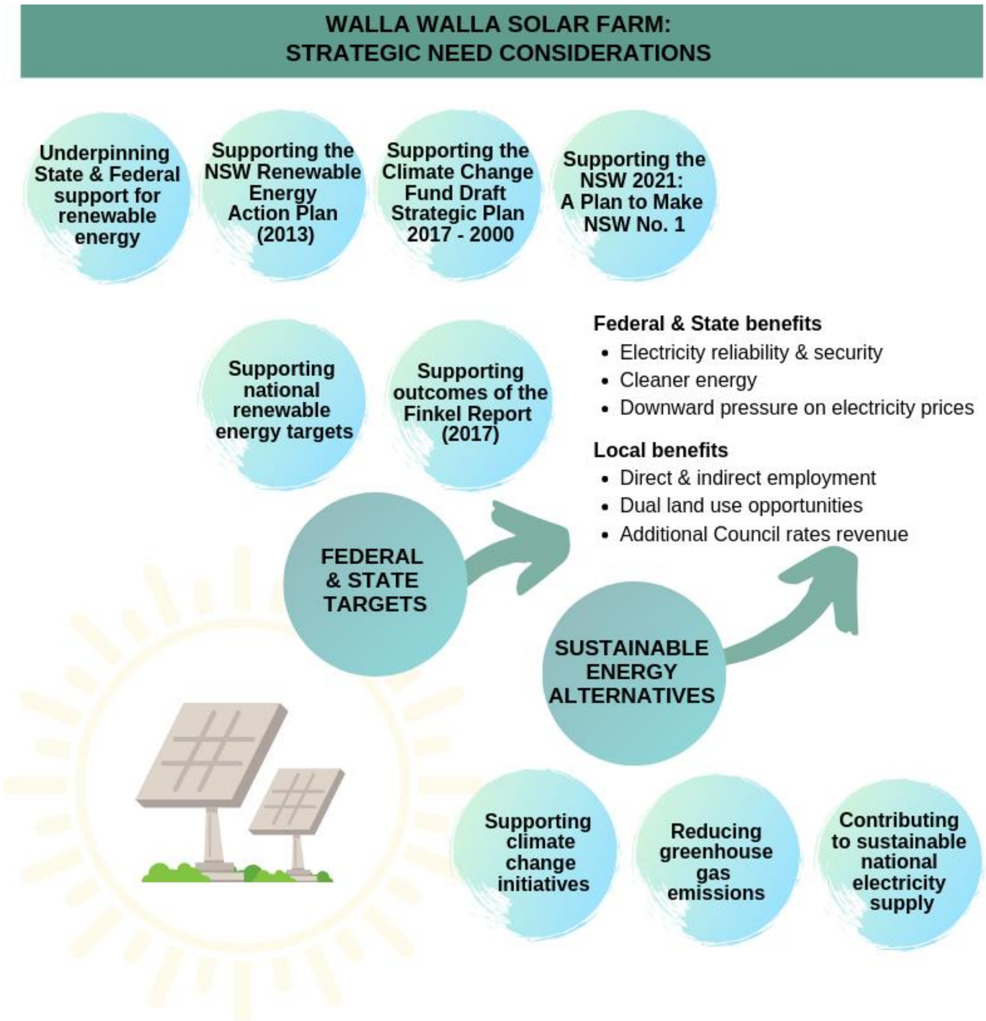
SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In particular, the EIS must include:

- *a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including other proposed or approved solar farms, rural residential development and subdivision potential).*
- *a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter.*

2.1 STRATEGIC NEED

The New South Wales Renewable Energy Action Plan (NSW Government 2013) identifies the following three goals: attract renewable energy investment and projects; building community support for renewable energy; and attract and grow expertise in renewable energy technology. Based on these goals, this section provides the strategic need for the proposal.



2.1.1 Federal and State targets

National renewable energy targets

The Kyoto Protocol is an international agreement created under the United Nations Framework Convention on Climate Change in Kyoto, Japan in 1997. The Australian Prime Minister signed Australia's instrument of ratification of the Kyoto Protocol in 2007, thereby committing Australia to reduce its collective GHG emissions.

There have been a number of government policies in place in Australia influencing the development of renewable energy. In 2001, the Commonwealth Government introduced the Mandatory Renewable Energy Target (MRET) Scheme to increase the amount of renewable energy being used in Australia's electricity supply. The initial MRET was for Australian to provide 9500 gigawatt hours (GWh) of new renewable energy generation by 2010.

This target was revised and increased to 45,000 GWh from 2001 to 2020 in January 2011. The MRET was split into a Small-scale Renewable Energy Scheme and LRET components to ensure that adequate incentives were provided for large scale grid connected renewable energy. The LRET aims to create a financial incentive for the establishment and growth of renewable energy power stations, such as wind and solar farms, or hydro-electric power stations through the creation of large-scale generation certificates.

In June 2015, the Australian parliament passed the *Renewable Energy (Electricity) Amendment Bill 2015.* As part of the amendment bill the LRET was reduced from 41,000 GWh to 33,000 GWh by 2020 with interim and post 2020 targets adjusted accordingly. The current projection is that about 23.5% of Australia's electricity generation in 2020 would be from renewable sources.

Finkel Report

The 2017 Independent Review into the Future Security of the National Electricity Market (Finkel Report) is a report commissioned by the Australian Government in order to establish a framework for the development of the Australian energy sector. It recommends the use of a Clean Energy Target (CET) scheme to stimulate renewable energy production throughout the National Electricity Market (NEM) and would likely replace the present Federal MRET scheme due to expire in 2020. The report modelled the outcomes required to achieve the trajectory committed to by the Australian Government by 2030 and determined that renewable energy would constitute approximately 42% of the NEM.

State and Federal support for renewable energy

At present, Australia has one of the world's highest GHG emissions per unit of electricity produced in the world, with the vast majority of its power generated by aging coal-fired power plants. The NSW Renewable Energy Action Plan (REAP) and LRET incentives are supported at the federal level by grant programs from the Australian Renewable Energy Agency (ARENA), and financing programs from the Clean Energy Finance Corporation.

NSW Renewable Energy Action Plan

In 2013, the NSW Government released the NSW Renewable Energy Action Plan to guide NSW's renewable energy development (NSW Government, 2013). The Government's vision is for a secure, affordable and clean energy future for NSW.

The Plan positions the state to increase energy production from renewable sources to reduce costs for energy consumers, for the greater benefit of NSW as a whole.

The Plan details 3 goals and 24 actions to efficiently grow renewable energy generation in NSW:

1. Attract renewable energy investment and projects.
2. Build community support for renewable energy.
3. Attract and grow expertise in renewable energy.

Furthermore, the Plan recognises that energy storage can increase the value of renewable energy to individuals, network operators and investors. Storage allows renewable energy investors to increase revenue by selling power at times of peak market prices as opposed to when the electricity is generated. This in turn places downward pressure on electricity prices by encouraging more supply at times of peak demand and reducing the need for additional distribution and transmission infrastructure.

Storage technology (including rechargeable batteries and thermal energy storage) is a global market, with many other countries currently grappling with ways to integrate increasing amounts of renewable energy into their networks. NSW can leverage off the work being done overseas as well as develop storage expertise within NSW to create a long-term export industry.

Climate Change Fund Draft Strategic Plan 2017 to 2022

The *Climate Change Fund Draft Strategic Plan* (NSW Government, 2016) sets out priority investment areas and potential actions using $500 million of new funding from the $1.4 billion Climate Change Fund over the next five years. Investment in these areas would help NSW make the transition to net zero emissions by 2050 and adapt to a changing climate.

This Strategic Plan is an important first step to implementing the policy framework. The Strategic Plan organises potential actions into three priority investment areas that would form the basis of future action plans:

- Accelerating advanced energy (up to $200 million).
- National leadership in energy efficiency (up to $200 million).
- Preparing for a changing climate (up to $100 million).

The advanced energy priority strategies focus on supporting the transition to a net-zero emissions economy by providing greater investment certainty for the private sector, accelerating new technology to reduce future costs and helping the community and industry make informed decisions about a net-zero emissions future.

NSW 2021: A Plan to Make NSW Number One

NSW 2021: A Plan to Make NSW Number One was released in 2011, replacing the State Plan as the NSW Government's strategic business plan, setting priorities for action and guiding resource allocation. Goal 22 of this plan seeks to protect our natural environment and includes a specific target to increase renewable energy.

A commitment is made to:

> *Contribute to the national renewable energy target [i.e. 20% renewable energy supply] by promoting energy security through a more diverse energy mix, reducing coal dependence, increasing energy efficiency and moving to lower emission energy sources* (NSW Government, 2011).

Specific initiatives under this target that directly support building solar power plants includes the Solar Flagships Program, in partnership with the Australian Government, established in 2009 (now closed). Additionally, a strategic move towards renewable energy generation is supported through the establishment of a Joint Industry Government Taskforce to develop a Renewable Energy Action Plan for NSW, which would identify opportunities for investment in renewable energy sources.

2.1.2 Sustainable energy alternative

Climate change

Electricity generation is the largest individual contributor of greenhouse gas emissions in Australia (DEE, 2016).

The proposal would contribute to the New South Wales Renewable Energy Action Plan (NSW Government 2013), which supports the national target of 20% renewable energy by 2020. The proposal would also further the three goals of the Action Plan:

1. Attract renewable energy investment and projects.
2. Build community support for renewable energy.
3. Attract and grow expertise in renewable energy.

The NSW 2021: A Plan to Make NSW Number One (NSW Government, 2011) has the following goal:

“Contribute to the national renewable energy target…by promoting energy security through a more diverse energy mix, reducing coal dependence, increasing energy efficiency and moving to lower emission energy sources.”

The proposal would also add to the Commonwealth Government’s objective to achieve an additional 33 GW from renewable sources by 2020 under the Large-scale Renewable Energy Target (LRET).

The COP21, also known as the 2015 Paris Climate Conference, achieved a legally binding and universal agreement on climate, with the aim of keeping global warming below 2°C, chiefly by reducing greenhouse gas emissions. The proposal would form part of the Australian effort to help meet this target.

Human activity is resulting in the release of large amounts of greenhouse gases (GHGs) which trap the sun’s heat in our atmosphere and alter the balance of the Earth’s climate. This threat is acknowledged by scientists and politicians around the world, as illustrated by the United Nations Paris Agreement on Climate Change. Federally, Australia has committed to reducing its emissions to 5% below 2000 levels by 2020, and 26-28% below 2005 levels by 2030 (DEE, 2017). Renewable energy helps to reduce emissions of GHGs associated with electricity generation.

Greenhouse gas emissions - lifecycle analysis and benefits of solar technology

Lifecycle analysis can be used to consider the emissions produced during the manufacture, construction, operation and decommissioning of, in this case, electricity generation technologies. When compared with existing conventional fossil fuel based electricity generation, solar PV technology generates far less lifecycle GHG emissions per GWh than conventional fossil-fuel-based electricity generation technologies (Fthenakis *et al,* 2008; NREL, 2012).

Unlike fossil fuel systems, most of the GHG emissions for solar technology occur upstream of the lifecycle, with most of the emissions (50-80%) arising during the production of the module (Weisser. n.d.). Other lifecycle emissions relate to construction and decommissioning activities. During solar plant operation, the production of electricity with PV modules emits no pollution, produces no GHGs, and uses no finite fossil-fuel resources.

Support activities, such as maintenance works, may however generate emissions but the amount would be regarded as negligible. End of life and associated transport activities do not result in meaningful cumulative GHG emissions (Weisser n.d).

Emissions from conventional energy generation based on fossil fuels can therefore be avoided by replacing conventional methods of fossil fuel energy generation with solar PV energy generation.

Electricity supply

The Australian Energy Market Operator (AEMO, 2018) forecasts that grid-supplied electricity consumption will remain flat for the next 20 years, despite projected 30% growth in population. Although not required to meet projected electricity demand, the proposal would benefit the network by shifting electricity production closer to local consumption and regulating inputs to the grid using an Energy Storage Facility.

The electricity network was designed to deal with a small number of very large power generating stations. The localisation of power generation helps the grid to cope with the supply from diversified renewable energy projects.

2.2 PROPOSAL BENEFITS

2.2.1 Broad benefits

Broad benefits that would be associated with the operation of the proposal include:

- Reduce GHG emissions, assisting the transition towards cleaner electricity generation.
- Provision of a renewable energy supply that would assist the Australian and NSW Governments to reach Australia's LRET and other energy and carbon mitigation goals.
- Embed electricity generation supply into the Australian grid, closer to identified consumption centres.
- Combatting the effects of climate change by utilising a clean renewable energy source as an alternative to burning fossil fuels.

Specifically, the proposal would:

- Generate approximately 740,000 MWh of renewable electricity per year.
- Supply enough power each year to service approximately 90,000 households (assuming average household consumption of 4,215 kWh per annum).
- Save around 520,000 tonnes of carbon dioxide (CO_2) per year, assuming generation would otherwise use brown coal with a carbon factor of 1.1 tonnes per MWh (DOEE ,2017).
- A solar energy facility that displaces 520,000 tonnes of CO_2 per annum is the equivalent of taking about 23,636 cars off the road each year, based on an average car in NSW travelling 14,000 km per year with CO_2 emissions of 162 g/km (or 2.3 tonnes of CO_2 emissions per car per year) (DIT, 2011).
- According to Deloitte, Australian households will pay $510 million more for power in 2020 without renewable growth through the RET and up to $1.4 billion more per year beyond 2020. Renewables increase competition in the wholesale energy market – and, as in any market, more competition means lower prices.

2.2.2 Electricity reliability and security benefits

The proposal would enhance electricity reliability and security.

While most of Australia's electricity is currently provided by coal-fired power stations, as many as three-quarters of these plants are operating beyond their original design life. Nine coal-fired power stations have closed since 2011-2012, representing around 3,600 MW of installed capacity (AER, 2018).

Even with demand-management initiatives, the retirement of old power stations would require the development of new, reliable and low-emissions energy supply. Given the high levels of solar irradiance in NSW, the strong transmission network in the region and the declining cost of solar power over the last decade, the proposal is an important source of new power generation.

The transition to renewable energy sources based on variable wind and solar PV generators has implications for reliability and security; these sources lack usable inertia to support power system security (Finkel *et al.* 2016). The NEM grid is long and linear, with much less network meshing than many international systems. Geographic and technological diversity in the network can improve security and smooth out the impacts of variability (Finkel *et al.* 2016), this is highlighted in the proposal given the geographical location of the proposal and its immediate proximity to existing transmission line.

While grid-supplied electricity consumption is expected to remain stable (AEMO, 2018), the proposal would benefit network reliability and security by providing embedded electricity generation closer to local consumption centres, contributing to a more diverse mix of energy sources and potentially regulating inputs (including improving the security of supply).

2.2.3 Downward pressure on electricity prices

Household electricity bills increased 61% between 2008-09 and 2012-13, due mainly to network expenditure (ABS, 2019). Australian households would pay $510 million more for power in 2020 without renewable growth through the RET and up to $1.4 billion more per year beyond 2020 (Roam Consulting 2014). Renewables increase diversity and competition in the wholesale energy market – and as in any market, more competition means lower prices.

Variable renewable energy generation such as PV solar operates with no fuel costs and can, with the right policy framework and technological development to manage variability, be used to reduce overall wholesale prices of electricity (Finkel *et al*., 2016).

Several studies on the impacts of increased large-scale renewable energy generation under the RET have indicated that this is likely to put downward pressure on electricity prices (Australia Institute, 2015).

2.2.4 Local benefits

Local social and economic benefits that would be associated with the construction and operation of the proposal include:

- Direct and indirect employment opportunities during construction and operation of the solar farm. This includes up to 250 employees at the peak of construction (8 to 12 months) and approximately 21 FTE operational staff for the life of the project, 16 of which are likely to live and work locally.
- Diversifying employment opportunities beyond the productive agriculture sector.
- The proposal would provide significant participation opportunities for businesses and workers located in the area.

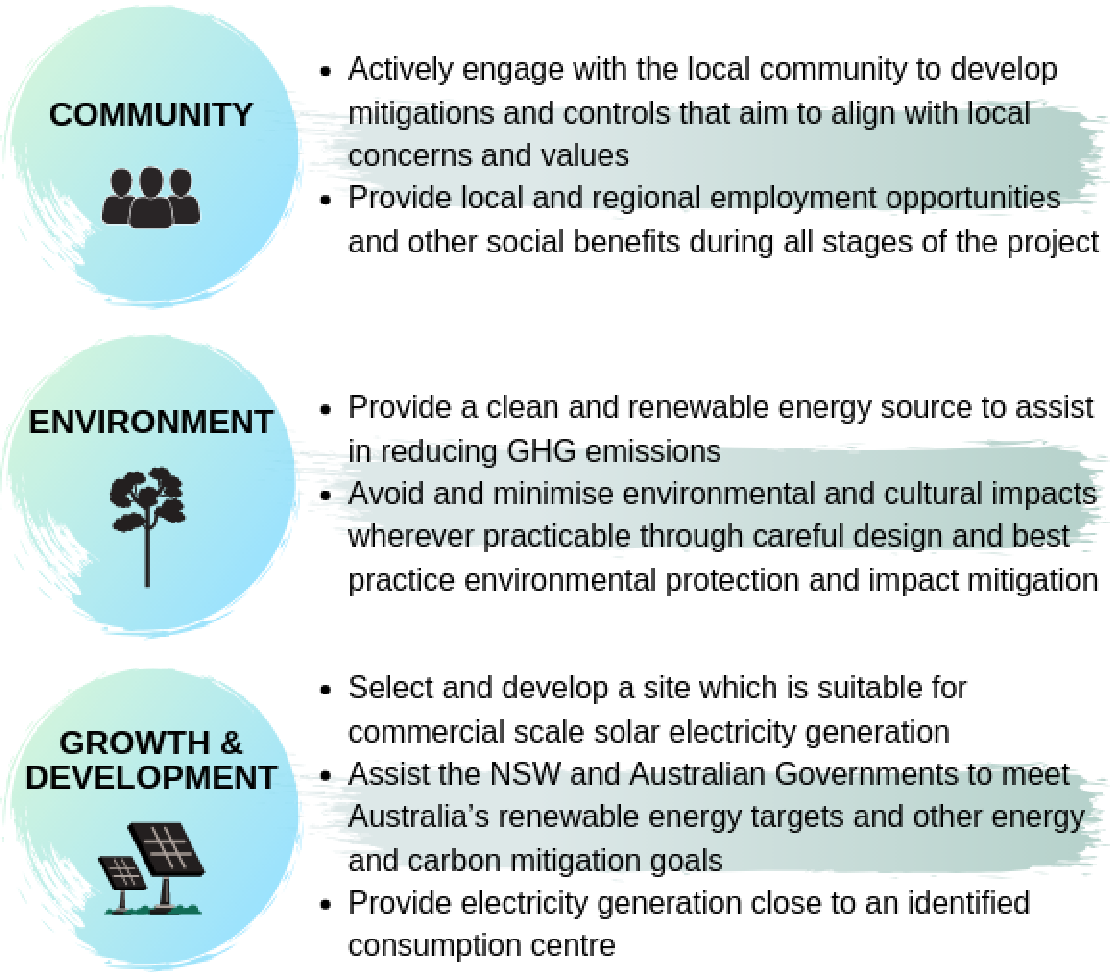
- Direct business volume benefits for local services, materials, and contracting (e.g. accommodation, food and other retail).
- Assistance in meeting the future national electricity demands.
- An approximate annual operating budget of $10 million.
- Council rates revenue associated with the solar farm.
- Introduce additional sources of employment and income to the region.

Additionally, the proposal would address the environmental constraints of the site appropriately. It would be designed to:

- Preserve biodiversity features through minimising tree and vegetation community removal.
- Enhance biodiversity through extensive planting of native vegetation, protecting sensitive areas, restoring riparian zones of retained dams and creek areas.
- Preserve Aboriginal cultural heritage through maintaining important features.
- Minimise impacts to soil and water, through pile driven panel mounts rather than extensive soil disturbance and excavation.
- Minimise visual impacts to neighbours, incorporating vegetation screens and setbacks located in consultation with neighbours, where required.
- Preserve agricultural production values, being highly reversible at the end of the project's life and utilising the area for sheep grazing for the lifetime of the project.

2.3 PROPOSAL OBJECTIVES

The objectives of the proposal are to:



2.4 ALTERNATIVES CONSIDERED

During the development of the proposal, a number of alternatives were considered. These include the 'do nothing option' (not developing the solar farm), alternative proposal area locations, and developing different renewable technologies.

2.4.1 The 'do nothing' option

The consequences of not proceeding with the proposal would be to forgo the identified benefits. This would result in the **loss** of:

- Opportunity to reduce GHG emissions and move towards cleaner electricity generation.
- A renewable energy supply that would assist in reaching the LRET.
- Additional electricity generation and supply into the Australian grid.
- Social and economic benefits created through the provision of direct and indirect employment opportunities during the construction and operation of the solar farm.
- Opportunities for farmers to diversify their income leading to resilience to drought and unpredictable market prices.

- Sustainable demand for local goods and services.

The 'do nothing option' would avoid:

- Temporary noise, traffic and dust, visual impacts during construction.
- The loss of 53 paddock trees.
- The permanent loss of 3.2 ha of productive agricultural land.

Given the benefits of the proposal, the do-nothing option is not considered to be a preferred option. Considering the benefits of the proposal and the low level of environmental impact (assessed within this EIS), the proposal is considered to be ecologically sustainable and justifiable.

2.4.2 Technology alternatives

Generation Technology

The LRET and REAP outline the commitment by both Australia and NSW more specifically to reduce GHG emissions and have set targets for increasing the supply of renewable energy. Other forms of largescale renewable energy accounted for in the LRET include wind, hydro, biomass, and tidal energy. The feasibility of wind, solar, biomass, hydro and tidal projects depend on the availability of energy resources and grid capacity.

PV solar technology was chosen because it is cost-effective, low profile, durable and flexible regarding layout and siting. It is a proven and mature technology which is readily available for broad scale deployment at the site. Immediate grid access enables energy production without the need to construct additional transmission lines to connect to the network.

Superior solar resources have been identified in NSW, providing excellent opportunities for solar projects.

2.4.3 Alternative site locations

During the site selection process for the proposal, the proponent reviewed the solar generation potential of many areas in NSW using a combination of computer modelling and analysis, on the ground surveying, and observation and experience of the proponent. The proposed site was selected because it provides the optimal combination of:

- Minimal biodiversity losses.
- Level terrain for cost effective construction.
- High quality solar resource.
- Compatible land use zoning (on the development site and considering adjacent land holdings).
- Existing road access.
- A low number of residential dwellings and businesses within close proximity.
- Onsite connection to the transmission network.
- High levels of available capacity on the grid transmission system.
- Land availability and support from the landowners.

The development site is of a scale that allows for flexibility in the design, allowing site constraints identified during the EIS process to be avoided or effectively mitigated.

The design of the proposal is the result of an iterative process. The design has been adapted progressively as information regarding site constraints, and the potential impacts and risks associated with the development of the proposal have become available.

Based on biodiversity, heritage and other investigations carried out for the EIS, the proposed layout achieves the objective of efficient electricity production while minimising environmental impacts overall.

Available grid capacity at a suitable voltage on the existing TransGrid Jindera to Wagga Wagga 330 kV transmission line west of the site was instrumental in making Walla Walla a suitable choice for a renewable energy development.

2.4.4 Scale of the proposal

The scale of the proposal has been influenced by:

- Property boundaries.
- The location of existing onsite dams, vegetation and plant communities.
- Consideration of Aboriginal cultural heritage values.
- Demand for new renewable electricity generation to meet generation targets.
- Commercial investment and viability considerations.
- Transmission grid capacity.

The proposed scale of the solar farm successfully responds to the constraints and opportunities inherent in these factors.

2.4.5 Grid connection and capacity

As part of the site selection process, the proponent has undertaken detailed electrical load-flow modelling of the NSW electricity transmission system. This detailed modelling has shown the available capacity on this section of the 330 kV grid system to be sufficient to support a proposal of this scale. The modelling also considered other committed future generation and the dynamic and static conditions of the transmission network. These assessments have been discussed with TransGrid as part of the ongoing grid connection consultation and agreement process.

2.5 SITE SUITABILITY AND JUSTIFICATION

The proposal would meet the proposal objectives, principally the development of a utility scale solar electricity power station. It is justified in terms of reducing Australia's GHG emissions and meeting future energy demands. It would contribute to Australia's renewable energy targets and support a global reduction in GHG emissions. Ultimately, it would contribute to economic development in Walla Walla and the surrounding region.

Suitability details are described in Table 2-1 below.

Table 2-1 Site conditions and constraints (NSW Large-scale Solar Energy Guideline for State Significant Development (DPE, 2018))

Preferable site conditions	Site justification
Visibility and topography – sites with high visibility, such as those on prominent or high ground positions, or sites which are located in a valley with elevated nearby residences with views toward the	The development site does not include any prominent or high ground positions, nor is it located within a valley. The proposal does not have high visibility from regional vantage points. The proposal is not visible from

Preferable site conditions	Site justification
site. This is particularly important in the context of significant scenic, historic or cultural landscapes.	Morgan's Lookout (7.5 km to the north-west). Two direct neighbours on slightly elevated land around the site have visibility of the arrays and substation. One of these residences functions as a wedding and accommodation venue. Although any solar farm development would have direct neighbours with some form of site visibility, the concerns raised by these residences have been fundamental in developing visual impact reduction measures in this EIS.
Biodiversity – areas of native vegetation or habitat of threatened species or ecological communities within and adjacent to the site, including native forests, rainforests, woodlands, wetlands, heathlands, shrublands, grasslands and geological features.	Based on preliminary biodiversity, heritage and other investigations, the indicative design would minimise environmental impacts overall. The final design would avoid the majority of native vegetation, water features and habitat of threatened species or ecological communities. The proposal intends to implement best practice biodiversity enhancement, with enough setback to allow for any shading impacts. The development site is unobtrusive, flat and has low-lying topography.
Residences – residential zones or urbanised areas.	The development site is within the rural agricultural landscape of Walla Walla. Residences are generally scattered with homesteads surrounded by large tracts of arable farmland. There are six direct neighbours adjoining the subject land perimeter, two of who are subject landowners. Within a 3 km radius from the site, there are an additional nine 'near neighbours' (excluding those residences on the outskirts of Walla Walla). The town of Walla Walla is 4.3 km west of the subject land, with the next nearest town – Culcairn, located 8.5 km north-west of site. Hence, the site is not considered to be located within a residential zone or urbanised area.
Agriculture – important agricultural lands, including Biophysical Strategic Agricultural Land (BSAL), irrigated cropping land, and land and soil capability classes 1, 2 and 3. Consideration should also be given to any significant fragmentation or displacement of existing agricultural industries and any cumulative impacts of multiple developments.	The proposal is not located on BSAL, including industry clusters and biophysical strategic agricultural land. The proposal is located on soil capability Class 4 and 6 land, with current land use of the site comprising sheep and cattle farming. Intermittently, the main subject land is also used for canola and wheat crops. As the land capability classification system is under review, adjacent land use has been taken into account to assess agricultural capability. The development site is located within 2 km of the proposed Culcairn Solar Farm.
Natural hazards – areas subject to natural hazards such as flooding and land instability.	The scale and size of the proposal was influenced by the subject land area, geology, hydrology, access and road connections. Back Creek runs west-east and Middle Creek (non-incised) south-east through the subject land that eventually confluences with Billabong Creek and drains into the Murray River. Back Creek contains remnant

Preferable site conditions	Site justification
	riparian vegetation and would not be impacted by the proposal, whereas the south-east overland ephemeral flow path is currently cultivated as a crop and is not immediately apparent on the ground. Neither creek line is key fish habitat. Flood modelling for the site shows 5% AEP, 1% AEP and PMF affects part of the development site. The substation would be located outside the PMF, while the O&M building and switchroom would be located outside the 1% AEP. Solar panels would be located largely outside the 5% AEP. Soil at the site is stable and suitable to support the level and type of infrastructure proposed.
Resources – prospective resource developments, including areas covered by exploration licences, and mining and petroleum production leases. Solar development applicants should seek advice from the Department of Planning, Division of Resources and Geoscience about the coverage of resources-related licences.	Email correspondence with GSNSW detail that there are no current operating mines of quarries over the proposal or adjacent lands (Appendix B.1). The GSNSW has identified that the 'Hurricane Hill' hard rock quarry operated by Boral Resources Pty Ltd is located approximately 1.5 km to the north of the project site. Consideration should be given to the impacts the project may have on the quarry's operations. Consultation with Boral during the preparation the EIS is also provided in Appendix B.2.
Crown Lands – if any part of the project or associated transmission or distribution infrastructure will cross Crown Lands, it may be subject to legislative requirements that restrict access to the land.	The development site comprises privately owned farmland that would be leased for the life of the proposal.

3 PROJECT DESCRIPTION

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must include:

- *a full description of the development, including:*
- *details of construction, operation and decommissioning.*
- *a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process).*
- *a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development.*

OFFICE OF ENVIRONMENT AND HERITAGE REQUIREMENTS

The assessment must include all ancillary infrastructure associated with the project such as roads, water and power supplies, and Rural Fire Service requirements for asset protection.

3.1 PROPOSAL AREA DESCRIPTION

The subject land (affected lots) comprises about 807 ha of freehold land, identified as Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735, Lot 3 DP 253113, Lot 1 DP 1069452, Lot 1 DP 933189 and Lot A DP 376389, with the transmission line running north to south through Lot 1 DP 1069452. Benambra Road runs along the northern boundary of the subject land, with Schneider's Road running through the development site (Figure 1-2). The development site would occupy 605 ha of the 807 ha subject land following lot realignment.

The development site (leased area) comprises several large paddocks that are generally flat, largely cleared of native vegetation, and cultivated for pastures and grazing, which is the dominant land use in the area. Figure 3-1 shows the cleared and heavily modified agriculture nature of the land.

The development site contains 17 farm dams. Native scattered paddock trees remain across the site comprised of Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) and River Red Gum (*Eucalyptus camaldulensis*). An absence of middle storey vegetation was noticeable across the development site. Photographs of current features of the development site are provided in Figure 3-1 to Figure 3-5 below.

There are no residences within the development footprint. The subject land and most adjoining land are unirrigated and used for agriculture, including grazing and cropping.

One 330 kV TransGrid transmission line runs north-south across the western side of the development site located between TransGrid's north Wagga Wagga and Jindera substations.

Benambra Road and Schneiders Road are local roads under the jurisdiction of Greater Hume Shire Council. Benambra Road currently experiences a low level of traffic, predominantly local traffic and agricultural machinery.

Figure 3-1 Example of cleared, highly modified agricultural paddocks.

Figure 3-2 Example of farm dam.

Figure 3-3 Example of stands of River Red Gum native vegetation (a)

Figure 3-4 Example of stands of River Red Gum native vegetation (b)

Figure 3-5 Example of grazed Grey Box Woodland derived grassland

3.2 COMMUNITY DESCRIPTION

The proposal is located within the Greater Hume Shire LGA, part of the Riverina region of southern NSW.

Walla Walla is the closest town to the proposal (approximately 4.3 km south-west). The town's population in 2016 was recorded as 836 persons (ABS 2016). The closest regional services are in Albury, 35 km south of the proposal. Walla Walla supports two schools, two churches, a supermarket, post office, service stations, restaurants, medical services and recreation facilities.

Culcairn is located approximately 10 km north-east of the proposal and is the centre of an agricultural district famed for its wheat, wool and lambs. Like Walla Walla, it is situated within the Greater Hume Shire LGA. The town is an important supply centre for nearby towns and villages including, Morven, Gerogery, Henty, Walla Walla and Pleasant Hills. Billabong Creek runs along the southern edge of town, lending its name to the local high school.

During consultation it was indicated that the community affiliate not only with Walla Walla but also with Culcairn (approximately 10 km north-east) and other surrounding towns such as Gerogery and Burrumbuttock. Like many rural communities, Walla Walla and Culcairn are both largely community driven. This implies a strong community 'sense-of-place', with many town-related activities being organised, funded and/or supported by the local community. Local businesses, specifically agriculturally based, are also supported by non-governmental organisations (NGOs).

There are six direct neighbouring landowners to the subject land referred to as R1, R2, R3, R4, R5 and R6. R3 and R4 are also subject landowners, who would lease the development site to FRV for the life of the proposal. All of these direct neighbours have homesteads on their properties, although the R6 homestead is not located within 1 km of the development site. R1 has two homesteads (R1a and R1b) in close proximity to each other – currently used for rental purposes, while R5 operates a wedding and accommodation venue (R5a). All landowners are working their surrounding land – mainly cattle and sheep grazing, as well as some cropping.

3.3 PROPOSED WALLA WALLA SOLAR FARM

Key features of the proposal are summarised in Table 3-1. Component specifications are subject to detailed design and product selection:

Table 3-1 Key features of proposed Walla Walla Solar Farm.

Proposal element	Description
Proposal	Walla Walla Solar Farm.
Proponent	FRV.
Capacity	300 MW (AC) Note: the approximate capacity is based on the proposed technology available at the time of the EIS but may change through the life of the solar farm as advances in technology occur.
Subject land	807 ha.
Development site	605 ha.
Development footprint	493 ha.
Site description	Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 118 of DP 753735, Lot 3 253113, Lot 1 DP 1069452, Lot 1 DP933189 and Lot A DP 376389. Freehold agricultural land zoned RU1 (Primary Production) under the Greater Hume Local Environmental Plan.

Proposal element	Description
Local Government Area	Greater Hume.
Subdivision	Lot 1 DP 1069452, Lot A DP 376389 and Lot DP933189 would be realigned and then subdivided into three lots, comprising 200, 89 ha and 3.2 ha respectively. Only 89 ha of this Lot 1 DP 1069452 (eastern portion) would be leased for the proposal. This new lot would contain solar arrays and the proposed substation. The remaining western portion would be retained by the landholder for farming activities. The 3.2 ha lot would contain the TransGrid substation, which would become the freehold property of TransGrid.
Solar array	Approximately 900,000 solar panels mounted in arrays, with 8 m to 14 m row spacing. The 2 m x 1 m solar panels would be arranged in rows of two mounted on single axis trackers with a maximum height not exceeding 4 m above the natural ground level. The PV mounting structure would comprise steel posts driven approximately 1.2-2.5 m into the ground using a small pile driver.
Modular inverters	The proposal would include approximately 72 modular inverter units across the site, each up to 4.5 m in height.
Substation	The substation would occupy 3.2 ha with gravelled hardstand and security fencing. Overhead cabling would connect the substation to the 330 kV transmission line. The maximum height of substation infrastructure including overhead cables would be 21 m.
Cabling	The majority of cabling across the development site would be below ground at approximate depths of at least 500 mm.
Internal access tracks	Internal access tracks would be topped with crushed stone or gravel to minimise dust. Internal access roads to the substation would be approximately 5 m to 10 m width (including shoulders and any required drainage), whilst general internal roads would be approximately 3.5 m to 5 m width.
Operations and maintenance buildings	Buildings would be constructed to provide a control room, switch room and storage facilities for the solar farm.
Security fencing, lighting and CCTV	Continuous security lighting (infra-red) and CCTV cameras would be installed on posts up to 3.5 m high adjacent to the perimeter security fencing and around the operation and maintenance buildings. Security fencing installed around the site would indicatively be 2.4 m high.
Construction hours	Standard daytime construction hours would be 7.00am to 6.00pm Monday to Friday and 7.00 am to 1.00 pm on Saturdays. In general, no construction activities would occur on Sundays or public holidays. Exceptions to these hours may be required on limited occasions. Greater Hume Shire Council and surrounding landholders would be notified of any exceptions.
Construction timing	16 to 20 months commencing early 2021.
Workforce	Construction – peak of around 250 workers Operation – approximately 21 full time equivalent staff and service contractors.
Operation period	Up to 30 years.
Decommissioning	The site would be returned to its pre-works state. All infrastructure would be removed. The site would be rehabilitated in consultation with the landowner consistent with land use requirements.
Capital investment	Estimated $399 million.

3.4 PROPOSAL LAYOUT

The proposed layout has been developed iteratively in tandem with the environmental assessment and community consultations to ensure potential impacts are avoided and minimised wherever possible.

A constraints analysis of the proposal site was undertaken to assist with designing the solar farm layout and planning the environmental assessment. Environmental constraints are factors which affect the 'developability' of a site, and include physical, ecological, social and planning aspects. Specific constraints at the site were allocated to three classes; high, medium and low. Environmental constraint classes are described in Table 3-2.

The layout of the proposed solar farm has been adapted to avoid high constraint areas as far as practicable and at least minimise impacts to moderate constraint areas (Figure 3-6). In terms of biodiversity values, Endangered Ecological Communities (EEC) vegetation and threatened flora and fauna habitat were avoided as far as practicable. FRV have commissioned a detailed survey of the development site by drone, which produces very accurate topographical data. The results of this survey would be used in the detail design state to ensure environmental constraints are addressed as well as practicable.

Table 3-2 Environmental constraints at Walla Walla development site

High constraint
Remnant woodland vegetation Remnant woodland with native understorey, including EEC in moderate-good Biometric condition. Woodland remnants have high conservation value. Some trees are hollow-bearing and provide potential threatened bird habitat.
Direct neighbours Four uninvolved residences are located directly adjacent to the subject land boundary.
Scarred trees Two scarred trees with Aboriginal cultural significance were identified within the development footprint.
Cultural trees Three cultural trees with Aboriginal cultural significance were identified within the development footprint.
Potential Archaeological Deposits (PAD) Two PADs were identified within the development footprint.
Moderate constraint
Isolated paddock trees 63 living isolated trees in cropland (some derived from an EEC and many hollow-bearing) have habitat and connectivity value for native wildlife.
Use of agricultural land The Land and Soil Capability Assessment Scheme (OEH, 2012) identifies the development site as Class 4 and Class 6 agricultural land.
Water storage dams Seventeen dams are present on the property, which present a practical constraint for the solar farm.
Isolated artefacts Twenty-three isolated Aboriginal artefacts were identified within the development footprint.
Artefact scatters Eleven artefact scatters were identified within the development footprint.
Low constraint
Cleared, cultivated paddocks Approximately 516 ha with exotic understorey with low habitat value.

3.5 SUBDIVISION

The proposal would require subdivision of the subject land within the Greater Hume LGA. The following configuration is proposed:

- Combining Lot 1 DP 1069452, Lot A DP 376389 and Lot 1 DP 933189

To create a three-lot subdivision (Figure 3-7):

- One lot would contain the solar farm compound and solar array and would comprise an area of approximately 89 ha.
- One lot of 3.2 ha within the compound area for the substation.
- The balance of land, being approximately 200 ha, would be retained by the landholder for agriculture land use.

Correspondence received from Greater Hume Council on 28 May 2019 confirmed that a Development Application (DA) 10.2018.138.1 had been made to realign three lots to form two lots: Lot 1 DP 106942, Lot 1 DP 933189 and Lot A DP 376389. Following this realignment, the DA also included subdivision of the consolidated lots to form two lots; including the 89 ha area to be leased under the proposal, shown in Figure 3-8. Greater Hume Shire Council have indicated that they do not oppose the proposed three lot subdivision. Correspondence from the Greater Hume Shire Council is provided in Appendix B.1. Landowner consents for the proposal are provided in Appendix D.

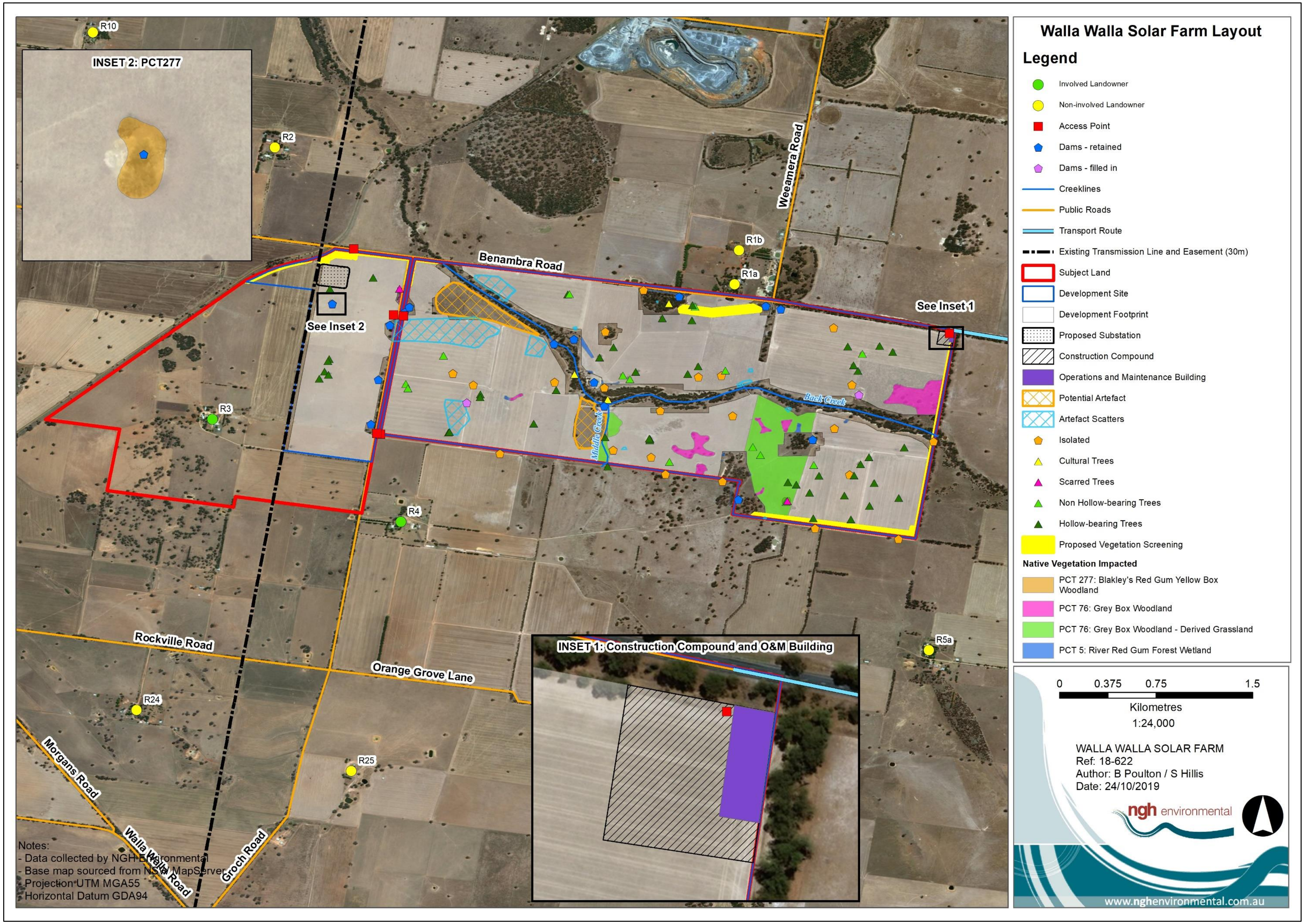


Figure 3-6 Environmental constraints

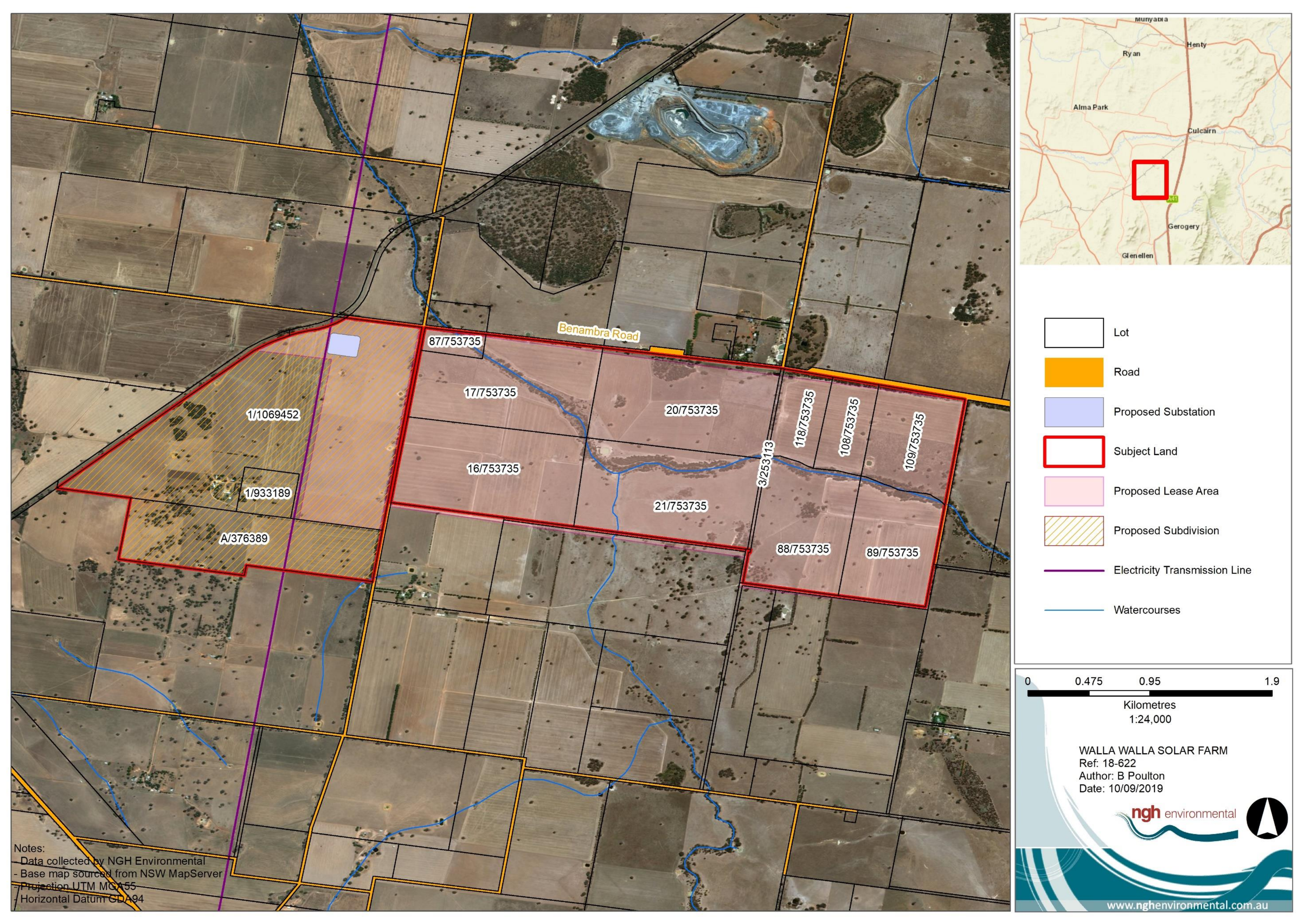


Figure 3-7 Current lot layout

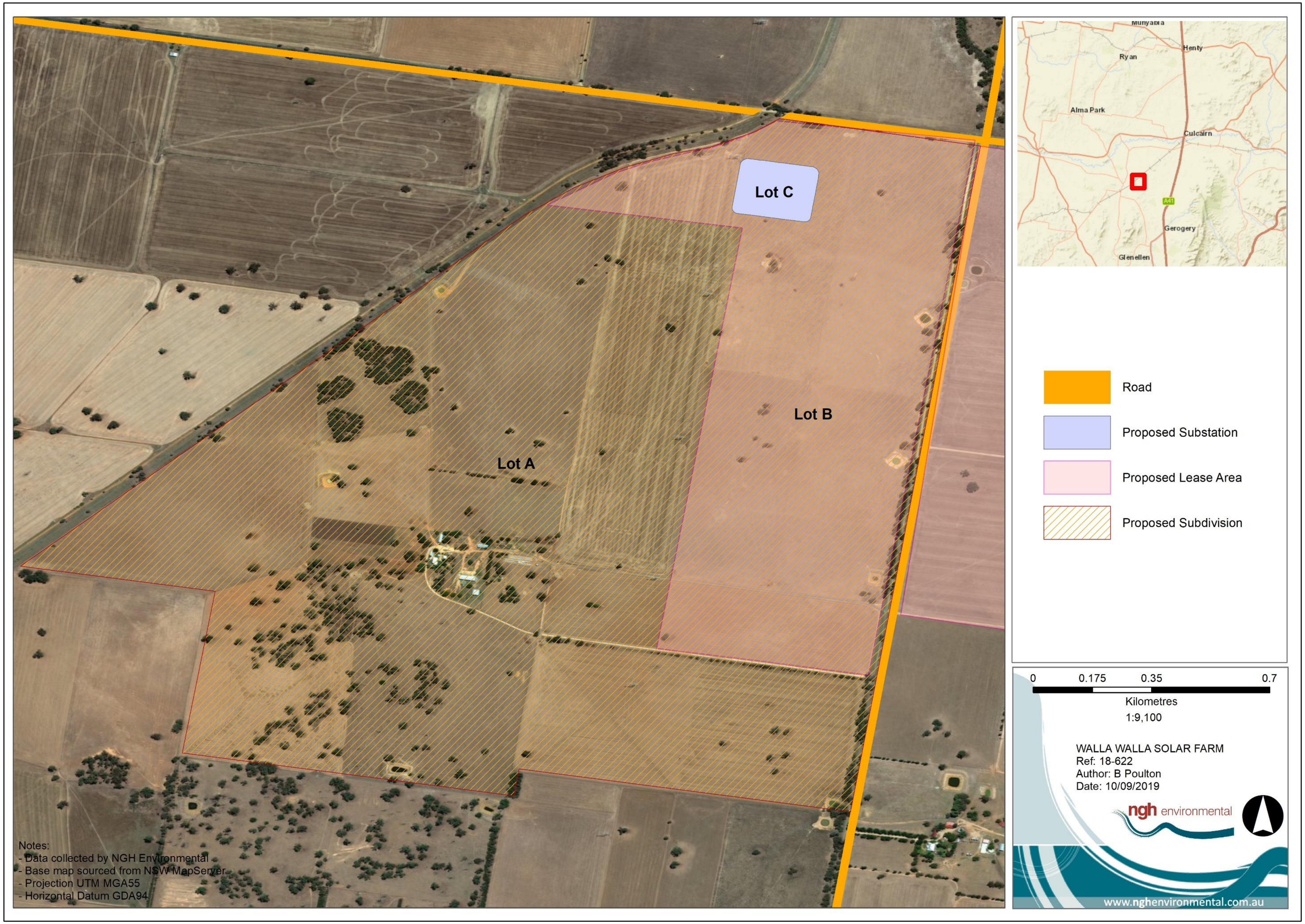


Figure 3-8 Proposed subdivision

3.6 PROPOSED INFRASTRUCTURE

The proposal involves the construction of a ground-mounted PV solar array which would generate around 300 MW AC of renewable energy. The solar farm would connect (via the substation and transmission line) directly into the TransGrid 330 kV transmission network, which passes through the property.

The layout of the infrastructure components is shown on Figure 1-3 and the components are described in detail below. Indicative plans and drawings of infrastructure components are provided in Appendix D. The plans and specifications of the components are subject to detailed design and product selection which will occur pending project approval, when Engineering, Procurement and Construction (EPC) contractors are appointed to the project.

3.6.1 Solar arrays

It is expected that the array would comprise approximately 900,000 single axis tracker PV solar panels mounted in rows on steel frames.

Single tracker system has been selected for its high energy yield, lower installation cost and fewer moving parts compared to other systems. The design eliminates array-gaps on the tracker at all pile mounting locations to enable greater yield per hectare.

A single axis tracker would have a typical maximum height of 4 m, based on a 2 m vertical height panel and 2 to 3 m high support posts. Row lengths would depend on the detailed design but could be up to 100 m. Spaces between rows (edges of panels) may vary between 8 m and 14 m.

Piles for the tracker system would be driven or screwed into the ground to support the solar array. The pile depth would be determined following detailed geotechnical site investigation; depths are typically 1.5 m to 1.7 m but may be up to 2.4 m. Pile heights would vary according to topography and soil conditions.

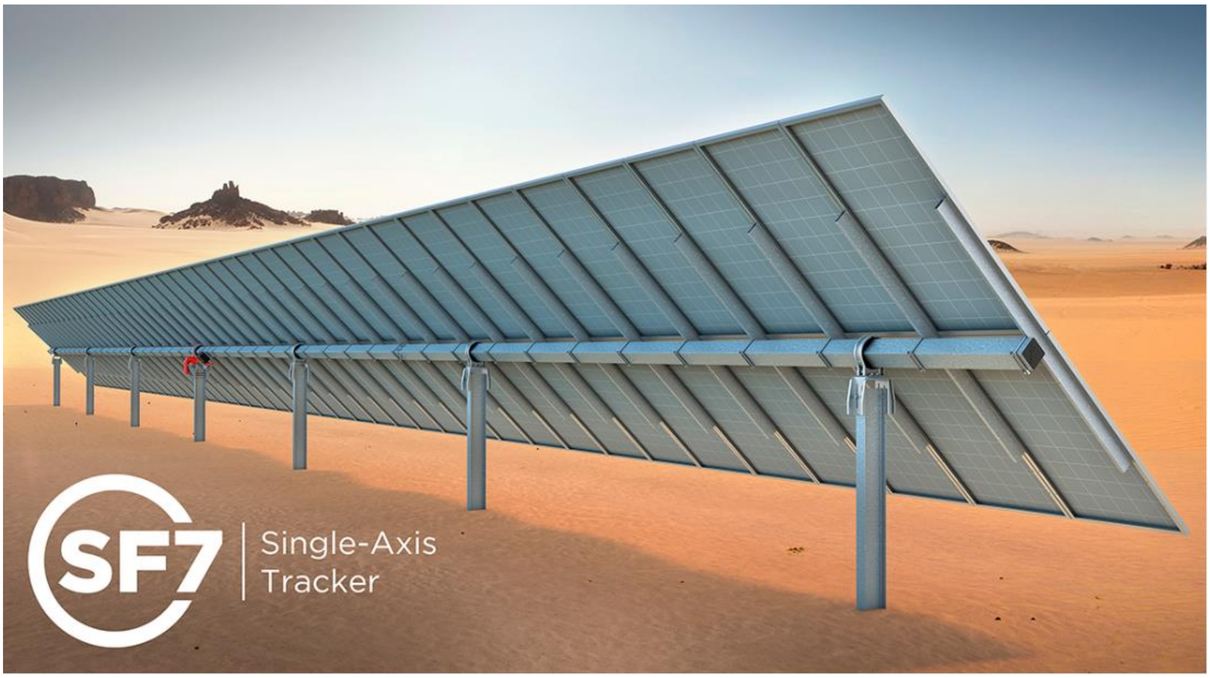


Figure 3-9 Example of 2 m x 1 m solar panels would be arranged in rows of two

Inverter/transformers

Electricity generated by the panels will be in 1500 Vdc format from where it will flow to the proposed 5 MW central inverter stations (72 across the site). Appendix D provides diagrams of the proposed inverter units and Figure 3-6 illustrates an example of the equipment within a solar array. The inverter units would be constructed on concrete footings approximately 300 mm above ground level.

At each central inverter site, the electrical current would be inverted to AC and then be transformed from 0.66 kV to 33 kV.

A switchroom (ring main unit) as part of the central inverter station of approx. every 4th central inverter would collect the 33 kV cables. From here the cables will be underground directly to the main 33 kV / 330 kV substation owned by TransGrid. Within the TransGrid substation the 33 kV current would be transformed up to 330 KV and exported to the wider transmission network.

The proposal includes approximately 72 modular inverter units across the site (locations illustrated in Figure 3-6

Power from the solar panels would generate direct current DC electricity that would be converted to AC via the inverter, with the voltages stepped up to 33 kV by the transformer.

The dimensions of these units would be approximately 3 m x 6 m with highs of approximately 4.5 m.

There would be one large high voltage transformer located near the substation. The high voltage transformer would step-up voltage to 330 kV (Appendix D).

Figure 3-10 Indicative modular transformer

3.6.2 Overhead and underground cabling

Most cabling at the site would be buried and located along the access tracks. The only overhead cabling likely would be that connecting the high voltage transformer to the substation.

All underground cabling would be installed at a depth of at least 500 mm with the electrical reticulation buried to either 600 mm (low voltage) or 800 mm (high voltage) depth, or in accordance with the relevant Australian Standard.

Prior to excavating the cable trench, the topsoil would be stripped and stockpiled for use in rehabilitating the trench line. Depending on the quality of the excavated material, a loam mix may be used in the trench to create a cable bed. Once the cables are installed, another layer of loam mix may be placed above the cable prior to the trench being backfilled with excavated material, replacing the soil profile to assist revegetation of the disturbed areas. Cables would be protected in accordance with *Australian Standard (AS) 3000:2007 Electrical Installations*.

3.6.3 Transmission network connection

The solar farm would connect directly to the TransGrid 330 kV overhead transmission line, which passes immediately west of the development site. The subdivision map (Figure 3-7) shows the location of the substation, and connection point to the transmission network.

3.6.4 Substation

The substation would be constructed to meet TransGrid's Substation Primary Design Standard (TransGrid, 2019). Design drawings for the proposed substation are provided in Appendix D. It is expected the substation would be located on a 3.2 ha lot. The two substation transformers would have an approximate height of 10 m. It would be owned and operated by TransGrid following construction.

The substation would be surrounded by a security fence. Gravel hardstand would be placed under and around the substation compound to restrict vegetation growth and provide a safe working environment in accordance with the relevant Australian Standards. The substation location is not impacted by flooding.

A 50 m vegetation buffer is proposed to aid screening of this infrastructure for this project where not prohibited by the required APZ.

3.6.5 Site access and internal tracks

The development site would be accessed primarily from one access point on Benambra Road on the northern eastern corner of the subject land, 2.6 km west of Olympic Highway. Substation access would also be via Benambra Road and this access point would only be used by TransGrid. The western land parcel would be accessed at two points crossing Schneiders Road east to west only. Construction traffic would only cross Schneiders Road and not utilise the road itself. Although the final design has not yet been completed, the location and form of the access road intersection would be developed to provide adequate sightlines for vehicles entering and exiting the site, in accordance with Austroads and NSW Roads and Maritime Services (RMS) guidelines.

The internal access roads would involve upgrading the existing entrance, constructing two new entrances and connecting these with a network of tracks accessing the solar farm infrastructure for maintenance. The main access and internal tracks would be constructed of engineered fill topped with crushed stone pavement. The internal roads would be approximately 3.5 m to 5 m width. The indicative locations of proposed internal tracks are shown on Figure 1-3 and Figure 3-6.

The site access and all internal tracks would be maintained throughout the construction and operation of the solar farm. If required, water trucks would be used to suppress dust on unsealed access roads and tracks during construction. Additional stabilising techniques and/or environmentally acceptable dust control would also be applied where required to suppress dust.

3.6.6 Site office, switchroom, storage

An O&M building comprising an administration office and reception would be located near the main access point at the north-eastern corner of the development site. Indicative designs for these buildings are provided in Appendix D. The O&M building and switchroom would contain essential fire safety equipment, including fire extinguishers and hose reels.

A single storey O&M building approximately 24.5 m x 12 m would be constructed for FRV administration on concrete footings to house control facilities. The building would likely be clad in unobtrusive green Colorbond sheeting. Guttering and a water tank would be installed to collect rainwater. The O&M building would contain an office and staff amenities (toilet, kitchen and storage). The switchroom would be a small control room (

Figure 3-11) located within the O&M building. This design alleviates the need for a second onsite substation which assists with mitigating visual impacts.

Figure 3-11 Indicative switchroom

3.6.7 Security CCTV, lighting and fencing

CCTV

FRV will procure a well-designed closed circuit television (CCTV) system that will deliver both high quality video surveillance as well as early detection of unauthorized entry to the solar farm associated O&M area. Cameras will be installed alongside the perimeter monitoring the area between the fence line and the solar panels. If human movement is detected, a relay will be activated communicating to the 24-hour offsite security control room. Inside the office at the workstation an alarm will be triggered advising security staff that a breach of the compound has been detected.

Along with this system, cameras and access controls will be installed at the O&M building and entry gate to protect against unauthorised access and provide video surveillance. A leading manufacture camera with one lens for daytime and a second thermal lens for night-time will be employed. All cameras that cover the perimeter are internet protocol (IP) rated and mounted on a 4 m high CCTV pole spaced between 200 m to 300 m apart and for every change of direction of fencing. Fibre optic cable has been selected for the transmission of data between the poles and back to the server room.

Lighting

Lighting across the development site would be reactive to prevent disrupting the rural nightscape largely devoid of light pollution and would be limited to the O&M building other critical infrastructure, deliberately located away from existing residential buildings. Lighting is expected to arise mainly from staff working in offices after nightfall, vehicles entering and leaving the proposal and external motion-sensing lighting provided for safety.

Lighting at the substation would be in accordance with TransGrid's *Substation Primary Design Standard*, which requires lights for:

- walking in open areas likely to be accessed.
- walking in closed or constrained areas (e.g. stairs).
- the substation security fence in areas unlikely to be accessed as a deterrent.

The substation would be owned and operated by TransGrid.

Fencing

The security fencing installed around the site would approximately 2.4 m high, providing adequate access points for project maintenance, land management purposes and for emergency egress (Appendix D). An example of the security fencing installed, including flood gates is shown in Figure 3-12. Fencing would include floodgates designed to minimise trapping debris material during flood events.

FRV have committed that the top wire on their security fencing would be devoid of barbed wire to minimise harm to native fauna. Barbed wire would also be absent from internal stock fencing within the development site.

Security fencing would be installed surrounding the substation in accordance with TransGrid's *Substation Primary Design Guidelines*.

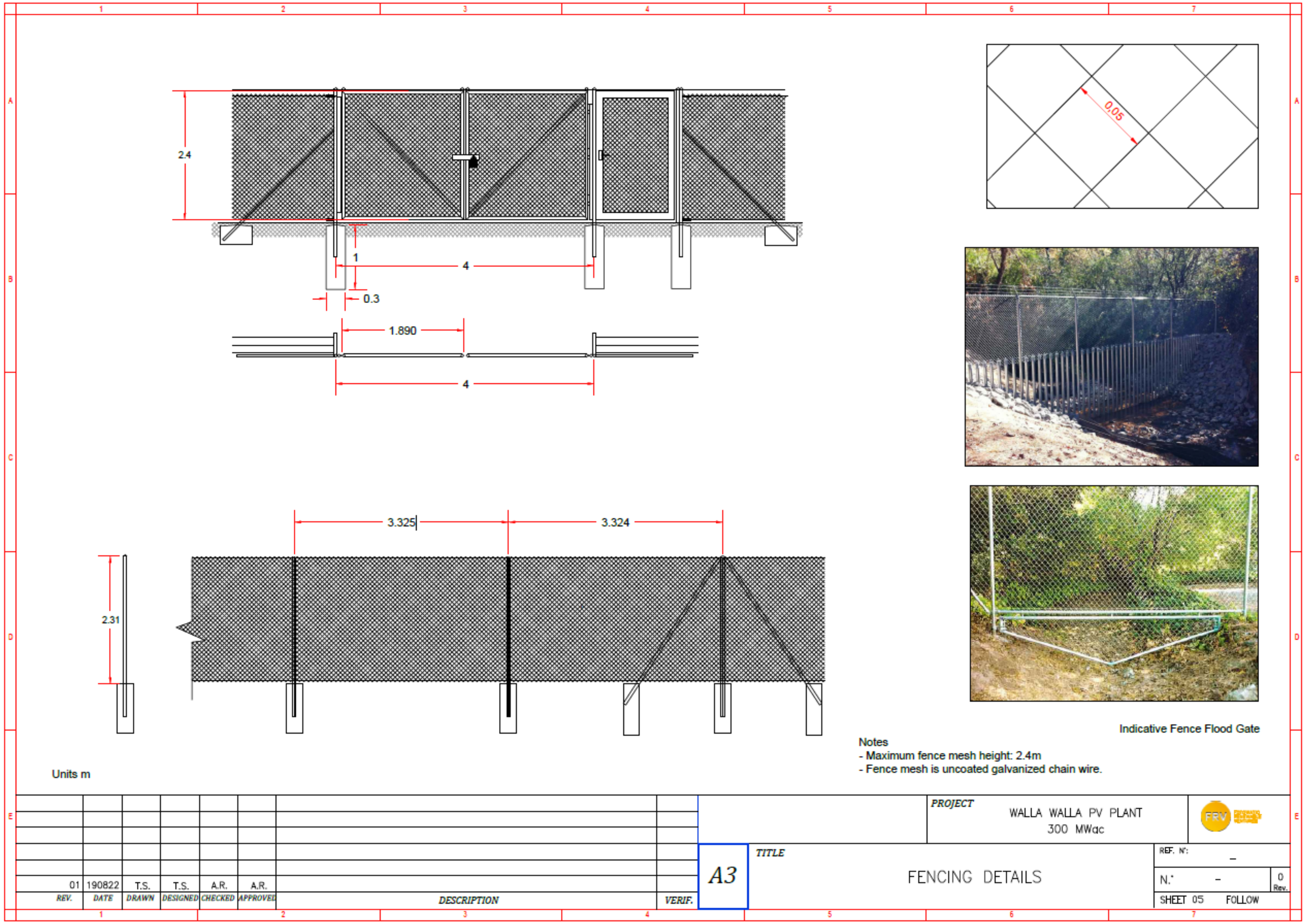


Figure 3-12 Proposed security fencing

3.6.8 Landscaping and revegetation

Landscaping and screen planting would be undertaken along sections of the perimeter of the site to 'break up' or 'soften' views of the infrastructure from key locations. This would entail 5 m to 50 m vegetation buffers of planted native species to break up views of the infrastructure from specific residences. Native tree and shrub species suited to site conditions would be selected to enhance local biodiversity to achieve effective screening of the solar farm infrastructure. Proposed screening options, developed in consultation with adjoining landholders, are presented in the Indicative Landscape Plan (Appendix E). FRV have also consulted Holbrook Landcare regarding plant species, spacing and optimising landscaping and biodiversity enhancement. Their *Notes Regarding Walla Walla PV Plant* (2019) is provided as an appendix to the BDAR.

The solar array would be mounted above ground and would enable groundcover species to persist during operation. Suitable perennial groundcover would be maintained beneath the panels and grazed to reduce biomass for bushfire management. Sheep grazing would also maximise efficient use of the land. Groundcover grass species would be selected which are tolerant of limited shading conditions and suitable for the soil type and climate at the proposal site.

The ten-metre minimum bushfire protection setback from solar farm infrastructure would be applied to any woody vegetation plantings undertaken around the perimeter of the solar farm, as well as remnant woodland vegetation, in accordance with Planning for Bushfire Protection guidelines (RFS, 2006). The setback area may include a 4 m wide (plus shoulders and required drainage) perimeter access track.

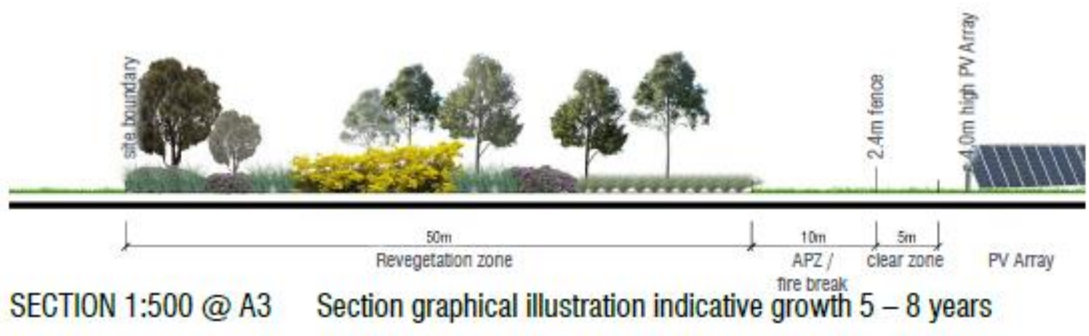


Figure 3-13 Indicative site boundary to solar infrastructure cross section

Areas disturbed during the construction phase would be stabilised and revegetated with suitable perennial grass species immediately following construction.

3.6.9 Temporary construction facilities

Temporary facilities established at the site during the construction phase would include:

- Material laydown areas.
- Temporary construction site office.
- Temporary car and bus parking areas for construction workers.
- Staff amenities (kitchen and toilet/s).
- Temporary security lighting and CCTV at construction compound.
- Containers for the use of subcontractors.
- Bunded area for refuelling.
- Storage area.
- Generator for construction compound power supply.

- Skips with wind shield and lid.

A hardstand area in the compound would consist of compacted stone to provide a clean, firm, level and free draining surface suitable for cabins and heavy traffic. Temporary staff amenities would be designed to accommodate the number of workers at the peak of the construction period (estimated at 250 workers).

3.7 CONSTRUCTION

3.7.1 Construction activities

The construction phase is expected to last approximately 16 to 20 months with a peak construction period of 8 to 12 months. The main construction activities would include:

- Site establishment and preparation for construction - fencing, ground preparation, construction of the internal track system, upgrade of existing access points/intersections, preliminary civil works and drainage.
- Installation of steel post and framing system for the solar panels.
- Installation of underground cabling (trenching) and installation of inverter stations.
- Installation of PV panels.
- Construction of O&M building and switchroom.
- Construction of the substation and connections.
- Removal of temporary construction facilities and rehabilitation of disturbed areas.
- Landscaping.

Pending the finalisation of the construction schedule, it is expected some stages of construction would occur concurrently. Temporary construction facilities would be situated at the north eastern corner of the development site (Figure 1-3).

3.7.2 Site preparation and earthworks

Soils within the development envelope have been heavily disturbed by decades of farming activities. Ground disturbance resulting from earthworks associated with the proposal would be minimal and limited to:

- The installation of the piles supporting the solar panels, which would be driven or screwed into the ground to a depth of 1.5 m – 2.4 m.
- Construction of internal access tracks and access points and associated drainage.
- Substation bench preparation.
- Concrete or steel pile foundations for the inverter stations, substation and maintenance building.
- Cable trenches up to 900 mm deep.
- Establishment of temporary staff amenities and offices for construction.
- Construction of perimeter security fencing and CCTV.

Topsoil under the footprint of the array area would remain in-situ during the construction of the solar farm. Topsoil salvaged from the construction of the access tracks and other works would be securely stored for use in site rehabilitation.

Where required, weed treatments would be undertaken prior to earth works commencing to reduce the potential spread of these species within the proposal footprint.

3.7.3 Materials and resources

Key resourcing requirements for the proposal would include labour, machinery and equipment, steel, electrical components (including PV panels and cables), water, gravel and landscaping materials.

Labour, machinery and equipment

It is anticipated that approximately 250 construction personnel would be required onsite during the peak construction period of 8 to 12 months. Construction supervisors and the construction labour force, made up of labourers and technicians, would be hired locally where possible.

It is anticipated that most workers would be local, and those who were not would use existing accommodation within Walla Walla, Culcairn and the surrounding region. It is proposed that bus transfers will be provided (where practicable) to minimise traffic volumes and transit risks during construction.

Equipment used during construction would include:

- Earth-moving equipment for civil works (excavators, graders).
- Small piling or drilling rigs for installation of the posts of the solar arrays.
- Diesel generators.
- Trucks.
- Light vehicles.
- Large transit vehicles, including delivery and waste removal vehicles.
- Forklifts.
- Cable trencher or excavator.
- Cable laying equipment.
- Cranes including 50 T mobile crane.

