NGH

Oxley Solar Farm

Amendment Report

Oxley Solar Farm

November 2022

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Acronyms and abbreviations

BC Act	*Biodiversity Conservation Act 2016* (NSW)
CEMP	Construction environmental management plan
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment (Cwth)
DPE	Department of Planning and Environment (NSW)
EIS	Environmental impact statement
EMF	Electro-magnetic frequencies
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ESD	Ecologically Sustainable Development
FATA	*Foreign Acquisitions and Takeovers Act 1975* (Cth)
FATAR	Foreign Acquisitions and Takeovers Regulation 2015
Fees Imposition Act	*Foreign Acquisitions and Takeovers Fees Imposition Act 2015* (Cth)
FIRB	Foreign Investment Review Board
ha	hectares
IPC	Independent Planning Commission
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW) (superseded by the TISEPP)
JRPP	Joint Regional Planning Panel
MLA	Moir Landscape Architects
PHA	Preliminary Hazards Assessment
REZ	Renewable Energy Zone
SCIA	*Security of Critical Infrastructure Act 2018* (Cth)
TISEPP	State Environmental Panning Policy (Transport and Infrastructure) 2021
TSR	Travelling Stock Reserves
VIA	Visual Impact Assessment

Table of definitions

Proponent	Oxley Solar Development Pty Ltd (ACN 629 954 329)
Proposal	Oxley Solar Farm
Proposal site	The broader area of land considered for siting of the solar farm. The Proposal site is **1,048ha**
Development footprint	The area of land that would be directly impacted by the Proposal. This includes all stages; construction, operation and decommissioning. It includes all impacts, temporary and permanent, including access and a buffer to account for 'constructability' i.e., installation of environmental controls. The Development footprint for the Proposal is **268ha** and has been reduced since the exhibition of the Environmental Impact Statement (EIS).

Executive summary

The proposed Oxley Solar Farm is located on the southern side of Waterfall Way (Grafton Road), approximately 14 kilometres (km) south-east of Armidale, in the New England region of NSW. The Proposal includes the construction, operation and decommissioning of a ground-mounted PV solar array facility and associated 50MWh lithium-ion Battery Energy Storage System (the Proposal). Approximately 215MW (AC) of renewable energy would be generated and supplied directly to the national electricity grid.

The Oxley Solar Farm Environmental Impact Statement (EIS) was prepared in accordance with the Proposal-specific Secretary's Environmental Assessment Requirements (SEARs), issued on 2 August 2019. The EIS was placed on public exhibition from 17 March 2021 to 14 April 2021: https://www.planningportal.nsw.gov.au/major-projects/projects/oxley-solar-farm.

A Submissions Report (NGH Pty Ltd, 2022) has been prepared on behalf of the Proponent, to respond to all community and agencies submissions made during the public exhibition of the EIS. The Proponent has made substantive refinements to the Proposal as originally described and assessed in the EIS, including significant reductions to the Development footprint. These reflect the Proponent's desire to develop a project that responds to local values and concerns. Together, the refinements and reductions also better address potential cumulative impacts which may occur in the future, given the site's location within the New England Renewable Energy Zone. This is a location well placed to be a driving force to deliver affordable energy to the grid and is experiencing an increase in renewable energy proposals.

Proposal refinements

The refinements can be summarised as:

1. Refinements to the Development footprint that are responsive to the environmental constraints of the Proposal site and the surrounding landscape, particularly:
    a. Less area now proposed to be impacted by the Proposal,
    b. Visual set back distances to dwellings increased,
    c. Proximity to National Park set back distances increased,
    d. Less impact on agricultural land,
    e. Less impact on better condition native vegetation and habitat.
2. Strengthening mitigation strategies to better recognise the site's values and identify opportunities for enhancement, primarily:
    a. Improved soil and water outcomes based on specialist assessment,
    b. Biodiversity connectivity enhancement,
    c. Bush fire mitigation improvements based on NSW FFS submissions,
    d. More detailed hazard controls following Preliminary Hazards Assessment completion.
3. Changes to the proposed site access and inclusion of a Gara River crossing upgrade. These will improve traffic safety and have benefits for local traffic during flooding.
4. Amendments to the proposed subdivision layout have been included to facilitate connection of the Proposal to the existing 132kV transmission line that intersects the site, subdivide what will become Transgrid substation assets and subdivide the BESS site.

The changes were made to reduce key impact areas of the Proposal. Updated specialist assessments were required to reflect the changes and revise the mitigation strategies. The updated assessments are summarised in this report and the updated mitigation strategies will form commitments of the Proposal, pending approval.

The specialist assessments provided in full with this report include:

- *Updated Visual Impact Assessment* (Moir Landscape Architecture, 2022)
- *Updated Hydrology assessment* (Footprint sustainable engineering , 2022)
- *Updated Biodiversity Development Assessment Report* (NGH , 2022a)
- *Biodiversity offset strategy* (NGH, 2022b)
- *Archaeological Report – Subsurface Testing* (NGH, 2022c)
- *Updated Historic Heritage Assessment* (NGH, 2022d)
- *Updated Noise and Vibration Impact Assessment* (Renzo Tonin & Associsates , 2022)
- *Updated Traffic Impact Assessment* (New England Surveying & Engineering , 2022)
- *Updated Preliminary Hazard Analysis* (NGH, 2022e).

In response to community concerns, a Soil Impact Assessment (NGH , 2022f) and Soil and Water Management Plan (NGH, 2022g) were also prepared to support the mitigation strategies developed to protect soil and water resources. These are appended in the Submissions Report (NGH Pty Ltd, 2022) and not duplicated in this document.

The environmental values at this site are therefore well understood, based on field surveys and specialist modelling outputs. To address inevitable areas of uncertainty, conservative approaches have been adopted. The updated specialist studies have informed the refined layout as well as the strategies that will manage the impacts during design, construction and operation and decommissioning. The result is a Proposal that responds well to its natural and cultural context as well as specific community expectations.

The changes to the Proposal between the Scoping Report (NGH Pty Ltd , 2019), the EIS (NGH Pty Ltd, 2021) and this report can be summarised in Table ES-2. Figure ES-2 illustrates the comparison between the EIS's indicative infrastructure layout and the updated Development footprint which reflects the changes above.

Table ES 1 Key changes to the Proposal between the Scoping Report, the EIS and the Amendment Report

	Scoping report	EIS Proposal	Amended Proposal	*Difference between EIS and Amended Proposal*
Proposed infrastructure				
Capacity of solar generation	Up to 300MW	255MW	**215MW**	*Reduced by 40MW*
Percentage generation capacity compared with Scoping Report	-	85%	72%	*Reduced by 13%*
Solar Panel Area (including access road)	380.66ha	269.78ha	**195.25ha**	*Reduced by 74.5ha*
Percentage solar panel area compared with Scoping Report	-	71%	**51.29%**	
Number of solar panels	1,017,856	715,680	**385,280**	*Reduced by 330,400 panels*
Percentage solar panels compared with Scoping Report	-	70%	**38%**	
Development footprint area	-	895ha [1]	**268ha** [2]	*Reduced by 627ha*
Percentage of Development footprint area compared with the EIS			**70%**	

[1] The EIS Development footprint covered the worst-case impact scenario and allowed for flexibility in the infrastructure layout.
[2] The amended Development footprint considers the infrastructure footprint on the basis of further civil design work; this footprint is more realistic in terms of total impact area, and now provides more certainty in terms of the final siting for the infrastructure.

	Scoping report	EIS Proposal	Amended Proposal	*Difference between EIS and Amended Proposal*
Visual impact reductions				
Distance of nearest above ground infrastructure to dwelling R3 (m) [3]	200	597	**778**	*Increased by 181m*
Distance of nearest above ground infrastructure to dwelling R4 (m)	400	570	**1,392**	*Increased by 822m*
Distance of nearest above ground infrastructure to dwelling R7 (m)	500	739	**1,584**	*Increased by 845m*
Oxley Wild Rivers National Park				
Distance of nearest infrastructure to the Blue Hole picnic table (m)	200	475	**1,285**	*Increased by 810m*
Distance of nearest infrastructure to the Threlfall walking track (m)	50	667	**1,165**	*Increased by 498m*

[3] Visual impact assessment receiver distances will not always be consistent with the noise assessment distances, as noise considers all works, including road upgrades, whereas for the visual, the nearest above ground operational infrastructure is more relevant.

	Scoping report	EIS Proposal	Amended Proposal	*Difference between EIS and Amended Proposal*
Biodiversity				
Native vegetation impacts	-	86.8ha	**93.78ha**	*6.45ha increase, in lower condition zones. This includes area considered non native in the EIS but now classified and assessed as native vegetation.*
Hollow bearing trees to be removed		20	**7**	*Reduce impact on 13 additional hollow-bearing trees.*
Serious and Irreversible Impact candidate Box Gum Woodland impacts (zones 2 and 4)	-	6.67ha	**2.6ha**	*Development has reduced in higher quality zones. No panels proposed in these zones.*
Serious and Irreversible Impact candidate species	-	2	2	*Assumed habitat areas now increased in accordance with BCD[4] guidance.*

[4] BCD; Biodiversity Conservation Division guidance confirmed June 2022.

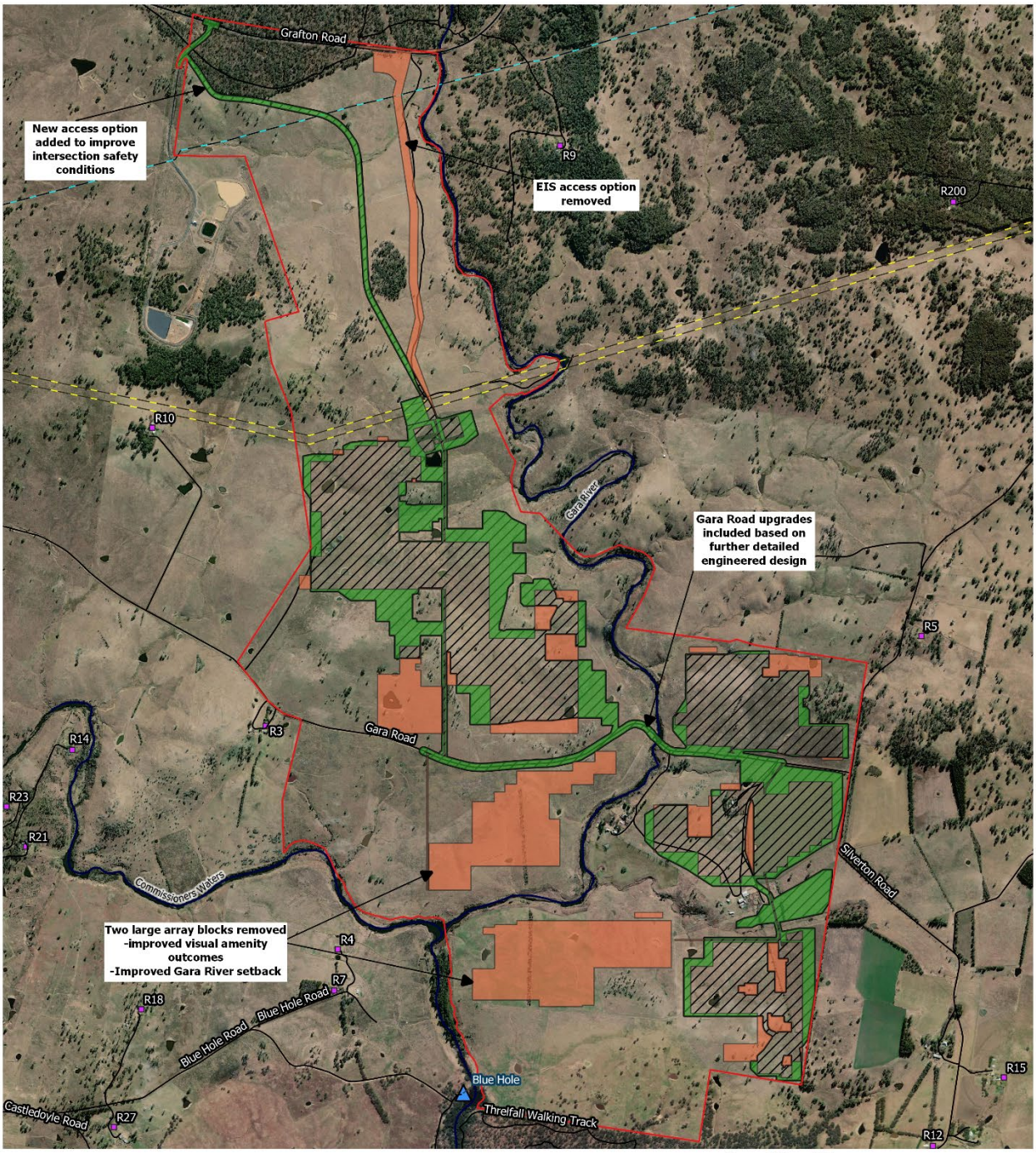

Figure ES 1 Comparison of changes made between the EIS and the now refined Development footprint

Evaluation of the updated Proposal

The updated evaluation of the Proposal, considering the refinements that have now been made is summarised below.

Table ES 2 Updated environmental evaluation of Proposal

Impact areas	Net result
Visual impacts	Reduced Development footprint and increased setbacks to dwellings and National Park have reduced visual impacts significantly: • Public roads visual impacts and glare – two sections of Silverton Road assessed as high visual impact where they are adjacent the site. Silverton Road, Gara Road, Blue Hole Road warrant supplementary screen planting for potential glare. • Dwellings visual impacts and glare – one moderate visual impact R4, 13 low or negligible, 14 nil. Five warrant supplementary screen planting for potential glare; R3, R4, R7, R10, R14. • National Park (Threlfall Walking Track and Blue Hole Picnic area) visual impacts and glare - now nil to negligible. • Limited cumulative impacts with other proposed or approved solar farms in the locality (two assessed as low with mitigation). Landscape Management Plan updated to demonstrate the effectiveness of proposed plantings.
Hydrological impacts	No significant impacts expected, in line with the conclusions of the EIS. Gara River causeway design would result in improved crossing conditions along Gara Road.
Combined physical impacts, including soil and water	No adverse impacts to Gara River water quality. High certainty around preservation of land capability throughout the life of the project.
Biodiversity	No anticipated significant impacts to Commonwealth listed entities (no referral under the EPBC Act). Offsets proposed in accordance with the NSW Biodiversity Offset Scheme for vegetation and three species ‘assumed to occur’. Serious and Irreversible Impact candidate Box Gum Woodland impacts of 2.6ha; physical offsets demonstrated to be feasible.

Impact areas	Net result
Aboriginal heritage impacts	Impacts to 13 sites and potential indirect impacts to 4 sites. 48 sites avoided. Mitigation including salvage and buffering of specific sites for avoidance agreed with the Registered Aboriginal Parties participating in this assessment.
Historic heritage impacts	No physical impacts on any historic heritage item. Minor visual impact on one unlisted item; the old Gara Homestead and shed (GH1), now 60m from the nearest infrastructure.
Noise and vibration impacts	Compliance with all applicable noise criteria.
Traffic and transport impacts	Compliance with all traffic safety guidelines. Upgrades have been agreed to by all road's authorities.
Hazards and risks	Compliance with all safety guidelines. All risks manageable.
Cumulative impacts	Potential for low cumulative visual impacts with two local solar farms. Potential cumulative traffic impacts if construction programs coincide with other large developments. The Proponent will liaise with council and representatives of nearby major developments to ensure cumulative impacts are managed. All risks manageable.

The table above demonstrates the reduced impacts of the updated Proposal, which align well with the issues raised by the community (the table is ordered by the number of times these issues were raised by the community). The assessment and mitigation strategies underpinning the Proposal are also considered conservative where uncertainty is present:

- While the final detailed design stage is yet to be undertaken, all impacts will be required to be confined to the consented Development footprint; all assessments are based on this 'worst-case' impact footprint. They include all potential impacts, temporary and permanent. They include room to establish all required environmental controls.
- Where specific infrastructure parameters or construction programming is yet to be determined, a 'worst case scenario' is assumed, for example hydrological, noise and traffic modelling, so the mitigation is precautionary and robust.

In both cases above, the actual impacts are therefore expected to be less than what has been assumed and mitigated.

Overall justification for the Proposal

With reference to the Draft Large Scale Solar Energy Guideline 2021, and the updated detailed environmental assessments, the Oxley Solar Farm can be considered highly suitable to the areas now proposed for development. In addition to responding to environmental constraints mapping, consideration has been given to the compatibility of the Proposal with the existing electricity network and the compatibility of the site for the generation of solar energy. This ensures construction and operating costs are reduced, maximising the viability of the Proposal and its contribution to meeting energy needs into the future. Considerations during initial site investigations to maximise solar energy generation included:

- Proximity to and capacity of the electrical transmission network
- Availability of an abundant solar resource
- Availability of suitable land (i.e., topography, aspect, presence of native vegetation)
- Compatibility of stakeholders interests / adjacent land uses.

The justification of the Oxley Solar Farm development remains consistent with the EIS.

In addition, due to the responses documented in this report to the public and agency submissions, the refinements now proposed:

- Provide increased certainty in relation to areas that will be impacted and areas that will be protected from impacts
- Provide increased certainty in relation to the management of environmental impacts.
- Include additional enhancement actions to improve on assets valued by the local community.
- Improve traffic safety and flood access for Proposal and also for local road users.
- Share the benefits of the Proposal to the broader community by entering a Voluntary Planning Agreement (VPA) with Armidale Regional Council:
    - Over a significant period of time Oxley Solar has been actively working with both previous and current Armidale Regional Council personnel to develop a VPA to benefit the Armidale Regional community. Oxley Solar is keen to finalise such an agreement with Armidale Regional Council in the near future.
- Better address potential cumulative impacts, important to the site's location within the New England Renewable Energy Zone.

The Oxley Solar Farm would result in numerous benefits, local and regional at a time of crisis in the energy network. As of June 2022, the combined effects of the war in Ukraine and flooding in Queensland and New South Wales have seen the price of fuel, gas and electricity increase exponentially. Short term electricity price caps have been imposed by the Australian Energy Market Operator (AEMO). The impact on electricity prices is contributing to a cost-of-living crisis for NSW residents. Increased renewable energy generation supported by transmission capability and storage are required to provide downward pressure on electricity prices and support long-term energy security, economic growth and prosperity.

The Proposal's objectives centre on the development of a viable renewable energy generation and storage facility that will provide a meaningful contribution to the state's transition to renewable energy technologies. The Oxley Solar Farm would:

- Generate electricity from a low-cost renewable source.

- Provide storage in order to deliver electricity at high demand times, when roof top solar is unavailable.
- Address Federal, state and local policies as well as international agreements in relation to reducing greenhouse gas emissions, global warming and the transition to greater renewable energy generation.
- Supply the equivalent of about 78,000 average NSW homes, displacing approximately 382,000 metric tonnes of carbon dioxide, currently generated by non-renewable sources.
- Provide employment, economic stimulus and diversification of the local agricultural economy.
- Contribute to the 'powerhouse' proposed for the New England REZ, the second highest solar penetration region in NSW.
- Seek an ongoing positive relationship with the local community by its commitment to incorporate local values and provide local enhancement of the landscape into the Proposal's design.
- Minimise environmental impacts during construction and operation and ensure the site, when decommissioned, has the same or better land capability and land use options.

These objectives align closely with Environmentally Sustainable Development (ESD), in their focus on the protection of natural resources and a better future of all Australians in the long-term. The assessment integrates all significant socio-economic and environmental considerations and seeks to avoid any potential serious or irreversible environmental damage, based on a quantified assessment of risk. The assessment and mitigations underpinning the Proposal are highly conservative where uncertainty is present.

On balance the Proposal can be seen to be well justified, meet all relevant planning provisions and guidelines and is considered justifiable, acceptable and approvable.

1. Introduction

1.1 Proposal background

The proposed Oxley Solar Farm is located on the southern side of Waterfall Way (Grafton Road), approximately 14 kilometres (km) south-east of Armidale, in the New England region of NSW. The EIS proposed the construction, operation and decommissioning of a 215MW (AC) ground-mounted PV solar array facility, associated 50MWh lithium-ion Battery Energy Storage System (the Proposal) and ancillary infrastructure. Refer to site location, Figure 1-1.

The Proposal requires development consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The Proposal is classified State Significant Development (SSD) under the EP&A Act as it is development for the purpose of electricity generating works with a capital investment value of greater than $30 million (clause 20, Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011).*

The Oxley Solar Farm Environmental Impact Statement (EIS) was prepared in accordance with the Proposal-specific Secretary's Environmental Assessment Requirements (SEARs), issued on 2 August 2019. The EIS was placed on public exhibition from 17 March 2021 to 14 April 2021: https://www.planningportal.nsw.gov.au/major-projects/projects/oxley-solar-farm. The key environmental issues identified in the EIS were biodiversity, visual amenity and landscape character, hydrology, Aboriginal heritage, noise and vibration, socio-economic, and compatibility with existing land uses. These issues were characterised and assessed in the EIS via specialist technical assessments. Detailed safeguards and mitigation measures were developed and included as commitments of the Proposal.

1.2 The proponent

Oxley Solar Farm is to be developed by Oxley Solar Development Pty Ltd (ACN 629 954 329). Address: Suite 35.02, Level 35, Grosvenor Place, 225 George Street, Sydney, NSW, 2000.

Oxley Solar Development is an Australian developer of utility-scale solar generation projects. The company is a subsidiary of Solar Megawatt Holding Pty Ltd (a company incorporated in Hong Kong). Solar Megawatt Holding Pty Ltd and its subsidiaries (hereafter refer to as "Solar Megawatt Group", or the "Group") was founded by investors with extensive experience in the renewable energy sector in China mainland and Asia-pacific.

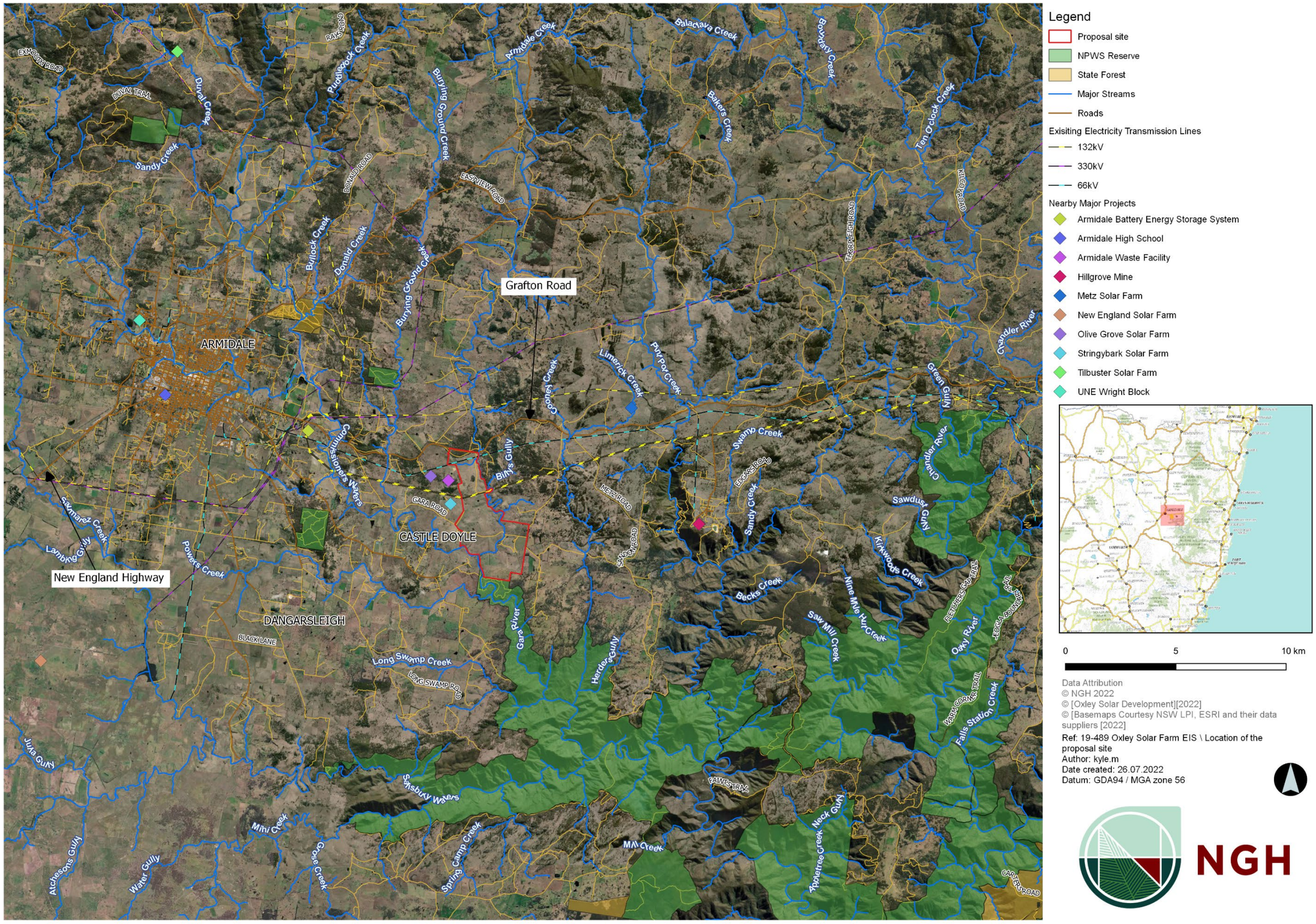

Figure 1-1 Regional setting

1.3 Purpose of the report

NGH has prepared this Amendment Report on behalf of the proponent to fulfil the requirements of Schedule 1 of the *Environmental Planning and Assessment Act 1979.* This Amendment Report has been prepared in accordance with the *State Significant Development Guidelines – preparing an amendment report* (NSW DPIE, 2021). The key purpose of the Amendment Report is to:

- Present the amendments of the Proposal.
- Assess the economic, environmental and social impacts of the amended Proposal.
- Help the community, Councils, government agencies and the consent authority gain a better understanding of the proposed amendments and their impacts.

This will allow for informed submissions and decisions on the merits of the amended Proposal (NSW DPIE, 2021).

Refinements now proposed

The Proponent has made substantive refinements to the Proposal as originally described and assessed in the EIS (NGH Pty Ltd, 2021). This report summarises and assesses those changes and provides an updated justification and evaluation of the Proposal as a whole. Specifically, the refinements have been done in consideration of visual, traffic and transport, biodiversity, heritage, soil and water impacts. Together these better address potential cumulative impacts which may occur in the future.

The refinements can be summarised as:

1. Refinements to the Development footprint that are responsive to the environmental constraints of the Proposal site and the surrounding landscape, particularly:
    a. Less area now proposed to be impacted by the Proposal,
    b. Visual set back distances to dwellings increased,
    c. Proximity to National Park set back distances increased,
    d. Less impact on agricultural land,
    e. Less impact on native vegetation and habitat.
2. Strengthening mitigation strategies to better recognise the site's values and identify opportunities for enhancement, primarily:
    a. Improved soil and water outcomes based on specialist assessment,
    b. Biodiversity connectivity enhancement,
    c. Bush fire mitigation improvements based on NSW FFS submissions,
    d. More detailed hazard controls following Preliminary Hazards Assessment completion.
3. Changes to the proposed site access and inclusion of a Gara River crossing upgrade. These will improve traffic safety and have benefits for local traffic during flooding
4. Amendments to the proposed subdivision layout have been included to facilitate connection of the Proposal to the existing 132kV transmission line that intersects the site.

1.3.1 Relationship to other reports

The Submissions Report has been completed (NGH Pty Ltd, 2022) and lodged concurrent with this Amendment Report. The Submissions Report contains the detailed responses to all submissions received during the EIS public exhibition and includes supporting information, where required. It also details further consultation undertaken since the EIS exhibition.

2. Strategic context

2.1 Regional setting

The Oxley Solar Farm is Proposal approximately 14km south-east of Armidale, within the Armidale Regional Local Government Area (LGA). Armidale is the closest regional center and includes the University of New England campus. Education and training are the largest employer in the Armidale Regional LGA, followed by health care and social assistance, and agriculture (Armidale Regional Council, 2019).

This region has been identified as an optimal Renewable Energy Zone (REZ) in which to develop new electricity generation projects, supported by existing transmission strength and capacity (AEMO, 2018). The New England North West is the second highest solar penetration region in NSW (DPIE, 2017). The New England REZ is expected to support around 830 operational jobs and 1,250 construction jobs. Refer to Figure 2-1 for REZ location.

Figure 2-1 Location of the New England Renewable Energy Zone

Source: https://www.energyco.nsw.gov.au/renewable-energy-zones/new-england-renewable-energy-zone

Of the 1,048ha Proposal site, the Development footprint would represent approximately 268ha which would be developed for the solar farm and associated infrastructure. Two existing Transgrid 132kV transmission lines run parallel to each other within the northern section of the Proposal site and would be used to connect the solar farm to the national electricity grid.

The indicative site layout presented in this Amendment Report assumes the maximum development impact[5] and includes the following key infrastructure:

- Approximately 385,280 PV solar panels mounted on either fixed or tracking systems, both of which are considered feasible:
    - Fixed-tilted structures in a north orientation; or
    - East-west horizontal tracking systems.
- Approximately 43 Power Conversion Units (PCU) composed of two inverters, a transformer and associated control equipment to convert DC energy generated by the solar panels to 33kV AC energy.
- An onsite 132kV substation containing up to two transformers and associated switchgear to facilitate connection to the national electricity grid via the existing 132kV transmission lines onsite.
- Steel mounting frames with driven or screwed pile foundations.
- Underground power cabling to connect solar panels, combiner boxes and PCUs.
- Underground auxiliary cabling for power supplies, data services and communications.
- Buildings to accommodate a site office, indoor 33kV switchgear, protection and control facilities, maintenance facilities and staff amenities.
- Internal access tracks for construction and maintenance activities.
- An energy storage facility with a capacity of up to 50MWh (i.e., 50MW power output for one hour) and comprising of lithium-ion batteries with inverters.
- Perimeter security fencing about 2.3m high.
- Native vegetation planting to provide visual screening onsite and for specific receivers.

The construction phase of the Proposal would take about 12–18 months. The peak construction period would be a shorter period of about 6 to 9 months. Approximately 300 workers would be required during construction.

Around five full time equivalent operations and maintenance staff and service contractors would operate the facility.

The solar farm is anticipated to be operational for about 30 years. Refurbishment may occur if it is extended beyond this initial duration. At the very end of the Proposal's life, when the solar farm if no longer considered viable, the site will be returned to existing or better land capability. All above ground infrastructure, with the possible exception of the onsite substation, would be removed. Any cabling more than 500mm underground may also be left in place (as this would not impact future agricultural activities following rehabilitation of the site). Similarly access tracks may be left in place, depending on the future use of the site.

[5] Proposing a 'maximum Development footprint' and assessing this allows flexibility required in the final design stages, post project approval. This minimises the need for further assessment at that time but should be noted as generally overestimating the impacts of the Proposal at this time.

The estimated capital investment of the Oxley Solar Farm Proposal would be about $372.330 million.

2.2 Policy context

The strategic policy context of the Proposal remains consistent with Chapter 2 of the Oxley Solar Farm EIS (NGH Pty Ltd, 2021). The proposed Oxley Solar Farm supports Commonwealth and NSW climate change commitments including:

- United Nations Paris Climate Change Agreements.
- Renewable Energy Target (RET) Scheme.
- National Energy Guarantee.
- NSW Climate change Policy Framework.
- NSW Net Zero Plan: Stage 1 2020 – 2030
- NSW Renewable Energy Target.
- NSW 2021: A Plan to Make NSW Number One.
- NSW Renewable Energy Action Plan.
- New England North West Regional Plan 2036.

The Australian Energy Market Operator (AEMO) released the Draft 2022 Integrated System Plan (Draft ISP) since the EIS was submitted (AEMO, 2021), which was finalised on 30 June 2022 (AEMO, 2022). The ISP reinforces the need for renewable rollouts with the forecasting of faster coal withdrawal across all potential energy market scenarios. The most likely scenario the 'Step Change' (see Section 2.3 of the ISP) scenario predicts that 14GW of coal capacity may be withdrawn by 2030.

3. Description of amendments

The Oxley Solar Farm Proposal's construction, operation and decommissioning activities remain generally as described in Section 4 of the EIS (NGH Pty Ltd, 2021). However, the Proponent has made substantive refinements to the Proposal Development footprint, as originally described and assessed in the EIS (NGH Pty Ltd, 2021). Specifically, the refinements have been done in consideration of visual, traffic and transport, biodiversity, heritage, soil and water impacts. Together these better address potential cumulative impacts which may occur in the future. The refinements can be summarised as:

1. Refinements to the Development footprint that are responsive to the environmental constraints of the Proposal site and the surrounding landscape.
2. Strengthening mitigation strategies to better recognise the site's values and identify opportunities for enhancement.
3. Changes to the proposed site access and inclusion of a Gara River crossing upgrade. These will improve traffic safety and have benefits for local traffic during flooding.
4. Amendments to the proposed subdivision layout have been included to facilitate connection of the Proposal to the existing 132kV transmission line that intersects the site and subdivide what will become Transgrid substation assets.

The changes represent:

- A 13% reduction in generating capacity of the solar farm.
- A 628ha reduction in area that would be impacted directly by the proposal.
- A 181m increase in the distance to the closest residential dwelling.
- A 810m increase in the distance to Blue Hole picnic table, Oxley Wild Rivers National Park.
- A reduction in impacts to Serious and Irreversible Impact candidate Box Gum Woodland impacts (zones 2 and 4), from 6.67ha to 2.6ha.
- A reduction in impacts to hollow bearing trees, from 20 to 7.

The changes to the Proposal between the Scoping Report (NGH Pty Ltd , 2019), the EIS (NGH Pty Ltd, 2021) and this report can be summarised in Table 3-1. The updated list of affected lots is provided as:

- Lot 5 DP253346
- Lot 6 DP625427
- Lot 2 DP1206469
- Lot 7003 DP1060201
- Lot 7004 DP1060201
- Lot 1 DP1206469

The changes detailed in full in Appendix A (an updated Proposal description) and shown in:

Figure 3-1, Figure 3-2 and Figure 3-3.

Table 3-1 Key changes to the Proposal between the Scoping Report, the EIS and the Amendment Report

	Scoping report	EIS Proposal	Amended Proposal	*Difference between EIS and Amended Proposal*
Proposed infrastructure				
Capacity of solar generation	Up to 300MW	255MW	**215MW**	*Reduced by 40MW*
Percentage generation capacity compared with Scoping Report	-	85%	72%	*Reduced by 13%*
Solar Panel Area (including access road)	380.66 ha	269.78ha	**195.25ha**	*Reduced by 74.5ha*
Percentage solar panel area compared with Scoping Report	-	71%	**51.29%**	
Number of solar panels	1,017,856	715,680	**385,280**	*Reduced by 330,400 panels*
Percentage solar panels compared with Scoping Report	-	70%	**38%**	
Development footprint area	-	895ha [6]	**268ha** [7]	*Reduced by 627ha*
Percentage of Development footprint area compared with the			**70%**	

[6] The EIS Development footprint covered the worst-case impact scenario and allowed for flexibility in the infrastructure layout.
[7] The amended Development footprint considers the infrastructure footprint on the basis of further civil design work; this footprint is more realistic in terms of total impact area, and now provides more certainty in terms of the final siting for the infrastructure.

