NEOEN Australia Pty Ltd

Gilgandra Solar Farm

Modification 1 SSD 6785

February 2019

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1. Introduction

1.1 Development context

The approved project is for the construction, operation and eventually decommissioning of a 40 megawatt (MW) solar farm to the south of Gilgandra in Central West NSW.

The project is classified as State Significant Development (SSD) and was granted development consent (Project Number SSD 6785) on 17 July 2017.

The proponent is Neoen Australia Pty Ltd (Neoen).

1.2 Site description

The approved project site is located about 23 kilometres south of Gilgandra and about 35 kilometres north of Dubbo on the western side of the Newell Highway. The township of Eumungerie is about three kilometres south of the proposal site on the eastern side of the Newell Highway.

The project site located at 4147 Newell Highway in the locality of Balladoran and is identified as Lot 7 DP 752575. The property is referred to as 'Oakvale'.

The project site is within the Gilgandra local government area (LGA), however land to the south and east of the site is within the Dubbo Regional LGA.

The proposal site comprises about 188 hectares of agricultural land which is currently used for livestock grazing. Land surrounding the site is also used for agricultural purposes (primarily grazing) with the exception of the Newell Highway corridor to the east.

1.3 Overview of the proposed modification

A modification to the approved project is sought, and involves the following:

- Amendment to the proposed maximum height of the solar panels, from 3 metres to 4.2 metres. The initial visual impact assessment completed as part of the EIS, was based on the height of the solar arrays being three metres above ground. Visual impacts from the panels at the proposed maximum height of 4.2 m can be adequately managed in accordance with the existing conditions of consent (refer Section 9 regarding vegetation buffer).
- Subdivision of Lot 7 DP 752575, to create two allotments. The purpose of the subdivision is to allow the land tenure for the Essential Energy owned components of the substation and telecommunications equipment to be separated from the solar farm.
- Additional area for temporary offices, car parking and laydown proposed to be located in the south west corner of the project site as shown in Figure 2-1. This will be wholly located within Lot 7 DP 752575. This is being included in this modification application to notify DPE of the location of this construction facility.
- Amendment to the approved 'Ancillary Infrastructure corridor' as shown in the EIS. The location and arrangement of this approved area is proposed to be amended to the eastern side of the existing transmission easement in a rectangular arrangement.
- Amendment to the proposed generation capacity of the solar farm is proposed as after consultation with Essential Energy determined that there was capacity to accommodate a 50 MW solar farm, the proposal is subsequently refined to increase the generation capacity to make use of the full connection capacity available. The increase in generation capacity does not result in a greater area of the property, therefore no further impacts are envisaged.

1.4 Approvals pathway

A development consent may be modified under Part 4, Clause 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) provided that development consent has been granted and is subject to and in accordance with the Environmental Planning and Assessment Regulation 2000. This application represents a modification involving minimal environmental impact as per Clause 4.55 (1A) of the EP&A Act.

1.5 The applicant

The applicant is Neoen Australia Pty Ltd (Neoen).

Neoen is an Independent Power Producer (IPP) specialising in developing and operating renewable energy projects, such as solar, wind and biomass. The company's head office is located in Paris (France) and has around 150 employees. It operates as Neoen Australia Pty Ltd within Australia and is referred to as Neoen within this document.

The relevant contact details for the applicant are:

Damien Hegarty, Project Manager

Neoen Australia

Level 10 - 227 Elizabeth Street, Sydney NSW 2000

M. +61 422 814 902

1.6 Purpose of this report

This report has been prepared by GHD Pty Ltd (GHD) on behalf of Neoen Australia Pty Ltd and describes the potential environmental impacts of the amended solar panel height and subdivision to support an application for modification of the development consent.

1.7 Scope and limitations

This report: has been prepared by GHD for NEOEN Australia Pty Ltd and may only be used and relied on by NEOEN Australia Pty Ltd for the purpose agreed between GHD and the NEOEN Australia Pty Ltd as set out in section 1.6 of this report.