Materials

Construction materials would be sourced as locally as possible. Culcairn and Albury are the nearest large towns which are a possible source of the bulk of the aggregate material required for construction, followed by Holbrook, Wodonga, and Wagga Wagga.

Approximately 10,000 m^3 of gravel would be required to surface the access road and internal service track network, inverter areas and substation hardstand. Loam mix may be required for the bedding of underground cables, depending on electrical design and ground conditions. Concrete would be required to construct the inverter, TransGrid substation and CCTV footings.

Approximately 25,000 kL of water would be required during construction, mostly for dust suppression, but also for cleaning, concreting, onsite amenities and landscaping. The bulk of this water would be commercially available, trucked in from Boral's Hurricane Hill Quarry on Weeamera Road and stored on-site in a steel or concrete tank. Approval in principle for using water from the quarry has been provided by Boral on 16 June 2019 (Appendix B.1).

A small amount of potable (drinking) water would be used onsite during the construction period on an as needs basis and stored within temporary water tanks at the staff amenities area.

3.7.4 Transport and access

A Construction Traffic Management Plan (CTMP) would be prepared following approval of the proposal to manage haulage traffic during the construction phase. Ontoit have conducted a Traffic Impact Assessment of the proposal (Appendix F).

Haulage route

Where possible, goods and services for the solar farm would be sourced locally. Items such as solar panels, posts and racking systems which can't be sourced locally would likely come by road from either Melbourne or Sydney. Construction traffic approaching from Albury or Wagga Wagga would be via Olympic Highway and onto Benambra Road. The final haulage route and movement number would be further detailed in the Traffic Management Plan that would be prepared by the appointed contractor as part of pre-mobilisation works.

Olympic Highway and Benambra Road Intersection

Austroads (2017) *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* specifies the turning treatment required at intersections. Based on traffic volumes and existing speeds along Olympic Highway and Benambra Road, Basic Right Turn (BAR) and Basic Left Turn (BAL) treatments are required at the intersection. However, the existing treatment consists of a double Auxiliary Right Turn (AUR) treatment between the Olympic Highway and Benambra Road. The configuration includes lane extensions and tapers on both the approach and departure sides of the intersection in both directions, which accommodates left turn movements into and out of Benambra Road. No further intersection treatment is required to accommodate the proposed increase in heavy vehicle movements. Figure 3-14 and Figure 3-15 shows the existing intersection based on a 30 m long A-Double vehicle and was created using a software called 'AutoTurn'.

Benambra Road

Access to the proposal would be via Benambra Road which already facilitates a two-way traffic flow suitable for use by the largest vehicles needed to access the development site. Benambra Road is sealed from Olympic Highway to the quarry turnoff at Weeamera Road.

Schneiders Road

Schneiders Road would be crossed at two points by construction vehicles. Schneiders Road is currently unsealed and no upgrades are proposed.

Road condition surveys

Prior to construction, a pre-condition survey of the relevant sections of the existing road network would be undertaken, in consultation with Greater Hume Shire Council. During construction the sections of the road network utilised by the proposal would be monitored and maintained to ensure continued safe use by all road users. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in the consistent condition as at the start of construction.

Traffic movements

Construction activities would typically be undertaken during standard daytime construction hours. Any construction outside of the normal working hours would be undertaken with approval from relevant authorities.

For materials and equipment delivery, during the three-month initiation stage approximately 24 heavy vehicles would require access to the site per day. This would extend to an estimated peak of 45 heavy vehicles per day during the peak delivery period during construction, equating to 90 heavy vehicle movements during this time (i.e. 45 inbound and 45 outbound). These heavy vehicle movements will predominantly be truck and dog configuration including mixer trucks and articulated loads. The largest design vehicle is expected to be a 26 m long B-Double semi-trailer, which would occasionally be used to transport larger plant. There would potentially be approx. 400 light vehicle movements (200 vehicles) a day transporting workforce and services to and from the site, during peak construction. However, a bus service is proposed to reduce the number of light vehicles. There would be approximately a total of 18,000 vehicle movements over the 16 to 20 month construction period.

Water for dust suppression will be obtained from the Quarry, on-site dams or potable water from a standpipe. Heavy vehicle movements associated with this have been accounted for within the TMP.

Figure 3-14 Swept path analysis turning right into Benambra Road

Figure 3-15 Swept path analysis turning left into Benambra Road

3.7.5 Work hours

Construction activities would be undertaken during standard daytime construction hours (7.00 am to 6.00 pm Monday to Friday and 7.00 am to 1.00 pm on Saturdays) or as otherwise agreed by DPIE. Any construction outside of these normal or agreed working hours, if required, would only be undertaken with prior approval from relevant authorities, or unless in emergency circumstances e.g. to make work safe.

3.8 OPERATION

3.8.1 Operation activities

Operation activities would include:

- Routine visual inspections, general maintenance and cleaning operations of the solar arrays as required.
- Routine visual inspections, general maintenance and cleaning operations of the substation.
- Vegetation management, likely using sheep to control grass growth beneath the panels. Groundcover vegetation would be maintained over the site to minimise erosion, dust and weeds (subject to climatic conditions). Groundcover would be monitored and remediation (such as reseeding, soil protection or destocking) undertaken as required.
- Site security response (24 hr) if required.
- Site operational response (24 hr) if required.
- Replacement of equipment and infrastructure as required.
- Maintenance of landscaping and screening plantings as required.
- Pest plant and animal control as required.

3.8.2 Materials and resources

During operation, potable water would be required for cleaning panels and animal care (livestock). Around 600 kL per year would be required for cleaning, sourced from standpipes and tankered to the site when required. Approximately 110 kL of water will be required per year for watering plants within the vegetation screening (Holbrook Landcare 2019). However, watering is very rarely carried out or required due to the Walla Walla region attracting more rain than other localised areas and if planting occurs in late winter/early spring. This coupled with good site preparation means the need for watering can be significantly reduced or eliminated all together.

A steel or concrete tank would be installed at the site to store water for bushfire protection and other non-potable water uses, with a minimum of 6 x 20,000 L reserved for fire-fighting purposes. Potable water would be required for staff using imported supplies or rainwater collected from tanks beside site buildings.

3.8.3 Transport and access

Staff and service contractors would primarily use light vehicles (4WD) during the operation phase. Trucks would be infrequent.

Traffic associated with the operation and maintenance of the solar farm would also use the routes specified for the construction phase (refer section 3.7.4).

3.8.4 Personnel and work hours

The solar farm would be monitored and operated by approximately 21 full time equivalent (FTE), 16 of which would be based onsite. This number is based on the number of staff employed at FRV's operational solar farms both in Australia and overseas. FRV anticipates that this number is higher than for other proposed large-scale solar farms because the proposal would be owner operated rather than contractor operated.

An indicative organisational chart for operations is provided in Figure 3-16.

The majority of plant maintenance including inverter station, transformer and HV switchgear, PV arrays, ground and vegetation and the trackers would be conducted by site staff on a rolling basis with activities scheduled consistently throughout the year. An indicative operational organisational chart is shown in Figure 3-16 and is based on FRVs existing and operational knowledge of projects.

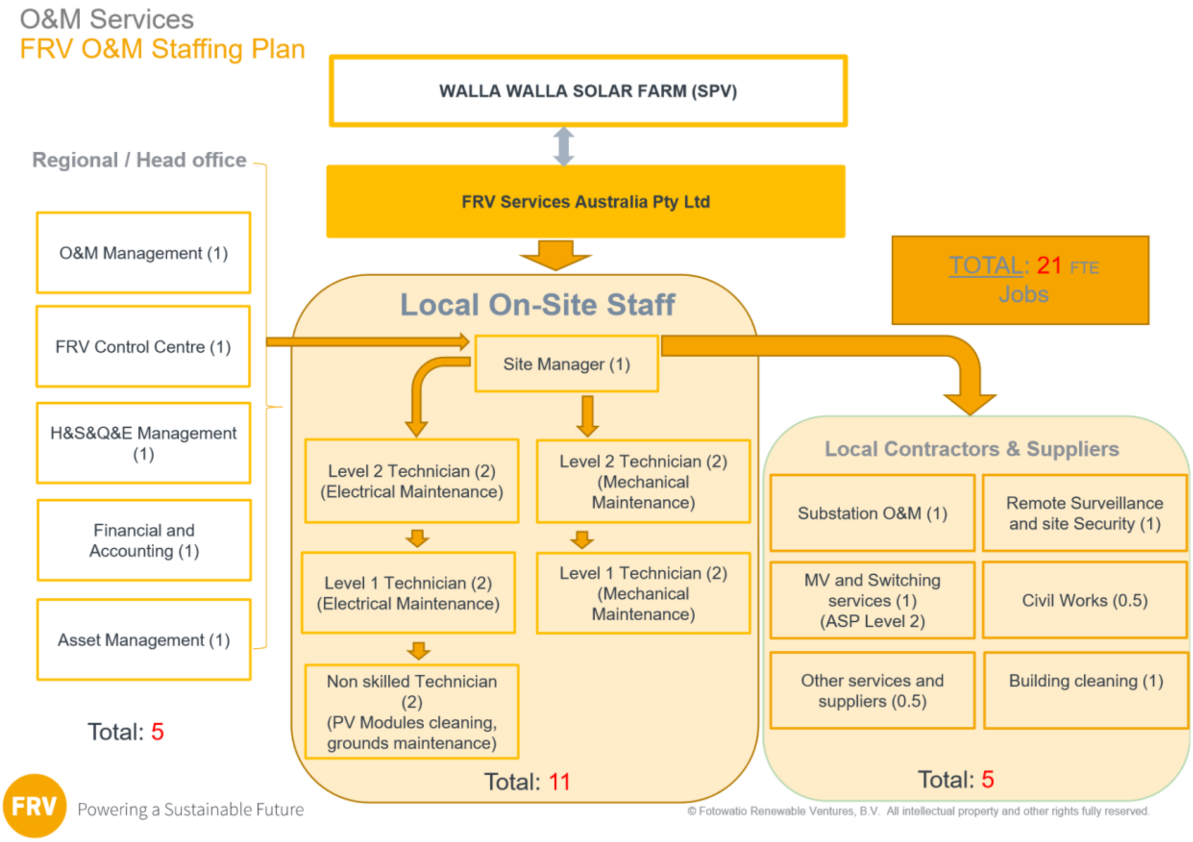


Figure 3-16 Indicative organisational chart (operation)

3.8.5 Refurbishment and upgrading

The solar farm operator may replace or upgrade solar panels or other infrastructure within the existing development footprint during the projected 30 year life of the solar farm. If any major upgrade works during the life of the solar farm would extend beyond the existing impact footprint or alter the nature or scale of environmental impacts, the proponent would consult DPIE regarding the need for further assessment or approval. The proponent would also consult DPIE regarding the need for further assessment and approval to continue the operation of the solar farm beyond the 30 year timeframe.

3.9 DECOMMISSIONING AND REHABILITATION

At the end of its operational life, the solar farm would be decommissioned. Before the site is decommissioned, a Rehabilitation and Decommissioning Management Plan (RDMP) will be prepared and approved by the relevant authorities.

3.9.1 RDMP objectives

The objectives of the RDMP will be to describe how project infrastructure will be removed after operations cease, and to establish methodology by which the post development soil condition is capable of being returned to its previous agricultural use. This includes:

- Identifying the final agricultural land use following decommissioning of the proposal.
- Providing a description of the development process and how it will be integrated with rehabilitation.
- Identifying a benchmark site that is used to determine realistic performance criteria.
- Including a timeline for rehabilitation activities.
- Outlining a program for monitoring rehabilitation success using appropriate indicators.

3.9.2 Timeline and methodology

Decommissioning would aim to return the site to its pre-works state, specifically cropping, grazing and general agriculture. Certain aspects of the development may be retained by mutual agreement with the landowner at the time of decommissioning, as they may be of value to ongoing agricultural activities. This may include site fencing, vegetative buffers, operation and maintenance buildings, access roads and established pasture grasses.

Typically, the reclamation of the proposal proceeds in reverse order of installation. All above and below ground infrastructure would be removed. Key elements of decommissioning would include:

- The solar arrays would be removed, including the foundation posts. Materials would be sorted and packaged for removal from the site for recycling or reuse wherever possible.
- All site amenities and equipment would be removed including buildings, inverter stations and materials recycled or reused wherever possible.
- Posts and cabling would be removed and recycled.
- Fencing would be removed including small concrete footings.
- Gravel pavement materials will be recovered and recycled as general fill in an appropriate location.
- Areas subject to compaction will have the topsoil ripped to a depth suitable for seeding if appropriate.
- Sodic soil will be treated as necessary with lime or gypsum.

All areas of soil disturbed during decommissioning would be rehabilitated in consultation with the landowner consistent with post-solar farmland use requirements. The site would be left stabilised, under a cover crop or other suitable groundcover. This will depend on what the landholder intends to use the land for at the time. The RDMP would reference:

- *The Australian Soil and Land Survey Handbook* (CSIRO, 2009).
- *The Guidelines for Surveying Soil and Land Resources* (CSIRO, 2008).

- *The land and soil capability assessment scheme: second approximation* (OEH, 2012).

Traffic required for decommissioning would be similar in type but of shorter duration than that required for the construction phase. Wherever possible and practicable, materials removed from the site would be either re-used or recycled (for example, some internal access is likely to be retained). A Decommissioning Traffic Management Plan would be captured as part of the RDMP.

3.10 INDICATIVE TIMELINE

An indicative timeline for the proposal is outlined in Table 3-3. It is expected that the solar farm would be commissioned at the end of the 16 to 20 month construction period.

Table 3-3 Indicative timeline

Phase	Approximate commencement	Approximate duration
Construction	Q1 2021	16 to 20 months
Operation	Q4 2022	30 years
Decommissioning	Q4 2052	6 months

3.11 CAPITAL INVESTMENT

The proposal would have an estimated capital investment of approx. $399 million.

4 PLANNING CONTEXT

4.1 PERMISSIBILITY

The proposed development is defined as electricity generating works and is permissible with consent under clause 34(1) of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP). Consent may be granted under Part 4 of the EP&A Act.

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) declares the proposal to be SSD as it is development for electricity generating works with a capital cost of greater than $30 million (clause 20, Schedule 1).

Section 4.12 (formerly section 78A) of the EP&A Act requires a development application for SSD to be accompanied by an EIS prepared in accordance with the EP&A Regulation. This EIS has been prepared in accordance with Part 4 of EP&A Act and Schedule 2 of the EP&A Regulation.

4.2 NSW LEGISLATION

4.2.1 Environmental Planning and Assessment Act 1979

Objects

Development in NSW is subject to the requirements of the EP&A Act and the EP&A Regulation. Environmental planning instruments prepared under the Act set the framework for development approval in NSW.

The proposal would be assessed under Part 4 of the EP&A Act. The objects of the EP&A Act are:

> *(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.*
>
> *(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.*
>
> *(c) to promote the orderly and economic use and development of land.*
>
> *(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.*
>
> *(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).*
>
> *(g) to promote good design and amenity of the built environment.*
>
> *(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.*
>
> *(j) to provide increased opportunity for community participation in environmental planning and assessment.*

The objects of the EP&A Act have been considered throughout this environmental assessment and natural resources and competing land uses have been considered. The proposal aims to promote the orderly and economic use of the land through the provision of utility services (power generation). The proposal has been located and designed so that it would avoid native vegetation as much as possible and minimise the use of natural and artificial resources while considering the social and economic welfare of the local community. For these reasons it is considered that the proposal is consistent with the objects of the EP&A Act.

Matters for consideration

Section 4.40 (formerly section 89H) of the EP&A Act provides that section 4.15 (formally section 79C) applies to the determination of DAs for SSD. Under section 4.15 of the EP&A Act, the consent authority is required to consider several matters when determining a DA under Part 4. These matters are listed in Table 4-1 and assessed in terms of their relevance to the proposal.

Table 4-1 Matters of consideration under the EP&A Act.

Provision	Relevance to the proposal
Any environmental planning instrument	Relevant Environmental Planning Instruments (EPIs) are discussed in section 4.2.
Any proposed instrument that is or has been the subject of public consultation under the EP&A Act and that has been notified to the consent authority	There are no draft instruments relevant to the proposal.
Any development control plan (DCP)	The Greater Hume DCP 2013 details local controls on industrial and commercial developments such as flood planning, visual amenity, parking and access and signage, and pollution controls. However, under clause 11 of the SRD SEPP provides that DCPs do not apply to SSD.
Any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4	There are no planning agreements that have been entered into, nor are any planning agreements proposed, that relate to the proposal.
The regulations (to the extent that they prescribe matters for consideration)	Clause 92 of the EP&A Regulation requires consideration of: • The Government Coastal Policy, for development applications in certain local government areas. • The provisions of AS 2601 for development applications involving the demolition of structures. Neither of these matters are relevant to the proposal.
Any coastal zone management plan (within the meaning of the *Coastal Protection Act 1979*), that apply to the land to which the development application relates	Repealed and no longer applicable.
The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	The likely impacts of the proposal, including environmental impacts on both the natural and built environments, and the social and economic impacts in the locality, are detailed in sections 6 and 6.8 of this EIS. This EIS demonstrates that the environmental impacts of the proposal have been avoided or minimized through careful project design. Overall impacts are considered manageable and justifiable.

Provision	Relevance to the proposal
The suitability of the site for the development	The suitability of the site for the development is assessed in section 2.5. Characteristics that make it suitable for development of a solar farm are identified and justified.
Any submissions made in accordance with the EP&A Act or the regulations	Feedback and direction from the public during the preparation of the EIS to maximise opportunities for public engagement. Public submissions would be sought and responded to as part of the EIS determination process. The proponent would consider and respond to any submissions made in relation to the proposal in a Submissions Report or Preferred Project Report following the public exhibition period.
The public interest	A number of public benefits are relevant to the proposal as discussed in section 2.2. Specifically, these relate to: • Reducing fossil fuel emissions that that contribute to climate change. • Meeting State and Australian Government policies to increase renewable energy supply. • Providing local employment and regional development opportunities.

4.2.2 *Environmental Planning and Assessment Regulation 2000*

Clauses 82 to 85B of the EP&A Regulation addresses public participation in SSD.

The Development Application and accompanying information (including this EIS) would be placed on public exhibition by DPIE for a period not less than 30 days.

4.2.3 *Greater Hume Local Environmental Plan 2012*

The development area is located within Greater Hume LGA and is subject to the provisions of the *Greater Hume Local Environmental Plan 2012* (Greater Hume LEP).

(2) The particular aims of this Plan are:

(a) to encourage sustainable economic growth and development in Greater Hume.

(b) to protect and retain productive agricultural land.

(c) to protect, conserve and enhance natural assets.

(d) to protect built and cultural heritage assets.

(e) to provide opportunities for the growth of townships.

It is considered that the proposal is compatible with the aims of the Greater Hume LEP, especially in encouraging sustainable economic growth and development, conserving natural and cultural heritage assets and providing opportunities for the growth of townships.

The proposal is located within land not zoned as water sensitive under the Greater Hume LEP. Neither the proposed development land nor transmission line are located within biodiversity sensitive land. The Greater Hume LEP does not contain any mapping of flood prone land.

Land zoning

The development area is zoned RU1 - Primary Production under the Greater Hume LEP. Electrical generation is not listed among developments that are permitted within the zone. However, the ISEPP takes precedence over an LEP and permits electricity generating works with consent in the RU1 zone. The SRD SEPP provides for the declaration of SSD and declares that the Independent Planning Commission (IPC) is the consent authority for certain SSD (see below).

The Greater Hume LEP states that the consent authority must have regard to the objectives for development in a zone when determining a development application. The objectives of the RU1 zone are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area;*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To maintain the rural landscape character of the land.*

For the life of the proposal, the development site would harness a renewable natural resource (solar energy). The activity would impact on land availability for primary production; however, it would be developed in a way that would minimise fragmentation and alienation of resource land and minimise land use conflict. Being reversible and involving limited ground disturbance, it would not remove the potential to use the land for primary production at the end of the life of the development. Upon decommissioning of the proposal, the development footprint would be rehabilitated to restore land capability to pre-existing agricultural use.

It is also important to note that solar farms do not preclude the use of land for primary industry production. 85% of agricultural sheep grazing activity is still possible whilst a solar farm is operating.

4.2.4 Development Control Plans and Council policies

The Greater Hume Development Control Plan 2013 (DCP) applies to all land within the LGA of Greater Hume. Clause 3 of the DCP provides specific development requirements relating to industrial development with the following objectives relevant to the proposal:

- *encourage industrial development, which will not detract from the quality of the surrounding environment.*
- *minimise the impact of the development on the natural features of the area.*
- *encourage the development of industrial undertakings which will be employment generating.*
- *focus the development of industries outside of commercial and residential areas so as to minimise conflict between the different uses.*
- *direct different types of industrial development to locations best suited for that activity.*
- *provide for a range of industrial activities in industrial precincts.*
- *ensure that development incorporates safe and functional movement of vehicles on and off site.*

The DCP should be read in conjunction with any relevant SEPPs. Where there is any conflict between a provision in the DCP and the SEPP, the provision of the SEPP shall prevail to the extent of the inconsistency.

4.2.5 State Environmental Planning Policy (Infrastructure) 2007

The ISEPP was introduced to facilitate the effective delivery of infrastructure across the State by improving regulatory efficiency through a consistent planning regime for infrastructure and services across NSW.

The proposal is defined in ISEPP clause 33 as electricity generating works, meaning a building or place used for the purpose of making or generating electricity.

Part 3 Division 4 of ISEPP relates to electricity generating works. Clause 34(1) states that *'Development for the purpose of electricity generating works may be carried out by any person with consent on the following land: (a) in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source – on any land; (b) in any other case – any land in a prescribed rural, industrial or special use zone'*.

Under the ISEPP, a prescribed rural, industrial or special use zone is defined as all land zoned RU1 Primary Production, RU2 Rural Landscape, RU3 Forestry, RU4 Primary Production Small Lots, IN1 General Industrial, IN2 Light Industrial, IN3 Heavy Industrial, IN4 Working Waterfront, SP1 Special Activities and SP2 Infrastructure.

As the proposal is on land zoned RU1 under the Greater Hume LEP, works are permissible with consent under Part 3 Division 4, Clause 34(1)b of the ISEPP.

4.2.6 State Environmental Planning Policy (State and Regional Development) 2011

The aims of the SRD SEPP are to identify development that is SSD and SRD

State Significant Development

Clause 8 of the SRD SEPP provides that development is declared to be SSD for the purposes of the EP&A Act if:

- *the development is not permissible without consent under Part 4 of the EP&A Act.*
- *the development is specified in Schedule 1 or 2 of the SRD SEPP.*

Clause 20 of Schedule 1 of the SRD SEPP includes:

> *"Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, bio-fuel, distillate and waste and hydro, wave, solar or wind power), being development that:*
>
> *(a) has a capital investment value of more than $30 million.*

The proposal has an estimated capital investment value of approximately $399 million, therefore the proposal is classified as SSD under Part 4 of the EP&A Act.

4.2.7 State Environmental Planning Policy No. 55 – Remediation of Land

SEPP No. 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. The SEPP applies to the whole of the State.

Clause 7 of SEPP No. 55 requires that the remediation of land be considered by a consent authority in determining a development application.

A search of the NSW Environment Protection Authority (EPA) contaminated land public record (NSW EPA 2018) was undertaken for contaminated sites within the Greater Hume LGA on 3 June 2019. The research returned no results for contaminated land within the Greater Hume LGA.

The risk that contamination associated with agricultural activities (e.g. pesticides) could be present on the site is considered to be low and no evidence of contamination was observed during the site assessment.

4.2.8 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

SEPP 33 defines and regulates the assessment and approval of potentially hazardous or offensive development. The SEPP defines 'potentially hazardous industry' as:

> *"…development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property, or*
>
> *(b) to the biophysical environment,*
>
> *and includes a hazardous industry and a hazardous storage establishment"*

'Potentially offensive industry' defined as:

> *…a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.*

SEPP 33 provides for systematic assessment of potentially hazardous and offensive development for the purpose of industry or storage. For development proposals classified as 'potentially hazardous industry' the policy requires a preliminary hazard analysis (PHA) to determine risks to people, property and the environment.

A checklist and a risk screening procedure developed by DPE is used to help determine whether a development is considered potentially hazardous industry (DoP, 2011). Appendix 3 of the *Applying SEPP 33* guidelines lists industries that may fall within SEPP 33; the lists do not include solar farms and energy storage facilities. The hazardous development status of the proposal is assessed in section 7.4.

A preliminary risk screening in accordance with SEPP 33 was undertaken and determined based on site-specific hazard mitigation measures that the proposal was not potentially hazardous. Therefore, a PHA was not completed (refer section 7.4).

4.2.9 State Environmental Planning Policy (Primary Production and Rural Development)

The new *State Environmental Planning Policy (*Primary Production and Rural Development), known as the PPRD SEPP, is a new framework that commenced on 28 February 2019. The new framework simplifies the NSW planning system by consolidating, updating and repealing provisions in five former agriculture-themed SEPPs, including the Rural Lands SEPP. The intention is to provide for better outcomes in balancing rural needs, including farming, and development, and to reduce the risk of land use conflict and rural land fragmentation. Many of the provisions in the repealed SEPPs were local-level land use planning matters, which have now been transferred to local LEPs. This aims to ensure local industry and community have greater access to and awareness of the agricultural land use planning provisions that apply. The intent of the new SEPP is to deal with agricultural land use matters of State or regional significance only.

The aims of the *State Environmental Planning Policy (Primary Production and Rural Development) 2019* (Primary Production SEPP) are:

(a) to facilitate the orderly economic use and development of lands for primary production.
(b) to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources.
(c) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations.
(d) to simplify the regulatory process for smaller-scale low risk artificial waterbodies, and routine maintenance of artificial water supply or drainage, in irrigation areas and districts, and for routine and emergency work in irrigation areas and districts.
(e) to encourage sustainable agriculture, including sustainable aquaculture.
(f) to require consideration of the effects of all proposed development in the State on oyster aquaculture.
(g) to identify aquaculture that is to be treated as designated development using a well-defined and concise development assessment regime based on environment risks associated with site and operational factors.

The objectives of Part 2 (State Significant Agricultural Land) of Primary Production SEPP are as follows:

(a) to identify State significant agricultural land and to provide for the carrying out of development on that land,
(b) to provide for the protection of agricultural land:
   i. that is of State or regional agricultural significance, and
   ii. that may be subject to demand for uses that are not compatible with agriculture, and
   iii. if the protection will result in a public benefit.

Land that is considered State Significant Agricultural Land is listed in Schedule 1 of the Primary Production SEPP. Schedule 1 of the SEPP is currently incomplete/blank, with mapping yet to be completed or publicly available (DPI *pers. comm.,* 12/06/19). As such, reference to the significance of agricultural land from Schedule 2 of the previously repealed *State Environmental Planning Policy (Rural Lands) 2008* is applied within this EIS (see below).

4.2.10 State Environmental Planning Policy (Rural Lands) 2008 (repealed)

The aims of the *State Environmental Planning Policy (Rural Lands) 2008* (Rural Lands SEPP) are:

(a) to facilitate the orderly and economic use and development of rural lands for rural and related purposes.
(b) to identify the Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State.
(c) to implement measures designed to reduce land use conflicts.
(d) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations.
(e) to amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

The proposal area is not identified in Schedule 2 as state significant agricultural land.

4.2.11 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP (The Mining SEPP) is designed to provide for the proper management and development of mineral, petroleum and extractive material resources and establish appropriate planning controls to encourage ecologically sustainable development through environmental assessment and management.

In particular, the SEPP outlines land that has been classed as Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CIC).

The proposal has not been identified as BSAL or CIC.

4.2.12 Protection of the Environment Operations Act 1997

The POEO Act is administered by the NSW EPA.

Under section 48 of the POEO Act, premises-based scheduled activities (as defined in Schedule 1 of the POEO Act) require an Environment Protection Licence (EPL). Clause 17 of Schedule 1 of the POEO Act concerns electricity generation works. General electricity works is a scheduled activity and requires an EPL where the activity has the capacity to generate more than 30 MW of electrical power. General electricity generation works is defined as:

> *'…the generation of electricity by means of electricity plant that, wherever situated, is based on, or uses, any energy source other than wind power or solar power.'*

The works would generate more than 30 MW of electrical power. However, electricity generation would be from solar power which is not considered a scheduled activity. Accordingly, an EPL is not required under the POEO Act for the proposal.

Sections 143 and 145 of the POEO Act also creates offences relating to pollution and the transport and disposal of waste and imposes a duty on the occupier of a site to notify certain 'pollution incidents.' The proponent must comply with the POEO Act in carrying out the proposal.

4.2.13 Roads Act 1993

The *Roads Act 1993* (Roads Act) provides for the classification of roads and for the declaration of roads authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads.

Any work within the road reserve, such as upgrades that interfere with the structure of the road, require consent from the road authority under section 138 of the Roads Act. Greater Hume Shire Council is the roads authority for all local roads surrounding the proposal, including Benambra Road and Schneiders Road, and RMS is the roads authority for Olympic Highway, being the major access route to the area.

Given that the Benambra Road/Olympic Highway intersection has already been upgraded to allow heavy vehicles to safely enter and exit Olympic Highway additional roadworks and section 138 consent will not be required. Section 138 consent would likely be required for two access points from Benambra Road and two from Schneiders Road.

4.2.14 Crown Lands Management Act 2016

The main aims of the *Crown Lands Management Act 2016* are to provide for the ownership and management of Crown land in NSW, and provide clarity concerning the law applicable to Crown land. Works within a Crown Reserve require environmental, social, cultural heritage and economic considerations to be considered and must facilitate the use of land by the NSW Aboriginal people.

No Crown lands are located within, adjoining or adjacent to the subject land as confirmed by DPI (Lands and Water Division) correspondence dated 25 June 2019.

4.2.15 Water Management Act 2000

The *Water Management Act 2000* (WM Act), currently administered by the Department of Industry (Water), is progressively being implemented throughout NSW to manage water resources. The aim of the WM Act is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and their in-stream uses as well as to provide for protection of catchment conditions.

Water may be sourced from several sources such as the Hurricane Hill quarry, RWCC water pipeline and Greater Hume Shire Council standpipes. As such, any water sources specified under the WM Act are not required.

4.2.16 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) sets out to conserve fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and biological diversity. Further, it aims to promote viable commercial fishing, aquaculture industries and recreational fishing opportunities. Threatened species, populations and ecological communities and key threatening process are listed in the FM Act's Schedules.

A permit under sections 201, 205 or 219 of the FM Act is not required for SSD under the provisions of section 4.41 of the EP&A Act.

4.2.17 National Parks and Wildlife Act 1974

Under the *National Parks and Wildlife Act 1974* (NPW Act), the Director General of Office or Environment and Heritage (OEH), now the Biodiversity and Conservation Division (BCD) of DPIE, is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. The Director General of BCD is also responsible under this legislation for the protection and care of native fauna and flora, and Aboriginal places and objects throughout NSW.

The provisions of the NPW Act have been considered for the proposal. The proposal area is not located within 10 km of any nature reserve or forest protected under the NPW Act (Figure 4-1), thus no impact on these areas are expected.

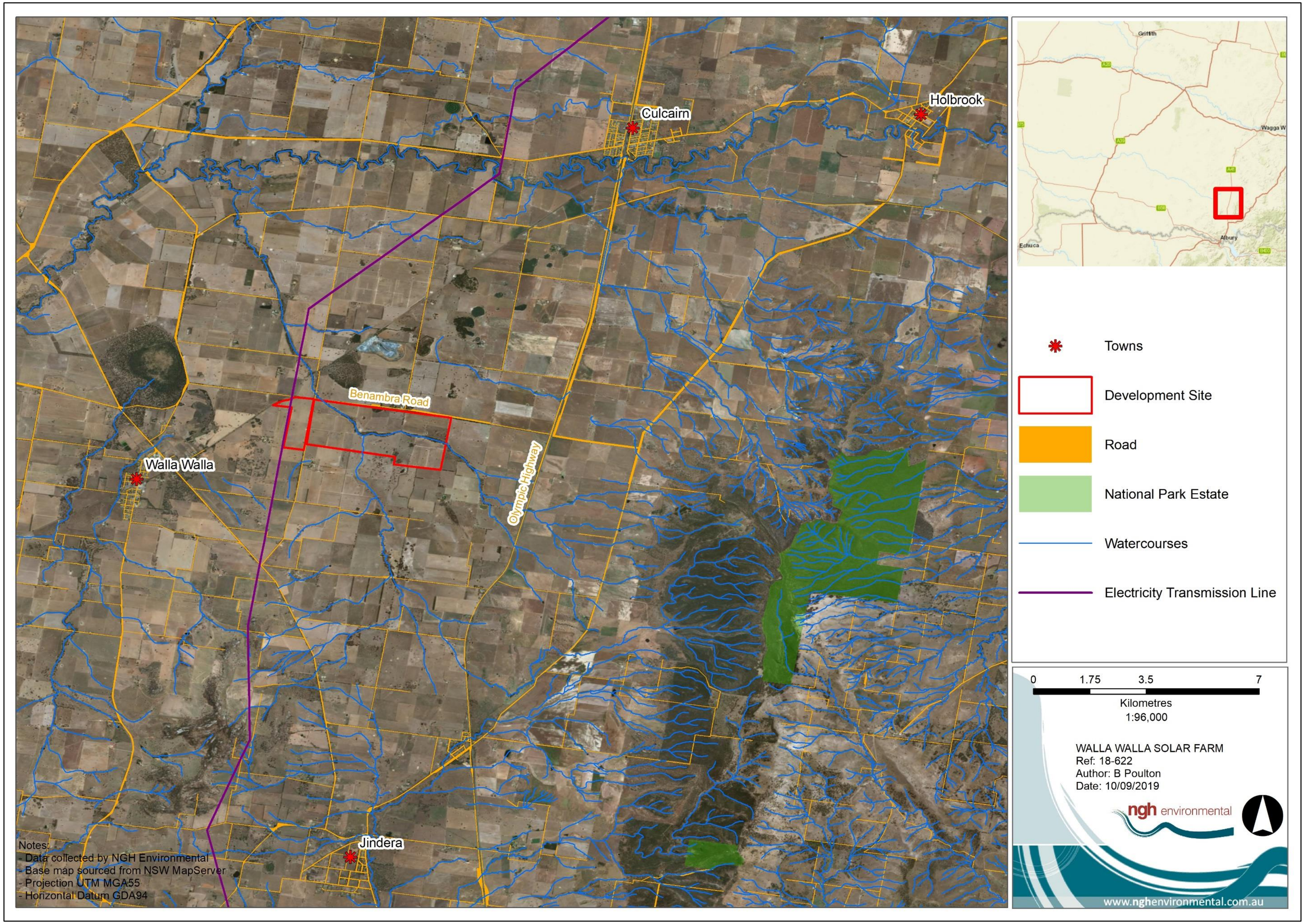


Figure 4-1 State Forests / reserves within 10 km of the proposal

An assessment of impacts to Aboriginal heritage is provided in section 6.8 and Appendix G. It is noted that under section 89J(d) of the EP&A Act, an Aboriginal Heritage Impact Permit (AHIP) under section 90 of the NPW Act is not required for SSD.

4.2.18 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) aims to conserve heritage values. The Heritage Act defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts listed in the Local or State Heritage Significance. A property is a heritage item if it is listed in the heritage schedule of the local Council's Local Environmental Plan or listed on the State Heritage Register, a register of places and items of particular importance to the people of NSW.

No relics or other items protected under the Heritage Act were located on the development site. Two items of heritage were located within 5 km of the development site, Walla Walla homestead and Morgan's Lookout. The closest site of State significance is located approximately 8.5 km south east of the proposal area. No other items were located within 10 km of the development site.

Section 146 of the Heritage Act requires any person who believes they have discovered or located a relic (in any circumstances) to notify the NSW Heritage Council.

4.2.19 Biosecurity Act 2015

The objects of the *Biosecurity Act 2015* (Biosecurity Act) are:

> *(1) The primary object of this [Biosecurity] Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.*
>
> *(2) The other objects of this [Biosecurity] Act are as follows:*
>
> *(a) to promote biosecurity as a shared responsibility between government, industry and communities.*
>
> *(b) to provide a framework for the timely and effective management of the following:*
>
> *(i) pests, diseases, contaminants and other biosecurity matter that are economically significant for primary production industries.*
>
> *(ii) threats to terrestrial and aquatic environments arising from pests, diseases, contaminants and other biosecurity matter.*
>
> *(iii) public health and safety risks arising from contaminants, non-indigenous animals, bees, weeds and other biosecurity matter known to contribute to human health problems.*
>
> *(iv) pests, diseases, contaminants and other biosecurity matter that may have an adverse effect on community activities and infrastructure.*
>
> *(c) to provide a framework for risk-based decision-making in relation to biosecurity.*
>
> *(d) to give effect to intergovernmental biosecurity agreements to which the State is a party.*
>
> *(e) to provide the means by which biosecurity requirements in other jurisdictions can be met, so as to maintain market access for industry.*

The proponent as a land manager would comply with the general biosecurity duties under the Biosecurity Act through management of on-site weeds and pests.

Prior to commencement of each phase, a weed management procedure would be developed as part of the Biodiversity Management Plan for the proposal to prevent and minimise the spread of weeds. This would include management protocol for declared priority weeds under the Biosecurity Act during construction, operation and decommissioning stages, and weed hygiene protocol in relation to plant, machinery, and fill.

Establishment of a temporary construction site compound, specifically rubbish bins containing food, can also potentially increase the risk of pest animals at the development site (mostly cat and fox). A pest management procedure would be developed and implemented by the proponent as part of a wider district baiting program where practicable (section 6.6).

4.2.20 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) establishes a new regulatory framework for assessing and offsetting the biodiversity impacts of proposed developments. The BC Act contains provisions relating to flora and fauna protection, threatened species and ecological communities listing and assessment, a biodiversity offsets scheme (BOS), a single biodiversity assessment method (BAM), calculation and retirement of biodiversity credits and biodiversity assessment and planning approvals. The BC Act is supported by the *Biodiversity Conservation Regulation 2017*.

Section 7.9(2) states that SSD development applications must be accompanied by a Biodiversity Development Assessment Report (BDAR) prepared in accordance with the BAM, unless the Secretary and Chief Executive of the OEH have determined that the proposed development is not likely to have any significant impact on biodiversity values. A BDAR has been prepared as part of this EIS (Appendix H) and is summarised in section 6.3.

4.2.21 Conveyancing Act 1919

The purpose of the *Conveyancing Act 1919* (Conveyancing Act) is to amend and consolidate the law of property and to simplify and improve the practice of conveyancing, and for such purposes to amend certain Acts relating thereto.

When land is leased from a landowner and the lease affects part of a lot or lots in a current plan, a subdivision under *s*.7A is required when the total of the original term of the lease, together with any option of renewal, when this is more than five years.

The proposal is located on freehold land. The realignment and subdivision of Lot 1 DP 1069452, Lot A DP 376389 and Lot 1 DP 933189 would be required.

4.2.22 Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. The proposal's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption.
- Resource recovery (including reuse, reprocessing, recycling and energy recovery).

- Disposal.

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development (section 7.5).

4.3 COMMONWEALTH LEGISLATION

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is administered by the Commonwealth Department of the Environment and Energy (DEE). Under the EPBC Act, if the Minister determines that an action is a 'controlled action' which would have or is likely to have a significant impact on a Matter of National Environmental Significance (MNES) or Commonwealth land, then the action may not be undertaken without prior approval of the Minister.

The EPBC Act identifies nine MNES:

- World heritage properties.
- National heritage places.
- Ramsar wetlands of international significance.
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water source, in relation to coal steam gas development and large coal mining development.

When a person proposes to take an action that they believe may be a 'controlled action' under the EPBC Act, they must refer the proposal to the DEE for a decision about whether the proposed action is a 'controlled action'.

A search of the Commonwealth Protected Matters Search Tool on 25 October 2018 indicated that there are no World Heritage Properties or National Heritage Places within the proposal area. Search results listed seven Wetlands of International Importance that are either known to occur or have potential to occur in the area, however no Ramsar wetlands are located within 10 km of the proposal sites and are not relevant to the site or proposal. Section 6.2 discusses the results of searches in relation to threatened species, ecological communities and migratory species. Table 4-2, Table 4-3 and

Table 4-4 summarise the results of the searches.

Table 4-2 Summary of Matters of National Environmental Significance (10 km search radius)

Matters of National Environmental Significance	Addressed in this EIS
World Heritage Properties	N/A
National Heritage Places	N/A
Wetlands of International Significance	N/A

Matters of National Environmental Significance	Addressed in this EIS
Great Barrier Reef Marine Park	N/A
Commonwealth Marine Areas	N/A
Threatened Ecological Communities	Section 6.8 and Appendix H
Threatened Species	Section 6.8 and Appendix H
Migratory Species	Section 6.8 and Appendix H

Table 4-3 Summary of other matters protected by the EPBC Act (10 km search radius)

Other Matters Protected by the EPBC Act	Addressed in this EIS
Commonwealth Lands	2
Commonwealth Heritage Places	N/A
Listed Marine Species	18
Whales and Other Cetaceans	N/A
Critical Habitats	N/A
Commonwealth Reserves	N/A

Table 4-4 Summary extra information (10 km search radius)

Extra Information	Addressed in this EIS
State and Territory Reserves	4
Regional Forest Agreements	2
Invasive Species	Section 6.8
Nationally Important Wetlands	1

Commonwealth listed threatened ecological communities, threatened species, migratory species and invasive species are discussed in the Biodiversity section (section 6.8) and the BDAR in Appendix H. A significant impact to any of these entities is considered highly unlikely and the proposed activity is considered highly unlikely to be a controlled action.

No other matter of national environmental significance would be affected by the proposed activity.

4.3.2 Native Title Act 1993

The *Native Title Act 1993* provides a legislative framework for the recognition and protection of common law native title rights. Native title is the recognition by Australian law that Indigenous people had a system of law and ownership of their lands before European settlement. Where that traditional connection to land and waters has been maintained and where Government legislation have not removed it, the law recognises the persistence of native title.

People who hold native title have a right to continue to practise their law and customs over traditional lands and waters while respecting other Australian laws. This could include visiting to protect important places, making decisions about the future use of the land or waters, and hunting, gathering and collecting bush medicines. Further, when a native title claimant application is registered by the National Native Title Tribunal, the people seeking native title recognition gain a right to consult or negotiate with anyone who wants to undertake a project on the area claimed.

Native title may exist in areas such as:

- Vacant Crown land.
- Some national parks, forests and public reserves.
- Some types of pastoral lease.
- Some land held for Aboriginal communities.
- Beaches, oceans, seas, reefs, lakes, rivers, creeks, swamps and other waters that are not privately owned.

A search of the National Native Title Tribunal Register was carried out on 12 February 2019 and again on 5 September 2019. Two native title claims were made in the Greater Hume LGA including Eastern Australian Pipeline (NN1996/025) and Greater Hume Shire Council (NN2007/008) but both of these have been discontinued. The development site is located on freehold land and not subject to any native title claims at this time.

4.3.3 Renewable Energy (Electricity) Act 2000

The *Renewable Energy (Electricity) Act 2000* (RE Act) aims:

- To encourage the additional generation of electricity from renewable sources.
- To reduce emissions of GHGs in the electricity sector.
- To ensure that renewable energy sources are ecologically sustainable.

Section 17 of the RE Act defines renewable energy sources eligible under the Commonwealth government's renewable energy target scheme. This includes solar energy.

Certificates for the generation of electricity are issued using eligible renewable energy sources. This requires purchasers (called liable entities) to surrender a specified number of certificates for the electricity that they acquire. In January 2011, renewable energy certificates were reclassified as either large-scale generation certificates or a small-scale technology certificates following changes to the scheme.

The proposal is the subject of application to the Clean Energy Regulator under the RE Act and would receive large scale generation certificates if applicable.

4.3.4 Hazardous Waste (Regulation of Exports and Imports) Act 1989

The *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Hazardous Waste Act) regulates the export, import and transit of hazardous waste to ensure humans and the environment are protected from the harmful effects of hazardous wastes. Pursuant to section 40 of the Hazardous Waste Act, *"A person must not export hazardous waste unless:*

(a) the person is the holder of an export permit authorising the person to export the waste; or
(b) the person is the holder of a transit permit authorising the person to export the waste; or
(c) the export has been ordered under section 34 or 35A."

Presently, there is no plan to establish a battery storage facility as part of the proposal. Should this change in the future, a modification would be sought addressing the handling and disposal of hazardous waste in accordance with the Hazardous Waste Act.

4.4 OTHER RELEVANT POLICIES AND MATTERS

4.4.1 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) involves the effective integration of social, economic and environmental considerations in decision-making processes. In 1992, the Commonwealth and all State and Territory Governments endorsed the *National Strategy for Ecologically Sustainable Development*.

In NSW, the concept has been incorporated in legislation such as the EP&A Act and EP&A Regulation. For the purposes of the EP&A Act and other NSW legislation, the Intergovernmental Agreement on the Environment (1992) and the *Protection of the Environment Administration Act 1991* outline principles which can be used to achieve ESD. These principles are presented below along with a description of how the proposal and this EIS have considered each principle.

a) The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii. an assessment of the risk-weighted consequences of various options.

The precautionary principle has been adopted in the assessment of expected impacts. All potential impacts have been considered and mitigated commensurate with risk. Where uncertainty exists, measures have been included to address the uncertainty. Generally, a worst-case assessment is undertaken to account for unknowns.

b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

Potential impacts of the proposal are likely to be localised and would not diminish the options regarding land and resource uses and nature conservation available to future generations. The proposal is considered to be reversable in terms of protecting the natural values of the site. Importantly, the proposal provides additional renewable energy that contributes to minimising the risk of climate change to current and future generations by reducing carbon emissions intensity of electricity generation.

c) *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*
The impacts of the proposal on biodiversity have been assessed in detail in section 6.8. The proposal includes measures to minimise impact on biodiversity including avoidance of higher conservation value areas where possible and management measures to minimise, manage and offset residual impacts. The impacts are considered to have been reduced as much as possible in this context and to be justified.
d) *Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:* i. *polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,* ii. *the users of goods and services should pay prices based on the full lifecycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,* iii. *environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*
Attributes of the proposal area such as existing native vegetation, soil and hydrology have been valued in terms of their broader contribution to the catchment and catchment processes. Pollution risks have been assessed and would place any cost of remediation solely upon the proponent.

The aims, structure and content of this EIS have incorporated the principles of ESD. The mitigation measures in section 8.2 set out an auditable environmental management commitment by the proponent.

Based on the social and environmental benefits generated by the proposal at a local and regional level, and the assessed impacts on the environment and their ability to be managed, it is considered that the development would be ecologically sustainable within the context of ESD and is justifiable.

4.4.2 NSW Large-scale Solar Energy Guideline for State Significant Development

The guideline provides the proponent and regulators with general guidance on the planning framework for the assessment and determination of state significant large-scale solar energy projects under the EP&A Act.

The objectives of the guideline are to:

- Provide guidance to the community, applicants, industry and regulators on how DPIE assesses environmental, social and economic impacts of state significant solar energy projects.
- Encourage industry to select suitable sites for projects to reduce the likelihood and extent of land use conflicts and environmental and social impacts.
- Facilitate better on-ground outcomes by promoting early identification of potential impacts.
- Promote meaningful, respectful and effective community and stakeholder engagement.
- Support the development of a sustainable solar industry in NSW by providing a clear, consistent and responsive policy framework.

The proposal has addressed the requirements of the guidelines through the assessment of environmental impacts (sections 6 and 6.8), site suitability (section 2.5), community and agency consultation (section 5.1) and policy and framework requirements (section 4).

4.4.3 NSW Riverina Murray Regional Plan 2036

The NSW Riverina Murray Regional Plan 2036 established a framework to grow the region's cities and local centres, support the protection of high-value environmental assets and make developing a strong, diverse and competitive economy central to building prosperity and resilience in the region (DPE, 2019).

The plan guides the NSW Government's land use priorities over the next 20 years, providing an overarching framework to guide subsequent land use plans, development proposals and infrastructure funding decisions.

The plan is broken down into a number of goals and directions, which detail a number of actions to be considered during the planning process. The following goals are applicable to the proposal, and were considered as part of this EIS:

Table 4-5 Directions, actions and consideration of the NSW Riverina Murray Regional Plan 2036

Goal 1: Direction and Actions	EIS Consideration
Direction 1: Protect the region's diverse and productive agricultural land 1.1 Develop a regional agricultural development strategy that: • Maps important agricultural land • Identifies emerging opportunities for agriculture. • Sets direction for local planning of agricultural development. 1.2 Protect important agricultural land identified in the regional agricultural development strategy from land use conflict and fragmentation and manage the interface between important agricultural lands and other land uses. 1.3 Minimise biosecurity risks by undertaking risk assessments, taking into account biosecurity plans and applying appropriate buffer areas.	The Department of Primary Industries (DPI) is conducting a 3-year program to map and recognise important agricultural land. The draft Riverina Murry Important Agricultural Land Mapping was on public exhibition through November and December 2018; however, the plan is no longer available for public viewing as it is being revised to take into consideration all public feedback. As such, important agricultural land from this draft plan cannot be considered in the EIS. The significance of the land has been assessed under the Primary Production SEPP 2019, the former Rural Lands SEPP 2008, the Mining SEPP 2007 and the Land and Soil Capability (LSC) Scheme. It has been determined that the land is not classified as significant under the relevant SEPPs, and as Class 4 and a small portion classified as Class 6, under the LSC Scheme. Use of the subject land for the proposal will not cause conflict or fragment the landscape, given that agricultural activities in the form of sheep grazing can continue on the site. The proposal also provides additional agricultural and economic diversification opportunities for the relevant landowners and broader community.
Direction 2: Promote and grow the agribusiness sector 2.1 Encourage agribusiness diversification by reviewing local plans and removing restrictive land use zonings and outdated land use definitions. 2.2 Provide opportunities to improve support to agriculture through better guidance on	The current land use zoning is compatible with electricity generating works under the ISEPP. The proposal has the potential to provide increased economic security to rural economies through diversification of employment opportunities and income streams. As mentioned above, agricultural activities in the form of sheep grazing can continue on the site. It is the intention

Goal 1: Direction and Actions	EIS Consideration
protecting agricultural land and managing the interface with other land uses. 2.3 Facilitate investment in the agricultural supply chain by protecting assets, including freight and logistics facilities, from land use conflict arising from the encroachment of incompatible land uses.	of the proponent and the relevant landowners to continue at 85% of existing strategic grazing on the site. Strategic sheep grazing would be used to reduce vegetation biomass and put grazing pressure on weeds adjacent to the solar panels while reducing potential bushfire fuel load.
Direction 11: Promote the diversification of energy supplies through renewable energy generation 11.1 Encourage renewable energy projects by identifying locations with renewable energy potential and ready access to connect with the electricity network. 11.2 Promote best practice community engagement and maximise community benefits from all utility-scale renewable energy projects. 11.3 Promote appropriate smaller-scale renewable energy projects using bioenergy, solar, wind, small-scale hydro, geothermal or other innovative storage technologies.	The proponent reviewed the solar generation potential of many areas in NSW. The proposed site was selected because it provides the optimal combination of manageable environmental constraints, generally level terrain, high quality solar resources, compatible land zoning, capacity in the grid transmission system and onsite access to connect to the network. The community has been extensively and directly engaged throughout the development process, with local benefits including direct and indirect employment, providing significant participation opportunities for local businesses, direct business volume for local services, materials and contracting, increased spending in the community and Council rates revenue.

4.4.4 2018 Draft Riverina Murry Important Agricultural Land Mapping

As detailed above, the draft Riverina Murry Important Agricultural Land Mapping was on public exhibition through November and December 2018; however, the plan is no longer available for public viewing as it is being revised to take into consideration all public feedback. As such, important agricultural land from this draft plan cannot be considered in the EIS.

4.5 SUMMARY OF LICENSES

Table 4-6 lists licenses that have been identified as relevant to the proposal.

Table 4-6 Summary of licenses required.

Instrument	Licence or approval requirement
EP&A Act, Part 4	SSD applications require approval from the Minister for Planning or the Independent Planning Commission. This EIS has been prepared in accordance with the requirements of the Secretary of the DPE.
Roads Act, section 138	Any works to public or classified roads requires consent under this act from the road authority. Greater Hume Shire Council is the roads authority for public roads within the Walla Walla area and RMS is the roads authority for Olympic Highway.
***Local Government Act 1993*, Section 68**	Approval is required to operate an onsite sewage management system and to draw water from a council standpipe. Consent from Greater Hume Shire

Instrument	Licence or approval requirement
	Council would be required for use of a standpipe and to operate an onsite sewage management system.
Oversize Overmass Permit	An oversize overmass permit will be required from the relevant road authority (Council and/or RMS) for any oversized vehicles.

Note: if it is determined that additional licenses or approvals are required, the proponent would obtain these prior to commencement of relevant activities.

5 STAKEHOLDER CONSULTATION

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Consultation –

During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders, quarry operators and mineral title holders.

In particular, you must undertake detailed consultation with affected landowners surrounding the development and Greater Hume Council.

The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.

Further consultation after 2 years –

If you do not lodge a development application and EIS for the development within 2 years of the issue date of these EARs, you must consult further with the Secretary in relation to the preparation of the EIS.

Under the NSW Large-scale Solar Energy Guideline (2018), the proponent is encouraged to engage with relevant stakeholders at all stages of the EIS, from scoping through to post-approval. These include:

- Government – including local council, NSW Government agencies and Commonwealth Government.
- Community – including local landowners, businesses, special interest groups, Aboriginal community members, and other potentially affected stakeholders.
- Mineral title holders.
- Network service providers.

5.1 AGENCY CONSULTATION

5.1.1 Secretary's Environmental Assessment Requirements (SEARs)

As the proposal is classified as SSD, a Scoping Report was prepared, and the SEARs requested for a 300 MW AC solar farm at Walla Walla. The SEARs were issued by DPE on 7 March 2019 (refer to Appendix A). The SEARs are intended to guide the structure and content of the EIS and reflect the responsibilities and concerns of NSW government agencies in relation to the environmental assessment of the proposal.

The following sections provide a summary of the SEARs from the various agencies and cross reference where each agency's specific matters are addressed within this EIS. Additional consultation was undertaken with several of the agencies to clarify some of the issues raised in the SEARs or seek further advice prior to EIS lodgement.

Department of Planning and Environment

Issue summary	Addressed in EIS
General Requirements – *The Environmental Impact Statement (EIS) for the development must comply with the requirements in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.* *In particular, the EIS must include:* • *a standalone executive summary.* • *a full description of the development, including:* - *details of construction, operation and decommissioning.*	Executive Summary

- *a site plan showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process).* - *a detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development.* • *a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including other proposed or approved solar farms, rural residential development and subdivision potential).* • *an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:* - *a description of the existing environment likely to be affected by the development.* - *an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region (in particular Hurricane Hill Quarry and the proposed Jindera and Glenellen Solar Farms), taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice.* - *a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below).* - *a description of the measures that would be implemented to monitor and report on the environmental performance of the development.* • *a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS.* • *the reasons why the development should be approved having regard to:* - *relevant matters for consideration under the Environmental Planning and Assessment Act 1979, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development.* - *the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses.* - *feasible alternatives to the development (and its key components), including the consequences of not carrying out the development.* • *a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter.* *The EIS must also be accompanied by a report from a suitably qualified person providing:* • *a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived.* • *certification that the information provided is accurate at the date of preparation.* *The development application must be accompanied by the consent in writing of the owner/s of the land (as required in clause 49(1)(b) of the Regulation).*	Figure 1-3 Figure 3-6 Sections 2 and 6.3 Sections 6 and 8 Section 8 Section 8.2.1 Appendix I Appendix E
Biodiversity – • *an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless OEH and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values.* • *the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.* • *an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description* of the measures to minimise and rehabilitate impacts.	Section 6.8

Heritage – *including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including consultation with the local Aboriginal community in accordance with the* *Aboriginal Cultural Heritage Consultation Requirements for Proponents.*	Section 6.9 Section 7.2
Land – • *an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:* ○ *a consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights.* ○ *a soil survey to determine the soil characteristics and consider the potential for erosion to occur.* ○ *a cumulative impact assessment of nearby developments;* • *an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:* ○ *consideration of the zoning provisions applying to the land, including subdivision.* ○ *completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide.* • *a description of measures that would be implemented to remediate the land following decommissioning in accordance with State Environmental Planning Policy No 55 - Remediation of Land.*	Section 6.3
Visual – *Including an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners.*	Section 6.1
Noise – *Including an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry 2017, and cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria.*	Section 0
Transport – • *an assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation.* • *an assessment of the likely transport impacts to the site access route (including Benambra Road and Olympic Highway), site access point, any rail safety issues, any Crown land, particularly in relation to the capacity and condition of the roads.* • *a cumulative impact assessment of traffic from nearby developments.* • *a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required).* • *a description of the measures that would be implemented to mitigate any transport impacts during construction.*	Section 6.6
Water – • *an assessment of the likely impacts of the development on surface water and groundwater resources (including flood zones, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulphate soils), related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts.* • *details of water requirements and supply arrangements for construction and operation.* • *a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).*	Section 6.7
Hazards –	Section 7.4

- *an assessment of potential hazards and risks associated with bushfires.* - *an assessment of the proposed transmission line and substation against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.*	
Socio-Economic – *Including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation.*	Section 6.4
Waste – *Identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.*	Section 7.5
Consultation – *During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders, quarry operators and mineral title holders.* *In particular, you must undertake detailed consultation with affected landowners surrounding the development and Greater Hume Council.* *The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.* **Further consultation after 2 years –** *If you do not lodge a development application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.*	Section 5
References – *The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.*	Section 10

Greater Hume Shire

Issue summary	Addressed in this EIS
On perusal of the documentation supplied it is advised that Council wishes to make the following comments for inclusion within the forthcoming EIS:	
• *Detailed information concerning the proposed recycling of generated packaging waste.*	Section 7.5
• *Traffic assessments to include cumulative impacts of the possibility of an adjacent largescale solar development being constructed concurrently to this proposal.*	Section 6.6
• *Clarity concerning the numbers employed during the operational phase of the development.*	Section 6.4
Council wishes to advise that since 2012 a section 94A Fixed Development Contribution Plan has applied to all of the Greater Hume Council area and Council currently has on exhibition a new section 7.12 Fixed Development Contribution Plan. Since the introduction of the Fixed Development Contribution Plans all proponents of eligible development have had a condition of consent applied upon their development consents requiring payment of the contribution. In accordance with the requirements of Fixed Development Contribution Plans payment is applicable irrespective of whether there is an impact from the development on local infrastructure. *Accordingly, Council wishes to assert that a failure by the Department of Planning to apply a S7.12 contribution in line with Council's Fixed Development Contribution Plan on this development would be inequitable to those that have previously paid or will in the future pay the levy.* *Should the Department of Planning be included to require the proponent to enter into a Voluntary Planning Agreement (VPA) with Council then it is requested that negotiations and the VPA be finalised before determination of development consent for the approval of the project. It is expected that the terms of the VPA would be consistent with the payment that would be received by Council from its Development Contribution Plan.*	

Issue summary	Addressed in this EIS
	Section 5

Department of Industry (DOI)

Issue summary	Addressed in this EIS
DOI Water – • *The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.* • *A detailed and consolidated site water balance.* • *Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.* • *Proposed surface and groundwater monitoring activities and methodologies.* • *Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (DPI, 2012), the Guidelines for Controlled Activities on Waterfront Land (NSW Government, 2018a) and the relevant Water Sharing Plans (available at https://www.industry.nsw.gov.au/water).*	Section 0
DOI Crown Lands – • *If the Crown Roads in the vicinity of the proposal are required for access, the roads are to either be transferred to Council or the proponent should make an application with DoI Crown Lands for the roads to be closed and purchased.*	Section 6.6 Appendix B.1
DPI – Agriculture • *The Draft SEARs provided by Department of Planning and Environment should be amended with the following changes as highlighted in the draft SEARs provided:* *a) (General requirements – details of construction, operation and decommissioning, including rehabilitation objectives for agricultural land.* *b) (Land – a soil survey undertaken in accordance with the Guidelines listed in Attachment 2).* *Please refer to Attachment 1 for detailed requirements.* • *Although the development is proposed for Class 4 and 6 land as assessed under the Land and Soil Capability Assessment Scheme, the Class 4 lands in this area are currently under review due to their value as high quality cropping farms. During the development of the EIS, information on the impact on farming adjacent to these properties and the region should be detailed.* • *During the development of the EIS and the rehabilitation strategy, the proponent should consider the removal of all underground infrastructure as part of the decommissioning of the solar farm at the end of life to ensure all previously cropped lands are returned to their predevelopment state.*	Section 6.3

DPE (Resources and Geoscience)

Issue summary	Addressed in this EIS
The Division has reviewed the Draft SEARs and Scoping Report (dated February 2019) for the Walla Walla Solar Farm Project (SSD 9874). The Division has identified that the "Hurricane Hill" hard rock quarry operated by Boral Resources Pty Ltd is located approximately 1.5 km to the north of the proposal site (Refer to Figure 1). Consideration should be given to the impacts the project may have on the extractive operation. *The Draft SEARs require the proponent to address the project's potential impacts on existing land uses, including mining, mineral and petroleum rights on the site and adjacent land, including an assessment of cumulative impacts of nearby developments and compatibility of the development with existing land uses during construction, operation and following decommissioning. The Draft SEARS also includes the*	Section 6.3 Section 7.4

Issue summary	Addressed in this EIS
requirement for consultation during the preparation of the Environmental Impact Statement (EIS) with exploration licence holders, quarry operators and mineral title holders. *The proponent should identify any of the above in the EIS and consult with the operators or title holders to establish if the proposal is likely to have a significant impact on current or future extraction of minerals, petroleum or extractive materials (including by limiting access to, or impeding assessment of resources). The EIS should also document any way the proposed development may be incompatible with existing or approved uses, or current or future extraction or recovery of resources under the land use compatibility requirements of Part 3 (13) of the MSEPP.* *In fulfilling the SEARs relating to the State's mineral resources and rights to assess and extract those resources, the Division requires the following project specific requirements to be addressed in the EIS:*	
• *The proponent should undertake a dated and referenced search for any new mineral, coal and petroleum applications over or adjacent to the proposal site during the preparation of the EIS. Evidence of the search should be provided in the form of a date referenced map. Current mining and exploration titles and applications can be viewed through the Division's MinView map viewer at:* **http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/geoscienceinformation/services/online-services/minview**	Section 6.3
• *The proponent must consult with the operators of Hurricane Hill Quarry, Boral Resources Pty Ltd and provide evidence of authentic consultation to the Division. This should include a letter of notification of the proposal to the quarry operator including a map indicating the solar farm project area (including associated electricity transmission infrastructure) in relation to the quarry site boundaries, and a letter of response from the quarry operator to the proponent. If responses are not received from the quarry operator, the proponent is to contact the Division.*	Section 5
• *Consultation with the Division in relation to the proposed location of any offsite biodiversity offset areas or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.*	Section 6.8 Appendix H

Fire and Rescue (FR) NSW

Issue summary	Addressed in this EIS
It is FRNSW experience that small and large scale photovoltaic installations present unique electrical hazard risks to our personnel when fulfilling their emergency first responder role. Due to the electrical hazards associated with large scale photovoltaic installations and the potential risk to the health and safety of firefighters, both FRNSW and the NSW Rural Fire Service must be able to implement effective and appropriate risk control measures when managing an emergency incident at the proposed site. *FRNSW recommends the following conditions of consent:* **1.** *That the ERP specifically addresses foreseeable on-site and off-site fire events and other emergency incidents (e.g. fires involving solar panel arrays, bushfires in the immediate vicinity) or potential hazmat incidents.* 2. *That the ERP specifically addresses foreseeable on-site and off-site fire events and other emergency incidents (e.g. fires involving solar panel arrays, bushfires in the immediate vicinity) or potential hazmat incidents.* 3. *That the ERP detail the appropriate hazard control measures that would need to be implemented to safely mitigate potential risks to the health and safety of firefighters and other first responders (including electrical hazards). Such measures would include the level of personal protective required to be worn, the minimum level of respiratory protection required, decontamination procedures, minimum evacuation zone distances and a safe method of shutting down and isolating the photovoltaic and battery storage systems (either totally or partially, as determined by risk assessment).* 4. *Other risk control measures that may need to be implemented in a fire emergency (due to any unique hazards specific to the site) should also be included in the ERP.* 5. *That two copies of the ERP (detailed in recommendation above) be stored in a prominent 'Emergency Information Cabinet' located in a position directly adjacent to the site's main entry point/s.*	Section 7.4

Issue summary	Addressed in this EIS
6. *Once constructed and prior to operation, that the operator of the facility contacts the relevant local emergency management committee (LEMC). The LEMC is a committee established by Section 28 of the State Emergency and Rescue Management Act 1989. LEMCs are required to be established so that emergency services organisations and other government agencies can proactively develop comprehensive inter agency local emergency procedures for significant hazardous sites within their local government area. The contact details of members of the LEMC can be obtained from the relevant local council.* *Further to the above recommendations, Fire & Rescue NSW requests to be consulted with respect to the operational compatibility of the proposed fire and life safety systems and their configuration at the project's preliminary and final design phases.* *FRNSW requests the opportunity to review and comment on the EIS report once completed.* *While there is currently no requirement for a fire safety study, FRNSW may request one be undertaken at a later stage should information be provided such it is deemed that the development poses unique challenges to the response to and management of an incident.*	

NSW Rural Fire Service (RFS)

Issue summary	Addressed in this EIS
The subject land is not mapped as bushfire prone land by Greater Hume Shire Council however the NSW RFS is the primary response agency for fighting fires within the site and surrounding locality. *The NSW RFS recommends that the SEARS for the project include a requirement to address the following, having regard to the requirements of 'Planning for Bush Fire Protection 2006:'* • *potential bushfire threats to the facility.* • *potential hazards to firefighters.* • *management of bushfire (including grass fire) impacting on and structural fire emanating form, the proposed solar farm and its associated infrastructure.* • *firefighting water supplies.* • *vehicle access and defendable space around the solar array.* • *land and vegetation management opportunities.* • *proposed emergency management procedures.* *Ultimately, as part of any consent issued for the project, the NSW RFS will require the proponent to develop a Fire Management Plan, in consultation with the local NSW RFS District Fire Control Centre.*	Section 7.4 Figure 7-4

Office of Environment and Heritage

Issue summary	Addressed in this EIS
OEH recommends that the EIS appropriately address the following • *Biodiversity and offsetting.* • *Aboriginal cultural heritage.* • *Flooding.* *The EIS should fully describe the proposal, the existing environment and impacts of the development including the location and extent of all proposed works that may impact on ACH and biodiversity. The scale and intensity of the proposed development should dictate the level of investigation. It is important that all conclusions are supported by adequate data. The assessment must include all ancillary infrastructure associated with the project and Rural Fire Service requirements for asset protection.* *OEH has reviewed the documentation and provides SEARs for the proposed development in Attachment A. Guidance material is listed in Attachment B.*	Section 6 Appendix H Appendix G Appendix J
Biodiversity - *The Scoping Report indicates that remnant vegetation will be largely retained but the layout of the development means numerous paddock trees would be removed. The threatened species habitat value of these trees will need to be determined as part of the EIS process. There is also a significant patch of*	Section 6.8 Appendix H

Issue summary	Addressed in this EIS
riparian vegetation across the site so potential indirect impacts of the development on threatened species habitat associated with this vegetation should be adequately documented. *In the design of the project the proponent should consider maintaining or developing vegetation connections between the larger remnant patches of vegetation on the site. Some of these may be threatened ecological communities and surrounding them with a solar panel array will be a potentially significant indirect, negative impact on the vegetation.*	
Aboriginal cultural heritage – *The result of an extensive search of the Aboriginal Heritage Information Management System (AHIMS) conducted on 7 December 2018 was that there were no registered Aboriginal sites or places identified in the proposal area. The AHIMS result identified 23 Aboriginal sites within 2 km of the proposal area. No field assessment was undertaken in the scoping report.* *A search by OEH showed that there are two artefact sites registered on AHIMS within 200 m of the proposal area. Large parts of NSW that have not been subject to archaeological survey and as such there may be unrecorded Aboriginal sites within or near the project area. The proposal area contains two creeks – Back Creek and Middle Creek. Proximity to water is known to be one indicator for the potential presence of Aboriginal sites. Field assessment will be required in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010). Remnant trees should be inspected for the potential of Aboriginal cultural modification and scarring.* *An ACHAR will be required as part of the EIS. The ACHAR is to include consultation in accordance with the 'Aboriginal cultural heritage consultation requirements for proponents 2010' (DECCW, 2010). Aboriginal cultural heritage values that exist across the whole area that will be affected by the development must be identified and documented in the ACHAR. All Aboriginal objects identified must be reported to the OEH through registration on AHIMS in accordance with the mandatory notification requirements of section 89A of the National Parks and Wildlife Act 1974.*	Section 6.9 Appendix G
Historic heritage – *Thanks for the referral, I've looked at the docs and there are no State Heritage concerns regarding the proposed development.* *DPE does not need to refer this project, including any future modifications, to the Heritage Council (i.e. Heritage Division of OEH), however other Divisions of OEH may respond separately in relation to Aboriginal Cultural Heritage or biodiversity.*	Section 7.1
Flooding – *The EIS should specifically address the attached requirements for flooding and conduct flood modelling for the purposes of appropriately locating major and sensitive infrastructure and for assessing impacts external to the site post development.*	Section 6.7 Appendix J

Roads and Maritime Services (RMS)

Issue summary	Addressed in this EIS
From review of the information provided including a scoping report prepared by NGH Environmental dated February 2018 it is understood that the development proposal represents the establishment of a Solar Farm with an intended capacity of up to 300 Megawatt on the subject site. The subject site is located with frontage to Benambra Road to the north-east of Walla Walla and to the West of the Olympic Highway. *From the information provided it is understood that access to the development site is proposed to be from Benambra Road, which is classed as a local road, within a 100 km/h speed zone. Benambra Road is an approved B-double route. Access to the site particularly for the delivery of components will rely on access via the Olympic Highway which is a Classified Road and also is an approved B-Double Route.* *Given the scale and operational characteristics of the proposed development Roads and Maritime Services considers that the traffic related issues relevant to the development should be considered and addressed in 2 distinct stages as follows:*	Section 6.6 Appendix F

Issue summary	Addressed in this EIS
• *Construction & Decommission phase – the transport of materials and equipment/components for the establishment of the facility and ancillary infrastructure, the movement and parking of construction related vehicles, including workers vehicles, during the construction of the facility.* • *Operational phase – the ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the project.* *Roads and Maritime Services emphasises the need to minimise the impacts of any development on the existing road network and maintain the level of safety, efficiency and maintenance along the road network. Given the scale of the proposal a Traffic Impact Assessment (TIA) should be submitted with the Development Application to allow for an informed assessment of the development proposal. The Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network.* *The supporting scoping report acknowledges the need for the Environmental Impact Statement to include an assessment of traffic impacts during the construction period. This assessment needs to consider both the transportation of the components required for the construction of the development and the workforce required. Traffic should also be considered and addressed during operation of the facility. The Traffic assessment shall detail the potential impacts associated with the phases of the development, the measures to be implemented to maintain the standard and safety of the road network, and procedures to monitor and ensure compliance. The supporting documentation identifies that a Traffic Management Plan is required to be prepared. The draft SEARs document that was forwarded should also reinforce the need for the consideration of the workforce traffic to the development site and potential options to minimise traffic generated by the construction workforce to the site and address fatigue issues.* *For guidance in the preparation of the TIA the applicant is referred to section 2 of the "Guide to Traffic Generating Developments" prepared by the RTA and the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and Part 13: Traffic Studies and Analysis. The TIA should contain information such as the expected traffic generation, vehicle numbers and types of vehicles, and travel routes for vehicles accessing the development site.* *Given the type and scale of the proposed development and its proximity to a public road it is considered appropriate that issues relating to potential for distraction of, and for glare impacts on, passing motorist be addressed in the development submission. As a minimum, consideration should be given to the establishment and maintenance of a visual buffer, such as a vegetated buffer, within the subject site along its frontage to any public road.*	

TransGrid

Issue summary	Addressed in this EIS
TransGrid Comment – • *TransGrid is working closely with the proponent in relation to the SF connection.* • *TransGrid is currently undertaking a formal connection enquiry response with the proponent.* • *Next stage would be to enter into a formal Connection Processes Agreement with the proponent to complete detailed scoping studies and designs, with a view to enter into formal project and connection agreements for the generation connection.*	Section 5.1

WaterNSW

Issue summary	Addressed in this EIS
The proposal is not located near any WaterNSW land assets or infrastructure; therefore, we have no particular requirements for the EIS.	N/A

Since the SEARs were issued on 7 March 2019, agencies further consulted in preparation of this EIS include:

- Greater Hume Council on the proposal generally, impacts on local roads, worker accommodation, construction and operational water and community contributions.