	Scoping report	EIS Proposal	Amended Proposal	*Difference between EIS and Amended Proposal*
EIS				
Visual impact reductions				
Distance of nearest above ground infrastructure to dwelling R3 (m) [8]	200	597	**778**	*Increased by 181m*
Distance of nearest above ground infrastructure to dwelling R4 (m)	400	570	**1,392**	*Increased by 822m*
Distance of nearest above ground infrastructure to dwelling R7 (m)	500	739	**1,584**	*Increased by 845m*
Oxley Wild Rivers National Park				
Distance of nearest infrastructure to the Blue Hole picnic table (m)	200	475	**1,285**	*Increased by 810m*
Distance of nearest infrastructure to the Threlfall walking track (m)	50	667	**1,165**	*Increased by 498m*

[8] Visual impact assessment receiver distances will not always be consistent with the noise assessment distances, as noise considers all works, including road upgrades, whereas for the visual, the nearest above ground operational infrastructure is more relevant.

	Scoping report	EIS Proposal	Amended Proposal	*Difference between EIS and Amended Proposal*
Biodiversity				
Native vegetation impacts	-	86.8ha	**93.78ha**	*6.45ha increase, in lower condition zones. This includes area considered non native in the EIS but now classified and assessed as native vegetation.*
Hollow bearing trees to be removed		20	**7**	*Reduce impact on 13 additional hollow-bearing trees.*
Serious and Irreversible Impact candidate Box Gum Woodland impacts (zones 2 and 4)	-	6.67ha	**2.6ha**	*Development has reduced in higher quality zones. No panels proposed in these zones.*
Serious and Irreversible Impact candidate species	-	2	2	*Assumed habitat areas now increased in accordance with BCD[9] guidance.*

[9] BCD; Biodiversity Conservation Division guidance confirmed June 2022.

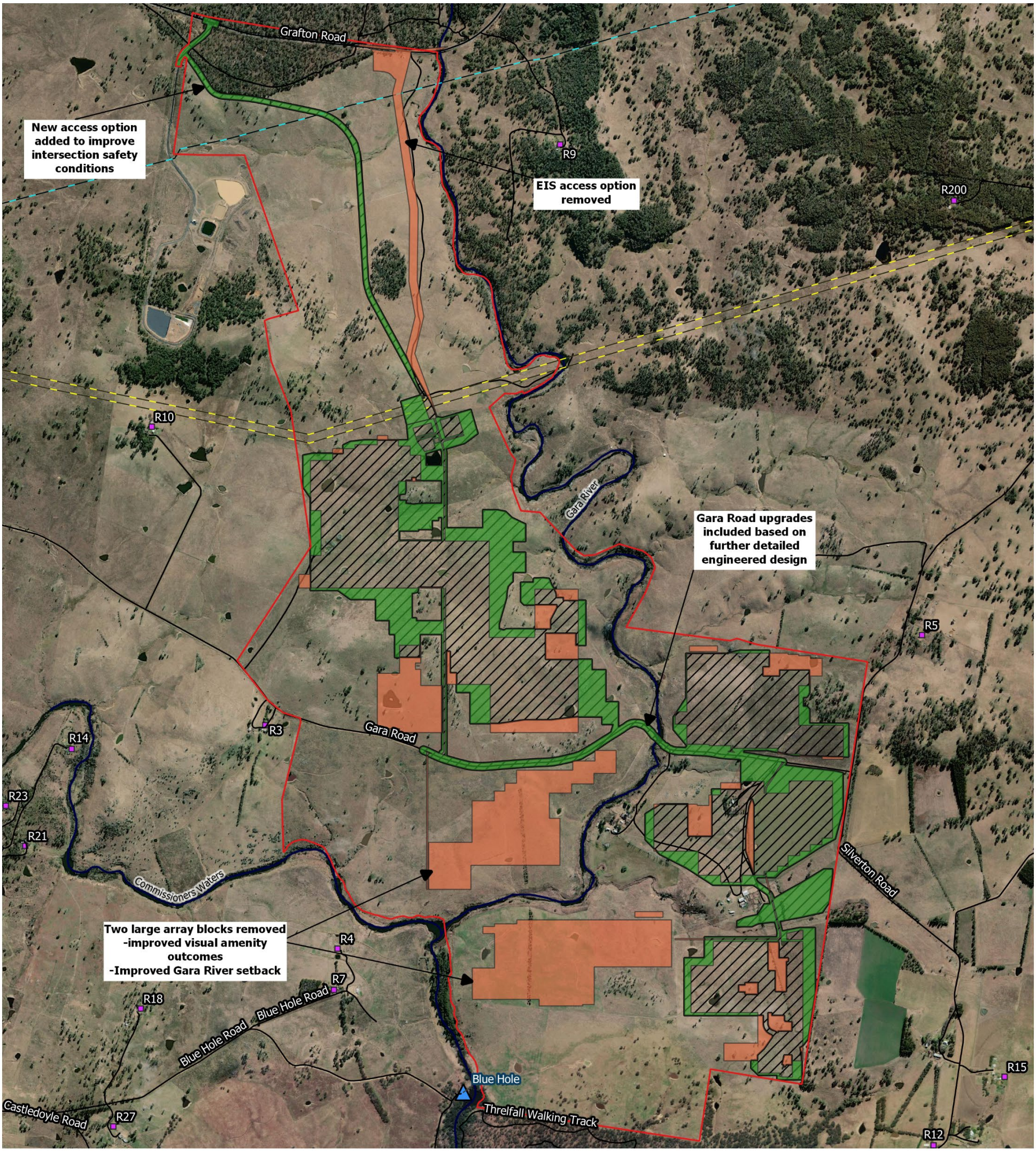

Figure 3-1 Comparison of changes made between the EIS's infrastructure layout and the now refined Development footprint.

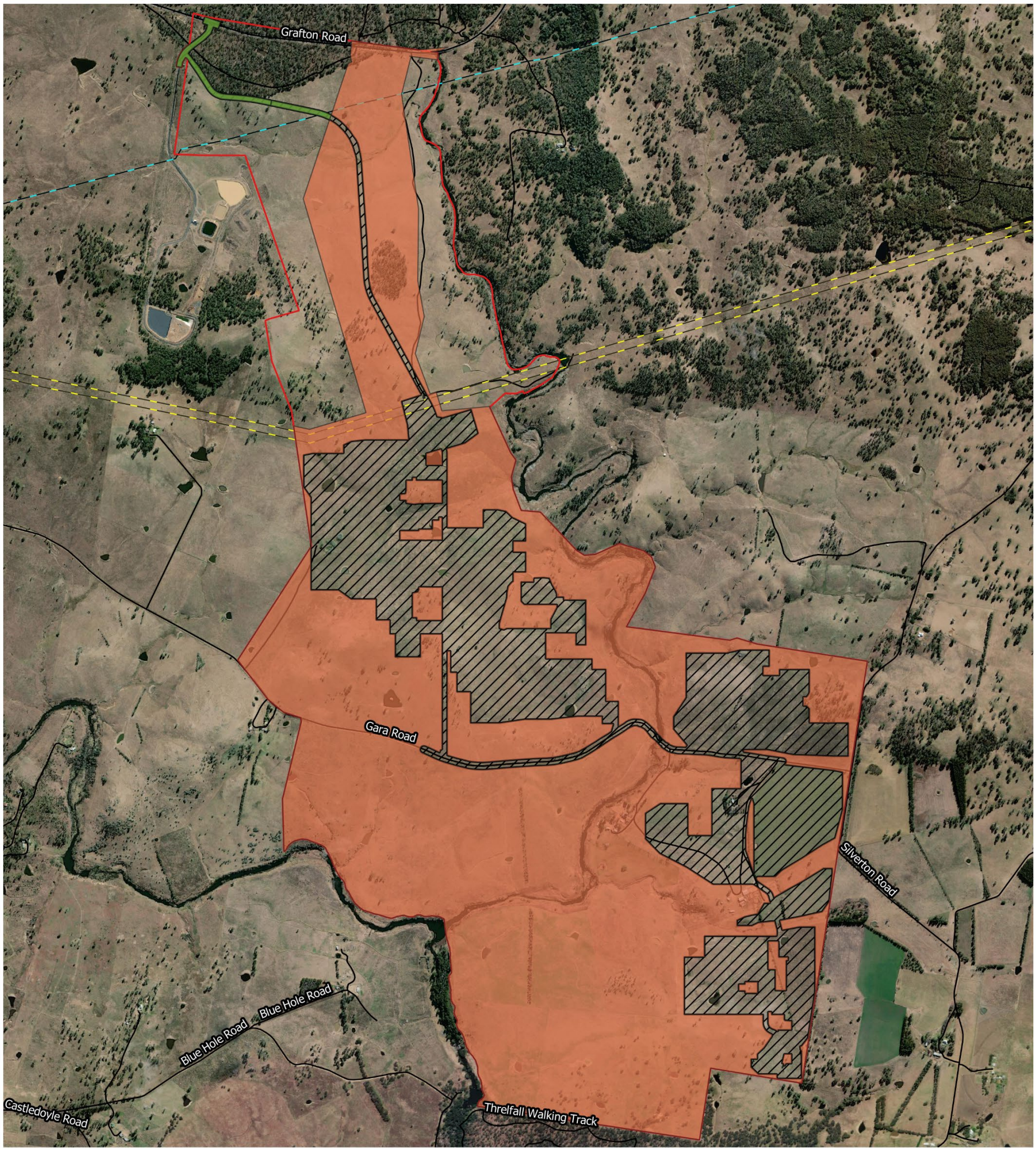

Figure 3-2 Comparison of changes made between the EIS's Development footprint and the now refined Development footprint.

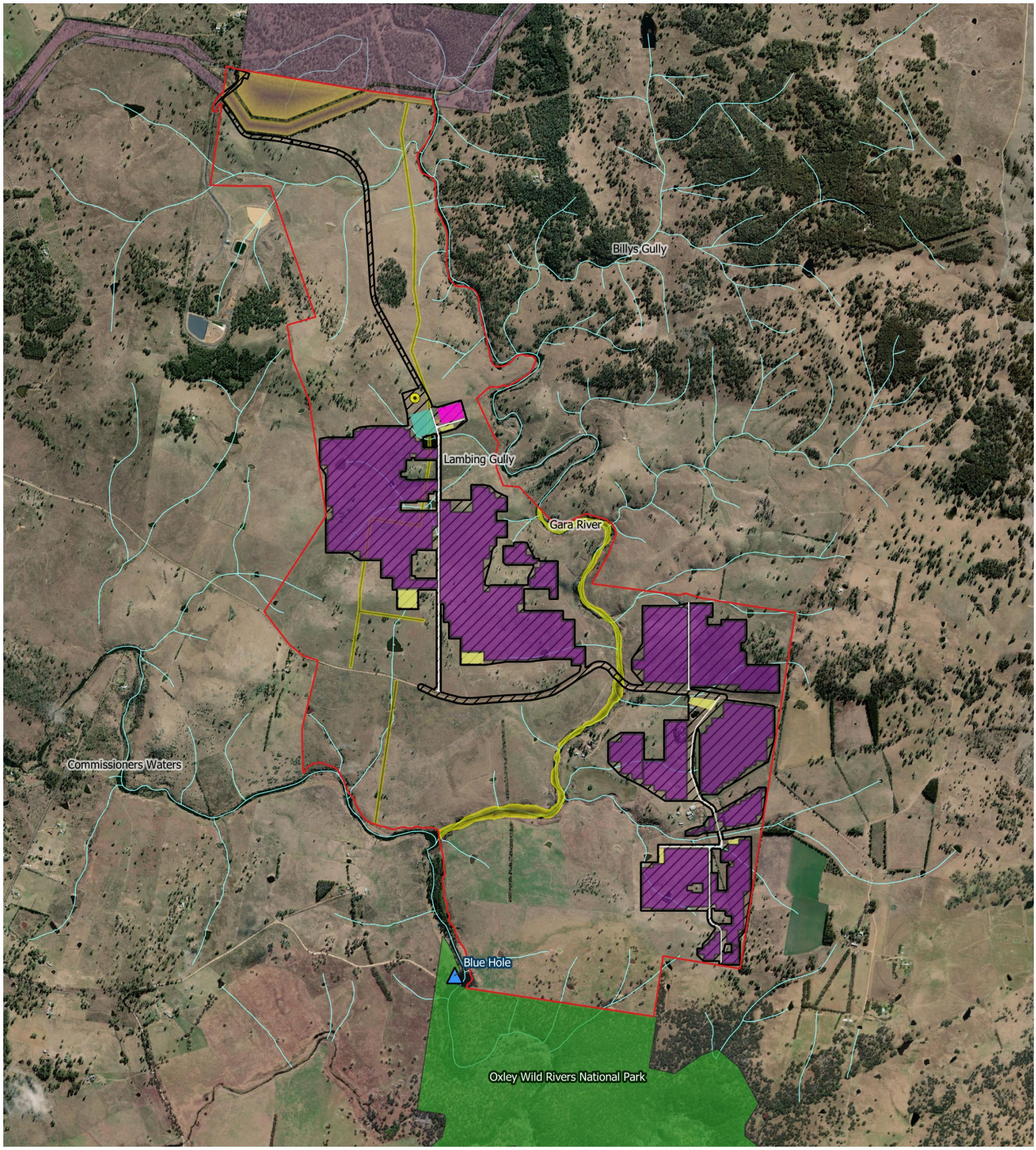

Figure 3-3 Updated environmental constraints over updated Development footprint.

3.1 Detailed descriptions

3.1.1 Refinements to the Development footprint

The EIS presented a broad Development footprint, in order to allow flexibility as the design work progressed, particularly in relation to ancillary areas impacted temporarily during construction. Most assessment in the EIS was undertaken using this broad area and so represented a 'worst case' impact assessment. The exception to this was:

- Visual impact; the montages prepared used the indicative panel area to represent a more realistic representation of the look of operational infrastructure.
- Biodiversity; the biodiversity offset obligation was calculated on a buffered indicative infrastructure layout, to represent a more realistic obligation.
- Aboriginal heritage; the test pitting survey strategy was undertaken on a buffered indicative infrastructure layout, to curtail the cost of this expensive assessment methodology.

However, this approach created uncertainty for several respondents, as evidenced in the submissions received after the public exhibition period.

In response, the Proponent undertaken additional civil design work that supports a much reduced Development footprint that still provides for sufficient flexibility in the detailed design stage that will occur closer to construction.

The refinements reflect the Proponent's desire to develop a Proposal that responds to local values and concerns. Specifically, the refinements reduce key environmental impacts :

- Less area now proposed to be impacted by the Proposal,
- Visual set back distances to dwellings increased,
- Proximity to National Park set back distances increased,
- Less impact on agricultural land,
- Less impact on better condition native vegetation and habitat.

Together, these better address potential cumulative impacts which may occur in the future, given the site's location within the New England Renewable Energy Zone.

The Development footprint area has reduced by 627ha and the solar panel area including access roads has reduced by 74.5ha. The overall reduction in the Proposal's capacity however, is not substantively affected (13% reduction; now 215MW). The key change has been to reduce temporary impact areas required for construction and include additional 'exclusion zones' to protect biodiversity and heritage areas.

Solar infrastructure has now been removed from the southwestern edge of the Proposal site (refer to Figure 3-3). The solar array areas were removed to lessen the visual impact of the solar farm. The resulting change now means that the nearest piece of solar farm infrastructure to the Blue Hole picnic area is 1,285m away and the nearest piece of solar farm infrastructure to the Threlfall walking track is 1,165m distant. These revisions bring the solar farm 810m and 498m further away from these sensitive areas respectively. Similar reductions in views are seen for residential receivers (refer Table 3-1).

No infrastructure now proposed in the moderate constraint native vegetation between Gara Road and Gara River or the area immediately south of Gara River, on the site's west. Increased setbacks from Gara River on the site's north-eastern boundary have also been implemented.

Together, these setbacks would reduce the Proposal's direct impacts on better condition native vegetation and the potential to impact Gara River. These were issues of concern to the community as highlighted during the response to submissions process.

No solar panels would be installed in areas of Box Gum Woodland with a vegetation integrity score of 30 or more. This vegetation community is a Serious and Irreversible Impact (SAII) candidate, and the updated Development footprint reduces impacts by 4ha. Only impacts that cannot be avoided (limited fencing and access alignments) are now proposed here. Hollow bearing tree impacts have also been reduced. Overall, a 6.45ha increase in native vegetation removal has occurred however, as these areas include areas considered non-native in the EIS but now classified and assessed as native vegetation, following further consultation with BCD.

Increased setbacks from the Oxley Wild Rivers National Park are now included. While habitat enhancement may be undertaken in the southern section of the Proposal site, extensive panel areas have now been removed from this area.

3.1.2 Strengthening mitigation strategies to better recognise the site's values and identify opportunities for enhancement

In response to community concerns, a further Soil impact assessment (NGH , 2022f) and Soil and Water Management Plan (NGH, 2022g) were prepared to support the mitigation strategies developed to protect soil and water resources. This increases the certainty with regard to protection of Gara River and the Oxley Wild Rivers National Park and catchment values. These are appended to the Submissions Report (NGH Pty Ltd, 2022).

The Proposal has investigated the potential to secure Box Gum Woodland offsets within the project area and demonstrated this is highly feasible. In this way, a newly established biodiversity stewardship agreement, the preferred offset option under the Biodiversity Conservation Act 2016 would provide in perpetuity protection and enhancement of these areas.

In response to consultation with the Armidale Tree Group (refer Section 5.1, and to address broader community concerns raised about water quality and impacts on Oxley Wild Rivers National Park, the Proposal has included an additional commitment, preparation and implementation of a Wildlife Corridor Connectivity Enhancement Plan. The aim of the plan would be to improve connectivity in specific areas of the site and to maintain this improvement for the life of the Proposal.

3.1.3 Changes to site access and crossing upgrades

Site access options

During further design works and consultation with Transport for NSW, it was identified that without substantial road upgrade works, the site access location presented in the EIS would not meet the safety requirements. Therefore, after an analysis of four possible locations, a new potential site access option was identified which would meet the Transport for NSW safety requirements (the access presented in the EIS is withdrawn). The Proponent proposing to seek approval for Grafton Road access. The proposed access is shown in Figure 3-1 and is detailed below. The option has the following constraints and potential impacts which are discussed further in Section 6.7:

Turning off Waterfall Way (Grafton Road), via the exiting Council landfill access road, and running east to join the Proposal site via a new access track.

- The internal access road only has width suited for two-way traffic for a length of 100m from the Waterfall Way (Grafton Road) intersection. Widening of the access would be required through a section of TSR within Lot 7003 DP1060201, and for a short distance within Armidale Regional Council's land at Lot 1 DP1206469.
- Security fencing and landfill access systems require modification to ensure no unauthorised landfill access.
- A longer internal access road would require construction within Lot 2 DP1206469.
- Culturally significant areas were identified near the route during environmental assessment which would be excluded during design and construction to avoid impacts.

It is intended that the existing property access at 1352 Grafton Road would be closed and fenced to prevent ongoing access at this point, so that all future access to Lot 2 D1206469 would occur via the new property access.

New access option will include a minimum 150m length of sealed surface immediately south of Waterfall Way, to avoid the tracking of gravel onto Waterfall Way (Grafton Road).

This access does not require any works on Waterfall Way (Grafton Road) since the existing landfill access is already designed as an Austroads Type BAL and CHR-S intersection. Widening of the existing landfill access road would be required between approximately 100m and 300m south of Waterfall Way (Grafton Road) to create a two-way road suitable for heavy vehicles to pass.

The maximum dimension design vehicle to regularly access the Oxley Solar Farm site is expected to be 25/26 metre length B-Doubles and 25 metre length semi-trailers. Swept paths have been checked to ensure that intersection geometry can permit the design service vehicles to enter and exit the site without crossing the road centreline, however this will need to be assessed in detail during the design phase. Over-dimensional vehicles will also access the site for an estimated 5 trips, which will operate under traffic control arrangements if necessary.

Gara Road upgrades and Gara River causeway upgrade

Improvements will be required along Gara Road between approximate chainages 7.78km and 9.70km, where it will be necessary for heavy vehicles to travel on Gara Road to access different parts of the Oxley Solar Farm. Such improvements would include localised widening and course straightening to allow heavy vehicles to pass, three new heavy vehicle property entrances, and upgrading in the vicinity of the Gara River causeway crossing where road width and sight distances are constrained (Figure 6-20). The access point will be in compliance with Austroads intersection guidelines and the Armidale Regional Council Engineering. Given there is little through-access at this part of the road, consideration could be given to temporary traffic control measures to control traffic in the vicinity of the Gara River crossing, in consultation with Armidale Regional Council.

The proposed causeway upgrading work aims to improve road safety, amenity and flood immunity, avoiding the need for vehicles to queue on approaches under traffic control or for 'wet' causeway crossings, while ensuring the structure requires minimal ongoing maintenance and is commensurate with long term traffic needs. The causeway would involve raising the road by up to 1.3m, that would include culverts as shown in the concept design in Figure 6-21.

The causeway upgrade will provide positive impacts as it relates to flooding along this section of road, it will benefit members of the public and the construction of the Oxley Solar Farm. The 1.3m level would allow dry crossings of the Gara River during most regular flow levels of the waterway. Construction would of the solar farm would be suspended if the causeway does become flooded. Flood depth markers would also be installed.

Figure 3-4 Concept of Causeway Upgrading, Gara Road Chainage 9.05km

3.1.4 Updated indicative subdivision layout

The Proposal would require three subdivisions; 1) The proposed onsite substation (to Transgrid), 2) The land to enable connection to the transmission lines and which will be incorporated into an expanded Lot 5 DP253346 (to the proponent), and 3) The BESS zone (to the proponent).

Boundaries of both Lot 2 DP1206469 and Lot 5 DP253346 would be modified by the proposed subdivision. Figure 3-5 shows the lots within and surrounding the Proposal site. The indicative subdivision of the site is indicated in Figure 3-6. The areas have been shown as:

- Lot A, residual agricultural land, about 208ha, to be retained by the existing landowner.
- Lot B, to enable connection to 132kV easement, about 26.5ha, to be incorporated into an expanded Lot 5 DP253346.
- Lot C, substation, about 2.4ha.
- Lot D, solar farm, about 668ha.
- Lot E, BESS, about 3ha.

Pending approval, the subdivisions would be administered through consultation with Armidale Regional Council. The subdivision areas shown are indicative only and would be formalised through subsequent subdivision applications.

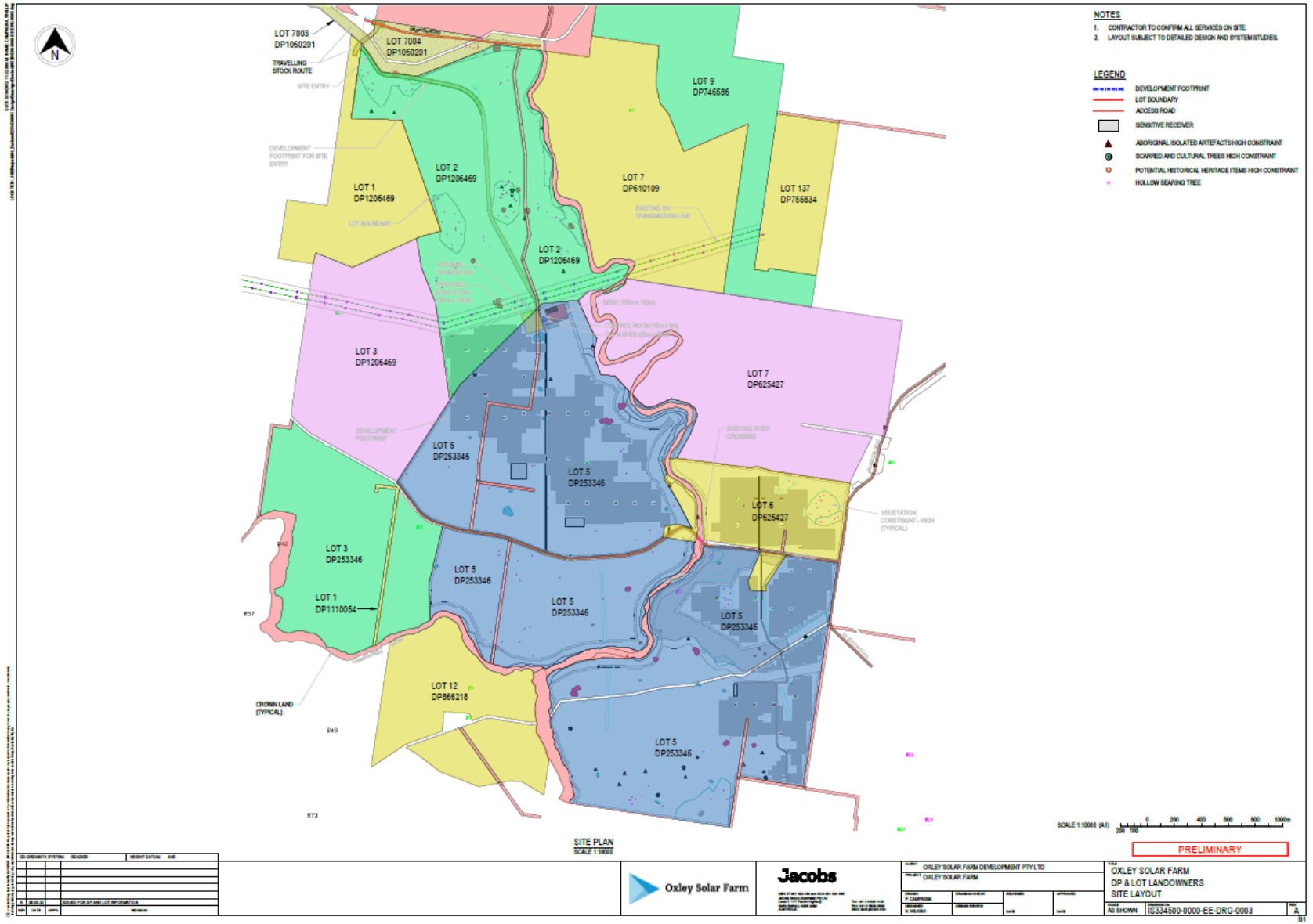

Figure 3-5 Lots and DP's (including neighbouring lots)

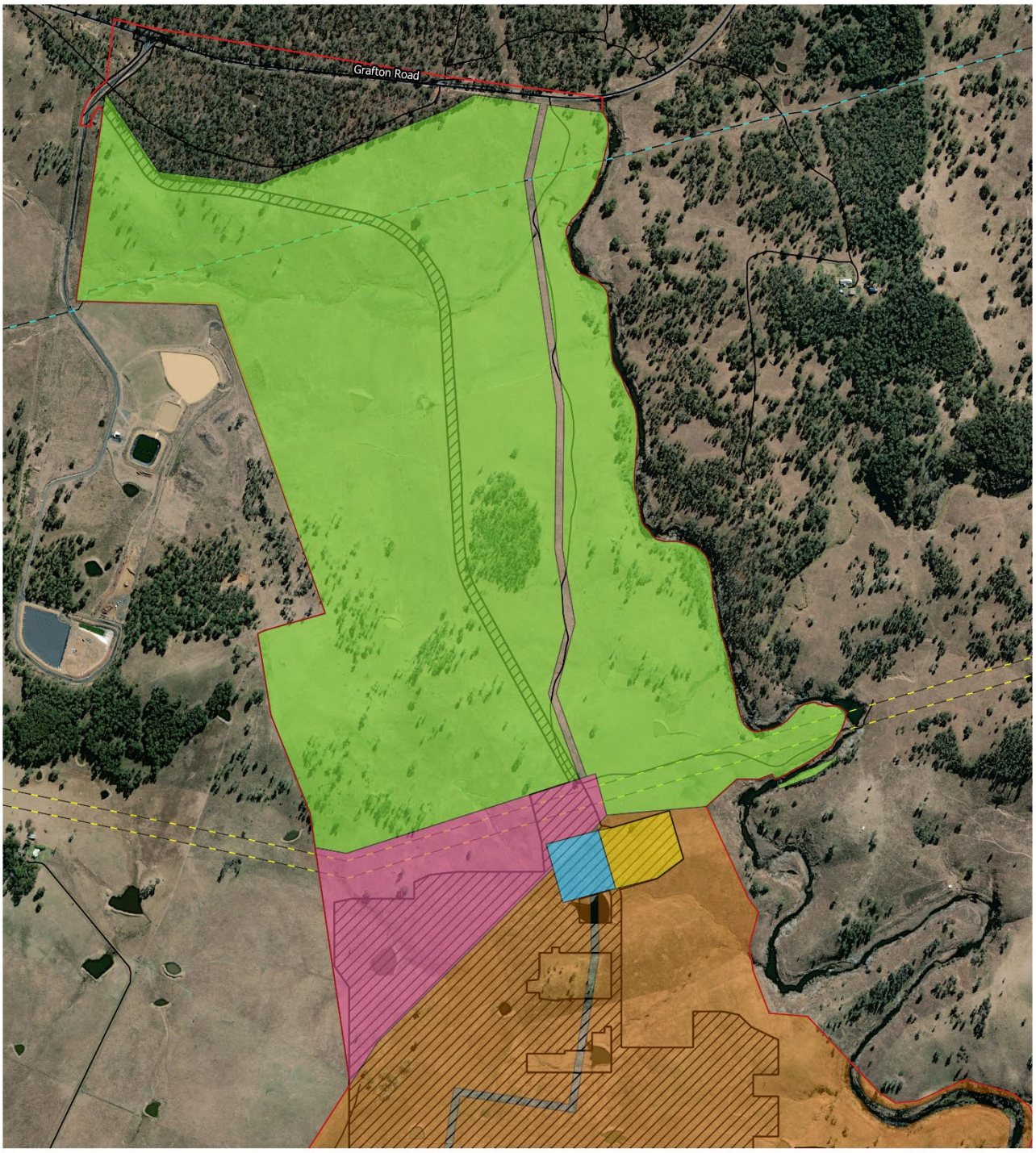

Figure 3-6 Indicative area to be subdivided from Lot 2 DP1206469 and Lot 5 DP253346

4. Statutory context

The statutory context of the Proposal remains consistent with Chapter 5 of the Oxley Solar Farm EIS (NGH Pty Ltd, 2021), except in relation to the following legislation revisions that have occurred since the EIS was lodged:

- The State Environmental Planning Policy (State and Regional Development) 2011 is now included in the **State Environmental Planning Policy (Planning Systems) 2021**
- The State Environmental Planning Policy (Infrastructure) 2007 is now part of the **State Environmental Panning Policy (Transport and Infrastructure) 2021 (TISEPP)**
- The Primary Production and Rural Development SEPP 2019 is now part of the **State Environmental Planning Policy (Primary Production) 2021**

The changes do not affect the permissibility of the Proposal:

- The Oxley Solar Farm would have an estimated capital investment cost greater than $30 million and is therefore considered SSD under Part 4 of the EP&A Act.
- Development for the purpose of a solar energy system may be carried out by any person with consent on any land, under the TISEPP.
- No Biophysical Strategic Agricultural Land (BSAL) as defined in Chapter 2 of Resources and Energy SEPP occurs within the boundaries of the Proposal site.

The State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 and State Environmental Planning Policy No. 33 – Hazardous and Offensive Development have now been consolidated into chapters of the **State Environmental Planning Policy (Resilience and Hazards) 2021.** Specific to the objectives of the State Environmental Planning Policy (Resilience and Hazards) 2021, the proposed Battery and Energy Storage System has a capacity of approximately 50MWh and does require the Proposal to undertake a Preliminary Hazards Analysis (PHA) which has been completed and is summarised in Section 6.8.

Schedule 2 of the Environmental Planning and Assessment Regulation 2000 has been revised to refer to **Section 173 of the Environmental Planning and Assessment Regulation 2021.** This change does not have a material affect on the Proposal as the SEARs are still current and addressed in the EIS and all subsequent documents such as this Amendment Report and the Submissions Report.

A consolidated statutory compliance table is attached as Appendix B of this report.

5. Community engagement

All consultation undertaken with the community and government agencies since public exhibition of the EIS is documented within the Submissions Report (NGH Pty Ltd, 2022). Only consultation specific to the amendments discussed in this report is extracted below.

5.1 Community consultation

Table 5-1 Outcomes of community consultation

Stakeholder group	Date	Consultation methods
Australian Energy Infrastructure Commissioner	June 2022	Discussed with Commissioner and staff, promotion of best practice approaches by proponents when developing large scale solar generation facilities.
State Government member for Northern Tablelands	February 2022	Briefed the member, communicated Oxley Solar responses to community submissions and shared latest project information.
Armidale Tree Group	November 2021 January 2022	Discussed ways the project could support the groups aims including habitat enhancement to promote wildlife corridor connectivity (refer details below). Letter encouraging the Proposal to implement vegetation enhancement initiatives was received from the Group.
Sustainable Living Armidale	November 2021 January 2022	Met with and briefed, Kept updated and discussed the project.
Rotary International (Armidale arm)	November 2021 February 2022	Discussed potential for support of community groups public service activities.
Tour de Rocks 2022	March 2022	Oxley Solar Sponsorship of Armidale based charity cycle ride in support of childhood cancer research
Anya's wish Walk (19 for 19 challenge)	November 2021	Oxley Solar Sponsorship of Armidale based walk in support of childhood cancer research
Liaison with residents	April 2021 to June 2022	In the various public communications (newsletter, direct contacts and website updates) from Oxley Solar offers were made to meet discuss the project. As a result of this, and on Oxley Solar initiatives, interactions occurred with members of the public and landowners. Additional specific liaison with landowners and photos (for relevant sites) occurred with receivers:

Stakeholder group	Date	Consultation methods
		R3, R4, R5 R7, R10, R18, R31, R39, R88, R200.
	During 2021 phone / email communications. Meeting on site January 2022.	R3 – Met with the landowner and family, communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint.
	November 2021	R4 – Met with landowner off site November 2021- communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint.
	November 2021	R7 - Met with landowner off site November 2021 plus communications thereafter - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Undertook visual assessment from residence January 2022.
	June 2021	R5 - Met with landowner on site June 2021 plus communications beforehand - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Undertook visual assessment from residence June 2021.
	November 2021	R10 - Met with landowner on site November 2021 - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Communication has been undertaken with this landowner over the past two years. Undertook visual assessment from residence November 2021.
	September 2020	R18 - Met with landowner on site September 2020 – electronic communication subsequently sharing latest project information including reduction of the solar panel footprint.
	June 2021	R31 - Met with landowner on site June 2021 - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Undertook visual assessment from residence June 2021.

Stakeholder group	Date	Consultation methods
	June 2021	R39 - Met with landowner on site June 2021 - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Undertook visual assessment from residence June 2021.
	June 2021	R88 - Met with landowner on site June 2021 - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Undertook visual assessment from residence June 2021.
	June 2021	R200 - Met with landowner on site June 2021 - communicated Oxley Solar responses to community submissions and shared latest project information including reduction of the solar panel footprint. Undertook visual assessment from residence June 2021.
Community newsletter communications:	July 2021 September 2021 June / June 2022	Since the project investigation commencement the Oxley Solar website has had an email and phone number available for use by the public at any time. The newsletters are located on the Oxley Solar Website and emailed to Stakeholders that have registered an interest.