GHD otherwise disclaims responsibility to any person other than NEOEN Australia Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

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2. Proposed modification

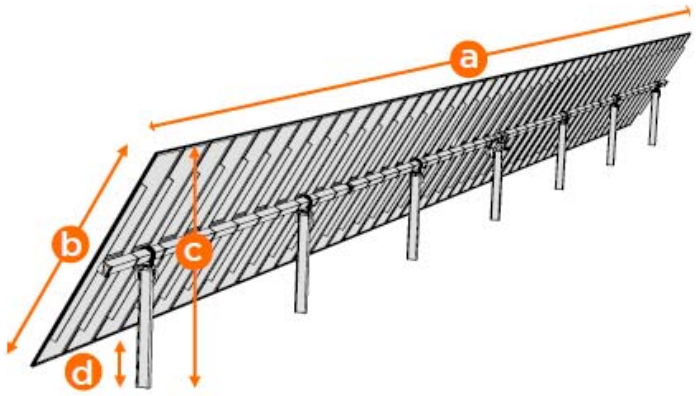
2.1 Panel height amendment

A modification to the approved project is sought, comprising an amendment to the maximum height of the solar panels, from 3 metres (m) to 4.2 m, change in type of panels, and improved panel arrangement. The amended solar panel arrangement will allow greater surface area and increased solar energy generation efficiency.

The panel height amendment will be wholly within the approved development footprint for the Gilgandra Solar Farm. No additional areas outside those previously assessed and approved are required to achieve the amendments.

The type of solar panels proposed to be used are bifacial modules instead of monofacial modules. Bifacial modules allow the photovoltaic modules to harvest irradiation from the backside of the modules which increases the solar generation efficiency. This efficiency is typically between 5% and 15%, depending on different factors including the plant design and the soil albedo (which refers to the rate of the absorbed portion of the incident solar radiation). An example bifacial panel is provided below which shows that directed sunlight reaching the front side of the panel and reflected sunlight on the rear side of the panel.

The bifacial panels, as provided by the construction contractor, have a height of 3.9 m (refer to "c" in diagram below) when the panel is at maximum tilt. To allow boundary buffer and to account for the topography of the land, a maximum height of 4.2 m would need to be assessed as part of this modification.



2.2 Laydown area

The approved area (as outlined in the EIS) for ancillary infrastructure (including delivery station, substation, operational and maintenance office, and car park is located in the centre of the site, shown on Figure 2-1 as 'Ancillary Infrastructure corridor'. The location and arrangement of this approved area is proposed to be amended. The proposed change is below the existing transmission easement in a square arrangement to the eastern side of the existing transmission easement in a rectangular arrangement. The revised area is shown on Figure 2-1.

An additional area is proposed for temporary offices, car parking and laydown and would be located in the south west corner of the project site as shown in Figure 2-1. This will be wholly located within Lot 7 DP 752575. This area is proposed in addition to the ancillary infrastructure corridor located in the centre of the site and is being included in this modification application to notify DPE of the location of this construction facility.

Through utilising this site entry, deliveries to the site (excluding the substation) will be unloaded in this laydown area and on the solar arrays, thereby minimising heavy haulage traffic within the site.