- OEH on content and level of detail to be included within the Flood Study prepared by GHD.
- OEH on Plant Community Type (PCT) assessment and biodiversity credits in preparation of the BDAR.

5.2 ABORIGINAL COMMUNITY CONSULTATION

5.2.1 Local Aboriginal Land Council and Registered Aboriginal Parties

Consultation with Aboriginal stakeholders was undertaken in accordance with clause *80C of the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010* following the consultation steps outlined in the guide provided by OEH. The guide outlines a four-stage process of consultation as follows:

- Stage 1 – Notification of project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed project.
- Stage 3 – Gathering information about cultural significance.
- Stage 4 – Review of draft cultural heritage assessment report.

The full list of consultation steps, including those groups and individuals that were contacted and a consultation log is provided in Appendix A of the ACHAR (Appendix G). A summary of actions carried out in following these stages, are as follows.

Stage 1. Letters outlining the development proposal and the need to carry out an ACHAR were sent to the Wagga Wagga and Young Local Aboriginal Land Councils (LALCs) and various statutory authorities including OEH, as identified under the OEH guide. An advertisement was placed in the local newspapers, the *Wagga Daily Advertiser* and the *Greater Hume Independent* on the 2 January 2019 seeking registrations of interest from Aboriginal people and organisations. A further series of letters was sent to other organisations identified by OEH in correspondence to NGH Environmental. In each instance, the closing date for submission was 14 days from receipt of the letter.

As a result of this process, three Aboriginal groups registered their interest in the proposal. These groups were:

- Albury and District Local Aboriginal Land Council.
- Yalmambirra.
- Bundyi Cultural Knowledge Group.

No other party registered their interest.

Stage 2. On 30 January 2019, an Assessment Methodology document for the proposal was sent to the Wagga LALC and all other registered groups and individuals as listed above. This document provided details of the background to the proposal, a summary of previous archaeological surveys and the proposed heritage assessment methodology for the proposal. The document invited comments regarding the proposed methodology and sought any information regarding known Aboriginal cultural significance values associated with the subject area and/or any Aboriginal objects contained therein. A minimum of 28 days was allowed for a response to the document. No comments were received on the methodology from the registered parties however all expressed an interest in participating in fieldwork.

Stage 3. The *Assessment Methodology* outlined in Stage 2 included a written request to provide any information that may be relevant to the cultural heritage assessment of the study area. It was noted that sensitive information would be treated as confidential. No response regarding cultural information was received in response to the methodology.

The fieldwork was organised, and the three registered groups were asked to participate in the fieldwork. The fieldwork was carried out between 25 and 29 March 2019 by an archaeologist from NGH Environmental with local Aboriginal representatives.

Stage 4 In early August 2019, a draft version of the ACHAR for the proposal was forwarded to the Registered Aboriginal Parties (RAPs) inviting comment on the results, the significance assessment and the recommendations. A minimum of 28 days has been allowed for responses to the document.

5.2.2 Aboriginal community feedback

Community consultation occurred throughout the project. The draft report was provided to each of the RAPs and feedback was sought on the recommendations, the assessment and any other issues that may have been important. The period for RAPs comments on the draft assessment has closed, with the report finalised with any additional comments.

5.3 BROADER COMMUNITY CONSULTATION

As part of the EIA process, dedicated community engagement and consultation has taken place to support development of appropriate mitigation measures, where required, to be documented in the EIS. In 2015, the NSW Government conducted its own investigation into community attitudes towards renewable energy and found people's views to be generally favourable of solar farms (OEH, 2015).

Engagement was initiated by Bison Energy as the initial developer with the support of a dedicated Community Liaison Officer. Following acquisition of the proposal by FRV in July 2019, significant and direct community engagement was undertaken by a designated project team, together with an independent regional community engagement consultancy (Banksia Communications). This engagement has been undertaken aligned to the requirements of the SEARs and the NSW DPE's Community & Stakeholder Engagement Guideline, part of the Draft EIA Guidance Series (June 2017). Guidance has also been taken from the DPE's (2007) Guidelines for Major Project Community Consultation and the Australian Renewable Energy Agency's (ARENA's) Establishing the social licence to operate large scale solar facilities in Australia: insights from social research for industry (ARENA n.d.).

A dedicated Community & Stakeholder Engagement Report (CSER) has been prepared to:

- Document the community engagement approach followed by FRV before and during the EIS preparation.
- Document key concerns, issues and/or comments raised by the community during this engagement, as well as how they have been addressed in the EIS.
- Document the future, ongoing community engagement approach for the project, should the proposal be approved.

Details of engagement resources and initiatives undertaken are outlined in the detailed CSER provided in Appendix B.2.

5.3.1 Community engagement approach

The approach followed for the proposed Walla Walla Solar Farm community engagement was aligned with the Public Participation Spectrum developed by the International Association for Public Particiation (IAP2) (https://www.iap2.org.au/Resources/IAP2-Published-Resources). The IAP2 Public Participation Spectrum '*is designed to assist with the selection of the level of participation that defines the public's role in any community engagement program...*'.

Although the proposed Walla Walla Solar Farm is only in the EIS stage, wherever possible, the supporting community engagement was aligned and demonstrated to achieve the public participation goals of:

- *Consultation* – to work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.
- *Involvement* – to partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.

Specific goals for community engagement are as follows:

- Ensure all stakeholders have up to date information about the project, FRV and its contractors;
- Provide timely opportunity for stakeholders to have direct input into aspects of the Walla Walla Solar Farm's development;
- Ensure stakeholders and community know where and how to get information relevant to their needs.

Consultation and *involvement* will continue to be key community engagement goals should the project be approved.

5.3.2 Identified communities and stakeholders

In order to tailor the engagement strategies, it was important to identify key community and stakeholder groups for the proposed solar farm. Five main groups were identified, highlighted in Table 5-1.

Table 5-1 List of identified communities and stakeholders for community engagement

Community & stakeholder group	Description
1. Residential dwelling and businesses within 1 km of the proposal or direct adjoining land (direct neighbours)	• Residential properties or businesses located within 1km of the proposal or has land directly adjoining to the property. • Referred to as development site 'direct neighbours.' • Considered the key proposal community stakeholders. • 6 stakeholders, two of whom are also the subject landowners. (One of the residential properties is also being operated as a local tourism venue – weddings and eco-accommodation) (map reference: R1, R2, R3, R4, R5, R6). • Identified upfront before the project's community engagement was formally initiated.
2. Landowners within a 3 km radius from the subject land (near neighbours)	• Residential, land and/or business owner within a 3 km radius from the proposed development site. (Included outlying residential properties of Walla Walla). • Referred to as 'near neighbours.' • 26 community members including (map reference: R7a-c to R27, R30, R37, R54, R64, R66). • Included community members registered on the project's community engagement database once identified by direct neighbours, or due to their participation in the various consultation strategies.
3. Landowners within a 3 - 5 km radius from the subject land (local community)	• Residential, land and/or business owner within a 3 km to 5 km radius from the proposed development site. (Included outlying farming properties of Walla Walla). • Referred to as 'local community.'

Community & stakeholder group	Description
	• 18 community members including (map reference: ref: R28, R29, R31, R33, R34, R35, R44, R50, R51, R76, R77, R79, R80, R81, R82, R83). • Included community members registered on the project's community engagement database due to their participation in the various consultation strategies.
4. Other community members (broader community)	• Community members residing or operating businesses in a radius greater than 5 km from the proposed development site. • Referred to as the 'broader community.' • 41 community members including (map reference: R32, R36, R38 - R43, R45 – R49, R52, R53, R55 – R63, R65, R67 – R77, R78) − Includes representative community bodies, such as the NSW Farmers' Association, Holbrook Landcare, Gum Swamp Community Committee, Walla Walla Development Committee, local Bushfire Brigades, Sporting Associations.
5. Greater Hume Shire Local Council	• LGA local decision-making authority.
6. Media	• Local media responsible for providing news coverage of local issues and developments.

A dedicated community engagement database (Microsoft Excel format) was established at the beginning of the consultation process. The details of each community and stakeholder member or group have been captured in this database.

As the time of compilation of this CSER, there were 106 entries listed on the project's community database (Figure 5-1).

It is noted that every effort has gone into accurately defining the exact location of residential, land and/or businesses of community members contributing to the project's engagement process to date – as defined in the community engagement database. This has been possible when addresses have been provided as part of the various consultation strategies, such as Community Feedback Forms, or verbal confirmation. Where this information was not made available, exact locations could not be verified. However, these community members are still included in the database.

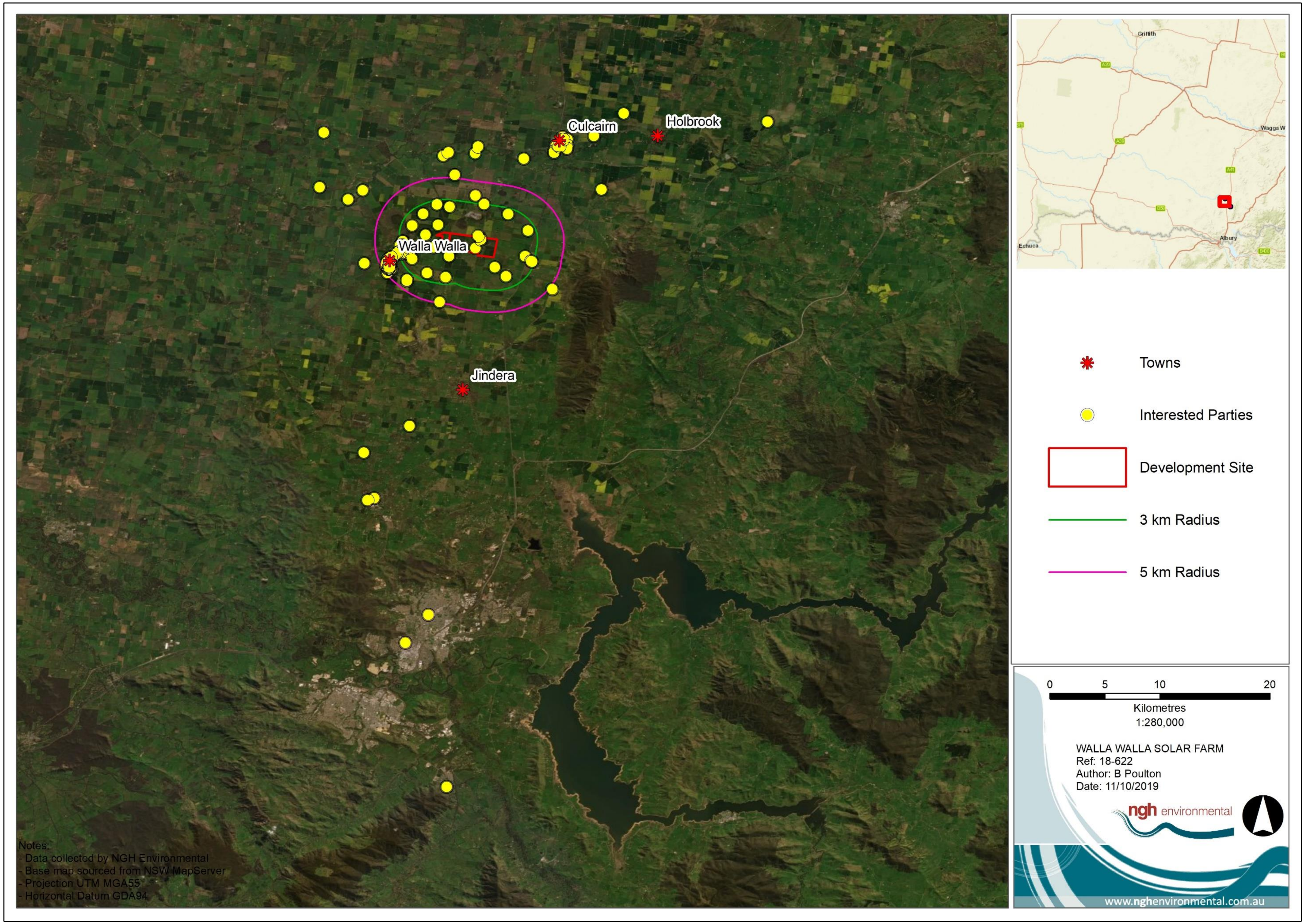


Figure 5-1 Regional broad community responses

5.3.3 Engagement Strategies

A range of community consultation were used with regards to the proposal. These include:

- Development of a project website to provide information and updates http://www.Walla Wallasolarfarm.com.au/. The website went live on 1 March 2019 and was adopted by FRV following acquisition and is now regularly updates. An online feedback form can be filled in to submit comments, suggestions and importantly registration for prospective suppliers and employment.
- E-mail and telephone correspondence via an established email address for feedback to infoaustralia@frv.com. Telephone correspondence was held mainly via the FRV Project Manager, with a direct mobile number provided to the community.
- Holding face-to-face meetings to obtain direct information and understanding of concerns and possible mitigation, along with providing individuals the opportunity to ask any direct questions regarding the proposal.
- Conducting Community Information Sessions for broader community engagement, comprising:

  Open Day No. 1: 7 May 2019 (Culcairn Bowling Club)

  - This Open Day was used to introduce the broader community to the project, explain the overall EIA process and determine where community engagement was considered key. Also, to provide feedback on preliminary specialist studies undertaken by that time.
  - 38 people registered their attendance at this Open Day.

  Open Day No. 2: 9 July 2019 (Walla Walla Bowling Club)

  - This Open Day was used to provide feedback on the completed specialist studies undertaken by that time, as well feedback on queries raised since the first Open Day.
  - 45 people registered their attendance at this Open Day.

  Open Day No. 3: 23 September (Walla Walla Bowling Club)

  - This Open Day was used to provide information on FRV, their experience and approach along with the changes which had been implemented into the design following community consultation.
  - Key FRV team members also attended the session to provide the community with an opportunity to engage with experts in their individual areas, including the 'FRV Head of Construction' and the 'FRV Head of Development'. A presentation was provided at 6pm by the FRV Project Manager.

  Open Day No. 4: 24 September (Walla Walla Bowling Club)

  - This Open Day was used to provide a further opportunity for the wider community to obtain information on FRV, their experience and approach along with the changes which had been implemented into the design following community consultation.
  - Key FRV team members also attended the session to provide the community with an opportunity to engage with experts in their individual areas, including the 'FRV Head of Construction' and the 'FRV Head of Development'.

- Providing Frequently Asked Questions, on the website, during face-to-face discussions, at Community Sessions, and via e-mail.
- Providing ongoing community information in the form of posters, flyers and advertisements in local papers, and at key locations across both Walla Walla and Culcairn.

5.3.4 Addressing community comments

The proposed Walla Walla Solar Farm obtained notable feedback from the community and stakeholders. From the community engagement database, captured and documented comments can be summarised into cumulative response areas, defined as follows:

- Main community concerns and queries including:
    - Environmental-related:
        - Loss of agricultural land use (food security & farmer livelihoods).
        - Incorrect classification of regional land capabilities.
        - Loss of- or impact on local biodiversity.
        - Presence of chemical / hazardous material contamination (in panels).
        - Visual impact.
        - Glare / reflectivity impact.
        - Night lighting impact.
        - Noise and vibration impact.
        - Thermal heating (PVHI – photo voltaic heat island effect).
        - Increased/uncontrolled water use.
        - Changes to surface water runoff (incl. flood pattern changes).
        - Increased fire threats & risks.
        - Increased/uncontrolled pests and weeds.
        - Unmitigated dust (construction).
    - Health and safety-related:
        - Unmitigated site access.
        - Increased traffic movement (mainly around school bus routes).
    - Socio-economic-related:
        - Loss of agricultural 'sense-of-place.'
        - Financial devaluation of adjacent properties.
        - Created community anguish (dividing community; future uncertainties).
        - Increased insurance / public liability for adjacent properties.
        - Loss of secondary agriculture and tourism-related job streams.
        - Cumulative impact of many solar farms in the region.

    - Main community benefits including:
        - Enhanced regional land use & income diversification.
        - Environmental benefits of renewable energy resources.
        - Availability of local jobs (construction).
        - Socio-economic contribution for local towns, specifically Walla Walla.
        - Indifferent / not indicated (community members or stakeholders registered on the database but not having provided any direct feedback on concerns, queries or benefits).

Table 5-2 provides the main concerns/queries and benefits identified, as well as the section in which they have been addressed in this EIS. Details are provided in the CSER.

Table 5-2 Main concerns, queries and benefits raised during community engagement and locations where they have been addressed in the EIS

Main concern/query or benefit	Section addressed in this EIS
Concerns / queries	
Loss of agricultural land use (food security & farmer livelihoods)	Section 6.3
Visual impact	Section 6.2
Financial devaluation of adjacent properties	Section 6.4
Loss of or impact on local biodiversity	Section 6.8
Loss of agricultural 'sense-of-place'	Sections 6.3 and 7.6
Loss of secondary agriculture and tourism-related job streams	Sections 6.4 and 7.6
Changes to surface water runoff (incl. flood pattern changes)	Section 0
Benefit	
Enhanced regional land use & income diversification	Section 6.4
Environmental benefits of renewable energy resources	Section 2.2
Availability of local jobs (construction)	Section 6.4

5.3.5 Providing responses to affected members of the community

Early in 2019, near neighbours potentially affected by visual and noise impacts from the proposal were met with on a one-to-one basis to discuss any questions and concerns they had. Following these initial discussions, the proponent provided written responses to all questions by email. After FRV acquired the project in July, they met with stakeholders in July, August and September 2019. During the face-to-face meetings, impact mitigation measures were provided and explained, specifically for each potentially affected residence. Uninvolved direct landowners R1, R2, R5 and R6 have been provided with clear mitigation measures.

5.3.6 Community Investment Program

Based on the ongoing community engagement, FRV has identified the desire to develop a dedicated Community Investment Program (CIP) for the proposal (Appendix B). The aim for this CIP would be to conceptualise and develop a strategy for possible projects and/or financial contribution for the local community as part of the solar farm operational period. This would be up-and-above the commitments made as part of the EIS.

The proponent has undertaken a CIP-based strengths, weaknesses, opportunities and threats' (SWOT) analysis, underpinned with the desire that FRV aims to:

- Give back to the Walla Walla, Culcairn and surrounding community.
- Support and build stronger, cohesive and more resilient communities within a diversified suite of land uses.
- Collaborate with and empower communities to identify their priorities.
- Encourage and support innovative solutions and approaches to local issues.
- Promote positive, long-term local outcomes and capabilities.
- Promote local awareness of and commitment to the sustainable community ideal.

The above opportunities have been identified as part of the numerous community discussions, some of them have already been preliminarily discussed with neighbours and community stakeholders.

5.3.7 Continued community and stakeholder engagement

Engagement activities would continue throughout the EIS determination period.

The CSER would be reviewed regularly, as well as at key transition phases between different stages of project development (e.g. prior to construction or operation). The CSER would continue to guide engagement activities at all stages of the project, ensuring that engagement is appropriate and in line with good practice.

Continued consultation would also be carried out with the direct neighbours on the exact details of the planned screening vegetation subject to approval of the EIS, as discussed in section 6.1.

5.3.8 Communication with non-government organisations

Preliminary discussions have been held with Boral Resources regarding the purchase of construction water, transport of heavy vehicles along Benambra Road and general information about the layout and activities of the proposal. Copies of this correspondence are provided in Appendix B.2.

FRV has also discussed the opportunity to obtain water from the metred water pipeline belonging to RWCC that runs through the development site. FRV were advised that use of this water from the existing metre (north of the development site) would be permissible with authorisation from the landholder. RWCC also advised that a formal application would be required to install an additional metering point along the pipeline at the southern end of the development site.

6 ENVIRONMENTAL IMPACT ASSESSMENT

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In particular, the EIS must include:

- *an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:*
  - *a description of the existing environment likely to be affected by the development;*
  - *an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region (in particular Hurricane Hill Quarry and the proposed Jindera and Glenellen Solar Farms), taking into consideration any relevant legislation, environmental planning instruments, guidelines, policies, plans and industry codes of practice;*
  - *a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and*
  - *a description of the measures that would be implemented to monitor and report on the environmental performance of the development.*

OFFICE OF ENVIRONMENT AND HERITAGE REQUIREMENTS

OEH recommends that the EIS needs to appropriately address the following:

1. *Biodiversity and offsetting.*
2. *Aboriginal cultural heritage.*
3. *Flooding.*

6.1 IMPACT ASSESSMENT APPROACH

Following the preparation of the Scoping Report, an impact assessment was undertaken to characterise the likely adverse environmental risks associated with the construction, operation and decommissioning of the proposal. The aim of the impact assessment was to ensure that all relevant risks were identified, investigated and mitigated as part of the EIS submission, relative to the degree of environmental risk they represented.

The environmental impact assessment below addresses all impacts likely to be attributed to the proposal (including the solar farm and transmission infrastructure). This includes consideration of:

- Direct impacts - impacts directly attributable to the construction, operational and decommissioning phases such as:
  - Disturbances to native vegetation, soil, water and air quality.
  - Potential to impact on cultural features and values.
  - Noise generated by equipment and traffic movements.
  - Public safety, pollution risks and hazards.
- Indirect impacts – follow-on or cascading impacts such as:
  - Impacts on the local economy.
  - Potential to impact existing and future land uses.
- Cumulative impacts - the combined potential effects of different impact types as well as the potential interaction with other proposals. For example:
  - The combined impact of construction noise, traffic and visual impacts for nearby residences.
  - The combined effects of the construction phase coinciding with other large infrastructure works that may be planned in the area.

Table 6-1 summarises the results of the impact assessment. Fourteen environmental impact were investigated.

Table 6-1 Analysis of adverse environmental issues.

Environmental risk	Outcomes	Impact (unmitigated)	Impact (mitigated)
Biodiversity	• Design modified to reduce clearing and removal of farm dams. • 15 retained dams and 10 dams transformed to create wetlands. • Significant vegetation screening aims to enhance retained habitat. • Proposed planting to connect to existing vegetation to create wildlife corridors. • 120 nesting boxes proposed to be implemented across the site. • Committed to no barbed wire on top of the FRV security fence.	Very High	Low
Aboriginal heritage	• Design modified to avoid PADs, scarred trees and cultural trees. Isolated artefacts and artefact scatters would be relocated and retained within the development site.	High	Medium
Visual	• Design modified to include infrastructure setbacks adjacent to direct neighbours. • Security fence setback from property boundaries and screened by any existing vegetation and proposed planting. • Relocation of substation to minimise visual impact on nearest residence. • Strategic screening plantings ranging in width from 5 m to 50 m.	Very High	Low to Medium
Noise	• Design modified to include infrastructure setbacks adjacent to near neighbours. • Relocation of access points to minimise noise impact on nearest residences. • No inverters installed within 400 m of nearest residence. • Construction mitigation measures implemented to minimise noise impacts on near neighbours.	High	Low

Environmental risk	Outcomes	Impact (unmitigated)	Impact (mitigated)
Land use	• Substantial investigations into the likely impacts of the proposal on regional agricultural productivity suggest minimal impact. • 85% of sheep grazing capacity retained over operation. • Income diversification can help farmers offset input costs for the portion of their land used solely for primary agriculture.	High	Medium
Soils and water	• Desktop investigations suggest that the proposal would improve soil health and structure over time. • Soil stability is suitable to support solar farm infrastructure. • Existing landform and drainage would not be altered by the proposal. • Infrastructure would be placed so that the proposal has minimal impact on surface water (and debris) moving during a flood event.	Medium	Low
Transport	• Main construction access relocated to north eastern corner of the development site, shortening transport route on local roads. Reducing noise and dust impact outside the development footprint. • Crossing points on Schneiders Road to minimise impacts on local roads. • Would consider implementing shuttle buses during construction to alleviate traffic movements.	High	Low to Medium
Hazards	• Fire preparation measures would exceed Planning for Bushfire Protection Guidelines (RFS 2018).	High	Low to Medium
Resource Use and Waste Generation	• Packaging would be minimised and recycled where practicable. • Packaging would be made from biodegradable materials where practicable.	Medium	Low

Environmental risk	Outcomes	Impact (unmitigated)	Impact (mitigated)
	• Solar arrays would be constructed largely from recyclable materials. • The proposal would contribute renewable energy to the national electricity network reducing reliance on fossil fuels.		
Historic Heritage	• No registered heritage places would be impacted by the proposal.	Low	Low
Climate	• The proposal would contribute renewable energy to the national electricity network reducing generation of GHG emissions. • Dust generation would be minimised through regular watering of internal roads.	Low	Low
Socioeconomic	• The proposal would provide approximately 250 FTE jobs during construction and approximately 21 FTE during operation. • The proposal would diversify employment opportunities, reducing reliance on the agriculture sector (vulnerable to climate and market fluctuations) in Walla Walla/Culcairn. • Desktop investigations indicate that property prices of adjacent productive agriculture land would not be adversely impacted by the proposal.	Medium	Low
Cumulative impacts	• Visual, noise and traffic cumulative impacts would be addressed individually prior to and during construction. • FRV would discuss potential cumulative impacts with other approved developments within 5 km of the development site to maximise efficient use of existing infrastructure and minimise impacts on near neighbours.	Medium	Low

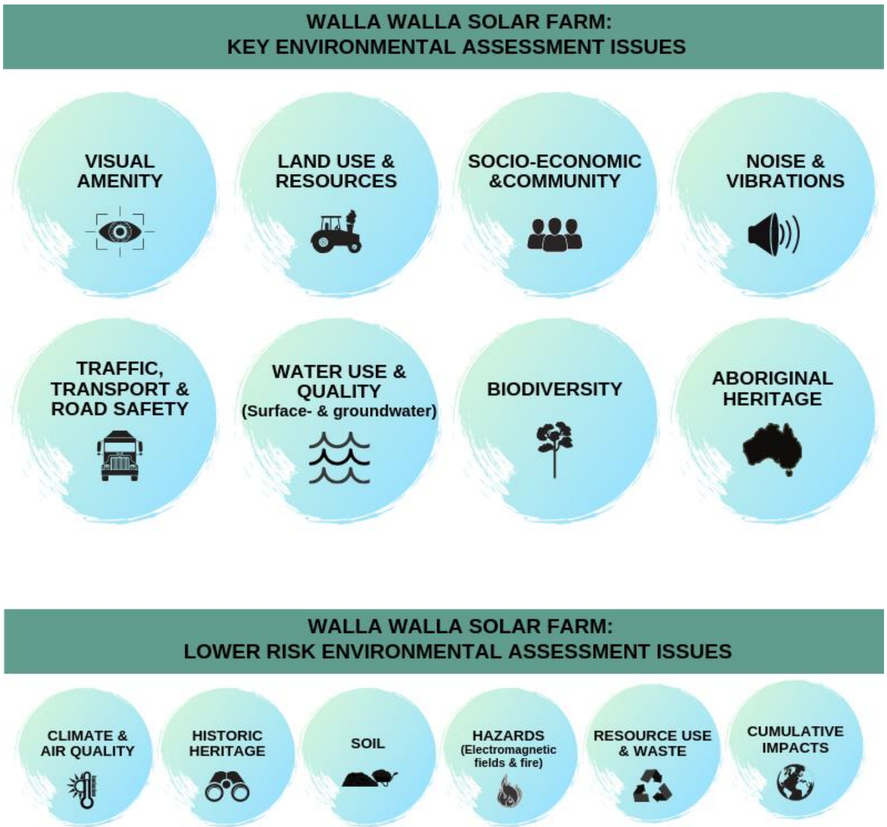
In summary, the following environmental risk were considered to be key issues for detailed assessment and consideration of mitigation strategies within the EIS:

- Visual amenity.
- Land use & resources.
- Socio-economic & community.
- Noise & vibrations.
- Traffic, transport & road safety.
- Water use & quality.
- Biodiversity.
- Aboriginal cultural heritage.

In addition, the following were also identified as being environmental assessment issues of lower risk: climate change & air quality, historic heritage, soil, health and safety-related hazards, resource use and waste, and cumulative impact.

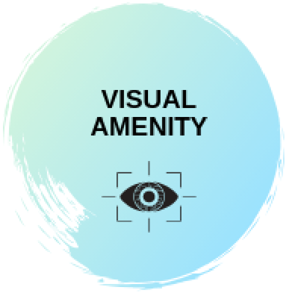
Visual amenity, biodiversity, Aboriginal heritage, traffic, flooding and noise impacts were investigated by specialists.

Full visual impact and quantitative noise assessments are provided in sections 6.1 and 6.3, whereas the reports for biodiversity and Aboriginal heritage, flood potential and traffic are attached as Appendices G, F, I and E, respectively (also summarised in section 6). Land use has been assessed in section 6.6 and addresses guidance provided in *Primefact 1063: Infrastructure proposals on rural land* (DPI, 2013) and the *Land and soil capability assessment scheme* (OEH, 2012). Lower risk issues are addressed in section 6.8.



Where a particular risk has also been captured during the community engagement as being a concern for community members, these concerns or queries have also been provided.

6.2 VISUAL AMENITY



A Visual Impact Assessment (VIA) was undertaken for the proposal. It provides a full assessment of the visual impacts associated with the proposal, including:

- Landscape character and scenic vistas.
- Stakeholder values regarding visual amenity.
- Potential impacts on representative viewpoints.
- Addressing requirements of the SEARs.
- Addressing the requirements of the NSW Large-scale Solar Energy Guidelines (DPE, 2018).

The VIA includes a strategy to address identified impacts, including onsite vegetation screening, general design measures and a process to verify the actual visual impacts of the proposal. This improves the reliability of the measures and provides a trigger to undertake additional mitigation if required. This section provides a summary of the VIA results and proposed mitigation measures. The full VIA is provided in Appendix K.

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Visual –

Including an assessment of the likely visual impacts of the development (including any glare, reflectivity and night lighting) on surrounding residences, scenic or significant vistas, air traffic and road corridors in the public domain, including a draft landscaping plan for on-site perimeter planting, with evidence it has been developed in consultation with affected landowners.

RELATED KEY COMMUNITY CONCERNS & QUERIES

As part of the community engagement, the proposal's visual impact was deemed one of two of the proposed solar farm's largest community impacts. The greatest visual impacts were raised from direct neighbours whose outlook from their homesteads and businesses is towards the proposal.

Main community group affected:
DIRECT NEIGHBOURS
(specifically R1, R2, R3, R4, R5, and R6)

Four direct neighbours (R1, R2, R5 and R6) (and the two subject landowners – R3 and R4) have houses and/or working land with a direct outlook on the subject land.

1. Direct visual impact
2. Location of substation
3. Design of vegetation screening
4. Glare / reflectivity, and night
5. Indirect (local /regional) visual

6.2.1 _Community values_

Community consultation specific to the assessment of visual impacts for the proposal was conducted for near neighbours and the broader community as summarised below:

- During January 2019, adjoining landholders were visited in person by Bison Energy including 5 uninvolved residences within a 2 km radius of the proposal.

- In May 2019, Urbaine Architecture visited the homes of residents identified through the engagement process that requested a visual montage. Montages of what the proposal may look like, including rendered images of solar panels, were created and provided to the relevant landowners in June 2019.
- Two open community meetings were held in May and July 2019 in Culcairn and Walla Walla, respectively.
- Between May and July inclusive, fliers with details about the proposal were posted on physical community noticeboards, the project's website and the Boarder Mail newspaper. Contact details for all residences within 3 km of the proposal were obtained during the community engagement process and all of these residents were invited to the second community meeting by email.
- All residents within a 3 km radius that requested follow up with the proponent during the community engagement period were contacted as per their requested contact method. This included face-to-face meetings, phone calls, emails and letters.
- In July 2019, FRV purchased the proposal and proceeded to engage with near neighbours, to understand their visual concerns.
- FRV used information from neighbours and stakeholders and the results of the initial VIA to redesign the layout and also develop a detailed Landscape Plan that includes clear setbacks and significant vegetation buffers.
- In September 2019, FRV met with neighbours again to provide information on the design changes which had been implemented to accommodate their concerns and also show the detailed landscaping plans which had been proposed.
- Third and fourth community meetings were held in Walla Walla to present to the wider community the changes which FRV had implemented to the design. Visual boards along with videos of existing FRV solar farms within Australia and globally were shown.

6.2.2 Potential impacts

An operational visual impact assessment was conducted considering:

- The proposed solar farm components.
- The potential for the proposed solar farm to be viewed from representative viewpoints.
- The degree of contrast the proposed solar farm would have within the identified landscape management zones (LMZs). LMZs were assigned to viewpoints based on the results of the fieldwork, and the contrast at that viewpoint was evaluated, as described below.
- The potential impact from glare.

Photomontages

Photomontages of the project shown within the existing context were prepared by Urbaine Architecture to assist in the impact assessment of the proposal. Three viewpoints were identified for the production of photomontages as they were located within 1 km of the proposal.

Evaluation results

12 viewpoints were assessed surrounding the development site to gage the visual impact of the proposal including the three residential properties with views of the development site and nine viewpoints from public roads. The locations of residential and public viewpoints are shown in Figure 6-1.

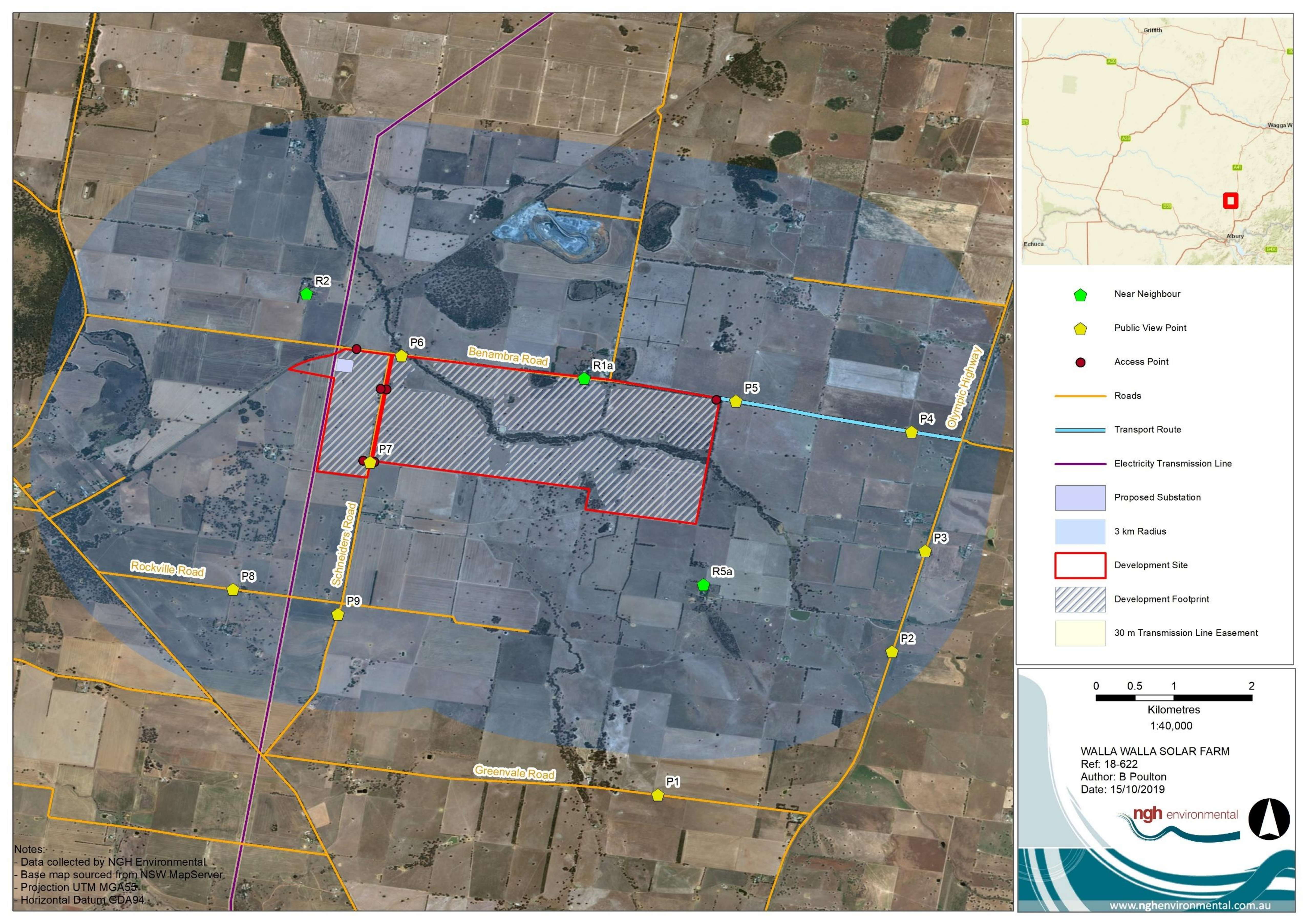


Figure 6-1 Visual impact assessment locations

6.2.1 Impact assessment and mitigation for near neighbours

RESIDENCE 1

- As R1 is the closest resident to the proposal. R1a specifically is approximately 80 m north from the property boundary while R1b is approximately 350 m north of the property boundary. FRV have provided the following mitigation measures:
  - Changed the site access. Originally, 3 main access points were proposed along the Benambra Road, with traffic travelling past these residences, creating unnecessary dust and noise impacts. FRV have abandoned these access points and created one single main access point to the north-east of the project, now approximately 1.4 km away from these residences, therefore dramatically reducing the impact.
  - Existing, mature boundary vegetation would now be retained.
  - Altered the solar array design layout, setting-back solar panels directly opposite the R1a and R1b homesteads. This is referred to as a 'visual set-back' and would be undeveloped and left as grazing paddocks and providing the residences a sense of space.
  - After this setback an extensive 50 m vegetation buffer would be implemented. A detailed landscaping plan has been created:
    - Specific species that would effectively develop across the understory, mid- and top-canopy structures.
    - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna.
    - Erecting nesting and faunal boxes to encourage wildlife use of the area.
    - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
  - From this vegetation buffer, a further 10 m setback would be allocated for the Asset Protection Zone (APZ).
  - After the APZ, only then would the solar farm security fence be installed.
  - An additional 5 m minimum setback would occur before the solar array.
  - From R1a, a 400 m radius 'inverter exclusion zone' would be implemented. Therefore, the design has been altered so no inverters would be installed within 400 m, to further reduce visuals.

Unmitigated impact	High
Residual impact	Moderate

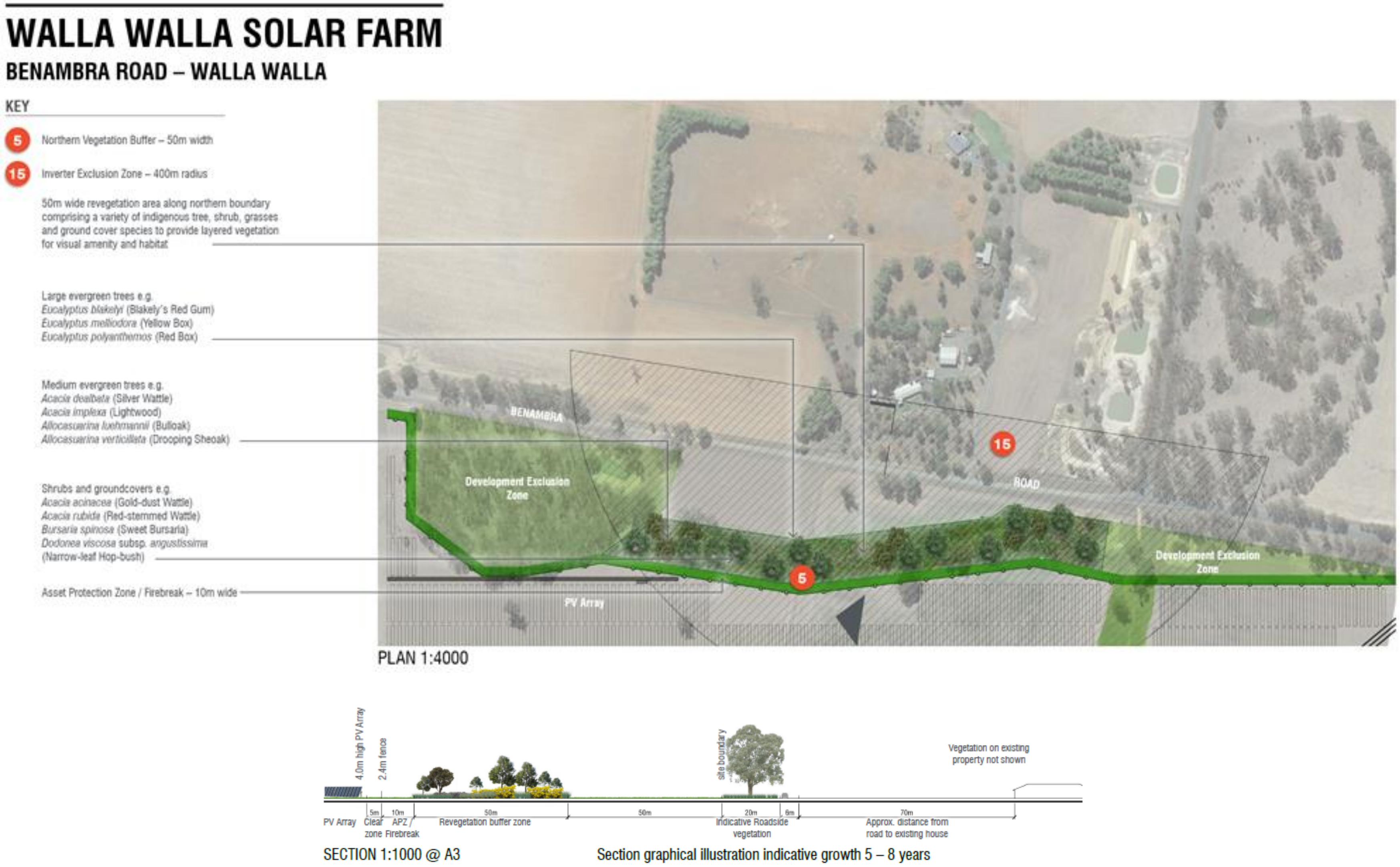


Figure 6-2 Mitigation setback and landscaping for Residences 1a and 1b

a) Existing Undeveloped View

b) Infrastructure Superimposed (prior to screening)

c) Infrastructure Superimposed with proposed Vegetation Screening

Figure 6-3 Existing, infrastructure and infrastructure with vegetation screening - views from the driveway of R1a

RESIDENCE 2

- R2 is located approximately 800 m north-west from the proposal. FRV have provided the following mitigation measures:
  - Changed the site access. Originally, 3 main access points were proposed along the Benambra Road, with traffic travelling in close proximity to their driveway, creating unnecessary dust and noise impacts. FRV have closed these proposed access points and created one single main access point to the north east of the project, now approximately 4.4 km away from these residences, therefore dramatically reducing the impact.
  - FRV have also changed the location of the proposed O&M facilities, which was originally proposed beside the TransGrid substation. It would now be located at the main access point, 4.4 km away from R2, therefore reducing any impact in the long term for this resident.
  - FRV reinvestigated the location of the substation and have moved this piece of infrastructure 100 m south to accommodate the views of R2. This was at significant cost and time to FRV.
  - By altering the location of the substation, mature boundary vegetation can now be retained, further protecting the views of R2.
  - Solar panels have not been proposed in the most north-western section of the development site.
  - Along with FRV moving the substation, an extensive 50 m vegetation buffer would be implemented. A detailed landscaping plan has been created:
    - Specific species that would effectively develop across the understory, mid- and top-canopy structures.
    - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna.
    - Erecting nesting and faunal boxes to encourage wildlife use of the area.
    - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
  - Additional screening would be implemented in the north-west boundaries including 5 m and 10m buffers which would also help facilitate views of the project from R2.
  - From the substation, a further 10 m setback would be established for the APZ.
  - After the APZ, only then would the solar farm security fence be installed. After further consultation, FRV decided to not implement the security fence close to the property boundary and instead closer to the solar array and further away from R2.
  - An additional 5 m minimum setback will would be implemented before the solar array.

Unmitigated impact	Moderate
Residual impact	Low

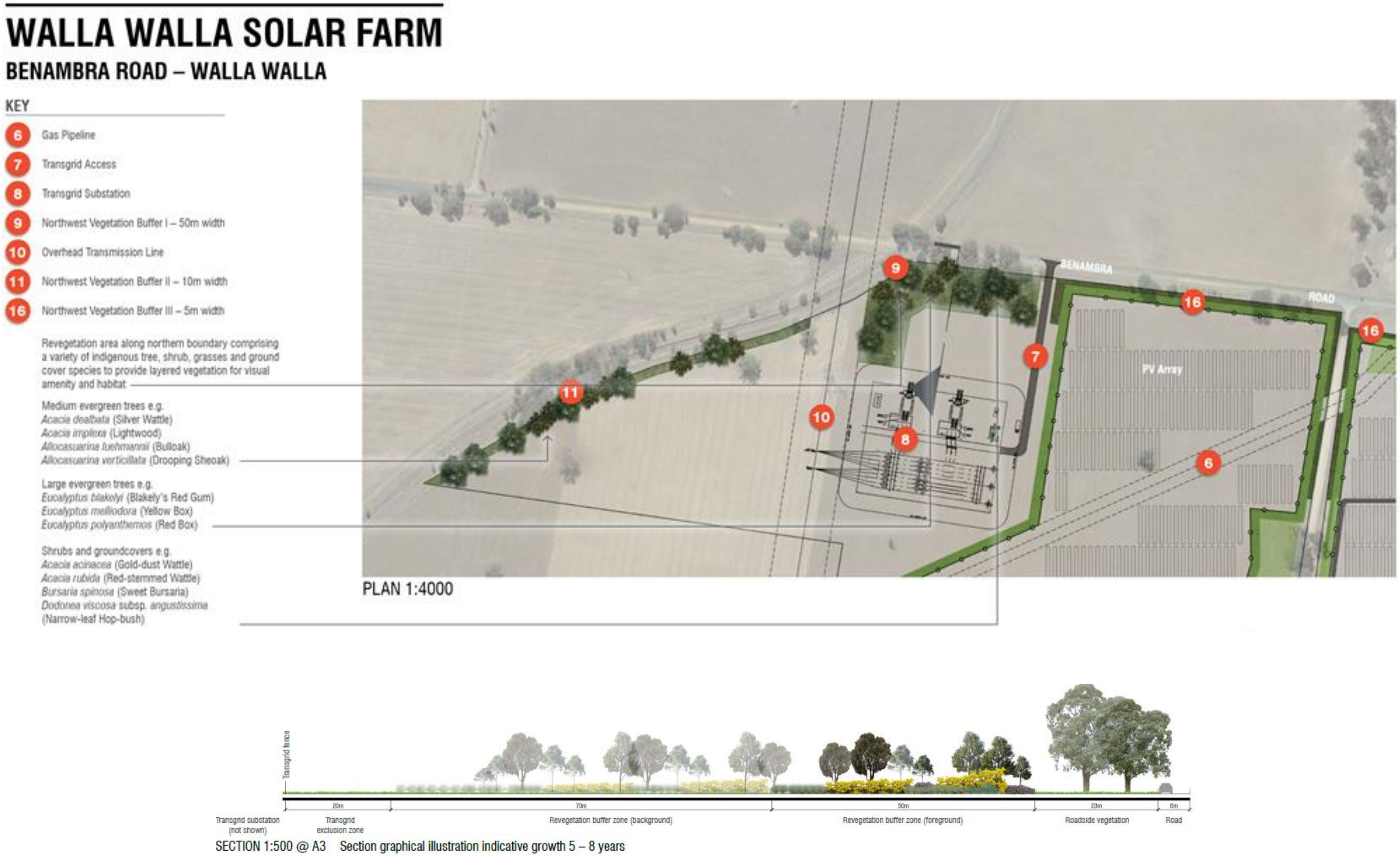


Figure 6-4 Substation relocation and landscaping for Residence 2

a) Existing undeveloped view

b) Infrastructure superimposed (prior to screening)

c) Infrastructure superimposed with proposed vegetation screening

Figure 6-5 Existing, original infrastructure and mitigated views from the second floor balcony of Residence 2

RESIDENCE 5

- R5a is located approximately 800 m south-east from the proposal. FRV have provided the following mitigation measures:
    - Altered the solar array design layout, setting-back solar panels at least 65 m from the southern property boundary.
    - Implementing this setback, has allowed FRV to therefore utilise this area and implement further mitigation by offering an extensive 50 m vegetation buffer along the full length of the southern boundary and 100 m travelling north along the eastern boundary. Following this 50 m buffer, an additional 5 m vegetation buffer would travel the full length of the eastern boundary to complement the existing mature vegetation that is present along the majority of the boundary. A detailed landscaping plan has been created:
        - Specific species that would effectively develop across the understory, mid- and top-canopy structures.
        - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna.
        - Erecting nesting and faunal boxes to encourage wildlife use of the area.
        - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
    - From this vegetation buffer, a further 10 m setback would occur for the APZ.
    - After the APZ, only then would the solar farm security fence be installed.
    - An additional 5 m minimum setback would occur before the solar array.

Unmitigated impact	Moderate
Residual impact	Low

Figure 6-6 Mitigation setback and landscaping for Orange Grove Gardens

a) Existing undeveloped view

b) Infrastructure superimposed (prior to screening)

c) Infrastructure superimposed with vegetation screening

Figure 6-7 Existing, original infrastructure and views mitigated with setback and landscaping for Orange Grove Gardens

RESIDENCE 6 (no views from dwelling)

- R6 is located approx. 2.2 km east from the proposal, with their dwelling surrounded by mature vegetation and therefore will have no views of the proposal from their dwelling itself. FRV have provided the following mitigation measures;
  - Altered the solar array design layout, setting-back solar panels, committing to at least 30m from the adjoining property boundary to any solar infrastructure.
  - Implementing this setback, has allowed FRV to therefore utilise this area and implement further mitigation by offering an 5m vegetation buffer along the eastern boundary. This will complement the mature vegetation which already exists along the majority of the eastern boundary. A detailed landscaping plan has been created;
    - Specific species that would effectively develop across the understory, mid- and top-canopy structures;
    - Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna; and
    - Erecting nesting and faunal boxes to encourage wildlife use of the area.
    - Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife.
  - From this vegetation buffer, a further 10m setback will occur for the APZ.
  - After the APZ, only then will the Solar Farm security fence be installed.
  - An additional 5m minimum setback will occur before the solar array will occur.

Unmitigated impact	Low
Residual impact	Low

Table 6-2 evaluates the expected level of visual impact from the 12 representative viewpoints including three residential dwellings and nine public viewpoints on local roads.

Nine public viewpoints were selected along local roads to assess the visual impacts of the proposal for local traffic and surrounding non-residential agricultural land. Depending on the presence of existing vegetation, the topography of the land and distance from the proposal additional screening has either been proposed or not proposed.

Table 6-2 Visual impact at public viewpoints with reference to the proposed solar farm at Walla Walla

PUBLIC VIEWPOINT 1		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Rural	Taken from Greenvale Road facing north towards the proposal. The Viewpoint is representative of the rural views of the area. Dominate features include the unsealed road, grazing and cropping paddocks, fencing, and vegetation. Proposed infrastructure is not discernible by residence or motorists due to distance, existing vegetative screening and the undulating nature of the area. **No mitigation is required**
Scenic Quality	Moderate	
Proximity	Background (<2 km)	
Sensitivity	Low	
LMZ Objective	C	
Contrast	Indistinct	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 2

Summary of Viewpoint		Viewpoint Description / Impact
LCU	Industrial	Taken from the Olympic Highway facing north-west towards the proposal. The Viewpoint is representative of the industrial views of the major highway. Dominate features include the dual lane sealed road, grazing and cropping paddocks, fencing, and vegetation. Proposed infrastructure is not discernible by residence or motorists due to distance, existing vegetative screening and the undulating nature of the area. **No mitigation is required**
Scenic Quality	Low	
Proximity	Background (<2 km)	
Sensitivity	Low	
LMZ Objective	C	
Contrast	Indistinct	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 3		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Residential	Taken from the Olympic Highway facing west towards the proposal. The Viewpoint is representative of the residential views of residences along the Highway. Dominate features include the tree lined, major sealed road, grazing and cropping paddocks, fencing, and dense vegetation. Proposed infrastructure is not discernible by residence or motorists due to dense existing vegetative screening and creek line in the distance. **No mitigation is required**
Scenic Quality	Moderate	
Proximity	Background (<2 km)	
Sensitivity	Moderate	
LMZ Objective	C	
Contrast	Indistinct	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 4

Summary of Viewpoint		Viewpoint Description / Impact
LCU	Residential	Taken from Benambra Road facing south towards the proposal. The viewpoint is representative both of the rural nature of the area and the residential homes along Benambra Road. Dominate features include the tree lined, sealed road, grazing and cropping paddocks, fencing and other vegetation (paddock trees, windrows and creek line). Currently, the land is predominately cleared and flat with moderate vegetative screening. Views of the proposed infrastructure will be negligible by approaching vehicles but are unlikely to cause distraction to motorists due to existing vegetative screening and distance from the proposal. The infrastructure blends with the existing views of the area. **No mitigation is required**
Scenic Quality	Low	
Proximity	Background (1-2 km)	
Sensitivity	Moderate	
LMZ Objective	C	
Contrast	Low	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 5		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Rural	Taken from Benambra Road outside the agricultural property owned by R6, facing south-west. Dominate features include the tree lined, sealed roads, grazing and cropping paddocks, fencing, and vegetation. The land is predominately cleared and flat with roadside vegetative screening. The location represents the first area where motorists will gain a view of the proposal as they drive west on the moderately used Benambra Road. Views of the proposed infrastructure would be noticeable but would be fleeting due to speed of travel and relatively dense nature of the existing roadside vegetation. **Mitigation** Existing boundary vegetation will be retained. Mature vegetative screening is available along the majority of the eastern boundary of the project and along the Benambra Rd, however, to further mitigate any visual impacts, 5m screening will be added to the eastern boundary to help infill and screen any views of the proposal.
Scenic Quality	Moderate	
Proximity	Foreground (>1 km)	
Sensitivity	Low	
LMZ Objective	C	
Contrast	Moderate	
Unmitigated Visual Impact	MODERATE	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 6		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Rural	Taken from the intersection of Benambra Road and Schneiders Road facing south-east towards the proposal. The viewpoint is representative both of the rural nature of the area and the industrial view of Benambra Road. Dominate features include the tree lined, sealed and unsealed roads, grazing and cropping paddocks, fencing, and vegetation. Currently, the land is predominately cleared and flat. The location represents an intersection in between two sections of the proposal. Views of the proposed infrastructure through vegetative screening will be noticeable on both sides of the road as vehicles turn south from Benambra Road onto Schneiders Road. Views would however be fleeting due to speed of travel and existing vegetation. **Mitigation** FRV will implement a vegetative buffer on either side of the intersection of Benambra Road and Schneiders Road to reduce visuals by motorists at the intersection. Setbacks of the infrastructure have also been implemented into the design.
Scenic Quality	Moderate	
Proximity	Foreground (>1 km)	
Sensitivity	Low	
LMZ Objective	C	
Contrast	Moderate	
Unmitigated Visual Impact	MODERATE	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 7		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Rural	Taken from Schneiders Road (proposed southern crossing point) at its intersection with the proposal, facing northeast. Dominate features include the tree lined, unsealed roads, grazing and cropping paddocks, fencing, and vegetation. The land is predominately cleared and flat with roadside vegetative screening. The location represents the first point where motorists will gain a view of the proposal as they drive north on Schneiders Road. Clear views of the proposed infrastructure will be noticeable on both sides of the road. Views would however be fleeting due to speed of travel. **Mitigation not required** Additional screening is not proposed along this section of Schneiders Road, predominantly utilised by landholders involved with the proposal. Implementing the Biodiversity Enhancement Plan would assist in filling gaps in existing vegetation along the Schneiders Road, which is to be retained.
Scenic Quality	Low	
Proximity	Foreground (>1 km)	
Sensitivity	Moderate	
LMZ Objective	B	
Contrast	Moderate	
Residual Visual Impact	MODERATE	

PUBLIC VIEWPOINT 8		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Residential	Taken from Rockville Road facing northeast towards the proposal. The viewpoint is representative both of the rural nature of the area and the residential homes along Rockville Road. Dominate features include the local road grazing and cropping paddocks, fencing and other vegetation. Currently, the land is predominately cleared and flat with moderate vegetative screening. Views of the proposed infrastructure are indistinct by residences and would be unnoticeable to motorists due to existing vegetative screening and distance from the proposal. **No mitigation is required**
Scenic Quality	Low	
Proximity	Background (<2 km)	
Sensitivity	Moderate	
LMZ Objective	C	
Contrast	Indistinct	
Residual Visual Impact	LOW	

PUBLIC VIEWPOINT 9		
Summary of Viewpoint		Viewpoint Description / Impact
LCU	Residential	Taken from Schneiders Road facing north towards the proposal. The viewpoint is representative both of the rural nature of the area. Dominate features include grazing and cropping paddocks, fencing and remnant vegetation. Currently, the land is predominately cleared and flat with moderate vegetative screening. Views of the proposed infrastructure are indistinct by residences and would not cause visual impact to motorists due to existing vegetative screening and distance from the proposal. **No mitigation is required**
Scenic Quality	Moderate	
Proximity	Middle-ground (1-2 km)	
Sensitivity	Moderate	
LMZ Objective	B	
Contrast	Indistinct	
Residual Visual Impact	LOW	

Medium impact – mitigation should be considered

Existing native vegetation occurs along Benambra Road and is also sparsely present along Schneiders Road. Where dams and patches of native vegetation are to be enhanced for biodiversity, this would aid to break up views from local roads. The proposed location for the TransGrid substation was selected for providing minimal visual impact on R2 compared to the alternatives available.

Low impact – no mitigation

Low impacts are seen for arterial roads, residences and businesses, where views of the solar farm infrastructure would be difficult to perceive or is indistinct. Visual impacts on involved landholders who would benefit financially from the proposal are also considered low. Low impacts are expected for the majority of the study area and representative viewpoints due to distance to infrastructure, existing vegetative screening, retained on-site vegetation and the overall undulating terrain of the area. No mitigation is required for these locations.

Landscape Plan

Screening vegetation has been considered in accordance with the draft planting layout provided in **Error! Reference source not found.** and Appendix E. The purpose of the screening is to break up the view into the site. Screening requirements include:

- Plantings would be more than one row deep and where practical, planted on the outside of the permitter fence, to break up views of infrastructure including the fencing.
- The plant species to be used in the screen are recommended to be native, derived from the naturally occurring vegetation community in this area. They should be fast growing with mixed canopy height. Species selection could be undertaken in consultation with affected near neighbours and a botanist, horticulturalist or landscape architect.
- The timing is recommended to be chosen to ensure the best chance of survival and can commence during the construction of the proposal if timing suits.
- The screen would be maintained for the operational life of the solar farm. Dead plants would be replaced. Pruning and weeding would be undertaken as required to maintain the screen's visual amenity and effectiveness in breaking up views.

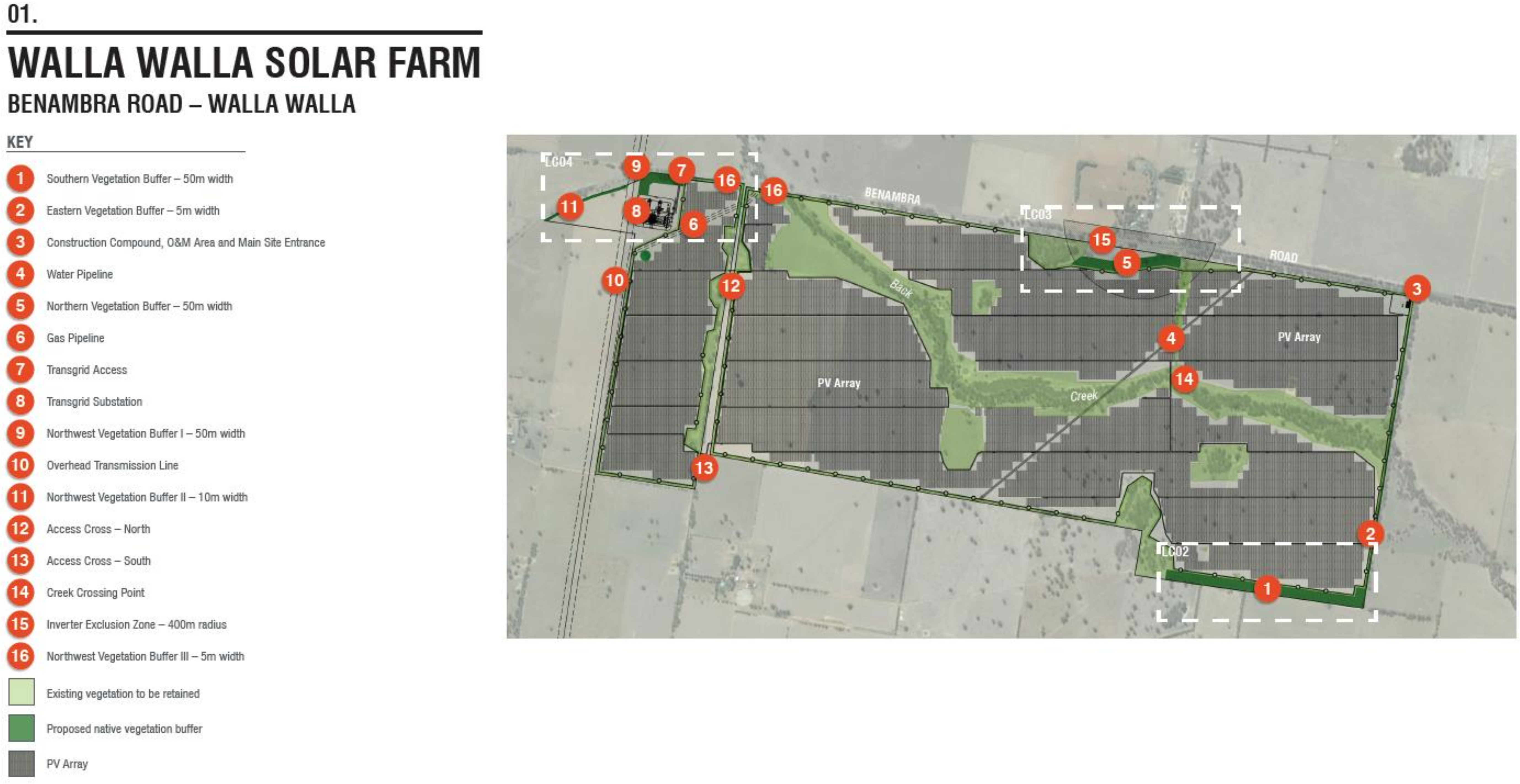


Figure 6-8 Detailed Landscape Plan

6.2.2 Glare

The potential for glare associated with non-concentrating PV systems that do not involve mirrors or lenses is relatively limited. PV solar panels are designed to reflect as little sunlight as possible, generally around 2% of the light received (Spaven Consulting, 2011), resulting in negligible glare or reflection. The reason for this is that PV panels are designed to absorb as much solar energy as possible in order to generate the maximum amount of electricity. The panels will not generally create noticeable glare compared with an existing roof or building surface (DoP, 2010). Seen from above (such as from an aircraft) they appear dark grey and do not cause a glare or reflectivity hazard. Solar PV farms have been installed on a number of airports around the world such as Darwin Airport.

Onsite infrastructure that may cause glare or reflections, depending on the sun angle, include:

- Steel array mounting - array mounting would be steel.
- Temporary site offices, sheds, PV boxes or PV skids.
- Perimeter fencing.
- Permanent staff amenities.

This infrastructure would be relatively dispersed and unlikely to present a glare or reflectivity hazard to residences, motorists or aircraft.

6.2.3 Potential cumulative impacts

Adverse cumulative impacts occur when the infrastructure or activities at the solar farm site exacerbate the negative impacts of other infrastructure or activities occurring nearby. The proposed Culcairn Solar Farm is in close proximity to the proposal and residences Figure 6-9. This cumulative impact assessment assumes a worst case scenario that both solar farms will be constructed and operated at the same time.

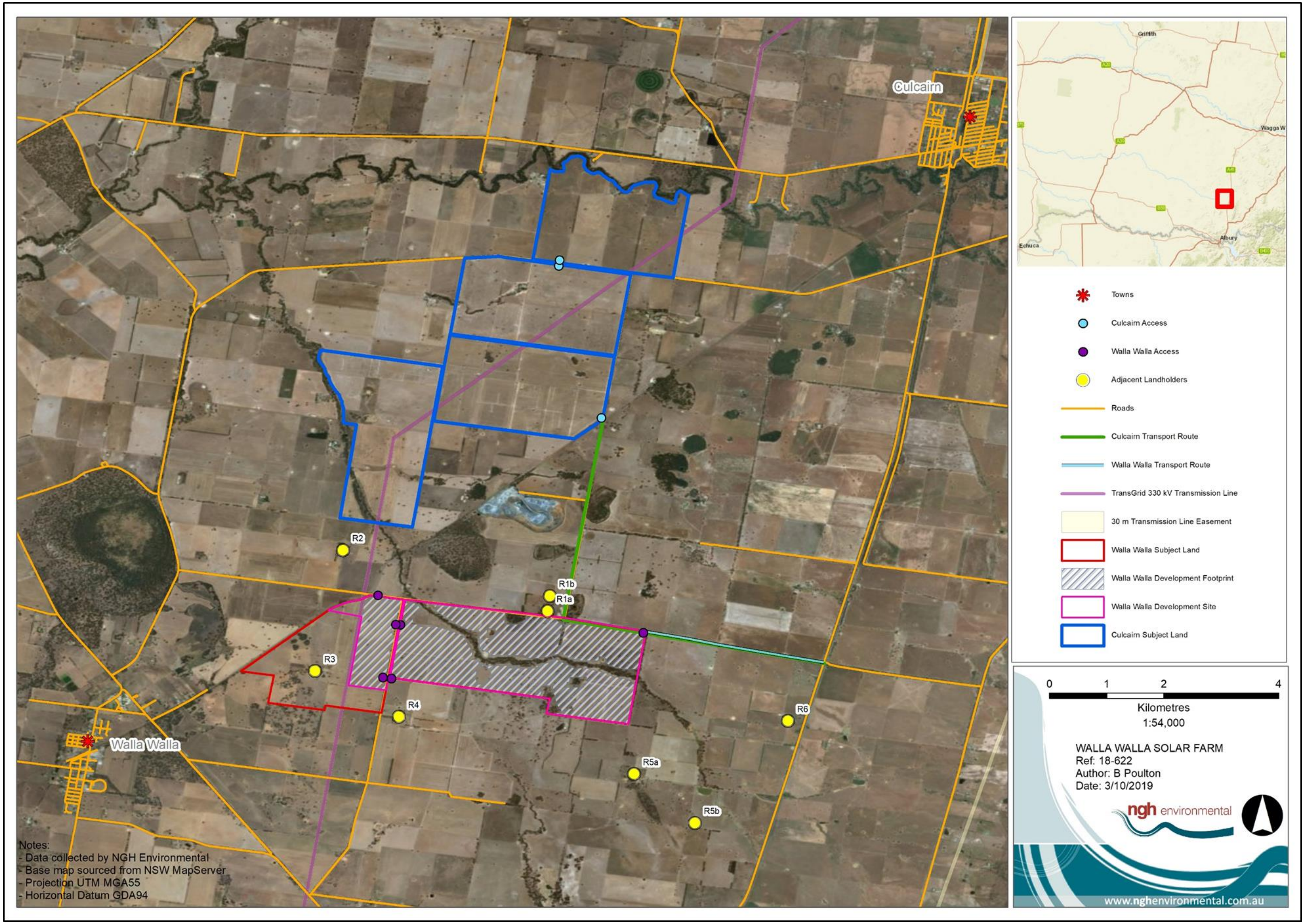


Figure 6-9 Cumulative impacts and proximity to the proposed Culcairn Solar Farm

Construction

During construction, the additional traffic and dust generation impacts are probably the greatest potential for cumulative visual impacts. The visual impact of increased traffic movements to the site would be predominantly limited to construction. A Traffic Management Plan (TMP) would be developed to minimise vehicle movements and dust as much as practical for construction. Should both of these proposed solar farm proposals be approved, the TMP would include scheduling of vehicle movements to ensure congestion along the shared transport route of Benambra Road is minimised.

Generally, adverse cumulative visual impacts are anticipated to be manageable due to the existing and retained vegetative screening and undulating terrain of the site that blocks out most views almost entirely. Specifically, screening to soften cumulative impacts near viewpoints 6 and 8 has been recommended on Benambra Road. Since FRV have relocated the primary construction access to the north eastern corner of the development site, residences on Benambra Road would be minimally impacted by the proposal. Should the Culcairn Solar Farm proposal be approved, and Benambra and Weeamera Roads are selected as a preferred construction transport route, visual disturbance for Residence 1a and 1b and Residence 2 would be exacerbated by Culcairn Solar Farm and not this proposal.

Operation

Despite two large-scale solar farms proposed within 2 km, views of both proposals from R1a and R1b would be prevented by the elevated topography to the north of these two residences. R2, which has elevated but not 360^{O} of the surrounding area would be able to see both projects from the house block. The view of both proposals, however, would be distant and broken. Generally, adverse cumulative visual impacts are anticipated to be manageable due to the existing and retained vegetative screening and undulating nature of the site that blocks out views from the majority of residential properties within 3 km. Specifically, as solar arrays are low lying infrastructure, screening is effective to soften and mitigate cumulative impacts and therefore FRV have implemented such screening throughout the project.

During operation, excepting unusual maintenance operations such as inverter or transformer replacement, a small maintenance team using standard vehicles are all that would be required. Cumulative visual traffic impacts are considered manageable.