5.2 Agency consultation

Table 5-2 Outcomes of agency consultation

Agency stakeholder	Date	Consultation comments
Department of Planning and Environment	May 2022	Justification for requiring more time to submit the submissions and Amendment reports, on account of further civil design work being undertaken to inform the changes, provided to DPE.
Biodiversity Conservation Service	June 2022	Discussion around new species that the BAM calculator is returning, since the EIS was submitted, and how to define suitable habitat.
	June 2022	Discussion around how to assess new Serious and Irreversible Impact Candidates that the BAM calculator is returning, since the EIS was submitted.
Northern Region	October 2020	Staff were contacted to review proposed access

Agency stakeholder	Date	Consultation comments
Transport for NSW		arrangements off Waterfall Way and advise of any proposed roadworks which may impact the construction of the Oxley Solar Farm. Comments provided on 15 October 2020 have been addressed within the Amendment Report and attached *Updated Traffic Impact Assessment* (New England Surveying & Engineering , 2022).
NSW Heritage	December 2021	Site cards from test pitting surveys registered.
Armidale Regional Council	Initial contact with Armidale Regional Council was in early 2019 Numerous in-person and other communications from April 2021 to May 2022	Engineering staff contacted to seek advice and information on roads and access, traffic volumes, crash history and any known traffic issues in proximity to the site. Advice was received that Council have no capital works planned in the area, and there are no identified road safety issues. Council staff also noted that development consent (DA-112-2019, PPSNTH-6) had been issued for the adjoining 29.9MW Stringybark Solar Farm having access from Gara Road. There has been ongoing liaison and consultation with Armidale Regional Council staff and elected members over all stages of the project since early 2019. Since the EIS exhibition in March 2021 Council has been regularly consulted and informed.

Registered Aboriginal Parties (RAPs)

Since the EIS was submitted, the RAPs for this Proposal were contacted and involved in the development and implementation of a test pitting survey program to better understand the potential Aboriginal cultural heritage impacts of the Proposal.

- On 27 March 2020, an Assessment Methodology (survey with provision for testing if required) document was sent to RAPs for review and comment.
- Test pitting was undertaken on 21–24 June, 26 June, 28 June – 1 July 2021 and 31 August – 3 September 2021, by NGH archaeologists and a rotation of representatives from the same five RAP groups engaged for the 2020 surveys.
- The report summarising the results was forwarded for review at the end of May 2022, allowing a 28-day review period.
- Comments provided by one RAP group and impact assessment finalised, 30 June 2022.

Full details are provided in the attached *Archaeological Report – Subsurface Testing* (NGH, 2022c).

A minor change to the RAPs-reviewed report was undertaken in July 2022, to extend the Development footprint where it crossed the 133kV transmission line, to allow sufficient space for this connection. This impacted a small additional area of a previously identified PAD (approx. 100m x 100m) which was determined to have been sufficiently previously subject to archaeological testing. The RAPs were notified of this change to the impact area in July 2022, and an updated copy of the final report provided at this time. This change did not impact the conclusions or mitigation measured proposed in Section 6.4.

6. Assessment of impacts

The changes described in Section 3 of this Amendment Report would have similar types of impacts as those presented in the EIS. In most cases, the changes represent a reduction in impacts, as the physical disturbance area has been substantively reduced; the Development footprint has been reduced by 627ha and the solar panel array area including access road has been reduced by 74.5ha). In addition, specific setbacks and exclusion zones have been added to ensure the Proposal's responds to the issues raised during the public exhibition.

However, given the changes to the Development footprint, updated assessments were required to ensure the anticipated impacts were accurately characterised and that the mitigation strategies were appropriate.

The updates specialist assessments appended (Appendices D – L) now include:

D. *Updated Biodiversity Development Assessment Report* (NGH , 2022a)
E. *Biodiversity offset strategy* (NGH, 2022b)
F. *Updated Visual Impact Assessment* (Moir Landscape Architecture, 2022)
G. *Updated Hydrology assessment* (Footprint sustainable engineering , 2022)
H. *Archaeological Report – Subsurface Testing* (NGH, 2022c)
I. *Updated Historic Heritage Assessment* (NGH, 2022d)
J. *Updated Noise and Vibration Impact Assessment* (Renzo Tonin & Associsates , 2022)
K. *Updated Traffic Impact Assessment* (New England Surveying & Engineering , 2022)
L. *Updated Preliminary Hazard Analysis* (NGH, 2022e).

Summaries of these assessments are provided below with the addition of an updated cumulative impact assessment. The consolidated safeguards and mitigation strategies are updated to reflect these assessments and other changes made in response to the public and agency submissions and are included as Appendix C.

6.1 Biodiversity

6.1.1 Background

Changes to the assessment

NGH prepared the biodiversity assessment of the Oxley Solar Farm (Biodiversity Development Assessment Report; BDAR V2.2), submitted to support the EIS in March 2021, would have resulted in impacts to approximately 87ha of native vegetation [10] including, most occurring in Box Gum Woodland TEC, as well as impacts to potential habitat for five species-credit species (assumed, rather than confirmed to occur, due to seasonal survey timing limitations).

[10] The EIS presented a broad Development footprint, in order to allow flexibility as the design work progressed, particularly in relation to ancillary areas impacted temporarily during construction. However, the biodiversity offset obligation was calculated on a buffered indicative infrastructure layout, to represent a more realistic obligation.

In response to the public and agency submissions, the Oxley Solar Farm has made substantive additional changes to the Proposal. In comparison to the BDAR v2.2, further 'avoid and minimise' actions were undertaken and are documented in BDAR v3 (Appendix D). Relevant to reducing biodiversity impacts, these included:

- More certainty in relation to impact areas – a constructability buffer was added to ensure all temporary and permanent impacts were captured.
- Increased set backs to Gara River in the central section of the site.
- Reduced Box Gum Woodland impacts, particularly in areas with higher vegetation integrity.
- More certainty in relation to the ability to offset Box Gum Woodland impacts.

Two other changes have been required to ensure the Proposal has sufficient certainty in relation to access. The included additional impact areas now assessed by BDAR V3:

- The access option previously presented in the EIS has been replaced by alternative access option.
- Causeway upgrades across the Gara River to improve access during flooding events for the Proposal; increased road and crossing impact areas are included to allow for these upgrades.

Furthermore, as BCD did not endorse all areas proposed to be classified as Category 1 Land (historically cultivated land thereby exempt from most aspects of the biodiversity assessment), the Category 1 mapping was updated in BDAR V3. BCD stated in their submission to BDAR v2.2 that the area between Gara Road and Gara River should not be classified as Category 1 land and should be assessed. This has now been updated in BDAR v3. The Proponent elected to remove panels from most of these areas.

Issues raised by the community that have been considered further in the refined Development footprint and are addressed specifically in the Submissions Report (NGH Pty Ltd, 2022) include:

- Protection of Gara River and waterways – No infrastructure now proposed in the moderate constraint native vegetation between Gara Road and Gara River or the area immediately south of Gara River, on the site's west. Increased setbacks from Gara River on the site's north-eastern boundary have also been implemented. Together, these setbacks would reduce the Proposal's direct impacts on better condition native vegetation and the potential to impact Gara River.
- Impacts to wildlife corridors - the Proposal has included an additional commitment to the preparation and implementation of a Wildlife Corridor Connectivity Enhancement Plan. The aim of the plan would be to improve connectivity in specific areas of the site and to maintain this improvement for the life of the Proposal.
- Habitat loss from clearing – further reductions to clearing, particularly in better condition Box Gum Woodland now afforded.
- Impacts to Koala habitat – further information provided about the value of the site as Koala habitat.
- Timing of assessment (during drought) – further information provided about the survey methodology and limitations.
- Bird deaths (phenomenon named the 'lake effect' where birds attempt to land on solar panels believing they are water bodies) – further information provided to address this issue.

The responses to these issues are presented in the Submissions Report (NGH Pty Ltd, 2022) and not duplicated here.

Statutory requirements

The assessment method used to update the biodiversity impact assessment is the Biodiversity Assessment Methodology (BAM) 2020, pursuant to the Biodiversity Conservation Act 2016. As required by the BAM, biodiversity impacts have been assessed through comprehensive mapping and assessment and for impacts that could not be avoided, an offset obligation is calculated.

Targeted surveys were undertaken over four survey periods:

- 20–22 August 2019
- 25–29 November 2019
- 4–8 May 2020
- 28–30 September 2020

No further field surveys were undertaken between BDAR v2.2 and BDAR v3.

All BCD comments provided during public exhibition are addressed in BDAR v3. In addition, BCD were consulted regarding the appropriate species polygons to represent two species assumed to occur:

- Tusked Frog *Adelotus brevis*
- Glandular Frog *Litoria subglandulosa.*

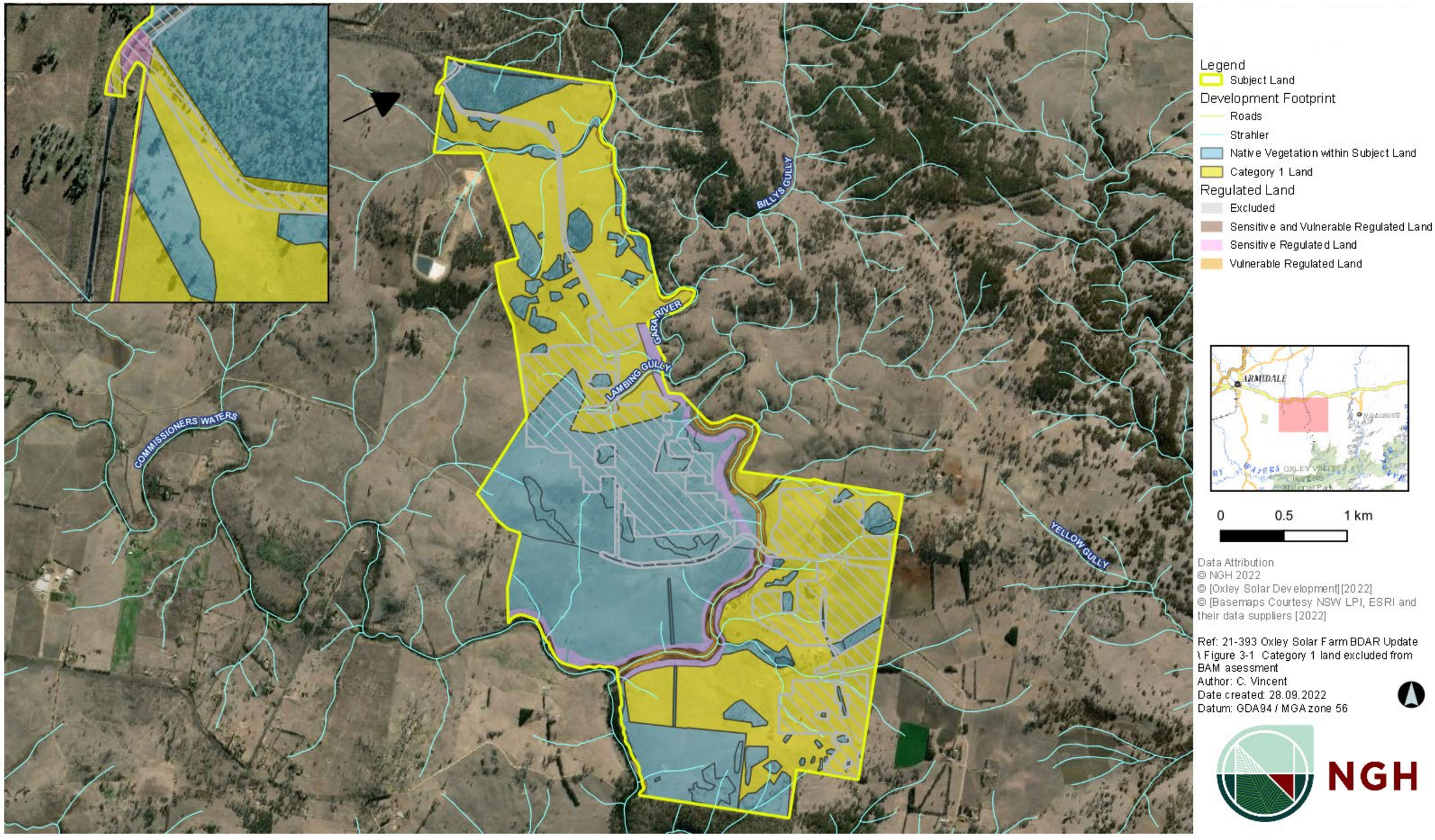

Figure 6-1 Updated Category 1 land mapping, reflecting BCD consultation.

6.1.2 Key findings of the assessment

The change in impacts between the BDAR which supported the EIS (BDAR v2.2) and the updated assessment appended to this report (BDAR v3) is summarised in Table 6-1. It is noted that:

- The method for calculating impacts in each zone has been updated since BDAR v2.2. This has resulted in an increase in impact areas for some zones due to the additional areas for the access road and Gara Road crossing and causeway upgrades, now included, as well as a generous constructability buffer added to ensure all temporary and construction impacts are adequately captured.
- The zone area increases show that these are generally in the lower condition (lower VI) zones, appropriately avoiding and minimising impacts, with particular focus on reducing impacts in the two SAII zones (zones 2 and 4).
- The method for calculating threatened species polygons has been updated since BDAR v2.2. This has resulted in an increase in assumed area for some species, namely, the Tusked Frog, Southern Myotis and Austral Toadflax, not due to an increase in the project's impacts.

Table 6-1 Comparison in impacts between BDAR V2.2 (submitted with the EIS) and BDAR V3 (appended to this Amendment Report)

Entity	BDAR v2.2 Submitted with EIS (ha)	BDAR 3.0 Submitted with Amendment Report (ha)	Net (ha)
Zone 1 (510 Woodland) (better condition, considered a Serious and Irreversible Impact candidate)	0.03	0.29	+ 0.26
Zone 2 (510 Woodland) (better condition, considered a Serious and Irreversible Impact candidate)	5.4	1.47	- 3.93
Zone 3 (510 Derived Native Grassland)	0.6	2.04	+ 1.44
Zone 4 (567 Woodland) (better condition, considered a Serious and Irreversible Impact candidate)	3.9	1.16	- 2.7
Zone 5 (567 Derived Native Grassland)	76.9	88.58	+ 11.68
Zone 6 (510 Woodland) (better condition, considered a Serious and Irreversible Impact candidate)	0.2	0.18	- 0.02
Hollow bearing trees to be removed by the Proposal.	20 trees	7 trees	-13 trees
Tusked Frog *Adelotus brevis* (assumed present) potential habitat	26	35.57	+ 9.57
Glandular Frog *Litoria subglandulosa* (assumed present) potential habitat	26	6.83	-19.17
Southern Myotis *Macropus* (assumed present) potential habitat	7.6	24.25	+ 16.65
Hawkweed *Picris evae* (assumed present) potential habitat	4.9	1.47	-3.43
Austral Toadflax *Thesium australe* (assumed present)	86.7	93.31	+ 6.61

The change in the offset obligation generated by the clearing is presented below in Table 6-2. The vegetation integrity score (scored out of 100) indicates the better condition zones, which can be seen to have had further impact reductions (zones 2 and 4).

Table 6-2 Comparison in credit requirements between BDAR V2.2 (submitted with the EIS) and BDAR V3 (submitted with the Amendment Report)

Zone ID	PCT ID	Vegetation integrity score	PCT name	BDAR v2.2 Submitted with EIS	BDAR 3.0 Submitted with Amendment Report	*Net*
1	84_Riparian	49.8	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	1	4	*+3*
2	510_Woodland	69.0	Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion	186	38	*-148*
3	510_Derived Native Grassland	26.6	Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion	7	21	*+14*
4	567_Woodland	37.7	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	73	16	*-60*
5	567_Derived Native Grassland	24.6	Broad-leaved Stringybark – Yellow Box shrub/grass open forest of the New England Tableland Bioregion	947	818	*-129*
6	84_Sedgeland	76.4	River Oak – Rough-barked Apple – red gum – box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	6	3	*-3*
Scattered Trees	510		Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tableland Bioregion	0	2	*+2*

Species Credit Species	BDAR v2.2	BDAR 3.0	*Net*
Tusked Frog *Adelotus brevis* (Endangered population in the Nandewar and New England Tableland Bioregions)	12	712	*+700*
Glandular Frog *Litoria subglandulosa*	12	138	*+126*
Southern Myotis *Macropus*	220	299	*+79*
Hawkweed *Picris evae*	186	51	*-135*
Austral toadflax *Thesium austral*	910	59	*-851*

Areas of land that meet the Cat 1 land requirement (updated in response to BCD comments) do not generate offsets under the BAM and are mapped below alongside areas generating an offset requirement, in Figure 6-2.

Retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets scheme.

Offsets required under the EPBC Act

The BDAR includes assessment of Commonwealth entities listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The evaluation concluded significant impacts are not anticipated and therefore referral and offsets for EPBC Act listed entities is not considered warranted.

Offset strategy

An offset strategy has been completed and is appended in Appendix E.

Using BAM data collected for the biodiversity assessment, all subject land surveyed that is not within the Development footprint has been included in this table to estimate the number of credits that may theoretically be generated in a Stewardship site established immediately adjacent to the Development project. This is an estimate, subject to further survey requirements to confirm the results, but is considered conservative as no 'active management' of these areas has been assumed, which would have the effect of increasing credits generated per hectare.

The impacts of the solar farm would include direct clearing as well as shading impacts from panels but have been assumed for the purpose of the investigation to incur 100% loss of vegetation and habitat within the Development footprint, which is also conservative.

The strategy provides confidence to the proponent, community and agency stakeholders that the Proponent has identified a suitable suite of options to address its biodiversity liability under the *Biodiversity Conservation Act 2016* (BC Act).

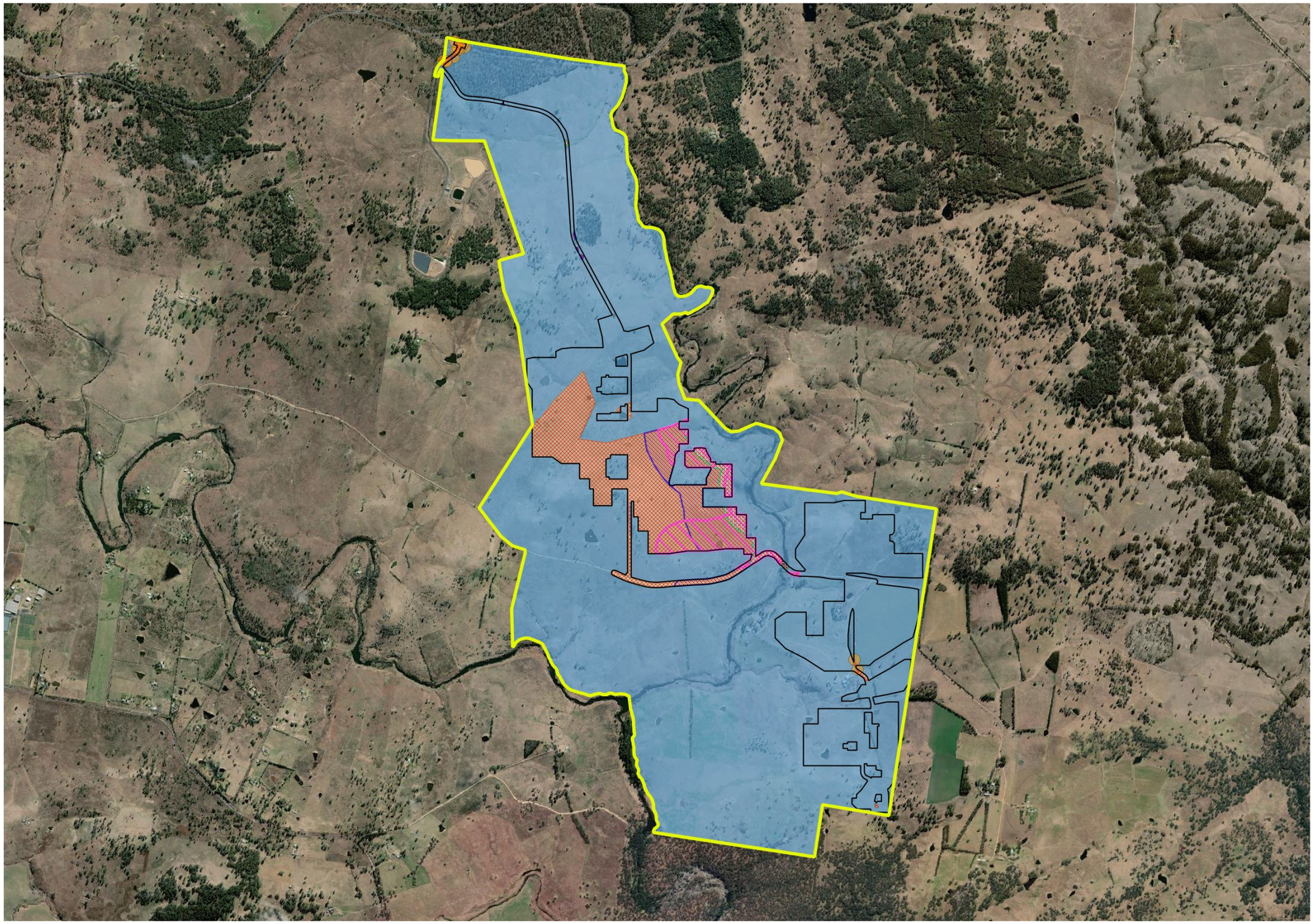

Figure 6-2 Impact areas generating offsets (ecosystem or species credits) and areas not requiring offsets

6.1.3 Updated mitigation measures

The largest impact expected from this solar farm is the impact of solar panels and shading on derived native grassland onsite. The assumption that solar panel arrays will result in 100% impact on groundcover is used throughout the biodiversity assessment because there is a lack of scientific data proving otherwise. It is recommended that monitoring of groundcover under the solar panels is undertaken:

1. Primarily to ensure that ground cover is retained to resist erosion and potential weed ingress is managed,
2. But also to provide information to the scientific community regarding the impact of shading on native grasslands in this location.

It may be that the conservative assumptions of this assessment (regarding 100% impact on vegetation) are an unnecessarily high impost on proposals that assist the transition to reduced greenhouse gas emissions and that thereby have many broader environmental benefits.

Adaptive management during construction and operation will be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and is key to the successful implementation of the relevant management plans. This will allow ongoing flexibility to manage objectives, allow for relevant feedback and modifications. Construction management plans will contain management plans for flora and fauna, which will have an adaptive management component. This includes measures to monitor predicted impacts of vehicle strikes, thresholds for species mortality that are based on relevant literature, which will trigger adaptive management actions, and any measures proposed to mitigate potential impacts.

The key management plans to commence in construction and continue throughout operation and ensure all mitigation measures are effectively implemented on the ground will be:

- Biodiversity management plan
- Groundcover management plan
- Wildlife corridor connectivity enhancement plan.

A general summary of the key measures required to mitigate the impacts of the Proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in full in the Appendix D BDAR.

Only one change to the mitigation strategies presented in BDAR v2.2 has been included (shown underlined). The complete and updated set of mitigation commitments is provided in Appendix C.

- Direct impacts from the clearing / modification of vegetation and habitats
    - Time works to avoid critical life cycle events on threatened species
    - Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or wildlife handler
    - Relocate habitat features (fallen timber, hollow logs) from within the development site.
- Indirect impacts

- Wildlife Corridor Connectivity Enhancement Plan to improve connectivity in specific areas of the site and to maintain this improvement for the life of the project.
- Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed
- Adaptive dust monitoring programs to control air quality.
- Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.
- Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.
- Temporary fencing to protect significant environmental features such as riparian zones.
- Preparation of a Biodiversity Management Plan to regulate activity in vegetation and habitat adjacent to the proposed development.
- Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise.
- Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill.
- Preparation of a Groundcover management plan to monitor ground cover beneath the solar array modules.
- Erosion and sediment controls.

- Prescribed impacts
  - Appropriate landscape plantings of local indigenous species to replace loss of planted vegetation Adaptive dust monitoring programs to control air quality.
  - Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment Temporary fencing to protect significant environmental features such as riparian zones.
  - Enforce site speed limits to reduce impacts of vehicle strikes on threatened fauna.
  - Involve a local Landcare group or educational institution in ongoing biodiversity monitoring and enhancement.
  - Plain wire instead of barbed used on top of the perimeter fence and stock fencing to reduce impacts on birds and Squirrel Glider.
  - Perimeter fence would be located to avoid, where possible, segmenting patches of native vegetation to facilitate native fauna movements.
  - Install approximately 120 nesting boxes for birds and mammals across the development site.
  - Creek lines and retained dams would be planted with native riparian vegetation and transformed into small, created wetlands for wildlife.
  - Appropriate landscape plantings of local indigenous species (where possible) within the development site.

6.2 Visual impacts

6.2.1 Background

Changes to the assessment

Moir Landscape Architecture Pty Ltd prepared the Landscape and Visual Impact Assessment (LVIA) for the original Oxley Solar Farm indicative layout, which was exhibited in March 2021 (NGH 2021).

Concern about visual impacts was the number one issue raised in the consultation with the community. Specific comments included:

- Proximity of the Proposal to the and concern about impacts on the visual amenity of Blue Holes picnic area in Oxley Wild River National Park, including specific viewpoints along Blue Hole Road and Threlfall Walking track.
- Concern about direct and cumulative impacts on scenic amenity, including landscape views, for surrounding landowners and residents along Castledoyle, Milne, Andersons, Blue Hole, Silverton and Gara Roads.
- Questioning the effectiveness of vegetative screens to mitigate visual impact given the Proposal site's topography and the growth rate of proposed screening species.
- Concern about glare.

In response to the public and agency submissions, the Oxley Solar Farm has made substantive additional changes to the Proposal. Relevant to reducing visual impacts, these included a reduced development footprint and solar panel area. Specifically:

- No infrastructure is now proposed between Gara Road and Gara River or the area immediately south of Gara River, on the site's southwest.
- Increased setbacks from Gara River on the site's north-eastern boundary.
- No infrastructure now proposed in land immediately adjoining the Oxley Wild Rivers National Park.

In addition, the updated assessment includes the following changes:

- Access and road upgrades: turning off Waterfall Way (Grafton Road) via the existing Council landfill access road and running east to join the Proposal site via a new access track.
- Causeway upgrades across Gara River.
- Strengthened mitigation strategies in relation to wildlife corridors which will increase the amount of visual screening as well as provide habitat for wildlife.

In relation to visual impacts, the key changes are quantified in Table 6-3 and Figure 6-3.

The visual impact assessment has now been updated to provide a full assessment of the revised visual impacts associated with the updated Development footprint (*Addendum to Landscape and Visual Impact Assessment,* Appendix F).

Table 6-3 Project changes summary

Proposed change	EIS Proposal	Amended Proposal
Scale of development revisions		
Solar Panel Area (ha) (including access roads)	269.78	**195.25**
Number of solar panels	715,680	**385,280**
Development footprint area (ha)	895	**268**

Statutory requirements

The assessment methodology includes:

- Preparation of two zone of visual influence diagrams to determine areas that would be shielded from views by topography (existing screening by vegetation or structures and attenuation of views with distance are not accounted for in this modelling technique).
- Updated viewpoint assessment.
- Updated dwelling assessments.
- Assessment of cumulative impacts, including nearby Metz Solar Farm, Stringybark Solar Farm and Olive Grove Solar Farm.
- Provision of a glint and glare assessment for all roads and dwellings within 2km.
- Updated mitigation methods, including a revised landscape plan.

There are no statutory guidelines for the assessment of visual impact of solar farms. The assessment references the *Guidelines for Landscape and Visual Impact Assessment (GLVIA3), Residential Visual Amenity Assessment* (RVAA), considered best practice, and Moir LA's extensive professional experience in undertaking landscape and visual assessments for infrastructure projects, including solar farms.

The updated assessment also addresses the DPE Request for Information (2 June 2021):

> *Visual – detailed assessment and consideration of visual impacts of the project on all non-associated residences and public viewpoints (including Oxley Wild Rivers National Park), including potential cumulative impacts with nearby solar farms and a glint and glare impact assessment.*

Two additional public viewpoints have now been assessed.

For glint and glare, the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories has been used to evaluate glare. This tool is recognised by the Australian Government Civil Aviation Safety Authority (CASA). The glint and glare analysis is based on a worst case scenario and does not take into account factors that would reduce the potential to experience glint and glare such as weather conditions (i.e., cloud coverage), intervening elements (such as vegetation / buildings etc) that reduce the potential to view the project and therefore eliminate opportunities to experience glint and glare.

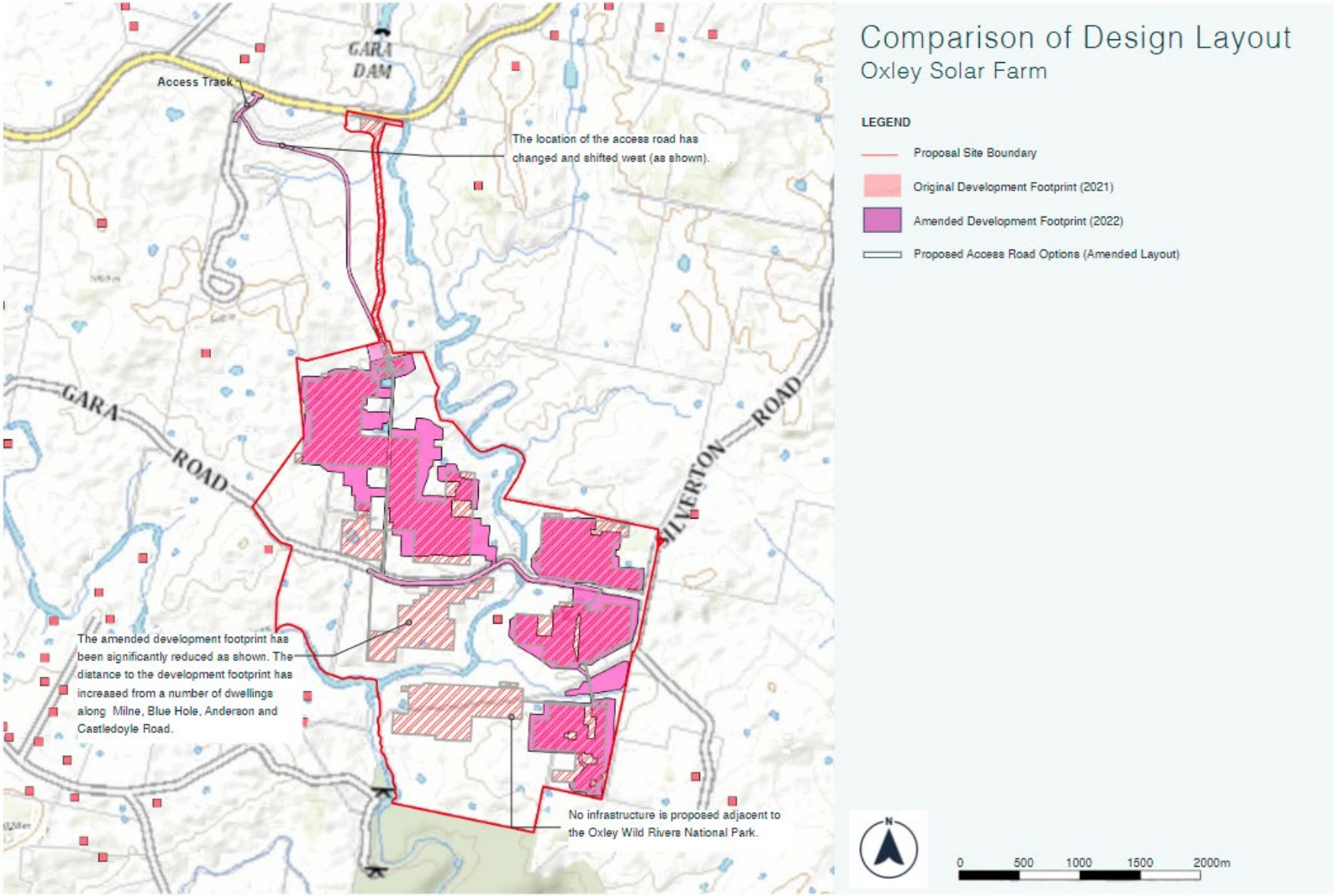

Figure 6-3 Comparison of the layout assessed in the EIS and the now refined Development footprint assessed in this Amendment report

6.2.2 Key findings of the assessment

Theoretical visibility

Comparative Zone of Visual Influence (ZVI) figures have been prepared for Oxley Solar Farm to illustrate the variation between the theoretical visibility of the original and amended proposals.

Visual influence diagrams are a confident way to determine areas with no visibility of the arrays due to topographic screening. Comparison of the two zone of visual influence diagrams shows the visibility of the array has been significantly reduced. As this modelling does not factor in existing screening by vegetation and structures and attenuation of views with distance (at 3km views will be much reduced due to distance), the actual visibility of the arrays would be significantly less than that portrayed. The diagrams show:

- A reduction in the overall extent of visibility from areas of land to the south and west of the Project.
- Visibility from land to the east remains largely consistent with the original Proposal, however receptors are limited in this area.
- Views from nearby dwellings to the west have been significantly reduced.
- A reduction in views of the Proposal from the Oxley Wild Rivers National Park to the south of the Site.
- The updated ZVI is provided below, Figure 6-4.

Assessment of visual impact to public view points (unmitigated[11])

The Amended proposal has resulted in reduced visual impact ratings for five of the public viewpoint locations assessed. The two viewpoints with a high visual impact rating are where the Proposal site boundary is located on Silverton Road. Proposed on-site screen boundary planting along this road is anticipated to significantly reduce the visual impact from the low use road once established. Moderate impacts are predicted for Milne Road (unchanged from previous assessment). All other view points are rated nil to low (including Blue Hole Road).

The Proposal site is bounded to the south by the Oxley Wild Rivers National Park. The Amended Proposal has removed all panels within close proximity of the National Park and two additional public viewpoints have been assessed from the Oxley Wild Rivers National Park in the updated assessment (Viewpoint OSF16 and OSF17, provided below). The assessment concludes:

- The Amended Proposal eliminates the potential to view the Project from Blue Hole Picnic Area (Viewpoint OSF16, Figure 6-5).
- Opportunities to view the proposal from Threlfall Walking Track are limited due to vegetation (Viewpoint OSF17, Figure 6-6).

[11] Unmitigated: before any measures to reduce impacts are considered.