6.2.4 Safeguards and mitigation measures

Table 6-3 Safeguards and mitigation measures for visual impacts

No.	Safeguards and mitigation measures	C	O	D
VA1	Screening would be required on-site, generally in accordance with the Landscape Plan developed in consultation with neighbouring landholders. • Plantings would be more than one row deep and where practical, planted on specific sections outside of the permitter fence, to break up views of infrastructure including the fencing. Screening within the vicinity of Residences 1a&b and 2 and 5a would have plantings implemented within a 50m screening width for maximum screening. • The plant species to be used in the screen would be native and derived from the naturally occurring vegetation community in the area. They should be fast growing and comprise a mixture of trees and shrubs capable of reaching a height of 3 to 4 m within 10 years. Species selection is being undertaken in	C	O	D

No.	Safeguards and mitigation measures	C	O	D
	consultation with affected near neighbours and a landscape architect. • Planting would be carried out at a suitable time of year to increase the chance of plant survival. • The screen would be maintained for the operational life of the solar farm. Dead plants would be replaced. Pruning and weeding would be undertaken as required to maintain the screen's visual amenity and effectiveness in breaking up views.			
VA2	Prior to the commencement of construction, a detailed landscape plan will be prepared including: • Screening location. • Species type. • Planting density and spacing. • Method for planting. • Descriptive measures that would be implemented to ensure vegetative screening is successful (i.e. irrigation or other watering method). A program to manage, monitor and report on the effectiveness of implemented measures.	**Design stage**		
VA3	The materials and colour of onsite infrastructure would, where practical, be non-reflective and in keeping with the materials and colouring of existing infrastructure or of a colour that would blend with the landscape.	**Design stage**		
VA4	During construction, dust would be controlled in response to visual cues. Areas of soil disturbed by the project would be rehabilitated progressively or immediately post-construction, reducing views of bare soil.	**C**		
VA5	Construction night lighting would be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations). It would be directed away from roads and residents so as not to cause light spill that may be hazardous to drivers.	**C**	**O**	**D**
VA6	The vast majority on construction vehicles would enter the development site via the north eastern entrance on Benambra Road, 2.6 km off Olympic Highway to minimise impact on residences.	**C**		

C: Construction; O: Operation; D: Decommissioning

6.3 LAND USE IMPACTS (INCLUDING MINERAL RESOURCES)

The nature of a development determines whether a permanent land use change occurs or whether the development is reversible. Apart from direct uses of the land, such as agriculture, electricity generation or mining, associated impacts, such as the degree of visual impact and traffic regimes, can affect the compatibility of alternative land uses. These issues as they relate to the proposal are discussed below. Given the location of the site, the discussion is centred on agricultural land use but also considers residential use, road and electricity networks and mining.

The proposal is consistent with the aims and planning principles of the SEPP (Primary Production and Rural Development) 2019. Part 2 of the Primary Production and Rural Development SEPP relates to state significant agricultural land. Given the proposal area is not identified in Schedule 1, it is not identified as state significant agricultural land and Part 4 does not apply.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

***Land –** Including:*

- *an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:*
  - *consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights.*
  - *a soil survey to determine the soil characteristics and consider the potential for erosion to occur.*
  - *a cumulative impact assessment of nearby developments.*
  - *a description of measures to remediate the land following decommissioning in accordance with State Environmental Planning Policy No 55 – Remediation of Land.*
- *an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:*
  - *a consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights.*
  - *a soil survey to determine the soil characteristics and consider the potential for erosion to occur.*
  - *a cumulative impact assessment of nearby developments.*
- *an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:*
  - *consideration of the zoning provisions applying to the land, including subdivision.*
  - *completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and a description of measures that would be implemented to remediate the land following decommissioning in accordance with State Environmental Planning Policy No 55 - Remediation of Land.*

DPE (RESOURCES AND GEOSCIENCE) REQUIREMENTS

The Division has reviewed the Draft SEARs and PEA (dated February 2019) for the Walla Walla Solar Farm Project (SSD 9874). The Division has identified that the "Hurricane Hill" hard rock quarry operated by Boral Resources Pty Ltd is located approximately 1.5km to the north of the proposal site (Refer to Figure 1). Consideration should be given to the impacts the project may have on the extractive operation.

In fulfilling the SEARs relating to the State's mineral resources and rights to assess and extract those resources, the Division requires the following project specific requirements to be addressed in the EIS:

- *The proponent should undertake a dated and referenced search for any new mineral, coal and petroleum applications over or adjacent to the proposal site during the preparation of the EIS. Evidence of the search should be provided in the form of a date referenced map. Current mining*

and exploration titles and applications can be viewed through the Division's MinView map viewer at:
http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/geoscienceinformation/services/online-services/minview

- _The proponent must consult with the operators of Hurricane Hill Quarry, Boral Resources Pty Ltd and provide evidence of authentic consultation to the Division. This should include a letter of notification of the proposal to the quarry operator including a map indicating the solar farm project area (including associated electricity transmission infrastructure) in relation to the quarry site boundaries, and a letter of response from the quarry operator to the proponent. If responses are not received from the quarry operator, the proponent is to contact the Division._

- _Consultation with the Division in relation to the proposed location of any offsite biodiversity offset areas or any supplementary biodiversity measures to ensure there is no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources._

RELATED KEY COMMUNITY CONCERNS & QUERIES

As part of the community engagement, the loss of agricultural land – from both a regional food security and farmer livelihoods perspective, was the second most prominent community impact captured.

Main community group affected:
BROADER COMMUNITY

Many community members and stakeholders noted an objection to the project not because they are against renewable energy generation, but purely because of the proposed solar farm location on productive agricultural land.

1. Loss of regional, productive agricultural land
2. Incorrect classification of local land capability
3. Reduced land productivity due to PV heat island effect
4. Increased soil salinity (due to removal of trees)

6.3.1 Existing environment

Agriculture and land capability

The rural land within the region is used primarily for agriculture including cropping and grazing. The development area comprises several large paddocks which have been deep ripped and largely cleared for pastures and grazing. Land and agricultural activities like those of the proposal area are widespread in the region. There is no evidence of horticulture or other intense farming activities within the proposal area.

The Mining, Petroleum, Production and Extractive Industries State Environmental Planning Policy 2007 (the Mining SEPP) extends across the proposal. As per the applicable documentation, the land is not classed as Biophysical Strategic Agricultural Land (BSAL) in the Mining SEPP Strategic Agricultural Land Map; BSAL has been described as land with high quality soil and water resources capable of sustaining high levels of productivity.

The land is classified as Class 4 and Class 6 under the Land and Soil Capability Assessment Scheme (OEH, 2012) and is described as gently sloping land capable of sustaining cultivation on a rotational basis. The land is readily used for a range of crops and pastures:

"Class 4 land is considered to have moderate to severe limitations where pasture improvement relies on minimum tillage techniques and the productivity may be seasonally high but overall is low as a result of major environmental constraints. Class 6 is considered Low Capability Land: Land that has very high limitations for high-impact land uses and is restricted to low-impact land uses such as grazing, forestry and nature conservation."

As existing land capability mapping is under review, adjacent land use is also used as a guide to indicate capability.

There are no mineral titles, exploitation licences or mineral applications relevant to the proposal area indicated in the Minview database (DPE, 2018).

For the construction period, there would be a complete temporary reduction in agricultural activities within the development footprint. During the operational phase 85% of development site's sheep grazing capacity would continue as it has been calculated that all the development items being implemented on the land (including solar array posts, fence posts, substation, O&M buildings, vegetation screening etc) only absorbs approx. 14.9% of the land. As such, it can be expected that the nature of the agricultural activities would change from cropping and grazing to energy generation and grazing. This would be further explored in the EIS.

The solar farm would be decommissioned at the end of its operational life, removing all infrastructure (not including planted native vegetation). It is expected that the land would be returned to its prior production uses, as solar farms typically do not have significant permanent impacts to soil and landform.

Overall, the adverse impacts related to alienation of resources are expected to be low and restricted only to the period of operation.

Agriculture is the main employing industry in the Greater Hume LGA, providing work for 22% of the population (ABS, 2019). The number of agricultural businesses has declined in recent years from 705 in 2012 to 695 in 2015 (ABS, 2019).

Although agriculture is a key industry in the Greater Hume LGA (Greater Hume Shire 2012), the development site is not mapped as being BSAL (DPE, 2017). BSAL is land that meets specific scientific criteria levels for soil fertility, land and soil capability classes and access to reliable water and rainfall levels. An amendment to the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 gave legal effect to the BSAL (NSW Government, 2014).

It is important to note that solar farms do not preclude the use of land for agriculture. Additionally, the degree of permanent land disturbance in the construction and operation of solar farms is small, and upon decommissioning of the proposal, the development footprint would be rehabilitated to restore land to pre-existing (or improved) agricultural capacity. As proponent has calculated that solar farm infrastructure which prevents farming activities will only occupy 90.6 ha or 14.9% of the development site, leaving the majority available for continued grazing. Groundcover growth under solar panels at FRV's operational Lilyvale Solar Farm in Queensland is shown in Figure 6-10.

Figure 6-10 Groundcover beneath solar panels at Lilyvale Solar Farm

Surrounding land uses

Land use activities surrounding the development site are predominantly agriculture with associated rural dwellings. The development site is zoned RU1 (primary production) (Figure 6-11). Surrounding agricultural land generally consist of cropping and grazing. Other land uses in the locality include:

- Benambra National Park is located within 9.5 km of the development site. It was created in January 2001 and covers an area of 1400 ha (NSW NPWS, 2018).
- Gum Swamp is approximately 2.7 km from the development site.
- Lake Hume is located about 19 km of the development site.
- Residential dwellings and associated dwellings.
- Public road network.
- Electricity connection and transmission infrastructure.
- Township of Walla Walla within 3.5 km of the site, comprising retail, health, accommodation and community services (refer to section 6.4).

Geological Survey of NSW (GSNSW) was consulted by email on 20 February 2019 (Appendix B.1), in regard to implications for access and prospective mineralisation. It was discussed with GSNSW that no onsite biodiversity offsets were proposed. The quarry on Hurricane Hill was identified, and no access issues were determined.

There are no mineral titles and no mineral applications relevant to the proposed development site indicated in the Minview database (Figure 6-12). The subject land does not hold any exploration applications, assessment lease applications, assessment leases, mining or production applications, or mining or production leases (DPE, 2018).

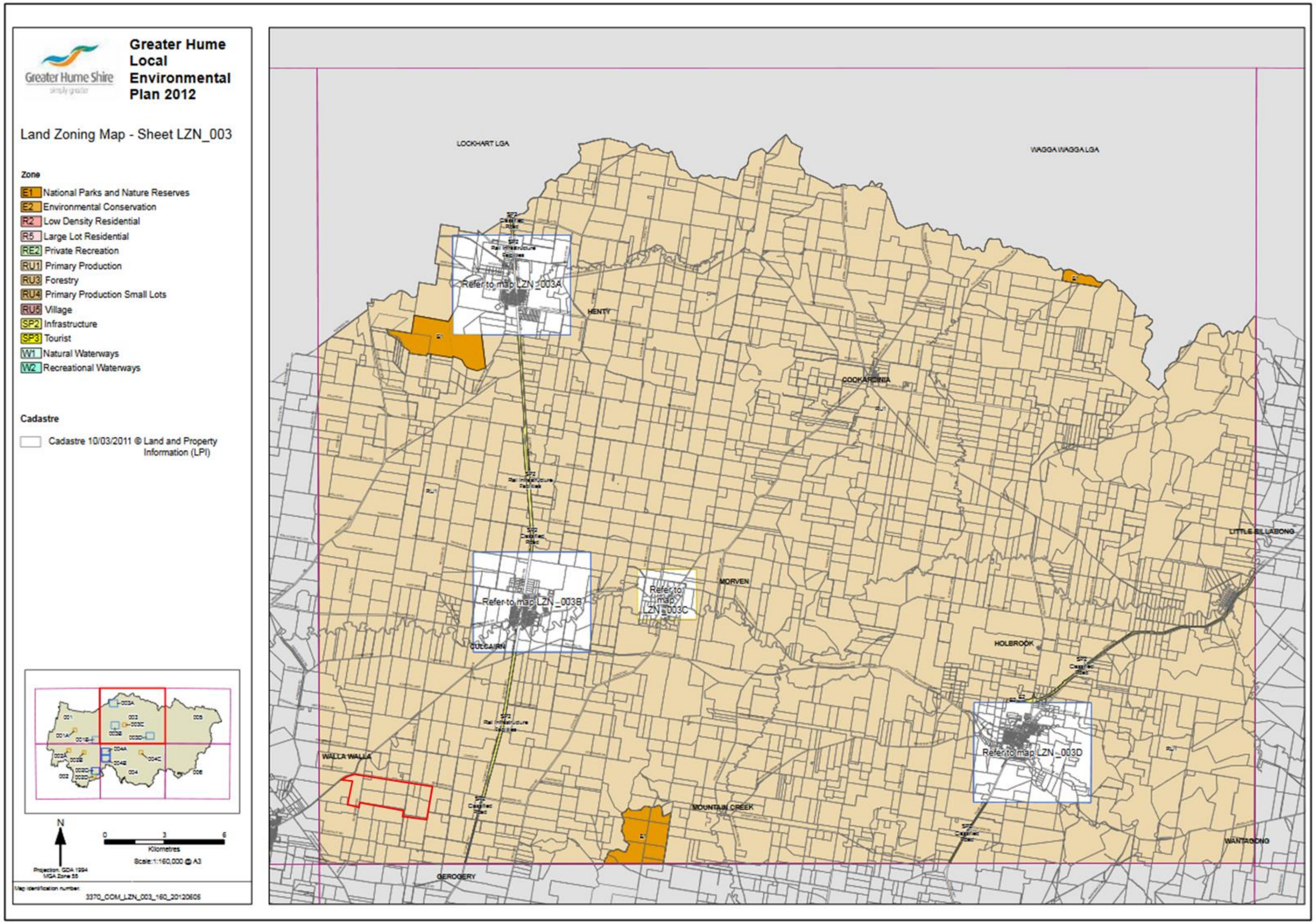


Figure 6-11 Planning zones surrounding the subject land (Greater Hume Shire Council 2010), indicated by the red line.

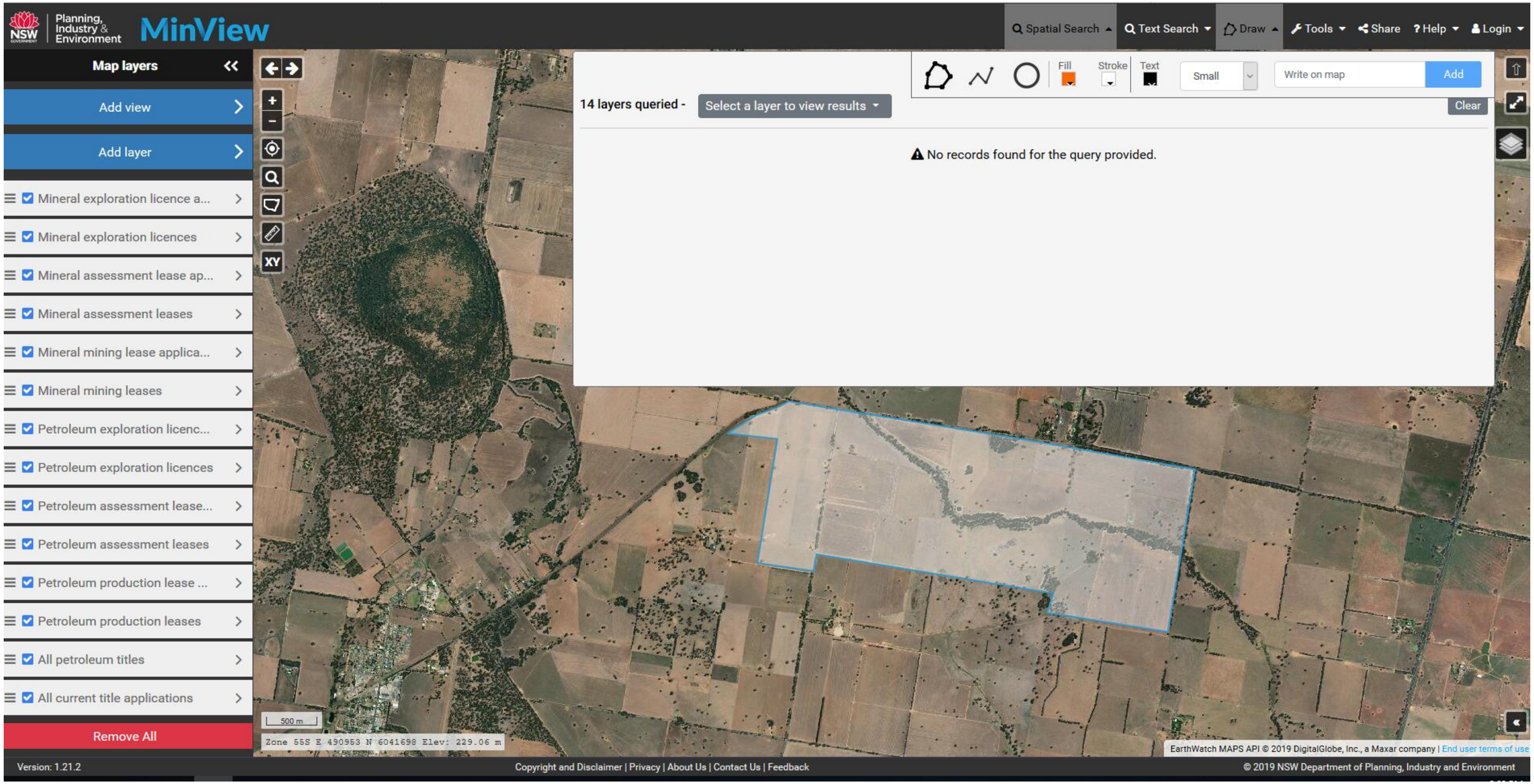


Figure 6-12 Exploration Licences for the development site and surrounding land (DPE, 2018). *The development site is outlined in blue.*

6.3.2 Potential impacts

Land use conflict risk assessment

A land use conflict risk assessment (LUCRA) has been carried out in accordance with the Department of Primary Industries Land Use Conflict Risk Assessment Guide (DPI, 2011). Given the proposed solar farm is different to the surrounding land use activities, primarily agriculture, this assessment aims to identify and rank potential land use conflicts so that they may be adequately managed. Where expected conflicts are adequately managed, the rights of the existing and proposed land uses can be protected.

The risk ranking in Table 6-5 has been determined using the risk ranking matrix shown in Table 6-4, and in accordance with the probability table and measure consequence table in Department of Primary Industries Land Use Conflict Risk Assessment Guide (DPI, 2011). The matrix ranks the risk of impacts according to the probability of occurrence and the consequence of the impact. Probability 'A' is described as 'almost certain' to probability 'E', which is described as 'rare'. The level of consequence starts at 1 – Severe to 5 – Negligible. The risk ranking from 1 to 25 is a result of the probability and consequence. For example, a risk ranking of 25 is the highest magnitude of risk (DPI, 2011).

Table 6-4 Risk ranking matrix (Source: DPI, 2011)

PROBABILITY	A	B	C	D	E
Consequence					
1	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5	11	7	4	2	1

Table 6-5 Land use conflict risk assessment summary

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
Agricultural land use					
Agricultural spraying (aerial)	C4	8	There is unlikely to be an impact to aerial spraying activities given low levels of glare and the limited height of infrastructure.	D4	8
Contaminated surface water runoff	B3	17	Implementation of a soil and water management plan and an erosion and sediment control plan would minimise the potential impact.	D4	5
Dust	B3	17	Dust generated during the construction and decommissioning stages to be managed using water carts when required.	C5	4

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
			Dust is not expected to generate a significant land use conflict during operation.		
Fire/ Bushfire	C1	22	Implementation of a Bushfire Management Plan and higher than required APZ would significantly reduce the probability of solar farm operation starting a fire or a bushfire damaging the solar farm infrastructure.	D3	9
Visual amenity	A3	20	Screen landscaping along boundaries where identified in section 6.1 would substantially mitigate expected impact on visual amenity.	A5	11
Noise	B3	17	Noise generated during construction and decommissioning stages would be minimised through the implementation of mitigation measures. Where regular maintenance practices are incorporated into operation, noise is not expected to generate a land use conflict.	C4	8
Traffic generation and disruption	B3	17	Traffic generation and disruptions during construction and decommissioning stages are considered likely however the impact would be temporary and able to be managed (refer to section 6.6). Traffic is not expected to generate a land use conflict during operation.	C4	8
Weed and pest control	A3	20	Implementation of pest and weed management plan during construction and operation phases	D4	5
Mining land use					
Resource extraction/exploration	D3	9	It is unlikely there would be an impact on resource extraction or exploration. In the long term (after decommissioning), the solar farm infrastructure would be removed, and the site made available for alternate	D5	2

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
			land uses including for mining purposes, if desirable.		

Construction and operation

The range of scores in the mitigated risk rating were medium, except for visual amenity, demonstrating that the proposed construction and operation of the solar farm will have minimal impact to the area.

The expected impact on surrounding land uses during construction is considered to be minimal given the temporary nature of the work and the implementation of mitigation strategies would further reduce the level of impact.

Once construction of the solar farm commences, agricultural activities would cease temporarily in the areas involved in access and construction. Grazing of the development site would then recommence once construction has been completed.

There may be some disruption to local traffic, during the construction and due to construction traffic movements, which may impact the operation of surrounding land uses. This would be a temporary impact and could be managed in consultation with local landholders. Sheep grazing would continue to ensure the grass fuel load is maintained at a low level.

It is considered unlikely that traffic movements associated with the proposal activities would generate a land use conflict with movement of local stock. The likelihood of conflict can be further minimised by consulting with local landholders.

Connection of transmission lines to the existing TransGrid overhead power line would be undertaken in consultation with TransGrid. The power line is located within the development site and is unlikely to generate a land use conflict with surrounding landholders.

The potential operational land use impact has been assessed in accordance with guidance provided in *Primefact 1063: Infrastructure proposals on rural land* (DPI, 2013)*, The Land and Soil Capability Assessment Scheme* (OEH, 2012) and the Large-scale Solar Energy Guideline for State Significant Development (NSW Government, 2018b).

LAND AND SOIL CAPABILITY IMPACTS

The proposal is not expected to adversely affect the biophysical nature of the land which determines its capability. During any broad area or trench line excavations at the site, topsoil would be removed, stockpiled separately and replaced to restore the original soil profile. Topsoil salvaged from the construction of the access tracks and other works would also be securely stored for use in site rehabilitation. Following construction, a perennial cover would be established to protect soils, enhance landscape function and prevent wind and water erosion. Resting the soil from cropping is expected to increase the soil's structure and water retention through carbon sequestration over time. At a time when an estimated 52% of the land used for agriculture, nearly two billion ha worldwide (FAO, 2019), the food producing capacity of the development site would be retained for future generations. Soil restoration and treatments would be guided by the findings of a pre-works soil survey conducted at the site (refer section 7.3).

Soil testing at 30 locations across the development site eliminated the need for lime to reduce acidity.

The development of a solar farm would potentially result in the following agricultural impacts:

- Broadacre cropping including what and canola would not be possible over the life of the proposal. However, the opportunity to rest the land would provide a multitude of benefits including returning soil organisms, soil carbon, soil moisture and soil structure to the areas previously cropped and grazed. Diversity in groundcover and native perennial species of grasses would be encouraged to increase soil stability, increase organic material and reduce evaporation losses.
- Sheep grazing would continue over 85% of development site. Continuing grazing would maintain groundcover, reduce fire risk (compared to no grazing) and reduce soil compaction (Figure 6-13).

Figure 6-13 Sheep grazing amongst solar panels at Lilyvale Solar Farm in Queensland

Resource loss and fragmentation

The proposal would not impact on land identified by the NSW Government as BSAL. Construction works involve only minor excavation with minimal disturbance to soils and soil profiles, and minimal risk of soil loss (refer to section 7.2 and section 6.6 for soil and water quality impacts). At the end of the operational period, solar farm infrastructure would be removed, the land would be rehabilitated to its pre-existing condition and available for agricultural use. The proposal would not result in the permanent removal of agricultural land.

The proposal has been designed to minimise the development footprint.

The proposal will not result in rural land fragmentation or alienation of resource lands as defined under the former Rural lands SEPP. It is considered that the proposal would not generate any land use conflicts or have an impact on the nature of existing surrounding agricultural holdings given the proposal will not alter the existing environment. The proposed subdivision and consolidation of lots would help facilitate the management of the solar farm while ensuring surplus land remains productive agricultural land.

Furthermore, the proposed subdivision would prevent the potential fragmentation of resource lands that may arise from subdivision should the proposed solar farm not proceed.

Disturbance to farming operations and livestock

Adjacent farming operations are compatible with the proposal. Noise from nearby farming practices over the day would not impact on the proposed solar farm. The proposed solar farm construction and decommissioning would largely occur in daylight hours and would not conflict with adjacent farming activity.

When sheep grazing recommences following construction, livestock would become accustomed to the solar panels as they are to existing installations currently on farms around the state, the country and the world. The solar arrays also provide valuable shade, wind and rain cover for sheep.

The impacts from dust on local and regional air quality, and farming operations are expected to be negligible during operation. During regular operation, only a small number of vehicles would be present at the site on a regular permanent basis and would be largely restricted to the compound where site offices would be located.

Changes in biosecurity risks – pest, diseases and weed risks

The proposal would result in the increased movement of vehicles and people to the development site. The primary risk to biosecurity is the spread of weeds that may result from the increased movement of vehicles in and out of the development site. Weed seeds can be transported through and from the development site on the tyres and undercarriages of vehicles and on staff clothing. The risk of weed dispersal would primarily be mitigated by confining vehicle and machinery movements to formed access tracks during all phases of the proposal and FRV have implemented a strict wash down procedure for vehicles entering the development site. FRV have been in contact with local suppliers of vehicle washdown facilities and have received positive responses.

A Pest and Weed Management Plan would be prepared for the construction and decommissioning phases, based on Greater Hume Shire Council and NSW DPI requirements. Management measures would focus on early identification of invasive weeds and effective management controls. During operations, the Pest and Weed Management Plan would manage impacts associated with weeds such as the risk of weed ingress along the boundary of the development site and the importation and spread of weeds through vehicle movements. The plan would focus on weed control techniques including herbicide and grazing pressure.

Establishment of a temporary construction site compound, specifically rubbish bins containing food, can potentially increase the risk of pest animals at the development site (mostly cats and foxes). Covered rubbish bins and regular waste removal during construction and operation would minimise this risk by removing the food source. Rabbit and fox numbers would be controlled through targeted pest management during the operational phase of the proposal. Grazing pressure and reduced plant biomass would also reduce resources and cover for pest species.

HEAT ISLAND EFFECT

As part of the community engagement, some queries were raised by residents about impacts on crops and livestock of neighbouring farms due to the perceived Photovoltaic Heat Island (PVHI) effect.

Around the world and within Australia, sheep graze within solar farms. Livestock and crops, including those proposed to be within the proposal during operations would not be impacted as the design of the solar farm would ensure no significant build-up of heat at the site, therefore animals and crops on neighbouring properties would not be affected. This is because the structure of the solar farm would not be thermally massive. The solar panels are thin, <4 cm, so they do not retain heat over the long term. Spacing between rows would be between 8 m and 14 m.

During the daytime, panels track the sun from sunrise to sunset as the use of single axis tracking technology would be utilised and not fixed panels, therefore avoiding the trapping of warm air underneath (Figure 6-14). At night panels are stored in a horizontal position for cooling and encouraging air flow. This is supported by Fthenakis and Yu (2013), who the solar plant completely cooled overnight, so the effect was limited in duration (Figure 6-15).

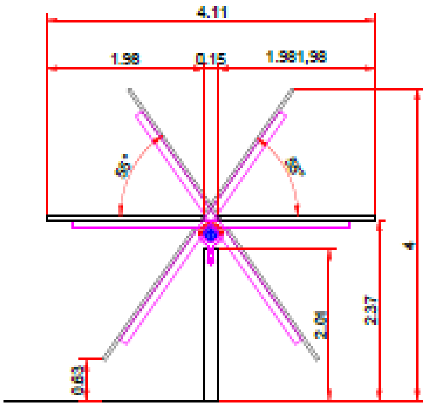


Figure 6-14 Indicative cross section of a tracking array

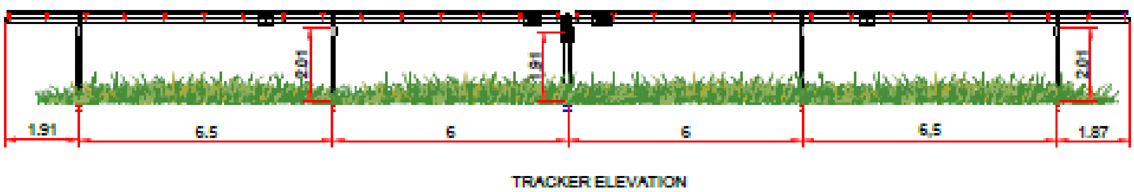


Figure 6-15 Indicative tracker elevation - night stowage for cooling

Published papers relevant to this item include:

- Armstrong A, Ostle N and Whitaker J (2016), *Solar park microclimate and vegetation management effects on grassland carbon cycling.*
- Barron-Gafford, GA, Minor, RL, Allen, NA, Cronin, AD, Brooks, AE & Pavao-Zuckerman, MA (2016). 'The photovoltaic heat island effect: Larger solar power plants increase local temperatures' *Scientific Reports, vol 6, 35070.* DOI: 10.1038/srep35070.
- Fthenakis, V.,& Yu, Y. (2013). *Analysis of the potential for a heat island effect in large solar farms,* Photovoltaic Specialists Conference (PVSC), 2013 IEEE 39th**.**
- Yang L, Gao X, Lv F, Hui X, Ma L, and Hou X (2017). Study on the local climatic effects of large photovoltaic solar farms in desert areas Solar Energy: 144, 244–253.

The topic has also been subject to recent consideration by a Victorian Planning Panel for solar farms proposed in Greater Shepparton for solar farms proposed by Neoen and X-Elio. This is detailed in the *Panel Report for the Greater Shepparton Solar Energy Facility Planning Permit Application 2017-162, 2017-274, 2017-301 and 2017-344* (Panel Report, 2018). Neoen, in preparation of a response to key issues raised in objecting submissions, commissioned a *Statement of Evidence by Greg Barron-Gafford* from the Research Group Biography, Ecosystem Science (University of Arizona) (Barron-Gafford, 2018).

Barron-Gafford (2018), in his Statement of Evidence (SoE) to the Victorian Planning Panel included results on the radius of the measured heat effects. This identified that the PVHI effect was indistinguishable from air temperatures over native vegetation when measured at a distance of 30 m from the edge of the PV array (Figure 6-16). In his SoE he states that:

'this pattern held true for both daytime and night-time conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstorey" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting, and the PVHI quickly dissipates'.

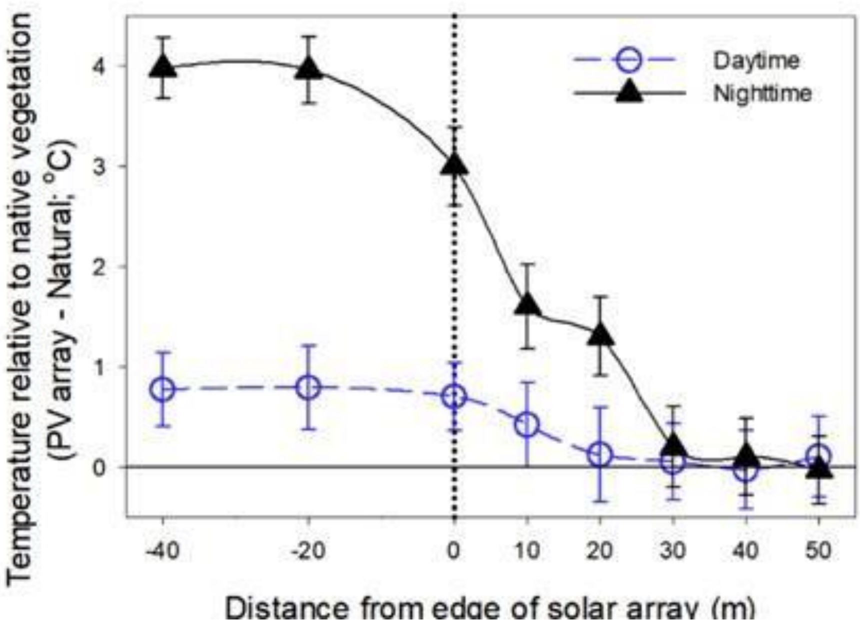


Figure 6-16 Measures of air temperature within and outside of the PV array (source:- Barron-Gafford, 2018)

In conclusion, the Victorian Planning Panel Report (Panel Report, 2018), accepted that solar arrays will affect air and soil temperatures within the solar array perimeter, but that in relation to outside of the solar array perimeter a heat island effect is unlikely to occur. It identified that any temperature increase within the solar array would be marginal and a 30 m setback from any neighbouring property boundary could be implemented. FRV have redesigned the project, implementing extensive setbacks in a number of areas and have also ensured 30m+ setbacks from the solar array to from any uninvolved landowner's property boundary to the solar array.

Existing and planned vegetation screening would serve to insulate neighbouring properties. All vegetation around the site – either planned or existing, together with the site's APZ and infrastructure layout, have been designed to include at least 30 m setback from uninvolved neighbouring property boundaries, even though not a legislative requirement.

MINING IMPACTS

The proposed solar farm is not located within an area that has been identified as a mining resource and no current mining exploration licences exist over the development site. In the short term, access to the land for mining operations would not be available, though long term impacts on mining would be negligible to the limited 30-year life of the proposal. After decommissioning, the solar farm infrastructure would be removed and the site made available for alternative land uses, including mining purposes, if desirable.

RESOURCE IMPACTS

The proposal would require approximately 12,300 m^3 of gravel to surface the access road and internal service track network and CPU and substation hardstand. Loam mix may be required for the bedding of underground cables, depending on the electrical design and ground conditions. Approximately 1,120 m^3 of concrete would be required to construct the inverter, substation, CCTV and foundations. The availability of these resources is not declining or limited in the region.

Materials used in the fabrication and construction of the solar farm infrastructure would include precast masonry products and concrete, steel, aluminium, copper and other metals, glass, plastics and fuels and lubricants. These are common industrial and construction materials. Silicon and silver are the major raw materials for crystalline silicon PV; resource availability is not limiting for these materials. Most components would be reused or recycled when infrastructure is replaced or decommissioned.

In view of the nature of the resources, the limited quantities required and the opportunities for recycling, the proposal is unlikely to place significant pressure on the availability of local or regional resources for other land uses in the area. It is estimated that approximately 25,000 kL of water would be required during construction, mostly for dust suppression but also for cleaning, concreting, on-site amenities and landscaping. The precise amount of water used during construction would be heavily affected by prevailing weather conditions and the need for watering to suppress dust generation. Operational water consumption would not exceed 600 kL per annum.

A small amount of potable (drinking) water would be imported to the site during the construction period. The potable water supply would be augmented by rainwater collection in tanks installed beside site buildings as constructed. Any requirement for potable water would be limited, confined to the construction phase and would not place pressure on local drinking water supplies.

Decommissioning

As the proposal would have relatively low levels of impact on the soil surface, both in the installation of infrastructure and the commitment to maintain ground cover vegetation, where practical, during operation, the proposal is considered to be highly reversible in terms of the preserving agricultural capability of the development site.

Following decommissioning, the rehabilitated site could be rehabilitated to restore to its pre-existing condition for alternate land uses, including agriculture or mining. At the end of the project, all above ground infrastructure would be removed and current agricultural activities could recommence.

6.3.3 Safeguards and mitigation measures

Potential for land use impacts is proposed to be addressed via the mitigation measures in Table 6-6.

Table 6-6 Safeguards and mitigation measures for land use impacts

No.	Safeguards and mitigation measures	C	O	D
LU1	Consultation with adjacent landholders would be ongoing to manage interactions between the solar farm and other properties.	**C**	**O**	**D**
LU2	Consultation would be undertaken with TransGrid regarding connection to the overhead energy transmission infrastructure.	**C**		
LU3	A Rehabilitation and Decommissioning Management Plan is to be prepared in consultation with DPIE and the landowner prior to			**D**

No.	Safeguards and mitigation measures	C	O	D
	decommissioning. The Rehabilitation and Decommissioning Management Plan is to include: • Removal of all infrastructure. • Removal of gravel from internal access tracks where required in consultation with landowners. • Reverse any compaction by mechanical ripping. • Targets and standards to indicate successful rehabilitation of disturbed areas. These targets and standards should be applied to rehabilitation activities once the proposal is decommissioned.			
LU4	A Pest and Weed Management Plan would be prepared to manage the occurrence of noxious weeds and pest species across the site during construction and operation. The Pest and Weed Management Plan must be prepared in accordance with Greater Hume Shire and DPIE requirements. Where possible integrate weed and pest management as a part of district-wide control measures.	**C**	**O**	
LU5	The proponent would consult with GSNSW in relation mineral exploration, or potential for sterilisation of mineral resources.	**C**		
LU6	Construction and operations personnel would drive carefully and below the designated speed limit according to the Traffic Management Plan to minimise dust generation and disturbance to livestock.	**C**	**O**	**D**
LU7	Underground cabling and all underground infrastructure to a depth of 2500 cm would be removed on decommissioning.	**C**		
LU8	Sheep grazing would be used as a preferred option to control weeds and grass growth, and to maintain agricultural production at the site.		**O**	

C: Construction; O: Operation; D: Decommissioning

6.4 SOCIOECONOMIC AND COMMUNITY

Large and new types of developments can produce social and economic impacts on local communities. These can be positive, such as the provision of employment and increased retail trade. They can also produce unintended adverse impacts, such as creating strains on existing infrastructure (e.g. public transport or accommodation facilities during construction or social infrastructure such as volunteer services, social ties and networks). This section investigates the socio-economic profile of the region to understand the potential impacts of the proposal on the socioeconomics and the local community.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

Socio-Economic –

Including an assessment of the likely impacts on the local community and a consideration of the construction workforce accommodation.

RELATED KEY COMMUNITY CONCERNS & QUERIES

These two concerns – considering the financial implications of the solar farm's presence within the Walla Walla community, were captured from 7% and 2% of the respondents, respectively. From a cumulative financial impact perspective, these were a close 'second concern' to visual and loss of agricultural land impacts.

Main community group affected:
DIRECT & NEAR NEIGHBOURS

The presence of the solar farm is perceived to have a direct & long-term negative financial impact on direct- & near neighbours - either from reduced land & homestead values, or the need to increase existing personal insurance policies.

1. Reduced land value: no buyers or tenants for land and/or homesteads
2. Increased insurance-related public liabilities

In addition to the above, the broader community were also concerned about how the presence of the proposal could impact on the rural 'sense of place' of the Walla Walla area. Uncertainties around the proposal and conflicting supporting views within the area has also resulted in mixed feelings within the community. These value-driven concerns were raised by 5% and 4% of the respondents, respectively.

Main community group affected:
BROADER COMMUNITY

Walla Walla and Culcairn have a high level of agricultural 'sense of place' for the local community. Many of the families have lived in the local areas for generations, with their land to remain in these families into the future. The community depends on each other - many concerned that development of solar farms is dividing the community, creating uncertainties for many on their future within the area.

1. Loss of agricultural community feel
2. Division of community, and general project uncertainty

6.4.1 Background

Socio-economic profile

Greater Hume is located in the southern NSW transport corridor between the regional centres of Albury and Wagga Wagga. The LGA borders Victoria and is linked by the Hume Freeway, Riverina and Olympic Highways. The Main Southern Railway Line traverses the shire, which has proximity to the Ettamogah Rail Hub, regional airports at Albury and Wagga Wagga and offers frequent direct flights to Sydney and Melbourne.

The town of Walla Walla is located approximately 35 km north of Albury-Wodonga and 130 km south of Wagga Wagga. The population of Walla Walla was 836 in 2016 (ABS, 2016).

Walla Walla has the largest Lutheran church in NSW and the only Lutheran secondary school in NSW in St Paul's College. Attractions within the locality include Morgan's Lookout, Zion Lutheran Church and Gum Swamp, a nationally important wetland that covers an area of approximately 200 ha.

The median age of persons in the Greater Hume LGA is 44; this is higher than the Australian average of 38 (ABS 2019). The 2016 census records state that 3.3% of the population are Aboriginal and Torres Strait Islander people (ABS 2016). A large portion, 86.2% of the community were born in Australia; 1.9% in England, 0.9% in New Zealand, 0.5% in Germany and 0.4% in the Netherlands (ABS, 2019).

The largest employment industries in Walla Walla are education (7.1%), grain farming (6.8%), mixed grain and sheep (6.4%), specialised sheep farming (6.1%) sheep farming, and healthcare (4.1%) (ABS, 2018). The unemployment rate for Greater Hume LGA is 4.1%, which is less than the national rate of 5.6% (ABS, 2011).

Walla Walla township is a service centre for the area, located approximately 4.3 km from the proposal. It is located in the north-east Riverina region in NSW on the Walla Walla to Jindera Road approximately 543 km from Sydney and approximately 352 km from Melbourne via the Hume highway.

Walla Walla includes:

- Second-hand shop.
- Agricultural suppliers and agronomy services.
- Steel fabrication.
- Earthworks and concreting services.
- Shopping precinct including newsagency, hairdressers, supermarket, pharmacy, bowling club, automotive services etc.
- St Paul's Lutheran School.
- Walla Walla Pioneer Museum.
- Recreational facilities including the Walla Walla swimming pool and Walla Walla Country Gold Club.

It is likely that Walla Walla and Culcairn would be the key service centres of the Walla Walla Solar Farm construction work force, with other service centres including, Table Top, Henty, Holbrook, Albury, Wodonga, and other smaller surrounding towns.

Community make up and priorities

Greater Hume Shire Council has four key strategic themes in their Community Strategic Plan 2017 - 2030 (Greater Hume Shire Council, 2017). The Shire's vision for the future is:

"Partnering to advance our rural communities."

The plan identifies the community's main priorities and aspirations for the future. The four key themes include:

- Leadership and communication.
- Healthy lifestyle.
- Growth and sustainability.
- Good infrastructure and facilities.

It is considered that the proposed solar farm meets the principles of the Community Strategic Plan, with particular reference to "growing our economy and promoting the culture and heritage offered in our communities."

General attitudes to renewable energy projects

Research indicates there is widespread support for solar energy as a source of energy for electricity generation in Australia (ARENA n.d.); 78% of respondents to the ARENA survey were in favour of largescale solar energy facilities and 87% are in favour of domestic installations. The largescale solar energy sector is still at a relatively early stage of development in Australia. However; while most members of the community are aware of largescale solar energy, many do not know a great deal about their impacts (ARENA n.d.).

Three approaches to improving community understanding of the visual impacts of largescale installations include:

- Provision of images (from many angles) of largescale solar facilities, particularly in the early stages of a proposal.
- Understanding the similarities between highly supported domestic scale installations and large-scale facilities.
- Understanding the current function of the land proposed to hold the facility and the additional value the installation allows for (Source: extracted from ARENA n.d.).

Section 6.1 of this EIS assesses the visual impacts of the proposal on the rural landscape and visual amenity of the area.

Community feedback on the proposal

The proponents undertook extensive preliminary consultation with surrounding neighbours and the general community. Engagement included four community open days and direct engagement through letters, emails, phone calls and multiple face-to-face meetings. A dedicated website and email address for the proposal were established to provide information about the proposal and enable communication and feedback to be received (section 5.3).

DIRECT ENGAGEMENT

Direct engagement was offered to the nearest neighbours of the boundary of the development site. This occurred through letter drops, emails, phone calls and face-to-face meetings. Concerns raised during the engagement include (but are not limited to):

- Visual impact.
- Non-agricultural use of productive farmland.
- Water pollution.
- Impact on neighbouring land values.
- Heating of surrounding land.
- Increased fire risk.
- Clearing.

Visual impact was addressed with the concerned individuals directly. In some instances, visual montages were provided to the concerned residence to show the before and after impacts of proposed vegetative screening. The proposed screening was also developed with input from near neighbours.

Accommodation availability

Culcairn, with a population of about 1,120, offers a hotel, motel and a caravan park. Walla Walla has a motel and eco-lodges, while Henty has a bed and breakfast. These accommodation facilities are within 30 km of the development site. Walla Walla contains a police station, while the closest fire station and hospital are located in Culcairn.

Albury is a large town south of the proposal with multiple accommodation options. Holbrook is approximately 50 km east of the development site has four motels and a hotel. Holbrook has a population of 1,335 and is home to the HMAS Otway Submarine, a major tourist attraction for the region.

Other services

Other services required by temporary construction staff that are not local include (but are not limited to) food outlets, local retail, health services and entertainment. While providing an economic boost to the area, it can also put pressure on services.

6.4.2 Potential impacts

Construction

During construction, the proposal would generate both positive and adverse socio-economic impacts.

Likely positive impacts include:

- Significant generation of short-term employment of up to 250 workers during peak construction (8-12months) and many of these could be drawn from the local area.
- The skills obtained during the employment would open up further opportunities to individuals and suppliers, creating long term benefits.
- Temporary boost to the local and regional economies through increased demand for accommodation, goods and services. A confidential report by Ernst and Young (2019) estimates the total indirect contribution to the regional economy from the construction of proposal at approx. $203 million.
- Increased resilience for local farmers and the community in the event of drought of lower agriculture commodity process by proving an additional source of income (independent of agriculture).

Likely adverse impacts include:

- Manageable increase in traffic on local roads during construction (refer to section 6.6).
- Change in the rural landscape character and visual amenity of the area (refer to sections 6.2 and 6.3).
- Influx of workers may put pressure on local accommodation, health and broader services.

Overall, it is considered that the proposal would have a positive socio-economic impact given the significant economic boost the proposal would generate. It is considered that adverse impacts would be manageable given the temporary nature of the construction phase. These temporary impacts would be managed through the implementation of safeguards.

Operation

During operation, the proposal would generate largely positive socio-economic impacts as described below.

EMPLOYMENT BALANCE

The development site includes sections of two privately owned mixed cropping and grazing farms. Both farms are currently family operated. During specific times of the year, contractors are engaged to assist with sowing and harvesting. These activities are seasonal and would typically employ several people. Limited additional employment is supported through local transportation services and processing (cattle, sheep and grain). In an employment context, the loss of jobs associated with the reduction of agricultural activities would be replaced by approximately 21 FTE jobs created to support solar farm operations. Approximately 85% of the sheep grazing productivity would be maintained within the development site, thus continuing to support connected service providers such veterinarians, shearers, farmhands, transportation etc.

DIVERSIFIED INCOME FOR LANDHOLDERS

Agribusinesses are vulnerable to multiple factors having the potential to impact their long-term viability, such as:

- Increasing input costs (e.g. water, fertiliser, soil ameliorants, herbicide).
- Environmental events (e.g. drought, floods, biosecurity infestation, fire).
- Fluctuating commodity prices.

The two private landholders leasing part of their agricultural land for the proposal would benefit from an alternative source of income. These lease payments would be regular and independent of the agriculture sector, providing resilience to cope with uncertainty relating to the factors listed above. Income diversification can also assist farmers to offset running costs and thus improve yields in land retained in agricultural production.

COMMUNITY RESILIENCE

Providing jobs and sources of income independent of agriculture, has the potential to lessen the blow to commercial and retail businesses in small regional towns because household disposable income across the community becomes more stable.

Operation and decommissioning

The development of rural land uses compatible with agricultural activities, such as solar power generation, has the potential to provide increased economic security to rural economies through diversification of employment opportunities and income streams. They also provide a substitute for carbon emission producing electricity production that is stable, renewable and consistent with State and National greenhouse emission reduction objectives.

The installation of solar array modules that involve little soil disturbance and provide an alternative income stream for large agricultural properties, can be seen as an important local economic benefit.

It is estimated that the solar farm would require around $33,330 per MW per year of spending to maintain, or about $10 million per year. This is mostly on local wages, local contractors and material. Over the life of the project, this could provide around $300M of economic activity in the local community.

Minimal adverse impacts are anticipated during operation and decommissioning. During operation, maintenance staffing and activities would be consistent but at low levels. The additional accommodation, traffic and healthcare impacts of operational staff are not likely to be noticeable.

Although the number of employees required during decommissioning would be less than that for construction, it is considered likely to offer a similar economic benefit in terms of opportunities for local staff and industries. Decommissioning may also include local recycling of infrastructure components.

Six respondents listed solar farm effects on land use or land values as a concern via the community feedback forms. It is generally considered that land prices around the development site are strongly linked to the agricultural productivity of the land. Agricultural productivity on surrounding land would not be affected by the proposal. It is therefore considered unlikely that land prices would be adversely affected by the proposal. A report to analyse the issue by JLL Valuations and Advisory (Agribusiness) was commissioned in June 2019. Its results showed no impact on land pricing or house values are anticipated. The report can be found in Appendix L.

6.4.3 Safeguards and mitigation measures

Table 6-7 Safeguards and mitigation measures for socioeconomic and community impacts

No.	Safeguards and mitigation measures	C	O	D
SE1	A Community and Stakeholder Engagement Plan (CSEP) would be implemented during construction to manage impacts to community stakeholders, including but not limited to: • Protocols to keep the community updated about the progress of the project and project benefits.	**C**	**O**	

No.	Safeguards and mitigation measures	C	O	D
	• Protocols to inform relevant stakeholders of potential impacts (haulage, noise etc.). • Protocols to respond to any complaints received.			
SE2	Liaise with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.	**C**	**O**	
SE3	Liaise with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.	**C**		**D**
SE4	Liaise with local tourism industry and council representatives to manage potential timing conflicts or cooperation opportunities with local events.	**C**		**D**

C: Construction; O: Operation; D: Decommissioning

6.5 NOISE AND VIBRATION IMPACTS

Noise and vibration impacts are an important consideration in the planning and implementation of the proposal's construction and maintenance activities. Decibels (dB) are measures on a logarithmic scale. An increase of 2 dB is barely perceivable but an increase of 10 dB is perceived as twice as loud. The addition of two noise levels will increase the noise level by 3 dB. For example, if one chainsaw is operating at 100 dB and another one starts right next to it, the total noise level would be recorded at about 103 dB. Adding additional noise of at least 8 dB lower, would not increase the overall noise levels.

> **SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS**
>
> *The EIS must also address the following specific issues:*
>
> ***Noise –***
>
> *Including an assessment of the construction noise impacts of the development in accordance with the* Interim Construction Noise Guideline (ICNG)*, operational noise impacts in accordance with the NSW Industrial Noise Policy for Industry 2017, and cumulative noise impacts (considering other operations in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria***.**

6.5.1 Policy setting

Construction noise

The NSW Interim Construction Noise Guideline (ICNG) (DECC, 2009) provides direction for the assessment and management of construction noise impacts. The guideline indicates that a quantitative assessment of noise impacts is warranted where works would impact an individual or sensitive land use for more than three weeks in total.

The ICNG provides direction on the calculation of 'noise management levels (NML)' for noise sensitive residences. The NMLs are relative to the time of day. During standard construction hours, construction noise levels measured at a residence should comply with Table 6-8. Residences are 'highly noise affected' when measured construction noise is above 75 dB(A) at the residence. Adhering to the levels described in the ICNG will minimise the impact of construction noise on adjacent residences. The **rating background noise level** (RBL) is a single figure that represents background noise levels for noise assessment purposes. The noise descriptor L_{AF90} is the noise level that is exceeded for 90% of the time and is used to measure the RBL. Measurements of the RBL are made at residences likely over seven days without rain, strong wind or extraneous noise.

Table 6-8 Construction noise levels.

Recommended Construction Hours	Noise Levels
Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	RBL + 10 dB
Work outside standard construction hours	RBL + 5 dB
Highly noise affected, likely strong community reaction	=75 dB(A)

Operational noise

The purpose of NSW Noise Policy for Industry (NPI) (EPA, 2017) is to ensure noise impacts associated with the operation of an industrial development are evaluated and managed consistently and transparently. The NPI specifies noise criteria to protect the community from excessive intrusive noise. The NPI provides guidance on the calculation of project noise trigger levels. Those trigger levels include:

- Intrusive noise levels.
- Amenity noise level.

The NPI describes the process for determining intrusive and amenity noise levels from an industrial noise source. Further, the NPI describes a process for determining acceptable levels of intrusive and amenity noise levels from an industrial noise source. The **L_{Aeq} descriptor** is used for measuring and describing intrusive noise levels and amenity noise levels. The **L_{Aeq} descriptor** is the equivalent continuous (energy-average) A-weighted noise level from the source measured over a 15-minute period (during operation).

Generally, the operational intrusive noise level is acceptable if it does not exceed the RBL by more than 5dB(A). The criteria for intrusive noise are described in Table 6-9. The night-time NML is not applicable to the proposal as no works would be undertaken or equipment utilized during darkness hours.

Table 6-9 NSW Noise Policy for Industry intrusiveness goals.

Time of day	RBL dB (A) L_{A90}	Intrusive noise = RBL + allowance	NML dB (A) $L_{A90\ (15min)}$
Day (Monday to Friday 7 am to 6 pm, Saturday to Sunday and public holidays 8 am to 6pm)	35	= RBL + 5	40
Evening (6pm to 10pm)	30	= RBL + 5	35
Night (Monday to Friday 10pm to 7am, Saturday to Sunday and public holidays 10pm to 8am)	30	= RBL + 5	35

The NPI describes a process for determining the project amenity noise levels. This aims to limit continuing increases in noise levels from industrial development. The recommended amenity noise levels (NPI Table 2.2) aim to protect against noise impacts such as speech interference, community annoyance and some sleep disturbance. The project amenity noise level represents the objective for noise from a single industrial development at a residence. Industrial noise during operation should not normally exceed the acceptable noise levels for rural properties. The NPI allows for the calculation of the project amenity noise level for industrial developments as the recommended amenity noise level minus 5 dB(A) (The night-time project amenity noise level is not applicable to the proposal as no works would be undertaken or equipment utilized during darkness hours.

Table 6-10). The night-time project amenity noise level is not applicable to the proposal as no works would be undertaken or equipment utilized during darkness hours.

Table 6-10 NSW Noise Policy for Industry amenity goals.

Receiver type	Noise amenity area	Time of day	Noise Level L_{Aeq} dB(A)	
			Recommended amenity noise level	Project amenity noise levels
Residential (including Orange Grove Gardens)	Rural	Day	50	45
		Evening	45	40
		Night	40	35

6.5.2 Background

Existing environment

The existing noise sources from land use on and adjacent to the development site generally consist of:

- Road traffic noise from Benambra Road, Weeamera Road, and the Olympic Highway.
- Quarrying and transport of materials.
- Livestock grazing and management.
- Spraying, cultivation and harvesting of crops.
- Hay baling or harvesting and transport.

Existing noise generating equipment or activities include; tractors, headers, bailers, grain and livestock transport, quad bikes, light vehicles, loaders, crushing plants, excavators, and heavy vehicles. These land uses characterise the background noise within the area. Noise levels from farm activities are concentrated at peak times during the year such as seeding and harvesting whereas noise from the adjacent quarry and traffic from Olympic Highway and local roads is more continuous throughout the year.

Traffic volumes were obtained from the Shire for Benambra Road (northern boundary of the site). The most recent traffic volumes were recorded between May and June 2016. The average daily traffic (adt) volumes recorded from 7:00am to 7:00pm Monday to Friday were 46 vehicles per day (vpd) on the eastern length of Benambra Road. Benambra Road is one of two routes to Boral Resources' Hurricane Hill rock quarry. As such traffic utilising Benambra Road between Weeamera Road and Olympic Highway is dominated by heavy vehicle movements associated with Hurricane Hill Quarry.

The Olympic Highway located 2.6 km to the east of the proposal is a major transport route in the region. In 2010 over 4500 vehicles used Olympic Highway each day. This was composed of 13% heavy vehicles including B-double semitrailers. The traffic noise on the Olympic Highway contributes to the noise character of the area.

Weather impacts on sound travel

Noise emission can also be influenced by prevailing weather conditions. Wind has the potential to increase noise at a residence when it is at low velocities and travels from the direction of the noise source. Prevailing winds for the proposal were obtained from the Bureau of Meteorology (BoM) weather station near Albury 35 km to the south (http://www.bom.gov.au/climate/averages/wind/selection_map.shtml). The wind roses indicate that winds are unlikely to blowing toward the nearest residence to the site.

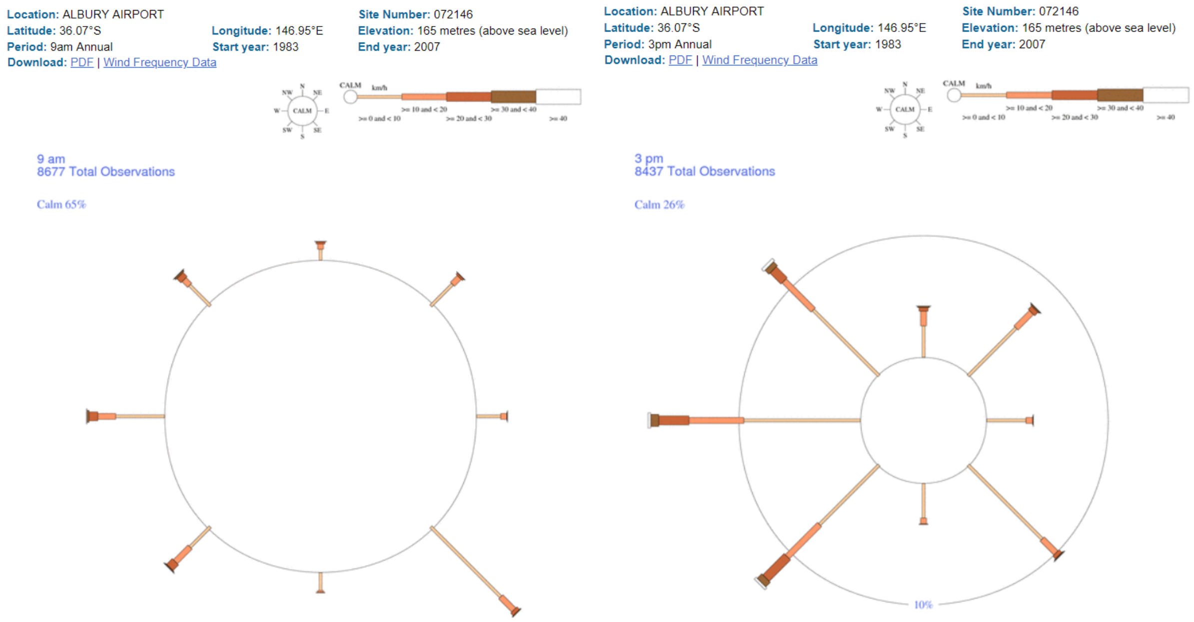


Figure 6-17 Albury BOM annual wind roses

Background noise levels

Background noise monitoring has not been conducted for the proposal, hence, the minimum applicable RBL of 35 dB (A) for the daytime and 30 dB (a)A for the evening and night-time periods was adopted for the noise assessment. It is anticipated, however that at certain periods that background noise levels would exceed noise from the proposal, this assessment therefore represents the worst-case scenario. Identified sources of background noise include Hurricane Hill Quarry operations, traffic, farming machinery and livestock.

Sensitive residences

27 residences were identified within 3 km of the development site boundary (including Orange Grover Gardens wedding venue).

Six residential properties are located within 1 km, north, west and south of the development site (Figure 6-18). The nearest uninvolved resident (R1) to the north of the development site with R1a about 80 m from the solar farm development site (with the planned landscaping setback this would be extended to approximately 210 m from any panel infrastructure). The nearest residential property to the west is the involved landholder (R3) of Lot 1 DP 1069452 about 580 m from the solar farm development footprint. The other two residences that could be potentially be impacted by noise include R2, located approximately 820 m northwest and R5a, located approximately 880 m south of the development site.

The distances between these residences from the development site boundary and the internal substation are shown in Table 6-11.

The location of residences in relation to the proposal are shown in Figure 6-18.

Table 6-11 Distance between the nearest residences to the proposal.

Residence	Distance (m) to proposal boundary	Distance (m) from internal substation
R1a	80 (210 with setback)	2420
R1b	350 (485 with setback)	2460

Residence	Distance (m) to proposal boundary	Distance (m) from internal substation
R2	820	950
R3	550	1190
R4	700	1800
R5a	880	4610

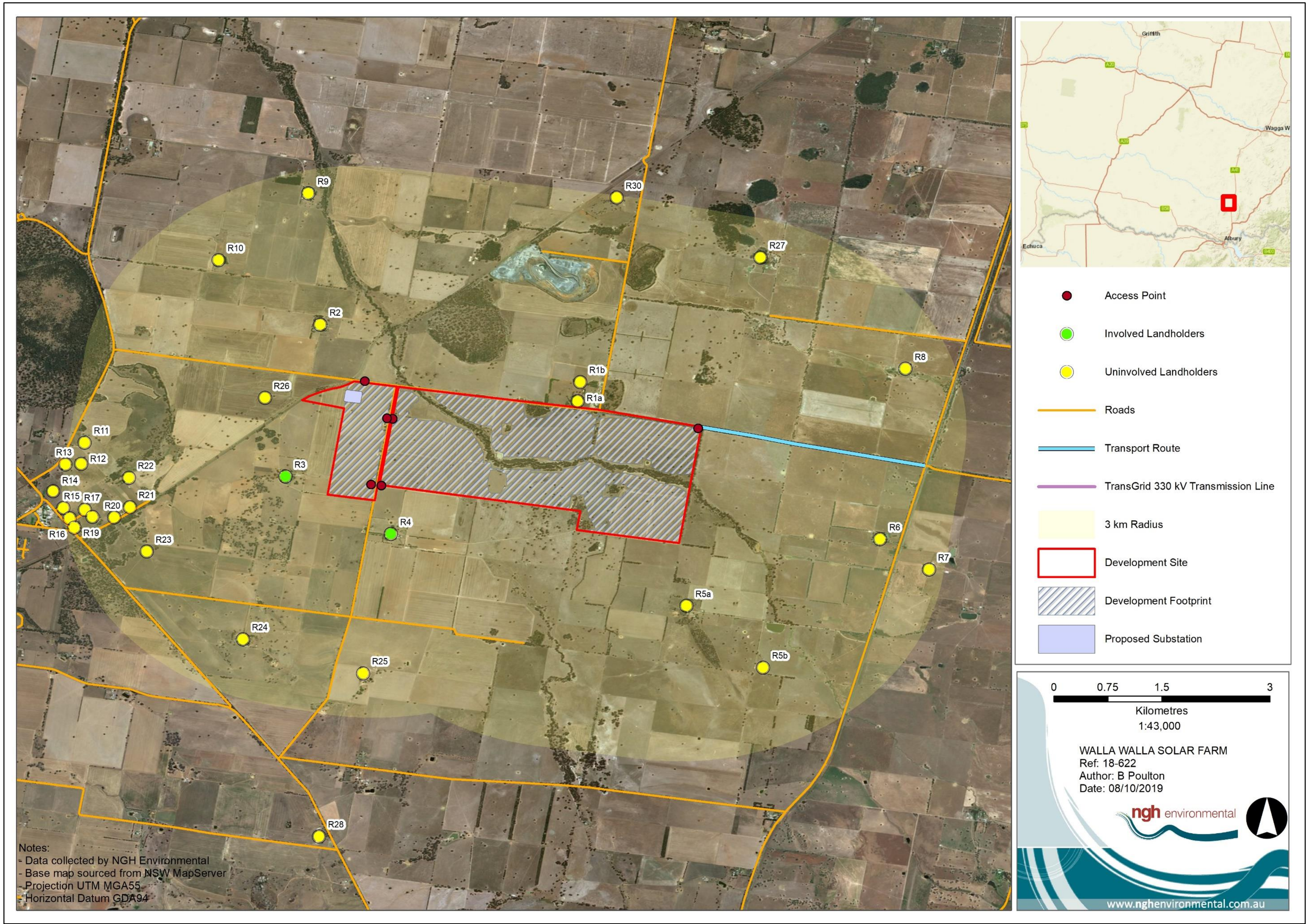


Figure 6-18 Nearby residences

6.5.3 Construction noise impact assessment

Construction noise management levels (NMLs) at all residential receptors have been calculated for the project (Table 6-12). These NMLs will be used to manage impacts associated with noise sensitive receivers adjacent to the proposal. The NMLs for the project have been calculated based on the minimum applicable RBL and NSW ICNG (DECC 2009) criteria (Table 6-5). In addition, during standard construction hours sensitive receivers experiencing construction noise at or above 75 dB (A) would be deemed highly noise effected. The night-time NML is not applicable to the proposal as no works would be undertaken or equipment utilized during darkness hours.

Table 6-12 Construction noise management levels

Location	Time of day	RBL dB (A) L_{A90}	NML dB (A) $L_{A90\ (15min)}$
All Residences	Day	35	45 (RBL + 10dB (A))
	Evening	30	35 (RBL + 5dB (A))
	Night	30	35 (RBL + 5dB (A))

Construction noise sources

Construction noise impacts would likely be from the operation of construction equipment. Several key activities on the site that are likely to produce the most noise include:

- Earth works for the construction of accesses roads, compounds and hard stands.
- Pile driving for solar panel frames and trenching for the installation of cabling.
- The delivery and movement of materials on site.

The proposed activities above use readily available construction equipment. As such, noise levels associated with that equipment (Table 6-13) and activity is well understood and able to be modelled. The construction activities selected above provide a **worst-case scenario** for noise generated from the site. It is common for the road work and compound construction activities to precede the construction of solar panel frames and cabling. The activities above rarely occur in the same location at the same time due to safety and logistics. As such, predictive modelling of the noise impacts during construction examines two scenarios, deemed to have the highest noise impact, that all of the plant listed in Table 6-13 would be operating simultaneously. It was envisaged that both scenarios would occur across the site but at different locations, concurrently and intermittently. Generally, earthworks for roads and hardstands (scenario one) would precede scenario two. Noise predictions were modelled for a worst-case scenario. Noise levels from works at the receivers are **likely to be less than** that predicted.

Table 6-13 Construction noise scenario plant

Scenario 1		Scenario 2		Scenario 3	
Earthworks and road construction	Sound power level ((dB)A)) at 7 m	Panel framing and cabling equipment	Sound power level ((dB)A)) at 7 m	Assembly of frames and panels	Sound power level ((dB)A)) at 7 m
Grader (x 2)	88	**Telehandler (x 5)**	66	**Front end loader/telehandler (x 15)**	66
Excavator (x 2)	85	**Flatbed truck (x 4)**	85	**Power generator 100 kVA (x 4)**	60
Water cart (x 3)	82	**Piling rig (x 5)**	87	**Power generator 5 kVA (x 4)**	78
Vibratory roller (2)	84	**Light vehicle (x 10)**	78	**Power hand tools (x 12)**	60
Tipper truck (4)	85	**Power hand tools (x 4)**	60	**Bobcat (x 4)**	87

The sound power levels for the equipment presented in the above table are sourced from the Australian Standard 2436 – 2010 'Guide to Noise Control on Construction, Demolition and Maintenance Sites'; the Interim Construction Noise Guidelines (ICNG), information from past projects and information held in the NGH database.

6.5.4 Construction scenarios

Three noise scenarios were used to predict the likely impact of noise at near residences (within 1 km). The predicted noise level for each scenario was calculated for each residence. Planned setbacks are included in calculations for scenarios 2 and 3 but not scenario 1 (as road construction works, fencing and landscaping activities would occur within the setback zones early in the construction phase). R1a would experience exceedances of the NML by 23 dB(A), 8 dB(A) and 6 dB(A) under scenarios 1, 2 and 3 respectively. R1b would experience one exceedance of the NML by 4 dB(A) under scenario 1 (Table 6-14,

Table 6-15 and Table 6-16). No other adjacent residence experienced exceedances. Based on the scenarios none of the adjacent residences would experience construction noise levels of 75 dB(A) and as such will **not be highly noise affected**. It should be noted that weather conditions affect the way noise travels, leading to decreased accuracy of noise level estimates over 300 m.

Table 6-14 Construction noise assessment Scenario 1

Residence ID	Address	Distance (m) to site boundary	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Below NML?
R1a	634 Benambra Road	80	**68**	45	No
R1b	634 Benambra Road	350	**49**	45	No
R2	932 Benambra Road	820	38	45	Yes
R3	161 Schneiders Road	550	43	45	Yes
R4	116 Schneiders Road	700	40	45	Yes
R5a	1791 Olympic Highway	880	37	45	Yes

Table 6-15 Construction noise assessment Scenario 2

Residence ID	Address	Distance (m) to site boundary	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Below NML?
R1a	634 Benambra Road	210	**53**	45	No
R1b	634 Benambra Road	485	42	45	Yes
R2	932 Benambra Road	820	35	45	Yes
R3	161 Schneiders Road	550	40	45	Yes
R4	116 Schneiders Road	700	37	45	Yes
R5	1791 Olympic Highway	880	34	45	Yes

Table 6-16 Construction noise assessment Scenario 3

Residence ID	Address	Distance (m) to site boundary	Highest Predicted Noise Level dB(A)	NML Standard Hours dB (A)	Below NML?
R1a	634 Benambra Road	210	**51**	45	No
R1b	634 Benambra Road	485	40	45	Yes
R2	932 Benambra Road	820	33	45	Yes
-R3	161 Schneiders Road	550	38	45	Yes
R4	116 Schneiders Road	700	35	45	Yes
R5	1791 Olympic Highway	880	32	45	Yes

The construction works would occur in a rural environment with a low level of background noise. The works are likely to generate exceedances of the NMLs for R1a and R1a at periods when works are carried out within the radiuses identified in Figure 6-19 to Figure 6-21.

All construction activities would spread across the development site and be or would be of a short duration within any specific location. FRV have initiated consultation with the owners of R1a and R1b in respect of any noise impacts and will maintain ongoing engagement.

Overall, construction noise is likely to noticeably affect only one (R1a) uninvolved nearby residence (Figure 6-22). Those effects would be temporary and intermittent during the construction of the solar farm.

The work would occur during normal working hours and, when audible, is not likely to be highly intrusive at sensitive receivers. Construction would move progressively across the site. These exceedances are likely to take place intermittently over approx. 6 weeks. This timeframe has been calculated by FRV, based on current and previous construction projects across Australia and is considered a conservative estimation. It includes an analysis of piling rates, installation of infrastructure and access tracks construction. Therefore, any potential cumulative noise impacts during construction would be short-term.

To assist further FRV will, during the sensitive 6 week period, appoint a dedicated Neighbourhood Liaison Officer who will visit the occupants (with the owner's permission) at least weekly to ensure that occupants are comfortable with the construction noise levels, assist with any mitigation proposals or requests and to update them on the rate of construction progress.

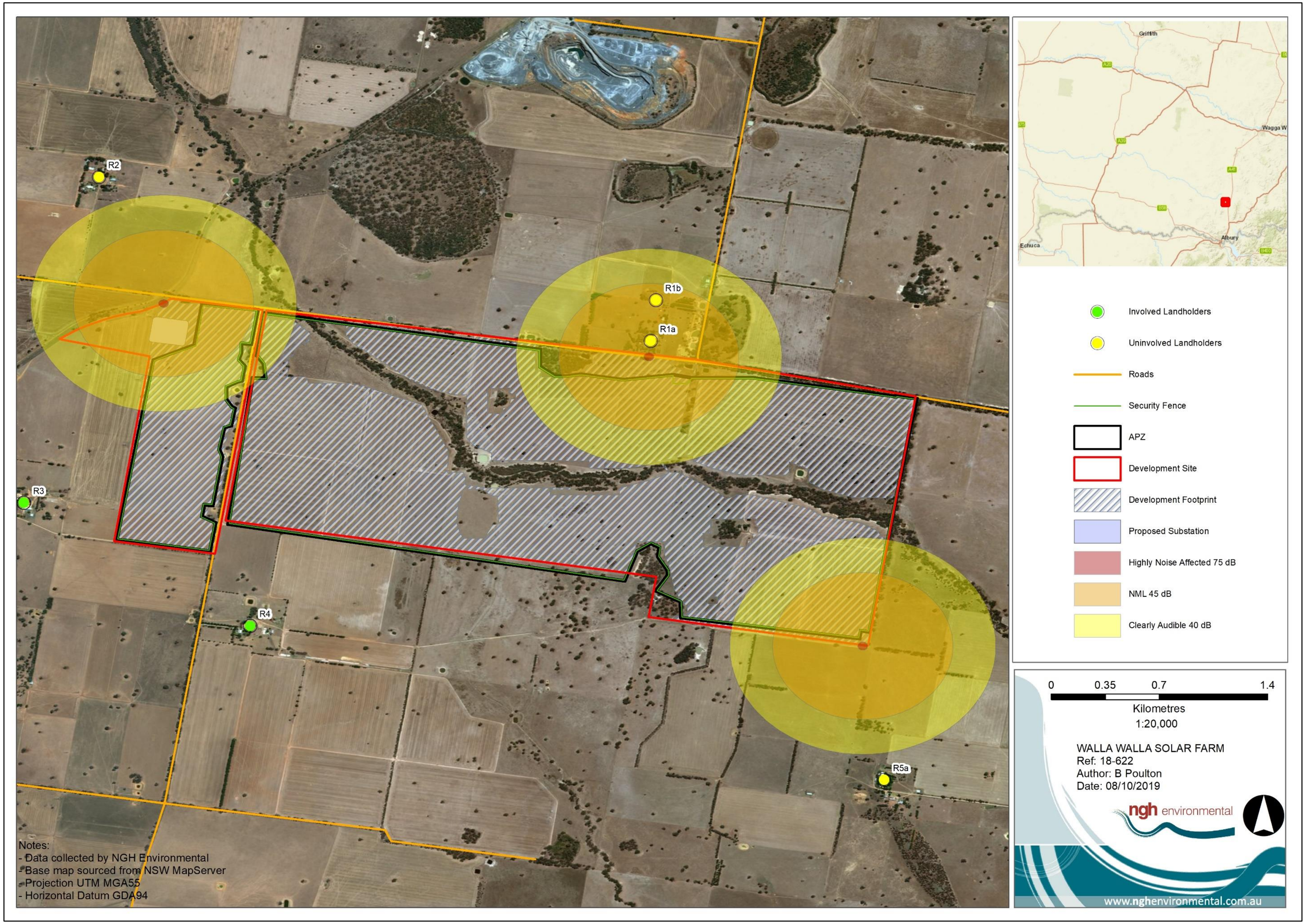


Figure 6-19 Noise impact under Scenario 1

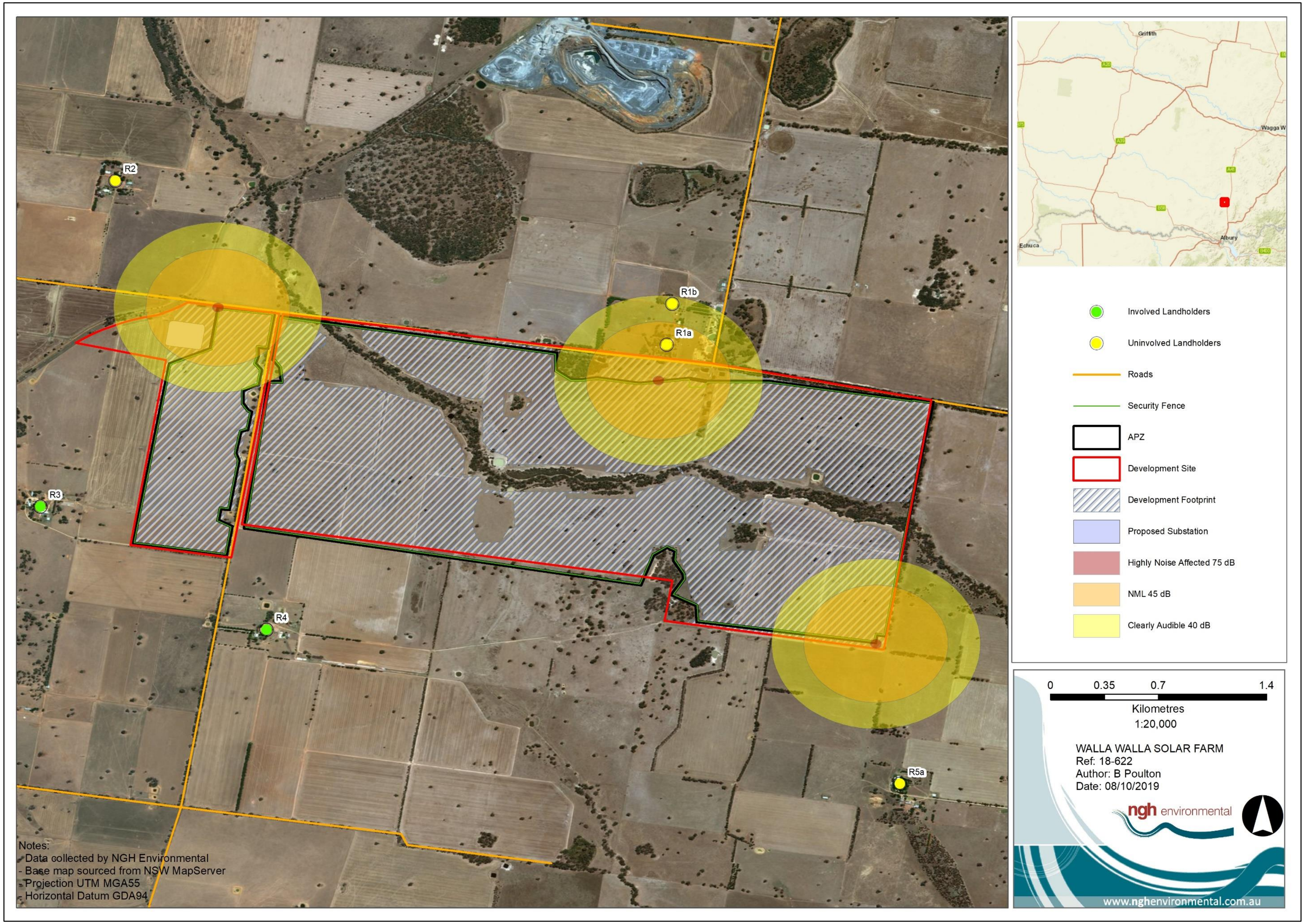


Figure 6-20 Noise impact under Scenario 2

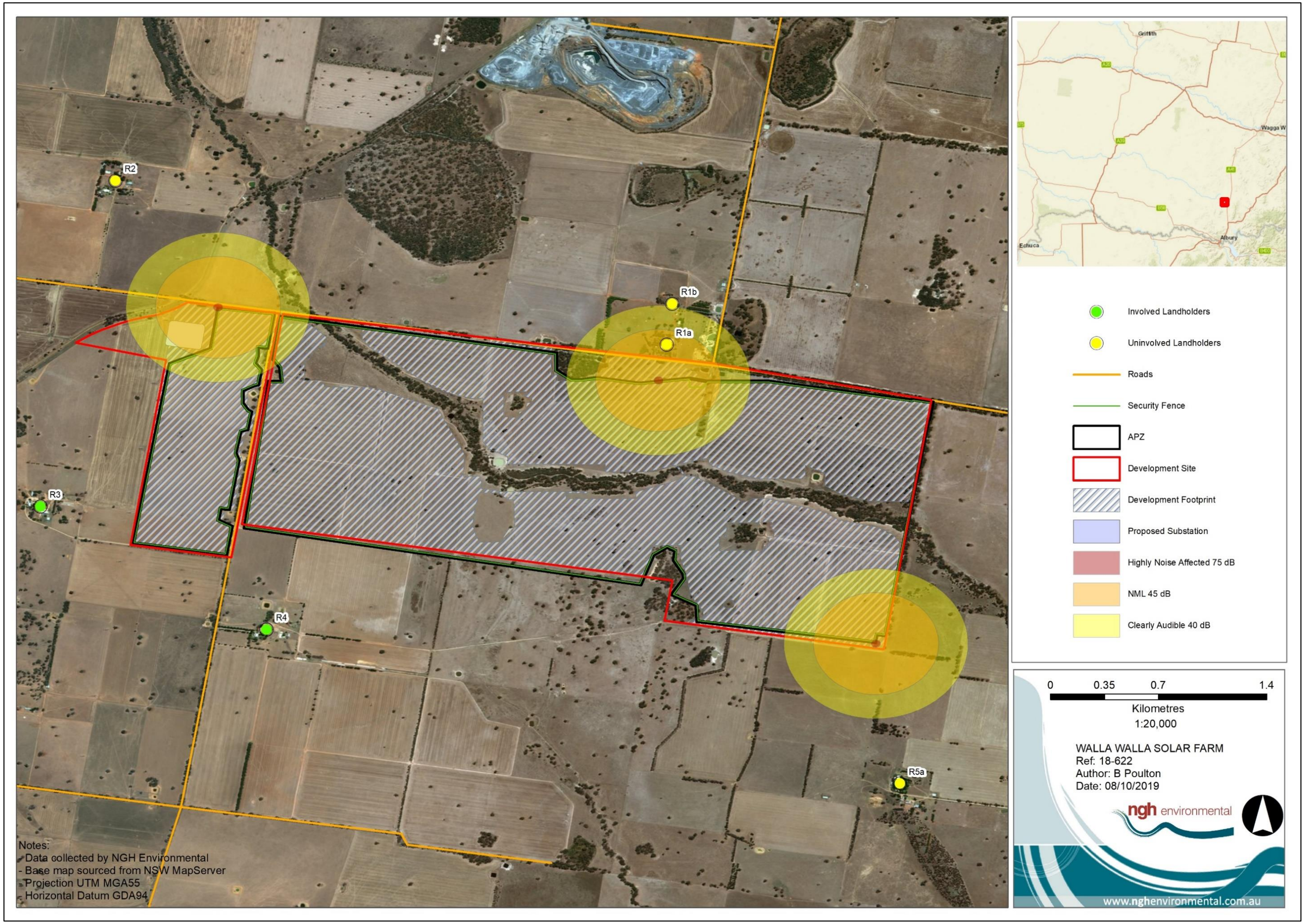
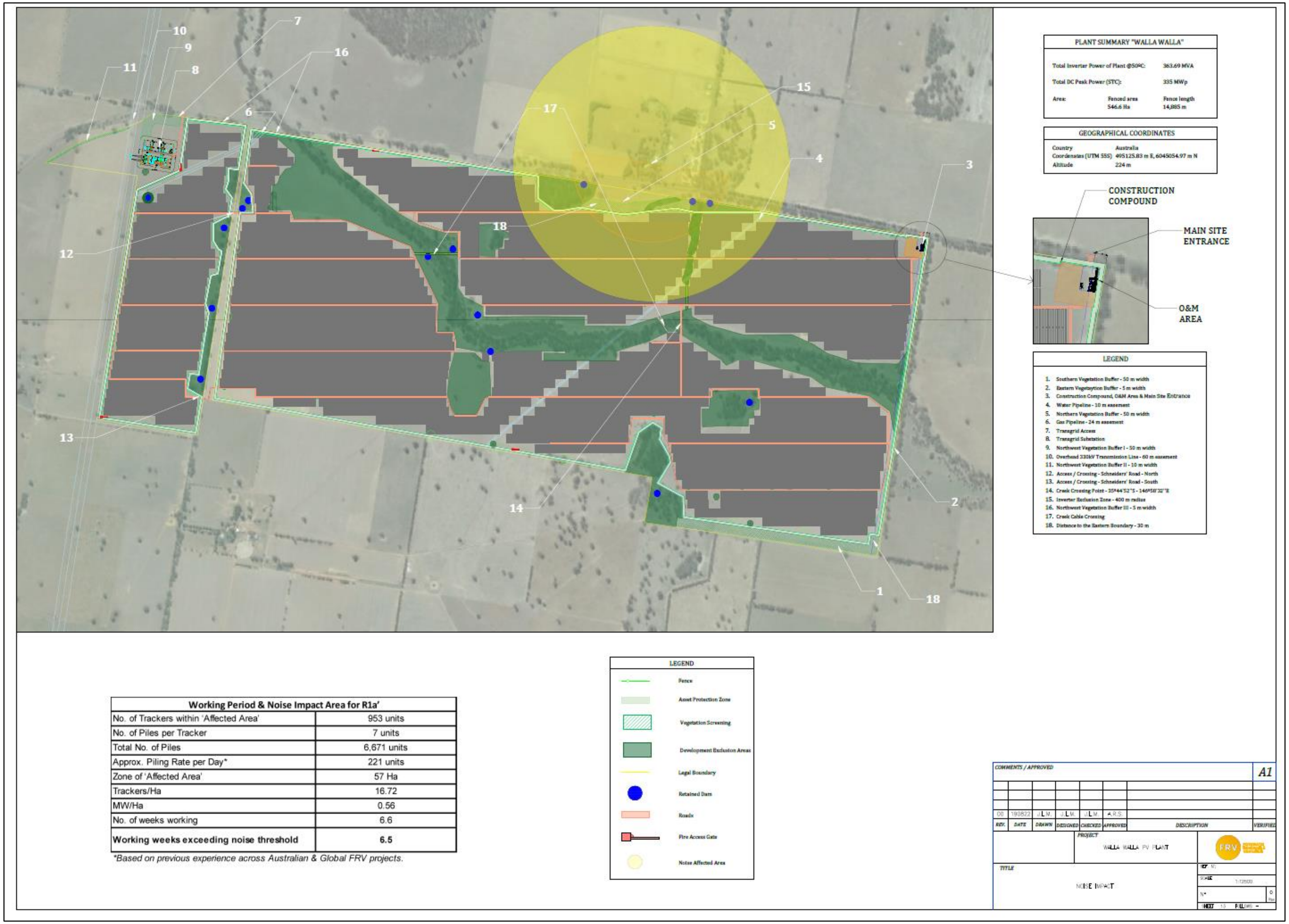


Figure 6-21 Noise impact under Scenario 3



Working Period & Noise Impact Area for R1a'	
No. of Trackers within 'Affected Area'	953 units
No. of Piles per Tracker	7 units
Total No. of Piles	6,671 units
Approx. Piling Rate per Day*	221 units
Zone of 'Affected Area'	57 Ha
Trackers/Ha	16.72
MW/Ha	0.56
No. of weeks working	6.6
Working weeks exceeding noise threshold	**6.5**

**Based on previous experience across Australian & Global FRV projects.*

Figure 6-22 Working Period and Noise Impact Area for R1a

6.5.5 Construction noise management plan

A detailed construction noise management plan would be developed prior to construction to mitigate impacts on residences where NML exceedances are likely.

The noise management plan would include the following actions:

1. Conversation with affected residents to identify their specific needs and continued ongoing liaison is already being implemented.
2. Identify and mark buffers across the development site within which NMLs at sensitive receiver locations are potentially exceeded.
3. Consideration would be given to implement noise mitigation measures within buffer areas including:
    - Construction works within buffer areas must only be undertaken the normal business hours of:
        - Monday to Friday 7:00am to 6:00pm.
        - Saturday 8:00am to 1:00pm.
        - No work on Sundays or public holidays.
4. Appoint a dedicated Neighbourhood Liaison Officer who will visit the occupants (with the owner's permission) at least weekly to ensure that occupants are comfortable with the construction noise levels, assist with any mitigation proposals or requests and to update them on the rate of construction progress.

6.5.6 Operation noise assessment

Operation noise sources

Overall noise levels associated with operations are demonstrably low due to the relatively benign nature of the operations. Noise from the operation of the solar farm would be generated by:

1. The new TransGrid substation.
2. Maintenance activities such as visual inspections of panels and structures, general maintenance (e.g. electrical repairs, replacing panels), cleaning of panels and emergency repairs (e.g. replacing torsion bars).
3. Tracking motors and movement of the solar panels.
4. Inverter stations.

The proposed activities above use readily available equipment. As such, noise levels associated with that equipment (Table 6-17) and activity is well understood and able to be modelled. The 'null effect distance' was modelled for each piece of equipment (Table 6-17). This represents the distance at which each individual piece of equipment no longer exceeds the intrusive NML criteria for the project.

Table 6-17 Operational equipment sound levels.

Equipment	Sound power level (dB (A)) at 7 m	Sound pressure level (dB) at 7 m	Null effect distance (m)
Substation transformers (x 2)	72	61	150
Light vehicle (x 1)	78	77	240

Equipment	Sound power level (dB (A)) at 7 m	Sound pressure level (dB) at 7 m	Null effect distance (m)
Tractor – slashing grass (x1)	92	81	700
Tractor – washing panels (x2)	92	81	700
Truck (x1)	83	72	350
Telehandler (x1)	81	70	300
Tracking motor (x10)	60	49	50
Modular inverters (x1)	70.4	59.4	130

Operational noise assessment

Using operational equipment sound power levels, noise levels have been calculated for four operational scenarios:

- Operation of tracking motors, internal substation and the inverter stations
- Maintenance vehicles accessing the site
- Grass slashing and panel cleaning
- Repairing faulty equipment

These scenarios are deemed to have the highest noise impact, that is if all of the plant listed (refer to Table 6-21 Table 6-23, Table 6-25) would be operating simultaneously, which is unlikely. If repairs are carried out, then the inverter is switched off and isolated for safety reasons. The activities selected provide a worst-case scenario for noise generated from the site.

The operational noise predictions are based on noise attenuation with distance from source. They do not take into account any obstacles between the source or weather conditions which can influence the level of noise perceived. Aspects of the proposal design would likely reduce operational noise, such as screening vegetation providing buffers between activities and equipment and nearby residences.

Intrusiveness criteria is used in Table 6.31 was used to determine exceedances presented in Tables 6.39 – 6.40.

Scenario 1 – Operation of trackers, substation and inverters

During operations, the substation and inverters would generate low levels of continuous noise. The tracking motors rotating the panels would generate low intermittent noise during the day, operating every 15 minutes for about 0.5 minutes. This scenario predicts the typical low noise levels that may be experienced during the operation of the solar farm infrastructure only (no maintenance activities occurring) (Table 6-18).

The substation would contain two transformers to transform 33 kV from the solar farm to 330 kV for transmission. Australian Standard AS 60076 Part 10 2009 ‘Power Transformers – Determination of Sound Power Levels’ specifies applicable sound power limits for all transformers based on the transformer rating (in MVA). Whilst the MVA rating of the internal substation is not yet available, a conservative assumption is provided below based on two 150 MVA facilities. The specification for the 150 MVA transformers indicates that the sound power output from 2 transformers would be about 72 dB(A) at 7 m.

During operation, there would be approximately 72 modular inverters. Due to their distribution across the site, for any one receiver, it is expected that only one inverter would be close enough to affect the noise environment. Accordingly, only one inverter has been used in the noise model below. No inverters would be installed within 400 m of R1a.

Table 6-18 Operational equipment for Scenario 1.

Equipment	Sound power level (dB (A)) at 7 m (per item)
TransGrid substation – transformer (x 2)	72
Tracking motor (x 10)	60
Inverter (x 1)	70

Table 6-19 Predicted noise levels for receivers during scenario 1 (during standard hours).

Receiver	Distance (m) from development infrastructure	Minimum distance (m) from Invertor	Distance (m) from substation	Predicted Noise Level dB (A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise affected	Description Clearly audible = < 10 dB (A) above NML Moderately intrusive = >10 dB (A) above NML Highly intrusive = > 75 dB (A)
R1a (uninvolved)	210	400	2420	28	Not noticeable
R1b (uninvolved)	485	675	2460	21	Not noticeable
R2 (uninvolved)	920	920	950	< 21	Not noticeable
R3 (involved)	550	550	1190	24	Not noticeable
R4 (involved)	700	700	1800	< 21	Not noticeable
R5a (uninvolved)	930	930	4610	< 21	Not noticeable

Table 6-20 Predicted noise levels for receivers during Scenario 1 (during evening hours)

Receiver	Distance (m) from development infrastructure	Minimum distance (m) from Invertor	Distance (m) from substation	Predicted Noise Level dB (A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise affected	Description Clearly audible = < 10 dB (A) above NML Moderately intrusive = >10 dB (A) above NML Highly intrusive = > 75 dB (A)
R1a (uninvolved)	210	400	2420	28	Not noticeable
R1b (uninvolved)	485	675	2460	21	Not noticeable
R2 (uninvolved)	920	920	950	< 21	Not noticeable
R3 (involved)	550	550	1190	24	Not noticeable
R4 (involved)	700	700	1800	< 21	Not noticeable
R5a (uninvolved)	930	930	4610	< 21	Not noticeable

*Note additional mitigation measures required during evening hours. N = Notification, V = Verification.

No residences are located within 135 m of the solar farm infrastructure, which is predicted to experience a minor noise exceedance of up to 5 dB (A)) above the intrusive daytime NML.

The solar farm would not normally be in operation during the evening and not in the night hours. The exception being summer with extended day lengths. This coincides with daylight savings (in NSW daylight savings begins on the first Sunday in October and ends on the first Sunday in April every year), where the invertor stations, tracking motors and on-site substation would still be operating until sunset.

There would be no adverse impacts to nearby residents under operational noise scenario 1, due to the low levels of noise generated from the equipment used and the distances of residences from the noise sources.

Scenario 2 – Maintenance vehicle activity

During operations, staff would be required on-site to maintain the solar farm. At times several vehicles may access the development site per day. Maintenance activities would mostly be conducted inside a maintenance/control building located in the north eastern corner of the development site. Noise from other maintenance works (replacing/inspecting equipment) would be intermittent and low level.

An operational maintenance scenario includes up to 2 maintenance vehicles across the project site to carry out electrical works or complete inspections. The scenario also includes the continuous noise generated by the internal substation and invertor stations, and intermittent noise associated with the tracking motors rotating the panels (Table 6-21).

Table 6-21 Operational equipment for Scenario 2.

Equipment	Sound power level (dB (A)) at 7 m (per item)
TransGrid substation – transformers (x 2)	72
Tracking motor (x 10)	60
Inverter (x 1)	70
Light vehicle (x 2)	81

Table 6-22 Predicted noise levels for Scenario 2.

Receiver	Distance (m) from development infrastructure	Minimum distance (m) from Invertor	Distance (m) from substation	Predicted Noise Level dB (A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise affected	Description Clearly audible = < 10 dB (A) above NML Moderately intrusive = >10 dB (A) above NML Highly intrusive = > 75 dB (A)
R1a (uninvolved)	210	400	2420	45	Clearly audible
R1b (uninvolved)	485	675	2460	33	Not noticeable
R2 (uninvolved)	920	920	950	28	Not noticeable
R3 (involved)	550	550	1190	32	Not noticeable
R4 (involved)	700	700	1800	29	Not noticeable
R5a (uninvolved)	930	930	4610	28	Not noticeable

R1a, when located within located within 210 m of maintenance works (e.g. light vehicles moving along the perimeter access track) are predicted to experience audible noise not exceeding the NPI criteria. The detailed noise assessment indicated that no residences would be adversely affected by the operational noise under scenario 2. However, this should be taken in the context of light vehicles already travelling along Benambra Road.

During operation, maintenance works would be intermittent and occur at a variety of locations across the development footprint as required. These activities would be short-term lasting several minutes at most and would occur during standard working hours, except in an emergency. Sensitive receivers would not be 'highly noise affected' during general maintenance access.

There would be no adverse impacts to nearby residents under operational noise scenario 2, due to the low levels of noise generated from the equipment used and the distances of residences from the noise sources. Noise emitted from light vehicles would be consistent with and indistinguishable from existing background noise. FRV have also minimised light vehicle use in proximity to R1a by relocating the access point to the north eastern corner of the development site.

Scenario 3 – Grass slashing and panel cleaning

During operations, intermittent grass slashing and panel cleaning may occasionally be required. Grass slashing along the APZ could generally occur in spring after vegetation growth has occurred and may be required after sporadic summer rainfall. Panel cleaning would occur after dusty conditions like summer or as required. FRV would implement crash grazing to control biomass within the APZ so slashing may not be required.

An operational scenario includes one tractor with a slasher attached. Slashing and panel cleaning would not be undertaken simultaneously within the same part of the development site but this is highly unlikely. The scenario also includes the continuous noise generated by the substation, inverters and tracking motors.

Table 6-23 Operation equipment for Scenario 3.

Equipment	Sound power level (dB (A)) at 7 m (per item)
Tractor – slashing grass or panel cleaning (x1)	92
TransGrid substation – transformers (x 2)	72
Tracking motor (x 10)	60
Inverter (x1)	70.4

Table 6-24 Predicted noise levels for scenario 3.

Receiver	Distance (m) from development infrastructure	Minimum distance (m) from Invertor	Distance (m) from substation	Predicted Noise Level dB (A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise affected	Description Clearly audible = < 10 dB (A) above NML Moderately intrusive = >10 dB (A) above NML Highly intrusive = > 75 dB (A)
R1a (uninvolved)	210	400	2420	56	Clearly audible
R1b (uninvolved)	485	675	2460	44	Clearly audible
R2 (uninvolved)	920	920	950	36	Not noticeable

Receiver	Distance (m) from development infrastructure	Minimum distance (m) from Invertor	Distance (m) from substation	Predicted Noise Level dB (A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise affected	Description Clearly audible = < 10 dB (A) above NML Moderately intrusive = >10 dB (A) above NML Highly intrusive = > 75 dB (A)
R3 (involved)	550	550	1190	43	Clearly audible
R4 (involved)	700	700	1800	40	Not noticeable
R5a (uninvolved)	930	930	4610	36	Not noticeable

R1a located approximately 210 m of possible grass slashing activity along the APZ is predicted to experience a short-term exceedance (up to 11 dB (A)) above the NPI criteria. **No other residence within 1 km of the proposal would be adversely affected by the operational noise under scenario 3.**

Grass slashing or panel cleaning may occur at a maximum of twice a year each. No residences would be 'highly noise affected' given that the work would occur during normal working hours, and the equipment would move progressively across the site meaning that the duration of any noticeable noise would be short (< 1 to 2 hours).

Scenario 4 – Repairing faulty equipment

During operations, repair and replacement of broken or faulty equipment would be required intermittently. A repair scenario consider, for example, the replacement of a torsion bar that operates the movement of the panels (Table 6-25). The scenario also includes the noise generated by the substation, inverters and tracking motors.

Table 6-25 Operation equipment for Scenario 4.

Equipment	Sound power level (dB (A)) at 7 m
Truck (x 1)	55
Telehandler (x 2)	81
Light vehicle (x 1)	78
TransGrid substation – transformers (x 2)	72
Tracking motor (x 10)	60
Inverter (x1)	70

Table 6-26 Predicted noise levels for Scenario 4.

Receiver	Distance (m) from development infrastructure	Minimum distance (m) from Invertor	Distance (m) from substation	Predicted Noise Level dB (A) Green = no exceedance Yellow = Minor exceedance Orange = Substantial exceedance Red = highly noise affected	Description Clearly audible = < 10 dB (A) above NML Moderately intrusive = >10 dB (A) above NML Highly intrusive = > 75 dB (A)
R1a (uninvolved)	210	400	2420	48	Clearly audible
R1b (uninvolved)	485	675	2460	36	Not noticeable
R2 (uninvolved)	920	920	950	28	Not noticeable
R3 (involved)	550	550	1190	35	Not noticeable
R4 (involved)	700	700	1800	32	Not noticeable
R5a (uninvolved)	930	930	4610	28	Not noticeable

*Note additional mitigation measures required during standard daytime hours. N = Notification, V = Verification.

R1a located 210 m of the solar farm infrastructure could experience a small noise exceedance of up to 3 dB (A)) above the intrusive daytime NML. No other residence within 1 km of the proposal would be adversely affected by the operational noise under scenario 4.

Repair and replacement of broken or faulty equipment would occur infrequently and would be clearly audible from R1a only, and only when undertaken close to the northern boundary of the development site. Panel replacement would be more likely, which would generate low noise levels from use of hand tools. **No sensitive receivers would be 'highly noise affected'** given that the work would occur during normal working hours and would be short-term.

Sleep disturbance

The NPI states:

> *The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.*
>
> *Where the subject development/premises night-time noise levels at a residential location exceed:*
>
> - *LAeq,15min 40 dB (A) or the prevailing RBL plus 5 dB, whichever is the greater; and/or*
> - *LAFmax 52 dB (A) or the prevailing RBL plus 15 dB, whichever is the greater.*
>
> *a detailed maximum noise level event assessment should be undertaken.*

During the night-time period, no mechanical plant would be operating due to the lack of sunlight. During daylight saving period over summer some tracker noise emissions may occur between 6 am and 7 am.

When the sun is not shining the invertors stations will not be operating. It is expected and analysis shows that noise levels at the closest receivers would be well below the sleep disturbance criteria.

Transmission line

Noise emissions from operational transmission lines can include aeolian and corona discharge noise. In the context of this proposal, aeolian noise could be generated when wind passes over transmission poles or lines. This type of noise is generally infrequent and is dependent on wind direction and velocity. Wind must be steady and perpendicular to the line to cause aeolian vibration. Given the distance to the closest residence from the overhead power line and the TransGrid substation is 950 m (R2), aeolian noise impacts are expected to be negligible.

SLR Consulting have previously measured corona noise (reference GEHA Report 045-109/2 dated 9 November 2004, pers. comm. I. Fricker December 2012) at a site near Officer in outer Melbourne, Victoria. SLR found it possible to measure corona noise at close distances, at high frequencies only, as other noise sources, namely traffic and birds, caused some interference at times. A 500-kV line was measured during damp foggy conditions.

At a distance of 30 m along the ground from the line, a L_{eq} noise level of about 44 dB (A) was measured. At 890 m the corona noise was calculated to be about 15 dB (A). The night-time intrusive criteria determined is 35 dB (A). The proposed transmission line would comply with the intrusive noise levels for the project.

6.5.7 Vibration

The NSW guideline *Assessing Vibration: A Technical Guideline* (DEC, 2006), is designed to be used in evaluating and assessing the effects on amenity of vibration emissions from industry, transportation and machinery. Sources of vibration covered in this guideline include construction and excavation equipment, rail and road traffic, and industrial machinery.

Based on the plant items to be used onsite during the construction phase including graders, dump trucks, rollers, water cart, piling and other vehicles, vibration generated by construction plant was estimated and potential vibration impacts summarised in Table 6-27.

Table 6-27 Potential impact from vibration to the two closest residences.

Residence	Distance (m) from site proposal (Approximate)	Level of risk for potential impact	Monitoring required
1	80	Very low	Not Required
2	880	Very low	Not Required

No operational ground vibration sources have been identified that are likely to generate ground vibration impacts at the nearest residential dwelling (80 m). Potential vibration impacts from operation are therefore not assessed any further.

6.5.8 Potential cumulative impacts

Cumulative impacts on residences could potentially be exacerbated should the construction of the proposed Culcairn Solar Farm occur concurrently with the proposal.

Construction

The distances of Residences 1 to 5a from the proposed Culcairn Solar Farm are shown in Table 6-28. Based on the assumption that Culcairn Solar Farm would utilise the same types of plant and equipment as the proposal, an assessment of construction noise impacts from both solar farms being constructed at the same time was conducted. No cumulative impacts resulting in NML exceedances are estimated.

Table 6-28 Cumulative construction noise impacts

Residence ID	Address	Distance (km) to Culcairn SF boundary	Below NML?
R1a	634 Benambra Road	2.1	Yes
R1b	634 Benambra Road	2.3	Yes
R2	932 Benambra Road	0.49	Yes
R3	161 Schneiders Road	2.7	Yes
R4	116 Schneiders Road	3.3	Yes
R5a	1791 Olympic Highway	5.3	Yes

Operation

Noise from the operation of both the proposed Culcairn Solar Farm and the proposal would be generated at each site by:

1. The TransGrid substation.
2. Maintenance activities.
3. Tracking motors and movement of the solar panels.

The internal substations would contain up to 2 transformers converting 33 kv to 330 kv for transmission to transmission line. Whilst the MVA rating of the internal substation is not yet available, it is expected that the sound power output from each facility would not exceed 90 dB(A) at 1 m. The closest residence from the Walla Walla substation is 820 m, while the location of the substation within the Culcairn development site is currently unknown. When the noise level of two transformers, 93 dB(A), is attenuated for distance the noise level from the internal substation would be 35 dB(A) or 5 dB(A), less than background. The attenuated noise level at a property at 1000 m from either substation would be 33 dB(A), thus no noise level exceedance from either or both proposals is anticipated.

6.5.9 Safeguards and mitigation measures

Table 6-29 Safeguards and mitigation measures for noise and vibration impacts

No.	Mitigation strategies	C	O	D
NS1	Works should be undertaken during standard working hours only. (Except for the connection to substation): • Monday – Friday 7am to 6pm. • Saturday 8am to 1pm. • No work on Sundays or public holidays.	C		
NS2	All staff onsite should be informed of procedures to operate plant and equipment in a quiet and efficient manner.	C	O	D
NS3	A letterbox drop would be prepared and provided to residences in close proximity to the works. The letter would contain details of the proposed works including timing and duration and a contact person for any enquiries or complaints.	C	O	D
NS4	Consult with R1 prior during pre-construction to develop suitable mitigation measures. A dedicated Neighbourhood Liaison Officer will be appointed with the landowners permission.	C		
NS5	No inverters to be installed within a 400 m radius of R1a.	C	O	
NS6	Develop and implement construction noise management plan	C		
NS7	Regular inspection and maintenance of equipment to ensure that plant is in good condition.	C	O	D
NS8	Appoint a dedicated Neighbourhood Liaison Officer who will visit the occupants (with the owner's permission) at least weekly to ensure that occupants are comfortable with the construction noise levels, assist with any mitigation proposals or requests and to update them on the rate of construction progress.	C		D

C: Construction; O: Operation; D: Decommissioning

6.6 TRAFFIC, TRANSPORT AND ROAD SAFETY

Large developments can increase pressure on local road networks, leading to increased wear and congestion. Ontoit was engaged to complete a Traffic Impact Assessment for the proposal including potential impacts to the proposed construction transport route including Olympic Highway and Benambra Road. Minimal impacts on Schneiders include installing underground cables and construction crossing the road at two access points. Access points have been selected to cause minimal disturbance to nearby residences.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

Transport – including

- *an assessment of the peak and average traffic generation, including over-dimensional vehicles and construction worker transportation.*
- *an assessment of the likely transport impacts to the site access route (including Benambra Road, Schneiders Road and Olympic Highway), site access point, any rail safety issues, any Crown land, particularly in relation to the capacity and condition of the roads.*
- *a cumulative impact assessment of traffic from nearby developments.*
- *a description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required).*
- *a description of the measures that would be implemented to mitigate any transport impacts during construction.*

ROADS AND MARITIME SERVICES REQUIREMENTS

From the information provided it is understood that access to the development site is proposed to be from Benambra Road or Schneiders Road, which are classed as local roads, within a 100 km/h speed zone. Benambra Road is an approved B-double route. Access to the site particularly for the delivery of components will rely on access via the Olympic Highway which is a Classified Road and also is an approved B-Double Route.

Given the scale and operational characteristics of the proposed development RMS considers that the traffic related issues relevant to the development should be considered and addressed in 2 distinct stages as follows:

- *Construction & Decommission phase – the transport of materials and equipment/components for the establishment of the facility and ancillary infrastructure, the movement and parking of construction related vehicles, including personal vehicles, during the construction of the facility;*
- *Operational phase – the ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the project.*

Roads and Maritime Services emphasises the need to minimise the impacts of any development on the existing road network and maintain the level of safety, efficiency and maintenance along the road network. Given the scale of the proposal a Traffic Impact Assessment (TIA) should be submitted with the Development Application to allow for an informed assessment of the development proposal. The Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network.

The supporting scoping report acknowledges the need for the Environmental Impact Statement to include an assessment of traffic impacts during the construction period. This assessment needs to consider both the transportation of the components required for the construction of the development and the workforce required. Traffic should also be considered and addressed during operation of the facility. The Traffic assessment shall detail the potential impacts associated with the phases of the development, the measures

to be implemented to maintain the standard and safety of the road network, and procedures to monitor and ensure compliance. The supporting documentation identifies that a Traffic Management Plan is required to be prepared. The draft SEARs document that was forwarded should also reinforce the need for the consideration of the workforce *traffic to the development site and potential options to minimise traffic generated by the construction workforce to the site and address fatigue issues.*

For guidance in the preparation of the TIA the applicant is referred to section 2 of the "Guide to Traffic Generating Developments" prepared by the RTA and the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and Part 13: Traffic Studies and Analysis. The TIA should contain information such as the expected traffic generation, vehicle numbers and types of vehicles, and travel routes for vehicles accessing the development site.

Given the type and scale of the proposed development and its proximity to a public road it is considered appropriate that issues relating to potential for distraction of, and for glare impacts on, passing motorist be addressed in the development submission. As a minimum, consideration should be given to the establishment and maintenance of a visual buffer, such as a vegetated buffer, within the subject site along its frontage to any public road.

GREATER HUME SHIRE COUNCIL REQUIREMENTS

Traffic assessment to include cumulative impacts of the possibility of an adjacent large-scale solar development being constructed concurrently to this proposal.

6.6.1 Existing environment

Regional road network

Walla Walla is located on the Walla Walla Jindera Road off Olympic Highway. Olympic Highway is a regional state highway, generally running in a north-south alignment. It has a carriageway width of 10 m, and one traffic lane of approximately 3.5 m wide in each direction.

Local road network

The RMS (2019) NSW Combined Higher Mass Limits and Restricted Access Vehicle Map indicates that Olympic Highway, Benambra Road and Schneiders Road are approved heavy vehicle access routes (25/26 m B-double routes as a maximum) (Appendix F). As such, the major access and transport/haulage route from the south and the north would be Olympic Highway. The major transport route is subject to further assessment, specialist input and consultation with Greater Hume Shire.

The Walla Walla townsite is accessible from several local roads off Olympic Highway including Cummings Road, Greenvale Road, Walla Walla Road and Benambra Road. As such, selecting Benambra Road as transport route to and from the proposal, would not adversely impact the majority of traffic moving to and from the local town centres of Walla Walla and Culcairn. Benambra Road is a local road running in an east-west alignment, extending from its intersection with Olympic Highway to its termination 11.5 km to the west. It is a partially sealed road with a width of approximately 6 m.

There are no Crown paper roads relevant to the proposal.

Traffic volumes

Traffic counts for Benambra Road, 100 m east of Schneiders Road were undertaken by Greater Hume Shire from 14:41 on Tuesday 24 May 2016 to 08:41 Friday 17 June 2016. Averaged daily (paired axle) vehicle counts over this period showed total Monday to Friday traffic counts between 07:00 and 19:00 range from 33 on Monday to 56 on Tuesday. Daily weekend vehicle counts for between 07:00 to 19:00 ranged from 8 to 15 on Saturday and Sunday, respectively. The vehicle paired axle counts does not distinguish between light and heavy vehicles.

6.6.2 Traffic generation

The Roads and Maritime Services '*Guide to Traffic Generating Development'* does not outline specific trip generation rates for the construction and operation of a Solar Farm. As such, traffic generation demand has been determined through the analysis of the forecasted employee, workforce and goods and service vehicle deliveries.

Construction

It is expected that daily traffic generation during the peak of the construction would arise from:

- Up to 250 construction personnel traveling to and from the development site. Daily light vehicle movements are estimated at 200 vehicles (400 light vehicle movements), which could be reduced by shuttling construction workers to the development site by bus.
- Up to 45 deliveries via heavy vehicles (90 heavy vehicle movements).

Peak construction vehicle movements represent the worst-case scenario of a maximum 490 vehicle movements per day and would be limited to the peak construction period of eight to twelve months.

Operation

An operational workforce plus service contractors visiting the proposal on an irregular basis is expected to generate minimal traffic movements.

6.6.3 Site access

The proposal would be accessed from one main point off Benambra Road to prevent unnecessary traffic travelling up past residents on the Benambra Road. Two access crossings are proposed on the Schneiders Road. A separate access is supplied for TransGrid to access their substation.

In consultation with the local RFS, several Fire Access Gates have now been proposed to enhance site safety and to be used only in the unlikely event of an emergency.

6.6.4 Potential impacts

Proposal requirements

A traffic impact assessment was completed by Ontoit in September 2019 (Appendix F). Access requirements can be separated into the following categories:

- Cars - would be required by project management staff and site workers to access the site. Cars would make up the largest proportion of vehicles accessing the site.
- Buses – would be used to transport workers to and from the site to minimise traffic volumes and transit risks during construction.
- Utility vehicles – would be required to transport equipment and materials around the site and for local pick up of materials.
- Trucks – would be used to transport equipment and materials around the site and for local pick up of materials. Larger sized deliveries would be undertaken by trucks as opposed to utility vehicles.
- Standard articulate trucks – would be used to transport approximately 12 metre containers from point of origin.

- Oversize and/or over-mass vehicles – may be required to deliver larger infrastructure components

Vehicle access to the site would generally be confined to the standard hours of construction. Exceptions would occur as staff arrive and leave the site, before and after shifts. Additionally, the delivery of large components may take place outside normal working hours, but this would be avoided where practicable.

Internal access tracks would facilitate access to all parts of the proposal, in particular to the central modular inverters.

Internal access tracks would remain unsealed but would be re-sheeted with gravel or crushed and compacted soil, to maintain their condition during the construction phase.

Construction and decommissioning

The potential traffic, transport and road safety impacts associated with construction of the proposal relate primarily to the increased numbers of large vehicles on the road network which may lead to:

- Increased collision risks (other vehicles, pedestrians, stock and wildlife).
- Damage to road infrastructure.
- Associated noise and dust (particularly where traffic is on unsealed roads) which may adversely affect nearby residences.
- Disruption to existing services (public transport and school buses).
- Reduction of the level of service on the road network caused by 'platooning' of construction traffic.

HAULAGE

While a detailed haulage program has not yet been developed, it is expected that the project's components are most likely to be delivered by road from Sydney and in some instances Melbourne. From Sydney, the route would likely include the South Western Motorway (M5), the Hume Highway (M31) and Olympic Highway (A41). From Melbourne, the route would also likely include the Hume Highway and Olympic Highway.

These roads are of sufficient capacity to accommodate the haulage of components required for the construction of the solar farm and transmission line.

INCREASED VEHICLE NUMBERS

40 to 60 employees would be required during the first months of construction, rising to 250 employees during the peak construction period (8 to 12 months duration). During the peak period, up to approximately 400 light vehicle movements per day would be expected to and from the site. Alternatively, to reduce total vehicle movements it is proposed to limit light vehicle actions by imposing a bus service. This is a safety management action and reduces impacts on the local road network. Based on the utilisation of bus services this would reduce the light vehicle traffic to around 120 movements during the peak construction time (considering movements to be a single trip).

For materials and equipment delivery, during the three-month initiation stage approximately 24 heavy vehicles would access the site each day. This would extend to an estimated peak of 45 heavy vehicles per day during the peak delivery period, equating to 90 heavy vehicle movements during this time (i.e. 45 inbound and 45 outbound). These heavy vehicle movements will predominantly be Truck and Dog configuration with a number of mixer trucks and articulated loads.

INCREASED COLLISION RISK

The increased collision risk relates primarily to traffic entering and exiting the site from Benambra Road to and from Olympic Highway. This relates to both oncoming traffic and traffic following vehicles that are turning off Olympic Highway.

Based on a 100 km/hr speed limit and a reaction time of 2 seconds, a safe intersection sight distance of 248 m is required in accordance with the Austroads (2009) *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*. At the Benambra Road / Olympic Highway intersection, sufficient sight distance is affordable for turning vehicles. Accordingly, the sight distance at the access is considered acceptable.

DAMAGE TO ROAD INFRASTRUCTURE

The increase in traffic and heavy vehicle movement could impact the condition of roads on the haulage network. Along Olympic Highway, the impact is expected to be negligible due to the existing capacity of the road network. However, the impact of turning traffic at the Olympic Highway / Benambra Road intersection would likely require monitoring to ensure that the road is maintained in an adequate condition.

Benambra Road is already sealed up to the Weeamera Road intersection. The proponent would manage construction impacts on Olympic Highway and Benambra Road with a Traffic Management Plan. This may require periodic road improvements and lane closures to preserve traffic flow.

ASSOCIATED NOISE AND DUST

The increase in traffic during construction and decommissioning may increase noise and dust in the local area. However, the majority of vehicles would be traveling at low speed. Impacts from dust generated from the proposed activity, including that associated with increased traffic is considered in section 7.4. FRV has modified the proposal design to ensure that the majority of construction traffic remains within the development site, utilising local roads as little as possible. This was to improve road safety and lower dust emissions.

The increase in traffic and heavy vehicle movement during construction and decommission would result in a minor increase in noise as a result of the proposed works. Olympic Highway is located directly east of the project and forms part of the intersection where the concentration of traffic is expected. Olympic Highway already experiences moderate levels of traffic including heavy vehicles. The closest residence (R1a) is located 1.4 km from the eastern access point on Benambra Road. The traffic noise during construction and decommission would be unlikely noticeable at the nearest sensitive residence.

DISRUPTION TO EXISTING SERVICES

Increased traffic along Benambra Road and Olympic Highway during construction may cause disruptions to general traffic flows and to public transport services including school bus routes that operate along the road. These disruptions would be short term only to provide traffic control during road work.

SUMMARY OF CONSTRUCTION AND DECOMMISSIONING IMPACTS

Overall, the additional traffic associated with the construction and decommissioning of the solar farm would be a small component of the existing traffic loads on local and state roads. No substantive increased collision risk, damage to road infrastructure, noise or dust impacts, disruption to existing services or reduced level of service is expected to accompany construction or decommissioning.

Operation

Vehicles would use the designated road network to access and travel within the site during the operational phase (about 30 years). Only a small number of vehicle movements per day would be expected during normal operation of the solar farm. Activities undertaken during the operation phase would include travelling to the site office or maintenance building and carrying out maintenance activities on the solar farm infrastructure. Operational staff would be confined to designated parking areas and access roads/tracks within the proposal area.

It is considered unlikely that the low levels of operational traffic would obstruct public or private local access or be above the background noise levels.

Additional risks to road safety from operational traffic would be minimal.

6.6.5 Potential cumulative impacts

Construction

Peak construction total traffic movements (return trips) for the proposal are estimated up to 490. As the proposed Culcairn Solar Farm is not a committed project, nor has an EIS been submitted, it is not possible to make an accurate analysis of the cumulative impacts. Therefore, this is why it is more appropriate to utilise the relevant and accurate information prior to construction within the Traffic Management Plan and Construction Management Plan. However, reviewing Culcairn Solar Farm, we know it is geographically larger than the proposal but would likely engage a similar sized work force. This means that should peak construction occur for both projects concurrently, then the worst-case scenario would add approximately 800 combined light and heavy vehicles using Benambra Road between Olympic Highway and the construction access point. Construction traffic from the proposed Culcairn Solar Farm would add to the existing 134 daily vehicle movements on Benambra Road up to Weeamera Road.

The Traffic Impact Assessment undertaken by Ontoit (2019) estimates the capacity of Benambra Road at approximately 600 vehicles per hour. It would be manageable to schedule heavy vehicle traffic movements to and from the development site outside peak worker transit periods, which would ensure that the capacity of Benambra Road is not exceeded.

The condition of Benambra Road between Weeamera Road and Olympic Highway is sealed and approximately 7.5 m wide. The Benambra Road/Olympic Highway intersection already has the capacity for 36 m A -Double trucks would be able to cater for a traffic flow capacity of approximately 300 vehicles per hour per lane. While this proposal does not propose any upgrades of the transport route from Olympic Highway to Weeamera Road, should the cumulative traffic numbers require upgrades and/or maintenance works, the proponents would expect to share the cost and responsibility for these works with Culcairn Solar farm following careful analysis of the dilapidation process.

Traffic management plan

The planned construction haulage route for the proposed Culcairn Solar Farm is likely to be Olympic Highway, west down Benambra Road and north along Weeamera Road. The increased traffic movements to the site would be predominantly limited to construction. The additional traffic and dust generation impacts have the potential to impact sensitive residences along Benambra Road, primarily Residence 1. A Traffic Management Plan (TMP) would be developed to minimise vehicle movements and dust as much as practical. Should both of these proposed solar farm proposals be approved, the TMP would include scheduling of vehicle movements to ensure congestion along the shared transport route of Benambra Road is minimised.

Generally, adverse cumulative traffic impacts are anticipated to be manageable through:

- reducing light vehicle movements by offering workers transport to and from site via shuttle bus.
- Once onsite for the day, the majority of construction traffic would remain onsite and not traverse local roads surrounding the proposal.
- Collaborating with the main users of Benambra Road including Boral Resources, Culcairn Solar Farm (if approved) and local schools regarding bus routes to coordinate scheduling and avoid road use conflicts.

Operation

Vehicle movements during the operation phase for solar farms is low. In the event that both the proposed Culcairn Solar Farm and the proposal become operational, it is anticipated that cumulative impacts on local roads would be negligible.

6.6.6 Safeguards and mitigation measures

Safeguards for traffic, transport and associated safety impacts are listed in Table 6-30.

Table 6-30 Safeguards and mitigation measures for traffic, transport and safety impacts

No.	Safeguards and mitigation measures	C	O	D
TT1	A Haulage Plan would be developed and implemented during construction and decommissioning, including but not limited to: • Assessment of road routes to minimise impacts on transport infrastructure and residential dwellings. • Scheduling of deliveries of major components to minimise safety risks (on other local traffic). • Traffic controls (signage and speed restrictions etc.).	**C**	**O**	**D**
TT2	A Traffic Management Plan would be developed and implemented during construction and decommissioning. The Traffic Management Plan would include but not be limited to: • Prior to construction, a pre-conditioning survey of the relevant sections of the existing road network, to be undertaken in consultation with Greater Hume Shire. • Assessment of road condition prior to construction on all local roads that would be utilised. • A program for monitoring road condition, to repair damage exacerbated by the construction and decommissioning traffic. • The designated routes of construction traffic to the site. • Carpooling/shuttle bus arrangements to minimise vehicle numbers during construction. • Scheduling of deliveries. • Community engagement regarding traffic impacts for nearby residents. • Consideration of cumulative impacts. • Traffic controls (speed limits, signage, etc.). • Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts. • Providing a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures.	**C**		**D**

No.	Safeguards and mitigation measures	C	O	D
	• Water to be used on unsealed roads (including internal roads) to minimise dust generation through increased traffic use. Following construction, a post condition survey of the relevant sections of the existing road network would be undertaken to ensure it is of similar condition as prior to construction.			
TT3	Obtain a section 138 Consent from the relevant council/agency to perform works within the road reserve.	**C**		
TT4	Any upgrades would be subject to detailed design and would be designed and constructed to the relevant Australian road design standards.	**Design Stage**		
TT5	The proponent would repair any damage resulting from project traffic (except that resulting from normal wear and tear) as required at the proponent's cost.	**C**		**D**

C: Construction; O: Operation; D: Decommissioning

6.7 WATER USE, QUALITY (SURFACE AND GROUNDWATER) AND HYDROLOGY

The quality of water resources is closely linked to the surrounding environment and land use. Poor water quality has a negative impact on public health, the health of our ecosystems, recreational activities, farming and other activities.

Water use describes the total amount of water used during construction, operations and decommissioning. Measures of water usage help evaluate the level of demand from industrial, agricultural, and domestic users.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

Water – _Including:_

- _an assessment of the likely impacts of the development on surface water and groundwater resources (including flood zones, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulphate soils), related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts._
- _details of water requirements and supply arrangements for construction and operation._
- _a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004)._

OEH REQUIREMENTS

The EIS should specifically address the attached requirements for flooding and conduct flood modelling for the purposes of appropriately locating major and sensitive infrastructure and for assessing impacts external to the site post development.

Flooding –

1. _The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:_
   a. Flood prone land.
   b. Flood planning area, the area below the flood planning level.
   c. Hydraulic categorisation (floodways and flood storage areas). d. Flood hazard.
2. _The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP flood levels and the probable maximum flood, or an equivalent extreme event._
3. _The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios:_
   a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.
4. _Modelling in the EIS must consider and document:_
   a. Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.
   b. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood.
   c. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flood velocities, flood levels, hazards and hydraulic categories.
   d. Relevant provisions of the NSW Floodplain Development Manual 2005.
5. _The EIS must assess the impacts on the proposed development on flood behaviour, including:_
   a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.
   b. Consistency with Council Floodplain Risk Management Plans.

c. Consistency with any Rural Floodplain Management Plans.
d. Compatibility with the flood hazard of the land.
e. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
f. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
g. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.
h. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council.
i. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.
j. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES.
k. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

RELATED KEY COMMUNITY CONCERNS & QUERIES

Due to the natural flood risk in the area, direct neighbours were concerned that changes to landform beneath the solar panels would increase the risk of downstream flooding and/or damage during extreme rain events. This concern was captured from 5% of the respondents.

Main community group affected:
DIRECT NEIGHBOURS

1. Alterations to subject land surface landform resulting in increased / altered stormwater events to downstream properties

Back Creek flows directly through the subject land. This creek, together with numerous upstream seasonal tributaries contribute to how surface water and, specifically, local storm events are controlled by local land users.

2. Management of stormwater events by the solar farm

6.7.1 Existing environment

Surface water

The proposal is located approximately 33 km north of the Murray River. Back Creek and Middle Creek run through the development site and flows into Billabong Creek, which in turn flows into the Murray River. These two creeks are classified as 3rd and/or 4th order streams, respectively, under the Strahler Stream Classification System (DPI, 2018).

Back Creek has a defined bank, dense riparian vegetation and deep incised channel. This creek is identified as a Class 3 stream under the Waterway Classification System (DPI, 2018). This is described as minimal fish habitat and/or as a named or unnamed waterway with intermittent flow and potential refuge, breeding or feeding areas for some aquatic fauna. Semi-permanent pools may form within the waterway or adjacent wetlands after a rain event. Development is not proposed within Back Creek. The pre-existing creek crossing, that currently obstructs water flow within Back Creek would be upgraded to provide better water flow. FRV would replace this with twin concrete pipes of sufficient diameter to ensure water during a flood event can flow efficiently. No riparian vegetation will be cleared, and a riparian vegetation zone buffer retained.

Middle Creek is made up of a slight depression in the landscape, void of all riparian vegetation. The area has been extensively cropped and grazed in the past, with current cover consisting of pasture grasses. The creek is identified as Class 4 under the Waterway Classification System (DPI, 2018). This is described as unlikely fish habitat, and/or as a named or unnamed waterway with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or few standing water or pools after rainfall events (e.g. dry gullies or shallow floodplain depressions with no permanent aquatic flora present). Development is not proposed within Middle Creek with a 10m setback proposed, with the exception of the internal road that would cross Middle Creek.

Seventeen man-made dams exist within the development site, four within Lot 1 DP 1069452 and 13 across multiple Lots of DP 753735. FRV have designed the project to retain 15 of the 17 farm dams on site. Five of the dams to be retained lie within close proximity to the vegetated Back Creek and fall outside the development footprint. A further 10 dams lie within isolated patches of vegetation and will also be retained. 10 of these 15 farm dams across the site would be enhanced with riparian vegetation to benefit wildlife such as frogs and small birds. As such, any impact to threatened aquatic systems are likely to be minimal. Two dams within the development footprint would be removed.

Water demand for the proposal would be relatively small, as construction of the solar farm is not water intensive. Preliminary discussions have been held with Boral over acquiring construction water from the Hurricane Hill Quarry, alternatively water would be sought from the Greater Hume Council for use of a standpipe in Walla Walla. Alternatively, FRV could utilise the RWCC waterpipe that crosses the development site. No surface or groundwater extraction of water is required.

Figure 6-23 Typical farm dam on the subject land

6.7.2 Surface hydrology and flooding

The site is located within the Murray River catchment. The large open drainage known as Back Creek runs through the property from the eastern border and exits via the north western site corner. Back Creek is fed by both Middle Creek and Mountain Dam Creek. Middle Creek, fed by Snake Gully and Hermitage Creek, runs into the site from the south and drains into Back Creek in the centre of the property. The confluence of Billabong Creek and Back Creek is approximately 7.4 km to the north northwest of the site. The development site does not occur on Flood Prone Land (NSW Government 2010), though flood modelling for the subject land undertaken by GHD in June 2019 shows 5% AEP, 1% AEP, and probable maximum flood (PMF) areas (Figure 6-24).

The soil assessment conducted by McMahon Earth Science in April 2019, concluded that acid sulphate soils are not present at the site (McMahon Earth Science, 2019).

Indicative flood gates for installation across Back Creek are shown in Figure 3-12.

GHD completed a flood study for the proposal, which is provided in its entirety in Appendix J.

5% AEP flood

The 5% AEP flood extent results in the inundation of 15% of the development property (Figure 6-24). The width of the 5% AEP flood extent generally varies from 120 m to 250 m, with the exception of the area to the east of the Middle Creek/Back Creek junction where broader inundation is present (GHD, 2019).

Velocities and flood depths will be highest within the incised Back Creek channel. The 5% AEP flood depth typically varies from 1.0 to 3.0 m within the incised channel. The average in-channel velocity typically varies from 0.5 to 1.5 m/s.

The overbank 5% AEP flood depth is generally less than 0.5 m. Although an incised waterway is not present within Middle Creek, it is still a high conveyance zone. In a 5% AEP event, the modelled flood depth in the base of the Middle Creek depression is typically 1.0 to 1.3 m. Average velocities are in the vicinity of 0.5 m/second.

1% AEP flood

The 1% AEP flood results in the inundation of 31% of the development site (Figure 6-24).

The 1% AEP flood levels are typically 0.2 to 0.3 m higher in comparison to the 5% AEP flood levels. Velocities will also be slightly higher.

The 1% AEP extent is generally relatively well confined, with the exception of the Back Creek south bank area upstream of the Middle Creek junction. Broad inundation on the south side of Back Creek upstream of the Middle Creek junction occurs in a 1% AEP flood. The 1% AEP flood depths for this area and the other areas outside the 5% AEP extent will typically not be more than 0.3 m, although there will be some localised areas where the flood depth is greater than 0.3 m.

PMF

The PMF results in the inundation of 72% of the development site (Figure 6-24). PMF flood levels are up to 2 m above the 1% AEP flood levels.

The PMF extent is what can be expected in the most extreme flood event possible. The probability of the PMF occurring is extremely small.

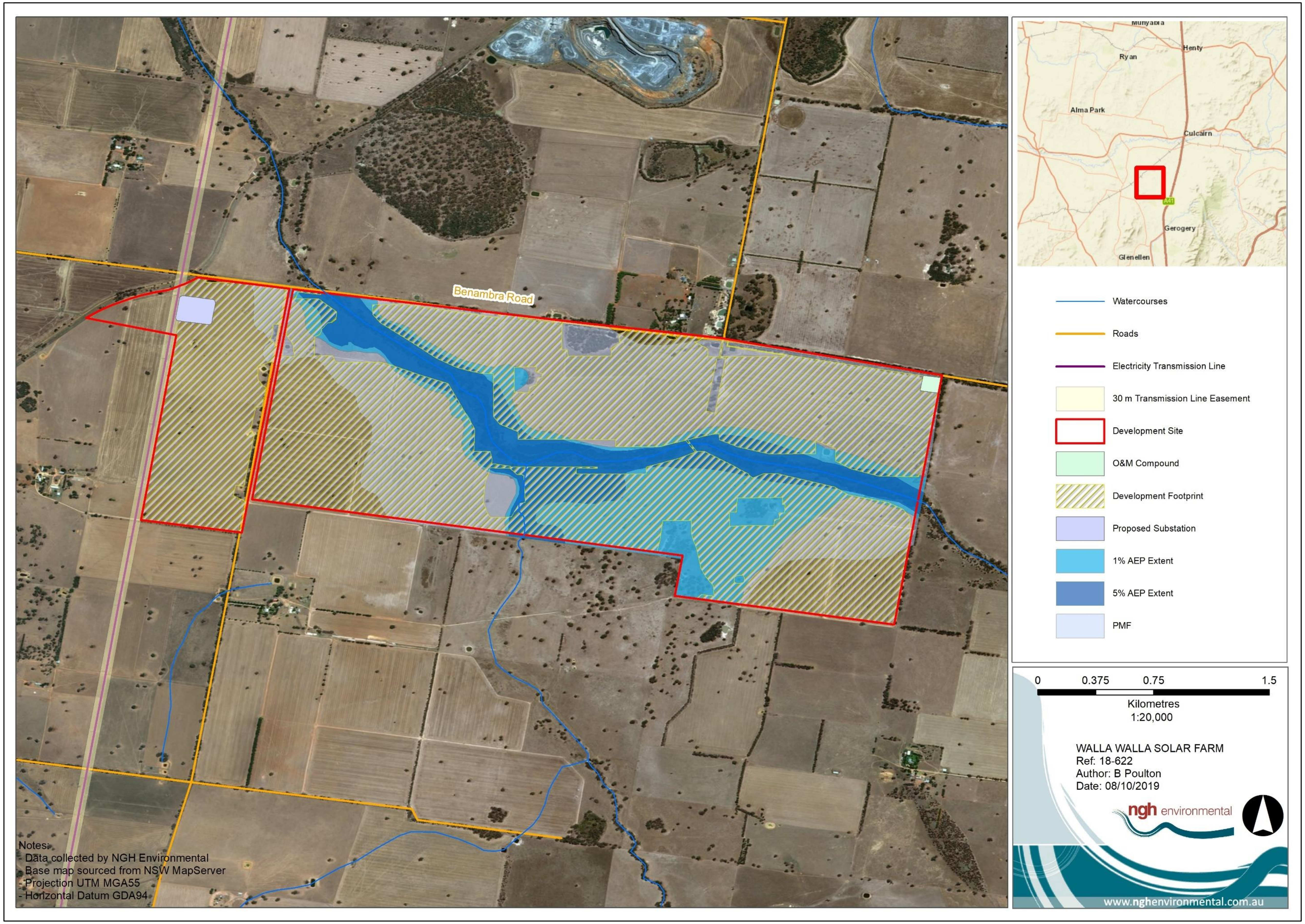


Figure 6-24 Flood modelling over the development site

Groundwater

The Australian Groundwater Explorer database (accessed 10 January 2019) of groundwater lists two bores within 1 km of the development site (GW088562 and GW503220). The status of this bore is listed as abandoned. GW088562 is located within the development site as shown in Figure 6-25.

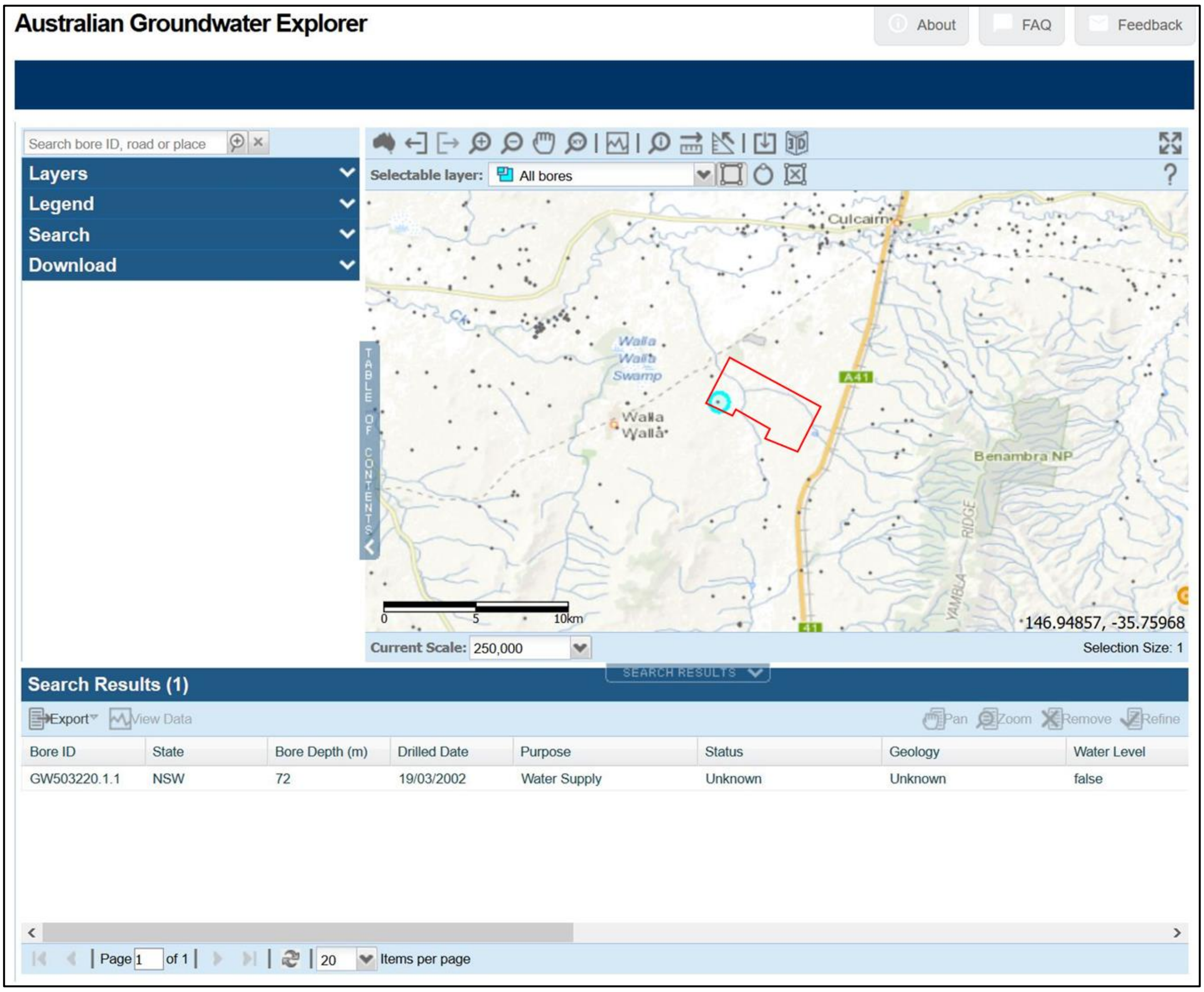


Figure 6-25 Groundwater works in the area (BoM 2019). *The subject land boundary is indicated by the red line.*

6.7.3 Potential impacts

Construction and decommissioning

WATER USE

Water use during construction would be minimal and largely used for dust suppression on unsealed roads and for the construction of new roads. The water requirement would vary, dependent on weather conditions, and is estimated to be up to 25,000 kL of grey water in total, based on an estimated 1 kL of water per km of internal road for dust suppression. About 600 kL of potable water would be required for employees and contractors (refer to Table 6-31).

Table 6-31 Water requirements during construction

Water quality	Annual construction water requirement (kL)	Potential sources	Availability
Potable (drinking)	600 (for ~20 months)	Potable water (truck delivery or RWCC metered point along water pipeline)	Available as required – commercial supply
Non-potable	25,000 (for ~20 months)	Groundwater from Hurricane Hill quarry (truck delivery)	Available as required

Water can be purchased (per kilolitre) from Boral for use of quarry groundwater where the volume is available. An application can also be made with Greater Hume Shire Council for a standpipe, where water can be accessed and trucked to the site. Council would then invoice for water usage per kilolitre.

SURFACE WATER QUALITY

The proposal would not directly affect surface water quality during construction due to the retention of 15 (of 17) farm dams and avoidance of works within 10 m of Back Creek. Construction would however occur over Middle Creek, limited to piling for solar array support poles. Impact to native vegetation associated with Middle Creek would be largely temporary and grassland would be able to persist beneath the solar arrays. Installation of cabling across natural drainage pathways would avoid impacting surface water flows by positioning cables either overhead of below ground.

Indirectly, the proposed works would involve a range of activities that could disturb soils and potentially lead to sediment laden runoff, affecting local water ways including the irrigation channels, during rainfall events. These potential impacts are discussed in section 7.3 and are unlikely to significantly impact on water quality.

The use of fuels and other chemicals on site pose a risk of surface water contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and herbicides, none of which are considered difficult to manage. Bunds for fuel storage would be implemented if applicable.

Detention ponds, if required to manage surface water during construction and operation, would be detailed in the design phase, specific to the array layout. Erosion and sediment control measures would be implemented to mitigate any impacts in accordance with Landcom (2004); refer to section 7.3.

GROUNDWATER

It is unlikely that ground water would be extracted during construction. If required, a licence will be obtained for water extraction. There is no groundwater vulnerability under the Greater Hume LEP (NSW Government 2010). It is considered that the proposal would have negligible impact on groundwater quality given the low pollution potential of the solar farm. Impacts to groundwater as a result of the proposed works are unlikely.

AQUATIC BIODIVERSITY

No impact to aquatic biodiversity is expected as a result of works.

Operation

WATER USE

Water use volumes during operation would be minimal, at approximately 710 kL per year, based on an estimate of 0.8 L per panel per year for washing and approx. 110 kL required for plant watering. Water would also be required for staff amenities at the control and maintenance building and for panel cleaning. Requirements would be extremely minor except for cleaning, which would be fully dependant on the weather. Some solar plants are never cleaned, others require more than two cleanings per year. Should water be required, it would be acquired from a local standpipe or taken from the RWCC pipeline.

Ablution facilities would be connected to a septic tank installed in line with Greater Hume Shire Council requirements.

Approval under section 68 of the *Local Government Act 1993* is required to operate an onsite sewage management system and to draw water from a council standpipe.

SURFACE WATER QUALITY

During operation, there is minimal potential for any impact to surface water quality. Appropriate drainage features would be constructed along internal access roads to minimise the risk of dirty water leaving the site or entering waterways. With the exception of internal roads, parking areas and areas around site offices, the site would largely retain its existing groundcover. Risks to water quality impacts during operation would therefore be low.

There would be a low risk of contamination in the event of a chemical spill (fuels, lubricants, herbicides etc.) as storage and emergency handling protocols would be implemented.

POTENTIAL IMPACTS OF FLOODING ON THE DEVELOPMENT

The development components likely to be most sensitive to flooding impacts are expected to be the buildings and equipment associated with the substation facility. The substation/compound footprint is currently 192 m x 166 m. The substation footprint is located wholly outside the PMF extent.

Modular inverters would be located across the development site. These are also expected to be sensitive to flooding impacts and would be located outside of the 5% AEP. Each inverter footprint is expected to be 12 x 3 m and would be placed on a raised concrete or hardstand pad above 300 mm. All electrical components would be located above the flood levels to comply with relevant health and safety guidelines and Australian Standards.