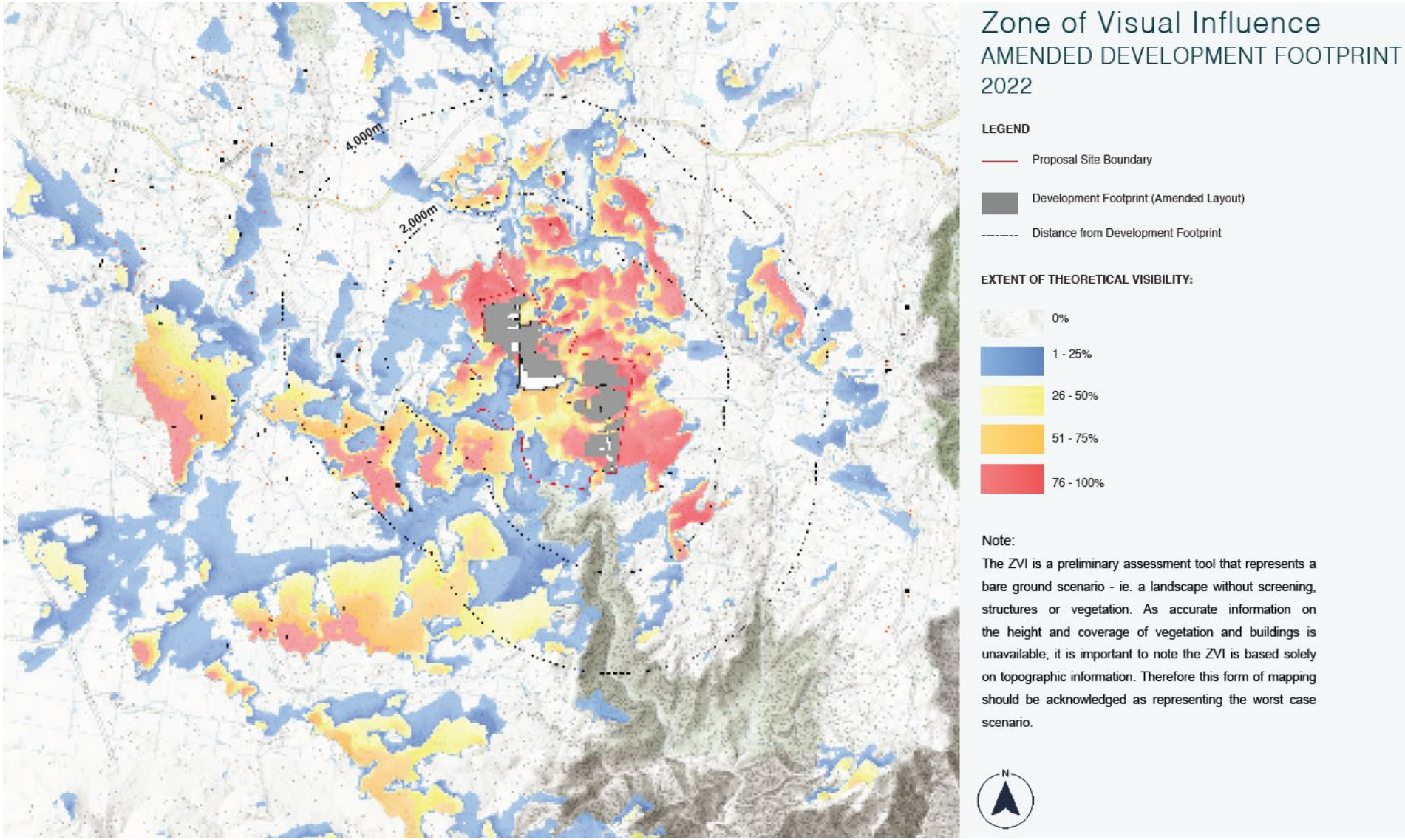

Figure 6-4 Updated theoretical visibility, based on topography

Figure 6-5 View from Blue Hole Picnic Area (Oxley Wild Rivers National Park) OSF16

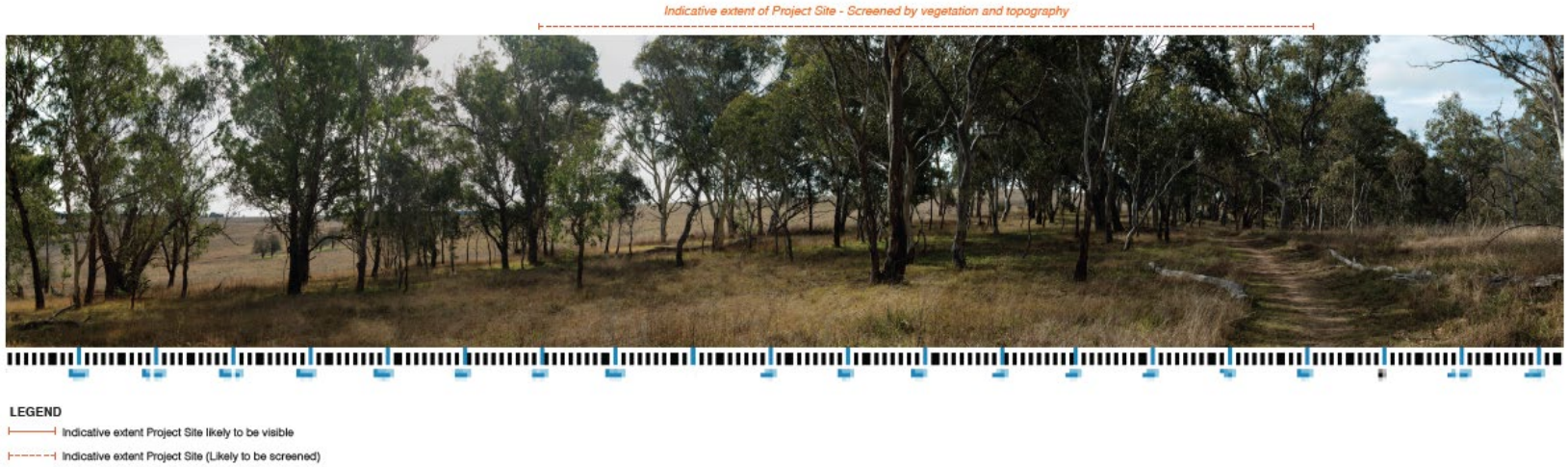

Figure 6-6 View from Threlfall Walking Track (Oxley Wild Rivers National Park) OSF17

Assessment of visual impact to dwellings (unmitigated)

It is likely a number of surrounding residences would have varying degrees of visibility toward the development site. However, some residences would have fragmented views due to existing vegetation, orientation of the dwelling or topography. A revised assessment of dwellings within 2km has determined the level of visual impact resulting from the Amended Layout and concluded:

- 14 of the 28 non-involved dwellings assessed will have no views to the Project due to topography and / or vegetation.
- Of the remaining 14 non-involved dwellings (refer to Table 6-4):
    - 1 has been assessed as having a moderate visual impact rating (Dwelling R4, based on a desktop assessment alone, refer to Figure 6-7).
    - 8 have been assessed as having a low visual impact rating
    - 5 have been assessed as having a negligible visual impact rating.

The LVIA which formed part of the EIS submission identified Castledoyle as the most populated area within close proximity to the Project Site. Dwellings associated with Castledoyle Road are generally set back from the roadside and a large majority have wind break planting along boundaries and fence lines. Although views to the original infrastructure layout were limited, the Proponent has addressed community concerns and the Development footprint has now been reduced to further reduce visibility from Castledoyle.

Residences on the eastern side of Milne and Andersons Road were identified as likely to have views to the Proposal to the east in the EIS submission. The Amended Development footprint has also reduced the visual impact from non-involved dwellings in this area.

Table 6-4 Updated visual impact assessment ratings

Assessment of visual impact to public view points (unmitigated)	
High visual impacts	**2;** Silverton Road
Moderate visual impacts	**1**
Low visual impacts	**2**
Negligible visual impacts	**6**
Nil visual impacts	**6**
Assessment of visual impact to dwellings (unmitigated)	
High visual impacts	**0**
Moderate visual impacts	**1;** R4 located on Blue Hole Road
Low visual impacts	**8**
Negligible visual impacts	**5**
Nil visual impacts	**14**

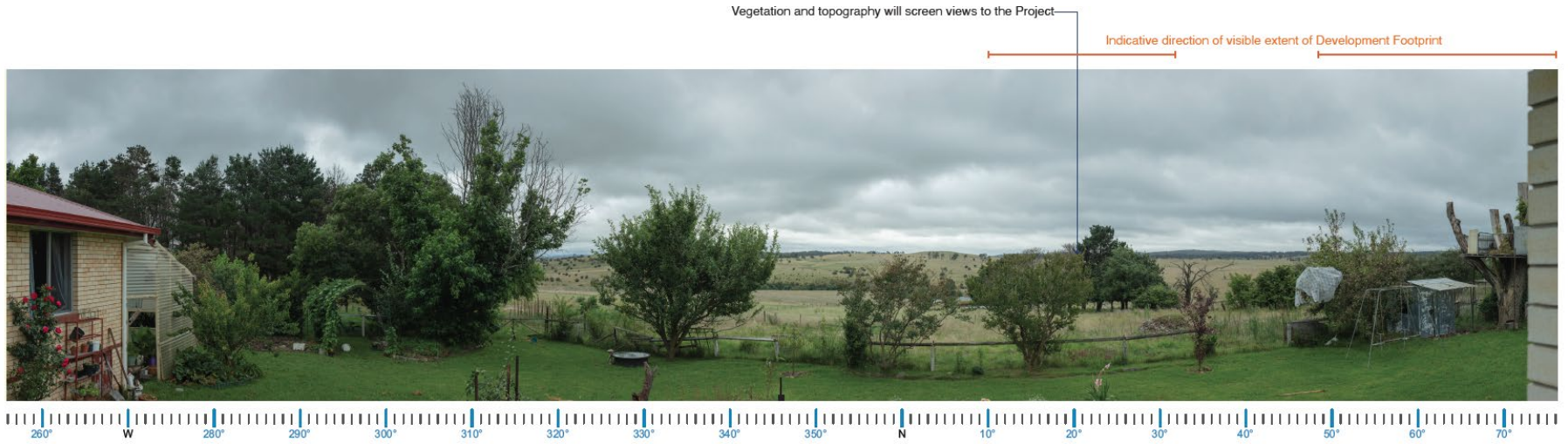

Figure 6-7 View from R4, off Blue Hole Road, rated as a moderate visual impact

Cumulative impacts

The Draft Planning NSW Guidelines state that:

> *"Cumulative impacts may result from a number of activities with similar impacts interacting with the environment in a region. They may also be caused by the synergistic and antagonistic effects of different individual impacts interacting with each other and may be due to temporal or spatial characteristics of the activities impacts."*

It is important the proposed Oxley Solar Farm considers the potential cumulative effects on the immediate and broader regional context it forms part of. Three solar farm projects are located within close proximity to the proposed Oxley Solar Farm (refer to Figure 6-8). An additional four are located further from the site. Low cumulative impacts would result due to the location and intervening topography and existing and proposed screening between these sites. The sites include:

- **Stringybark Solar Farm (APPROVED)** Stringybark Solar Farm is sited adjacent to the north western boundary of Oxley Solar Farm. The Stringybark Solar Farm is likely to appear as a part of the Oxley Solar Farm Project. A cumulative visual impact is likely to be felt by motorists travelling along Gara Road as they pass both projects, however in consideration of the mitigation measures proposed for each Project, the cumulative impacts are likely to be low.
- **Olive Grove Solar Farm (APPROVED)** Olive Grove Solar Farm is located to the northwest of the Oxley Solar Farm Site, off Grafton Road. Views to the Oxley Solar Farm Project are limited from the north due to a combination of vegetation and topography. Due to the limited visibility of the Oxley Solar Farm Project and proposed mitigation measures, opportunities to view both projects from nearby dwellings is likely to be low.
- **Armidale BESS (PREPARING EIS)** The Armidale BESS is located approximately 5km east of Armidale, and approximately 7km northwest of from the Oxley Solar Farm Site. The project is in the prepare EIS stage. The perceived cumulative visual impact resulting from these two projects would be indiscernible.
- **Metz Solar Farm (CONSTRUCTED)** The Metz Solar Farm is located approximately 6.5 kilometres to the north east of the Oxley Solar Farm. Due to the limited visibility of the Oxley Solar Farm Project from the north, there will be no opportunities to view both Projects concurrently.
- **New England Solar Farm (CONSTRUCTION COMMENCED)** Located about 20km from the proposal site, construction commenced in 2021. There will be no opportunity to view the two Projects simultaneously.
- **Tilbuster Solar Farm (APPROVED)** Tilbuster Solar Farm is located about 21km from the proposal site. The project was approved in 2022. There will be no opportunity to view the two Projects simultaneously.
- **Sailsbury Solar Farm (STATUS UNKNOWN)** Salisbury Solar Farm, is located about 30km south-west of the proposal site. Project status is unknown. There will be no opportunity to view the two Projects simultaneously.

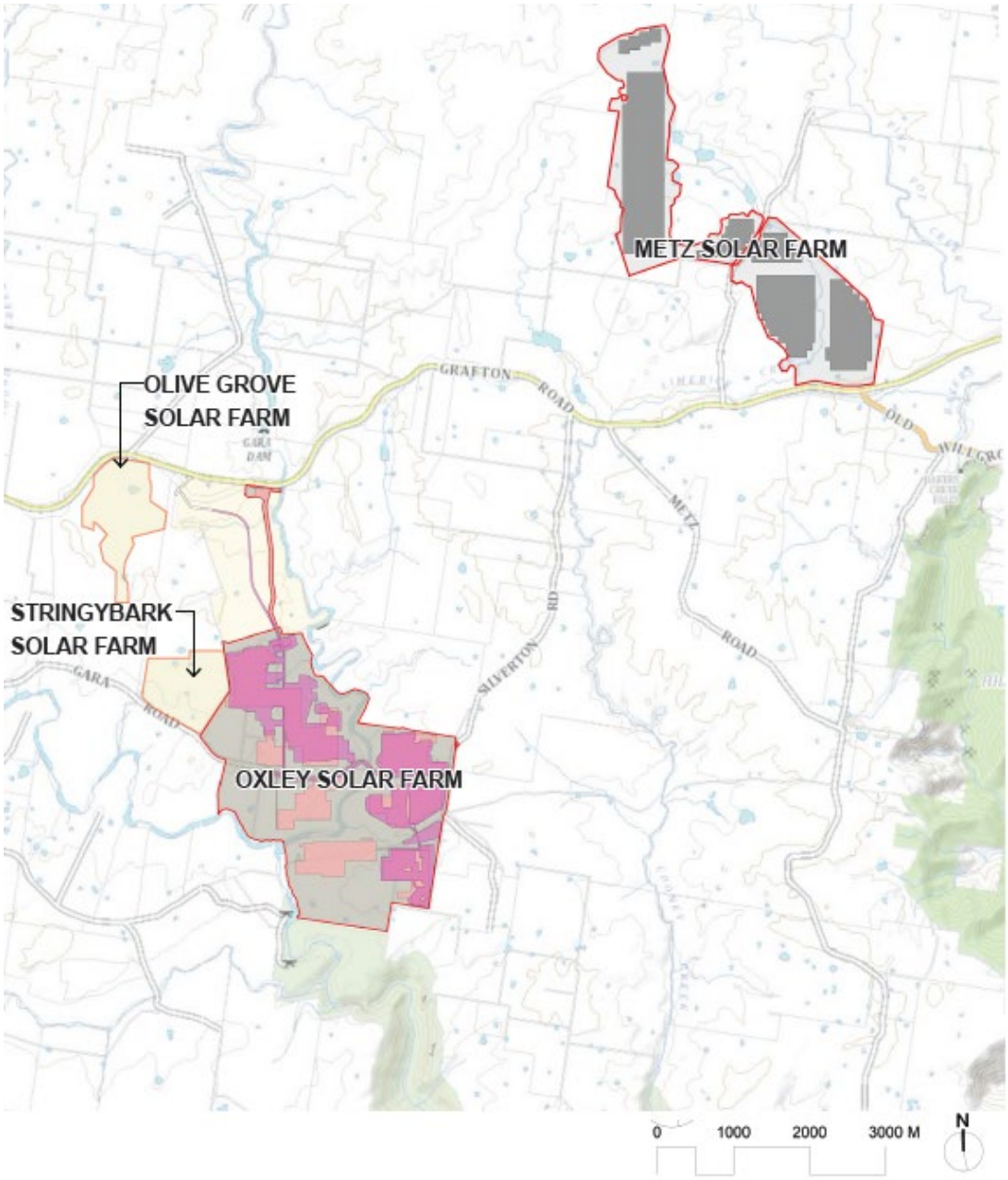

Figure 6-8 Nearby solar farms

Glint and glare assessment

Glare can be broadly classified into three categories: low potential for after image, potential for after image, and potential for permanent eye damage (refer to Table 6-5). This is indicated by three colours:

1. Green Glare: Low potential for temporary after-image
2. Yellow Glare: Potential for temporary after-image
3. Red Glare: Retinal burn, not expected for PV.

Mitigation is considered for yellow and red glare. This would apply to three sections of road and five residences. No red glare is predicted.

Table 6-5 Glint and glare results summary

Receiver	Number in each impact category (unmitigated)	Description
Transport route receptors		
Yellow Glare: Potential for temporary after-image	3	Mitigation warranted (additional screening now proposed): Silverton Road, Gara Road, Blue Hole Road. These warrant screen planting as mitigation.
Red Glare: Retinal burn, not expected for PV.	0	-
Dwelling/sheds		
Yellow Glare: Potential for temporary after-image	9	No mitigation warranted (due to existing screening): R5, R11, R15, R200. Mitigation warranted (additional screening now proposed): R3, R4, R7, R10, R14.
Red Glare: Retinal burn, not expected for PV.	0	-
Public receptor		
Green Glare: Low potential for temporary after-image	1	Blue Hole Road Picnic Area.
Yellow Glare: Potential for temporary after-image	0	-
Red Glare: Retinal burn, not expected for PV.	0	-

6.2.3 Updated mitigation measures

Due to the relatively low height of the proposed solar panels, the most effective mitigation measure is on-site planting. Observations made during site inspections indicate pockets of scattered vegetation around the Project Site will assist in fragmenting views from publicly accessible areas including public roads, Oxley Wild River National Park and associated picnic areas and walking tracks.

Where views to the Project Site will be available from publicly accessible land, on site mitigation will assist in reducing the visibility of the Project. Proposed on-site mitigation will include but will not

be limited to 10–20 metres buffer planting to fragment views (refer to Figure 6-9 for an example cross section).

A draft landscaping plan has been prepared (refer to Figure 6-10). Plant species selected are to be well suited to the local conditions and in keeping with the existing landscape character. Maintenance and management period will be in place to ensure successful establishment (replacement of loss to vegetation where density requirements are not achieved, weed control, routine watering etc.)

In circumstances where residences are subject to a moderate or high level of visual impact, screen planting is an option proposed to assist in mitigating views of solar panels from residential properties. As the viewing location of the proposal would be generally fixed there is opportunity to significantly reduce potential visual impact from the proposal. In order to achieve visual screening planting between the Project and the homestead, tree planting could be undertaken in consultation with the relevant landowners to ensure that desirable views are not inadvertently eroded or lost in the effort to mitigate views of the solar panels.

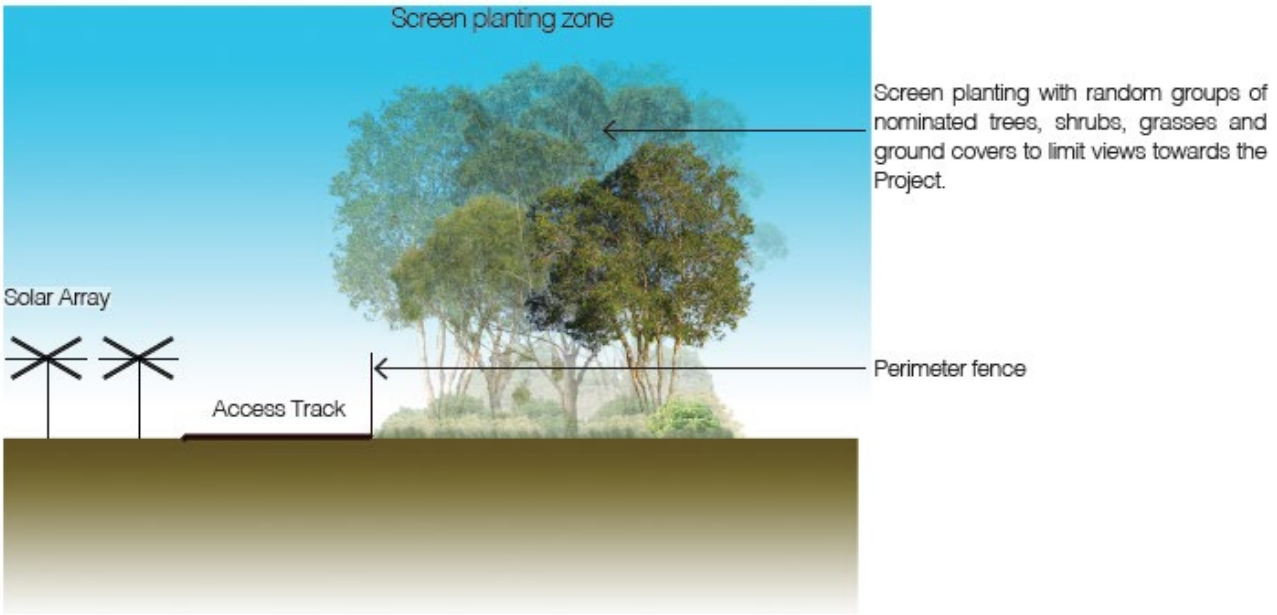

Figure 6-9 Typical planting cross-section

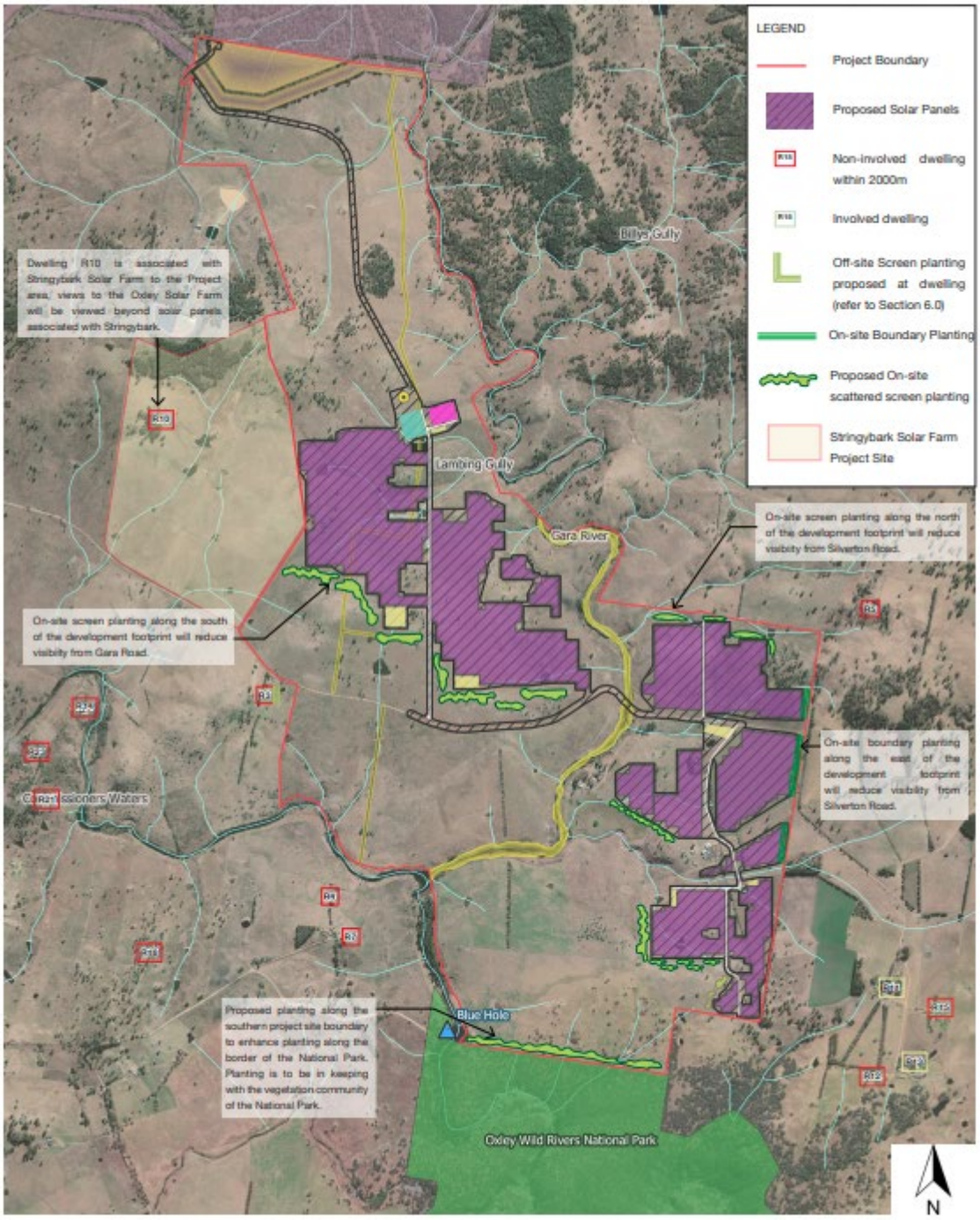

Figure 6-10 Proposed onsite screen planting

6.3 Hydrology

6.3.1 Background

Changes to the assessment

The hydrological and hydraulic analysis of the Oxley Solar Farm (Footprint sustainable engineering , 2022), submitted to support the EIS in March 2021, assessed impacts to hydrology relating to a larger array area, since then the array area of the Proposal has been reduced by 27.6%. Additionally, access road has changed and Gara River causeway upgrade is now proposed.

The changes in the Proposal have not significantly altered the outcomes of the hydrological and hydraulic analysis however, the updated hydrological and hydraulic analysis of the Oxley Solar Farm has been updated and is included in Appendix G.

The updated Proposal description and environmental commitments have also been updated to address DPE Water and Natural Resources Access Regulator (NRAR) recommendations to have access roads within floodplains constructed to less than 150 millimetres above the natural ground level. This requirement is reflected in an amended mitigation measure in Section 6.3.3.

Furthermore, the causeway upgrade particularly will provide increased flood security not only for the Proposal but for local motorists.

Statutory requirements

The assessment method remains consistent with the requirement of the SEARs under Section 173 of the *Environmental Planning and Assessment Regulation 2021*. The Oxley Solar Farm has been designed to be above the 1% AEP flood level, and outside high flood hazard areas (H5 and above). Figure 6-11 and Figure 6-12 show the updated solar farm layout in relation to 1% AEP flood levels and flood hazard categories.

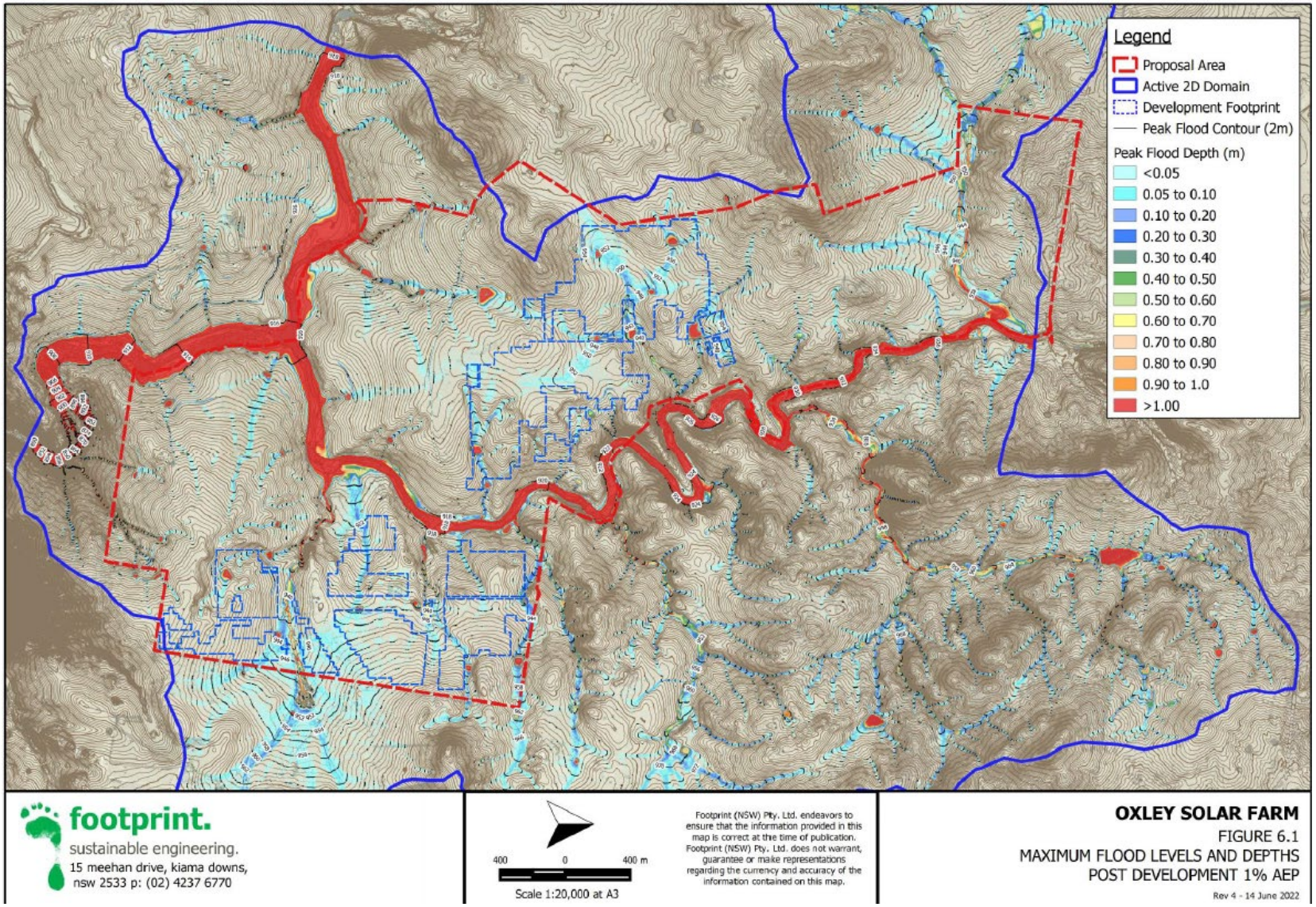

Figure 6-11 1% AEP flood depths

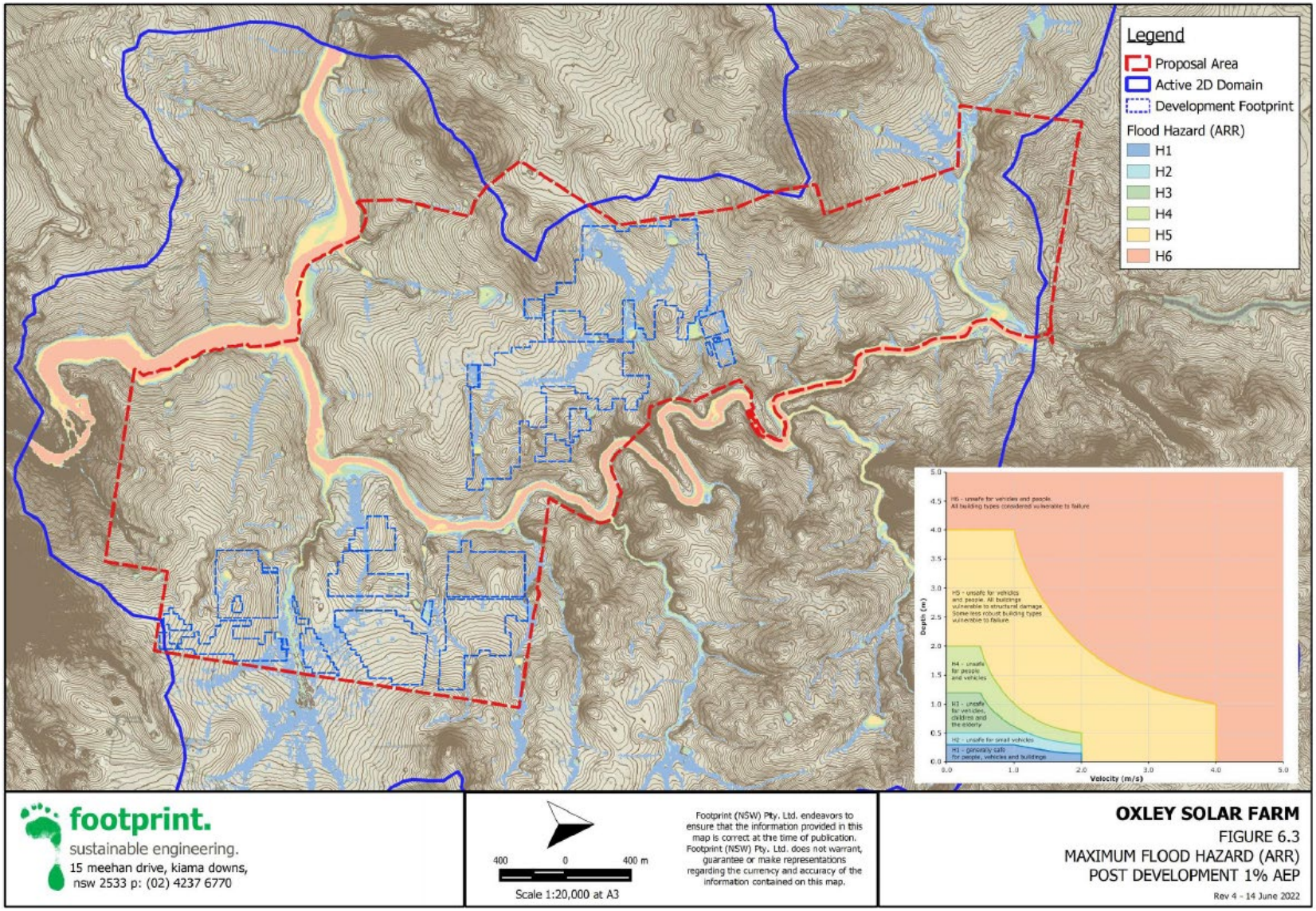

Figure 6-12 1% AEP flood hazard

6.3.2 Key findings of the assessment

The results of the updated hydrological and hydraulic analysis of the Oxley Solar Farm (Footprint sustainable engineering , 2022) remain consistent with the findings that were presented in the EIS. That is:

- There is not predicted to be a significant impact on flood behaviour for the 1% AEP event as a result of the proposed works, with flood level, depths, velocities and hazards remaining largely unchanged.
- The change in maximum flood level and peak velocity resulting from the proposed development are anticipated to remain unchanged across most of the proposal area, due primarily to most of the infrastructure being located outside the floodplain.
- Some minor increases in flood levels and corresponding decreases in velocity are shown to occur with proposed laydown, parking and building areas, however these changes are very localised and are not anticipated to adversely impact on adjoining properties.

The analysis will be used to guide the design with respect to the extent and elevation of proposed solar array infrastructure; flood management recommendations relating to buildings and structures, signage, the solar array, electrical infrastructure, fencing, waterway crossings and access roads now form commitments of the project. In addition, any areas of existing erosion within the proposed Development footprint would be appropriately treated prior to the erection of solar array modules to ensure their ongoing stability.

The largest expected impact in relation to hydrology and flooding is the potential for Gara Road to be impassable during significant flood events. Flood warning signs, flood level indicators, and a Business Floodsafe Plan would be implemented as outlined in the EIS. To further mitigate the risk of flooding at the Gara Road crossing of the Gara River the mitigation to construct access road within floodplains less than 150 millimetres above the natural ground to align with the exemption for flood work approvals in Clause 50 of the Water Management (General) Regulation 2018, has been adopted and incorporated into concept designs for the Gara River Crossing (see Section 6.7).

6.3.3 Updated mitigation measures

The one mitigation that will be updated now reads:

> *Access roads within the floodplain should be constructed as close to natural ground levels (less then 150mm) as possible so as not to form an obstruction to floodwaters. The surface treatment of roads should be designed giving regard to the* velocity of floodwaters to minimise potential for scouring during flood events.

The key management plans to commence in construction and continue throughout operation and ensure all mitigation measures are effectively implemented on the ground will be:

- Emergency Response Plan
- Flood Response Plan
- Business Floodsafe Plan.

Refer to Appendix C for consolidated updated mitigation measures.

6.4 Aboriginal heritage

6.4.1 Background

Changes to the assessment

NGH prepared the Aboriginal Cultural Heritage Assessment (ACHA) (NGH Pty Ltd 2021), assessing the original Oxley Solar Farm indicative layout, which was exhibited in March 2021 (NGH Pty Ltd, 2021). It committed to subsurface testing to provide greater certainty regarding potential Aboriginal cultural heritage impacts.

The key proposal changes affecting the historic heritage assessment were the changes to the extent of the Development footprint, as follows:

- Area and extent of Development footprint significantly reduced, from 895ha to 268ha; a reduction of 70%.
- The number of panels significantly reduced, from 715,680 to 385,280; a reduction of 38%.

Additionally, the road access option presented in the EIS has been revised to consider improved road safety outcomes and crossing upgrades are now included over the Gara River for improved access during floods. These changes have also been considered.

The subsurface testing archaeological report is summarised below and provided in full in the Appendix H.

Statutory requirements

The survey methodology, implementation and assessment have been in accordance with the SEARs and had involvement from the Aboriginal stakeholders. Relevant guidelines have included cl80C of the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010 and updated cl 60 of the National Parks and Wildlife Amendment Regulation 2019, following the consultation steps outlined in the Guidelines for Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (ACHCRP) guide.