Multiple solar panels would be attached to a single horizontal member (rack) supported by a pole mount at each end. The panels are able to pivot to maximise their efficiency as the sun moves across the sky. The panels can also be pivoted to a horizontal position during a flood event to minimise the risk of the panels being submerged in floodwater and subject to possible debris impacts. Solar panel mounts and panel elevations should be designed to minimise flood damage.

Where perimeter fencing around the outside of the development side crosses the waterways at Back Creek and Middle Creek, the fencing will need to be designed to not excessively capture debris carried by floodwater. Excessive debris capture will lead to higher forces on the fence and likely resulting damage.

Development should comply with the minimum setback distances from waterways.

POTENTIAL IMPACTS OF THE DEVELOPMENT ON FLOODING

Development on a floodplain can lead to changes in flooding conditions as a result of the following causes:

- Raising of ground levels (i.e. filling associated with the development, including building pads and raised access tracks).
- Structures obstructing flow (e.g. buildings, bridges/culvert crossings, pole mounts in the case of solar fields, fences).

The above can lead to floodwater being redirected, thereby exacerbating flooding where the additional flow is diverted to. It can also lead to higher flood levels and velocities.

Potential impacts on flooding from proposed infrastructure are summarised in Table 6-32.

Table 6-32 Potential impacts on flooding from proposed infrastructure

Infrastructure	Potential impact(s)	Flood management control(s)
Substation	Greatest potential obstruction to flow.	Locate wholly outside flood affected area.
O&M building	Collection of debris during flooding, potentially impacting water flow.	Located wholly outside 5% and 1% AEP extents.
Modular inverter units	Potential to increase localised flood levels.	Located wholly outside 5% and 1% AEP extents.
Solar panels	Collection of debris during flooding, potentially impacting water flow.	Position panels largely outside 5% AEP extent. Elevate supporting racks and panels above 1% AEP flood level.
Perimeter fencing	Collection of debris potentially obstruction water flow. Greatest potential to impact adjoining landholders.	The flood gates crossing the 5% AEP flood affected area are designed to minimising trapping of debris.
Internal access roads	Potential to alter existing water flow patterns.	Access tracks located within the 1% AEP inundation extents should not be raised more than 100 mm above ground surface level. Access tracks located within 100 m of Back Creek and Middle Creek should not be raised more than 50 mm above ground surface level.

As the proposal does not intend to raise ground levels or obstruct surface water flows, it is considered flooding would not be exacerbated.

POTENTIAL RISK FROM FLOODING TO LIFE, HEALTH AND SAFETY

The proposed development is expected to pose an extremely low risk in relation to the safety of persons who may be present on the site during flooding.

The reasons for this are as follows:

- The nature of the proposed development is such that no persons will be occupying the site, except when carrying out maintenance and any other temporary work related activities. There are no habitable buildings proposed for the site.
- The expected limited need for actions to minimise property flood damage (i.e. no need for persons to be on-site during flooding), assuming that the solar panels are able to be pivoted to a horizontal position remotely.

GROUNDWATER

No operational activities would affect groundwater. There would be no impacts to GDEs during operation.

6.7.4 Safeguards and mitigation measures

Safeguards to manage impacts relating to water use, water quality are listed in Table 6-33.

Table 6-33 Safeguards and mitigation measures for water quality impacts

No.	Safeguards and mitigation measures	C	O	D
WA1	All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental chemical (e.g. fuel) spills.	**C**	**O**	**D**
WA2	All fuels, chemicals, and liquids would be stored at least 50 m away from any waterways or drainage lines and would be stored in an impervious bunded area.	**C**	**O**	**D**
WA3	Adequate incident management procedures would be incorporated into the Construction and Operation Environmental Management Plans, including requirement to notify EPA for incidents that cause material harm to the environment (refer s147-153 POEO Act).	**C**	**O**	**D**
WA4	The refuelling of plant and maintenance of machinery would be undertaken in impervious bunded areas.	**C**	**O**	**D**
WA5	Machinery would be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills.	**C**		**D**
WA6	Erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).	**C**	**O**	**D**
WA7	Ensure appropriate drainage controls are incorporated into the design.	**Design**		
WA8	Implement flood impact design controls recommended in the Walla Walla Solar Development – Site Flood Assessment (GHD, 2019).	**Design** **C**		

C: Construction; O: Operation; D: Decommissioning

6.8 BIODIVERSITY

NGH (2019a), prepared a BDAR (Appendix H) to provide an assessment of the biodiversity values associated with the development site. Surveys were completed for any threatened plants, animals and ecological communities likely to occur. Offsets for biodiversity offsets were calculated for all biodiversity losses FRV will contribute to the NSW Offset Scheme as well as enhancing the retained biodiversity onsite where practicable including planting flowering trees and shrubs, installing 120 nesting boxes across the site and enhancing 10 retained farm dams for wildlife.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

Biodiversity – including

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

OFFICE OF ENVIRONMENT AND HERITAGE REQUIREMENTS

The Scoping Report indicates that remnant vegetation will be largely retained but the layout of the development means numerous paddock trees would be removed. The threatened species habitat value of these trees will need to be determined as part of the EIS process. There is also a significant patch of riparian vegetation across the site so potential indirect impacts of the development on threatened species habitat associated with this vegetation should be adequately documented.

In the design of the project the proponent should consider maintaining or developing vegetation connections between the larger remnant patches of vegetation on the site. Some of these may be threatened ecological communities and surrounding them with a solar panel array will be a potentially significant indirect, negative impact on the vegetation.

Biodiversity –

1. *Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 using the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM, unless OEH and DPE determine that the proposed development is not likely to have any significant impact on biodiversity values.*
2. *The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.*
3. *The BDAR must include details of the measures proposed to address the offset obligation as follows;*
   a. *The total number and classes of biodiversity credits required to be retired for the development/project;*
   b. *The number and classes of like-for-like biodiversity credits proposed to be retired;*
   c. *The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules;*
   d. *Any proposal to fund a biodiversity conservation action;*
   e. *Any proposal to make a payment to the Biodiversity Conservation Fund.*

   If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.
4. *The BDAR must be submitted with all digital spatial data associated with the survey and assessment as per Appendix 11 of the BAM.*

> *5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.*

RELATED KEY COMMUNITY CONCERNS & QUERIES

Main community group affected:
BROADER COMMUNITY

The mature scattered paddock trees and Back Creek are considered key components of the local area's ecological corridors.

1. Removal of mature paddock trees
2. Ecological integrity of Back Creek
3. Effect of infrastructure on wildlife

6.8.1 Approach

A specialist Biodiversity Assessment Report (BDAR) was prepared by NGH Environmental to investigate and assess the potential impacts of the proposal on biodiversity. The aims of the report were to address the biodiversity matters raised in the SEARs and to address the requirements of the BC Act. The BDAR also addresses the assessment requirements of the EPBC Act. It also provides a 'credit requirement' in order that impacts, that are not avoided, are offset in accordance with the BC Act and Biodiversity Assessment Methodology (BAM).

The full report is included in Appendix H and the report is summarised below.

6.8.2 Existing environment

Landscape features

The eastern half of the development site falls in a generally westerly direction. The western half of the site falls towards the Back Creek crossing of Benambra Road, located 200 m west of Schneiders Road. The highest parts of the assessment site are located in the south west corner (up to 218 m AHD) and the south east corner (up to 231 m AHD). Ground surface elevations along the Benambra Road frontage vary from 205 to 216 m AHD.

The landscape of the project area is described as hillslope on granite lithology with a very low local relief of 9 m to 30 m. The soil surface is firm and well drained with no evidence of dryland salinity (OEH, 2019a). The slope of the land is measured as flat to 2^{o} along the eastern edge of the development site.

The soils within the development site are characterised as Chromosols. Chromosols have a strong texture contrast between A and B horizons. There is a clear or abrupt textural B horizon in which the upper portion of the horizon (0.2 m) is not strongly acid and not sodic. These soils are the most commonly encountered soils under agricultural use in Australia (McMahon Earth Science, 2019).

Groundwater and surface water

The Back Creek/Middle Creek catchment extends into a hill range, 6 km east of the Olympic Highway. The upper catchment area drains westwards crossing the Olympic Highway and the adjoining Melbourne-Sydney Railway at multiple culvert structures. The terrain west of the Olympic Highway is flatter, generally draining northwards towards the assessment property.

The majority of the Back Creek catchment has been predominantly cleared for agriculture, with the exception of the steeper hillside areas located in the upper catchment. The west side catchment boundary abuts the Petries Creek catchment which drains into the Walla Walla township and ultimately Gum Swamp on the north side of Walla Walla.

Native vegetation

The development site has previously been cropped but is currently used for mixed farm purposes. The vegetation within the development site has been previously cleared, evidenced by remaining paddock trees, fallen trees and stumps. The groundcover is predominately exotic grasses and forbs of Barley Grass (**Hordeum leporinum*), Rye Grass (**Lolium spp*), Brome Grass (**Bromus spp*) and Clover (**Trifolium spp.*) with some scattered natives, particularly Windmill Grass (*Chloris truncata*) and Wallaby Grass (*Rytidosperma spp.*). Other exotic species common throughout the site include Catsear (**Hypochaeris radicata*), Saffron Thistle (**Carthamus lanatus*) and Onion Grass (**Romulea rosea*).

Native scattered paddock trees remain across the site comprised of Grey Box (*Eucalyptus microcarpa*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) and River Red Gum (*Eucalyptus camaldulensis*). An absence of middle storey vegetation was noticeable across the development site. Paddock trees are defined according to the BAM as solitary trees (one or two) located 50 m or more from other trees. Trees in groups of three or more are assessed as part of an ecological community and are not considered to be 'paddock trees.'

Higher quality Grey Box woodland remains along the roadsides bordering the proposal area. The road reserves bordering the northern boundary of the development site have a mix of native groundcovers, shrubs and over-storey canopy. River Red Gum (*E. camaldulensis*) with little understorey as a result of recent grazing, occurs along a large portion of Back Creek.

The areas of remnant vegetation provide habitat and fauna movement corridors. Hollow bearing trees and a good condition over-storey could provide habitat for several threatened woodland birds and mammals such as the Superb Parrot (*Polytelis swainsonii*) and Squirrel Glider (*Petaurus norfolcensis*).

69.4 ha of native woodland vegetation occurs within the development site. This is comprised of:

- 44.5 ha of River Red Gum herbaceous – grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the Eastern Riverina Bioregion.
- 17.9 ha of Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions.
- 0.2 ha of Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.
- 6.8 ha of Riparian Blakely's Red Gum – box – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion.

29.6 ha of derived grassland from Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions also occurs within the development site.

63 living scattered paddock trees and two stags occur within the development site.

Four PCTs were identified within the study area including:

- PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the Eastern Riverina Bioregion. PCT 5 is not listed under the BC Act or the EPBC Act.
- PCT 76 – Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Forms part of the Threatened Ecological Community (TEC) - Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregion listed as Endangered under the NSW BC Act).
- PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Forms part of the TEC - White Box - Yellow Box - Blakely's Red Gum Woodland listed as endangered under the BC Act).
- PCT 278 – Riparian Blakely's Red Gum – box – sedge – grass tall open forest of the central NSW South Western Slopes Bioregion (Forms part of the White Box - Yellow Box - Blakely's Red Gum Woodland listed as endangered under the BC Act.

TECs within the development site are shown in Figure 6-26.

Cleared areas (non-indigenous vegetation)

About 505 ha occurs as non-native vegetation. This vegetation is comprised of sown exotic pastures, crops and farm tracks.

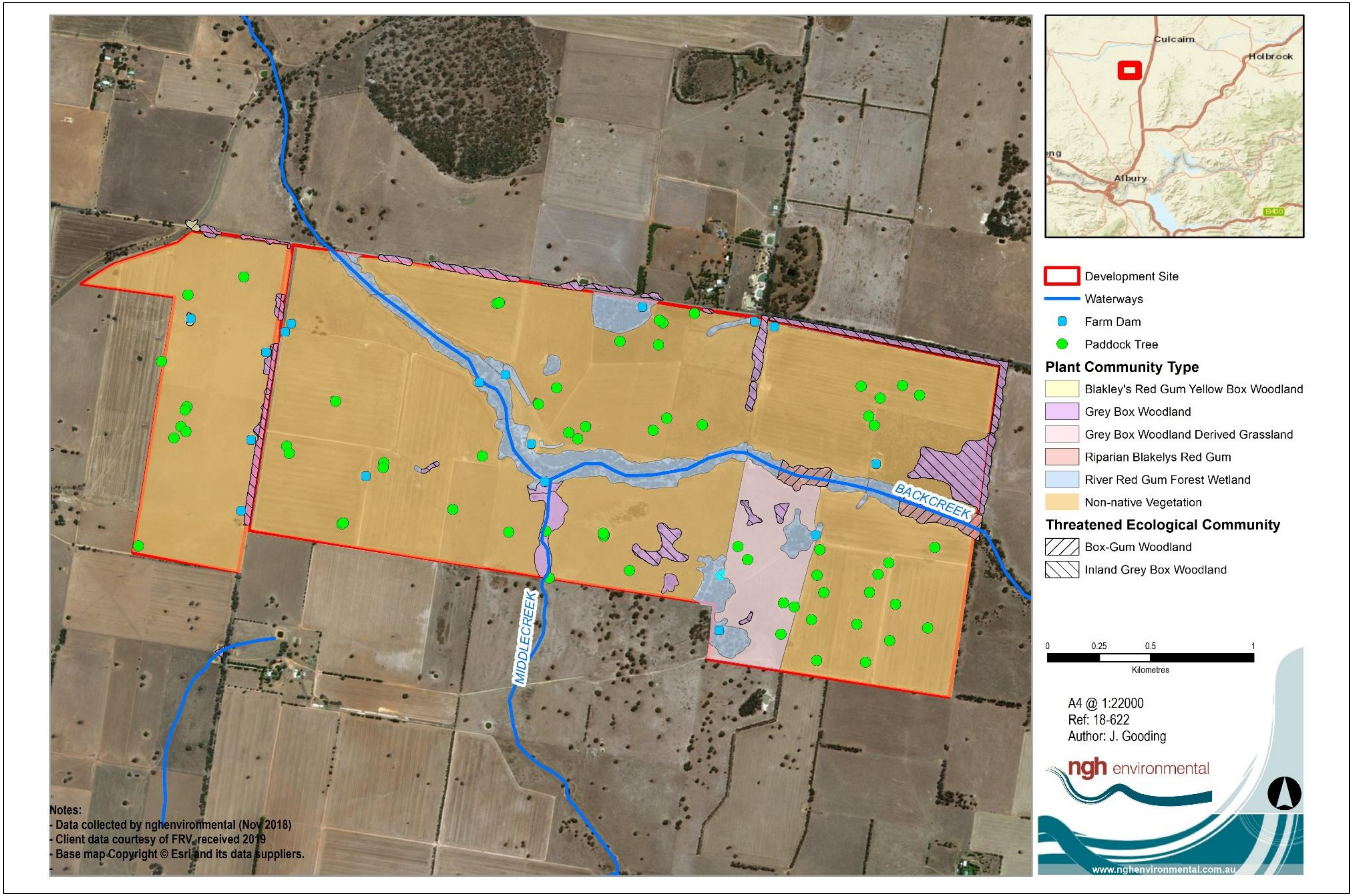


Figure 6-26 PCTs and TECs at the development site

Threatened species

The following ecosystem credit species were returned by the BAM calculator as being associated with the PCTs present on the development site (Table 6-34). These species are assumed to occur on site and contribute to ecosystem credits. No ecosystem credit species were excluded from the assessment; all are assumed to occur and contribute to ecosystem credits. Of these 36 species, two were observed on site, the Flame Robin (*Petroica phoenicea*) and Brown Treecreeper (*Climacteris picumnus victoriae*).

Table 6-34 Threatened species returned from the BAM calculator as requiring survey

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Fauna			
Australian Painted Snipe ***Rostratula australis***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland.	Endangered	Endangered
Barking Owl (Foraging) ***Ninox connivens***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Black-Chinned Honeyeater ***(Eastern Subspecies)*** ***Melithreptus gularis gularis***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Brown Treecreeper **(eastern Subspecies)** ***Climacteris picumnus victoriae***	PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland. PCT 76 – Grey Box tall grassy woodland.	Vulnerable	Not Listed
Diamond Firetail ***Stagonopleura guttata***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Dusky Woodswallow ***Artamus cyanopterus cyanopterus***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not listed
Flame Robin ***Petroica phoenicea***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Freckled Duck ***Stictonetta naevosa***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland.	Vulnerable	Not Listed
Gang Gang Cockatoo (foraging) ***Callocephalum fimbriatum***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not listed
Gilbert's Whistler ***Pachycephala inornata***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland.	Vulnerable	Not Listed
Glossy Black Cockatoo (Foraging) ***Calyptorhynchus lathami***	PCT 76 – Grey Box tall grassy woodland.	Vulnerable	Not listed
Grey Falcon ***Falco hypoleucos***	PCT 76 – Grey Box tall grassy woodland.	Endangered	Not Listed
Grey Headed Flying Fox (Foraging) ***Pteropus poliocephalus***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Vulnerable
Grey-crowned Babbler **(eastern subspecies)** ***Pomatostomus temporalis temporalis***	PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Hooded Robin (South-eastern form) ***Melanodryas cucullata cucullata***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Koala (Foraging) ***Phascolarctos cinereus***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Vulnerable
Little Eagle (Foraging) ***Hieraaetus morphnoides***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Little Lorrikeet	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland.	Vulnerable	Not Listed

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Glossopsitta pusilla	PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.		
Little Pied Bat ***Chalinolobus picatus***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not listed
Major Mitchell's Cockatoo (Foraging) ***Lophochroa leadbeateri***	PCT 76 – Grey Box tall grassy woodland.	Vulnerable	Not Listed
Masked Owl (foraging) ***Tyto novaehollandiae***	PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland. PCT 76 – Grey Box tall grassy woodland.	Vulnerable	Not Listed
Painted Honeyeater ***Grantiella picta***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Vulnerable
Purple-crowned Lorrikeet ***Glossopsitta porphyrocephala***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland.	Vulnerable	Not Listed
Regent Honeyeater (foraging) ***Anthochaera phrygia***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Critically Endangered	Critically Endangered
Scarlet Robin ***Petroica boodang***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Speckled Warbler ***Chthonicola sagittata***	PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland. PCT 76 – Grey Box tall grassy woodland.	Vulnerable	Not listed
Spotted Harrier ***Circus assimilis***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not listed
Spotted-tailed quoll	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland.	Vulnerable	Endangered

Common Name	Associated PCT	NSW Listing Status	National Listing Status
Dasyurus maculatus	PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.		
Square-tailed Kite (Foraging) ***Lophoictinia isura***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Superb Parrot (Foraging) ***Polytelis swainsonii***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Vulnerable
Swift Parrot (Foraging) ***Lathamus discolor***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Endangered	Critically Endangered
Turquoise Parrot ***Neophema pulchella***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Varied Sittella ***Daphoenositta chrysoptera***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
White-bellied Sea-Eagle (foraging) ***Haliaeetus morphnoides***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed
Yellow-bellied Sheathtail Bat ***Saccolaimus flaviventris***	PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland. PCT 76 – Grey Box tall grassy woodland. PCT 277 – Blakely's Red Gum – Yellow Box grassy tall woodland.	Vulnerable	Not Listed

The BAM calculator predicted the following species credit species (Table 6-35) for the development site. A desktop assessment was undertaken for habitat constraints and geographic restrictions to determine which species would be included or excluded for further targeted surveys in the development site. Eight species lacked suitable habitat or fell outside the known geographic range and were excluded from further assessment. These excluded species are highlighted in grey in the table below.

Table 6-35 Candidate species credit species requiring assessment

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Fauna							
Barking Owl (Breeding) ***Ninox connivens***	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	High	Vulnerable	Not listed	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site
Bush Stone-curlew ***Burhinus grallarius***	Fallen/standing dead timber including logs.	High	Endangered	Not listed	Fallen timber in woodland areas in development site	Included	Habitat components on site
Eastern Pygmy-possum ***Cercartetus nanus***	Broad range of habitat from rainforest through sclerophyll forest and woodland to heath, but in most areas woodlands and heath preferred.	High	Vulnerable	Not listed	Suitable habitat in woodland areas	Included	Habitat components on site
Gang-gang Cockatoo (Breeding) ***Callocephalon fimbriatum***	Eucalypt tree species with hollows greater than 9 cm diameter.	High (breeding) / Moderate (foraging)	Vulnerable	Not listed	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site
Glossy Black Cockatoo **(Breeding)** ***Calyptorhynchus lathami***	Living or dead tree with hollows greater than 15 cm diameter and greater than 5 m above ground.	High	Vulnerable	Not listed	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Glossy Black Cockatoo, Riverina Population **(Breeding)** ***Calyptorhynchus lathami***	Only in Carrathool, Griffith, Leeton and Narrandera LGA.	High	Endangered	Not Listed	Development site falls outside geographic restrictions	Excluded	Not within Geographic Range
Grey-headed Flying-fox (Breeding) ***Pteropus poliocephalus***	Range of vegetation communities including rainforest, open forest, and closed and open woodland. Roost sites usually near water, including lakes, rivers, and coastlines. Known to roost in locality. Breeding Camps	High	Vulnerable	Vulnerable	Woodland areas in development site	Included	Surveys required
Large-eared Pied Bat ***Chalinolobus dwyeri***	Cliffs or within two km of rocky areas containing caves, overhangs, escarpments, outcrops or crevices. Or within two km of old mines or tunnels.	Very High	Vulnerable	Vulnerable	No Cliff, Rocky areas or tunnels within 2km of development site	Excluded	No habitat components on or near site
Koala (Breeding) ***Phascolarctos cinereus***	Temperate, subtropical and tropical eucalypt woodlands and forests where suitable food trees grow, of which there are more than 70 eucalypt species and 30 non-eucalypt species that are particularly abundant on fertile clay soils. Known in subregion.	High	Vulnerable	Not listed	Woodland areas in development site	Included	Surveys required

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Little Eagle (Breeding) ***Hieraetus morphnoides***	Nest trees - live (occasionally dead) large old trees within vegetation. Paddock trees can provide important breeding habitat.	Moderate	Vulnerable	Not listed	Large old tree within development site	Included	Habitat components on site
Major Mitchell's Cockatoo (Breeding) ***Lophochroa leadbeateri***	Living or dead tree with hollows greater than 10 cm diameter.	High (breeding)/ Moderate (foraging)	Vulnerable	Not listed	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site
Masked Owl (Breeding) ***Tyto novaehollandiae***	Living or dead trees with hollows greater than 20 cm diameter.	High	Vulnerable	Not listed	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site
Pink-tailed Legless Lizard ***Aprasia parapulchella***	Rocky areas or within 50 m of rocky areas.	High	Vulnerable	Vulnerable	No Rocky Areas within development site	Excluded	No suitable habitat
Regent Honeyeater (Breeding) ***Anthochaera phrygia***	Temperate woodlands and open forests of the inland slopes of south-east Australia, in particular dry open forest, woodland, Box-Ironbark woodland, and riparian forests of River Sheoak.	High	Critically Endangered	Critically Endangered	Development site not within mapped important areas (OEH, pers. com)	Excluded	Not within Mapped Important Areas

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Sloane's Froglet ***Crinia sloanei***	Semi-permanent/ephemeral wet areas containing relatively shallow sections with submergent and emergent vegetation. Within 500 m of wet areas, swamps or waterbodies.	Moderate	Vulnerable	Endangered	Farm Dams present in development site	Excluded	Habitat components on site
Southern Myotis ***Myotis macropus***	Hollow Bearing Trees within 200 m of riparian zone. Bridges, caves or artificial structures within 200 m of riparian zone.	High	Vulnerable	Not listed	Hollow Bearing Trees within 200 m of Back Creek	Included	Habitat components on site
Square-tailed Kite (Breeding) ***Lophoictinia isura***	Timbered habitats including dry woodlands and open forests, particularly timbered watercourses. Known in subregion. Nest Trees.	Moderate	Vulnerable	Not listed	Large old trees within development site	Included	Habitat components on site
Squirrel Glider ***Petaurus norfolcensis***	Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 m apart).	High	Vulnerable	Not listed	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site
Superb Parrot (Breeding) ***Polytelis swainsonii***	Living or dead E. blakelyi, *E. melliodora*, *E. albens*, *E. camaldulensis*, *E. microcarpa*, *E. polyanthemos*, *E. mannifera*, *E. intertexta* with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm.	High (breeding)/ Moderate (foraging	Vulnerable	Vulnerable	Suitable Hollow Bearing Trees within development site	Included	Habitat components on site

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Swift Parrot ***Lathamus discolor***	On the coast and southwest slopes in areas with abundant flowering eucalypts or lerp. Feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box. Known in subregion.	Moderate	Endangered	Critically Endangered	Development site not within mapped important areas	Excluded	Not within mapped important areas
White-bellied Sea-Eagle (Breeding) ***Haliaeetus morphnoides***	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	High	Vulnerable	Not listed	Large dams within 1 km of development site. 1 known record within 10 km of development site	Included	Suitable habitat within development site
Flora							
A spear-grass ***Austrostipa wakoolica***	Alluvial plains and plains.	Moderate	Endangered	Endangered	Suitable habitat within woodland areas	Included	Within Geographic Range
Ausfeld's Wattle ***Acacia ausfeldii***	Associated species include *Eucalyptus albens*, *E. blakelyi* and *Callitris* spp., with an understorey dominated by *Cassinia* spp. and grasses. Known in subregion.	High	Vulnerable	Not listed	Suitable habitat within woodland areas	Included	Within Geographic Range
Pine Donkey Orchid ***Diuris tricolor***	Will grow in disturbed areas.	Moderate	Vulnerable	Not listed	Suitable habitat within woodland areas	Included	Within Geographic Range

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Mossgiel Daisy ***Brachyscome papillosa***	South and West of Coolamon-Ardlethan Road, West of Lockhart and north of Rand.	High	Vulnerable	Vulnerable	Development site not within geographic restrictions	Excluded	Not within Geographic Range.
Sand-hill Spider Orchid ***Caladenia arenaria***	West of Lockhart and North of Rand.	High	Endangered	Endangered	Development site not within geographic restrictions.	Excluded	Not within Geographic Range
Silky Swainson-pea ***Swainsona sericea***	Box-gum woodland in southern tablelands and South West Slopes. Sometimes in association with cypress pines. Known in subregion.	High	Vulnerable	Not listed	Suitable habitat within woodland areas	Included	Within Geographic Range
Slender Darling Pea ***Swainsona murrayana***	Grows in a variety of vegetation types including Bladder Saltbush, Black Box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* spp.	Moderate	Vulnerable	Vulnerable	Suitable habitat within woodland areas	Included	Within Geographic Range
Spiny Peppercress ***Lepidium aschersonii***	On ridges of Gilgai Clays.	High	Vulnerable	Vulnerable	No Gilgai clays in development site	Excluded	No suitable habitat on site
Small Purple-pea ***Swainsona recta***	Predominantly grassy woodlands, but sometimes extends into grassy open forest, usually with tree cover including Blakely's Red Gum, Yellow Box, and White Box. Known in subregion.	Moderate	Not listed	Endangered	Suitable habitat within woodland areas	Included	Within Geographic Range

Credit species	Habitat and geographic restrictions[1]	Sensitivity to gain class	NSW listing status	National listing status	Habitat Components and abundance on site	Included or Excluded	Reason for Inclusion or exclusion
Small Scurf-pea ***Cullen parvum***	Grassland, River Red Gum woodland or Box-Gum woodland, sometimes on grazed land and usually on table drains or adjacent to drainage lines or watercourses, in areas with rainfall between 450 mm and 700 mm. Known in subregion.	High	Endangered	Not listed	Suitable habitat within woodland areas	Included	Habitat components on site
Spike-rush ***Eleocharis obicis***	Semi-permanent/ephemeral wet areas. Periodically waterlogged sites, including table drains and farm dams.	High	Vulnerable	Vulnerable	Farm dams and ephemeral wet areas in development site	Included	Habitat components on site

6.8.3 Site surveys

General biodiversity surveys were undertaken on 8, 9, 13, 14 and 15 November 2018. Targeted threatened fauna diurnal and nocturnal surveys were undertaken on 13, 14 and 15 November 2018 and 11 and 26 June 2019. Targeted threatened flora surveys were undertaken on 13, 14, and 15 November 2018, 30 and 31 January 2019 and 3 and 4 July 2019.

Diurnal birds

- Targeted hollow bearing tree survey was undertaken 13 and 14 November 2018 for Superb Parrot, Gang-gang Cockatoo and Major Mitchell's Cockatoo.
- Targeted Surveys for breeding Glossy Black Cockatoo were undertaken on the 11 and 26 June 2019.
- A woodland bird survey was completed 13 and 14 November 2018 and 11 June 2019 which included 6 x 20-minute point surveys at three locations. Opportunistic surveys were also undertaken by car and foot.
- All mature trees were surveyed between 8 and 15 November for the presence of stick nests. Cleared areas were also observed during daylight hours, opportunistically for hunting presence.

Note: Survey for Little Eagle were unable to be undertaken during the OEH recommended survey period to comply with the BDAR requirements under the BC Act.

Nocturnal birds

- Targeted spotlighting surveys were undertaken on the evening of 13 and 14 November 2018 for approximately two hours per night for Bush Stone Curlew and Barking Owl.
- Targeted spotlighting surveys were undertaken on the evenings of the 11 and 26 June for the Masked Owl.
- Targeted call play back (20 minute x 6) over two nights at three locations for Bush-stone Curlew, Barking Owl and Masked Owl.

Nocturnal mammals

- Targeted survey for Koalas was undertaken during the day of 13 to 15 November 2018. All mature feed trees were inspected for scats and scratches.
- Targeted survey for Grey-headed Flying Fox was also undertaken on 13 to 15 November 2018, with canopy of trees observed for roosting bats.
- Targeted spotlighting surveys were undertaken on the evening of 13 and 14 November 2018 and 11 and 26 June 2019 for approximately two hours per night for all nocturnal species.

Amphibians

- Call playback surveys for the Sloane's Froglet were completed on 3 and 4 July 2019 at dams within the development site between 8:00am and 12:00pm.

Threatened flora

- Targeted flora transects were also undertaken of woodland and grassland areas at 10 m intervals in accordance with the NSW Guide to Surveying Threatened Plants (OEH, 2016): from 8 to 15 November 2018 for Small Purple Pea, Slender Darling Pea, Silky Swainson Pea, *Austrostipa wakoolica* and *Eleocharis obicis*.

- Surveys for the Small Scurf Pea were undertaken 30 and 31 January 2019. Surveys were undertaken using the parallel field traverse survey technique in accordance with the NSW guide to Surveying Threatened Plants (OEH, 2016).
- Surveys Ausfeld's Wattle were undertaken for this species on 9, 12 and 13 November 2018. Suitable habitat for this species could occur in areas of remnant woodland vegetation. Very few mid-storey species were present, and any shrubs would have been easily detected.

Surveys for the Pine Donkey Orchid were unable to be undertaken during the specified time period (September) as per the BAM.

All survey effort was conducted to the BAM Calculator requirements, BDAR requirements and OEH guidelines and recommendations.

6.8.4 Survey results

Table 6-36 summarises all species found on-site. Three threatened species were detected on site, two ecosystem species (Flame Robin (*Petroica phoenicea*) & Brown Tree Creeper (*Climacteris picumnus*)) and one credit species, the Squirrel Glider (*Petaurus norfolcensis*). Flame Robins were observed foraging in grassland next to the River Red Gum Woodland in the south of the Site. A Brown Treecreeper and two Squirrel Gliders were detected in the River Red Gum Woodland along Back Creek. Impacts to the Squirrel Glider are considered under the Species Credits.

No karsts, caves, crevices or cliffs occur within the development site. No surface rocks or rocky outcrops occur within the development site. No human made structures that could be used by threatened bat species occur within the development site. Non-native vegetation within the development site is predominantly exotic pasture and crops of wheat and canola. No threatened species are considered to rely on the non-native vegetation within the development site.

There are two waterways that intersect the development site. The waterway entering the eastern boundary of the assessment site is Back Creek. The waterway entering at the southern boundary of the assessment site is Middle Creek. Back Creek is incised with remnant woodland vegetation lining the banks on both sides through the development site. Middle Creek has been cleared, previously cropped and is currently grazed.

Seventeen farm dams occur within the development site that provide catchment for drainage. These dams provide limited habitat values as they are heavily grazed and lack fringing vegetation.

Table 6-36 Fauna identified on-site through survey effort

Species Group	Scientific Name	Common Name	Listed	14/11/18 Opportunistic	11/06/19 Opportunistic	11/06/19 Plot a	11/06/19 Plot b	11/06/19 Plot c
Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	LC		O			
Aves	*Chenonetta jubata*	Wood Duck	LC					O
Aves	*Climacteris picumnus*	Brown Treecreeper	V		H			
Aves	*Colluricincla harmonica*	Grey Shrike-thrush	LC		H			
Aves	*Corvus coronoides*	Australian Raven	LC	O			H	H
Aves	*Corvus mellori*	Little Raven	LC				H	O
Aves	*Cracticus nigrogularis*	Pied Butcherbird	LC					O
Aves	*Cracticus tibicen*	Australian Magpie	LC	O		O	O	O
Aves	*Cracticus torquatus*	Grey Butcherbird	LC				H	
Aves	*Eolophus roseicapillus*	Galah	LC	O		O		O
Aves	*Grallina cyanoleuca*	Peewee	LC			H	H	O
Aves	*Manorina melanocephala*	Noisy Miner	LC				O	
Aves	*Pardalotus striatus*	Striated Pardalote	LC	O				
Aves	*Petrochelidon nigricans*	Tree Martin	LC	O				
Aves	*Petroica phoenicea*	Flame Robin	V		O			
Aves	*Platycercus eximius*	Eastern Rosella	LC	O		O		O
Aves	*Podargus strigoides*	Tawny Frogmouth	LC	O	O			
Aves	*Psephotus haematonotus*	Red-rumped Parrot	LC		O			
Aves	*Rhipidura leucophrys*	Willy Wagtail	LC		O			
Aves	*Sturnus vulgaris*	Common Starling	I	O	O			

Species Group	Scientific Name	Common Name	Listed	14/11/18 Opportunistic	11/06/19 Opportunistic	11/06/19 Plot a	11/06/19 Plot b	11/06/19 Plot c
Mammals	*Macropus giganteus*	Eastern Grey Kangaroo	LC		O			
Mammals	*Petaurus norfolcensis*	Squirrel Glider	V					
Mammals	*Pseudocheirus peregrinus*	Ringtail Possum	LC		O			
Mammals	*Trichosurus vulpecula*	Brushtail Possum	LC	O				
Mammals	*Vulpes vulpes*	European Red Fox	I					
Reptiles	*Varanus varius*	Lace-Monitor	LC	O				
Amphibians	*Crinia parinsignifera*	Beeping Froglet	LC					H

H = heard, O = observed, LC = least concern, V = vulnerable (BC Act), I = introduced

6.8.5 Potential impacts

Direct impacts

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site. These cannot be entirely avoided, although FRV is committed to minimising adverse impacts where practicable and enhancing retained habitat features for local wildlife. Biodiversity enhancement measures developed in collaboration with Holbrook Landcare include but are not limited to:

- Installing approximately 120 nesting boxes across the development site.
- Expanding connected woodland to facilitate Sugar Glider movement.
- Filling screening vegetation with food plants for fruit, pollen and nectar feeders.
- Retaining 15 of the 17 farm dams and transforming 10 retained farm dams into small created wetlands.
- No barbed wire on the top of FRV security fencing or internal stock fencing.

Direct adverse impacts such as habitat clearance and installation and operational effects of installed infrastructure as detailed in Table 6-37.

Table 6-37 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, transmission lines, compound sites, stockpile sites, access tracks)	38.6 ha	Regular	Construction	• Direct loss of native flora and fauna habitat. • Potential over-clearing of habitat outside proposed development footprint. • Injury and mortality of fauna during clearing of fauna habitat and habitat trees • Disturbance to stags, fallen timber, and bush rock
Removal of paddock trees	53 paddock trees	Regular	Construction	• Direct loss of native flora and fauna habitat. • Decline in local fauna populations.
Displacement of resident fauna	Unknown	Regular	Construction, operation	• Direct loss of native fauna. • Decline in local fauna populations.
Injury or death of fauna	Unknown	Regular	Construction	• Direct loss of native fauna. • Decline in local fauna populations.
Removal of habitat features e.g. HBTs and dams	72 HBTs 2 farm dams	Regular	Construction	• Direct loss of native fauna habitat. • Injury and mortality of fauna during clearing of habitat features.
Shading by solar infrastructure	330 ha (70% of solar array)	Regular	Operational Phase: Long-term	• Modification of native fauna habitat. • Potential loss of groundcover resulting in unstable ground

Nature of impact	Extent	Frequency	Duration and timing	Consequence
				surfaces and sedimentation of adjacent waterways.
Existence of permanent solar infrastructure (Fencing, array infrastructure).	498 ha (470 ha solar array)	Regular	Operational Phase: long-term	• Modification of habitat beneath array (mostly non-native). • Reduced fauna movements across landscape due to fencing. • Collision risks to birds and microbats (fencing).

Loss of native vegetation

About 38.6 ha of native vegetation would be removed by the proposal. The changes in vegetation integrity scores as a result of clearing are documented for each vegetation zone in Table 6-38 below. Note, while shading and microclimate effects are unlikely to remove all vegetation beneath the array, a future integrity score of zero is entered as a worst case.

Table 6-38 Table of current and future vegetation integrity scores for each vegetation zone within the development site.

Zone ID	PCT ID	Zone Name	Impact area (ha)	Vegetation Integrity Score	Future Vegetation Integrity Score	Ecosystem credits required
PCT 76: Western Grey Box tall grassy woodland						
2	76	Grazed	10.0	20.2	0	101
3	76	Wetland	3.2	14.1	0	32
4	76	Derived Grassland	23.9	16.2	14.1	26
6	76	Roadside	0.04	40.5	0	1
					SUBTOTAL:	**160**
PCT 5: River Red Gum herbaceous grassy very tall open forest wetland						
8	5	Wetland	0.2	41.9	0	3
9	5	Creek line	0.4	40.7	0	6
					SUBTOTAL:	**9**
						TOTAL: 169

Loss of species credit species habitat or individuals

Two Squirrel Gliders were detected in the River Red Gum Woodland along Back Creek. This creek line would provide core habitat and has been avoided by the proposal and would be enhanced by preventing livestock from entering planted areas to allow understorey regrowth. Some Grey Box woodland areas within 100 m of the creek line are considered to provide some secondary habitat and have been considered in the offset calculations. No loss of connectivity would occur for the Squirrel Glider as movement would still be maintained and enhanced along Back Creek and adjoining areas outside the development site. The loss of species credit species habitat or individuals as a result of clearing is documented in Table 6-39 below.

Table 6-39 Summary of species credit species loss at the development site

Species Credit Species	Biodiversity risk weighting	Area of habitat lost (ha)
Little Eagle *Hieraaetus morphnoides*	1.50	10.8 ha (assumed)
Squirrel Glider *Petaurus norfolcensis*	2.0	8.2 ha (observed)
Southern Myotis *Myotis Macropus*	2.00	10.8 ha (assumed)
Pine Donkey Orchid *Diuris tricolor*	1.50	1.2 ha (assumed)

Loss of paddock trees

63 live paddock trees occur throughout the development site comprised of a mix of Grey Box, Yellow Box, and Blakely's Red Gum, River Red Gum and White Cypress. 53 of these paddock trees would be removed by the proposal.

Loss of hollow-bearing trees (HBTs)

It is estimated 72 hollow-bearing trees would be removed by the proposal. FRV would attempt to minimise the impact of the loss of hollows by installing approximately 120 nesting boxes for birds and mammals across the development site.

Indirect impacts

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. Table 6-40 below details the type, frequency, intensity, duration and consequence of the indirect impacts that may occur as a consequence of the proposal. Given the current land management practices and degraded nature of the development site, indirect impacts that are unlikely to occur or be exacerbated as a result of the proposal.

Table 6-40 Potential indirect impacts to biodiversity during the construction and operational phases

Nature of impact	Impact	Duration and timing	Vegetation communities, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)				
Inadvertent impacts on adjacent habitat or vegetation.	Possible – Clearing may inadvertently extend into retained vegetation patches.	Construction phase: short-term.	• PCT 76 – Western Grey Box tall grassy woodland. • PCT 5 - River Red Gum herbaceous-grassy very tall open forest. • PCT 277 – Blakely's Red Gum-Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion. • Squirrel Glider.	• Direct loss of native flora and fauna habitat. • Injury and mortality of fauna during clearing of fauna habitat and habitat trees. • Disturbance to stags, fallen timber. • Increased edge effects.
Reduced viability of adjacent habitat due to edge effects.	Unlikely – retained vegetation is currently isolated and surrounded by exotic vegetation.	n/a.	n/a.	n/a.
Reduced viability of adjacent habitat due to noise, dust, heat or light spill.	Possible – construction works may impact on habitat quality in retained vegetation.	Operational phase: short-term.	• Squirrel Glider. • Southern Myotis. • Little Eagle. • Flame Robin. • Brown Tree Creeper.	• May alter fauna activities and/or movements. • Loss of foraging or breeding habitat. • Inhibit the function of plant species, soils and dams.
Transport of weeds and pathogens from the site to adjacent vegetation.	Possible – may be brought in soils or unclean machinery.	Construction and operational phases: long-term.	• PCT 76 – Western Grey Box tall grassy woodland. • PCT 5 - River Red Gum herbaceous-grassy very tall open forest.	• Degradation of community biodiversity and integrity. • Weed encroachment (remnant veg). • Movement of weeds by water to downstream habitats.

Nature of impact	Impact	Duration and timing	Vegetation communities, threatened species and habitats likely to be affected	Consequence for bioregional persistence
			• PCT 277 – Blakely's Red Gum-Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion. • Pine Donkey Orchid.	
Increased risk of starvation, exposure and loss of shade or shelter.	Unlikely – Food sources still abundant.	n/a.	n/a.	n/a.
Loss of breeding habitats.	Possible.	Construction phase: long-term.	• Squirrel Glider. • Southern Myotis. • Little Eagle. • Flame Robin. • Brown Treecreeper.	• Loss of potential breeding habitat.
Trampling of threatened flora species.	Unlikely – no known threatened flora species in adjacent vegetation.	n/a.	n/a.	n/a.
Inhibition of nitrogen fixation and increased soil salinity.	Unlikely – groundwater table unlikely to change. Majority of site is currently under cropping rotation.	n/a.	n/a.	n/a.
Fertiliser drift.	Unlikely – fertilisers unlikely to be applied.	n/a.	n/a.	n/a.
Rubbish dumping.	Unlikely – development site will be fenced.	n/a.	n/a.	n/a.
Wood collection.	Unlikely – development site will be fenced.	n/a.	n/a.	n/a.

Nature of impact	Impact	Duration and timing	Vegetation communities, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Bush rock removal and disturbance.	Unlikely – no bush rock in development site.	n/a..	n/a.	n/a.
Increase in predatory species populations.	Possible – additional shelter habitat for predatory invasive species.	Construction and operational phases: long-term.	• Squirrel Glider. • Little Eagle. • Flame Robin. • Brown Treecreeper.	• Injury and mortality of fauna from predatory species.
Increase in pest animal populations.	Possible - additional shelter habitat for invasive species.	Construction and operational phase: long-term.	• Squirrel Glider. • Little Eagle. • Flame Robin. • Brown Treecreeper.	• Injury and mortality of fauna from predatory species. • Disturbance to native flora and fauna. • Loss of foraging or breeding habitat.
Increased risk of fire.	Unlikely – No battery storage in proposal.	n/a.	n/a.	n/a.
Disturbance to specialist breeding and foraging habitat.	Unlikely – No specialist breeding or foraging habitat.	n/a.	n/a.	n/a.
Earthworks and mobilisation of sediments.	Possible - loss of groundcover during construction may increase mobilisation of sediment.	Construction: short term	• PCT 5 - River Red Gum herbaceous-grassy very tall open forest. • PCT 76 – Western Grey Box tall grassy woodland. • PCT 277 – Blakely's Red Gum-Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion. • Pine Donkey Orchid.	• Erosion and sediment deposition pollution on downstream habitats. • Alternation of surface watercourses (isolating high biodiversity value communities).

Prescribed impacts

The following prescribed biodiversity impacts are relevant to the proposal:

- Impacts of the development on the connectivity of different areas of habitat of threatened species that facilitates the movement of these species across their range.
- Impacts of the development on the movement of threatened species to complete their lifecycle.
- Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation.
- Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.
- Impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC.

Impacts to matters of national environmental significance

One vegetation community listed as critically endangered under the EPBC Act was identified within the development site – PCT 278 - Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion. An AoS was undertaken for this PCT, which concluded that this vegetation community would not be impacted by the proposal.

Patches of PCT 76 – and PCT 277 – did not meet the vegetation condition threshold for the EPBC listed threatened communities due to the poor condition of understory.

No EPBC listed species were recorded during the field surveys, however five additional fauna species and two migratory species were considered to have the potential to occur within the development site.

EPBC Assessments of Significance (AoS) were completed for the threatened Fauna: Regent Honeyeater, Superb Parrot, Painted Honeyeater and Swift Parrot. These concluded that a significant impact was unlikely, on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population.
- Affect habitat critical to the survival of these species.
- Affect habitat or introduce disease such that these species would decline.
- Introduce invasive species harmful to the species.
- Interfere with the recovery of these species.

The EPBC Referral Guidelines for the Koala (DoE, 2014), documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The assessment resulted in a score of 4, and as such, habitat within the study area is not considered to be critical to the survival of the Koala. An AoS is not required.

EPBC Assessments of Significance (AoS) were completed for the migratory species; Fork-tailed Swift and White Throated Needletail. These concluded that a significant impact was unlikely, on the basis that the proposal would not impact on important habitat for these species.

No referral is considered necessary to the Australian Government's Department of Environment and Energy for these seven species.

6.8.6 Impacts requiring offsets

Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

a) A vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community,
b) A vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
c) A vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset and the ecosystem credits required for the proposal are documented in Table 6-38.

Paddock tree credits

Offsets are required for the clearing of Class 2 and Class 3 paddock trees. 52 Class 2 and Class 3 paddock trees would be removed by the proposal. The paddock trees form part of three different PCTS. PCT 76: Western Grey Box tall grassy Woodland, PCT 277: Blakely's Red Gum – Yellow Box grassy tall woodland and PCT 5: River Red Gum herbaceous – grassy very tall open forest wetland on inner floodplains. Ecosystem credits are calculated as per the streamlined assessment defined in the BAM – Appendix 1 and Table 12. These ecosystem credits required are documented in Table 6-41.

Table 6-41 Paddock tree offsets

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Number of Credits Required	Ecosystem credits required
PCT 76 – Western Grey Box tall grassy woodland				
Class 2 **(>20 cm DBH and <50 cm DBH)**	No	0	0.5	0
Class 2 **(>20 cm DBH and <50 cm DBH)**	Yes	1	0.75	1
Class 3 **>50 cm DBH**	No	7	0.75	6
Class 3 **>50cm DBH**	Yes	32	1	32
			SUBTOTAL:	**39**
PCT 277 – Blakley's Red Gum – Yellow Box grassy tall woodland				
Class 2 **(>20 cm DBH and <50 cm DBH)**	No	0	0.5	0
Class 2 **(>20 cm DBH and <50 cm DBH)**	Yes	0	0.75	0
Class 3 **>50cm DBH**	No	3	0.75	3

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Number of Credits Required	Ecosystem credits required
Class 3 **>50 cm DBH**	Yes	8	1	8
			SUBTOTAL:	**11**
PCT 5 – River Red Gum herbaceous – grassy very tall open forest wetland on inner floodplains				
Class 2 **(>20cm DBH and < 50cm DBH)**	No	1	0.5	1
Class 2 **(>20cm DBH and < 50cm DBH)**	Yes	0	0.75	0
Class 3 **>50cm DBH**	No	0	0.75	0
Class 3 **>50cm DBH**	Yes	1	1	1
			SUBTOTAL:	**2**
			TOTAL:	**52**

Species credits

An offset is required for the threatened species impacted by the development that require species credits. These species and the species credits required are documented in Table 6-42. As mentioned above, these species were not able to be surveyed for, and presence is assumed.

Table 6-42 Species credit species that require offsets

Species Credit Species	Biodiversity risk weighting	Area of habitat lost (ha)	Species credits required
Little Eagle *Hieraaetus morphnoides*	1.50	10.8 ha (assumed)	87
Squirrel Glider *Petaurus norfolcensis*	2.00	8.2 ha (observed)	89
Southern Myotis *Myotis Macropus*	2.00	1.5 ha (assumed)	19
Pine Donkey Orchid *Diuris tricolor*	1.50	1.2 ha (assumed)	14

Offsets required under the EPBC Act

No species listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development. PCT 278 was identified through desktop background searches but would not be impacted by the proposal. As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

6.8.7 Aquatic biodiversity

Groundwater Dependent Ecosystems (GDEs)

One patch of unclassified potential for aquatic groundwater dependant ecosystems (GDE) is shown on the northern boundary of the proposal along Benambra Road (Figure 7-5). This patch of remnant vegetation overlaps the subject land but has been excluded from the development footprint. High and moderate potential terrestrial GDE exists along Back Creek, which has also largely been excluded from the development footprint. Patches of low potential terrestrial GDE would be removed under the proposal as shown in Figure 6-28.

As such, there is a low potential for groundwater to be encountered during excavations and earthwork for the construction. This is likely to be highly localised and no inception of groundwater is considered.

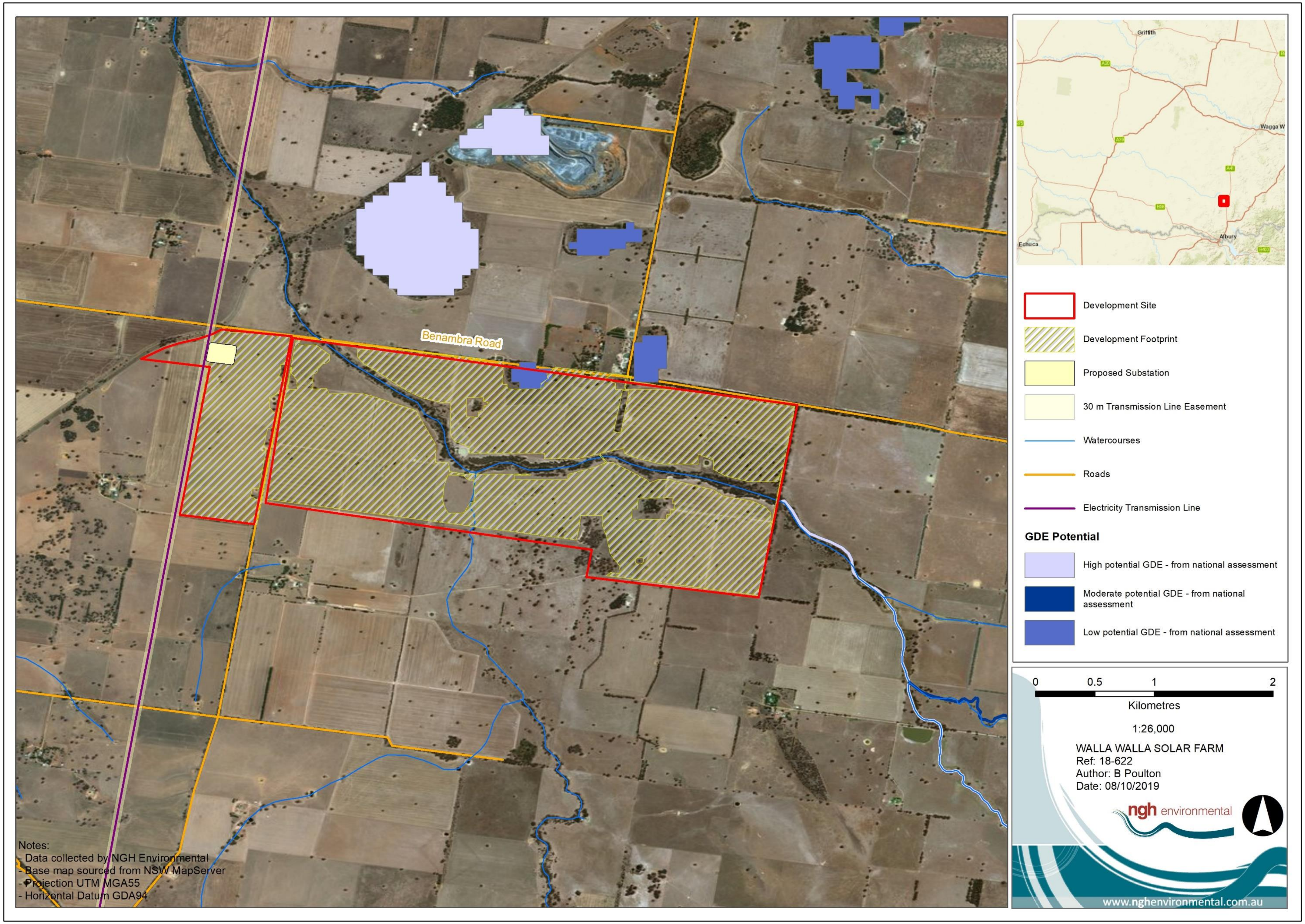


Figure 6-27 Aquatic GDEs in proximity to the development site

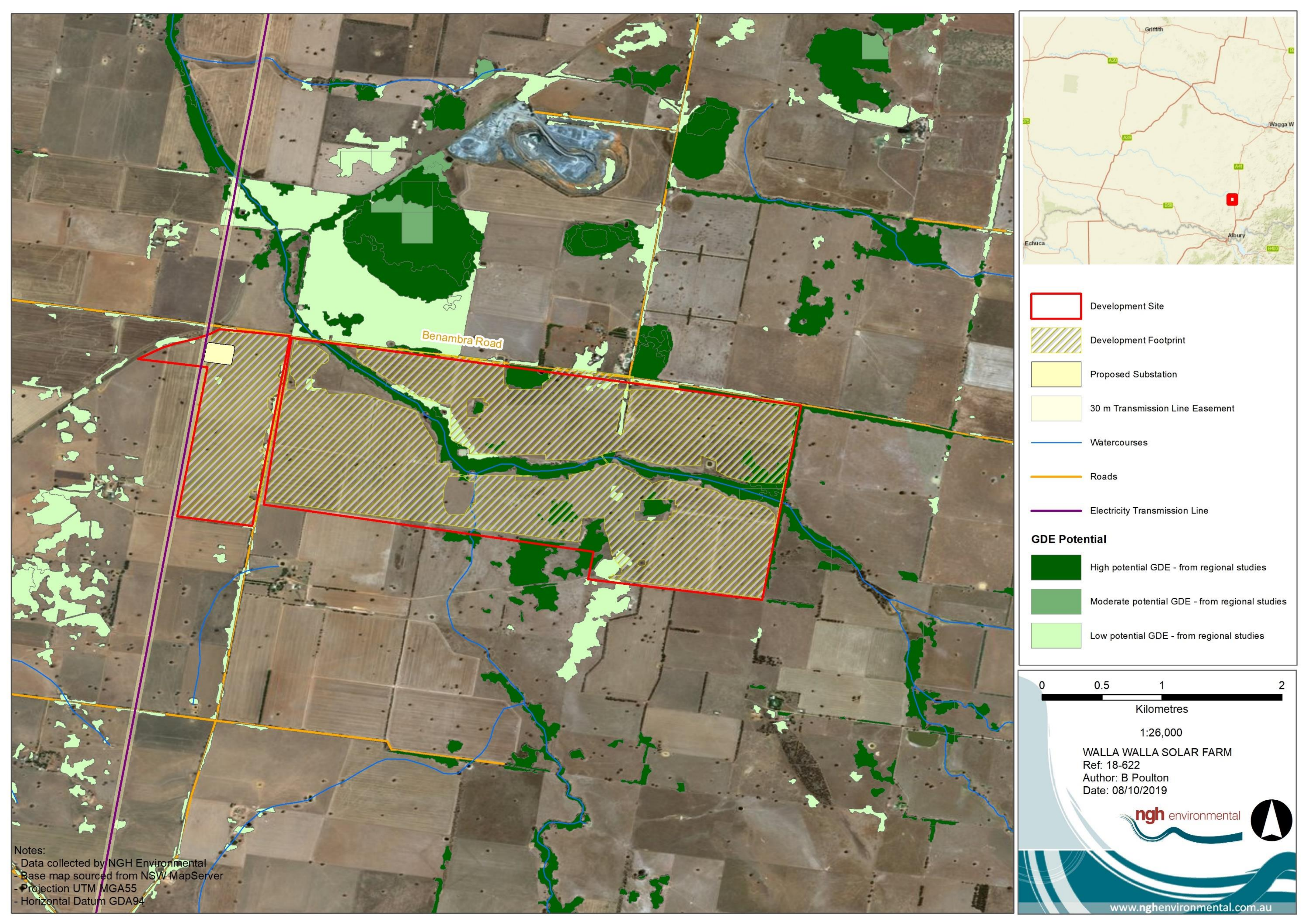


Figure 6-28 Terrestrial GDEs within and surrounding the development site

Aquatic biodiversity

Species that could potentially be impacted under the *Fisheries Management Act 1994* were assessed in Appendix M. It was determined that there would be no impact to threatened aquatic species. One EEC listed under the FM Act was identified within the development site: *Lowland Murray River* aquatic ecological community. An AoS for this EEC was completed and is presented in Appendix M. It was concluded that this EEC would not be impacted by the proposal.

6.8.8 Safeguards and mitigation measures

Safeguards and mitigation to protect biodiversity are listed in Table 6-43.

Table 6-43 Safeguards and mitigation measures for biodiversity impacts

No.	Safeguards and mitigation measures	C	O	D
BD1	Timing works to avoid critical lifecycle events such as breeding or nursing: • Hollow-bearing trees would not be removed during breeding and hibernation season (Spring to Summer). • If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken by an ecologist or suitably qualified person to ensure no impacts to fauna would occur.	C		
BD2	Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing. A trained ecologist or licensed wildlife handler would be present during clearing events and complete: • Pre-clearing checklist. • Tree clearing procedure.	C		
BD3	Relocate habitat features (fallen timber, hollow logs) from the development site to adjacent area for habitat enhancement.	Pre - construction		
BD4	Plain wire instead of barbed used on top of the perimeter fence and stock fencing to reduce impacts on birds and Squirrel Glider.	C	O	
BD5	Perimeter fence location to avoid, where possible, segmenting patches of native vegetation to facilitate native fauna movements.	C	O	
BD6	Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance where partial clearing is proposed: • Approved clearing limits clearly delineated with temporary fencing prior to construction commencing. • No stockpiling or storage within dripline of retained trees. • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance. • Remove native vegetation by chainsaw rather than heavy machinery.	C		

No.	Safeguards and mitigation measures	C	O	D
BD7	Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise. Construction Environmental Management Plan would include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	C	O	
BD8	Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill: • Avoid Night Works. • Direct lights away from vegetation.	C	O	D
BD9	Adaptive dust monitoring programs to control air quality: • Daily monitoring of dust generated by construction and operation activities. • Construction would cease if dust observed blown from site until control measures were implemented. • All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.	C		
BD10	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas incorporated into the Pest and Weed Management Plan.	C	O	
BD11	All staff induction and regular communications to cover environmental features retained and protection measures to be implemented (including but not limited to): • Retained dams, trees and vegetation communities. • Site speed limits to be enforced to minimise fauna strike. • Vehicle hygiene and biosecurity.	C	O	
BD12	Preparation of a Biodiversity Management Plan to implement biodiversity projection measures (including but not limited to): • Retaining habitat features (e.g. hollow logs) where feasible. • Staged removal of hollow-bearing trees and other habitat features with attendance by an ecologist. • Unexpected threatened species finds. • Rehabilitation and enhancement of disturbed areas.	C		
BD13	Screening and landscaping plantings (up to 50 m where practicable) to be comprised of local indigenous species representative of the vegetation in the development site.	C		

C: Construction; O: Operation; D: Decommissioning

6.9 ABORIGINAL HERITAGE

NGH (2019a), prepared an ACHAR to provide an assessment of the Aboriginal cultural values associated with the proposal area and to assess the cultural and scientific significance of any Aboriginal heritage sites recorded. The full report is provided in Appendix G and is summarised below.

The ACHAR was prepared in line with the following:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011).
- *Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales* (OEH, 2010a).
- *Aboriginal cultural heritage consultation requirements for proponents 2010* (OEH, 2010b).

Consultation with Aboriginal stakeholders was undertaken in accordance with clause *80C of the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010,* following the consultation steps outlined in the (ACHCRP) guide provided by OEH.

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues.

Heritage –

Including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents*.*

OFFICE OF ENVIRONMENT AND HERITAGE REQUIREMENTS

The result of an extensive search of the Aboriginal Heritage Information Management System (AHIMS) conducted on 7 December 2018 was that there were no registered Aboriginal sites or places identified in the proposal area. The AHIMS result identified 23 Aboriginal sites within 2 kilometres of the proposal area. No field assessment was undertaken in the scoping report.

A search by OEH showed that there are two artefact sites registered on AHIMS within 200 metres of the proposal area. Large parts of NSW that have not been subject to archaeological survey and as such there may be unrecorded Aboriginal sites within or near the project area. The proposal area contains two creeks – Back Creek and Middle Creek. Proximity to water is known to be one indicator for the potential presence of Aboriginal sites. Field assessment will be required in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010). Remnant trees should be inspected for the potential of Aboriginal cultural modification and scarring.

An Aboriginal Cultural Heritage Assessment Report (ACHAR) will be required as part of the EIS. The ACHAR is to include consultation in accordance with the 'Aboriginal cultural heritage consultation requirements for proponents 2010' (DECCW, 2010). Aboriginal cultural heritage values that exist across the whole area that will be affected by the development must be identified and documented in the ACHAR. All Aboriginal objects identified must be reported to the OEH through registration on AHIMS in accordance with the mandatory notification requirements of section 89A of the National Parks and Wildlife Act 1974.

Aboriginal cultural heritage –

1. *The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The*

identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and be guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) and consultation with OEH regional branch officers.

2. *Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.*
3. *Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.*
4. *The assessment of Aboriginal cultural heritage values must include a surface survey undertaken by a qualified archaeologist in areas with potential for subsurface Aboriginal deposits. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR.*
5. *The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts.*
6. *The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.*

6.9.1 Background

The proposal is within an area identified as part of the Wiradjuri language group. This is an assemblage of many small clans and bands speaking a number of similar dialects (Howitt 1904, Tindale 1974, MacDonald 1983, Horton 1994).

The Wiradjuri language group was the largest in NSW prior to European settlement. The borders were, however, not static, and were most likely fluid, expanding and contracting over time to the movements of smaller family or clan groups. Boundaries ebbed and flowed through contact with neighbours, the seasons and periods of drought and abundance.

It was the small family group that was at the core of Aboriginal society and the basis for their hunting and gathering life. The immediate family camped, sourced food, made shelter and performed daily rituals together. The archaeological manifestations of these activities are likely to be small campsites, characterised by small artefact scatters and hearths across the landscape. Places that were visited more frequently would develop into larger site complexes with higher numbers of artefacts and possibly more diverse archaeological evidence.

These small family units were part of a larger band which comprised a number of families. They moved within an area defined by their particular religious sites (MacDonald 1983). Such groups might come together on special occasions such as pre-ordained times for ceremonies, rituals or simply if their paths happened to cross. They may also have joined together at particular times of the year and at certain places where resources were known to be abundant. The archaeological legacy of these gatherings would be larger sites rather than small family camps. They may include large hearth or oven complexes, contain a number of grinding implements and a larger range of stone tools and raw materials.

The topography of the region features low-gradient undulating and hilly ranges, wide valleys and isolated peaks (Goldsmith, Barker & Johnston, 1985). The topography of the Walla Walla region is comprised of the extensive flat alluvial Back Creek – Billabong Creek floodplains with sparse narrow drainage lines. Local relief is low at <5 m and elevation varies from 200 to 250 m in height. Hurricane Hill is the most prominent of three hills in the local area which is located 1.5 km north of the proposal area. Within the immediate proposal area, the landscape bears flat to gently undulating gradients with a low hill rising in the western portion of the proposal area.

Two ephemeral water courses run through the proposal area: Back Creek and Middle Creek. These two water courses flow into Billabong Creek, which in turn flows into the Murray River. Seventeen farm dams occur within the proposal footprint. These are the only hydrological features within the development footprint.

The areas in close proximity to a water source on slightly raised flat areas and hill crests are likely to have been a major focus for Aboriginal people in the area. However, prior to European land modifications, this area as a whole may have provided resources, shelter, water and food for Aboriginal people.

Database searches and consultation

A search of the AHIMS database was conducted over an area approximately 10 km east-west x 10 km north-south centred on the proposal area on the 7th of December 2018. The AHIMS Client Service Number was: 387836. The search area extended from Lat, Long: -35.7911, 146.8976 to Lat, Long: -35.7077, 147.0298 with a 1 km buffer zone. There were 23 Aboriginal sites and no declared Aboriginal Places recorded in the search area. Figure 6-29 shows the locations of the AHIMS sites in relation to the assessment area and Table 6-44 shows a breakdown the of the site types.

Table 6-44 Breakdown of previously recorded Aboriginal sites in the region.

Site Type	Number
Modified Tree (Carved or Scarred)	16
Artefact (1 or more)	7
TOTAL	**23**

No registered sites lie within the Walla Walla Solar Farm proposal area. Two registered artefact scatters, or open campsites, are located between 60-200 m north of the proposal area along Back Creek (AHIMS# 55-6-0026 and #55-6-0027). Further investigation of the archaeological reports associated with these scatters has confirmed that the historical locations of these sites is incorrect, and AHIMS# 55-6-0026 should be located on the southern bank and AHIMS# 55-6-0027 should be located on the northern bank of Back Creek.

An additional five sites are located between 600-1800 m north of the proposal boundary (AHIMS #55-6-0032, #55-6-0033, #55-6-0028, #55-6-0012 and #55-6-0013). The remaining 16 sites are within 3 to 5 km of the proposal area and predominantly concentrated around Gum Swamp and Petries Creek to the west or other areas where previous archaeological investigation have occurred to the north.

There is a high proportion (69.5%) of scarred trees recorded in the area especially where there are remnant stands of native trees. Scarred trees provide a tangible link to the past and provide evidence of Aboriginal subsistence activities through the deliberate removal of bark or wood. It is likely that the high proportion of scarred trees in the 5 km area surrounding the proposal area is related to lack of surveys in the area and the more obtrusive nature of scarred trees when compared to small artefact scatters and isolated stone artefacts.

Based on the number of previously recorded sites in the relatively small search area, it is expected that a vast number of additional sites exist within this region that have not yet been recorded on the AHIMS database. This is not due to a lack of Aboriginal cultural sites, but instead reflects the nature of the archaeological investigations which have focused on targeted areas of development and not the general landscape.

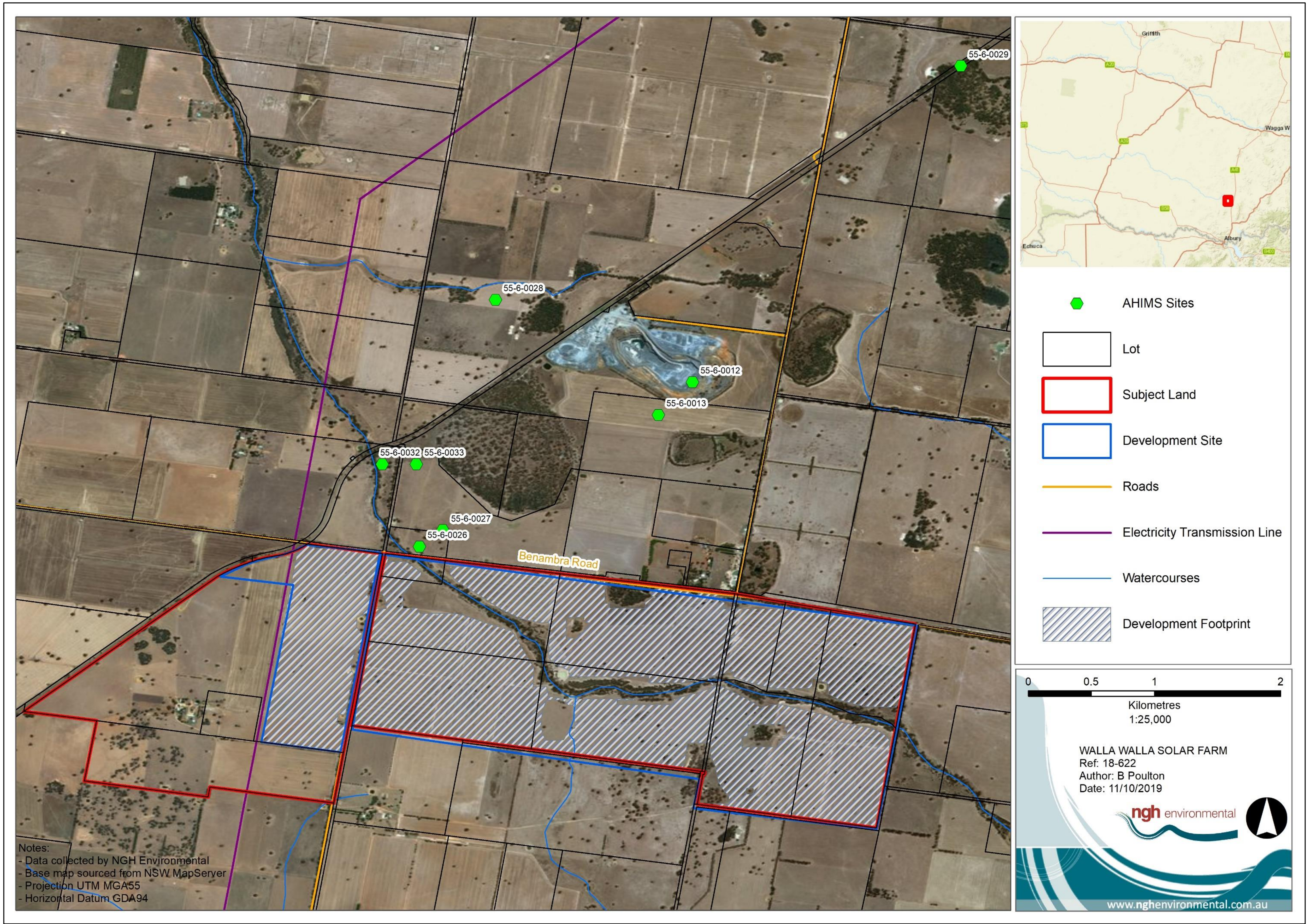


Figure 6-29 Location of AHIMS sites within 5 km of the subject land

6.9.2 Site survey

Methodology

The survey strategy was to cover as much of the ground surface as possible within the proposal area. Although the actual ground impact from the construction method for the proposed solar farm was likely to be low, the placement of solar arrays across the landscape has the potential to cover any cultural heritage sites.

The strategy therefore was to walk a series of transects across the landscape to achieve maximum coverage. Because the proposal site was generally cleared paddocks used for grazing livestock or recently ploughed crop fields, transects were spaced evenly with the survey team spread apart at 30 m intervals, walking in parallel lines. The cleared nature of the paddocks made this an ideal survey strategy. The team were able to walk in parallel lines, at a similar pace, allowing for maximum survey coverage and maximum opportunity to identify any heritage features. The survey team consisted of a minimum of four people and a maximum of five people which allowed a 120 m to 150 m wide tract of the proposal area to be surveyed with each transect depending the number of people present. At the end of each transect, the team would reposition along a new transect line at the same spacing and walk back on the same compass bearing.

While the proponent has excluded areas of existing viable native vegetation remnants from the development footprint where possible, the areas of remnant vegetation, specifically along Back Creek, were deemed to have high archaeological potential for mature trees within the proposal area and were inspected for any evidence of Aboriginal scarring (Long, 2005). Native paddock trees were also inspected for evidence of Aboriginal scarring (Long, 2005).

NGH believes that the survey strategy was comprehensive and the most effective way to identify the presence of Aboriginal heritage sites. Discussions were held in the field during each day between the archaeologists and Aboriginal community representatives to ensure all were satisfied and agreed with the spacing and methodology.

The proposal area was divided into five landforms based on contour mapping and visual inspection during field survey:

- Creeks and depressions.
- Flats.
- Gradual slopes.
- Hill Crest.
- Elevated flats.

The survey for the Walla Walla Solar Farm proposal area was undertaken by the team over five days from the 25 to 29 March 2019. Over the course of the survey notes were made about visibility, photos taken, and any possible Aboriginal features identified were inspected, assessed and recorded if deemed to be Aboriginal in origin.

Results and conclusions

Despite the variable visibility encountered during the survey 11 artefact scatters (Walla Walla SF AFT 1 to Walla Walla SF AFT 11), 23 isolated finds (Walla Walla SF IF 1 to Walla Walla SF IF 23) and two scarred trees (Walla Walla Solar Farm 495495 and Walla Walla Solar Farm 497946) were recorded. Two areas of potential archaeological deposit were also recorded in association with Back Creek (PAD 1 and PAD 2). The Aboriginal community representatives also identified three cultural trees (Walla Solar Farm 497199, Walla Walla Solar

Farm 496602 and Walla Walla Solar Farm 496812). The details of these sites are outlined below, and their locations shown in Figure 6-30.

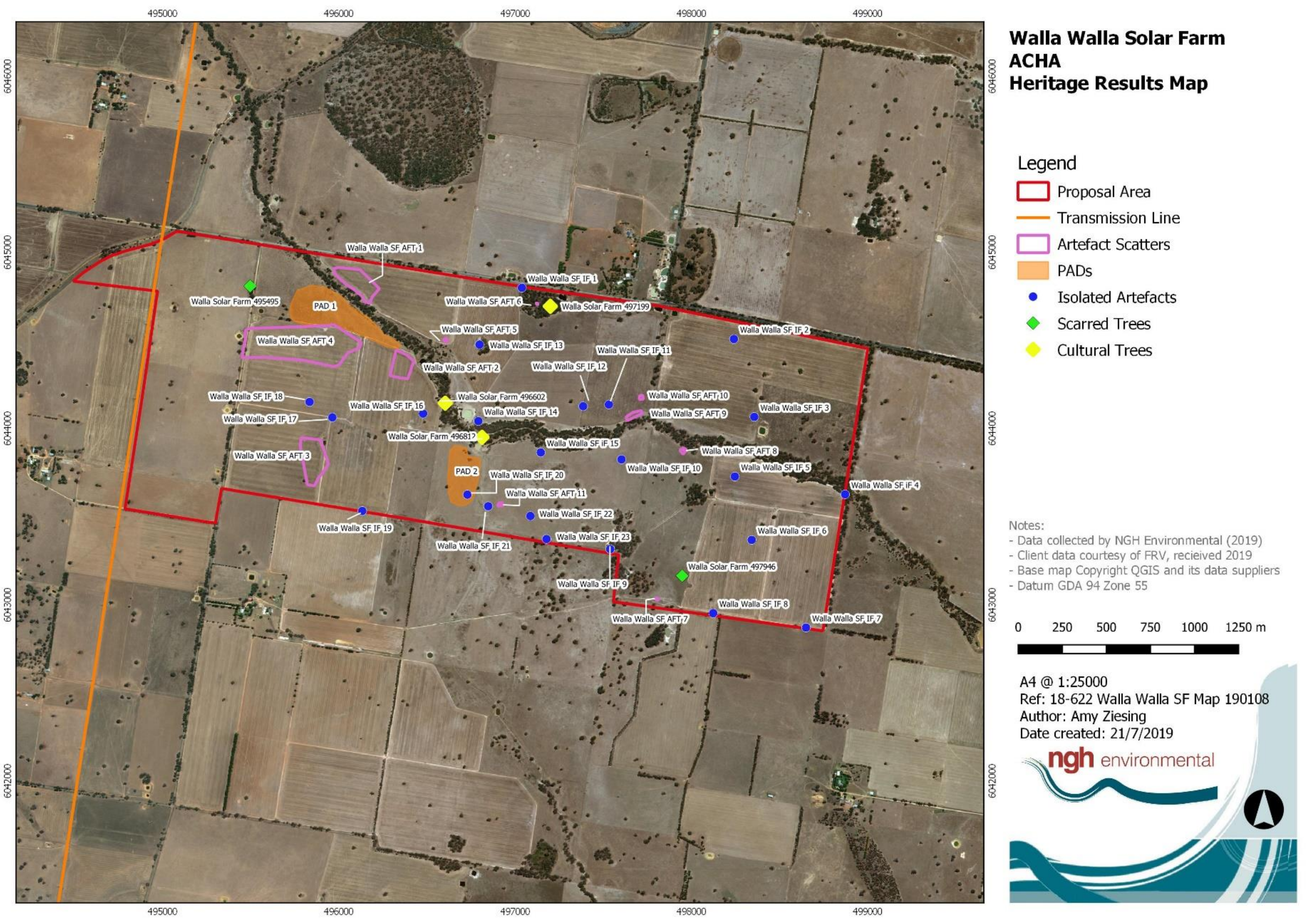


Figure 6-30 Results from the heritage survey

It should be noted that the Aboriginal representative, Mark Saddler independently assigned a naming convention to the scarred and cultural tree sites he identified during the survey and submitted these to AHIMS. A total of five sites were submitted to AHIMS by Mark Saddler in March 2019. Mark Saddler has also provided NGH with a report on his participation in the survey which is provided in full in the ACHAR (Appendix G).

A summary of all the cultural and archaeological Aboriginal sites recorded during the survey within the Walla Walla proposal area is provided in Table 6-45. The artefact data and detailed site descriptions are provided in full in the ACHAR (Appendix G).

Table 6-45 Summary of sites to be impacted and avoided by the proposal

AHIMS	Name	Type
55-6-0174	Walla Walla SF IF1	Isolated Find
55-6-0175	Walla Walla SF IF2	Isolated Find
55-6-0176	Walla Walla SF IF3	Isolated Find
55-6-0177	Walla Walla SF IF4	Isolated Find
55-6-0178	Walla Walla SF IF5	Isolated Find
55-6-0179	Walla Walla SF IF6	Isolated Find
55-6-0180	Walla Walla SF IF7	Isolated Find
55-6-0181	Walla Walla SF IF8	Isolated Find
55-6-0182	Walla Walla SF IF9	Isolated Find
55-6-0183	Walla Walla SF IF10	Isolated Find
55-6-0184	Walla Walla SF IF11	Isolated Find
55-6-0185	Walla Walla SF IF12	Isolated Find
55-6-0186	Walla Walla SF IF13	Isolated Find
55-6-0187	Walla Walla SF IF14	Isolated Find
55-6-0188	Walla Walla SF IF15	Isolated Find
55-6-0189	Walla Walla SF IF16	Isolated Find
55-6-0190	Walla Walla SF IF17	Isolated Find
55-6-0191	Walla Walla SF IF18	Isolated Find
55-6-0192	Walla Walla SF IF19	Isolated Find
55-6-0193	Walla Walla SF IF20	Isolated Find
55-6-0194	Walla Walla SF IF21	Isolated Find
55-6-0195	Walla Walla SF IF22	Isolated Find
55-6-0196	Walla Walla SF IF23	Isolated Find
55-6-0163	Walla Walla SF AFT1	Artefact Scatter
55-6-0164	Walla Walla SF AFT2	Artefact Scatter
55-6-0165	Walla Walla SF AFT3	Artefact Scatter
55-6-0166	Walla Walla SF AFT4	Artefact Scatter
55-6-0167	Walla Walla SF AFT5	Artefact Scatter
55-6-0168	Walla Walla SF AFT6	Artefact Scatter
55-6-0169	Walla Walla SF AFT7	Artefact Scatter

AHIMS	Name	Type
55-6-0170	Walla Walla SF AFT8	Artefact Scatter
55-6-0171	Walla Walla SF AFT9	Artefact Scatter
55-6-0172	Walla Walla SF AFT10	Artefact Scatter
55-6-0173	Walla Walla SF AFT11	Artefact Scatter
55-6-0144	Walla Solar Farm 495495	Scarred Tree
55-6-0148	Walla Solar Farm 497946	Scarred Tree
55-6-0145	Walla Solar Farm 497199	Cultural Tree
55-6-0147	Walla Solar Farm 496602	Cultural Tree
55-6-0146	Walla Solar Farm 496812	Cultural Tree

CONSIDERATION OF POTENTIAL FOR SUBSURFACE MATERIAL

The field survey of the Walla Walla Solar Farm proposal area in conjunction with an assessment of contour data, archaeological modelling and consideration of the comments from the RAPs have resulted in the identification of two areas considered to have potential for *in situ* subsurface deposits that require further assessment. It is recommended that the two areas of Potential Archaeological Deposit (PADs) (PAD 1 and PAD 2) are subject to a limited subsurface testing program, if they are unable to be avoided by the proposed development footprint, to establish the true archaeological potential, significance and extent of sites within the proposal area. PAD 1 is associated with an elevated area of land to the south of Back Creek in the north western portion of the proposal area. PAD 2 is associated with an elevated area of land to the south west of the convergence of Middle and Back Creeks.

Discussions were held with the proponent following the completion of the field survey and it was determined that the two PAD areas would be retained and fenced off whilst being hand sown with native grass seed to provide additional habitat for wildlife.

Based on the land use history, an appraisal of the landscape, soil, level of disturbance and the results from the field survey it was concluded that there was negligible potential for the presence of intact subsurface deposits with high densities of cultural material within the remainder of the proposal area outside the two PADs. Consequently, subsurface testing is not warranted.

Impacts to values

The values potentially impacted by the development are any social and cultural values attributed to the artefacts and the sites by the local Aboriginal community. The extent to which the loss of the sites or parts of the sites would impact on the community is only something the Aboriginal community can articulate.

The impact to scientific values for this development are summarised in Section 5 of the ACHAR with the stone artefact sites rated as having low loss of scientific value. While the majority of the stone artefact sites are rated as having total loss of scientific value (n=24, 70.6%) it is argued that there are likely to be a number of similar sites in the local area and therefore the impact to the overall local archaeological record is considered to be low. Additionally, there are a number of stone artefact sites that will not be harmed (n=10; 29.4)

The stone artefacts have little research value apart from what has already been gained from the information obtained during the present assessment. This information relates more to the presence of the artefacts and in the development of Aboriginal site modelling, which has largely now been realised by the recording.

The intrinsic values of the artefacts themselves may be affected by the development of the proposal area. Any removal of the artefacts, or their breakage would reduce the low scientific value they retain. The impact to the axe blank is considered to have low to moderate loss of scientific value.

The two scarred tree sites would not be impacted by the proposal as per the proposed design in this report. Ten of the stone artefact sites would also not be impacted by the proposal. The three cultural trees identified by the Aboriginal community members will also not be impacted by the proposed development.

No other values have been identified that would be affected by the development proposal.

Identified risks to known sites are listed in Table 6-46.

Table 6-46 Identified risk to known sites and recommendations

AHMIS #	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
55-6-0163	Walla Walla SF AFT 1	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0164	Walla Walla SF AFT 2	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0165	Walla Walla SF AFT 3	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0166	Walla Walla SF AFT 4	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0167	Walla Walla SF AFT 5	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0168	Walla Walla SF AFT 6	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0169	Walla Walla SF AFT 7	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0170	Walla Walla SF AFT 8	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.

AHMIS #	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
55-6-0171	Walla Walla SF AFT 9	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0172	Walla Walla SF AFT 10	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0173	Walla Walla SF AFT 11	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0174	Walla Walla SF IF 1	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0175	Walla Walla SF IF 2	Poor – 100+ year history of agricultural and pastoral use.	Low to moderate	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0176	Walla Walla SF IF 3	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0177	Walla Walla SF IF 4	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0178	Walla Walla SF IF 5	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0179	Walla Walla SF IF 6	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.

AHMIS #	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
55-6-0180	Walla Walla SF IF 7	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0181	Walla Walla SF IF 8	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface objects prior to development of proposal area.
55-6-0182	Walla Walla SF IF 9	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0183	Walla Walla SF IF 10	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0184	Walla Walla SF IF 11	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0185	Walla Walla SF IF 12	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0186	Walla Walla SF IF 13	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0187	Walla Walla SF IF 14	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0188	Walla Walla SF IF 15	Poor – 100+ year history of agricultural and pastoral use.	Low	None-– outside of	None	None	Site will be avoided by proposed development.

AHMIS #	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
				development footprint			Ensure avoidance with 5 m buffer around site
55-6-0189	Walla Walla SF IF 16	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0190	Walla Walla SF IF 17	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0191	Walla Walla SF IF 18	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0192	Walla Walla SF IF 19	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0193	Walla Walla SF IF 20	Poor – 100+ year history of agricultural and pastoral use.	Low to moderate	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
55-6-0194	Walla Walla SF IF 21	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0195	Walla Walla SF IF 22	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0196	Walla Walla SF IF 23	Poor – 100+ year history of agricultural and pastoral use.	Low	Direct	Total	Total loss of value	Salvage surface object prior to development of proposal area.
55-6-0144	Walla Solar Farm 495495	Poor – 100+ year history of agricultural and pastoral use.	Low	None–– outside of	None	None	Site will be avoided by proposed development.

AHMIS #	Site name	Site integrity	Scientific significance	Type of harm	Degree of harm	Consequence of harm	Recommendation
				development footprint			Ensure avoidance with 10 m buffer around site
55-6-0148	Walla Solar Farm 497946	Poor – 100+ year history of agricultural and pastoral use.	Low	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 10 m buffer around site
55-6-0147	Walla Solar Farm 496602	Poor – 100+ year history of agricultural and pastoral use.	Low	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 10 m buffer around site
55-6-0145	Walla Solar Farm 497199	Poor – 100+ year history of agricultural and pastoral use.	Low	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 10 m buffer around site
55-6-0146	Walla Solar Farm 496812	Poor – 100+ year history of agricultural and pastoral use.	Low	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 10 m buffer around site
N/A	Walla Walla PAD 1	Good – minimal disturbance from pastoral activities	Low to moderate	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site
N/A	Walla Walla PAD 2	Good – minimal disturbance from pastoral activities	Low to moderate	None–– outside of development footprint	None	None	Site will be avoided by proposed development. Ensure avoidance with 5 m buffer around site

6.9.3 Potential impacts

Construction

Avoiding harm to the 23 isolated finds, 11 artefact scatter sites, two scarred trees and three cultural trees identified within the proposed Walla Walla Solar Farm proposal area is technically possible through avoidance. However, the scattered nature of the stone artefact sites across the area would pose serious design constraints on the solar farm proposal. Where possible the design has already been altered to avoid remnant vegetation, two scarred trees, three cultural tree sites and two area of PAD.

Mitigation of harm to cultural heritage sites generally involves some level of detailed recording to preserve the information contained within the site. Mitigation can be in the form of minimising harm, through slight changes in the development plan or through direct management measures of the sites and Aboriginal objects.

It is recommended that the sites recorded within the proposed Walla Walla Solar Farm development footprint are salvaged by an archaeologist with representatives of the registered Aboriginal parties prior to the proposed development commencing. The artefacts should be collected and moved to a safe area within the property that will not be subject to any ground disturbance.

Should there be any change to the development footprint that may impact the two PADs (PAD 1 and PAD 2) mitigation in the form of a limited program of subsurface testing is recommended to be undertaken.

Operation

During operation, it is unlikely the proposal would impact any further on Aboriginal archaeology. No mitigation is required during operation.

6.9.4 Safeguards and mitigation measures

The ACHAR identifies that the development proposal can proceed with no additional archaeological investigations. The report identifies a number of safeguards, these are identified below.

Table 6-47 Safeguards and mitigation measures for Aboriginal heritage impacts

No.	Safeguards and mitigation measures	C	O	D
AH1	The proponent should prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the Solar Farm and management of known sites and artefacts. The CHMP should include the unexpected finds procedure to deal with construction activity. Preparation of the CHMP should be undertaken in consultation with the registered Aboriginal parties.	C		
AH2	In the unlikely event that human remains are discovered during the construction, all work must cease in the immediate vicinity. BCD, the local police and the registered Aboriginal parties should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal.	C		
AH3	The development must avoid the two possible Scarred Trees (Walla Solar Farm 495495 and Walla Solar Farm 497946). A minimum 10 m buffer around each tree should be in place to protect the trees canopy and root system.	C		

No.	Safeguards and mitigation measures	C	O	D
AH4	If complete avoidance of the 23 isolated find sites and 11 artefact scatters recorded within the proposal area is not possible, the artefacts within the development footprint must be salvaged prior to the proposed work commencing and moved to a safe area within the property that would not be subject to any ground disturbance.	**Pre-construction**		
AH5	The collection and relocation of the artefacts should be undertaken by an archaeologist with representatives of the registered Aboriginal parties and be consistent with Requirement 26 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales. A new site card/s would need to be completed once the artefacts are moved to record their new location on the AHIMS database.	**Pre-construction**		
AH6	A minimum 5 m buffer should be observed around all artefact scatters and isolated find sites that cannot be avoided, including those outside the development footprint.	**C**		
AH7	Further archaeological assessment would be required if the proposal activity extends beyond the area assessed as detailed in this report. This would include consultation with the registered Aboriginal parties and may include further field survey.	**C**		

C: Construction; O: Operation; D: Decommissioning

7 ASSESSMENT OF ADDITIONAL ISSUES

7.1 CLIMATE AND AIR QUALITY

Potential impacts on air quality in the form of vehicle emissions and dust would be managed during construction by selecting a transport route and site access as farm as practicable from nearby residences. The transport route to the side would be limited to sealed roads while dust from internal roads would be managed by use of water trucks and maintaining groundcover.

7.1.1 Existing environment

Climate

The Greater Hume LGA is part of the NSW South Western Slopes Bioregion, Lower Slopes subregion. This bioregion is dominated by a sub-humid climate that generally experiences hot summers and cool wet winters (OEH, 2016). The BoM (2019a) temperature records available from the nearest long-term climate station at Albury Airport (station no. 072160) indicate a mean summer maximum of 32.3 °C (January) and a mean winter minimum of 3.1 °C (July) (Figure 2-7). The BoM (2019a) rainfall records from the same station show a mean annual rainfall of 623.7 mm, and that rainfall is generally greatest over winter and spring, with the average monthly maximum occurring in August (66.5 mm).

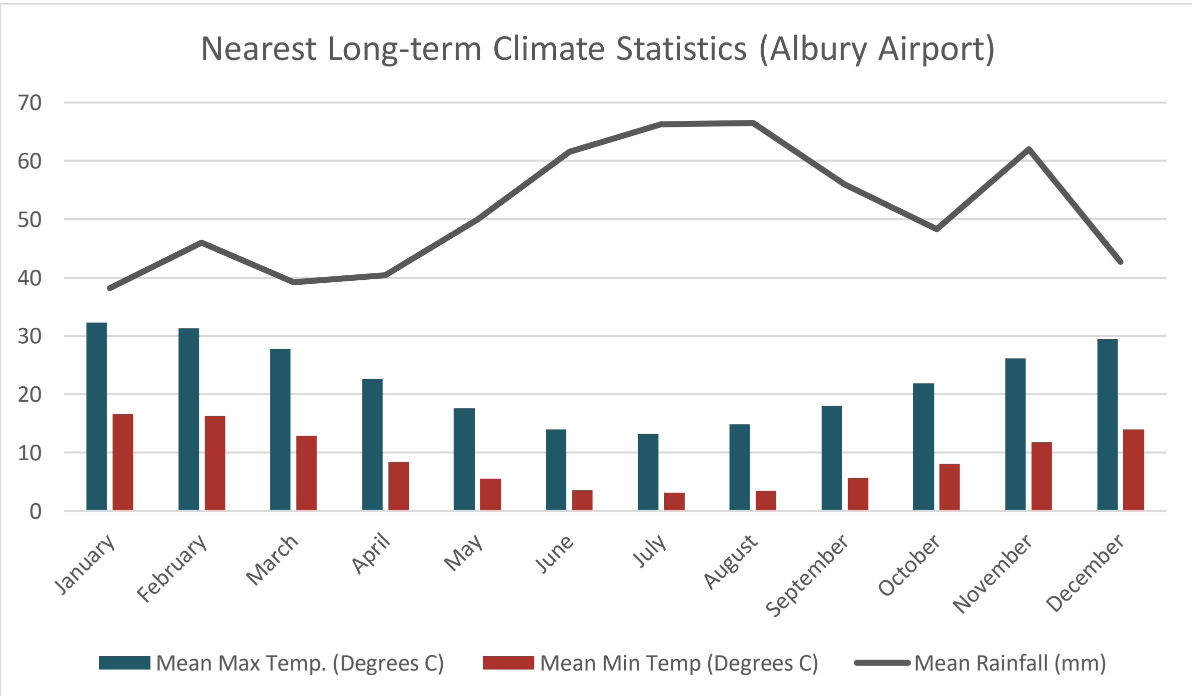


Figure 7-1 Climate statistics for Albury Airport (BOM 2019a).

Local air quality

The air quality around the development site is generally expected to be good and typical of that found in a rural setting in NSW. Existing sources of air pollution for the development site include:

- Vehicle emissions.

- Dust from nearby unsealed roads.
- Agricultural activities including sowing, lime application, burning of paddocks or earth moving.

A search of the National Pollutant Inventory (Australian Government, 2019) identified five substance emissions facilities located within the Greater Hume LGA, which include:

- Albury Galvanizing Pty Ltd, Walla Walla.
- APT Management Services Pty Ltd, Culcairn.
- Boral CSR Bricks Pty Ltd, Walla Walla.
- Boral Resources (Country) Pty Ltd, Culcairn.
- Rivalea (Australia) Pty Ltd, Bungowannah.

No residential dwellings are located within the development site. Adjoining land uses include grazing and cropping for agriculture. Two properties have been identified as being involved with the project, with an additional 30 uninvolved neighbours within 3 km of the site. There are two residences within 500 m of the site. Topography of the development site is undulating to flat and there is minimal vegetation screening the development site.

CRITERIA

The POEO Act requires that no vehicle shall have continuous smoky emissions for more than ten seconds. Limits on dust emission of less than 4 mg/m^2/month are also specified by the EPA.

Climate change

Climate change refers to the warming temperatures and altered climatic conditions associated with the increased concentration of GHGs in the atmosphere. GHG's include carbon dioxide, methane and water vapour. Climate change projections for Australia includes more frequent and hotter hot days and fewer frost days, rainfall decline in southern Australia and more extreme weather events including intense rainfall, more severe drought and harsher fires (CSIRO, 2015). The region is currently in a drought.

7.1.2 Potential impacts

Construction and decommissioning

Climate can act to influence the impacts of construction and decommissioning on the environment. For example, hot, dry or windy conditions can exacerbate adverse air quality impacts; prolonged rainfall can increase soil compaction impacts (Dean and Green, 2017). For these reasons, the specific climatic conditions of the site are considered in the assessment of impacts.

Dust generation would accompany excavation and other earthworks as well as the movement of trucks and work vehicles along the unsealed access road during construction and decommissioning of the proposed solar farm. Air emissions would also be produced from equipment and vehicle exhaust fumes. Dust and emissions can be a nuisance, interfere with visibility when driving or lead to adverse health impacts when severe or prolonged (Dean and Green, 2017). Emission of GHGs are likely to contribute to climate change.

The construction phase is expected to last between 16 and 20 months, with a peak period lasting approximately 8 to 12 months. During this time, emissions would be generated from earth-moving equipment, diesel generators, trucks, cranes and pile driving equipment. Vehicles accessing the site would include the construction labour force, largely using shared (bus) transport, (up to 250 construction personnel during the peak period) and haulage traffic delivering construction components (as detailed in section 6.6).

Earthworks associated with construction and decommissioning are relatively minor and not likely to cause significant dust or emissions. The construction of the solar arrays uses a piling machine which is designed to reduce soil disturbance and corresponding dust pollution. The impact area for the piles would be approximately 0.1% of the development site.

Additional disturbance and earthworks will be associated with trenching for cables, the construction of concrete footings for infrastructure and internal access tracks.

One dwelling is located directly adjacent to the subject land boundary and would the key residence for adverse air quality impacts. Existing mature vegetation occurs between some residences and the development site. Dust impacts would be mitigated using dust suppression methods; refer to section 7.1.3.

There are also two involved residences and 30 uninvolved residences within 3 km of the development site. Due to the distance of these residential dwellings, dust and emissions would be expected to dissipate readily over this distance. Substantive air quality impacts are not anticipated for these dwellings. With the minor earthworks involved and implementation of mitigation measures, air quality issues are considered manageable.

No climatic impacts are anticipated as a consequence of the construction and decommissioning activities for the solar farm. However, construction will be responsive top local conditions to ensure impacts are manages. Haulage traffic and plant and equipment would generate emissions, however, the short duration of the work, the scale of the proposal and mitigation strategies in place suggest this contribution would be negligible in a local or regional context.

Operation

AIR QUALITY

The generation of solar energy during the operation of the proposal would generate negligible air quality impacts and emissions. The operation of the solar farm would produce minimal CO_2 emissions when compared to conventional coal and gas fired powered stations (Table 7-1). As discussed in Section 2.2, the operation of the proposal would help reduce GHG emissions and move towards cleaner electricity generation. Based on 740,000 MWh per annum, the proposal would offset the brown coal equivalent of more than 814,000 tonnes per annum of CO_2 emissions and power the equivalent of about 90,000 NSW homes.

Table 7-1 Comparison of CO_2 equivalent emissions produced per kilowatt hour for the lifecycle of the asset

Generation method	Emissions produced (grams CO2 equivalent per kWh)	Source
PV solar farm	19-59	Wright and Hearps (2010)
Coal-fired power station	800-1000	Wright and Hearps (2010)
Combined cycle gas turbine	400	Alsema *et al*. (2006)

Maintenance activities during operation would result in some minor, localised vehicle emissions and potentially some generation of dust from vehicles travelling on the unsealed access roads although strict speed limits would be enforced due to health and safety, which would assist as a mitigating factor. The impacts on local and regional air quality are expected to be negligible during operation. During major maintenance activities, this number could increase to 20-30 vehicles at any one time for a limited period.

There is also a risk that unsealed access tracks may create dust during windy conditions. However, the access tracks will be regularly maintained. Dust creation is expected to be no more than the existing unsealed roads that surround the site. As such, a noticeable increase in dust creation is unlikely.

Reduction of dust causing agricultural activities will also temporarily cease over the development area, with groundcover maintained to reduce erosion and dust. It is argued that overall dust creation on the subject land will decrease.

Limited amounts of fuel would be required for maintenance vehicles during operation of the solar farm and for temporary power generation in the event of an unplanned outage. During operation, the proposal would have a significantly positive impact on global climate by assisting to reduce Australia's reliance on fossil fuels for electricity generation (discussed in section 2.2).

Due to the existing activities surrounding the site and the minimal impacts on air quality during operation, the cumulative impact is not expected to be significant. Cumulative impacts are discussed further in section 7.6.

7.1.3 Safeguards and mitigation measures

Air quality impacts would be addressed via the mitigation strategies in Table 7-2.

Table 7-2 Safeguards and mitigation measures for climate and air quality impacts

No.	Safeguards and mitigation measures	C	O	D
AQ1	Construction transport route to the development site to maximise use of sealed roads.	C		
AQ2	Primary construction access point located in north eastern corner of the development site away from residential buildings.	C		
AQ3	Development of a complaints procedure to promptly identify and respond to issues generating complaints.	C	O	D
AQ4	Protocols to guide vehicle and construction equipment use, to minimise emissions would be included in construction and operational environmental management plans. This would include but not be limited to Australian standards and POEO Act requirements.	C	O	D
AQ5	During construction, operation and decommissioning, dust would be monitored and managed to prevent dust leaving the development site. This includes dust from stockpiled materials.	C	O	D
AQ6	Monitor local weather conditions and manage the site if any conditions will exacerbate air quality (e.g. wind).	C		
AQ7	Fires and material burning are prohibited on the development site.	C	O	D

C: Construction; O: Operation; D: Decommissioning

7.2 HISTORIC HERITAGE

A desktop search was completed for historical heritage in late 2018, which concluded that there are not registered heritage sites within or near the development site.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

Including an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, including adequate consultation with the local Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents.

OFFICE OF ENVIRONMENT AND HERITAGE REQUIREMENTS

The EIS must provide a heritage assessment including but not limited to an assessment of impacts to State and local heritage *including conservation areas, natural heritage areas, places of Aboriginal heritage value, buildings, works, relics, gardens, landscapes, views, trees should be assessed. Where impacts to State or locally significant heritage items are identified, the assessment shall:*

a. outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the NSW Heritage Manual (1996).
b. be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria).
c. include a statement of heritage impact for all heritage items (including significance assessment).
d. consider impacts including, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant).
e. where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design, to guide physical archaeological test excavations (terrestrial and maritime as relevant) and include the results of these test excavations.

7.2.1 Approach

A search of listed items (under the Heritage Act, the Australian Heritage Database and those listed by local Councils and State Government agencies) was completed for the Greater Hume LGA on 7 November 2018.

A desktop study was undertaken to identify any historic heritage (non-indigenous) items or places in proximity to the study area, with a particular focus on the development site. Greater Hume LGA was used in the search as the development site is situated within the Greater Hume Shire. Heritage databases searched as part of this assessment included:

- The NSW State Heritage Inventory (SHI) (OEH, 2019b) (includes items on the State Heritage Register and items listed by state agencies and local government) to identify any items currently listed within or adjacent to the development site. The area searched was Greater Hume LGA.
- The Australian Heritage Database (includes items on the National and Commonwealth Heritage Lists) to identify any items that are currently listed within or adjacent to the development site.
- The Environmental Heritage (Schedule 5) of Greater Hume LEP for locally listed heritage items that are within or adjacent to the development site.

A general site inspection was also undertaken, with no items of historical heritage identified.

7.2.2 Results

A summary of the results of the heritage searches are illustrated in Table 7-3. Details of listed items are provided below.

Table 7-3 Summary of heritage listings in the Greater Hume LGA

Name of register	Number of listings
World Heritage List	**0**
National Heritage List	**0**
Commonwealth Heritage List	**0**
NSW State Heritage Register	**4**
State Agency Heritage Register	**12**
Greater Hume LEP 2012	**172**

State Heritage Register

A search of the NSW heritage Register on 31 July 2018 for the Greater Hume LGA identified 4 items under the NSW Heritage Act and 61 items listed under the Greater Hume LEP and by state agencies. None of the items listed in the State Heritage Search were located within 3 km of the development site.

NSW State Agency Heritage Register (Section 170)

A search of the NSW State Agency Heritage Register for the Greater Hume LGA indicated 12 listings. These include:

- Bethanga Bridge over the Murray River, Riverina Highway (SH 20), Albury.
- Culcairn Police Station and Official Residence, 33 Balfour Street, Culcairn.
- Culcairn Railway Precinct, Melville Street, Culcairn.
- Gerogery Gatekeeper's Residence, Main Street, Gerogery.
- Henty Police Station and Official Residence, 41 Sladen Street, Henty.
- Henty Railway Precinct, Railway Parade, Henty.
- Holbrook Courthouse and Residence, Albury Street, Holbrook.
- Holbrook Police Station and Lockup Keeper's Residence, 64 Albury Street Holbrook.
- Ten Mile Creek Bridge, Hume Highway, Holbrook.
- Union Bridge over Murray River, Hume Highway (SH2), Albury.
- Vokins Creek Bridge, Little Billabong Road, 54.4 km west of Tumbarumba.
- Wymah Ferry Crossing on the Murray River, Main Road 282, Wymah.

The above items are listed by State Agencies under s.170 of the Heritage Act. None of the above items are located within or in close proximity of the development site.

Local Heritage Schedule

A search of the Greater Hume Local Environmental Plan 2012 was completed on 18 of January 2019, which found eight items of local significance near the proposal area (Table 7-4). None of these items will be impacted by proposed solar farm with the closest site being over 3.7 km within the Walla Walla townsite.

Table 7-4 Local Environmental Plan heritage listings

Scheme	Heritage Item	Status	Impact
Walla Walla Solar Farm	Morgan's Lookout	Registered - Local	None
	German pioneer wagon	Registered - Local	None
	Zion Lutheran Church and manse	Registered - Local	None
	First Lutheran School and cottage	Registered - Local	None
	Walla Walla Literary Institute and Memorial Hall	Registered - Local	None
	St Mary's Catholic Church	Registered - Local	None
	Walla Walla General Cemetery	Registered - Local	None
	"Walla Walla" homestead	Registered - Local	None

No items of historic heritage significance will be impacted by proposal. The closest site is over 3.7 km south east from the proposal area. All the historic heritage places identified in these searches are shown in Figure 7-2 below.

Figure 7-2 Greater Hume LEP (2012) Heritage Map results for the Walla Walla Solar Farm (NSW Government 2012). *Red boundary indicates the proposed solar farm.*

7.2.3 Potential impacts

A number of heritage items were identified from the desktop study, outlined above. Most of these items are found in Walla Walla and other towns and villages. Two of these items are found within 2 km of the development site.

The proposal is not considered likely to have a significant impact on heritage values in accordance with the Heritage Act, the EP&A Act, and the EPBC Act.

7.2.4 Safeguards and mitigation measures

Safeguards to protect historical heritage are listed in Table 7-5.

Table 7-5 Safeguards and mitigation measures for historic heritage

No.	Safeguards and mitigation measures	C	O	D
HH1	Should an item of historic heritage be identified, the Heritage Division (DPIE) would be contacted prior to further work being carried out in the vicinity.	**C**	**O**	**D**

C: Construction; O: Operation; D: Decommissioning

7.3 SOIL

A soil capability assessment was undertaken McMahon Earth Science in April 2019, which found that soil across the site is suitable to support solar farm infrastructure. Subsoils did not store high levels of salt and would not create dryland salinity conditions should the water table rise over the life of the proposal.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS
Land – *Including:*
• *an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:* - *a consideration of agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights.* - *a soil survey to determine the soil characteristics and consider the potential for erosion to occur.* - *a cumulative impact assessment of nearby developments.*
• *an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:* - *consideration of the zoning provisions applying to the land, including subdivision.* - *completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and a description of measures that would be implemented to remediate the land following decommissioning in accordance with State Environmental Planning Policy No 55 - Remediation of Land.*
Water –
Including:
• *a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with* Managing Urban Stormwater: Soils & Construction *(Landcom 2004).*

7.3.1 Approach

An eSPADE soil profile (OEH, 2018), within the subject land along Schneiders Road south of the proposal records haplic brown dermosol. Surface condition is firm, with no erosion and no evident salting.

A desktop survey was undertaken of the development site by NGH Environmental, and a field survey was undertaken of 30 representative survey sites by McMahon Earth Science (2019). The soil was analysed for topsoil and subsoil pH, electrical conductivity (EC), dispersion, nutrients and cations. The resultant Soil Assessment provides an analysis and evaluation of landforms and soil types as identified on subject land. Limitations and management actions are provided for the soil landscapes that have been identified onsite.

The NSW Australian Soil Classification spatial data indicates that soil types within the subject land are primarily sodosols and kurosols. However, data surveyed and ground truthed by McMahon Earth Science suggests that soils on the site are chromosols.

The methods that were used for sampling and classification of in situ soils was carried out as per the Australian Soil and Land Survey Field Handbook (NCST, 2009) and The Australian Soil Classification (Isbell, 1996). Using the Guidelines for Surveying Soil and Land Resources (McKenzie *et al*. 2008), it was deemed that the density of investigation of the pits should be 'Moderately High (Detailed)' to satisfy the project planning objectives.

The soil assessment is summarised below and provided in full in Appendix N

Figure 7-3 Soil survey investigation pit locations

7.3.2 Existing environment

Topography and geology

The site is located over the Walbundrie and Howlong 1:50,000 Topographic Maps (Sheets 8226-N and 8226-S respectively) at an elevation range of approximately 205 m to 225 m AHD. The landform of the site consists of extremely low relief and shallow alluvial stream channels forming an alluvial plain. One large open drainage known as Back Creek, runs through the site from east to north west. Smaller open depressions and drainage lines feed into the creek from both sides. Back Creek runs into the moderately deep and partly perennial Billabong Creek which lies approximately 7 km north of the site.

The site geology forms part of the broader Shepparton formation with lithology dominated by Cainozoic alluvium deposits of unconsolidated to poorly consolidated mottled variegated clays and silty clays. This forms the fluvio-lacustrine, floodplain, channel and levee environments found across the site. A deposit of siluro-devonian acid volcanics exists in the very centre of the site running across both sides of Back Creek, this deposit is defined to an area of less than 1 km^2.

Potential contamination

A search of the NSW EPA contaminated land public record (NSW EPA, 2019) was undertaken for contaminated sites within the Greater Hume LGA on 11 April 2019. The search did not return any results for the LGA.

There is a risk that contamination associated with agricultural activities (such as use and storage of pesticides) could be present in the development site. However, no evidence of contamination was observed during the field work and this risk is considered very low.

Soil

Soil investigations undertaken by McMahon Earth Science encountered were typical of the locale, generally falling into reconnaissance survey classes. Slight variations in profiles exist due to remnant parent formations, drainage plains and the complex soil sequences that are associated with such. Soil moisture contents varied between soil types but were generally found to be moderately moist in the topsoil and usually drier with depth. Free groundwater was not encountered to the investigated depth. One soil characteristic exists at the site, Chromosols, classified using the Australian Soil Classification System (Isbell, 1996).

The site lies within the mapping units Va14 & Va17 from the Digital Atlas of Australian Soils (CSIRO, 2018), which are described in the soil assessment completed by McMahon Earth Science in April 2019 (Appendix N).

Table 7-6 Soil types in the development site

Va14	
Landscape	Undulating country
Soils	Plains of hard alkaline and neutral yellow mottled soils (Dy3.43 and Dy3.42). Associated are various earths (Gn2.2 and Gn2.9) with other undescribed soils. Data are limited. Occurs on sheet(s): 3
Location	The eastern quarter of the development site
Va17	
Landscape	Flat low-lying alluvial basin transected by natural drainage lines
Soils	Flat to gently undulating country with some swamps and broken by an occasional low gravelly or stony ridge or hillock: chief soils are hard alkaline yellow mottled soils (Dy3.43) and (Dr2.33), both containing ironstone gravel and sometimes forming soil complexes. Associated are: ridges and hillocks of (Dr2.32, Dr2.42) and (Um4.1) soils similar to unit Qc3; small flat areas of (Dr2.23); and various undescribed soils in local situations, e.g. subjacent to swamps and on stream terraces. Data are limited. Occurs on sheet(s): 3
Location	Majority of the development site except for the eastern quarter

CHROMOSOLS

Chromosols have a strong texture contrast between A and B horizons. There is a clear or abrupt textural B horizon in which the upper portion of the horizon (0.2 m) is not strongly acid and not sodic. These soils are the most commonly encountered soils under agricultural use in Australia.

The analysis of the soils is described in Table 7-7.

Table 7-7 Soil analysis results (McMahon, 2019)

Description	pH	Salinity rating EC (dS/m)	Cation exchange capacity (cmol (+)/kg)	Plant available phosphorus (mg/kg)	Phosphorus buffering index	Calcium: magnesium ratio
Topsoil	4.6 to 5.9 (generally moderate acidity)	0.06 to 0.2 dS/m (lot to very low)	3.9 to 5.8 (non-sodic)	21 to 61	45 to 100	2.0 to 8.0

Limitations

The identification of the landscape limitations of the site enable best practice management actions to be implemented for the construction, operation and decommissioning of the project. The potential landscape limitations are summarised below in Table 7-8.

Table 7-8 Landscape limitations (McMahon, 2019)

Soil type	Location	Erosion Hazard	Salinity risk	Acid soil	Waterlogging risk	Acid sulfate soils	Infrastructure risk
Chromosol	Predominant across the site	Low	Low	Yes	Low	No	Low

Results summary

The risk of erosion on-site due to construction activities is considered to be low due to low relief and generally low salinity of topsoils and subsoils. Excavation of soils should be limited where possible, and excavated subsoil stockpiled and contained to avoid potential dispersion. Groundcover should also be maintained to reduce erosion and sedimentation risk.

Acid sulfate soils were not present on-site and are unlikely to occur due to lack of appropriate landscape characters, such as the dominance of mangroves, reeds, rushes and other marine/estuarine or swamp-tolerant vegetation, low lying areas, back swamps or scalded areas of coastal estuaries or floodplains etc.

Survey results from test pits in the paddocks indicate a permeable soil profile. As a result, the risk of salt build-up in discharge areas is low. Deep rooted vegetation would be maintained with limited ground disturbance and clearing.

7.3.3 Potential impacts

Construction and decommissioning

Construction activities, such as excavation and earthworks, have the potential to disturb soils, cause soil erosion and subsequent sedimentation. Earthworks are required during the construction phase including for the construction of access roads, compound, laydown and parking areas, pile erection, trenching and boring and fencing:

- Based on a worst-case scenario, 75,000 piles at approximately 20 cm x 20 cm would be pile driven into the ground = 00.65 ha of disturbance (0.01 % of the 460.31 ha development footprint).
- 25 km of track at 5 m wide = 12.5 ha of disturbance (2.54% of the 493 ha development footprint).

- TransGrid substation of 192 m x 166 m = 3.2 ha of disturbance (0.65 % of the 493 ha development footprint).
- 72 inverter transformer stations of 12 m x 3 m = 0.26 ha of disturbance (0.05 % of the 493 ha development footprint).

Excavation of trenched for cabling will also be required up to 1200 mm deep and 1000 mm wide.

These activities would remove the existing ground cover and disturb soils, potentially decreasing their stability and increasing their susceptibility to erosion. Most of these activities require only detailed earthworks or earthworks limited to a small defined area. As mentioned above, excavation of subsoils will be limited where possible, and excavated subsoils will be stockpiled and contained to avoid potential dispersion and sediment transfer.

Ground disturbance resulting from the proposal would also be limited, given no major earthworks are required due to low relief of the landscape. Groundcover would be retained as far as practicable prior to and during construction. A Ground Cover Management Plan would be prepared to ensure stability post construction for the operation of the proposal.

Soil compaction would occur as hardstands and internal access roads are created, which would reduce soil permeability thereby increasing run off and the potential for concentrated flows. During excavations mixing of different soil horizons can retard plant growth due to inadequate topsoil layer. Overall, these impacts would occur in small, discrete parts of the development site and are not considered substantial.

Given the majority of soils on site are classified as 'non-sodic' and are of low salinity, the risk of salt build-up in discharge areas is low. However, changing direction of surface waters and any run-on should be avoided as local changes in the water regime are likely to mobilise any salts stores, however low, in the soil. Deep rooted vegetation will be maintained where present and established where absent, with ground clearing minimised.

Pile driving/screwing of steel posts supporting the arrays as well as installation of fencing uses light equipment within a small and discrete footprint and is unlikely to result in substantial disturbance of soils. The areas of disturbance would be sparsely distributed, and groundcover would be retained as far as possible prior to, during and post-construction.

Overall, the risk of erosion is considered low. With limited topographic relief, runoff is considered to be readily manageable and unlikely to cause substantial erosion or lead to substantial sediment loads entering any natural waterways. Concrete spill risk is moderate due to overland flow paths and waterways within the development footprint for solar panels and infrastructure, though compound infrastructure would not be located near creek lines.

The use of fuels and other chemicals onsite poses a risk of soil contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and (minimally) herbicides. Spills of these contaminants can alter soil health, affecting its ability to support plant growth. When mobilised, such as in a rain event or flooding, the substances may spread via local drainage lines, affecting much larger areas including aquatic habitat. Overall, these risks are low and considered readily manageable.

The Greater Hume LGA is not classed as an area identified by NSW EPA (2019b) as containing naturally occurring asbestos (NOA). Therefore, it is unlikely that the minor earthworks required during construction would impact on any NOA. However, the Greater Hume LGA is classed as an area identified by NSW EPA (2019b) as containing NOA.

Operation

SOIL IMPACTS

The primary risk of erosion during operation is from concentrated runoff from the panels. Such runoff could lead to increased soil erosion below the solar array modules during significant rain events and could be influenced by seasonal droughts. The soils have a moderate to severe erosion risk and retaining vegetation underneath the panels would assist in reducing erosion from rainfall run-off. During high rainfall events, panels would be placed in a vertical position to decrease the concentrated surface runoff and increase the exposure of ground surface roughness.

Operational maintenance activities and vehicles would be largely confined to the formalised access tracks, minimising impacts to soils. Occasional vehicle access in between panel arrays would require traversing over undisturbed soils. This is expected to be infrequent and not likely to increase the erosion risk.

There would remain a risk of soil contamination in the event of a chemical spill (fuels, lubricants, herbicides), although there would be only small quantities of such chemicals kept on site.

Vegetation and ground habitats are also likely be affected by reduced insolation and temperature and increased humidity underneath the solar modules. Wind speeds may also be reduced.

Pasture grasses at the proposed solar array site comprise two physiological groups; cool season C3 grasses and warm season C4 grasses. C4 grasses require more sunlight to drive photosynthesis than C3 grasses and are likely to decline or disappear from under the array.

In the grazed paddocks, existing native and exotic pasture across the site is likely to decline initially due to shading following PV array installation. A reduction in cover may lead to bare ground and susceptibility of the soil to erosion. The selection of a more suitable shade tolerant pasture species for planting would address this issue, if bare areas develop.

Soil underneath the PV modules would likely receive less rainfall than surrounding soil, although evapotranspiration losses would also be lower due to shading and reduced air movement. Lateral movement of surface and subsurface water from adjacent rain-exposed areas would be likely to occur. As such, the net amount of moisture available to vegetation under the PV modules should not be substantially altered.

Groundcover will be established and maintained in line with the Groundcover Management Plan.

The impacts on soil listed above would be minimised by using panel tracking system as opposed to fixed panels. By reducing cultivation activities less soil disturbance would be observed, as the site would no longer be tilled or harvested for pasture. On completion of the proposal, further soil disturbance or vegetation removal (exotic pastures or re-established native grasses) would not be observed until decommissioning, thus improving overall quality of the soil structure and reducing erosion potential.

7.3.4 Safeguards and mitigation measures

Activities with potential for adverse soil impacts would be managed through the development and implementation of site specific sediment control plans and spill controls, as detailed below (Table 7-9).

Table 7-9 Safeguards and mitigation measures for soil impacts

No.	Safeguards and mitigation measures	C	O	D
SO1	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) would be prepared, implemented and monitored during the construction and decommissioning of the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. The SWMP and ESCP would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Regularly inspect erosion and sediment controls, particularly following rainfall. • Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within the stormwater channel during concentrated flows. • Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. • Ensure that machinery leaves the site in a clean condition to avoid tracking sediment onto public roads. • In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. • During excavation, monitor for increases in salinity, reduce water inputs and remediate the site with salt tolerant vegetation. • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events. • Areas of disturbed soil would be rehabilitated promptly and progressively during construction.	**Prior to and during construction**		**D**
SO2	An ESCP developed in consultation with a soil scientist and an agronomist would take into account soil survey results to ensure perennial grasscover is established across the site as soon as practicable after construction and maintained throughout the operation phase. The ESCP would cover: • Soil restoration and preparation requirements. • Species election. • Soil preparation. • Establishment techniques. • Maintenance requirements. • Perennial groundcover targets, indicators, condition monitoring, reporting and evaluation arrangements: o Live grass cover would be maintained at or above 70% at all times to protect soils, landscape function and water quality. o Any grazing stock would be removed from the site when cover falls below this level.	**Prior to construction**		

No.	Safeguards and mitigation measures	C	O	D
	○ Grass cover would be monitored on a fortnightly basis using an accepted methodology. • Contingency measures to respond to declining soil or groundcover condition. • Identification of baseline conditions for rehabilitation following decommissioning.			
SO3	The array would be designed to allow sufficient space between panels to establish and maintain groundcover beneath the panels and facilitate weed control.	**Design**		
SO4	A comprehensive Fire Management and Emergency Response Plan (FMERP) would be developed for the site and specifically address foreseeable on-site and off-site emergency incidents. The FMERP would detail appropriate risk control measures that would need to be implemented to safely mitigate potential risk to soil, health and safety of firefighters and first responders in the case of a hazardous spill.	**C**	**O**	**D**
SO5	A FMERP would be developed and implemented during construction, operation and decommissioning to prevent contaminants affecting adjacent surrounding environments. The FMERP would include spill and contamination responses to: • Manage the storage of any potential contaminants onsite. • Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation). • A protocol would be developed in relation to discovering buried contaminants within the development site (e.g. pesticide containers, if any). It would include stop work, remediation and disposal requirements.	**C**	**O**	**D**
SO6	Any area temporarily used during construction (laydown and trailer complex areas) would be restored to original condition or re-vegetated with native plants.	**C**	**O**	**D**
SO7	Best practice management measures should be employed where applicable to reduce the risk of erosion and sedimentation control: • Preserve and stabilise disturbed areas, drainageways and steep slopes. • Minimise the extent and duration of disturbance. • Install perimeter controls. • Employ the use of sediment control measures to prevent off- and on-site damage. Inspect and maintain sediment and erosion control measures regularly. • Control stormwater flows onto, through and from the site in stable drainage structures. Protect inlets, storm drain outlets and culverts. • Provide access and general construction controls.	**C**	**O**	**D**

C: Construction; O: Operation; D: Decommissioning

7.4 HAZARDS

An environmental hazard is a thing or situation which can threaten the environment or human health. Hazards may be natural or created or result from the interaction between human activity and the natural environment. Hazards relevant to the proposal and proposal site include risks associated with hazardous goods, electromagnetic fields, fire and flooding.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

***Hazards** – Including:*

- *an assessment of potential hazards and risks associated with bushfires.*
- *an assessment of the proposed transmission line and substation against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields.*

FIRE AND RESCUE NSW

FRNSW recommends the following conditions of consent:

1. *That a comprehensive ERP is developed for the site.*
2. *That the ERP specifically addresses foreseeable on-site and off-site events and other emergency incidents (e.g. fires involving solar panel arrays, bushfires in the immediate vicinity) or potential hazmat incidents.*
3. *That the ERP detail the appropriate hazard control measures that would need to be implemented to safely mitigate potential risks to the health and safety of firefighters and other first responders (including electrical hazards). Such measures would include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, decontamination procedures, minimum evacuation zone distances and a safe method of shutting down and isolating the photovoltaic and battery storage systems (either totally or partially, as determined by risk assessment).*

NSW RURAL FIRE SERVICE

The NSW RFS recommends that the SEARs for the project include a requirement to address the following, having regards to the requirements of 'Planning for Bush Fire Protection 2006':

- *potential bushfire threats to the facility.*
- *potential hazards to firefighters.*
- *management of bushfire (including grass fire) impacting on and structural fire emanating from the proposed solar farm and its associated infrastructure.*
- *firefighting water supplies.*
- *vehicle access and defendable space around the solar array.*
- *land and vegetation management opportunities.*
- *proposed emergency management procedures.*

7.4.1 Hazardous materials and development

SEPP 33 Hazardous and Offensive Development requires a Preliminary Hazard Assessment (PHA) to be prepared for potentially hazardous or offensive development. Appendix 3 of the Applying SEPP 33 Guidelines lists industries that may fall within SEPP 33, which does not include solar farms. Appendix 2 of the guidelines provides a risk screening procedure and a checklist to identify Hazardous and Offensive Development in instances where the applicability of SEPP 33 is not immediately apparent. The Applying SEPP 33 Guideline is, however, a guide only and final determination is made based on considerations if the development would fall under the definition of potentially hazardous in the actual SEPP 33.

RISK SCREENING

SEPP 33 screening procedure considers the quantity of dangerous goods stored or transported, the frequency of transportation movements, and in some cases the distance of the materials from the site boundary. The guidelines require goods to be classified according to the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).

A development which exceeds the screening thresholds in the guidelines would be considered potentially hazardous and a PHA would be required. For quantities that fall below the stated thresholds, the SEPP indicates that there is unlikely to be a significant off-site risk, in the absence of other risk factors.

The dangerous goods that would require transportation and storage for the proposal are detailed in Table 7-10, with the location of the proposed storage sites shown on Figure 3-6. Transportation and storage of dangerous goods would not exceed SEPP 33 thresholds, therefore would not be considered potentially hazardous. The proposal does not require a PHA.

Table 7-10 SEPP 33 transport thresholds

Hazardous Material	Storage Threshold	Transport Threshold	On-site Quantities	On-site Storage Arrangements	Exceeds Threshold?
Class 3 - Flammable Liquids (PG II)					
Fuel (petrol)	5 tonnes	>750 cumulative >45/week	1 tonne	Stored in a bunded area, 20 m from boundary	No
Class 6.1 Toxic Substances (PG II, III)					
Pesticides (herbicides)	2.5 tonnes	All	1 tonne	Secure operations storage building	No

OTHER RISK FACTORS

The proposal would not involve the storage or transport of incompatible materials, generation of hazardous wastes, generation of dusts within confined areas, activities involving hazardous materials, incompatible, reactive or unstable materials and process conditions, or storage or processing operations involving high (or extremely low) temperatures.

POTENTIALLY OFFENSIVE INDUSTRY

The proposal would result in relatively minor vehicle and machinery exhaust emissions during the construction phase. The emissions occur outside, in a rural locality, and would be readily dispersed. The emissions would not be considered hazardous within the context of SEPP 33. Noise impacts would largely be confined to standard working hours during the construction phase and have been demonstrated to fully comply (with the exception of one resident during piling operations) with construction, operation and traffic criteria (section 6.3); noise emissions would not be hazardous to neighbouring residents. Water pollution risks have been assessed as low (section 7.2), subject to identified mitigation measures, with longer term benefits following cessation of cultivation and maintenance of groundcover across the site. Based on these factors, the proposal is not considered a potentially offensive industry.

7.4.2 Fire

Bushfire presents a threat to human and animal life, homesteads and infrastructural assets, and can adversely impact ecological values. A bushfire risk can be considered in terms of environmental factors that increase the risk of fire (fuel quantity and type, topography and weather patterns), as well as specific activities (such as hot works) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines and other electrical components).

Existing environment

The development site is gently undulating to flat. Local native vegetation remains in and around the site as native remnant patches and scattered paddock trees. Remnant native vegetation is minimal to the south and west of the site bordering adjoining properties. Remnant vegetation is present along the eastern fence line adjoining the private property of R6. Roadside native vegetation occurs on the northern boundary of the site along Benambra Road (Figure 6-26).

Patches of remnant vegetation are located within the subject land along Back Creek, with additional remnant patches on Lot 20 and Lot 88 of DP 753735. The majority of the development site has been cleared and cultivated in the past. Although the site is not identified as bushfire prone land (NSW RFS, 2019), discussions with the local community highlight that the area has experienced significant fires over the past few years; the risk of which is higher in the hot, dry summer months

The existing natural bushfire hazards within the development site are as follows:

- A narrow corridor of remnant eucalypt woodland along Back Creek through the middle of the development site.
- Remnant patches of vegetation located on the northern and south-eastern sections of the development site.

Groundcover has largely been removed or maintained at low levels due to cultivation practices and grazing and is so not considered a fire risk. Where areas are enhanced, crash grazing may be used to ensure understorey growth does not accumulate to unacceptable levels. This advice was provided by Holbrook Landcare and would be adopted where appropriate.

The local bush fire danger period occurs between October and March, where conditions are most conducive to bushfire ignition - being hot and dry. The harvest period of November to mid-December is considered a prime risk period due to the use of machinery (ignition source) in crops (fuel) and the generally high activity in the rural sector. January and February present the highest temperatures, coupled with low humidity and dry crop stubble over extensive areas.

Prevailing wind direction is from west to east, for most of the year (BoM 2018).

There are five Rural Fire Services (RFS) within 30 km of the development site. The closest RFS is about 4.5 km away in Walla Walla, on Commercial Street. Following this, the Culcairn RFS is located approximately 10 km away. Based on RFS-related operational queries raised during the community engagement. Several members of the local RFS were interviewed or spoken to over the phone between 24 September and 27 September 2019. Advice on practical fire issues was gleaned and has been incorporated into the proposal design and fire protection infrastructure/procedures to be adopted across the development site.

In the event of a bushfire originating on a property outside of the solar farm, the RFS (Incident Controllers) would be expected to undertake defensive operations and not enter a perimeter around electricity infrastructure – i.e. they would protect the facility from an encroaching bush or grass fire, or if the solar farm is on fire, attempt to prevent the spread of fire from the solar farm. This approach is the same as currently followed for electrical substations in the path of a fire, or one that was alight. However, RFS crews could access any structure on fire, such as offices, buildings, carparks, etc. that are not actual electricity generation/storage infrastructure.

In terms of residences and farming- and infrastructure-related assets at risk from bushfire near the proposal, six residences are located directly adjacent to the development site (within a 1 km radius). Another nine dwellings are located within a 3 km radius. Additionally, farm sheds, watering points, silos and equipment are common in the local area. As stated above, November to mid-December represents a period of high activity when many people are active in harvest and other farm activities onsite and in the local area.

In terms of resources to fight fire, 15 farm dams would be retained within the development site as well as multiple water troughs for livestock. Additional dams are scattered on properties surrounding the proposal. In addition, following consultation with local FRS members, FRV would install twin 20,000 L water tanks at six locations around the solar farm. Two further water points would also be utilised with hydrants located directly onto the existing RWCC watermain that crosses the development site. The proliferation of multiple water sources has been incorporated to alleviate fire crews queuing for water sources where needed quickly. Further an additional four emergency fire access points have been identified to allow both FRV operational staff to enter the development site at strategic locations to assist in quickly delivering water to grass fires.

Planning for Bushfire Protection Guidelines (2018)

According to the *Planning for Bushfire Protection (PBP) Guidelines* (RFS 2018) (Bushfire Guidelines), six key Bush Fire Protection Measures for developments should be adhered to:

a) the provision of clear separation of buildings and bush fire hazards in the form of fuel reduced APZ (comprising inner and outer protection areas and defendable space).
b) construction standards and design.
c) appropriate access standards for residents, fire fighters, emergency service workers and those involved in evacuation.
d) adequate water supply and pressure.
e) suitable landscaping to limit fire spreading to a building.
f) emergency management arrangements for fire protection and/or evacuation.

The *Bushfire Guidelines* provides the following bushfire management objectives for National Construction Code Class 5 to 8 buildings (including commercial and industrial facilities) and Class 10 non-habitable buildings and structures (such as garages and fences):

- *to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress with evacuation.*
- *to provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.*
- *to provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development.*
- *consideration of storage of hazardous materials away from the hazard wherever possible.*

In addition, the Bushfire Guidelines provides requirements for the Asset Protection Zone (APZ), which include the following design parameters:

- A minimum carriageway width of 4 m for rural/residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint).

- In forest, woodland and heath situations, rural property access roads have passing bays every 200 m that are 20 m long by 2 m wide, making a minimum trafficable width of 6 m at the passing bay.
- A minimum vertical clearance of 4 m to any overhanging obstructions, including tree branches.
- Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 m outer radius.
- Curves have a minimum inner radius of 6 m and are minimal in number to allow for rapid access and egress.
- The minimum distance between inner and outer curves is 6 m.
- The crossfall is not more than 10 degrees.
- Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.

The Bushfire Guidelines do not specifically address solar farms. In relation to wind farms, the guidelines provide for a 10 m APZ from structures, associated buildings, infrastructure and adequate firefighting access. FRV have incorporated a 10 m APZ for this solar farm proposal. The APZ must be maintained to the standard of an inner protection area for the life of the development to provide adequate access for firefighting purposes.

The Bushfire Guidelines require a bushfire emergency management and operation plan detailing the suspension of work involving risk of ignition during total fire bans, the availability of fire-suppression equipment, storage and maintenance of flammable materials, notification of the local NSW RFS Fire Control Centre for any works during the fire danger period that have the potential to ignite surrounding vegetation, and bush fire emergency management planning.

7.4.3 Potential fire impacts

Construction and decommissioning

Specific activities that would be associated with the construction of the proposal that may cause or increase the risk of bushfire include:

- Site maintenance activities such as mowing, slashing and using other petrol-powered tools.
- Hot works, including welding and soldering activities.
- Operating a petrol, LPG or diesel-powered motor vehicle over land containing combustible material.
- Operating plant fitted with power hydraulics on land containing combustible material.
- Smoking and careless disposal of cigarettes on site.

Considering the low vegetation cover as a fuel source over the development site and other factors discussed above, it is considered unlikely that construction of the solar farm would pose a significant uncontainable bushfire risk. Site access would be formalised at the beginning of the construction stage during civil works, which would increase the ability to access and suppress any fire onsite or on adjoining sites.

A 10 m APZ would be established outside the perimeter security fence to facilitate easy access by local firefighters to contain fire on either side of the APZ without the need to wait for electricity generating equipment to be shut down and given the all clear to enter the development site. Any infrastructure inside the perimeter fence would be set back a further 5 m effectively creating a 15 m fire break that could be accessed from either side of the security fencing.

The bushfire hazard associated with the activities listed above is considered highly manageable. Risks would be minimised through the implementation of fire and bushfire mitigation measures outlined in section 7.4.6.

Potential impacts from decommissioning activities would be similar to those for construction. As for construction, any bushfire risk associated with decommissioning of the project would be highly manageable.

Operation

MAINTENANCE ACTIVITIES

Repairs and maintenance activities during operation could increase bushfire risk. All electrical components would be designed to minimise potential for ignition. Groundcover beneath panels would be maintained and not permitted to accumulate to high fuel loads (access and solar input requirements are in line with this activity). Strategic grazing is one potential method for keeping fuel loads to a minimum around the solar farm infrastructure.

An APZ would be maintained around individual buildings and the entire development site including inverters, delivery station and solar substation. Internal access tracks are 3.5 m to 5 m wide allowing adequate access for emergency vehicles including fire trucks.

Bushfire risks during operation of the solar farm and connection infrastructure would be manageable.

BUSHFIRE AND COMPLIANCE WITH PBP GUIDELINES

<u>Asset Protection Zones</u>

Appendix 2 of the PBP guidelines provides minimum APZ requirements for habitable buildings in residential developments designated as bushfire prone. While the proposal is not residential, these APZ prescriptions would be applied to the solar farm infrastructure to provide defendable space and to manage heat intensities at the infrastructure interface.

The PBP guidelines indicates a minimum APZ width of 10 m for grassy woodlands (total fuel load 15 tonnes/hectare) and semi-arid woodlands (total fuel load 18 tonnes/hectare) on flat ground in the Southern Riverina with a Fire Danger Rating of 80. This setback is based on the need to conform to Level 3 construction (AS3959 – 1999) for a building of Class 1 or 2 under the BCA.

The 2017 *Planning for Bush Fire Protection* (NSW RFS, 2017) specifies the following minimum APZ widths for residential subdivisions on flat ground in FDI 80 areas:

Grassy woodlands	11 m
Semi-arid woodlands (grassy)	6 m.

An APZ of minimum width of 10 m would be provided around the solar farm buildings, substation and BSU, and around the outside perimeter of the solar array. The 10 m APZ setback requirement would also be applied to any woody vegetation plantings undertaken around the perimeter of the solar farm. All of the APZ would be managed as an Inner Protection Area. The APZ surrounding the proposed BSU and substation would include gravel surfacing to minimise the risk of fire escaping from the facilities and the risk of external fire affecting the facilities.

<u>Fuel hazard management</u>

According to the PBP guidelines, the APZ should provide a tree canopy cover of less than 15% located greater than 2 m from any part of the roofline of a dwelling and should not overhang any building. Trees should have lower limbs removed up to a height of 2 m above the ground. The understorey should be managed (mowed) to treat all shrubs and grasses on an annual basis in advance of the fire season.

There would be no trees or shrubs within the APZ established for the solar farm, or within the solar array area. Grassland Fuel Hazard is a function of grass height and cover, with variation according to curing and species fuel characteristics. Grass fuel would be monitored and managed using stock grazing or mowing to maintain safe fuel levels. Grass height within the APZ would be maintained at or below 5 cm throughout the October-April fire season. Grass height outside the APZ, including beneath the solar array, would be maintained at or below 15 cm throughout the fire season.

The overhead powerlines at the development site would be managed by maintaining appropriate vegetation clearances to minimise potential ignition risks, in accordance with the Industrial Safety Steering Committee (ISSC) (2016) 3 Guideline for Managing Vegetation Near Power Lines.

<u>Access</u>

Safe and efficient access (suitable for firefighting appliances) would be established and maintained over the solar farm site. The APZ around the perimeter of the site may incorporate a 4 m wide gravel access track. The perimeter track would comply with the requirements for fire trails in section 4.1.3 of the PBP guidelines, including:

- A minimum carriageway width of 4 m with an additional 1 m wide strip on each side of the trail clear of bushes or long grass.
- Minimum vertical clearance of 4 m.
- Capacity for passing using the 10 m APZ.
- Connection to the property access road and/or to the through road system at frequent intervals of 200 m or less.

The turn radius and swept path clearance on access roads would be suitable for Category 1 Tankers (Medium Rigid Vehicle).

<u>Fire-fighting resources and preparedness</u>

Two 20,000 L x 6 steel or concrete water storage tanks are proposed to be installed across the project, including the main access point, dedicated emergency fire access points and adjoining the main internal access road for firefighting and other non-potable water uses., A 65 mm Storz outlet, a metal valve and a minimum of 6 x 40,000 L reserve is proposed for fire-fighting purposes (see Figure 7-4). Rainwater tanks installed beside site buildings for staff amenities would also enable RFS connectivity. Suitable fire extinguishers and PPE would be maintained at site buildings.

A Bush Fire Management Plan would be developed prior to commissioning in consultation with the local NSW RFS District Fire Control Centre to manage fire risks, resources and preparedness. Following commissioning of the solar farm, the preparedness of local RFS and Fire and Rescue brigades would be enhanced through site orientation and information events and the facilitation of training. An Emergency Response Plan, including an Evacuation Plan, Emergency Fire Response Plan and SCRP would also be developed to enable rapid, safe and effective incident response.

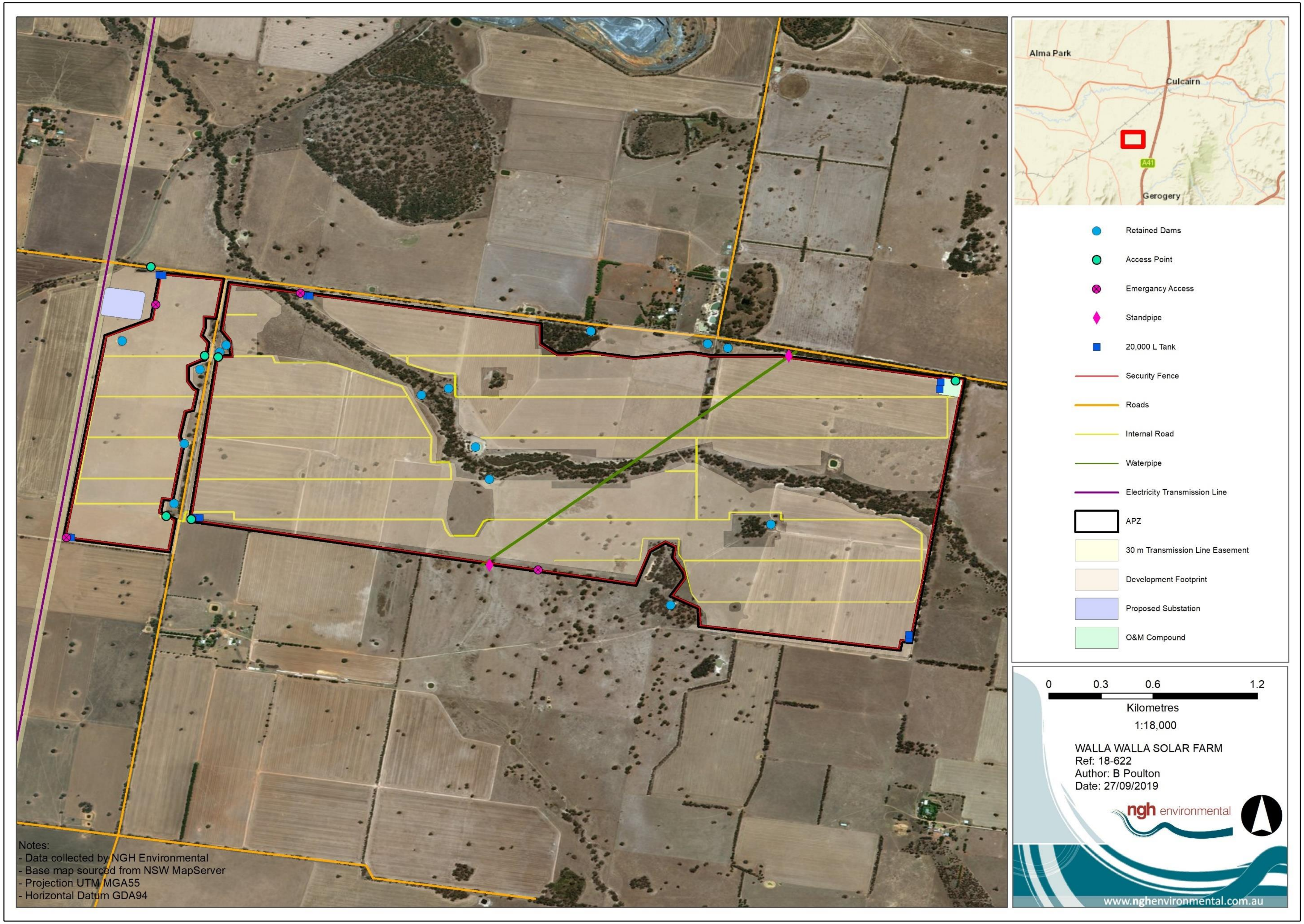


Figure 7-4 Fire preparation measures

7.4.4 Electric and magnetic fields

This section addresses potential hazards and risks associated with electric and magnetic fields (EMFs). While a low risk to the public, in terms of the levels produced by the proposal, it is an issue that has sometimes been a concern for local residents, as evidenced by solar farm feedback collected by NGH over the last several years.

About EMFs

EMFs consist of electric and magnetic fields and are produced whenever electricity is used. EMFs also occur naturally in the environment, e.g., from a build-up of electric charge in thunderstorms and Earth's magnetic field (WHO, 2012).