A summary of the entire field survey program that has informed the assessment is provided as follows:

- The original survey was conducted from the 12 -21 May 2020 and identified 24 isolated stone artefacts, 18 stone artefact scatters, one scarred tree and seven cultural trees.
- The second survey for the Additional North Survey Area 1 was conducted on 25 June 2021 and identified six contemporary scarred trees, one scarred tree, one surveyor tree, one unfired clay grass bowl and one stone artefact scatter.
- The third survey for the Alternative North Survey Area 2 was conducted on 11 January 2022. No archaeological or cultural material or modified trees were identified during this survey.
- The test excavation program was undertaken between 21–24 June, 26 June, 28 June – 1 July 2021 and 31 August – 3 September 2021. A total of 114 test pits were excavated across ten areas of Potential Archaeological Deposit (PAD). Artefacts were recovered from Pit 4 and Pit 5 (PAD 17); Pit 50 (PAD 20); Pit 52, Pit 53, Pit 54 and Pit 61 (PAD 9); Pit 78 and 82 (PAD 13); Pit 103 (PAD 21); Pit 109 and Pit 110 (PAD 19).

The areas subject to test excavation are shown in Figure 6-13 below.

6.4.2 Key findings of the assessment

An assessment of the proposed infrastructure layout identified that the sites listed below will be impacted by the proposed development works:

Direct impacts for:

IF26, IF27, IF28, IF29, IF30, IF31, IF32, IF33, AS20, CST1, CST3, CST4 and CT1.

Indirect impacts possible (i.e., may be outside of impact areas) for:

IF10, AS9, ST2, SVT1, IF14, AS18, CT6, CT7.

It should be noted that IF26-33 and AS20 were recovered during the subsurface excavation program and retrieved for analysis and therefore impacts to these were negligible under the testing programme.

As the updated Development footprint extends into some areas that were not subjected to subsurface testing, where data could not be defensibly extrapolated, these are now defined as exclusion zones, unless further assessment is undertaken in these areas. The general coverage of testing for the remainder of the PADs and low quantities of recovered subsurface artefacts can be generally extrapolated to assume low sensitivity in all other areas, provided an Unexpected Finds Procedure is employed during the construction works.

Table 6-6 below provides a summary of the number and type of sites to be impacted and the degree of harm and the consequence of that harm upon site types. All sites identified are mapped in Figure 6-14. Exclusion zones have been defined based on the results, Figure 6-15.

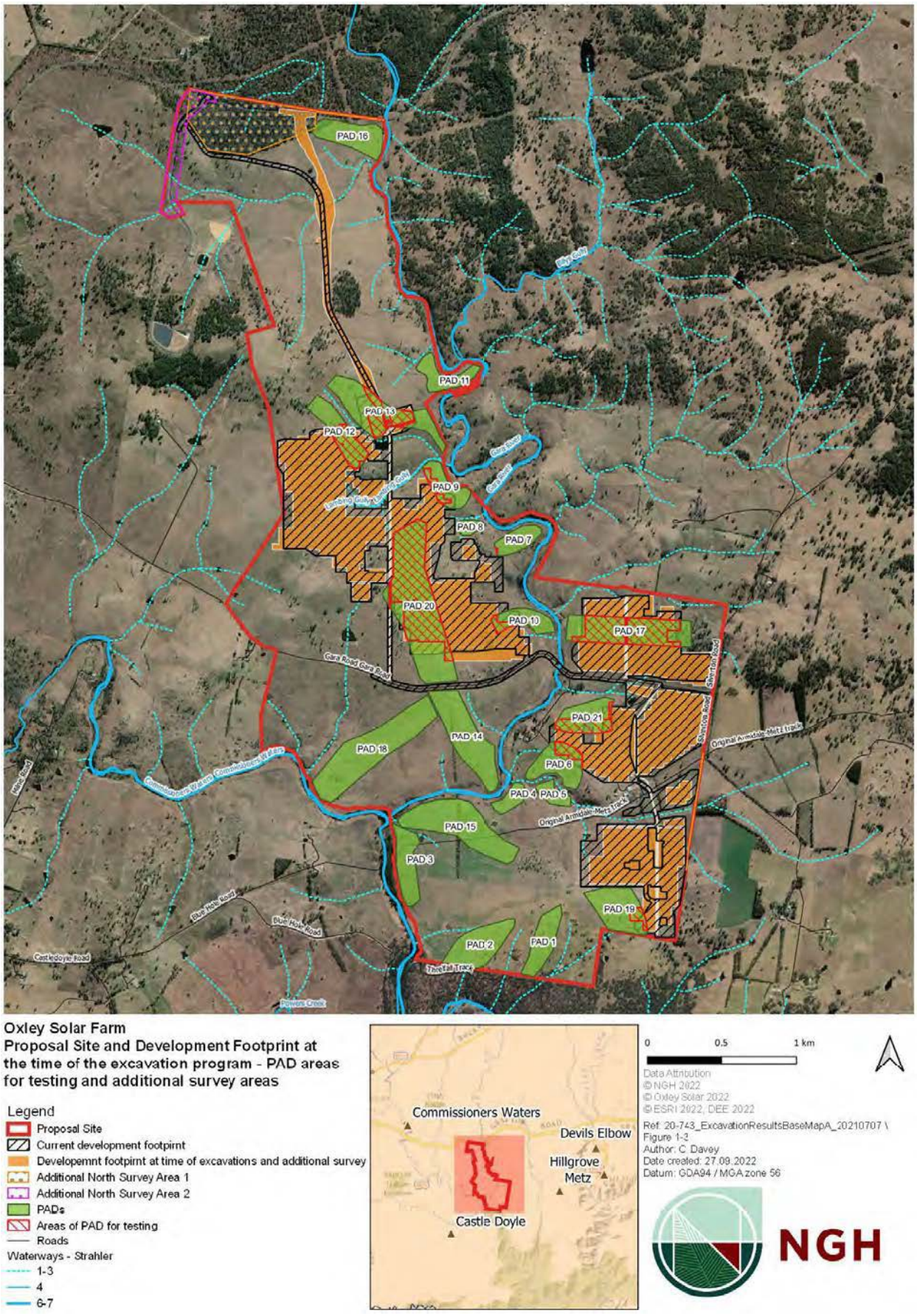

Figure 6-13 Areas of PAD that were subject to sub-surface testing (Development footprint current at time of excavation)

Table 6-6 Summary of the degree of harm and the consequence of that harm upon site types

Site type	Type of harm	Degree of harm	Consequence of harm	Number of sites
Isolated finds	Direct	Complete	Total loss of value	8
	Indirect	Partial	Partial loss of value	1
	Nil	Nil	Not applicable	25
Artefact scatters	Direct	Complete	Total loss of value	1
	Indirect	Partial	Partial loss of value	1
	Nil	Nil	Not applicable	14
Scarred trees	Indirect	Partial	Partial loss of value	0
	Nil	Nil	Not applicable	1
Contemporary scarred trees	Direct	Complete	Total loss of value	3
	Nil	Nil	Not applicable	3
Cultural trees	Direct	Complete	Partial loss of value	1
	Indirect	Partial	Total loss of value	2
	Nil	Nil	Not applicable	4
Surveyor tree [12]	Indirect	Partial	Partial loss of value	1
PADs	Direct	Complete	Negligible as a limited number of subsurface finds were collected during the testing programme.	Parts of PAD6, PAD9, PAD10, PAD12, PAD13, PAD19, PAD20, PAD21.
	Nil	Nil	Not applicable	PAD1, PAD2, PAD3, PAD4, PAD5, PAD7, PAD8, PAD16, PAD11, PAD14, PAD15, PAD18 and Parts of PAD6, PAD10, PAD12, PAD19, PAD20, PAD21
Unfired clay grass bowl	Nil	Nil	Not applicable	1

[12] This is a non- listed surveyor's tree, not an Aboriginal heritage item. It is additionally addressed in the Non-indigenous heritage assessment, summarised in Section 6.5.

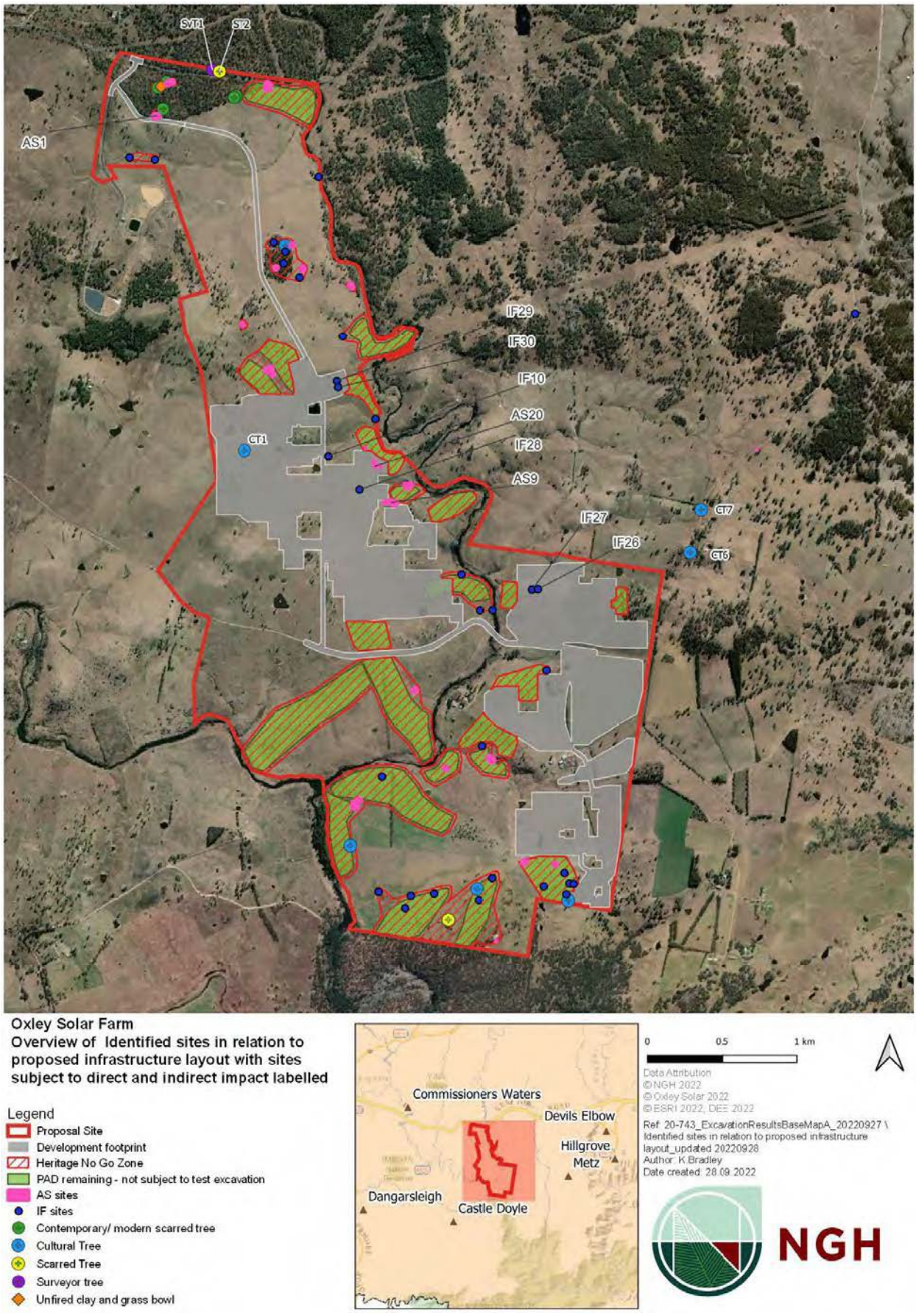

Figure 6-14 Identified sites in relation to proposed infrastructure layout

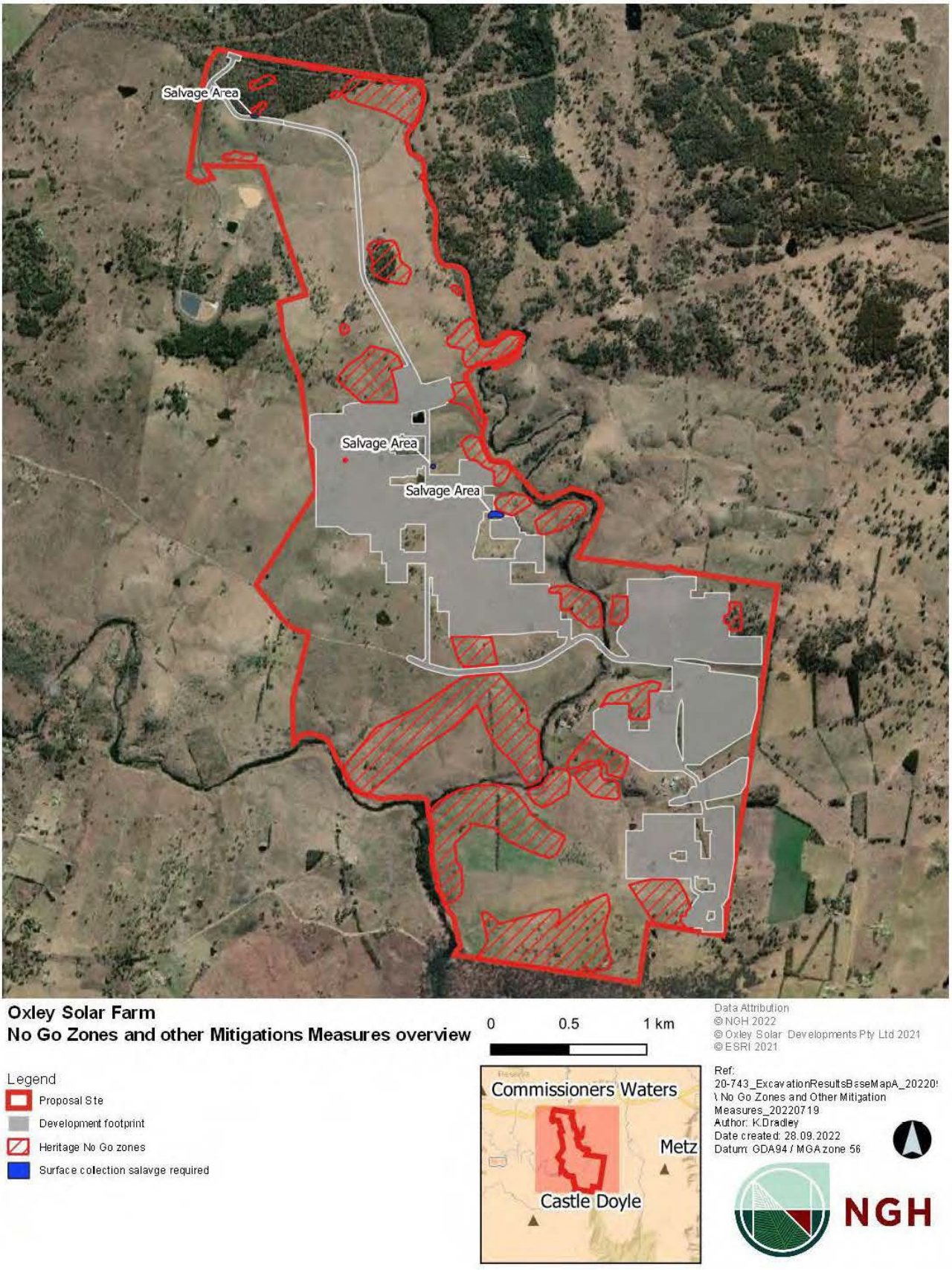

Figure 6-15 Exclusion zones (no-go) and other mitigation measures – Overview

6.4.3 Updated mitigation measures

The updated mitigation measures are provided in full in Appendix C. They are paraphrased below and include measures for the protection of:

Trees

- Avoidance of CT1, cST1, cST3 and cST4 inclusive of a 10 metre buffer surrounding these sites; “no go zones” surrounding these areas must be marked on all construction plans and in the Cultural Heritage Management Plan for the project.
- Avoidance of CT2, CT3, CT4, CT5, ST1, cST2, cST5 and cST6 within the Proposal Site, inclusive of a minimum of a 10-m buffer; the location of CT2, CT3, CT4, CT5, ST1, cST2, cST5 and cST6 must be marked on all construction plans and in the Cultural Heritage Management Plan for the Project.

Stone Artefacts

- Where complete avoidance of any of the isolated finds and/or artefact scatters recorded in proximity to the Development footprint is not possible, then the surface stone artefacts must be salvaged prior construction works. The location of isolated finds and artefact scatters within the Development footprint should be marked on all construction plans until the salvage is completed.
- The collection and relocation of the surface artefacts (IF10, AS9) would be undertaken by an archaeologist with RAPs, as selected by the Proponent consistent with Requirement 26 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.
- Artefacts salvaged during the excavation program and in future salvage efforts (IF10, IF26, IF27, IF28, IF29, IF30, IF31, IF32, IF33, AS9, and AS20) may be temporarily stored for further analysis if this cannot be undertaken on site at the time of salvage.
- If storage at the Keeping Place is not possible, it is proposed that artefacts be buried on-site within a ‘no go zone’ with details and burial location submitted to the Aboriginal Heritage Information Management System (AHIMS) database.
- A minimum 5 metre buffer should be observed around all stone artefact sites that will not be impacted by the proposed development.

Management framework

- The Proponent must prepare a Cultural Heritage Management including an unexpended finds.
- All employees, contractors and visitors to the Oxley Solar Farm area should participate in a Cultural Heritage Induction.
- A further archaeological assessment would be required if the proposal activity extends beyond the area assessed in this report. This would include consultation with the RAPs and may involve further field surveys or test excavations.
- A care agreement with Heritage NSW in accordance with the NPW Act must be undertaken for the artefacts to be stored at Armidale and Region Aboriginal Cultural Centre & Keeping Place.
- In the unlikely event that human remains are discovered during the construction of the Oxley Solar Farm, all work must cease in the immediate vicinity. Heritage NSW and the local police should be notified.

6.5 Non-Indigenous heritage

6.5.1 Background

Changes to the assessment

NGH prepared the Historic Heritage Assessment for the original Oxley Solar Farm indicative layout, which was exhibited in March 2021 (NGH, 2022d). The assessment has now been updated to provide a full assessment of the revised historic heritage impacts associated with the updated Development footprint.

The assessment methodology included identification and evaluation of heritage significance and impacts on two listed heritage items, and three potential heritage items:

- Listed heritage items:
    - Gondwana Rainforests (United Nations Educational, Scientific and Cultural Organization (UNESCO) World heritage (ID: 368), NHL (ID: 386), SHR (ID: 1002))
    - Gara River Hydro-Electric Scheme (State Heritage Register (SHR) ID: 0986)
- Potential (not-listed) heritage items:
    - Surveyors tree (SvT1)
    - Cottage site (CS) 1 – archaeological site of former rural house
    - Gara Homestead (GH) - house and workers accommodations, working sheds.

No additional sites were identified in the updated assessment.

The key Proposal changes affecting the historic heritage assessment were the changes to the extent of the Development footprint, as follows:

- Area and extent of Development footprint significantly reduced, from 895ha to 268ha; a reduction of 70%.
- The number of panels significantly reduced, from 715,680 to 385,280; a reduction of 38%.
- Increased setbacks from the Oxley Wild Rivers National Park are now included.

Additionally, the road access option presented in the EIS has been revised to consider improved road safety outcomes and crossing upgrades are now included over the Gara River for improved access during floods. These changes are also considered.

Concern about impacts on heritage values was noted in four community submissions (this includes Aboriginal heritage). Specific comments referenced the cultural heritage values of the Oxley Wild Rivers National Park and questioned the compatibility with its World Heritage Values.

NSW Heritage raised two issues in their submission, requiring that the requirements of the SEARs and the NSW Heritage Manual 2001 be addressed, and specifically, that a Historical archaeological assessment be carried out in accordance with HNSW guidelines and by a suitably qualified historical archaeologist.

These concerns have been addressed in the updated Historic Heritage Assessment, appended in full in Appendix I and summarised below.

6.5.2 Key findings of the assessment

The changes made to the extent of the Development footprint has increased the setback distances to all sites identified within the original assessment. No other sites have been returned in the updated assessment.

There would be no *physical* impact on these or any other heritage item identified. There would be a minor impact on one item only; the old Gara Homestead, in that views will be possible of the solar farm from this location. This is the same outcome as the original assessment. The visual catchment of the homestead will include views of the Proposal to the east and southeast however, from the homestead the solar farm will not be prominent due to the topography.

The table below provides a summary of the physical impact and visual impact of the updated Development footprint on the identified historic heritage items. The sites are also mapped below in

Table 6-7 Historic heritage impact summary

Item	Physical impact	Other impacts
Gondwana Rainforest (Oxley Wild Rivers National Park portion) The set back distanced for this item have increased from 450m to 522m (77m) under the new Development footprint.	None. The natural heritage site is located outside, though immediately adjacent to the Proposal Site property boundary, but is at least 450m south west of the actual Development footprint at its nearest point. A biodiversity assessment has determined that there will be low impacts to threatened species and that connectivity between the Gondwana Rainforest and other reserves will be maintained.	None. The curtilage of the Gondwana Rainforests as listed is screened by an additional layer of trees on private property. As such, the solar farm will not be visible from with the curtilage of the item, and the item is not visible from the development. The aesthetic values of the Gondwana Rainforest relate to the natural beauty which is generally enjoyed from within the item.
Gara River Hydro Electric Scheme	None. The archaeological site is located outside, though immediately adjacent to the Proposal Site property boundary, but is at least 450m south west of the Development footprint at its nearest point. No evidence to suggest any archaeological remains of this site are present within the Development footprint was identified.	None. There are no aesthetic values identified for this item. Additionally, as the archaeological site is bounded by the same curtilage as the Gondwana Rainforests at this location, it is also screened by a layer of trees on private property. There will be no visual impact to the Gara River Hydro Electric Scheme as there is no line of site between the registered site and the Oxley Solar Farm development.

Item	Physical impact	Other impacts
Potential heritage item SvT1; a non-listed surveyors tree.	None. The Development footprint will avoid this tree by 20m. A temporary protective barrier may be required.	None. There are no aesthetic values associated with this item, and it will remain in situ, in association with the road with whose origins it is associated.
Potential heritage item CS1; a non-listed former rural house.	None. The closest works are approximately 400m east of this site, on the other side of Gara River.	None. There are no aesthetic values associated with this item.
Potential heritage item GH1; a non-listed house and workers accommodations, working sheds. The set back distanced for this item have increased from 20m to 60m (40m) under the new Development footprint.	None. None of the structures will be impacted.	**Minor.** **The setting of the old Gara Homestead will be altered by the placement of solar arrays to the east and southeast, however, from the homestead this will not be prominently visible due to the slope of the natural hill, and the significant views from the house to the west will not be developed.**

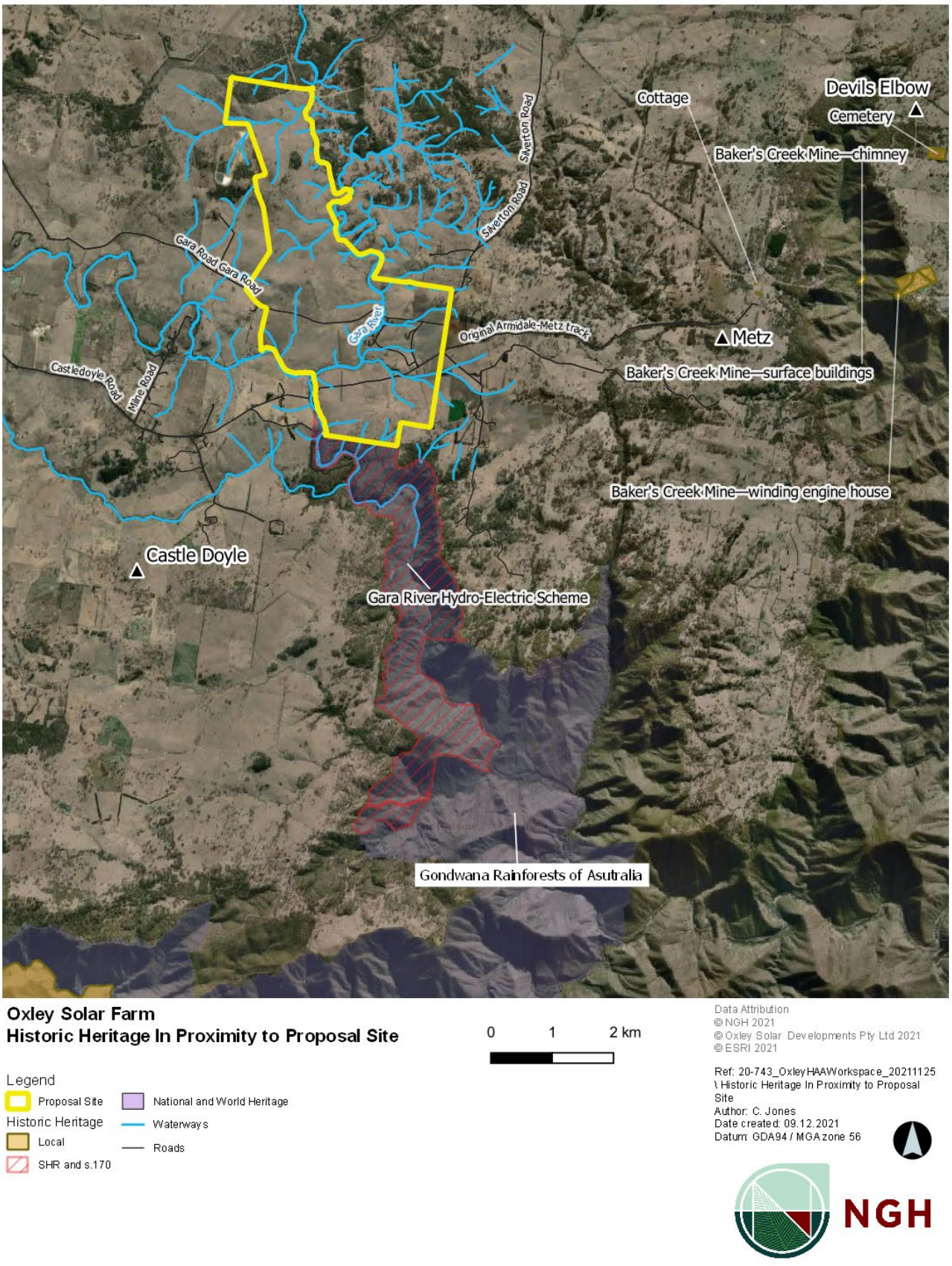

Figure 6-16 Historic heritage in proximity to Proposal site

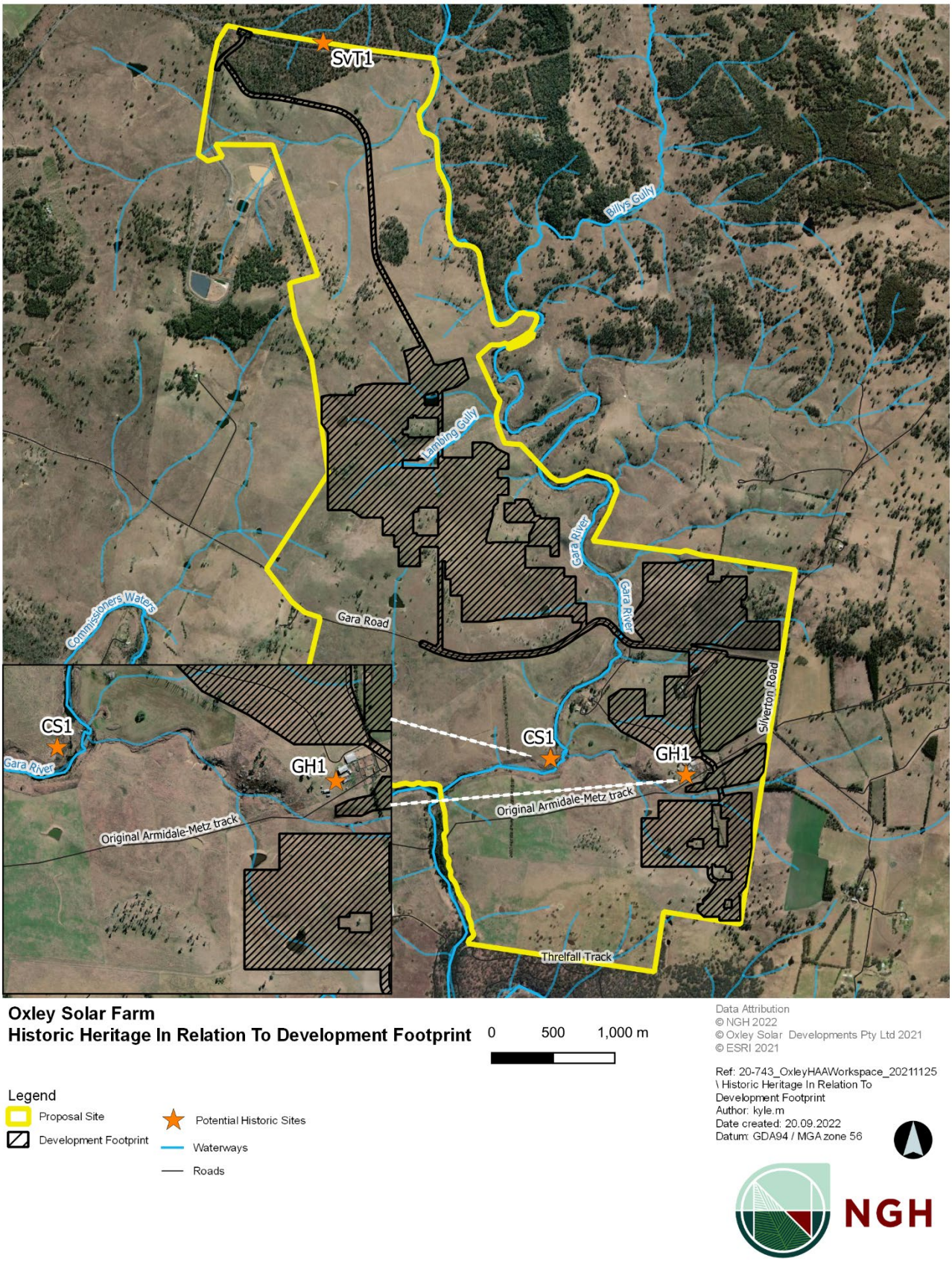

Figure 6-17 Historic heritage items within and adjacent to the updated Development footprint.

6.5.3 Historical archaeological assessment

The archaeological potential of the Proposal site relates to the historical practices described in the previous sections, namely settlement, pastoral and agricultural, and goldmining. Pastoral and agricultural activities date from the 1830s, when squatters began expanding west through NSW after initial exploration expeditions were conducted by John Oxley in 1818. These pastoral and agricultural industries continue to the present-day. By 1852, the Proposal site and region was mostly cleared of vegetation to provide grazing country to cattle and sheep as the pastoral industry became more and more widespread across the region. In addition to the expanding pastoral industries, the surrounding Hillgrove and Metz regions developed into goldmining precincts from 1877.

Archaeological materials within the area could relate to any one of these industries including, early accommodation and personal belongings, as well as infrastructure, machinery, and equipment. As much of the area remains used for pastoral and agriculture purposes, existing properties may contain residences and associated agricultural structures that may have survived from these initial days of industrial expansion.

Based on this regional history, the archaeological potential of the Development footprint could include remains of:

- Fences and gates, nails, and structural fittings
- Animal stock runs
- Sheds, and pens/stock yards
- Dams
- Shearing sheds and accommodation
- Work and storage sheds
- Stockyards
- Communications infrastructure
- Local sealed and unsealed roads and tracks
- Farming equipment, such as ploughs and tractors
- Saddlery; and
- Personal belongings of stockmen, such as clay pipes, smoking accessories, leather and potentially other fabric remains, such as buttons; and glass bottles.

Assessment of potential impacts to these features has concluded the Cottage site (CS) 1 as an archaeological site of former rural house but no impacts were assessed as the area will be avoided during the works.

6.5.4 Updated mitigation measures

The proposed access track will not impact on historic heritage. No other changes have been made to the historic heritage recommendations, with the exception that the increased setback distances below, now shown in **bold**:

- The Gondwana Rainforests of Australia immediately adjacent to the Proposal Site, and **at least 522m** south west of the Development footprint at its nearest point. While the curtilage of the Gondwana Rainforests as listed is screened by an additional layer of trees on private

property. As such, the solar farm will not be visible from with the curtilage of the item, and the item is not visible from the development.

- The Gara Homestead has been identified to be of potential local heritage significance. No physical impacts are proposed to the extant structures or surrounds **within 60m of the homestead and within 60m of the workers accommodation and sheds.** Visual impacts must be limited to the eastern side of the house. Where the Development footprint is amended and includes impacts to the physical structures or to the vista westwards from the homestead, further assessment is required.

These are now included where required in the updated Project description, Appendix A, and consolidated updated mitigation measures in Appendix C.

6.6 Noise and vibration

6.6.1 Background

Changes to the assessment

A Construction and Operational Noise and Vibration Assessment (NVA) for the proposed Oxley Solar Farm was undertaken by Renzo Tonin and Associates for the EIS (Renzo Tonin & Associsates , 2022). Since then the NVA has been revised according to the changes to the Proposal that are outlined in Chapter 3. In the EIS, the noise assessment noted three noise exceedances during construction at R3, R4, and R5. The revised NVA is summarised below and included in full in Appendix J, there were no noise or vibration related exceedances in the revised NVIA.

Receiver distances from the Development footprint have been amended in the NVA to consider the reduced panel coverage of the site and the proposed access in the north of the Development footprint. In most cases the noise and vibration receiving distance from most receivers is now less than that assessed in the EIS. This has been summarised in Section 6.6.2.

Statutory requirements

Consideration of noise and vibration impacts is a requirement of the SEARs under Section 173 of the Environmental Planning and Assessment Regulation 2021. Noise and vibration may also contribute to ‘potentially offensive industry’ as defined in the State Environmental Planning Policy (Resilience and Hazards) 2021.

The NVA considered the following noise policies and standards:

- NSW ‘Interim Construction Noise Guideline’ (DECC, 2009)
- NSW ‘Noise Policy for Industry’ (NSW EPA, 2017)
- ‘Assessing Vibration: A Technical Guideline’ (DECC, 2006)
- NSW ‘Road Noise Policy’ (DECCW, 2011)

In addition, one public submission was provided than specifically mentioned noise and/or vibration. The assessment specifically addresses this receiver (R5).

6.6.2 Key findings of the assessment

Updated setback distances

The existing environment of the Proposal remains consistent with the EIS with the exception of revised receiver distances as a result of changes to the Development footprint; some setback distances have now been increased. Only R6, R8 and R17 would be closer to the Development footprint due to proposed changes to Waterfall Way (Grafton Road) access.

Table 6-8 Setback distances of receivers / dwellings to the updated Development footprint.

ID	Address	EIS description	Amended description	Distance further from noise and vibration source [13](Development footprint)
R3	686 Gara Road, Metz	Residential property located approximately 185m west of the Proposal site.	Residential property located approximately 760m west of the Development footprint	+575m
R4	111 Blue Hole Road, Castle Doyle	Residential property located approximately 310m west of the Proposal site.	Residential property located approximately 1,135m west of the Development footprint	+825m
R5	445 Silverton Road Metz	Residential property located approximately 320m east of the Proposal site.	Residential property located approximately 650m west of the Development footprint	+330m
R6	8 Argyle-Mining Vale Road, Metz	Residential property located approximately 950m north-east of the Proposal site.	Residential property located approximately 260m from the proposed access road	-690 m
R7	109 Blue Hole Road, Castle Doyle	Residential property located approximately 610m west of the Proposal site.	Residential property located approximately 1,390m west of the Development footprint	+780m
R8	52 Argyle-Mining Vale Road, Metz	Residential property located approximately 900m north-east of the Proposal site.	Residential property located approximately 360m west from the proposed access road	-540m
R9	1392 Grafton Road, Metz	Residential property located approximately 800m east of the Proposal site.	Residential property located approximately 1,000m west of the Development footprint	+200m

[13] Receiver distances will not be consistent with section 6.2 in some cases as noise and vibration impacts are considered from all areas of the Development footprint (including road upgrade works) whereas the visual assessment measures from the nearest above ground operational infrastructure element of the Development footprint.