Electric fields are produced by voltage. Magnetic fields are produced by current. When electricity flows, EMFs exist close to the lines and wires that carry electricity and close to electrical devices and appliances while operational (WHO, 2007). Electric and magnetic field strengths reduce rapidly with distance from the source and, while electric fields are shielded to some extent by building materials, magnetic fields are not.

In Australia, transmission lines and other electrical devices and infrastructure, including substations, operate at a frequency of 50 hertz (Hz). This frequency falls within the Extremely Low Frequency (ELF) range of 0-300 Hz.

Research into photovoltaic solar arrays in California by Chang and Jennings (1994) indicated that magnetic fields (the EMF type of greatest public concern) were significantly less for solar arrays than for household applications. Chang and Jennings (1994) found magnetic fields from solar arrays were not distinguishable from background levels at the site boundary, suggesting the health risk of EMFs from solar arrays is minimal.

Over decades of EMF research, no major public health risks have emerged, but uncertainties remain (WHO, 2007). While it is accepted that short-term exposure to very high levels of electromagnetic fields can be harmful to health, the International EMF Project has thus far concluded that there are no substantive health consequences from exposure to ELF electric fields at the low levels generally encountered by the public (WHO, 2007), such as those that would be produced by electricity generation at the proposed solar farm and along the transmission line.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) published Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) in 1998. The guidelines were updated in 2010. The objective of the paper was to establish guidelines for limiting EMF exposure that would provide protection against known adverse health effects.

To prevent health-relevant interactions with ELF fields, ICNIRP recommends limiting exposure to these fields so that the threshold at which the interactions between the body and the external electric and magnetic field causes adverse effects inside the body is never reached. The exposure limits, called basic restrictions, are related to the threshold showing adverse effects, with an additional reduction factor to consider scientific uncertainties pertaining to the determination of the threshold. They are expressed in terms of the induced internal electric field strength in V/m. The exposure limits outside the body, called reference levels, are derived from the basic restrictions using worst-case exposure assumptions, in such a way that remaining below the reference levels (in the air) implies that the basic restrictions would also be met (in the body). These are not the actual limits, they are simply guidance figures for when it is necessary to investigate the basic restriction (ICNIRP, 2010). Reference levels for occupational and general public exposure are shown in Table 7-11.

Table 7-11 ICNIRP reference levels for electric and magnetic fields. Values are for 50 Hz

Electric fields	Magnetic fields
Occupational	
ICNIRP reference level: 10 kV/m	ICNIRP reference level: 1 mT
field actually required: 24.2 kV/m	field actually required: 3.03 mT
General public	
ICNIRP reference level: 5 kV/m	ICNIRP reference level: 200 µT
field actually required: 9.9 kV/m	field actually required: 606 µT

The proposal includes five main types of infrastructure that could create EMFs:

1. Solar Panels and invertors.
2. Underground cables.
3. Overhead 330 kV transmission line (connecting to existing 330 kV TransGrid transmission line).
4. Solar substation.

Typical and maximum EMF levels for these types of infrastructure are discussed below. Strength attenuates with distance from the infrastructure, as seen below.

Underground cabling does not produce external electric fields due to the shielding effects of the soil, however, magnetic fields still occur. They are expected to be minimal.

The substation would be classified as a high voltage substation (rated high capacity of 330 kV). The highest electromagnetic field is usually produced by the lines and cables supplying the substation and not by the equipment inside the substation itself. If the substation itself produces a field outside its perimeter, it usually falls away over the first few m (EMFs info, 2019). TransGrid have a 20m exclusion zone around the perimeter of their substation.

7.4.5 Potential EMF impacts

Construction and decommissioning

There is low potential for EMF impacts during the construction and decommissioning phases of the project. The maximum magnetic field of the proposed transmission line is well under the 200 µT and 1000 µT limits respectively recommended for public and occupational exposure.

Staff would be exposed to EMF's over intermittent periods during works at and around the existing kV overhead transmission line. Exposure to EMFs during the construction of the substation and its connection to the existing transmission line would be short term, therefore the effects are likely to be negligible.

The construction site would be fenced to protect the public from construction health and safety risks.

Operation

During operation, EMF sources would include underground cabling, and the solar array incorporating inverters.

Electric fields can be reduced with distance from operating electrical equipment and by shielding, while magnetic fields are reduced more effectively with distance. Using the Principle of Prudent Avoidance to design and site this infrastructure, the exposure to EMFs can be minimised and potential for adverse health impacts minimised also.

The site is surrounded by agricultural land. Public access would be restricted by fencing around the site including substation during the operational phase. Given the levels associated with the infrastructure components, and the distance to the site perimeter fence, EMFs from the solar farm are likely to be indistinguishable from background levels at the boundary fence. The underground cabling would not produce external electric fields due to shielding from soil, and its magnetic fields are expected to be well within the public and occupational exposure levels recommended by ARPANSA and ICNIRP.

Using the Principle of Prudent Avoidance to design and site infrastructure, exposure to EMFs and potential for adverse health impacts can be further reduced. Adverse health impacts from EMFs would not result from the proposal.

7.4.6 Safeguards and mitigation measures

ICNIRP sets out protective measures to reduce personal harm from EMFs if the basic restrictions are expected to be exceeded. These include engineering design, administrative controls and personal protective clothing. The works undertaken for the proposed solar farm are not expected to exceed the basic restriction levels. The following safeguard and mitigation measures would be implemented to reduce any further risks associated with EMF exposure and bushfire management (Table 7-12).

Table 7-12 Safeguards and mitigation measures for health and safety (EMFs and bushfire management)

No.	Safeguards and mitigation measures	C	O	D
HA1	Dangerous or hazardous materials would be transported, stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids,* and the ADG Code where relevant. All potential pollutants kept on-site would be stored in accordance with relevant HAZMAT requirements and bunded.	**C**	**O**	**D**
HA2	All design and engineering would be undertaken by qualified competent persons with the support of specialists as required.	**C**		
HA3	All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia.	**C**		
HA4	Design of electrical infrastructure to minimise EMFs through the solar array (underground).	**C**		

<table>
<tr><th>No.</th><th>Safeguards and mitigation measures</th><th>C</th><th>O</th><th>D</th></tr>
<tr><td>HA5</td><td><u>Bushfire Preparedness (construction)</u>
All workers, subcontractors and visitors will be inducted to ensure they are aware of their responsibilities relating to fire safety.
Designated emergency management personnel will be trained according to their level of responsibility (First Aiders, Fire Wardens).
Contractors will comply with the restrictions applied during Fire Danger Period and Total Fire Bans. No hot works such as grinding and welding will be performed during Total Fire Bans without the appropriate permit.
Adequate firefighting equipment (e.g. extinguishers and water trucks) should be available across the site to quickly manage any fire.
All firefighting equipment will be in accordance with relevant fire safety standards and will be inspected on a regular basis and replaced after use or where faulty.
Handle and store dangerous and flammable goods in accordance with the measures outlined in the Code of Practice for the Storage and Handling of Workplace Dangerous Goods (2013).
As far as practicable, vehicles will move around site using designated roads and tracks and must not park on or drive in long grass or off road.
Diesel vehicles are to be used where practicable. The use of petrol-powered vehicles should be restricted, unless inspected and risk assessed by the Head Contractor. Petrol vehicles should not be used for off road or be parked off road with the engine running.
No burning of waste or construction materials on site.
Smoking will only be permitted in designated smoking areas.</td><td>C</td><td>O</td><td>D</td></tr>
<tr><td>HA6</td><td>A FMERP would be developed and implemented during construction, operation and decommissioning, with input from the local RFS centre, and include but not be limited to:
Operational procedures relating to mitigation and suppression of bush fire relevant to the solar farm.
Addressing foreseeable on-site and off-site fire events or other emergency incidents.
Detailing appropriate risk control measures that would need to be implemented to safely mitigate potential risk to the health and safety of firefighters and other first responders.
Such measures will include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, decontamination procedures to be instigated, 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).
Other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the site.
Management of activities with a risk of fire ignition.
Management of fuel loads onsite.</td><td>C</td><td>O</td><td>D</td></tr>
</table>

No.	Safeguards and mitigation measures	C	O	D

	• Storage and maintenance of firefighting equipment, including siting and provision of adequate water supplies for bush fire suppression.
	• 24-hour emergency contact details including alternative telephone contact.
	• Site infrastructure plan.
	• Firefighting water supply plan.
	• Site access and internal road plan.
	• Construction of asset protection zones, fire trails, access for firefighting and on-site suppression equipment and their continued maintenance.
	• Location of hazards (physical, chemical and electrical) that will impact on the firefighting operations and procedures to manage identified hazards during the firefighting operations.
	• Such additional matters as required by the NSW RFS District Office.
	• The below requirements of Planning for Bush Fire Protection 2006:
	  o Identifying asset protection zones.
	  o Providing adequate egress/access to the site.
	  o Emergency evacuation measures.
	Two copies of the FMERP will be stored in a prominent location in a position directly adjacent to the main entry point.			

HA7	To allow for emergency service personnel to undertake property protection activities, a 10 m defendable space managed as an APZ shall be provided around the buildings, switching station, BESS units, outside perimeter of the solar array, and all areas of unmanaged vegetation being retained within the site.	C	O	D
HA8	Six 20,000 L water supply (tanks) fitted with 65 mm Stortz fittings shall be located at each fire gate access point. These would be located at the main site entrance, the entrance to the sub-station, and the site entrance along Schneiders Road – two at each location (cumulative volume of 40,000 L at each access point).	C	O	D
HA9	Once constructed and prior to operation, the operator of the facility will contact the relevant local emergency management committee (LEMC).	C	O	
HA10	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • The NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids*. In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	C	O	D

C: Construction; O: Operation; D: Decommissioning

7.5 RESOURCE USE AND WASTE GENERATION

Waste generated during construction would largely consist of equipment packaging materials and would be minimised and recycled where practicable. Suppliers and transport providers would be requested to use the minimum amount of packaging to project equipment for transport to site. Packaging materials would be transferred to a commercial waste transfer station for recycling or disposal. Solar array infrastructure is comprised of largely valuable and recyclable materials including aluminium, copper, silicon and glass and would be largely reused or recycled following decommissioning.

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The EIS must also address the following specific issues:

Waste –

Identify, quantify and classify the likely waste stream to be generated during construction and operation and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.

GREATER HUME SHIRE COUNCIL

The Council wishes to make the following comments for inclusion within the forthcoming EIS:

Detailed information concerning the proposed recycling of generated packaging waste.

7.5.1 Existing environment

Resource use

Key resources and estimated quantities (pending the completion of the detailed project design) required to construct the proposed solar farm include those listed in Table 3-1.

During operation and decommissioning, resources used would be associated with maintenance activities and use of machinery and vehicles. Water requirements during operation are estimated to be 600 kL / year based on the estimate of 0.8 L per panel.

Waste generation

POLICY POSITION

Legal requirements for the management of waste are established under the POEO Act and the *Protection of the Environment Operations (Waste) Regulation 2005*. Unlawful transportation and deposition of waste is an offence under section 143 of the POEO Act. Littering is an offence under section 145 of the POEO Act.

The WARR Act includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. FRV is committed to adopting environmental best practice and would follow the waste hierarchy throughout all stages of the proposal, with priority given to minimising waste generation. Resource management options would be considered against a hierarchy shown in

Figure 7-5 Waste hierarchy (source: wastelessfuture.com)

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development.

CONSTRUCTION

Solid waste is one of the major pollutants caused by construction. Several construction activities would produce solid wastes, such as:

- Unpackaging materials.
- Excess building materials.
- Scrap metal and cabling materials.
- Plastic and masonry products, including concrete wash.
- Excavation of topsoils and vegetation clearing (expected to be minimal).
- Liquid bio wastes from onsite septic systems.

In accordance with definitions in the POEO Act and associated waste classification guidelines, most waste generated during the construction phase would be classified as building and demolition waste within the class general solid waste (non-putrescible). Ancillary facilities in the site compound would also produce liquid wastes and sanitary (clinical waste) classified in accordance with the POEO Act.

FRV is committed to environmental best practice and would ensure that panels are supplied in biodegradable packaging, where practicable. FRV would also work with Greater Hume Shire Council and commercial services to recycling as much packaging as practicable.

OPERATION

During operation the solid waste streams would be associated with maintenance activities and presence of employees. Some materials, such as fuels, lubricants and metals may require replacement over the operational life of the project.

DECOMMISSIONING

Decommissioning of the site would involve the recycling or reuse of materials including:

- Solar panels and mounting system.

- Metals from posts, cabling, fencing.
- Buildings and equipment such as the inverters, transformers and similar components would be removed for resale or reuse, or for recycling as scrap.

The vast majority of solar panel materials can be recycled. Items that cannot be recycled or reused would be disposed of in accordance with applicable regulations and to appropriate facilities. All infrastructure above ground and to a depth of 2500 mm would be removed from the site during decommissioning.

7.5.2 Potential impacts

Construction and decommissioning

While increasing scarcity of resources and environmental impacts are emerging from the use of non-renewable resources, the supply of the materials required for the proposal are not currently limited or restricted. In the volumes required, the proposal is unlikely to place significant pressure on the availability of local or regional resources. The use of the required resources is considered reasonable given the benefits of offsetting fossil fuel electricity generation.

Water would be required during construction for activities including watering of roads, topsoil stockpiles and in the site office and amenities compound. Water use is considered in section 6.6.

During decommissioning, all above ground infrastructure and materials would be removed from the site and recycled or otherwise disposed of at approved facilities. The proposal is considered highly reversible in its ability to return to the pre-existing land use or alternative land use. The majority of the project components are recyclable and mitigation measures are in place to maximise reuse and recycling in accordance with resource management hierarchy principles.

Operation

LIFECYCLE ANALYSIS

Lifecycle analysis (LCA) assesses and quantifies the energy and material flows associated with a given process to identify the resource impacts of that process and potential for resource recovery. LCA estimates energy and emissions based on the total life cycle of materials used for a project, being the total amount of energy consumed in procuring, processing, working up, transporting and disposing of the respective materials (Schleisner, 2000).

A lifecycle inventory of multicrystalline PV panels was undertaken by European and US photovoltaic module manufacturing companies in 2005-2006. Over the 30-year lifetime of the panels, it is expected that 28 g of GHG emissions would be produced per kWh of energy generated (Fthenakis *et al.* 2011). The 'energy payback time' for multicrystalline PV panels is dependent on the geographical location, however on average it is estimated to be 1.5 years. A solar installation in Southern Europe would be even less than 1.5 years (Fraunhofer ISE, 2015), which is considered comparable to the development site.

The purification of the silicon, which is extracted from quartz, accounts for 30% of the primary energy to produce the panel. This stage also produces the largest amount of pollutants with the use of electricity and natural gas for heating (Fthenakis *et al*. 2011). The waste produced during production of the panels which can be recycled include graphite crucibles, steel wire and waste slurry (silicon and polyethylene glycol). However, silicon crystals cannot be recycled during this stage (Fthenakis *et al*. 2011). The production of the frames and other system components, including cabling, would also produce emissions and waste but less than the production of panels.

The energy yield ratio of a product is a ratio of the energy produced by, in this case, a solar PV system over its lifetime, to the energy required to make it is referred to as the system's. PV system energy yield ratio in Northern Europe was estimated to be more than ten, indicating the system would produce more than ten times the amount of energy required to make it (Fraunhofer ISE, 2015). This positive energy yield ratio also means that GHG emissions generated from the production of solar energy systems are more than offset over the systems' lifecycle (GA and ABARE, 2010).

When compared to the major electricity generating methods employed in Australia, solar farms are favourable for the following reasons:

- CO2 emissions generated per kilowatt hour of energy produced.
- Short energy payback time in comparison to the life span of the project.
- Potential to reuse and recycle component parts.

RESOURCES AND WASTE STREAMS

Electricity production using photovoltaics emits no pollution, produces no GHGs, and uses no finite fossil-fuel resources (US Department of Energy, 2004). Only limited amounts of fuels would be required for maintaining vehicles during operation of the solar farm.

Operational waste streams would be very low given the low maintenance requirements of the solar farm.

It is likely that some electrical components, such as inverters, transformers and electrical cabling, would need replacement over the proposed life of the solar farm. This would require further use of metal and plastic based products. Repair or replacement of infrastructure components would result in some waste generation. However, these activities would occur very infrequently and there would be a high potential for recycling or reuse of the waste.

7.5.3 Safeguards and mitigation measures

A Waste Management Plan would be developed to minimise waste and maximise the opportunity for reuse and recycling. Impacts are proposed to be addressed via the mitigation measures in Table 7-13.

Table 7-13 Safeguards and mitigation measures for resource use and waste generation

No.	Safeguards and mitigation measures	C	O	D
WM1	A Waste Management Plan (WMP) would be developed and implemented during construction, operation and decommissioning to minimise wastes. It would include but not be limited to: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy. • Quantification and classification of all waste streams. • Provision for recycling management onsite. • Provision of toilet facilities for onsite workers and how sewage would be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	**C**	**O**	**D**

C: Construction; O: Operation; D: Decommissioning

7.6 CUMULATIVE IMPACTS

Cumulative impacts relate to the combined effect of similar or different impacts on a particular value or residence and may occur concurrently or sequentially. For these purposes, cumulative impacts are associated with other known or foreseeable developments occurring in proximity to the proposal. The incremental effects of the proposal on existing background conditions in the study area have been taken into account in the preceding assessment sections.

> ***SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS***
>
> *In particular, the EIS must include:*
>
> - *the reasons why the development should be approved having regard to:*
>   - *relevant matters for consideration under the Environmental Planning and Assessment Act 1979, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development.*
>   - *the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses.*
>   - *feasible alternatives to the development (and its key components), including the consequences of not carrying out the development.*

7.6.1 Existing environment

The proposed Walla Walla Solar Farm will contribute to overall infrastructure development in the region.

A review of the SSD register for the Greater Hume LGA and surrounding LGAs of Albury City, Federation, Lockhart, Wagga Wagga and Snowy Valleys (bordering LGAs) was conducted on 02 October 2018. Four major solar farms developments have been applied for within the Greater Hume LGA including Culcairn, Walla Walla, Glenellen and Jindera. Note, none of these solar farms have received development approval at this stage.

Solar farms registered in surrounding LGAs include Mulwala Solar Farm, Gregadoo Solar Farm and Bomen Solar Farm. A number of other State Significant Developments have been applied for within the surrounding LGAs. Major projects listed on the Major Projects Register within the Greater Hume LGA include:

- Jindera Solar Farm – SEARs Issued.
- Glenellen Solar Farm – SEARs Issued.
- Walla Walla Solar Farm -SEARs issued.
- Culcairn Solar Farm – SEARs issued.
- Rockley Falls Quarry (Modification 7 – 24-hour Concrete Production) – Determination.
- Rockley Falls Quarry (Modification 6 – Extended operations) – Determination.
- Hume Highway Duplication (Woomargama Bypass (modification 1) – Determination.
- Rockley Falls Quarry (Modification 5 – Wet Batch Plant and Operating Hours) – Determination.
- Rockley Falls Quarry (Modification 3 – Dry-Mix Batch Plant) – Determination.
- Rockley Falls Quarry (Modification 4 – Vegetation Offset Areas) – Determination.
- Hume Highway Duplication (Holbrook Bypass) – Determination.
- Hume Highway Duplication (Woomargama Bypass) – Determination.
- Hume Highway Duplication (Tarcutta Bypass) – Determination.

- Rockley Falls Quarry Project – Determination.
- Hume Highway Duplication (Woomargama to Mullengandra Modification 1) – Determination.
- Hume Highway Duplication (Sturt Highway to Tarcutta Modification 3) – Determination.
- Hume Highway Duplication (Sturt Highway to Tarcutta Modification 2) Determination.
- Hume Highway Duplication (Sturt Highway to Tarcutta Modification 1) Determination.
- Hume Highway Duplication (Kyeamba Hill Modification 1) – Determination.
- Hume Highway Duplication (Yarra Yarra to Holbrook Modification 1) – Determination.
- Hume Highway Duplication (Yarra Yarra to Holbrook) – Determination.
- Hume Highway Duplication (Woomargama to Mullengandra) – Determination.
- Hume Highway Duplication (Concept Plan) – Determination.
- Hume Highway Duplication (Sturt Highway to Tarcutta) – Determination.
- Hume Highway Duplication (Kyeamba Hill) – Determination.
- Hume Highway Duplication (Little Billabong) – Determination.
- Hume Highway Duplication (Tarcutta Bypass Modification 1 Ladysmith Road Quarry) – Withdrawn.

Cumulative impacts may have a minor impact to SSD proposals occurring within the LGAs. Mechanisms to consult with local industry are however, included in section 5 and would assist to manage cumulative impacts should additional developments become relevant to the proposal.

During construction and operation, key cumulative impacts may include additional stress on the grid, community complaints regarding visual amenity impacts, stress on local business for supply and demand, staff accommodation, noise impacts, air quality, waste management, traffic etc.

This EIS has looked specifically at potential cumulative impacts with the proposed Culcairn Solar Farm located 2 km from the development site. FRV understands that two other large-scale solar farms are proposed within the Greater Hume LGA (Figure 7-6) but has determined that these two solar farms are too far away to contribute towards cumulative visual, noise and local road transport impacts.

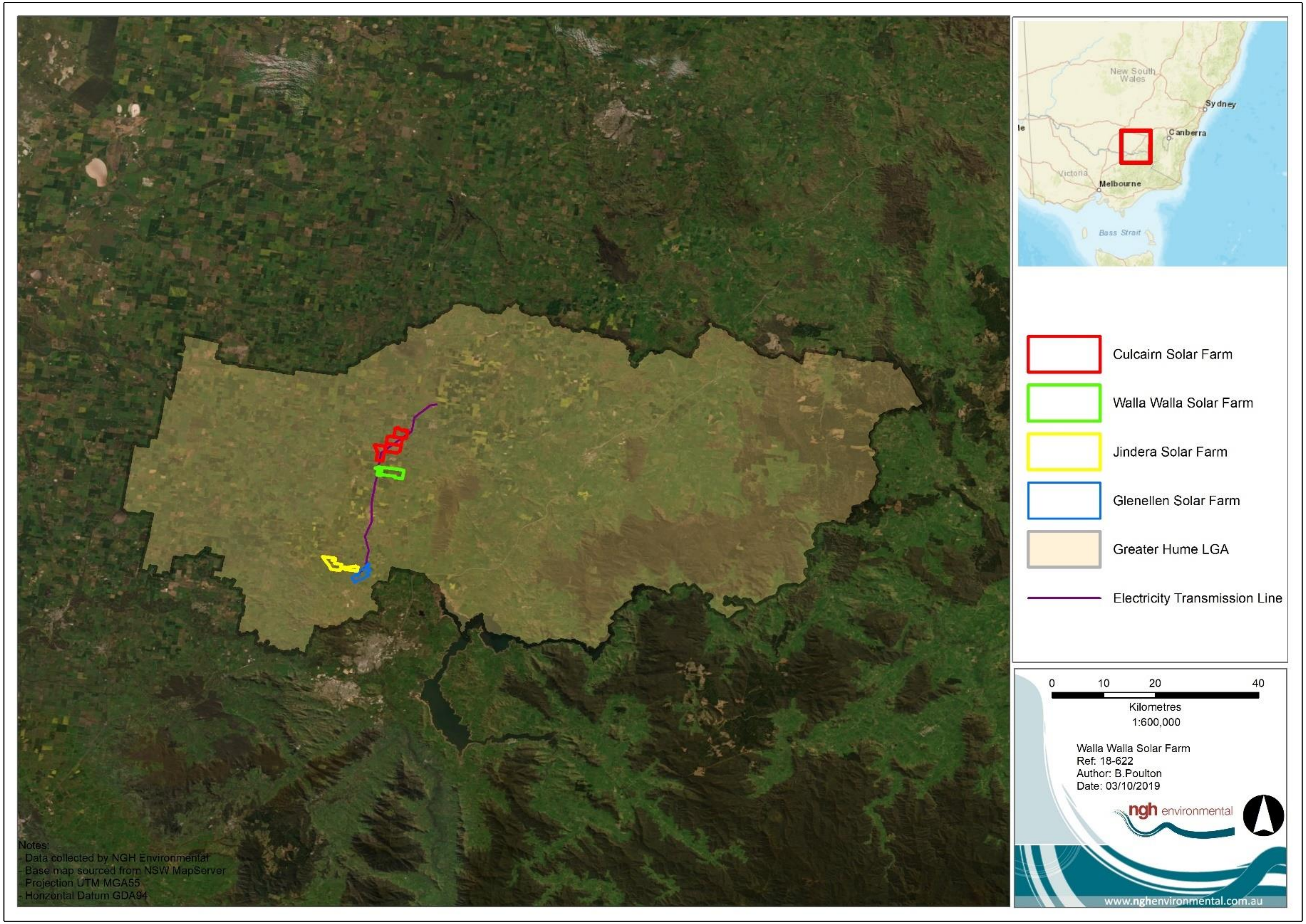


Figure 7-6 Current proposed large-scale solar farms within Greater Hume LGA

7.6.2 Potential impacts

Potential cumulative impacts are primarily associated with the following:

- Biodiversity impacts.
- Visual and landscape character impacts.
- Noise impacts
- Traffic impacts.
- Pressure on local facilities, goods and services.
- Local agricultural impacts.

Biodiversity impacts

The clearing of native vegetation, which is a key threatening process at both the State and Commonwealth level, is considered a major factor in the loss of biological diversity. At least 61 % of native vegetation in NSW has been removed since European settlement (NSW Scientific Committee, 2011) and the removal of vegetation at the proposal is contributing to this process. The cumulative impact of similar renewable energy projects, particularly where EEC is involved, can be considerable given that many poorly-conserved vegetation communities have a substantial portion of their extent represented on private land where most renewable energy projects are proposed. Small losses of vegetative communities may be insignificant at a local level but may accumulate over time to cause a significant reduction in the extent of remnant patches.

Cumulative impacts are considered best addressed by avoiding and minimising. Where avoidance is not possible the impact of each contributing project is assessed on a case by case basis. Long term mechanisms like offsetting through the BAM are structured to address the ongoing impacts of multiple projects in a cohesive manner. For the proposal, credits were generated the biobanking credit calculator (BCC) and offsetting of biodiversity impacts considered. However, the overall proposal has been designed to avoid and minimise impacts to biodiversity.

Visual and landscape character impacts

The visibility of the facility (the operation view) may generate a cumulative impact with the existing transmission lines running through the subject land. The proposal requires security fencing and steel dominated infrastructure. The mitigation measures recommended in this report and the VIA (section 6.5) will act to reduce the cumulative impacts. Screen planting would be undertaken in key locations on-site, outside the perimeter fence, to minimise views of infrastructure.

Generally, adverse cumulative visual impacts are anticipated to be manageable due to the ability to effectively screen infrastructure within the low relief landscape.

Noise impacts

Noise impacts through the use of plant machinery and vehicles would be heightened if the construction of other developments is undertaken concurrently.

However, the majority of residences are a considerable distance from the proposal area and construction noise from the proposal are considerably lower than noise management levels (refer section 6.3). One exceedance of 68 dB LAeq was noted for Residence 1 during earthworks, 64 dB LAeq for piling panel supports and 55 dB LAeq for assembly of frames and panels. Mitigation measures to address and reduce any impact has been proposed as part of this report. Cumulative impacts are therefore unlikely to increase construction noise impacts and are expected to be minor and manageable.

Should the Walla Walla and Culcairn Solar Farms undergo peak construction periods simultaneously, it is possible that some residents, particularly those located between the two would receive noise impacts from both projects.

Traffic impacts

Cumulative traffic impacts may occur on the construction access and freight transport route, primarily on Benambra Road. Olympic Highway is a high capacity road designed for heavy vehicle traffic and is likely to absorb any cumulative impacts. Any impact to Benambra Road and Schneiders Road is expected to be noticeable; however, any impact from increased traffic would be predominately limited to the 16 to 20 month construction period.

Cumulative traffic impacts are considered unlikely or would be short term, however, should the Walla Walla and Culcairn Solar Farms undergo peak construction periods simultaneously, it is possible that Benambra Road and Olympic Highway would experience increased traffic flow from both projects.

During operation, excepting unusual maintenance operations such as inverter or transformer replacement, only a small maintenance team using light vehicles would be required.

Accommodation impacts

Greater Hume and surrounding areas provide many visitor accommodations. It is possible that, in conjunction with other major projects, shortages of accommodation could during the construction stage. The proponent would engage with local accommodation providers and Greater Hume Shire Council if necessary, to provide additional short term and temporary accommodation at these businesses. The proponent would also consult with Greater Hume Shire Council to co-ordinate construction schedules to minimise conflict with any local festivals or activities. Scheduling staff 'rostered days off' could help alleviate accommodation pressures by allowing itinerant workers to go back home.

It is considered that the demand for health care and other services would also be dispersed throughout the surrounding towns to coincide with where workers are staying.

Pressure on local facilities, goods and services

There is potential that the possible concurrent construction of the proposal with other SSD or local development would increase pressures on local community services including accommodation. However, there is also a potential for positive cumulative economic effects from the construction of multiple developments in the area. Socio-economic benefit in relation to developments in the region will be a continuous ongoing benefit for the community with increased jobs and economic input into local business.

The proposal would not result in significant impacts to local businesses, residents and road users, subject to the range of identified mitigation measures. Due to the number of local communities in the area, any cumulative impact on local services are likely to be spread between communities. There is sufficient residual capacity within the existing communities. It is unlikely that there would be negative cumulative impacts to local facilities, goods and services.

Local agriculture impacts

Approximately 605 ha of cropping and grazing land would be converted to solar farm development. The proposal would not permanently fragment primary production land, with the exception of the 3.2 ha permanent TransGrid substation. Upon decommissioning, the solar farm would require limited rehabilitation to restore it to its pre-existing capability for agriculture land use including the removal of all infrastructure above ground and below ground to a depth of 2500 mm. The soil structure and chemical composition would not be directly altered by the proposal, although the carbon content and general fertility is expected to improve as result of an extended rest from cropping over the operational phase.

Continued use of this land for livestock grazing would be maintained within the development footprint for the life of the proposal. Therefore, the development of a solar farm would potentially result in the following agricultural impacts:

- 877 tonnes/year drop in grain production (based on the 2019-2020 forecast yield for wheat across NSW, (Department of Agriculture, 2019).
- Sheep grazing would continue at 85% pre-construction capacity across the development site.
- 3.2 ha of arable land lost to future agricultural land use.

These impacts have been assessed in detail in section 6.3 and found to be highly manageable and entirely reversible at the end of the life of the proposal, with the exception of the substation what would persist as a TransGrid asset, with an initial life of 50 years (as per TransGrid's Primary Design Standard).

The close proximity of the proposal and proposed Culcairn solar farm has the potential to increase the cumulative impacts affecting land use change and local agriculture. The cumulative development sites for both proposals would see approximately 1,935 ha of arable land temporarily diverted from agriculture as the primary land use.

The Greater Hume Shire covers an area of approximately 5,746 km^2 (~574,600 ha). Of this, approximately 4,359 km^2 (~435,900) is used for agriculture (Greater Hume Council 2018). The temporary diversion of 1,935 ha (~0.24%) of agricultural land within the Greater Hume Shire would result in a negligible decrease in the overall productivity of the region. A case study of the Nyngan Solar Farm in the Bogan Shire by Dr Turlough Guerin of the Agricultural Institute of Australia (2017) indicated that the project did not significantly reduce the agricultural output of the locality.

PRODUCTIVE LAND PRESERVED FOR FUTURE GENERATIONS

An estimated 12 million ha of arable land are lost to land degradation globally each year (UNCCD, 2009). Solar farms constitute a temporary and reversable primary land use, allow sheep grazing to persist over the life of the project and can function as an 'arable land savings account,' securing productive land for future generations.

Solar farm development sites can be returned to agricultural use following decommissioning. The benefits of resting land from cropping include (NSW Government 2012):

- Increased groundcover and diversity of groundcover with biosecurity management.
- Increase in soil moisture and nutrients.
- Increases in soil organic matter means less evaporation, less impact of runoff and less erosion.
- Perennial grasses can be encouraged to increase soil stability of grassland around the panels.
- Microorganism populations responsible for nutrient cycling, improving soil structure and controlling disease are able to recover.

REGIONAL ECONOMIC DIVERSITY

Potential loss of about 0.24% of agricultural land within the region should be measured against wider government strategic goals and environmental benefits including:

- Strategic goals of the Commonwealth and NSW Governments for renewable energy development going forward.
- The environmental benefits of solar energy production, in particular the reduction of greenhouse gas emissions.
- The economic benefits of using an area with reliable solar resources and access to existing electricity infrastructure.
- The benefits of alternative and increased energy supply for grid stability and reliability.

Currently, the farms occupying the development sites for the proposal and the proposed Culcairn Solar Farm provide a small number of FTE jobs with a number of contractors employed during harvesting and during other busy periods. At the commencement of construction, each solar farm would engage approximately forty staff, ramping up to several hundred workers during peak construction. The number of FTE jobs for the proposed Culcairn Solar Farm is currently unknown but this proposal is expected to create approximately 21 FTE.

The potential cumulative impact of the reduction in agricultural employment would be balanced by the additional employment during construction and on-going employment of staff during operation. Additional local services could be maintained during operation. This would benefit the local economy by spreading employment across multiple industries, thus reducing the community's dependence on agriculture commodity market fluctuations and increasing resilience to drought. FRV estimate that the proposal would directly contribute $10 million into the local economy each year during operations.

7.6.3 Safeguards and mitigation measures

The cumulative impacts identified for the proposal are considered to be best managed by dealing with each component individually. No additional safeguards are proposed.

8 ENVIRONMENTAL MANAGEMENT

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

In particular, the EIS must include:

- *A consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS.*

8.1 ENVIRONMENTAL FRAMEWORK

The environmental risks associated with the proposal would be managed by implementing a project-specific suite of mitigation measures detailed in sections 5 and 6.8 and summarised below.

All commitments and environmental safeguards would be managed through the implementation of a Project Environmental Management Plan, consisting of a CEMP, an Operation Environmental Management Plan and a Decommissioning Environmental Management Plan. These plans would be prepared sequentially, prior to each stage of works.

These plans would detail the environmental management responsibilities of specific staff roles, reporting requirements, monitoring requirements, environmental targets and objectives, auditing and review timetables, emergency responses, induction and training, complaint response procedures and adaptive management mechanisms to encourage continuous improvement.

8.2 MITIGATION MEASURES

8.2.1 Safeguards and mitigations

A summary of the safeguards and mitigation measures contained within this EIS are listed collectively in Table 8-1 below.

Table 8-1 Safeguards and mitigation measures summary

Construction (C), Operation, (O), Decommissioning (D)

No.	Safeguards and mitigation measures	C	O	D
Visual				
VA1	Screening would be required on-site, generally in accordance with the Landscape Plan developed in consultation with neighbouring landholders. • Plantings would be more than one row deep and where practical, planted on specific sections outside of the permitter fence, to break up views of infrastructure including the fencing. Screening within the vicinity of Residences 1a&b and 2 and 5a would be at least two rows deep to allow for maximum screening. • The plant species to be used in the screen would be native and derived from the naturally occurring vegetation community in the area. They should be fast growing and comprise a mixture of trees and shrubs capable of reaching a height of 3 to 4 m within 10 years. Species selection is being undertaken in consultation with affected near neighbours and a landscape architect.	C	O	D

No.	Safeguards and mitigation measures	C	O	D
	• Planting would be 2 months of completion of construction, so actual views of infrastructure are known or during winter/spring to increase the chance of plant survival. The screen would be maintained for the operational life of the solar farm. Dead plants would be replaced. Pruning and weeding would be undertaken as required to maintain the screen's visual amenity and effectiveness in breaking up views.			
VA2	Prior to the commencement of construction, a detailed landscape plan would be prepared including: • Screening location. • Species type. • Planting density and spacing. • Method for planting. • Descriptive measures that would be implemented to ensure vegetative screening is successful (i.e. irrigation or other watering method). A program to manage, monitor and report on the effectiveness of implemented measures.	**Design stage**		
VA3	The materials and colour of onsite infrastructure would, where practical, be non-reflective and in keeping with the materials and colouring of existing infrastructure to blend with the landscape.	**Design stage**		
VA4	During construction, dust would be controlled in response to visual cues. Areas of soil disturbed by the project would be rehabilitated progressively or immediately post-construction, reducing views of bare soil.	**C**		
VA5	Construction night lighting would be minimised to the maximum extent practicable (i.e. manually operated safety lighting at main component locations). It would be directed away from roads and residents so as not to cause light spill hazardous to drivers.	**C**	**O**	**D**
VA6	The vast majority on construction vehicles would enter the development site via the north eastern entrance on Benambra Road, 2.6 km off Olympic Highway to minimise impact on residences.	**C**		
Land use				
LU1	Consultation with adjacent landholders would be ongoing to manage interactions between the solar farm and other properties.	**C**	**O**	**D**
LU2	Consultation would be undertaken with TransGrid regarding connection to the overhead energy transmission infrastructure.	**C**		
LU3	A Rehabilitation and Decommissioning Management Plan would be prepared in consultation with DPIE and the landowner prior to decommissioning. The Rehabilitation and Decommissioning Management Plan is to include: • Removal of all infrastructure. • Removal of gravel from internal access tracks in consultation with landowners. • Reverse any compaction by mechanical ripping. • Targets and standards to indicate successful rehabilitation of disturbed areas. These targets and standards should be applied to rehabilitation activities once the proposal is decommissioned.			**D**

No.	Safeguards and mitigation measures	C	O	D
LU4	A Pest and Weed Management Plan would be prepared to manage the occurrence of noxious weeds and pest species across the site during construction and operation. The Pest and Weed Management Plan must be prepared in accordance with Greater Hume Shire and DPIE requirements. Where possible integrate weed and pest management with adjoining landowners. Pest control would likely be carried out on a district-wide basis.	C	O	
LU5	The proponent would consult with GSNSW in relation mineral exploration, or potential for sterilisation of mineral resources.	C		
LU6	Construction and operations personnel would drive carefully and below the designated speed limit according to the Traffic Management Plan to minimise dust generation and disturbance to livestock.	C	O	D
LU7	Underground cabling and all underground infrastructure to a depth of 2500 cm would be removed on decommissioning.	C		
LU8	Sheep grazing would be used to control weeds and grass growth, and to maintain agricultural production at the site.		O	
Socio-economic				
SE1	A Community and Stakeholder Engagement Plan (CSEP) would be implemented during construction to manage impacts to community stakeholders, including but not limited to: • Protocols to keep the community updated about the progress of the project and project benefits. • Protocols to inform relevant stakeholders of potential impacts (haulage, noise etc.). Protocols to respond to any complaints received.	C	O	
SE2	Liaise with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.	C	O	
SE3	Liaise with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.	C		D
SE4	Liaise with local tourism industry and council representatives to manage potential timing conflicts or cooperation opportunities with local events.	C		D
Noise and vibrations				
NS1	Works should be undertaken during standard working hours only. (Except for the connection to substation): • Monday – Friday 7am to 6pm. • Saturday 8am to 1pm. • No work on Sundays or public holidays.	C		
NS2	All staff onsite should be informed of procedures to operate plant and equipment in a quiet and efficient manner.	C	O	D
NS3	A letterbox drop would be prepared and provided to residences in close proximity to the works. The letter would contain details of the proposed works including timing and duration and a contact person for any enquiries or complaints.	C	O	D
NS4	Consult with R1 during pre-construction to develop suitable mitigation measures. A dedicated Neighbourhood Liaison Officer will be appointed with the landowners permission.	C		D

No.	Safeguards and mitigation measures	C	O	D
NS5	No inverters to be installed within a 400 m radius of R1a.	C	O	
NS6	Develop and implement construction noise management plan	C		
NS7	Regular inspection and maintenance of equipment to ensure that plant is in good condition.	C	O	D
Traffic				
TT1	A Haulage Plan would be developed and implemented during construction and decommissioning, including but not limited to: • Assessment of road routes to minimise impacts on transport infrastructure and residential dwellings. • Scheduling of deliveries of major components to minimise safety risks (on other local traffic). • Traffic controls (signage and speed restrictions etc.).	C		D
TT2	A Traffic Management Plan would be developed and implemented during construction and decommissioning. The Traffic Management Plan would include but not be limited to: • Prior to construction, a pre-conditioning survey of the relevant sections of the existing road network, to be undertaken in consultation with Greater Hume Shire. • Assessment of road condition prior to construction on all local roads that would be utilised. • A program for monitoring road condition, to repair damage exacerbated by the construction and decommissioning traffic. • The designated routes of construction traffic to the site. • Carpooling/shuttle bus arrangements to minimise vehicle numbers during construction. • Scheduling of deliveries. • Community engagement regarding traffic impacts for nearby residents. • Consideration of cumulative impacts. • Traffic controls (speed limits, signage, etc.). • Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts. • Providing a contact phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures. • Water to be used on internal roads to minimise dust generation through increased traffic use. Following construction, a post condition survey of the relevant sections of the existing road network would be undertaken to ensure it is of similar condition as prior to construction.	C		D
TT3	Obtain a Section 138 Consent from Greater Hume Shire to perform works within the road reserve.	C		
TT4	Any upgrades would be subject to detailed design and would be designed and constructed to the relevant Australian road design standards.	Design Stage		

No.	Safeguards and mitigation measures	C	O	D
TT5	The proponent would repair any damage resulting from project traffic (except that resulting from normal wear and tear) as required at the proponent's cost.	C		D
Water use, quality (surface and groundwater) and hydrology				
WA1	All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental chemical (e.g. fuel) spills.	C	O	D
WA2	All fuels, chemicals, and liquids would be stored at least 50 m away from any waterways or drainage lines and would be stored in an impervious bunded area.	C	O	D
WA3	Adequate incident management procedures would be incorporated into the Construction and Operation Environmental Management Plans, including requirement to notify EPA for incidents that cause material harm to the environment (refer s147-153 POEO Act).	C	O	D
WA4	The refuelling of plant and maintenance of machinery would be undertaken in impervious bunded areas.	C	O	D
WA5	Machinery would be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills.	C		D
WA6	Erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).	C	O	D
WA7	Ensure appropriate drainage controls are incorporated into the design.	Design		
WA8	Implement flood impact design controls recommended in the Walla Walla Solar Development – Site Flood Assessment (GHD, 2019).	Design C		
Biodiversity				
BD1	Timing works to avoid critical lifecycle events such as breeding or nursing: • Hollow-bearing trees would not be removed during breeding and hibernation season (Spring to Summer). • If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken by an ecologist or suitably qualified person to ensure no impacts to fauna would occur.	C		
BD2	Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing. A trained ecologist or licensed wildlife handler would be present during clearing events and complete: • Pre-clearing checklist. • Tree clearing procedure.	C		
BD3	Relocate habitat features (fallen timber, hollow logs) from the development site to adjacent area for habitat enhancement.	Pre - construction		
BD4	Plain wire instead of barbed used on top of the perimeter fence and stock fencing to reduce impacts on birds and Squirrel Glider.	C	O	

No.	Safeguards and mitigation measures	C	O	D
BD5	Perimeter fence location to avoid, where possible, segmenting patches of native vegetation to facilitate native fauna movements.	C	O	
BD6	Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance where partial clearing is proposed: • Approved clearing limits clearly delineated with temporary fencing prior to construction commencing. • No stockpiling or storage within dripline of retained trees. • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance. • Remove native vegetation by chainsaw rather than heavy machinery.	C		
BD7	Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise. Construction Environmental Management Plan would include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	C	O	
BD8	Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill: • Avoid Night Works. • Direct lights away from vegetation.	C	O	D
BD9	Adaptive dust monitoring programs to control air quality: • Daily monitoring of dust generated by construction and operation activities. • Construction would cease if dust observed blown from site until control measures were implemented. • All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.	C		
BD10	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas incorporated into the Pest and Weed Management Plan.	C	O	
BD11	All staff induction and regular communications to cover environmental features retained and protection measures to be implemented (including but not limited to): • Retained dams, trees and vegetation communities. • Site speed limits to be enforced to minimise fauna strike. • Vehicle hygiene and biosecurity.	C	O	
BD12	Preparation of a Biodiversity Management Plan to implement biodiversity projection measures (including but not limited to): • Retaining habitat features (e.g. hollow logs) where feasible. • Staged removal of hollow-bearing trees and other habitat features with attendance by an ecologist. • Unexpected threatened species finds.	C		

No.	Safeguards and mitigation measures	C	O	D
	• Rehabilitation and enhancement of disturbed areas.			
BD13	Screening and landscaping plantings (up to 50 m where practicable) to be comprised of local indigenous species representative of the vegetation in the development site.	C		
Aboriginal heritage				
AH1	The proponent should prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the Solar Farm and management of known sites and artefacts. The CHMP should include the unexpected finds procedure to deal with construction activity. Preparation of the CHMP should be undertaken in consultation with the registered Aboriginal parties.	C		
AH2	In the unlikely event that human remains are discovered during the construction, all work must cease in the immediate vicinity. BCD, the local police and the registered Aboriginal parties should be notified. Further assessment would be undertaken to determine if the remains were Aboriginal or non-Aboriginal.	C		
AH3	The development must avoid the two possible Scarred Trees (Walla Solar Farm 495495 and Walla Solar Farm 497946). A minimum 10 m buffer around each tree should be in place to protect the trees canopy and root system.	C		
AH4	If complete avoidance of the 23 isolated find sites and 11 artefact scatters recorded within the proposal area is not possible, the artefacts within the development footprint must be salvaged prior to the proposed work commencing and moved to a safe area within the property that would not be subject to any ground disturbance.	Pre-construction		
AH5	The collection and relocation of the artefacts should be undertaken by an archaeologist with representatives of the registered Aboriginal parties and be consistent with Requirement 26 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales. A new site card/s would need to be completed once the artefacts are moved to record their new location on the AHIMS database.	Pre-construction		
AH6	A minimum 5 m buffer should be observed around all artefact scatters and isolated find sites that cannot be avoided, including those outside the development footprint.	C		
AH7	Further archaeological assessment would be required if the proposal activity extends beyond the area assessed as detailed in this report. This would include consultation with the registered Aboriginal parties and may include further field survey.	C		
Air quality				
AQ1	Construction transport route to the development site to maximise use of sealed roads.	C		
AQ2	Primary construction access point located in north eastern corner of the development site away from residential buildings.	C		
AQ3	Development of a complaints procedure to promptly identify and respond to issues generating complaints.	C	O	D
AQ4	Protocols to guide vehicle and construction equipment use, to minimise emissions would be included in construction and operational	C	O	D

No.	Safeguards and mitigation measures	C	O	D
	environmental management plans. This would include but not be limited to Australian standards and POEO Act requirements.			
AQ5	During construction, operation and decommissioning, dust would be monitored and managed to prevent dust leaving the development site. This includes dust from stockpiled materials.	**C**	**O**	**D**
AQ6	Monitor local weather conditions and manage the site if any conditions will exacerbate air quality (e.g. wind).	**C**		
AQ7	Fires and material burning are prohibited on the development site.	**C**	**O**	**D**
Historic heritage				
HH1	Should an item of historic heritage be identified, the Heritage Division (DPIE) would be contacted prior to further work being carried out in the vicinity.	**C**	**O**	**D**
Soil				
SO1	A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) would be prepared, implemented and monitored during the construction and decommissioning of the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. The SWMP and ESCP would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Regularly inspect erosion and sediment controls, particularly following rainfall. • Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within the stormwater channel during concentrated flows. • Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. • Ensure that machinery leaves the site in a clean condition to avoid tracking sediment onto public roads. • In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. • During excavation, monitor for increases in salinity, reduce water inputs and remediate the site with salt tolerant vegetation. • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events. • Areas of disturbed soil would be rehabilitated promptly and progressively during construction.	**Prior to and during construction**		**D**
SO2	ESCP developed in consultation with a soil scientist and an agronomist would take into account soil survey results to ensure perennial	**Prior to**		

<table>
<tr><th>No.</th><th>Safeguards and mitigation measures</th><th>C</th><th>O</th><th>D</th></tr>
<tr><td></td><td>grasscover is established across the site as soon as practicable after construction and maintained throughout the operation phase. The ESCP would cover:
Soil restoration and preparation requirements.
Species election.
Soil preparation.
Establishment techniques.
Maintenance requirements.
Perennial groundcover targets, indicators, condition monitoring, reporting and evaluation arrangements:
Live grasscover would be maintained at or above 70% at all times to protect soils, landscape function and water quality.
Any grazing stock would be removed from the site when cover falls below this level.
Grasscover would be monitored on a fortnightly basis using an accepted methodology.
Contingency measures to respond to declining soil or groundcover condition.
Identification of baseline conditions for rehabilitation following decommissioning.</td><td></td><td></td><td></td></tr>
<tr><td>SO3</td><td>The array would be designed to allow sufficient space (8 m to 14 m) between panels to establish and maintain groundcover beneath the panels and facilitate weed control.</td><td>Design</td><td></td><td></td></tr>
<tr><td>SO4</td><td>A comprehensive Fire Management and Emergency Response Plan (FMERP) would be developed for the site and specifically address foreseeable on-site and off-site emergency incidents. The FMERP would detail appropriate risk control measures to safely mitigate potential risk to soil, health and safety of firefighters and first responders in the case of a hazardous spill.</td><td>C</td><td>O</td><td>D</td></tr>
<tr><td>SO5</td><td>A FMERP would be developed and implemented during construction, operation and decommissioning to prevent contaminants affecting adjacent surrounding environments. The FMERP would include spill and contamination responses to:
Manage the storage of any potential contaminants onsite.
Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation).
A protocol would be developed in relation to discovering buried contaminants within the development site (e.g. pesticide containers, if any). It would include stop work, remediation and disposal requirements.</td><td>C</td><td>O</td><td>D</td></tr>
<tr><td>SO6</td><td>Any area temporarily used during construction (laydown and trailer complex areas) would be restored to original condition or re-vegetated with native plants.</td><td>C</td><td>O</td><td>D</td></tr>
<tr><td>SO7</td><td>Best practice management measures should be employed where applicable to reduce the risk of erosion and sedimentation control:
Preserve and stabilise disturbed areas, drainageways and steep slopes.</td><td>C</td><td>O</td><td>D</td></tr>
</table>

No.	Safeguards and mitigation measures	C	O	D
	• Minimise the extent and duration of disturbance. • Install perimeter controls. • Employ the use of sediment control measures to prevent off- and on-site damage. Inspect and maintain sediment and erosion control measures regularly. • Control stormwater flows onto, through and from the site in stable drainage structures. Protect inlets, storm drain outlets and culverts. Provide access and general construction controls.			
Hazards (EMFs, fire)				
HA1	Dangerous or hazardous materials would be transported, stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids,* and the Australian Dangerous Goods Code (ADG Code) where relevant. All potential pollutants kept on-site would be stored in accordance with relevant HAZMAT requirements and bunded.	C	O	D
HA2	All design and engineering would be undertaken by qualified competent persons with the support of specialists as required.	C		
HA3	All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia.	C		
HA4	Design of electrical infrastructure to minimise EMFs through the solar array (underground).	C		
HA5	Bushfire Preparedness (construction) • All workers, subcontractors and visitors will be inducted to ensure they are aware of their responsibilities relating to fire safety. • Designated emergency management personnel will be trained according to their level of responsibility (First Aiders, Fire Wardens). • Contractors will comply with the restrictions applied during Fire Danger Period and Total Fire Bans. No hot works such as grinding and welding will be performed during Total Fire Bans without the appropriate permit. • Adequate firefighting equipment (e.g. extinguishers and water trucks) should be available across the site to quickly manage any fire. • All firefighting equipment will be in accordance with relevant fire safety standards and will be inspected on a regular basis and replaced after use or where faulty. • Handle and store dangerous and flammable goods in accordance with the measures outlined in the Code of Practice for the Storage and Handling of Workplace Dangerous Goods (2013). • As far as practicable, vehicles will move around site using designated roads and tracks and must not park on or drive in long grass or off road. • Diesel vehicles are to be used where practicable. The use of petrol-powered vehicles should be restricted, unless inspected and risk assessed by the Head Contractor. Petrol vehicles should not be used for off road or be parked off road with the engine running. • No burning of waste or construction materials on site. • Smoking will only be permitted in designated smoking areas.	C	O	D

No.	Safeguards and mitigation measures	C	O	D
HA6	A FMERP would be developed and implemented during construction, operation and decommissioning, with input from the local RFS centre, and include but not be limited to: • Operational procedures relating to mitigation and suppression of bush fire relevant to the solar farm. • Addressing foreseeable on-site and off-site fire events or other emergency incidents. • Detailing appropriate risk control measures that would need to be implemented to safely mitigate potential risk to the health and safety of firefighters and other first responders. • Such measures will include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, decontamination procedures to be instigated, 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). • Other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the site. • Management of activities with a risk of fire ignition. • Management of fuel loads onsite. • Storage and maintenance of firefighting equipment, including siting and provision of adequate water supplies for bush fire suppression. • 24-hour emergency contact details including alternative telephone contact. • Site infrastructure plan. • Firefighting water supply plan. • Site access and internal road plan. • Construction of asset protection zones, fire trails, access for firefighting and on-site suppression equipment and their continued maintenance. • Location of hazards (physical, chemical and electrical) that will impact on the firefighting operations and procedures to manage identified hazards during the firefighting operations. • Such additional matters as required by the NSW RFS District Office. • The below requirements of Planning for Bush Fire Protection 2006: o Identifying asset protection zones. o Providing adequate egress/access to the site. o Emergency evacuation measures. Two copies of the FMERP will be stored in a prominent location in a position directly adjacent to the main entry point.	C	O	D
HA7	To allow for emergency service personnel to undertake property protection activities, a 10 m defendable space managed as an APZ shall be provided around the buildings, switching station, BESS units, outside perimeter of the solar array, and all areas of unmanaged vegetation being retained within the site.	C	O	D
HA8	Six 20,000 L water supply (tanks) fitted with 65 mm Stortz fittings shall be located at each fire gate access point. These would be located at the main site entrance, the entrance to the sub-station, and the site entrance	C	O	D

No.	Safeguards and mitigation measures	C	O	D
	along Schneiders Road – two at each location (cumulative volume of 40,000 L at each access point).			
HA9	Once constructed and prior to operation, the operator of the facility will contact the relevant local emergency management committee (LEMC).	**C**	**O**	
HA10	All chemicals and fuels used on-site must be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • The NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids.* In the event of an inconsistency, the most stringent requirement must prevail to the extent of the inconsistency.	**C**	**O**	**D**
Waste management				
WM1	A Waste Management Plan (WMP) would be developed and implemented during construction, operation and decommissioning to minimise wastes. It would include but not be limited to: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy. • Quantification and classification of all waste streams. • Provision for recycling management onsite. • Provision of toilet facilities for onsite workers and how sewage would be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	**C**	**O**	**D**

8.2.2 Community-specific safeguards and mitigations

Table 8-2 highlights the safeguards and mitigation measures discussed with the community members whose concerns, queries and inputs are considered key in the ongoing future success of the proposal. Namely, the proposal's uninvolved direct neighbours R1 R2, R5 and R6.

Table 8-2 Community-specific safeguards and mitigation measures

ID	Safeguards and mitigation measures	C	O	D
R1	• As R1 is the closest resident to the proposal, approx. 80m north from R1a and the property boundary. FRV have provided the following mitigation measures; - Changed the site access. Originally, 3 main access points were proposed along the Benambra Road, with traffic travelling past these residences, creating unnecessary dust and noise impacts. FRV have closed these proposed access points and created one single main access point to the North-East of the project, now approx. 1.4km away from these residences, therefore dramatically reducing the impact. - FRV have also changed the location of the proposed Operations and Maintenance facilities which was originally proposed beside the substation. It will now be located at the main access point, 1.4km away from R1, therefore in the long-term this will reduce traffic travelling past their residences. - Existing, mature boundary vegetation will now be retained. - Altered the solar array design layout, setting-back solar panels directly opposite the R1a&b homesteads. This is referred to as a 'visual set-back' and will be undeveloped and left as grazing paddocks and provide the residences a sense of space. - After this setback an extensive 50m vegetation buffer will be implemented. A detailed landscaping plan has been created; ▪ Specific species that would effectively develop across the understory, mid- and top-canopy structures; ▪ Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna; and ▪ Erecting nesting and faunal boxes to encourage wildlife use of the area. ▪ Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife. – From this vegetation buffer, a further 10m setback will occur for the Asset Protection Zone (APZ). – After the APZ, only then will the Solar Farm security fence be installed. – An additional 5m minimum setback will occur before the solar array will occur. – From R1a, a 400m radius 'Inverter Exclusion Zone' has been implemented. Therefore, the design has been altered so no inverters will be installed within 400m, to further reduce visuals. – Continual access to directly communicate and engage with FRV.	C	O	

ID	Safeguards and mitigation measures	C	O	D
R2	• R2 is located approx. 800m north-west from the proposal. FRV have provided the following mitigation measures; - Changed the site access. Originally, 3 main access points were proposed along the Benambra Road, with traffic travelling in close proximity to their driveway, creating unnecessary dust and noise impacts. FRV have closed these proposed access points and created one single main access point to the North-East of the project, now approx. 4.4km away from these residences, therefore dramatically reducing the impact. - FRV have also changed the location of the proposed Operations and Maintenance facilities which was originally proposed beside the substation. It will now be located at the main access point, 4.4km away from R2, therefore reducing any impact in the long-term for this resident. - FRV reinvestigated the location of the substation and undertook an extensive redesign and have moved this piece of infrastructure 100m South to accommodate the views of R2. - By altering the location of the substation, existing, mature boundary vegetation can now be retained, further protecting the views of R2. - Solar Panels have not been proposed in the most north-western section of the development site. - Along with FRV moving the sub-station, an extensive 50m vegetation buffer will also be implemented. A detailed landscaping plan has been created; ▪ Specific species that would effectively develop across the understory, mid- and top-canopy structures; ▪ Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna; and ▪ Erecting nesting and faunal boxes to encourage wildlife use of the area. ▪ Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife. – Additional screening has also been implemented in the north-west boundaries including 5m and 10m buffers which will also help facilitate views of the project from R2. – From the substation, a further 10m setback will occur for the Asset Protection Zone (APZ).	C	O	D

ID	Safeguards and mitigation measures	C	O	D
	– After the APZ, only then will the Solar Farm security fence be installed. FRV decided to not implement the security fence around the property boundary, which will help R2 retain a sense of the rural landscape. – An additional 5m minimum setback will occur before the solar array will occur. – Continual access to directly communicate and engage with FRV.			
R5	• R5a is located approx. 800m south-east from the proposal. FRV have provided the following mitigation measures; - Altered the solar array design layout, setting-back solar panels at least 65m from the property boundary. - Implementing this setback, has allowed FRV to therefore utilise this area and implement further mitigation by offering an extensive 50m vegetation buffer along the southern boundary and also 100m travelling north along the eastern boundary. A detailed landscaping plan has been created; ▪ Specific species that would effectively develop across the understory, mid- and top-canopy structures; ▪ Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna; and ▪ Erecting nesting and faunal boxes to encourage wildlife use of the area. ▪ Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife. – From this vegetation buffer, a further 10m setback will occur for the Asset Protection Zone (APZ). – After the APZ, only then will the Solar Farm security fence be installed. – An additional 5m minimum setback will occur before the solar array will occur. – Continual access to directly communicate and engage with FRV.	C	O	D
R6	• R6 is located approx. 2.2 km east from the proposal, with their dwelling surrounded by mature vegetation. No views are available of the proposal from the dwelling itself. FRV have provided the following mitigation measures; - Altered the solar array design layout, setting-back solar panels, committing to at least 30m from the adjoining property boundary to any solar infrastructure. - Implementing this setback, has allowed FRV to therefore utilise this area and implement further mitigation by offering an 5m vegetation buffer	C	O	D

ID	Safeguards and mitigation measures	C	O	D
	along the eastern boundary. This will complement the mature vegetation which already exists along this eastern boundary. A detailed landscaping plan has been created; ▪ Specific species that would effectively develop across the understory, mid- and top-canopy structures; ▪ Specific species (shrubs and trees) that encourage foraging, pollination and habitat creation for local insects, birds and fauna; and ▪ Erecting nesting and faunal boxes to encourage wildlife use of the area. ▪ Connect to existing vegetation to create an ecological corridor for local and seasonal wildlife. – From this vegetation buffer, a further 10m setback will occur for the Asset Protection Zone (APZ). – After the APZ, only then will the Solar Farm security fence be installed. – An additional 5m minimum setback will occur before the solar array will occur. – Continual access to directly communicate and engage with FRV.			

9 CONCLUSION

> ***SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS***
>
> *In particular, the EIS must include:*
>
> - *The reasons why the development should be approved having regard to:*
>   - *Relevant matters for consideration under the* Environmental Planning and Assessment Act 1979*, including the objects of the Act and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development;*
>   - *The suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and*
>   - *Feasible alternatives to the development (and its key components), including the consequences of not carrying out the development.*

9.1 NEED AND BENEFITS

The proposed Walla Walla Solar Farm would involve the construction and operation of a proposed 300 MW AC solar farm at Walla Walla, south eastern NSW. The 605 hectare (ha) development site is located on freehold rural land, approximately 4.3 km northeast of Walla Walla in the Greater Hume LGA. The development footprint of the proposal is approximately 493 ha.

The proposal would contribute to the NSW Renewable Energy Action Plan (NSW Government 2013), which supports the achievement of the national target of 20% renewable energy by 2020 (NSW Government 2013a). The proposal would also further the three goals of the Action Plan:

1. Attract renewable energy investment and projects.
2. Build community support for renewable energy.
3. Attract and grow expertise in renewable energy.

The proposal would also contribute to the Australian Government's objective to achieve an additional 33 GW of energy from renewable sources by 2020 under the LRET scheme.

Local social and economic benefits that would be associated with the construction and operation of the proposal include:

- Direct and indirect employment opportunities during construction and operation of the solar farm. This includes up to 250 employees at the peak of construction (8 to 12 months) and approximately 21 FTE operational staff for the life of the project. Maintenance contracts for panel cleaning, fence repair, road grading, etc. would also be required and would likely be met by local contractors.
- Direct business volume benefits for local services, materials, and contracting.

It is estimated that the solar farm would require around $10 million per year of operational spending to maintain. This would mostly be spent on local wages, local contractors, and material. Over the life of the project, this could provide around $300 million of additional economic activity in the local community.

9.2 ENVIRONMENTAL ASSESSMENT AND MITIGATION OF IMPACTS

NGH with input from specialists including ecologists, environmental scientists, archaeologists and financial planners, has prepared this EIS on behalf of the proponent, FRV. This EIS has assessed the broader proposal and development site where infrastructure may be located. Overall, the Proposal would represent a further contribution to Australia's transition to a low emission energy generation economy. It is considered highly compatible with existing land uses and highly reversible upon decommissioning; returning the site to its previous agricultural capacity is a commitment of the project.

The key environmental risks have been investigated through detailed specialist investigations. These included:

- Biodiversity impacts – the BDAR concluded that no significant impacts to threatened species and ecological communities would result. No referrals under the EPBC Act are considered to be required. An offset requirement has been calculated for the project and would ensure an in-perpetuity commitment to account for the small area of native vegetation that the proposal cannot avoid.
- Aboriginal heritage impacts – the Aboriginal Heritage survey and assessment found that no operational impact to Aboriginal cultural heritage would occur from the proposal. Minor impacts will be seen from construction. A mitigation strategy has been developed for each site recorded and forms a commitment of the project, which includes salvage and avoidance.
- Visual impact - the VIA concluded that the operational solar farm would impact very few people on a regular basis, with six occupied residences (including two involved landholders) within 1 km of the development site. Specific native vegetation plantings and setbacks have been identified in consultation with affected landowners, to soften views of infrastructure.
- Noise impacts – the noise assessment concluded that generally noise impacts during construction, operation and decommissioning would be within the accepted noise criteria. NML exceedance of 23 dB and 4 dB, would occur at Residence 1a and 1b during construction but can be appropriately mitigated.
- Land use - While the agricultural output from the existing farmland would be slightly reduced by the operation of the solar farm, approx. 85% of the land can still be utilised for sheep grazing. The proposal is reversible and would not result in the permanent loss of agricultural land.

A suite of management measures has been developed to address environmental impacts and risks to these and other physical, social and environmental impact areas. Key management strategies centre on the development of management plans and protocols to minimise impacts and manage identified risks. The management measures account for uncertainty and are precautionary where required. The impacts and risks identified are considered highly manageable with the effective implementation of the measures stipulated in this EIS.

9.3 ABILITY TO BE APPROVED

- The development site is highly appropriate to solar energy generation.
- The proposal is consistent with local, State and Federal planning provisions.
- The development site has been selected to avoid or minimise environmental impacts where possible through an iterative constraint investigation/design process.
- The development footprint has been designed/reduced to avoid or minimise impacts to vegetation, habitat, neighbours and aboriginal artefacts.
- Visual impacts have been reduced through proposed vegetative screening.
- Land use conflicts and hazard risks are considered manageable and acceptable.

The residual impacts are considered justifiable and acceptable in the context of the proposal's benefits.

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APPENDIX A SECRETARY’S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

APPENDIX B CONSULTATION

B.1 AGENCY CONSULTATION

B.1.1 Email regarding subdivision from Greater Hume Shire Council

Good Afternoon

Further to your request dated 28 May 2019 Council advises:

- Lots 16, 17, 20, 21, 87, 88, 89, 108, 109 &118 DP853735 - No development applications for 2018/2019 year.
- Lot 1 DP1069452 has an application for a realignment of 3 Lots to 2 Lots approved by Councillors at meeting dated 26 September 2018.

Should you require further information please contact Council's Planning & Building Department on 6036 0100.

Do not reply to this email – this address is not monitored.

Regards

Development Applications
Culcairn Office
Ph. 02 6036 0100

Greater
Hume
Council

Disclaimer - This email and attached files may contain information that is confidential and/or subject to legal privilege. If you receive this e-mail and are not the intended addressee please delete and notify sender immediately. Views expressed in this message are those of the individual sender and not necessarily the views of Greater Hume Council

B.1.2 Email from Boral regarding construction water supply

Good morning Rebecca,

We have the ability to store rain water runoff however this all depends on the weather.

I could not definitely commit to the suggested volume at this time.

There would also need to be consideration around water quality & environmental requirements.

regards

IAN FORREST
Manager - Quarries (Culcairn)

Telephone: (02) 6029 8600
Mobile: 0408609206
Fax: (02) 6029 7501
Email: Ian.Forrest@boral.com.au

Boral Quarries
P.O. Box 93, Culcairn NSW 2660

B.1.3 Email from Geographical Survey of NSW

NSW GOVERNMENT | Planning & Environment

20 February 2019

Bridgette Poulton
Environmental Consultant
NGH Environmental
PO Box 5464
Wagga Wagga NSW 2650

Emailed: bridgette.p@nghenvironmental.com.au

Your Reference: Walla Walla Solar Farm
Our Reference: DOC19/125357

Dear Ms Poulton,

Re: Proposed Walla Walla Solar Farm - Clause 13 Compatibility Test

I refer to your email dated 13 February 2019 inviting NSW Department of Planning & Environment – Division of Resources & Geoscience to provide comments on the Walla Walla Solar Farm proposal.

The Division appreciates the opportunity for early consultation on this State Significant Development proposal for a solar farm in the Greater Hume LGA. The Division has provided project specific requirements to supplement the Secretary's Environmental Assessment Requirements (SEARs), issued by the Department of Planning and Environment – Planning Services, for the preparation of the Environmental Impact Statement (EIS) for the proposed Walla Walla Solar Farm.

Resource specific SEARs for renewable energy projects require an assessment of the impact of the development on existing land uses, including the compatibility of the development with the existing land uses on the site and adjacent land (e.g. operating mines, extractive industries, mineral or petroleum resources, exploration activities), during operation and after decommissioning.

This requires the proponent to identify any of the above in the EIS and consult with the operators and or titleholders to establish if the proposal is likely to have a significant impact on current or future extraction of minerals, petroleum, or extractive materials (including by limiting access to, or impeding assessment of, those resources), and any way the proposed development may be incompatible with any existing or approved uses, or current or future extraction or recovery under the land use compatibility requirements of Part 3 (13) of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive industries) 2007* (Mining SEPP).

In fulfilling these requirements, a search of current mineral, coal and petroleum titles must be undertaken through the Division's MinView application, with the results shown on a map, in drafting of the EIS. Additionally, the EIS must identify whether there are adjacent mines of quarries for land use compatibility considerations.

According to current departmental databases, the Division has identified that there are no current mineral, coal or petroleum titles over the site or adjacent lands.

The Division has identified that the 'Hurricane Hill' hard rock quarry operated by Boral Resources Pty Ltd is located approximately <1.5km to the southeast of the project site (refer to Figure 1). Consideration should be given to the impacts the projects may have on the quarry's operations under cl13 of the Mining SEPP. The Division recommends consultation with Boral during the preparation of the EIS.

Queries regarding the above information, and future requests for advice in relation to this matter, should be directed to the Division of Resources and Geoscience.
Yours sincerely

Andrew Helman
A/Manager - Land Use

for Paul Dale
Director – Land Use & Titles Advice

NSW Department of Planning and Environment
DIVISION of RESOURCES & GEOSCIENCE
PO Box 344 Hunter Region Mail Centre NSW 2310
E: landuse.minerals@geoscience.nsw.gov.au
Tel: 02 4063 6500
ABN 38 755 709 681

B.1.4 Email from NSW Crown Lands

Re: Crown Lands Reserves Query - Wagga Wagga

CR elly.simpson@crownland.nsw.gov.au on behalf of CL Reserves <cl.reserves@

To Bridgette Poulton

Reply | Reply All | Forward | ...

Tue 25/06/2019 1:38 PM

Hi Bridgette

Thank you for your email. From having a quick look at our mapping system I can't see any reserves near the first list of Lot and DPs, however there is a reserve near 1/1069452. It is not adjoining the Lot but close by. The reserve number is 1003019 and the Lot is 137/753764.

Kind regards,
Dubbo Business Centre | Reserves
NSW Department of Industry | Lands and Water Division
P.O. Box 2185 | DANGAR NSW 2309
T: 1300 886 235 (option 5, option 1) | E: reserves@crownland.nsw.gov.au |
W: www.crownland.nsw.gov.au

B.2 COMMUNITY AND STAKEHOLDER ENGAGEMENT PLAN

APPENDIX C LANDOWNER CONSENTS

(CONFIDENTIAL)

APPENDIX D PROPOSAL MAPS AND DRAWINGS

APPENDIX E DETAILED LANDSCAPE PLAN

APPENDIX F TRAFFIC IMPACT ASSESSMENT

APPENDIX G ABORIGINAL CULTURAL HERITAGE ASSESSMENT

APPENDIX H BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT (BDAR)

APPENDIX I CAPITAL INVESTMENT VALUE REPORT

(CONFIDENTIAL)

APPENDIX J WALLA WALLA FLOOD STUDY

APPENDIX K VISUAL IMPACT ASSESSMENT

APPENDIX L AGRIBUSINESS CONSULTING ADVICE – WALLA WALLA SOLAR FARM

APPENDIX M FM ACT HABITAT ASSESSMENT AND ASSESSMENT OF SIGNIFICANCE

APPENDIX N SOIL ASSESSMENT

APPENDIX O ECONOMIC CONTRIBUTION ANALYSIS

(CONFIDENTIAL)