ID	Address	EIS description	Amended description	Distance further from noise and vibration source [13](Development footprint)
R10	597 Gara Road, Metz	Residential property located approximately 760m west of the Proposal site.	Residential property located approximately 800m west of the Development footprint	+40m
R11	692 Silverton Road, Metz	Residential property located approximately 720m east of the Proposal site.	Residential property located approximately 720m west of the Development footprint	0m
R13	761-765 Silverton Road, Metz	Residential property located approximately 780m west of the Proposal site.	Residential property located approximately 780m west of the Development footprint	0m
R17	1060 Grafton Road, Metz	Residential property located approximately 2,300m east of the Proposal site.	Residential property located approximately 1,435m west from the proposed access road	865m
R22	771 Silverton Road, Metz	Residential property located approximately 1,450m south of the Proposal site.	Residential property located approximately 1,500m west of the Development footprint	+50m
R26	1474 Castledoyle Road, Castle Doyle	Residential property located approximately 1,600m south of the Proposal site.	Residential property located approximately 2,700m west of the Development footprint	+1,100m

Construction noise impact assessment

The construction of the Oxley Solar Farm meets the requirements of a quantitative assessment under the NSW 'Interim Construction Noise Guideline' (DECC, 2009). The guideline specifies noise targets, or 'noise management levels', for residences and other noise sensitive receivers (Table 6-9Table 6-9). The Rating Background Level (RBL) is used to identify construction noise exceedances. For the Oxley Solar Farm, all residential receivers have a daytime noise management level of 45dB.

Table 6-9 Noise management levels at residential receivers

Time of day	Management Level
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected Rating Background Level + 10dB(A)
	Highly noise affected 75dB(A)

Time of day	Management Level
Outside recommended standard hours	Noise affected Rating Background Level + 5dB(A)

Noise impact predictions take into account the typical noise levels of construction equipment likely to be used for the construction phase of the Proposal. The equipment and their sound power levels are shown in Table 6-10 where no changes proposed from the EIS assessment.

Table 6-10 Typical solar farm construction equipment and their expected sound power levels.

Equipment used	Number of items required	Laeq Sound power levels (dBA) per single item
Small Pile Driving Rig[14]	6	114
Crane[14]	2	110
Drum roller	2	109
Padfoot roller	2	109
Wheeled loader	2	109
Dump Truck	4	108
30T Excavator	8	107
Grader	4	107
Chain trencher	2	104
Water truck	4	104
Telehandler	4	98
Forklift	4	90

Table 6-11 presents the amended noise levels likely to be experienced at the nearby affected receiver locations during the construction works within the updated Development footprint and includes access road. It should be noted that the small pile driving rig and crane are not required for road works so noise impacts are lower in those areas in comparison to solar panel installation areas. The predicted levels are considered a worst-case scenario with up to three nosiest plants operating concurrently. Based on the predicted construction noise levels presented above, the construction management level **will not** be exceeded throughout construction. This is revised from the EIS assessment which assessed that R3, R4 and R5 would have noise exceedances.

[14] Only used for construction of solar farm and not for construction of access road

Table 6-11 Predicted Laeq 15 min construction noise levels at receiver locations for works within the Development footprint

Receiver	Noise management level[15]	Predicted construction noise Level, $L_{Aeq\ (15\ min)}$	Compliance with criteria? (Yes/No)
R3	45	<20-37	Yes
R4		<20-33	Yes
R5		<20-40	Yes
R6		<20-45	Yes
R7		<20-31	Yes
R8		<20-42	Yes
R9		<20-31	Yes
R10		<20-36	Yes
R11		<20-29	Yes
R13		<20-37	Yes
R17		<20-28	Yes
R22		<20-29	Yes
R26		<20-21	Yes

Other noise and vibration impact assessments

The EIS assessed all remaining construction and operational noise and vibration impacts to be compliant with all relevant criteria. To maintain conciseness in this report the following impact assessments have not been repeated:

- Operational noise assessment
- Sleep disturbance assessment
- Vibrational assessment
- Road traffic noise assessment.

Refer to Appendix J for the full assessments.

[15] Noise management for standard day time construction works (i.e. Monday to Friday 7am to 6pm and Saturday 8am to 1pm).

6.6.3 Updated mitigation measures

On mitigation measure has been revised based on the revised noise assessment:

- As there was no exceedances predicted for any receivers for the revised Development footprint, the EIS requirement for **direct consultation with R3, R4 and R6 has been removed**, along with the precautionary **measure to notify receivers when works are within 700m of dwellings**.

6.7 Traffic, transport and safety

6.7.1 Background

Changes to the assessment

New England Surveying & Engineering undertook a Traffic Impact Assessment (TIA) for the Oxley Solar Farm indicative layout which was exhibited in March 2021. The assessment has now been updated to address changes to the layout and respond to comments received from Armidale Regional Council and Northern Region Transport for NSW staff and submissions on the EIS. The goal of the TIA is to provide the safest road design for the Proposal with the best possible environmental outcomes, and this justifies the changes made in the report. The full updated TIA is included as Appendix K.

The key additions to the updated TIA include the following:

- An analysis of four primary access point options from Waterfall Way (Grafton Road) based on comments received through direct consultation with TfNSW and Armidale Regional Council. Concerns focused on the safety of sight distances at access point intersections with Waterfall Way (Grafton Road).
- Access points from Gara Road have been revised and adjusted based on changes in the layout. There are four access points proposed.
- A detailed concept design for causeway upgrades around Gara Road including culvert designs over Gara River.
- An updated assessment of cumulative impacts based on comments received on the EIS.

Statutory requirements

The changes made to the Proposal and the TIA do not change the existing environment of the Proposal laid out in the EIS. The information that has not been revised since the EIS such as existing and expected traffic volumes are not repeated in this report.

6.7.2 Key findings of the assessment

The updated TIA has assessed access and causeway options and determined:

1. One feasible access option and their upgrade requirements
2. Improvements along Gara Road and a suitable causeway upgrade

Access options off Waterfall Way (Grafton Road)

Four access options were considered for primary site access from Waterfall Way (Grafton Road). The options are A, B, C and D in Figure 6-18. The TIA determined that option A and B would not be feasible as Safe Intersection Sight Distance (SISD) and or Approach Sight Distance's (ASD) could not be achieved Option C would be through Travelling Stock Reserve with addition impacts and hence will not be further investigated. Figure 6-18 shows the longitudinal section with 10 times vertical exaggeration at each access point. The figure gives a visual reference of how the vertical grade of Waterfall Way (Grafton Road) affects SISD and ASD for motorists approaching from the east. Option D has an acceptable SISD and ASD and is referenced as proposed access road in this report.

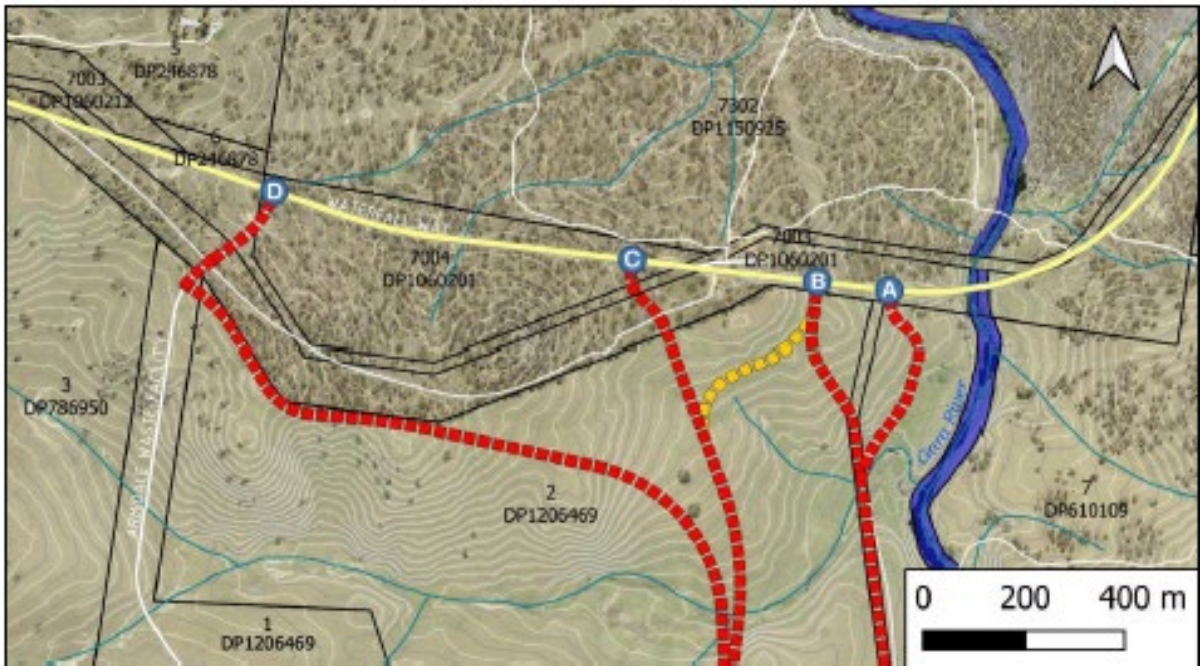

Figure 6-18 Alternative access options considered from Waterfall Way (Grafton Road)

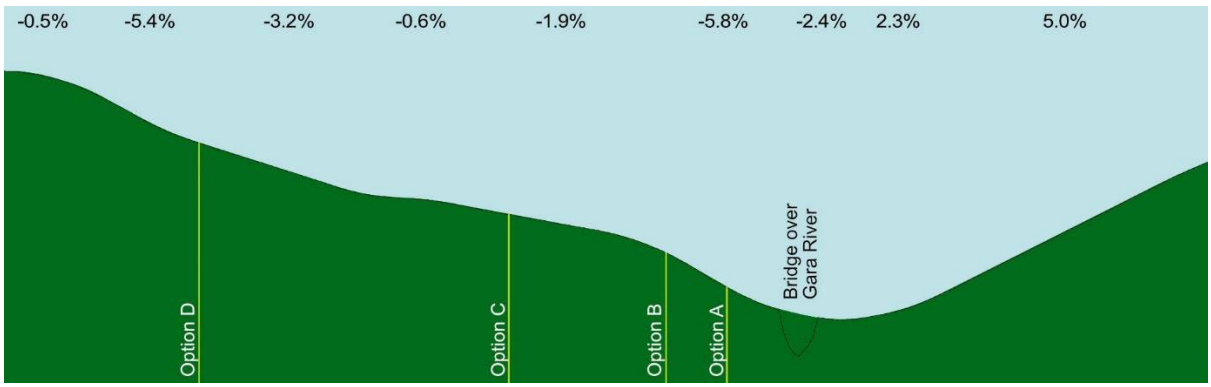

Figure 6-19 Longitudinal (West to East) section along the centreline of Waterfall Way (Grafton Road)

Intersection treatment from proposed access road

Proposed access road turning off Waterfall Way (Grafton Road), via the exiting Council landfill access road (Option D), and running east to join the Proposal site via a new access track. **This option would not require any upgrade at Waterfall Way (Grafton Road) as the existing BAL / CHR-S intersection treatment would be sufficient for Oxley Solar Farm construction traffic.**

Gara Road upgrades and Gara River causeway upgrade

Improvements will be required along Gara Road between approximate chainages 7.78km and 9.70km, where it will be necessary for heavy vehicles to travel on Gara Road to access different parts of the Oxley Solar Farm. Such improvements would include localised widening and course straightening to allow heavy vehicles to pass, three new heavy vehicle property entrances, and upgrading in the vicinity of the Gara River causeway crossing where road width and sight distances are constrained (Figure 6-20). The access points will be in compliance with Austroads intersection guidelines and the Armidale Regional Council Engineering. Given there is little through-access at this part of the road, consideration could be given to temporary traffic control measures to control traffic in the vicinity of the Gara River crossing, in consultation with Armidale Regional Council.

The proposed causeway upgrading work aims to improve road safety, amenity and flood immunity, avoiding the need for vehicles to queue on approaches under traffic control or for 'wet' causeway crossings, while ensuring the structure requires minimal ongoing maintenance and is commensurate with long term traffic needs. The causeway would involve raising the road by up to 1.3m, that would include culverts as shown in the concept design in Figure 6-21.

Figure 6-20 Concept of Causeway Upgrading, Gara Road Chainage 9.05km

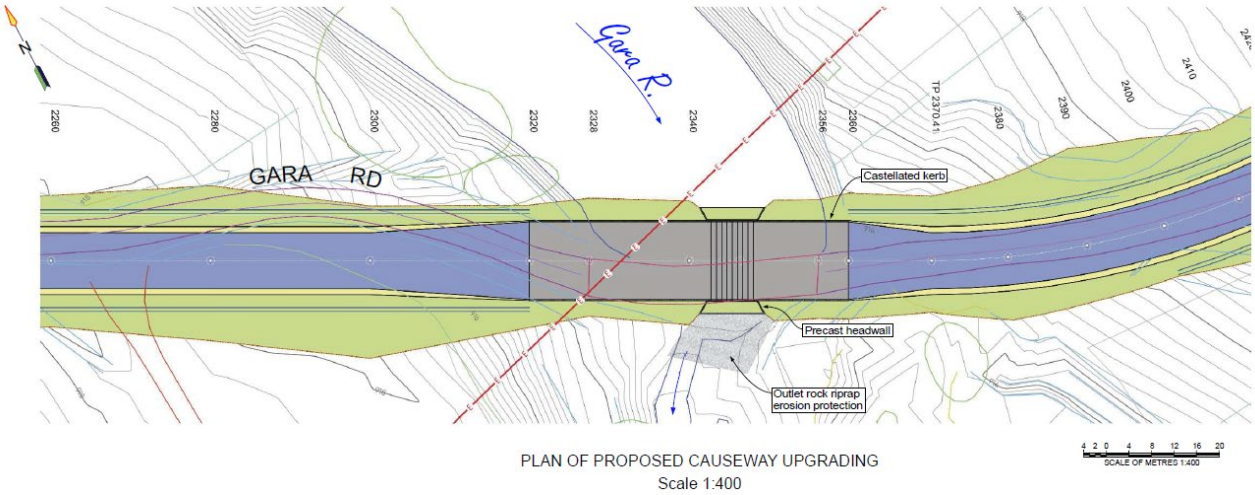

Figure 6-21 Aerial plan view of proposed Gara Road causeway upgrade

Updated cumulative traffic impacts

The cumulative impact of traffic has been updated to include the current status of nearby traffic generating developments. It is expected that cumulative traffic impacts would be limited to additional traffic generation along Waterfall Way (Grafton Road). Developments that have the potential to add additional traffic and Waterfall Way (Grafton Road) are:

- Metz Solar Farm
- Olive Grove Solar Farm
- Stringybark Solar Farm
- Armidale Regional Landfill
- Oven Mountain Pumped Hydro Storage
- Doughboy Wind Farm
- Armidale Battery Energy Storage System.

To avoid duplication within this report please refer to Section 6.9 for the assessment of cumulative impacts.

It is concluded in Section 6.9 that cumulative traffic generation impacts are uncertain, however are not expected to be significant. No additional mitigation measures are considered warranted.

6.7.3 Updated mitigation measures

There have been four changes to the mitigation strategies presented in the EIS TIA, shown below. The complete and updated set of mitigation commitments is provided in in Appendix C.

- EIS mitigation measure T4 has been updated to include the treatments for access from Waterfall Way (Grafton Road)
- EIS mitigation measure T6 has been updated to address the relocation of Gara Road access points
- EIS mitigation measure T7 has been updated to provide the detail requested in the EIS submissions to provide a detailed concept design for the Gara Road upgrades between chainages 7.78km and 9.70km

- EIS mitigation measure T8 has been updated to respond to direct consultation from TfNSW to reference the ARC Engineering Code that, "*Internal access, parking and manoeuvring areas are to be sealed wherever the gradient exceeds 16% to minimise erosion of the pavement".*

6.8 Hazardous materials and development

6.8.1 Background

Changes to the assessment

The assessment of hazardous materials in the EIS included risk screening for chemicals to be stored on site including Li-ion batteries. The assessment included mitigation measures for appropriate handling of hazardous materials and a commitment to protocol development for BESS maintenance and fire risk measures.

DPE – Hazards outlined in their submission on the EIS that the proposed 50MWh BESS proposed for the Oxley Solar farm is significantly large (exceeding 30MW) and would require a preliminary hazard analysis (PHA) to be submitted, in line with the approach for prior SSDs. As such a PHA has been completed and included in Appendix L. The key finding of the assessment are outlined in Section 6.8.2.

No changes have been made to the Proposal that would directly relate to Hazardous materials and development. The PHA considers local values and concerns in applying the Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). Particularly, issues raised by the community included:

- Potential for solar farm components to cause fires
- Potential for damaged solar farm components to leak toxic chemicals

It is noted in the submissions report that risks of damaged solar panels leaching toxic chemicals is present but not considered significant. This is due to their weatherproof construction and historically low occurrence of soil contamination under panels (Robinson & Meindl, 2019). The biggest contamination risks within the solar farm would be from chemicals released from the BESS, which are assessed in the PHA and summarised below.

Statutory requirements

The objective of the PHA is to develop a comprehensive understanding of the hazards and risks associated with the operation of the BESS for the Oxley Solar Farm and the adequacy of safeguards. The PHA assessed on the basis that the battery storage will be designed in accordance with the following:

- NFPA 855, Standard for the Installation of Stationary Energy Storage Systems;
- AS/NZ 5139:2019, Electrical installations - Safety of battery systems for use with power conversion equipment
- IEC 62897, Stationary Energy Storage Systems with Lithium Batteries - Safety Requirements
- UL 9540, Energy Storage Systems and Equipment

- UL 9540A; Testing the fire safety hazards associated with propagating thermal runaway within battery systems.
- FM Global DS 5-33 Property Loss Prevention Data Sheets
- FM Globals Development of Sprinkler Protection Guidance for Lithium Ion Based Energy Storage Systems.

The PHA considers:

- Identification of the nature and scale of all hazards at the Proposal, and the selection of representative incident scenarios.
- Analysis of the consequences of these incidents on people, property, and the biophysical environment.
- Evaluation of the likelihood of such events occurring and the adequacy of safeguards.
- Calculation of the resulting risk levels of the facility.
- Comparison of these risk levels with established risk criteria and identification of opportunities for risk reduction.

6.8.2 Key findings of the assessment

The key findings of the hazards assessment relate to the results of the PHA summarised below and provided in full in Appendix L.

Risk assessment

For each identified hazard and associated event, the resulting consequences and likelihood was determined from a hazard register. The hazard register considered 10 key hazardaous events as follows:

1. Electrical (Exposure to voltage)
2. Arc Flash
3. Exposure to electric and magnetic fields
4. Fire
5. Reaction (Thermal runaway)
6. Chemical (Release of electrolyte (liquid/ vented gas) from the battery cell)
7. Chemical (Coolant leak)
8. Chemical (Refrigerant leak)
9. External factors (Fire)
10. External factors (Vandalism).

The hazards table includes the cause, consequence, controls (mitigations) and liklyhood of occurance, which are then summasied in a consequence and likelihood of the identified events table.

The consequence and likelihood of the identified events are presented in Table 6-12.

The breakdown of these events according to their risk ratings are as follows:

- 8 medium risk events
- 2 low risk events.

Table 6-12 Risk assessment

Hazard	Event	Consequence (Impact to People)	Likelihood	Risk
Electrical	Exposure to voltage	Major	Very Unlikely	Medium
Arc flash	Arc flash	Major	Very Unlikely	Medium
EMF	Exposure to EMF	Insignificant	Extremely Unlikely	Low
Fire	Bushfire	Major	Very Unlikely	Medium
Reaction	Thermal runaway in battery	Major	Very Unlikely	Medium
Chemical	Release of electrolyte from the battery cell (liquid/vented gas) resulting in fire and/or explosion	Major	Very Unlikely	Medium
	Battery coolant leak	Moderate	Unlikely	Medium
	Refrigerant leak	Minor	Very Unlikely	Low
External factors	Water ingress resulting in fire	Major	Extremely Unlikely	Medium
	Vandalism due to unauthorized personnel access	Moderate	Unlikely	Medium

Potential impacts

Based on the overall risk acceptance criteria used for the study, the risk profile for the Proposal is considered to be tolerable with consideration of appropriate mitigation measures.

The majority of the medium risk events relate to fire events resulting from a variety of causes (e.g., release of flammable materials, battery thermal runway, infrastructure fire, bushfire, etc). The study identified proposed prevention controls to reduce the likelihood of these fire events and mitigation controls to contain the fires to minimise potential for escalated events (e.g., fire management plan, APZs, vegetation management etc.). Based on the identified controls, the highest likelihood for these events were rated as very unlikely (i.e., heard of in the industry, but not expected to occur).

One of the medium risk events identified is a battery coolant leak, and this is due to a recent fire within a battery facility being constructed within Victoria. It is understood that the fire commenced during setting up of the facility and was contained to the site. The most likely root cause of the fire

was a leak within the liquid cooling system causing arcing in the power electronics of the Megapack's battery modules. This resulted in heating of the battery module's lithium-ion cells that led to a propagating thermal runaway event and the fire [16]. The potential for a similar incident has been considered in this assessment and additional mitigation measures have been included in the PHA to prevent this event occurring again such as pressure testing the cooling system and additional detection fault alarms that work when the system is offline. With the implementation of these measures the consequences would be significantly reduced. However due to how recent this event was, the risk event has still been considered moderate risk.

Based on the size of the Development footprint, proposed location for Proposal infrastructure within the Proposal Site, proposed controls and distance to neighbouring land uses (including neighbouring properties and agricultural operations), the exposure to fire events will primarily be to the Proposal's construction and operations workforce. Offsite impacts would be expected to be minimal.

The risk assessment concluded that there is no potential for offsite fatality or injury. Therefore, the Proposal meets the land use planning criteria. Risk events identified are onsite impacts and assessed against *Work Health and Safety* (WHS) *Act* requirements to reduce risk. Risks were assessed by the Proposal as tolerable.

6.8.3 Updated mitigation measures

The EIS identified risks of Li-ion batteries onsite and made a commitment to developing protocols for minimising these risks. The PHA was undertaken as a requirement for BESS's with a capacity over 30MWh. The PHA provides a comprehensive list of controls that will be applied when developing the final Li-ion battery protocols and the Proposal's commitments now include more specific controls (included in Appendix C).

The hazard register in Table 4-4 of the PHA (see Appendix L) lists controls that would be applied to manage each of the 10 identified hazards. These controls would be included in a project specific:

- Fire Management Plan
- Fire Safety Plan
- Emergency Response Plan

6.9 Cumulative impacts

6.9.1 Background

Cumulative impacts were assessed in Section 8.10 of the EIS. Submissions from the public and agencies have been considered in revising the assessment for this amendment report.

Cumulative impacts are the additional impacts arising from foreseeable future developments, combined with the impacts of the Proposal on the existing environment. It is important that all major developments such as the Oxley Solar Farm consider the cumulative impacts of neighbouring projects. This is required for proactive state and local planning outcomes. As such this report assesses additional major projects that were not covered by the EIS that are in planning or construction as of June 2022. A cumulative impact assessment is a requirement of the SEARs

[16] https://victorianbigbattery.com.au/wp-content/uploads/2022/01/VBB-Fire-Independent-Report-of-Technical-Findings.pdf

under Section 173 of the Environmental Planning and Assessment Regulation 2021. It is noted that delays in any project may affect the conclusions of this assessment.

The key concerns of the community in regard to cumulative impacts are cumulative visual impacts to receivers that may see Oxley Solar Farm and the nearby Olive Grove and Stringybark Solar Farm, and also cumulative impacts of emerging renewables projects on agriculture in the region. The assessment in this section addressed these concerns, amends errors noted by submissions, and provided an updated assessment based on a require for more information by DPE. Community submissions relating to cumulative impacts are included in Section 4.1 of the Submissions Report.

This section follows the NSW Government's *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE, 2021). The assessment is largely based on impacts to relevant key issues identified in the EIS (NGH Pty Ltd, 2021), SEARs, and submissions.

6.9.2 Key findings of the assessment

Only new large-scale projects which have potential to produce material cumulative impacts within the Armidale Dumaresq LGA have been considered, including State Significant Development (SSD) and State Significant Infrastructure (SSI) projects, designated development projects requiring an EIS, projects which are likely to significantly affect the environment and require an EIS, major urban developments and 'controlled actions' requiring Commonwealth approval.

Major projects listed on the Major Projects Register within the Armidale Regional LGA and Uralla Shire LGA are presented in Table 6-13. In summary, the Oxley Solar Farm has potential to generate cumulative impact risks:

- During construction with the Tilbuster Solar Farm, Salisbury Solar Farm, Metz Solar Farm and New England Solar Farm due to the overlap of construction periods.
- During operation with Metz Solar Farm[17], Stringybark Solar Farm, Hillgrove Mine and Olive Grove Solar Farm due to their locality to the Proposal site.
- The following projects do not have clearly defined construction periods and as such would also potentially overlap with the constriction period of the Oxley Solar Farm:
    - Doughboy Wind Farm
    - Rangoon Wind Farm
    - Armidale Battery Energy Storage System
    - Oven Mountain Pumped Hydro Energy Storage Project

[17] Likely to be completed very soon, reducing potential for cumulative traffic impacts.

Table 6-13 Major projects (SSD and SSI) in the Armidale Regional LGA as of June 2022

Project	Proposed activity	Status	Timing	Distance from project	Relevant issues	Potential for cumulative impact
Armidale High School	Redevelopment to combine the existing Armidale High School and Duval High to establish a new, purpose built high school with a capacity for approximately 1,580 students.	Approved (2018)	Construction ongoing	13km	Unlikely given construction would likely be complete prior to Q1 2024 Oxley Solar Farm construction commencement.	Low considering scale of impacts; the majority of the school has already been redeveloped.
Armidale-Waste Facility	Operational landfill	Approved (2012) and operational	Currently operational	400m	Traffic	Low
Tilbuster Solar Farm	Construction and operation of an up to 150MW solar farm.	Approved (2022)	Construction period not known but likely to overlap with Oxley Solar Farm.	21km	Biodiversity Land use Visual amenity (nil views) Socio-economic Traffic	Low considering distance.
UNE New Wright Block	Development of three residential blocks and a hub building, demolition of the Wright Centre and the addition of 188 car spaces.	Approved (2020)	Construction period not known.	15km	Socio-economic Traffic	Low

Project	Proposed activity	Status	Timing	Distance from project	Relevant issues	Potential for cumulative impact
Salisbury Solar Farm	Construction and operation of an up to 700MW solar farm.	No longer on Major Project webpage	Construction period not known.	21km	Visual amenity (nil views) Impacts to issues unlikely given distance and location, and current planning status	Low
Metz Solar Farm	Construction and operation of an up to 115MW solar farm.	Approved (2017) Currently under construction, operation proposed for 2022 (FRV, 2022)	Construction likely to be complete prior to Oxley Solar Farm construction period.	7.4km	Biodiversity Land use Visual amenity (nil views) Socio-economic	Low
New England Solar Farm	Construction and operation of an up to 720MW solar farm. Modification proposes an additional 321ha of land to the project to accommodate a change to the project infrastructure layout.	Prepare Mod Report	Timing not specified in amendment report.	20km	Biodiversity Land use Visual amenity (nil views) Socio-economic Traffic	Moderate

Project	Proposed activity	Status	Timing	Distance from project	Relevant issues	Potential for cumulative impact
Stringybark Solar Farm	Construction and operation of a 30MW solar farm on land adjacent to the Proposal site.	Approved by Joint Regional Planning Panel (2020)	Construction timeline forecasted for 2020 with a 9 month construction period. To date construction has not commenced.	500m	Biodiversity Land use Visual amenity (low) Socio-economic Traffic	Moderate
Olive Grove Solar Farm	Construction and operation of a 30MW solar farm on land nearby the Proposal site.	Approved by Joint Regional Planning Panel (2020)	Construction timeline forecasted for 2020/2021 with a 9-month construction period. To date construction has not commenced.	1.3km	Biodiversity Land use Visual amenity (low) Socio-economic Traffic	Moderate
Doughboy Wind Farm	52 wind turbines (rated at up to 6MW) with a 100MW / 400MWh Battery Energy Storage System	Prepare EIS	Construction period not known.	33km	Impacts to issues unlikely given distance and location.	Low
Rangoon Wind Farm	6,000ha wind farm Proposal split into two separate sites.	Prepare EIS	Construction period not known.	62km	Impacts to issues unlikely given distance and location.	Low
Armidale Battery	150MW / 300MWh Battery Storage System to be located adjacent to the	Prepare EIS	Construction period not known.	6.6km	Biodiversity	Moderate

Project	Proposed activity	Status	Timing	Distance from project	Relevant issues	Potential for cumulative impact
Energy Storage System	existing Armidale Substation				Land use Visual amenity Socio-economic Traffic	
Oven Mountain Pumped Hydro Energy Storage Project	900MW hydro-electric power plant	Prepare EIS	Construction period not known.	43km	Impacts to issues unlikely given distance and location.	Low
Hillgrove Mine	An extension of mine life was assessed and approved for the operational Hillgrove Mine.	Approved	The Mine is currently in operation.	8km	Traffic	Low

Figure 6-22 Existing and approved SSD nearby the Proposal site

Potential cumulative impacts

Potential cumulative impacts are primarily associated with the following issues:

- Biodiversity impacts;
- Land use -agriculture
- Visual and landscape character impacts;
- Noise impacts;
- Traffic impacts;
- Pressure on local facilities, goods and services.

Biodiversity

The majority of the Development footprint (around 195ha or about 73% of the Development footprint) will consist of solar panels. In grasslands, which predominate onsite, the impacts of shading and diversion of rainfall runoff from the panels themselves is largely unknown and therefore the entire Development footprint is assumed to be removed. However, as the indicative layout shows, substantial peripheral areas are likely to be unimpacted and it is likely that a number of perennial native species will persist underneath the solar arrays, as they do in open woodlands subject to a degree of shading. Certainly, only a minor proportion of the seed bank will be impacted by the Proposal, given the limited excavation proposed. It is considered likely that with the establishment of more long-term ground cover monitoring programs for solar farms in NSW, as would be undertaken for this Proposal, that the impacts of shading will become better understood and this overestimation of impacts better quantified.

Cumulative impacts to vegetation connectivity is an important consideration in regards to nearby state significant developments, the Proposal has made revisions to the layout to avoid impacts to native vegetation. Siting solar panels on Box Gum Woodland with a vegetation integrity score of 30 or more has been avoided through layout revision. This vegetation type is a SAII candidate, and its protection is vital to positive biodiversity outcomes in the region. Refinements to the Proposal have also avoided any infrastructure to be place in moderate constraint native vegetation between Gara Road and Gara River or the area immediately south of Gara River, on the site's west. The riparian vegetation that exists around the Gara River is an important connectively corridor.

Commitments have been made to secure Box Gum Woodland offsets under a newly established biodiversity stewardship agreement, the preferred offset option under the Biodiversity Conservation Act 2016. An offset strategy is now provided in Appendix E that demonstrates that offsets for clearing are feasible within local area. While Oxley Solar Farm cannot control the biodiversity management undertaken by other developments in the region, the offset commitment and impact avoidance taken is considered adequate to reasonably mitigate cumulative biodiversity impacts.

Visual and landscape character impacts

Limited cumulative visual impacts with other proposed or approved solar farms in the locality would occur. Of the seven solar farms considered (either approved or proposed), only two were found to have low impacts and warrant mitigation:

1. **Stringybark Solar Farm (APPROVED)** Stringybark Solar Farm is sited adjacent to the north western boundary of Oxley Solar Farm. The Stringybark Solar Farm is likely to appear as a part of the Oxley Solar Farm Project. A cumulative visual impact is likely to be felt by motorists travelling along Gara Road as they pass both projects.

2. **Olive Grove Solar Farm (APPROVED)** Olive Grove Solar Farm is located to the northwest of the Oxley Solar Farm Site, off Grafton Road. Views to the Oxley Solar Farm Project are limited from the north due to a combination of vegetation and topography. Due to the limited visibility of the Oxley Solar Farm Project and proposed mitigation measures, opportunities to view both projects from nearby dwellings is likely to be low.

Mitigation measures proposed for each Project suggest the cumulative impacts are likely to be low.

Land use

The land on which the Development footprint is located is predominantly grazed by sheep and cattle and intermittent cropping for feed, this land use is not heavily productive due to the limitations of the sites' soils. Approximately 268ha of agricultural land would be converted into solar farm development this is a number reduce from 895ha originally stated in the EIS. Within the Development footprint continued sheep grazing may occur depending on agreements with the existing landholder. The existing landowner would be able to manage the remaining 782ha of the Proposal site as they see fit which will likely be continued grazing.

The Development footprint of the Proposal is not significant in comparison to the total availability of land in the region. Armidale Regional LGA covers an area of approximately 8,621km^2 (~826,100ha) and contributes 1.4% of the total agriculture value of NSW. The 268ha Development footprint represents about 0.005% of all agricultural holdings [18]in the North West NSW region in 2016-17 (ABS, 2018) and 0.03% of all land in the Armidale Regional LGA. In total Major projects in the region are estimated to total up to 7,000ha of holdings in the Armidale Regional LGA accounting for about 0.12% of all agricultural holdings in the North West NSW region and 0.8% of all land in the LGA.

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. Currently, there is only part time staff employed in agriculture at the Proposal site. The Proposal would increase employment on this land; during construction there would be approximately 300 full time equivalent staff during peak construction and 5 full time equivalent staff during operation, while current agricultural employment would largely remain if the landowner continues to graze the remaining 782ha of the Proposal site.

The pre-works agricultural potential and productivity can be readily restored following decommissioning of the solar farm and is a commitment of the Proposal.

The Proposal is not likely to result in significant cumulative impacts to the area of available agricultural land, local and regional agricultural production and agricultural employment opportunities if developers and Armidale Regional Council coordinate and as such the Proponent would enter a Voluntary Planning Agreement in efforts to mitigate cumulative agricultural impact (refer to Section 6.9.3 and Appendix C).

Noise impacts

Noise impacts through the use of plant, machinery and vehicles would ordinarily be increased if the construction of other developments is undertaken concurrently. Construction noise is considered manageable through the implementation of mitigation measures outlined in Appendix C. During operation, the Proposal would generate negligible noise impacts. With the operation of Stringybark and Olive Grove Solar Farm adjacent to the Proposal site, the operational noise is also likely to be

[18] According to the ABS there was 5,763,825ha of land mainly used for agricultural production in the North West NSW region in 2016-17.

negligible due to the noise nature of solar farms. Cumulative impacts are therefore unlikely to increase noise impacts and are expected to be minor and manageable.

Traffic impacts

The cumulative impact of traffic has been updated to include the current status of nearby traffic generating developments. It is expected that cumulative traffic impacts would be limited to additional traffic generation along Waterfall Way (Grafton Road). Developments that have the potential to add additional traffic to Waterfall Way (Grafton Road) are:

- Metz Solar Farm
- Olive Grove Solar Farm
- Stringybark Solar Farm
- Armidale Regional Landfill
- Oven Mountain Pumped Hydro Storage
- Doughboy Wind Farm
- Armidale Battery Energy Storage System.

Metz Solar Farm

Construction of the 115MW Metz Solar Farm is in progress with completion expected in 2022, prior to the commencement of the Oxley Solar Farm. Operational traffic associated with the Metz Solar Farm will result in a minor increase to through-traffic on Waterfall Way past the Oxley Solar Farm access, forecast in the Traffic Assessment at up to 8 vehicles per day in each direction, and this additional ongoing traffic is considered for the Oxley Solar Farm intersection warrants.

Olive Grove Solar Farm

The 30MW Olive Grove Solar Farm site access is located east of Gara Road and west of the Oxley Solar Farm access. Since traffic generation will primarily occur between Armidale and the Olive Grove solar farm site access, this development is not likely to impact Austroads intersection warrants for the Oxley Solar Farm.

Armidale Regional Landfill

The Armidale Regional Landfill 12km from Armidale was officially opened in October 2020 and has capacity to accept up to 15,000 tonnes of general solid waste per annum over its 50-year design life. The new landfill does not accept domestic self-haul waste deliveries. Instead, all waste is transferred from existing waste management facilities in Armidale and Guyra, or delivered directly by kerbside waste collection trucks. For the purpose of this assessment and based on discussion with staff at Armidale Regional Council, peak traffic of 20 vehicles are estimated to enter and exit the landfill daily, assumed to be a peak of 2 vehicles per hour.

Oven Mountain Pumped Hydro Storage

The Oven Mountain Pumped Hydro Storage (OMPHS) project comprises the construction of two reservoirs, tunnels and an underground power station, enabling water from the lower reservoir to be pumped into the upper reservoir using excess power from other renewable energy projects. Water would be released from the upper reservoir to generate up to 600MW of hydro power during periods of peak electricity demand.

The OMPHS Scoping Report dated January 2021 notes that due to the remoteness of the site, temporary camp accommodation will be required for the construction workforce. The primary transport route could be from either Armidale or Kempsey. In the former case, the route would be

via Waterfall Way and the Armidale-Kempsey Road. Local materials will likely be sourced for concrete aggregate and dam fill, but supplementary materials such as fly-ash and cement dust will need to be transported to site. Construction may overlap with the Oxley Solar Farm. For the purpose of this traffic assessment, construction traffic on Waterfall Way during the peak construction period between 2023 and 2025 is estimated at 60 vehicles per day.

Doughboy Wind Farm

The 600MW Doughboy Wind Farm will be located east of the Oxley Solar Farm site. The Doughboy Wind Farm Scoping Report dated September 2020 states the primary heavy vehicle access to the site will be via the New England Highway, Waterfall Way (Grafton Road) and Kilcoy Road. Overlength and overmass vehicles may travel via Guyra Road and Wongibinda Road. Potential materials for the project construction include 60 wind turbines, a 100MW energy storage battery, operations building, concrete batch plant facilities, rock crushing equipment, gravels, and water.

The Scoping Report does not provide estimates of additional traffic generated on Waterfall Way (Grafton Road), and no detailed traffic assessments are yet available on the NSW Major Projects website within the NSW Planning Portal. Construction may overlap with the Oxley Solar Farm. For this assessment, it is assumed that peak traffic generation will be 275 trips daily, being the average generation stated in traffic assessments for the much larger 119-turbine White Rock Wind Farm (MP10_0160) and 159 turbine Sapphire Wind Farm (MP09_0093). Peak construction is assumed to occur over a 3-year period commencing in 2024.

Armidale Battery Energy Storage System

The Armidale Battery Energy Storage Scheme is located adjacent the Armidale 330kV transmission substation, and will have 150MW battery power and 300MWh battery storage, capable of powering more than 20,000 homes. The construction period is 12 months. Construction may overlap with the Oxley Solar Farm. The scoping report states that the peak traffic generation will be 45 trips daily.

Other regional energy projects

The Rangoon and Thunderbolt Wind Farms (along with the Tilbuster, New England and Salisbury Solar Farms), are all accessed via the New England Highway and are not expected to create any adverse impacts or significant traffic generation on Waterfall Way. The Winterbourne Wind Farm is located 33km from the Oxley Solar Farm and is not expected to have any traffic impacts on Waterfall Way (Grafton Road).

Cumulative traffic impacts conclusion

Since many developments are still in the planning stage, with no traffic impact assessments yet published, there is some uncertainty about the timing of developments and the impacts of combined development traffic. Traffic assessments for these developments will need to consider traffic generation from the Oxley Solar Farm and other regional energy projects.

There is potential for the peak construction period of the Oxley Solar Farm to overlap with the peak construction period for the Oven Mountain Pumped Hydro Storage and Doughboy Wind Farm projects. Combined traffic for the Oven Mountain and Doughboy Wind Farms is estimated at 335 vehicles per day in the assumed peak construction period between 2023 and 2025, and 36 vehicles per day thereafter for operational activities.

The Metz Solar Farm is expected to be complete prior to the start of the Oxley Solar Farm, and only operational traffic movements of 16 vehicle trips per day generated by this development.

Access Option for the Oxley Solar Farm co-located with the Armidale Regional Landfill access, resulting in estimated peak hour traffic turning at the access of up to 16 vehicles per hour.

Existing traffic in 2022 on Waterfall Way (Grafton Road) is estimated to be 1,834 vehicles per day, combining eastbound and westbound directions. Assuming typical 1.04% compound traffic growth on Waterfall Way (Grafton Road), and conservatively allowing additional traffic of 102 vehicles per day in 2022 to account for the construction of nearby major developments and an additional 10 vehicles per day thereafter associated with operational activities for the Metz Solar Farm, estimated traffic over the next ten (10) years is shown in Table 6-14.

Along Waterfall Way (Grafton Road) adjacent the site, the AM peak period was measured to occur between 11:15am and 12:15pm, and the PM peak period is between 3:15pm and 4:15pm.

Table 6-14 Estimate daily traffic volumes (both directions), Waterfall Way (Grafton Road)

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Daily traffic	1834	1998	2015	2032	1751	1768	1786	1804	1822	1841	1859	1878
Am Peak hour	144	145	147	148	150	152	153	155	156	158	160	161
PM Peak hour	162	164	166	167	169	171	173	174	176	178	180	182

Considering the increases in traffic volume estimated Waterfall Way (Grafton Road) is expected capacity for the increase in traffic and would not result in transport issues that would prevent the Proposal from being approvable. No additional mitigation measure have been proposed.

Pressures on local facilities, goods and services

The construction of the Tilbuster Solar Farm, Metz Solar Farm (expected to be completed imminently), Salisbury Solar Farm, New England Solar Farm and potentially additional projects in early planning such as Armidale Battery Energy Storage System would result in a large influx of workers required for the projects. It is proposed for all projects that workers could be accommodated in Armidale and other surrounding towns throughout the construction period.

This has the potential to put substantial strain on local facilities, good and services. The use of accommodation for workers would reduce the amount of accommodation available for tourists visiting the region. 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.

Consultation with community liaison representatives for the Tilbuster Solar Farm, Salisbury Solar Farm, Metz Solar Farm and New England Solar Farm would be ongoing to ensure this influx is managed appropriately so as to not place stress on stakeholders including business owners in Armidale.

The Proposal would not result in significant impacts to local businesses, residents and road users, subject to the range of identified mitigation measures. It is unlikely that there would be negative cumulative impacts to local facilities, goods and services.

6.9.3 Employment mitigation measures

Accommodation and employment has been identified in this updated assessment and through consultation Armidale Regional Council. As such an additional mitigation measure has been developed. The mitigation measure will include the development of an Accommodation and Employment Strategy detailed below:

- Prior to the commencement of construction, the Proponent would prepare an Accommodation and Employment Strategy for the development in consultation with Armidale Regional Council. The strategy must:
    - Propose a strategy to facilitate the accommodation of the workforce associated with the development
    - Investigate options for prioritising the employment of local workers for the construction and operation of the development where feasible
    - Include a program to monitor and review the effectiveness of the strategy over the life of the development.

7. Justification

7.1 Evaluation, subsequent to Proposal changes

7.1.1 Updated assessments and outcomes now achieved

In response to the public and agency submissions, the Oxley Solar Farm has made substantive changes to the Proposal. This has taken some time, given the number issues raised in submissions. Further civil design work was undertaken to reduce the Proposal extent in key areas. This necessitated updated specialist assessments. The result is an updated Proposal description and accompanying environmental commitments which demonstrate the Proposal's desire to develop a Proposal that responds to local values and concerns.

The refinements have been undertaken in consideration of cumulative impacts which may occur in the future, given the site's location within the New England Renewable Energy Zone; a location well placed to be a driving force to deliver affordable energy to the grid. The updated environmental assessment of the Proposal's key impacts are summarised below.

Table 7-1 Updated environmental evaluation of Proposal

Impact areas	Net result
Visual impacts	Reduced Development footprint and increased setbacks to dwellings and National Park have reduced visual impacts significantly: • Public roads visual impacts and glare – two sections of Silverton Road assessed as high visual impact where they are adjacent the site. Silverton Road, Gara Road, Blue Hole Road warrant supplementary screen planting for potential glare. • Dwellings visual impacts and glare – one moderate visual impact R4, 13 low or negligible, 14 nil. Five warrant supplementary screen planting for potential glare; R3, R4, R7, R10, R14. • National Park (Threlfall Walking Track and Blue Hole Picnic area) visual impacts and glare - now nil to negligible. • Limited cumulative impacts with other proposed or approved solar farms in the locality (two assessed as low with mitigation). Landscape Management Plan updated to demonstrate the effectiveness of proposed plantings.
Hydrological impacts	No significant impacts expected, in line with the conclusions of the EIS. Gara River causeway design would result in improved crossing conditions along Gara Road.

Impact areas	Net result
Combined physical impacts, including soil and water	No adverse impacts to Gara River water quality. High certainty around preservation of land capability throughout the life of the project (demonstrated through the provision of a further Soil Impact Assessment and Soil and Water Management Plan, appended to the Submissions Report (NGH Pty Ltd, 2022).
Biodiversity	No anticipated significant impacts to Commonwealth listed entities (no referral under the EPBC Act). Offsets proposed in accordance with the NSW Biodiversity Offset Scheme for vegetation and three species 'assumed to occur'. Serious and Irreversible Impact candidate Box Gum Woodland impacts of 2.6 ha; physical offsets demonstrated to be feasible.
Aboriginal heritage impacts	Impacts to 13 sites and potential indirect impacts to 4 sites. 48 sites avoided. Mitigation including salvage and buffering of specific sites for avoidance agreed with the Registered Aboriginal Parties participating in this assessment.
Historic heritage impacts	No physical impacts on any historic heritage item. Minor visual impact on one unlisted item; the old Gara Homestead and shed (GH1), now 60m from the nearest infrastructure.
Noise and vibration impacts	Compliance with all applicable noise criteria.
Traffic and transport impacts	Compliance with all traffic safety guidelines. Upgrades have been agreed to by all road's authorities.
Hazards and risks	Compliance with all safety guidelines. All risks manageable.
Cumulative impacts	Potential for low cumulative visual impacts with two local solar farms. Potential cumulative traffic impacts if construction programs coincide with other large developments. The Proponent will liaise with council and representatives of nearby major developments to ensure cumulative impacts are managed. All risks manageable.

7.1.2 Updated evaluation of site suitability

With reference to the Draft Large Scale Solar Energy Guideline 2021 (DPIE, 2021) and endorsed *Large-Scale Solar Energy Guideline for State Significant Development* (DPIE, 2018), and the updated detailed environmental assessments, the Oxley Solar Farm can be considered highly suitable to the areas proposed for development. Refer to Table 7-2.

Table 7-2 Environmental site suitability checklist

Site constraints / factor	Outcome
Location within a REZ	The site selected is within a REZ and thereby will capitalise on economies of scale and clustering of generators, storage and transmission infrastructure.
Proximity to regional cities	Armidale is listed in the Proposed Infrastructure SEPP Amendments: Renewable energy and regional cities. However, at 14km from Armidale, the proposal is not close enough to trigger consideration of this TISEPP.
Important agricultural land	No Biophysical Strategic Agricultural Land (BSAL) as defined in Chapter 2 of Resources and Energy SEPP occurs within the boundaries of the Proposal site. No high capability land will be affected (Class 3 or above).
Visibility and topography	Few dwellings and valued tourist destinations in the local area would be impacted by extensive views or glare. • Two sections of Silverton Road rate a high visual impact where they are adjacent the site. • One dwelling has a greater than low impact. Five warrant supplementary screen planting for potential glare. • Threlfall Walking Track and Blue Hole Picnic area within the Oxley Wild Rivers National Park would experience nil to negligible visual impacts • Limited cumulative impacts with other proposed or approved solar farms in the locality (two assessed as low with mitigation) can be addressed by visual screening.
Aboriginal cultural heritage	Constraints mapping, based on extensive test pit surveys, have been used to ensure the impacts to Aboriginal cultural heritage are acceptable and can be managed.
Biodiversity	Constraints mapping, based on extensive surveys and habitat modelling, has been used to demonstrate the 'avoid and then minimise' mandate for impacts to conservation significant vegetation, flora and fauna. In particular, no Commonwealth listed species warrant referral and Serious and Irreversible Impact candidate Box Gum Woodland impacts of 2.6ha have been shown to be feasible to offset. Additional amelioration measures are highly appropriate at this site and will enhance habitat connectivity and function.
Natural	The Development footprint has been modelled using hydrological catchment models to show the proposal would not impact local hydrological function or exacerbate erosion or

Site constraints / factor	Outcome
hazards	flooding to any substantive degree. Bushfire risks are manageable with standard set-backs included in the Development footprint.

In addition, consideration has been given to the compatibility of the Proposal with the existing electricity network and the compatibility of the site for the generation of solar energy. This ensures construction and operating costs are reduced, maximising the viability of the Proposal and its contribution to meeting energy needs into the future. Considerations during initial site investigations to maximise solar energy generation included:

- Proximity to and capacity of the electrical transmission network
- Availability of an abundant solar resource
- Availability of suitable land (i.e., topography, aspect, presence of native vegetation)
- Compatibility of stakeholders' interests / adjacent land uses.

The environmental impacts at this site are well understood and specialist studies have informed the refined layout as well as the strategies that will management the impacts during design, construction and operation and decommissioning. The environmental investigations and constraints mapping undertaken for the project have considered:

- Receivers; nearby dwellings and valued recreational nature conservation areas, land zoning compatibility and the ability to effectively mitigate visual impacts.
- Hydrology and watercourses
- Soils and land capability
- Aboriginal cultural heritage and non-indigenous heritage
- Biodiversity and opportunities for enhancement of habitat
- Cumulative impacts of other proposed or approved major projects.

Exclusion zones ensure that the areas adjacent to the solar farm will be protected, through the implementation of management plans, into detailed design and through to construction and operation. The updated constraints mapping identifies the key constraints within the Proposal site (now presented in Figure 3-3).

7.1.3 Proposal objectives and alignment with Environmentally Sustainable Development (ESD)

The Oxley Solar Farm would result in numerous benefits, local and regional at a time of crisis in the energy network. As of June 2022, the combined effects of the war in Ukraine and flooding in Queensland and New South Wales have seen the price of fuel, gas and electricity increase exponentially. Short term electricity price caps have been imposed by the Australian Energy Market Operator (AEMO). The impact on electricity prices is contributing to a cost-of-living crisis for NSW residents. Increased renewable energy generation supported by transmission capability and storage are required to provide downward pressure on electricity prices and support long-term energy security, economic growth and prosperity.

The Proposal's objectives centre on the development of a viable renewable energy generation facility that will provide a meaningful contribution to the state's transition to renewable energy technologies. The Oxley Solar Farm would:

- Generate electricity from a low-cost renewable source.
- Provide storage in order to deliver electricity at high demand times, when roof top solar is unavailable.
- Address Federal, state and local policies as well as international agreements in relation to reducing greenhouse gas emissions, global warming and the transition to greater renewable energy generation.
- Supply the equivalent of about 78,000 average NSW homes, displacing approximately 382,000 metric tonnes of carbon dioxide, currently generated by non-renewable sources.
- Provide employment, economic stimulus and diversification of the local agricultural economy.
- Contribute to the 'powerhouse' proposed for the New England REZ, the second highest solar penetration region in NSW.
- Seek an ongoing positive relationship with the local community by its commitment to incorporate local values into the Proposal's design.
- Minimise environmental impact during construction and operation and ensure the site, when decommissioned, has the same or better land capability and land use options.

These objectives align closely with Environmentally Sustainable Development (ESD), in their focus on the protection of natural resources and a better future of all Australians in the long-term. The principles of Environmentally Sustainable Development (ESD) have been incorporated in the design, and will be incorporated into construction, ongoing operations and decommissioning of the development. The assessment integrates all significant socio-economic and environmental considerations and seeks to avoid any potential serious or irreversible environmental damage, based on a quantified assessment of risk. Specific to ESD criteria, this is set out below.

Intergenerational equity

In the supply of 215MW of renewable energy and provision of a 50MWh Lithium-ion Battery Energy Storage System, the Proposal will provide a meaningful contribution to the state's transition away from harmful greenhouse gas emissions and provide a better future for all Australians. Climate change represents specific risks for rural areas and agriculture. It is an intergenerational risk to which there is no current 'silver bullet'. The Oxley Solar Farm would be one of many actions required to make the changes necessary to address this risk.

The integration of economic, social and environmental factors

The Proposal would diversify and enhance the rural economy during construction, driving a local economy stimulus to provide services to construction contractors, many of whom will be local. It will also provide a drought proof income stream while allowing for some continued agricultural operations.

The Proposal has been designed to protect natural and cultural resources, informed by constraints mapping, incorporating exclusion zones to be protected, avoiding serious and irreversible impacts and committing to enhancement of biodiversity connectivity.

The precautionary principle

The assessment and mitigation strategies underpinning the Proposal are conservative where uncertainty is present:

- While the final detailed design stage is yet to be undertaken, all impacts will be required to be confined to the consented Development footprint; all assessments are based on this 'worst-case' impact footprint. They include all potential impacts, temporary and permanent. They include room to establish all required environmental controls.
- Where specific infrastructure parameters or construction programming is yet to be determined, a 'worst case scenario' is assumed, for example hydrological, noise and traffic modelling, so the mitigation is precautionary and robust.

In both cases above, the actual impacts are therefore expected to be less than what has been assumed and mitigated.

7.2 Benefits and costs of the Proposal

7.2.1 Original justification for the Proposal

The justification of the Oxley Solar Farm development remains consistent with the EIS:

- It would contribute to meeting Australia's renewable energy targets and greenhouse gas commitments, as quantified above.
- The Proposal aligns with international, Commonwealth and state goals and polices for mitigating climate change and renewable energy projects.
- Being a renewable energy project, it would assist in improving electricity reliability and security benefits within Australia as the energy supply from coal-fired power stations are reduced.
- It would assist in increasing competition in the wholesale energy marked and therefore assist in reducing electricity prices within Australia.
- It would provide direct and indirect employment opportunities during the construction and operating phases of the Proposal.
- It would provide a significant injection of expenditure in the local area during the 12–18 month construction period.
- The Proposal would be a new land use thereby diversifying the local land use within the region, providing a drought resilient revenue stream for the local agricultural economy.
- The Proposal site meets the preferable site conditions of a solar farm development outlined by the Large Scale Solar Energy Guideline for SSD 2018 (DPIE) including optimal solar resources, suitable land, capacity to rehabilitate, proximity to electrical network and connection capacity. It is also consistent with the Draft Large Scale Solar Energy Guideline for SSD 2021 (DPE).
- The Proposal is appropriately located within the New England REZ which is the second highest solar penetration region in NSW, supported by existing transmission strength and capacity (AEMO, 2018).
- The Proposal remains of a viable scale while responding to site constraints and minimising environmental impacts to the site and surrounding locations.

- Two existing 132kV transmission lines traverses the site which means the that the connection to the high voltage network can be made onsite without the need to construct any transmission lines. It also reduces the distribution loss factor risk.
- Once the solar farm reaches the end of its operational life, the site can be remediated to its existing land capability so that grazing and occasional cropping can be resumed.
- There is substantial community support in the region for renewable projects.

7.2.2 Benefits of the amended Proposal

While the array area of the Proposal has been reduced (by 74.5 ha) in response to community submissions and further investigations, this justification remains entirely consistent with the updated Proposal presented for each of these points. The reduction in the Proposal's capacity would be only 13%.

In addition, due to the responses documented in this report to the public and agency submissions, the refinements:

- Provide increased certainty in relation to areas that will be impacted and areas that will be protected from impacts
- Provide increased certainty in relation to the management of environmental impacts.
- Include additional enhancement actions to improve on assets valued by the local community.
- Improve traffic safety and flood access for Proposal and also for local road users.
- Share the benefits of the Proposal to the broader community by entering a Voluntary Planning Agreement (VPA) with Armidale Regional Council:
    - Over a significant period of time Oxley Solar has been actively working with both previous and current Armidale Regional Council personnel to develop a VPA to benefit the Armidale Regional community. Oxley Solar is keen to finalise such an agreement with Armidale Regional Council in the near future.
- Better address potential cumulative impacts, important to the site's location within the New England Renewable Energy Zone.

7.2.3 Costs of not proceeding

The consequences of not proceeding with the proposed Oxley Solar Farm would result in:

- Loss of opportunity to reduce GHG emissions and move towards cleaner renewable electricity generation.
- Loss of a renewable energy supply that would assist in reaching the NSW renewable energy targets.
- Loss of additional electricity generation and supply into the National grid.
- Loss of social and economic benefits created through the provision of direct and indirect employment opportunities during the construction and operation of the solar farm.

7.3 Ability to be approved

The Oxley Solar Farm would result in numerous benefits, local and regional. At a time of crisis in the energy network, it forms an important part of NSW and Australia's transition to renewable energy generation, offering a more sustainable future.

The Proposal meets relevant planning requirements and is consistent with the principles of Environmentally Sustainable Development (ESD), which have been incorporated in the design, and will be incorporated into construction, ongoing operations and decommissioning of the development.

The environmental values at this site are well understood, based on field surveys and specialist modelling outputs. To address inevitable areas of uncertainty, conservative approaches have been adopted. The updated specialist studies have informed the refined layout as well as the strategies that will management the impacts during design, construction and operation and decommissioning. The result is a Proposal that responds well to its natural and cultural context as well as specific community expectations. The benefits of the Proposal clearly outweigh the costs of not developing the project.

It is considered justifiable and approvable.

8. References

ABS. (2018). *Agriculture .* Retrieved from Australian Bureau of Statistics : https://www.abs.gov.au/statistics/industry/agriculture

AEMO. (2018). *2018 Electricity Forecasting Insights - March 2018 Update.* Retrieved from https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/nem-electricity-demand-forecasts/2018-electricity-forecasting-insights-march-2018-update

AEMO. (2021, December). *Draft 2022 Integrated System Plan.* Retrieved from https://aemo.com.au/-/media/files/major-publications/isp/2022/draft-2022-integrated-system-plan.pdf?la=en

AEMO. (2022, June). *2022 Integrated System Plan.* Retrieved from https://www.aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en

Armidale Regional Council. (2019). *Our Region.* Retrieved from http://www.armidaleregional.nsw.gov.au/our-region/tourism/our-region

DECC. (2006). *Assessing Vibration: A technical Guideline.* Sydney .

DECC. (2009, July). *Interim Construction Noise Guideline.* Retrieved from NSW Environment Protection Authority: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/09265cng.pdf

DECC. (2009). *Interim Construction Noise Guideline .* Sydney.

DECCW. (2011). *NSW Road Noise Policy .* Sydney .

DoP. (2011, January). *Hazardous Industry Planning Advisory Paper No 6.* Retrieved from https://www.planning.nsw.gov.au/-/media/Files/DPE/Other/hazardous-industry-planning-advisory-paper-no-6-hazard-analysis-2011-01.pdf?la=en

DoP. (2011, May). *Multi-level Risk Assessment .* Retrieved from https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/assessment-guideline-multi-level-risk-assessment-2011-05.pdf?la=en

DPIE. (2017, August). *The New England North West Regional Plan 2036.* Retrieved from Department of Planning, Industry and Environment: https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/New-England-North-West

DPIE. (2018, December). Retrieved from Large-ScaleSolar Energy Guideline For State Significant Development: https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/large-scale-solar-energy-guideline-2018-12-11.pdf?la=en

DPIE. (2021). *Cumulative Impact Assessment Guidlines for State Signficant Projects .*

DPIE. (2021). *Draft Large-Scale Solar Energy Guideline.*

Footprint sustainable engineering . (2022). *Proposed Oxley Solar Farm, Armidale, New South Wales Hydrological and Hydraulic Analysis.*

FRV. (2022). *About The Metz Solar Farm.* Retrieved from http://metzsolarfarm.com/about-us/

Moir Landscape Architecture. (2022). *LANDSCAPE AND VISUAL IMPACT ASSESSMENT Oxley Solar Farm.*

New England Surveying & Engineering . (2022). *TRAFFIC IMPACT ASSESSMENT OXLEY SOLAR FARM 914 GARA ROAD, METZ.*

NGH . (2022a). *BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT Oxley Solar Farm .*

NGH . (2022f). *Soil Impact Assessment Oxley Solar Farm.*

NGH. (2022b). *Biodiversity Offset Strategy Oxley Solar Farm .*

NGH. (2022c). *Archaeological Report – Subsurface Testing Oxley Solar Farm.*

NGH. (2022d). *Historic Heritage Assessment Oxley Solar Farm .*

NGH. (2022e). *Priliminary Hazard Analysis .*

NGH. (2022g). *Draft Soil and Water Management Plan Oxley Solar Farm .*

NGH Pty Ltd . (2019). *SCOPING REPORT OXLEY SOLAR FARM.*

NGH Pty Ltd. (2021). *Environmental Impact Statement - Oxley Solar Farm.*

NGH Pty Ltd. (2022). *Oxley Solar Farm Submissions Report .*

NSW DPIE. (2021). *State significant development guidelines – preparing an amendment report.*

NSW EPA. (2017). *Industrial Noise Policy .* Sydney .

Renzo Tonin & Associsates . (2022). *OXLEY SOLAR FARM Construction & Operational Noise & Vibration Assessment.*

Robinson, S., & Meindl, G. (2019). Potential for leaching of heavy metals and metalloids from crystalline silicon photovoltaic systems. *Journal of Natural Resources and Development 09*, 19-24.

Appendix A Updated Project Description and Schedule of Lands

A.1 Updated Project Description

A.2 Updated Schedule of Lands

Proposed infrastructure	Lots and DP	Owner	Existing use	Ownership arrangements
All proposed solar farm infrastructure including solar arrays, connection infrastructure, battery storage, internal roads and ancillary infrastructure:	Lot 5 DP253346	Currently owned by one private landowner (involved landowner)	Agriculture	OSD would purchase this land
	Lot 6 DP625427	Currently owned by one private landowner (involved landowner)	Agriculture	OSD would purchase this land
	Lot 1 and Lot 2 DP1206469	Currently owned by one private landowner (involved landowner)	Agriculture	OSD would purchase part of this land
	Lot 7003 and 7004 DP1060201	Crown Land	Road easement Travelling stock reserve	OSD would lease or purchase this land.
Site access:	Lot 1 and Lot 2 DP1206469	Currently owned by one private landowner (involved landowner)	Agriculture	Easement would be established.
	Lot 7003 and Lot 7004 DP1060201	Crown Land	Road easement Travelling stock reserve	Easement would be established.
Gara Road and Gara River causeway upgrades:	Lot 6 DP625427	Currently owned by one private landowner (involved landowner)	Agriculture	OSD would purchase this land
	Lot 5 DP253346	Currently owned by one private landowner (involved landowner)	Agriculture	OSD would purchase this land

Appendix B Updated Statutory Compliance Table

The compliance table below takes into consideration changes to NSW regulation and SEPP's that have occurred since the submission of the Oxley Solar Farm EIS.

Category	Statutory requirements	Relevance to Project
Power to grant consent	State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) Environmental *Planning and Assessment Act 1979* (EP&A Act).	Section 20 of Schedule 1 of the Planning Systems SEPP states that the following is considered a SSD: *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:* *(a) has a capital investment value of more than $30 million, or* *(b) has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance.'* The Proposal would have a capital investment cost estimate of more than $30 million ($372.330 million). Therefore, the Proposal is classified as "State Significant Development" under division 4.7 of the EP&A Act. The Minister for Planning and Public Spaces is the consent authority for SSD, and SSD applications are assessed by DPE (unless specific conditions occur e.g., where 50 or more people have objected to the application, the local council has objected to the application; and/or the applicant has disclosed a reportable political donation, whereby **the Independent Planning Commission (IPC) would be the consent authority, which is the case for this Proposal.**
Permissibility	State Environmental Panning Policy (Transport and Infrastructure) 2021 (TISEPP), Armidale Dumaresq Local Environmental Plan 2012	The Proposal site is located within land zoned RU1 (Primary Production), under the Armidale Dumaresq Local Environmental Plan 2012. Electricity generation is prohibited within these land zones, however Section 2.36(1)(b) of the TISEPP states development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. Therefore, the Project is permissible with consent.
Other approvals	*Roads Act 1993* (Roads Act), *Environment Protection and Biodiversity Conservation Act 1999*	**Approvals and licences** • Section 4.42 of the EP&A Act states "*An authorisation of the following kind cannot be refused if it is necessary for carrying out State significant development that is authorised by a development consent*

Category	Statutory requirements	Relevance to Project
	(EPBC Act), *Environmental Planning and Assessment Act 1979* (EP&A Act), Environmental Planning and Assessment Regulation 2021, *Crown Lands Management Act 2016* (CLM Act), State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP), *Heritage Act 1977, Water Management Act 2000* (WM Act), *National Parks and Wildlife Act 1974* (NPW Act), *Fisheries Management Act 1994* (FM Act)	*under this Division and is to be substantially consistent with the consent*": Consent under section 138 of the Roads Act for road upgrades to the public road network. • An easement, licence or permit under division 5.6 of the CLM Act will be attained through consultation with DPE • A Water Access Licence under Section 56 of the Water Management Act 2000 for river offtake would be attained prior to the works.
Mandatory matters for consideration		The following key Commonwealth, State and Local legislative and policy instruments are applicable to the Proposal: <u>Commonwealth</u> • EPBC Act • *Native Title Act 1993* <u>NSW</u> • EP&A Act • Planning Systems SEPP

Category	Statutory requirements	Relevance to Project
		• TISEPP • Hazards and Resilience SEPP • State Environmental Planning Policy (Primary Production) 2021 • State Environmental Planning Policy (Resources and Energy) 2021 • Roads Act • CLM Act • NPW Act • WM Act • *Heritage Act 1977* • *Biodiversity Conservation Act 2016* (BC Act). <u>Local instruments</u> • Armidale Dumaresq Local Environmental Plan 2012 • Armidale Dumaresq Development Control Plan 2012

Appendix C Updated Consolidated Safeguards And Mitigation Table

Note:

Underline indicates new mitigation text

~~Strikethrough~~ indicates mitigation text removed since the EIS

Factor	Mitigation measure	C	O	D
Biodiversity				
B1	Time works to avoid critical life cycle events. Hollow-bearing trees would not be removed during breeding season (spring to summer) for threatened hollow dependant fauna. If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur.	C		
B2	Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or wildlife handler. A tree clearing procedure would be implemented to minimise harm to resident fauna.	C		
B3	Relocate habitat features (fallen timber, hollow logs) from within the development site. A procedure for relocation of habitat features to adjacent area for habitat enhancement would be implemented.	C		
B4	Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed. Additionally: • Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. • No stockpiling or storage within dripline of any mature trees. • Access and laydown in areas of White Box Yellow Box Blakely's Red Gum	C		

Factor	Mitigation measure	C	O	D
	Woodland TEC will be minimised to reduce impacts. Exclusion fencing and signage or similar would be installed around habitat to be retained			
B5	Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise. Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	C		
B6	Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill: • Avoid night works where possible. Direct lights away from vegetation.	C	O	
B7	Adaptive dust monitoring programs to control air quality. • Daily monitoring of dust generated by construction activities. • Construction would cease if dust observed being 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		
B8	Temporary fencing to protect significant environmental features such as riparian zones. Prior to construction commencing, exclusion fencing, and signage would be installed around habitat to be retained.	C		
B9	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas. • A Weed Management procedure would be developed for the Proposal to prevent and minimise the spread of weeds. This would include: • Management protocol for declared priority weeds under the Biosecurity Act 2015		O	

Factor	Mitigation measure	C	O	D
	during and after construction • Weed hygiene protocol in relation to plant, machinery, and fill. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated, and reported. The weed management procedure would be incorporated into the Biodiversity Management Plan	C		
B10	Staff training and site briefing to communicate environmental features to be protected and measures to be implemented. • Site induction and toolbox talks for ecologically sensitive areas would be undertaken. • Staff training and site briefing to communicate impacts of traffic strikes on native fauna. • Awareness training during site inductions regarding enforcing site speed limits. Site speed limits to be enforced to minimise fauna strike.	C	O	
B11	Preparation of a management plan to regulate activity in vegetation and habitat adjacent to the proposed development. Preparation of a Biodiversity management plan that would include protocols for: • Protection of native vegetation to be retained. • Best practice removal and disposal of vegetation. • Staged removal of hollow-bearing trees and other habitat features such as fallen logs with attendance by an ecologist. • Weed management. • Unexpected threatened species finds. • Exclusion of vehicles through sensitive areas. • Rehabilitation of disturbed areas.	C		

Factor	Mitigation measure	C	O	D
B12	Preparation of a vegetation management plan to monitor ground cover beneath the solar array modules. A Ground cover management plan would be developed to: • Ensure that ground cover is retained beneath panels, to resist erosion and weeds. Preserve the native composition as much as possible.		O	
~~B13~~ (see S7)	~~Erosion and sediment controls. An erosion and sediment control plan would be prepared in conjunction with the final design and implemented.~~	~~C~~		
B14	Creek lines and retained dams would be planted with native riparian vegetation and transformed into small created wetlands for wildlife. Riparian plantings would comprise local native sedges, rushes, grasses and small shrubs.	C		
B15	Screening and landscaping plantings to be comprised of local indigenous species representative of the vegetation in the development site. Screening and landscaping plantings (up to 50m where practicable) to be comprised of local indigenous species representative of the vegetation in the development site.		O	
B16	Involve a local landcare group or educational institution in ongoing biodiversity monitoring and enhancement. Involve a third party organisation to monitoring and maintain biodiversity enhancement activities. Communicate outcomes with third parties to contribute knowledge of how biodiversity can be preserved on solar farms.		O	
B17	Plain wire instead of barbed used on top of the perimeter fence and stock fencing to reduce impacts on birds and Squirrel Glider. Security fencing would be comprised of approximately 2m high cyclone fencing. Use plain wire perimeter fencing where this intersects woodland to avoid potential entrapment of fauna on fence.	C		
B18	Perimeter fence would be located to avoid, where possible, segmenting patches of native vegetation to facilitate native fauna movements. The final 'for construction' design would	C		

Factor	Mitigation measure	C	O	D
	include the perimeter fencing avoiding rather than intersecting patches or retained woodland.			
B19	Install approximately 120 nesting boxes for birds and mammals across the development site. Nesting boxes would be designed to meet the requirements of target species including Squirrel Gliders, bats, parrots and owls. Nesting boxes would be monitored periodically for use and/or replacement.	C		
B20	Wildlife corridor connectivity enhancement plan to improve connectivity in specific areas of the site and to maintain this improvement for the life of the project.	C	O	
Visual amenity and landscape character				
V1	The following design considerations will be applied to the Proposal: • Consideration of potential visual impacts should be considered when siting the PCU's and storage shed within the proposed Development footprint. They should be situated at a suitable distance from residences. Excess material should be used to berm the southern section to assist in fragmenting views. • The design should retain the existing roadside planting along the eastern boundary of the site. This would reduce the overall visual impact of proposed development. • Consideration should be given to the material and colours of the PCU's, the battery, and storage shed to ensure minimal contrast and to help blend into the surrounding landscape. In general materials should be nonreflective and should be painted in neutral colours that are sensitive to the surrounding landscape. • Consideration should be given to controlling the type and height of PCU's, the battery, and storage shed to ensure the development does not contrast significantly with surrounding landscape. • Security fencing and frames will be non-reflective.	Design		
V2	Existing vegetation should be retained and protected, where possible, during the works to	C		

Factor	Mitigation measure	C	O	D
	maintain the existing level of screening.			
V3	A landscaping plan will be prepared and implement. The plan will include a variety of landscape mitigation strategies to assist in the integration of the Proposal into the existing landscape character, specifically: • A wide band of native plantings of trees up to 5-10m in height for the southern boundary of the Proposal site to address potential visual impacts from the Oxley Wild Rivers National Park. These can be positioned in three (3) rows (or approximately 6 - 9m wide) between the property boundary and security fence. The tree canopy should not intrude into the zone that exists between the edge of the security fence and the solar panels (refer to figure 7-10 of the EIS). • Screen planting along Silverton Road to assist in screening views from R5 and reducing the visual impact from Silverton Road. • Screen planting on the western boundary of the site to reduce the potential visual impact from R3. • Consultation with landowners identified in table 7-8 of the EIS within 1.5km of the Proposal site to undertake screen planting near dwelling as required. Screen planting is to be undertaken in consultation with landowners to ensure desirable views are not diminished.	C	O	
V4	Night lighting would be minimised to the maximum extent possible (i.e. manually operated safety lighting at main component locations).		O	
Watercourses and hydrology				
W1	The design of buildings, equipment foundations and footings for electrical componentry and panel mounts would be designed to avoid the 1% AEP flood level to minimise impacts from potential flooding including: • The solar array mounting piers would be designed to withstand the forces of floodwater (including any potential debris loading) up to the 1% AEP flood event plus 500mm freeboard, giving regard to the depth and velocity of floodwaters.	Design		

Factor	Mitigation measure	C	O	D
	• The tracking axis for solar tracking modules would be located above 1% AEP flood event plus 500mm freeboard. • The mounting height of the solar module frames would be designed such that the lower edge of the module is clear of the predicted 1% AEP flood level. • All electrical infrastructure, including inverters, would be located above the 1% AEP flood level plus 500mm freeboard. • Where electrical cabling is required to be constructed below the 1% AEP flood level it would be capable of continuous submergence in water. • The proposed perimeter security fencing would be constructed in a manner which does not adversely affect the flow of floodwater and should be designed to withstand the forces of floodwater, or collapse in a controlled manner to prevent impediment to floodwater. • Any fencing across Gara River or Commissioners Waters should be avoided in preference to creating separate fenced compounds on either side of the creeks			
W2	At the substation site, slight raising of the adjacent roadway (or similar type bunding) is recommended in order to divert upslope runoff around this critical piece of infrastructure.	Design		
W3	All buildings and structures (including solar arrays) associated with the Proposal should be located outside high hazard areas (H5 and above) where they may be vulnerable to structural damage and have significant impact on flood behaviour.	Design		
W4	If the proposed crossing structures over Gara River will be rendered impassable during significant flood events, the following would occur: • Flood warning signs and flood level indicators would be placed on each approach to the proposed crossings. A Business Floodsafe Plan be prepared for the development to ensure the safety of employees during flood events in general accordance with the NSW SES “Business Floodsafe Toolkit and Plan”.	C	O	D

Factor	Mitigation measure	C	O	D
W5	Any road crossings on watercourses within the Proposal Area would be of the type defined in Table 2 of the Hydrological and Hydraulic Analysis Report was prepared by Footprint NSW Pty Ltd in Appendix G. Any proposed crossings (vehicular or service) of existing watercourses on the subject site should be designed in accordance with the following guidelines, and in the case of vehicle crossing should preferably consist of bed level crossings constructed flush with the bed of the watercourse on first and second order watercourses to minimise any hydraulic impact: • Guidelines for Watercourse Crossings on Waterfront Land **Invalid source specified.** • Guidelines for Laying pipes and Cables in Watercourses on Waterfront Land **Invalid source specified.** • Why *do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge, 2003). *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI, 2003).	Design		
W6	Within the floodplain access roads should be constructed as close to natural ground levels as possible so as not to form an obstruction to floodwaters. The surface treatment of roads should be designed giving regard to the velocity of floodwaters to minimise potential for scouring during flood events.	C		
W7	An Emergency Response Plan incorporating a Flood Response Plan would be prepared prior to construction covering all phases of the Proposal. The plan would: • Detail who would be responsible for monitoring the flood threat and how this is to be done. • Detail specific response measures to ensure site safety and environmental protection. • Outline a process for removing any necessary equipment and materials offsite and out of flood risk areas (i.e., rotate array modules to provide maximum clearance of the predicted flood level). • Consider site access in the event that some tracks become flooded.	C	O	D

Factor	Mitigation measure	C	O	D
	• Establish an evacuation point. • Define communication protocols with emergency services agencies.			
Aboriginal Heritage				
AH1	The proposed layout of the solar farm must be amended to avoid CT1 plus a 20m buffer surrounding the site.	PC		
AH2	A small heavily vegetated area to north of the Proposal site near Waterfall Way (Grafton Road) has not been subject to archaeological survey. Further archaeological assessment would be required in this area. This would include consultation with the registered Aboriginal parties and further field survey.	PC		
AH3	Archaeological test excavation of those sections of PAD that intersect with the proposed design is required in order to establish the nature and extent of the deposits and therefore inform, significance, impact and proposed mitigation measures. This subsurface excavation will be undertaken following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2011). An addendum ACHA report must be prepared to address the findings of the test excavation, significance assessment, impact assessment and proposed management of these PAD areas and any additional sites identified during the subsurface testing programme of works.	PC		
AH4	The subsurface testing of the PADs (3, 5, 6, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21) which will be impacted by the development must be undertaken prior to any works and/or the issuing of any approvals for the Oxley Solar Farm.	PC		
AH5	During construction works, high visibility fencing must be erected around CT6 and CT7 to ensure indirect impacts through use of Silverton Road as a transport corridor do not occur and the designated “no go zones” surrounding these areas must be included in the CHMP for the project. The development avoids the scarred tree (Oxley Solar Farm ST1) as well as	C	O	D

Factor	Mitigation measure	C	O	D
	the five cultural trees (Oxley Solar Farm CT1-5 and CT8) within the Proposal site. A minimum of a 20-m buffer should be established around each of these sites by placing high visibility bunting (or similar) to avoid any inadvertent impacts to the root system and canopy during construction, preconstruction and decommission works.			
AH6	If complete avoidance to any of the isolated finds and/or artefact scatters recorded within the Proposal site is not possible the surface stone artefacts within the Development footprint must be salvaged. The surface collection salvage of these stone artefacts must occur prior to the proposed construction works commencing for the Oxley Solar Farm. Until surface collection salvage has occurred a minimum 5m buffer must be observed around all stone artefact sites.	PC		
AH7	The collection and relocation of the surface artefacts should be undertaken by an archaeologist with representatives of the registered Aboriginal parties, as selected by the Proponent, and be consistent with Requirement 26 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.* The salvage of Aboriginal objects can only occur following development consent that is issued for State Significant Developments and must occur prior to any construction works commencing.	PC		
AH8	Any artefacts salvaged may be temporarily stored at an NGH office for further analysis if it is unable to be undertaken at the time of salvage onsite. The with permanent storage of the artefacts will be at Armidale and Region Aboriginal Cultural Centre & Keeping Place with any formal tools likely to be stored/displayed at the Cultural Centre. Where the storage of artefacts cannot occur at the Armidale and Region Aboriginal Cultural Centre & Keeping Place they will be buried on-site, outside of the Development footprint. The burial of salvaged artefacts onsite is proposed to be within the “no go zones” outside the extent of the sites recorded which are not to be impacted.	PC		
AH9	All objects salvaged and buried within the Proposal site must have their burial location submitted to the AHIMS database.	PC		

Factor	Mitigation measure	C	O	D
AH10	A care agreement with Heritage NSW must be undertaken for the artefacts to be stored at Armidale and Region Aboriginal Cultural Centre & Keeping Place	PC		
AH11	An Aboriginal Site Impact Recording Form must be completed and submitted to AHIMS following harm for each site collected or destroyed from salvage and/or construction works as approved for impacts in line the development consent for this State Significant Development.	PC		
AH12	A minimum 5m buffer should be observed around all stone artefact sites that are being avoided by the proposed development. The implantation of heritage “no go zones” within the Proposal site should be implemented to ensure that sites which are being avoided by the proposed development are not inadvertently impacted.	PC,C	O	D
AH13	For any impacts to additional sites and PADs currently being avoided by this Proposal or areas outside those assessed as part of the survey for the Oxley Solar Farm, as assessed in this report, further assessment and consideration of impacts on Aboriginal Heritage as determined by an archaeologist should occur. Additional Aboriginal consultation and further assessment which may include survey and/or subsurface testing may be required.	C	O	D
AH14	The Proponent should prepare a Cultural Heritage Management Plan (CHMP) to address the potential for finding additional Aboriginal artefacts during the construction of the Oxley Solar Farm and for the management of known sites, artefacts and PADs within the Project area. The Plan 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. A draft unexpended finds procedure is provided in Appendix H.	PC		
AH15	In the unlikely event that human remains are discovered during the construction of the Oxley Solar Farm, all work must cease in the immediate vicinity. Heritage NSW and the local police should be notified. Further assessment would be undertaken to determine if the remains are Aboriginal or non-Aboriginal. If the remains are deemed to be Aboriginal in	C	O	D

Factor	Mitigation measure	C	O	D
	origin the Registered Aboriginal Parties should be advised of the find as directed by Heritage NSW.			
AH16	A further archaeological assessment would be required if the Proposal activity extends beyond the area assessed in this report. This would include consultation with the registered Aboriginal parties and may involve further field survey.	C	O	D
Noise and vibration				
NV1	A Noise Management Plan would be developed as part of the CEMP. The plan would include, but not be limited to: • ~~Consultation with receivers R3, R4 and R5.~~ • ~~Time restrictions and/or providing periods of repose for receivers R3, R4 and R5 for when construction works are within approximately 700m of their dwellings.~~ • Use less noisy plant and equipment where feasible and reasonable. • Plant and equipment to be properly maintained. • Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended. • Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel. • Avoid any unnecessary noise when carrying out manual operations and when operating plant. • Any equipment not in use for extended periods during construction work should be switched off. • Complaints procedure deal with noise complaints that may arise from construction activities. Each complaint would need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits. • Establish good relations with people living in the vicinity of the site at the beginning of Proposal and maintain. Keep people informed, deal with complaints seriously and	C		

Factor	Mitigation measure	C	O	D
	expeditiously. The community liaison member of staff should be adequately experienced.			
Social and economic				
SE1	Liaison with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.	C		
SE2	Liaison with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.	C		D
SE3	Liaison with local tourism industry representatives to manage potential timing conflicts with local events.	C		D
SE4	The Community Consultation Plan would be implemented to manage impacts to community stakeholders, including but not limited to: • Protocols to keep the community updated about the progress of the Proposal and Proposal benefits. • Protocols to inform relevant stakeholders of potential impacts (haulage, noise, air quality etc.). Protocols to respond to any complaints received.	C		D
SE5	The Proponent will consult with local employment agencies and training organisations and where practicable, will consider supporting training and apprenticeships.	C	O	D
Compatibility with existing land uses				
LU1	Undertake a soil survey prior to construction to inform the CEMP and sub-plans, rehabilitation and operational aspects.	PC		

Factor	Mitigation measure	C	O	D
LU2	Consultation would be undertaken with Transgrid regarding connection to the substation and design of electricity transmission infrastructure.	C	O	D
LU3	Consultation with DPIE-Crown Lands would be ongoing, and the following would be undertaken: Prior to construction, a lease will be applied for to allow construction to commence within Crown roads on the Proposal site.	PC		
LU4	A pest and weed management plan would be prepared to manage the occurrence of priority weeds and pest species across the site during construction and operation. The plans must be prepared in accordance with Armidale Regional Council and NSW DPI requirements.	C	O	
LU5	A Rehabilitation Plan would be prepared to ensure the array site is returned to at least or better than pre-solar farm land and soil capability. The plan would be developed with reference to the base line soil testing and with input from an agronomist to ensure the site is left stabilised, under a cover crop or other suitable ground cover. The soil survey would be based on: • *Australian Soil and Land Survey Handbook* (CSIRO, 2009) • *Guidelines for Surveying Soil and Land Resources* (CSIRO, 2008) • *The land and soil capability assessment scheme: second approximation (OEH, 2012)*			D
Water use and water quality				
WQ1	All fuels, chemicals, and liquids would be stored at least 40m from any waterways or drainage lines, not on sloping land and would be stored in an impervious bunded area.	C	O	D

Factor	Mitigation measure	C	O	D
WQ2	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	O	D
WQ4	All potential pollutants stored on-site would be stored in accordance with HAZMAT requirements and bunded.	C	O	D
WQ5	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 Protection of the Environment Operations Act).	C	O	D
WQ6	Ensure appropriate drainage controls are incorporated into the design to minimise the area of disturbance, runoff and pollutant generation.	Design		
WQ7	Alterations to ground water are to be avoided to prevent mobilisation of any salt stores, however low, in the soil. If groundwater is to be intercepted at any stage of the development the proponent must obtain the relevant entitlement and approval where required prior to any extraction.	C	O	D
WQ8	Re-use of stormwater should be considered wherever possible.		O	
WQ9	Inspect stormwater control measures at least quarterly, and before (when forecasts indicate a >50% chance of rain) and after rainfall of more than 10mm in 24 hours.	C	O	
Soils				
S1	As part of the CEMP, a Soil and Water Management Plan (SWMP) (with erosion and sediment control plans) would be prepared, implemented and monitored during the	C		

Factor	Mitigation measure	C	O	D
	Proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. These plans would include provisions to: • Install, monitor and maintain erosion controls. Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability. • Manage topsoil in all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. Stockpile topsoil appropriately so as to minimise weed infestation, maintain soil organic matter, maintain soil structure and microbial activity. • Handling of topsoil should be undertaken when the topsoil is moist (not wet or dry) to avoid structural decline. • Avoid stockpiles greater than 2m in height to prevent structural decline. It should be stripped and stockpiled separately. Stockpiles should be stabilised with a groundcover (i.e. geo-textile or similar) if stockpiling is required for more that 6 weeks. • Minimise the area of disturbance from excavation and compaction; rationalise vehicle movements and restrict the location of activities that compact and erode the soils as much as practical. Any compaction caused during construction would be treated such that revegetation would not be impaired. • Manage works in consideration of heavy rainfall events; if a heavy rainfall event is predicted, the site should be stabilised, and work ceased until the wet period had passed. • Areas of soil disturbed by the Proposal would be rehabilitated progressively or immediately post- construction, reducing views of bare soil.			
S2	A Groundcover Management Plan would be developed in consultation with an agronomist and to ensure final land use includes perennial ground cover establishment across the site as soon as practicable after construction and maintained throughout the operation phase. The plan would cover: • Soil handling, restoration and preparation requirements.	C	O	D

Factor	Mitigation measure	C	O	D
	• Plant Species election. • Soil preparation. • Establishment techniques. • Maintenance and monitoring requirements. • Perennial groundcover targets, indicators, condition monitoring, reporting and evaluation arrangements – i.e. A target of 70% live vegetation cover would apply to protect soils, landscape function and water quality. Additional measures would be implemented where practical when live ground cover falls below 70%. Ground cover would be monitored on a monthly basis using an accepted methodology during the initial rehabilitation phase for up to 12 months, and then annually until the required groundcover is achieved. • Contingency measures to respond to declining soil or groundcover condition, i.e., any grazing stock would be removed from the site when cover falls below the target of 70% live ground cover. • Identification of baseline conditions for rehabilitation following decommissioning. • Preserve the native composition as much as possible.			
S3	The array would be designed to allow sufficient space between panels to establish and promote groundcover beneath the panels and allow for implementation of weed controls.	Design		
S4	A Spill and Contamination Response Plan would be developed as part of the overall Emergency Response Plan to prevent contaminants affecting adjacent surrounding environments. The plan would include measures to: • Respond to the discovery of existing contaminants at the site (e.g. pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements. • Requirement to notify the EPA for incidents that cause material harm to the environment (refer s147-153 of the POEO Act).	C	O	D

Factor	Mitigation measure	C	O	D
	• Manage the storage of any potential contaminants onsite. • Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and the EPA notification procedures and remediation. • Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. • Prevent contaminants affecting adjacent pastures, dams, water courses and native vegetation. • Monitor and maintain spill equipment • Induct and train all site staff.			
S5	The transformers will be filled with oil, and waterproof bunds built around them to manage oil spills.	Design		
S6	A protocol would be developed in relation to discovering buried contaminants within the Proposal site (e.g., pesticide containers). It would include stop work, remediation and disposal requirements.	C	O	D
S7 (previously committed under B13)	A construction Erosion and Sediment Control Plan (ESCP) should be prepared for the Proposal in accordance with Landcom Soils and Construction: Managing Urban Stormwater (2004).	C	O	D
S8	The design, construction and decommissioning of the Proposal should minimise the extent and duration of ground disturbance and avoid disturbing steep slopes and waterways.	C		D
S9	A revegetation plan (operation) should be prepared and include stabilisation and topsoil amelioration (e.g., incorporation of organic matter to improve soil structure or gypsum to improve structure, reduce hard-setting surfaces and reduce soil dispersion).		O	

Factor	Mitigation measure	C	O	D
S10	Subsoils disturbed during construction and with an exchangeable sodium percentage above 6% should be treated with gypsum to increase the levels of calcium and magnesium, and thus lowering the exchangeable sodium percentage and the dispersiveness of the soil.	C		D
S11	Reference the soil survey results (NGH , 2022f), *Australian Soil and Land Survey Handbook* (CSIRO 2009), *Guidelines for Surveying Soil and Land Resources* (CSIRO 2008) and the *Land and Soil Capability Assessment Scheme: second approximation* (OEH 2012) when remediating the soils onsite during decommissioning.			D
Traffic, transport and safety				
T1	A Haulage Plan would be developed and implemented during construction and decommissioning, including but not limited to: • Direction of traffic flow (both heavy and light). • Loads, weights and length of haulage and construction related vehicles and the number of movements of such vehicles. • Scheduling of deliveries of major components to minimise safety risks (on other local traffic). • Traffic controls (signage and speed restrictions etc.). • All heavy vehicle movements to/from the access point are to be managed to ensure that only one inbound or outbound vehicle is travelling along the access route in the vicinity of the site at a time. Heavy vehicle movements into and out of the Proposal Site will be controlled via traffic management means, including a traffic controller, temporary lowered speed limit and additional road signage alerting vehicles of truck movements in the area.	C	O	D
T2	The proponent would engage an appropriately qualified person to prepare a Road Dilapidation Report for all road routes between the New England Highway and the site, and on Gara Road between chainages 7.7km and 9.7km, to be used during the construction	PC		D

Factor	Mitigation measure	C	O	D
	(and decommissioning) activities, in consultation with the relevant road authority. This report is to address all road related infrastructure. Reports must be prepared prior to commencement and after completion of construction (and decommissioning).			
T3	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
T4	~~The design and construction of a new vehicular access from Waterfall Way (Grafton Road) to Lot 2 DP1206469, complying with the rural style BAL / BAR treatments specified in the Austroads Guide to Road Design, as amended by Transport for NSW in their supplementary road design guidelines, and designed to accommodate the swept path of the maximum dimension vehicles which will service the site.~~ The construction and maintenance of a new primary site access from Waterfall Way to Lot 2 DP1206469. Such access will require use of the existing Armidale Regional Landfill access at 1238 Grafton Road. The internal landfill access road is to be upgraded through the Travelling Stock Reserve and Lot 1 DP1206469 to a two-way pavement having minimum sealed width of 6.0m and 0.5m grave shoulders, complying with the Armidale Regional Council Engineering Code. Upgrades will be required to security fencing and the access control system to prevent unauthorised landfill access. For works on the State road network the developer is required to enter a Works Authorisation Deed (WAD) with TfNSW before finalising the design or undertaking any construction work within or connecting to the road reserve. The WAD documentation is to be submitted for each specific change to the state road network for assessment and approval by TfNSW prior to commencement of any works within the road reserve.	C		
T5	Closure of the existing rural property access from Waterfall Way (Grafton Road) to Lot 2 DP1206469, including alteration of boundary fencing, after the construction of the replacement access.	PC,C		

Factor	Mitigation measure	C	O	D
T6	The design and construction of four new heavy vehicle property accesses between Gara Road and the development site, in a manner consistent with Armidale Regional Council Engineering Code and Austroads guidelines. Each access is to be located so that Austroads sight distance requirements can be achieved, be designed to achieve a maximum intersection angle between 70° and 110° with Gara Road, and contain the swept path of the maximum dimension design access vehicles. Unless other alternate positioning and/or higher order intersection treatments at the Gara Road site access points listed below can demonstrate the achievement of Austroads sight distances and is acceptable to Armidale Regional Council as the roads authority, then: a) the site access point at approximate chainage 9,500m as measured from Waterfall Way is to be relocated eastwards to approximate chainage 9,425m; and b) the site access point at approximate chainage 8,770m is to be used for left-turn egress only to Gara Road only due to limited sight distances to the east.	PC,C		
T7	Gara Road to be upgraded between the proposed new solar farm site access point at approximate chainages 7.78km and 9.70km to achieve: a) a pavement comprising a minimum 6.0m wide bitumen sealed surface and including 0.5m wide shoulders on each side; and b) the existing causeway crossing of the Gara River is to be upgraded consistent with the concept drawing at Appendix K, in the TIA. Any upgrades should be consistent with the Armidale Regional Council Engineering Code and referenced standards, except where expressly varied by Armidale Regional Council.	PC,C	O	D
T8	The design and installation of warning signage at those locations on Gara Road and Silverton Road where the road suddenly narrows as identified in the table below, to provide advance warning to motorists who may be unfamiliar with road conditions. All signage is to comply with the requirements of Australian Standard 1742.1 Manual of Uniform Traffic Control Devices and the Armidale Regional Council Engineering Code.	PC		

<table>
<tr><th>Factor</th><th>Mitigation measure</th><th>C</th><th>O</th><th>D</th></tr>
<tr><td></td><td>
<table>
<tr><td>Chainage</td><td>Constraint to two-way traffic</td></tr>
<tr><td colspan="2">Gara Road</td></tr>
<tr><td>3,255m</td><td>Single lane causeway across Burying Ground Creek</td></tr>
<tr><td>4,285m</td><td>Single lane causeway across an unnamed non-perennial waterway</td></tr>
<tr><td>5,350m</td><td>Single lane causeway across an unnamed non-perennial waterway</td></tr>
<tr><td>9,050m</td><td>Single lane causeway across Gara River</td></tr>
<tr><td colspan="2">Silverton Road</td></tr>
<tr><td>1,450m</td><td>Single lane causeway over unnamed non-perennial waterway</td></tr>
<tr><td>2,075m</td><td>Public gate including single-lane stock grid</td></tr>
<tr><td>5,270m</td><td>Public gate including single-lane stock grid</td></tr>
</table>
Engineering plans for all roadworks are to be prepared by a suitably qualified person and submitted to Armidale Regional Council for approval prior to the issue of Section 138 Roads Act approval for the work.</td><td></td><td></td><td></td></tr>
<tr><td>T9</td><td>A Traffic Management Plan would be developed and implemented during construction and decommissioning. The plan will be prepared in consultation with the relevant road authority and the appointed transport contractor. The plan would include, but not be limited to:
The designated routes and vehicular access of construction traffic (both light and heavy) to the site. This will include the management and coordination of movement of vehicles for construction and worker related access to limit disruptions to other motorists, emergency vehicles, school buses and other public transport. Note, construction and operational staff will be advised not to use Silverton Road as a site access.
Procedure for informing the public where any road access will be restricted as a result of the project.
The designated routes of construction traffic to the site.
Carpooling/shuttle bus arrangements to minimise vehicle numbers during construction.
Scheduling of deliveries.
Community consultation regarding traffic impacts for nearby residents.</td><td>C</td><td></td><td>D</td></tr>
</table>

Factor	Mitigation measure	C	O	D
	• Consideration of cumulative impacts. • Traffic controls (speed limits, signage, etc.), and any proposed precautionary measures to warn road users such as motorists about the construction activities for the project, especially at the access site along Waterfall Way (Grafton Road). • Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts. • Details of measures to be employed to ensure safety of road users and minimise potential conflict. • A driver Code of Conduct to address such items as appropriate driver behaviour including adherence to all traffic regulations and speed limits, driver fatigue, safe overtaking and maintaining appropriate distances between vehicles, etc. and appropriate penalties for infringements of the Code. • Details of procedures for receiving and addressing complaints from the community concerning traffic issues associated with truck movements to and from the site. • 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 unsealed roads to minimise dust generation through increased traffic use. Following construction, a post condition survey of the relevant sections of the existing road network to be undertaken to ensure it is of similar condition to that prior to construction.			
T10	All internal circulation roads, parking and manoeuvring areas are to be designed and constructed in accordance with the planned number, dimension and mass of construction service vehicles, and in compliance with the previsions of the Armidale Regional Councils Engineering code, and AS/NZS 2890.1 Off Street Parking. Any internal roads which are not designed for two-way travel should have regular hard-standing provision for heavy vehicles travelling in opposite directions to pass. Internal access, parking and manoeuvring areas are to be sealed wherever the gradient exceeds 16% to minimise erosion of the pavement.	PC,C		

Factor	Mitigation measure	C	O	D
T11	Obtain a Section 138 Consent from the relevant council/agency to perform works within the road reserve.	C		
T12	Prior to the commencement of construction on-site, the Proponent would undertake all works to upgrade relevant state roads, their associated road reserve and any public infrastructure in that road reserve to a standard suitable for use by heavy vehicles to meet any reasonable requirements that may be specified by TfNSW. The design, specifications and construction of these works must be completed and certified by an appropriately qualified person to a standard to accommodate the traffic generating requirements of the project. On Classified Roads the geometric road design and pavement design must be to the satisfaction of the TfNSW.	PC		D
Resource use and waste generation				
WR1	A Waste Management Plan (WMP) would be developed 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 identify that sullage 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
WR2	Septic system is installed and operated according to the Armidale Regional Council regulations.	C	O	

Factor	Mitigation measure	C	O	D
Non-indigenous Heritage				
HH1	Should an item of historic heritage be identified, the Heritage Division (EES) would be contacted prior to further work being carried out in the vicinity.	C	O	D
HH2	The recommendations of the historic heritage assessment are to be incorporated in the CEMP as follows: • The Gara River Hydro-electric scheme (1895-1907) is adjacent to the southern boundary of the Proposal Site. The current Proposal will not impact this site, however if alterations to the Development footprint are required, these must be further assessed to determine whether impacts to physical remains of the site may be impacted. • The Gondwana Rainforests of Australia immediately adjacent to the Proposal Site, and at least 522m south west of the Development footprint at its nearest point. While the curtilage of the Gondwana Rainforests as listed is screened by an additional layer of trees on private property. As such, the solar farm will not be visible from with the curtilage of the item, and the item is not visible from the development. • Proposed works will not impact on the identified archaeological site CS1 as currently proposed. In the event that the footprint changes and impacts to this location are required, an archaeological investigation would be required. This would require detailed research into the potential origins of the cottage and preparation of a research design and methodology for excavation. • The Gara Homestead has been identified to be of potential local heritage significance. No physical impacts are proposed to the extant structures or surrounds within 60m of the homestead and within 60m of the workers accommodation and sheds. Visual impacts must be limited to the eastern side of the house. Where the Development footprint is amended and includes impacts to the physical structures or to the vista westwards from the homestead, further	C		

Factor	Mitigation measure	C	O	D
	assessment is required.			
Electric and Magnetic Fields				
E1	All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia.	C		
E2	All design and engineering would be undertaken by qualified and competent person/s with the support of specialists as required.	C		
E3	Design of electrical infrastructure would minimise EMFs.	C		
Bush fire				
BF1	Copper conductors would be used where necessary to electrically bond the metal structures to earth to protect personnel and equipment in the event of lightning strikes and electrical faults.	Design		
BF2	Dangerous or hazardous materials would be stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids*.	C	O	D
BF3	Develop a Bush Fire Management Plan to include but not be limited to: • Specific management of activities with a risk of fire ignition (hot works, vehicle use, smoking, use of flammable materials, blasting). • Incorporation of fire safety and response in staff and contractor induction, training, OHS procedures and Work Method Statements. • Designation of a staff safety officer tasked with ensuring implementation of the plan and regular liaison with firefighting agencies. • Document all firefighting resources maintained at the site with an inspection and	C	O	D

Factor	Mitigation measure	C	O	D
	maintenance schedule. • Monitoring and management of vegetation fuel loads. • A communications strategy incorporating use of mobile phones, radio use (type, channels and call-signs), Fire Danger Warning signs located at the entrance to the site compounds, emergency services agency contacts. In developing the Bush Fire Management Plan, NSW RFS would be consulted on the volume of water supplies, fire-fighting equipment maintained on-site, fire truck connectivity requirements, proposed APZ and access arrangements, communications, vegetation fuel levels and hazard reduction measures.			
BF4	An APZ of minimum 10m would be maintained between all vegetation and solar farm infrastructure within the Development footprint. The APZ around the perimeter of the site would incorporate a 4m wide gravel access track. Average grass height within the APZ would be maintained at or below 5 centimetres on average throughout the August - March fire season. Average grass height outside the APZ, including beneath the solar array, would be maintained at or below 10 centimetres throughout the fire season.	C	O	
BF5	The overhead powerlines at the site would be managed by maintaining appropriate vegetation clearance limits to minimise potential ignition risks, in accordance with the *ISSC 3 Guideline for Managing Vegetation Near Power Lines*.		O	
BF6	Appropriate fire-fighting equipment would be held on site to respond to any fires that may occur at the site during construction. This equipment would include fire extinguishers, a 1000 litre water cart (fitted with suitable hosing, fittings and diesel firefighting pump) retained on site on a precautionary basis, particularly during any blasting and welding operations. Additionally the Development footprint will house a 20,000-litre water supply (tank) fitted with a 65mm storz fitting shall be located adjoining the internal property access road within the required APZ.	C		

Factor	Mitigation measure	C	O	D
	Equipment lists would be detailed in Work Method Statements.			
BF7	The NSW RFS and Fire and Rescue would be provided with a contact point for the solar farm, during construction and operation.	C	O	
BF8	Following commissioning of the solar farm, the local RFS and Fire and Rescue brigades would be invited to an information and orientation day covering access, infrastructure, firefighting resources on-site, fire control strategies and risks/hazards at the site.		O	
BF9	The perimeter access track would comply with the requirements of property access road in accordance with Table 5.3b of the PBP. All access and egress tracks on the site would be maintained and kept free of parked vehicles to enable rapid response for firefighting crews and to avoid entrapment of staff in the case of bush fire emergencies. Access tracks would be constructed as through roads as far as practicable. Dead end tracks would be signposted and include provision for turning firefighting vehicles.	C	O	D
BF10	A Hot Works Permit system would be applied to ensure that adequate safety measures are in place. Fire extinguishers would be present during all hot works. Where practicable hot works would be carried out in specific safe areas (such as the Construction Compound temporary workshop areas).	C	O	D
BF11	Machinery capable of causing an ignition would not be used during bushfire danger weather, including Total Fire Ban days.	C	O	D
BF12	Prior to operation of the solar farm, an Emergency Response Plan (ERP) would be prepared in consultation with the RFS and Fire and Rescue NSW. This plan must include but not be limited to: • Specifically addresses foreseeable on site and off site fire events and other emergency incidents. • Risk control measures would include the level of personal protective clothing		O	

Factor	Mitigation measure	C	O	D
	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 PV system (either in its entirety or partially, as determined by risk assessment). • Outline other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the site. • Two copies of the ERP are stored in a prominent 'Emergency Information Cabinet' which is located in a position directly adjacent to the site's main entry point/s. Once constructed and prior to operation, the operator of the facility would contact the relevant local emergency management committee (LEMC).			
BF13	Fire risks associated with the lithium-ion energy storage facility would include: • Locating the Energy Storage Facility as far as practicable from any sensitive receptors or large stands of vegetation. • Installing reliable automated monitoring (voltage and temperature), alarm and shutdown response systems. • Installing reliable integrated fire detection and fire suppression systems (inert gas). • Ensuring the battery containers are not vulnerable to external heat effects in the event of a bushfire. • Designing appropriate separation and isolation between battery containers and between batteries and other infrastructure, including gravel surfacing around the facility for a minimum 10m in accordance with asset protection zone standards. • Compliance with all relevant guidelines and standards. • Preparation of a specific Battery Fire Response Plan, under the general Bushfire Management Plan, in consultation with fire authorities, fire suppression experts and in reference to relevant standards and guidelines. Facilitation of first responder training in the management of Lithium-ion battery fires at the site for local brigades.		O	

Factor	Mitigation measure	C	O	D
Hazardous materials and development				
H1	Dangerous or hazardous materials would be stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids*.	C	O	D
H2	Protocols would be developed for lithium-ion battery storage, maintenance, and incident response to mitigate Li-ion fire risks.	C	O	D
H3	The transportation of new and waste lithium-ion batteries would comply with the requirements of the Dangerous Goods Code, including specific 'special provisions' and 'packing instructions' applying to the transportation of Li-ion batteries.	C	O	D
H4	Controls listed in the hazard register within the PHA will be included in the following project specific plans: • Fire Management Plan • Fire Safety Plan • Emergency Response Plan	C	O	D
Air quality and climate				
A1	Track width of internal tracks would be minimised during detailed design.	Design		
A2	Dust generation by vehicles accessing the site and earthworks at the site would be suppressed using water applications or other means as required.	C		D
A3	Vehicle loads of material which may create dust would be covered while using the public road system.	C		D

Factor	Mitigation measure	C	O	D
A4	All vehicles and machinery used at the site would be in good condition, fitted with appropriate emission controls and comply with the requirements of the POEO Act, relevant Australian standards and manufacturer's operating recommendations. Plant would be operated efficiently and turned off when not in use.	C	O	D
A5	Fires and material burning is prohibited on the Proposal site.	C	O	D
Cumulative impacts				
C1	The proponent would liaise with representatives for the Tilbuster Solar Farm, Salisbury Solar Farm, Metz Solar Farm and New England Solar Farm to manage impacts on local services, accommodation and businesses.	C		
C2	Prior to the commencement of construction, the Proponent would prepare an Accommodation and Employment Strategy for the development in consultation with Armidale Regional Council. The strategy must: • Propose a strategy to facilitate the accommodation of the workforce associated with the development • Investigate options for prioritising the employment of local workers for the construction and operation of the development where feasible • Include a program to monitor and review the effectiveness of the strategy over the life of the development.	C	O	D

Appendix D Updated Biodiversity Development Assessment Report (BDAR v3)

Appendix E Biodiversity Offset Strategy

Appendix F Updated Visual Assessment

Appendix G Updated Hydrology Assessment

Appendix H Subsurface Aboriginal Cultural Heritage Assessment Report

Appendix I Updated Historic Heritage Assessment (HHA)

Appendix J Updated Noise Assessment

Appendix K Updated Traffic Impact Assessment (TIA)

Appendix L Updated Preliminary Hazard Assessment (PHA)