2.3 Resizing of the solar farm

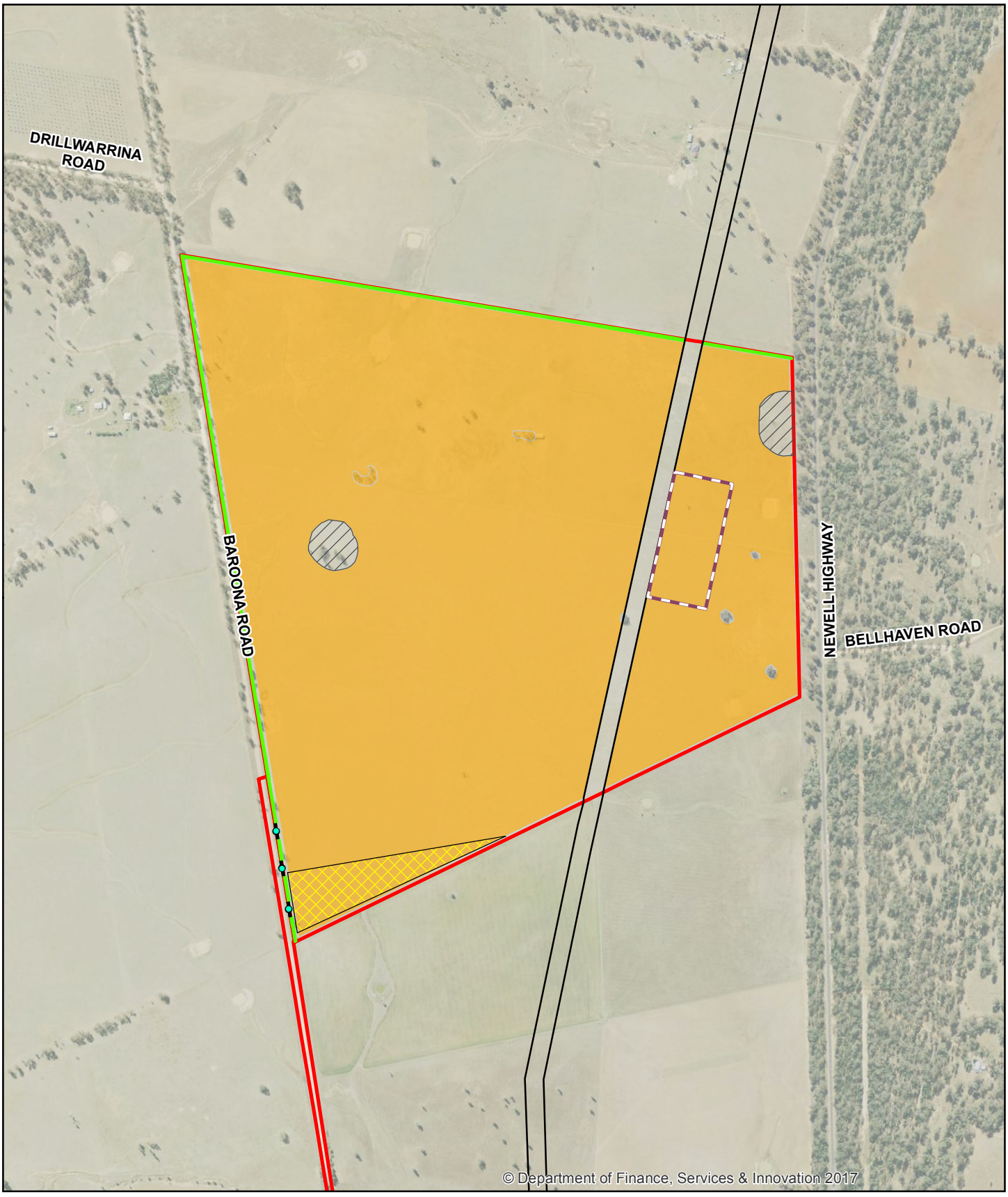
The generation capacity of the solar farm was largely determined by the connection capacity to the Essential Energy transmission line which runs through the site. It was initially assumed that there was sufficient connection capacity to enable a 40 MW solar farm to be developed. As further consultation with Essential Energy has determined that there is capacity to accommodate a 50 MW solar farm, the proposal has been refined to increase the generation capacity to make use of the full connection capacity available.

The number of solar panels constituting the project would need to be increased by a further 6,000 (approximately) to enable the corresponding increase in generation capacity, although all panels would still be located within the approved areas. The number of panels and inverters for the approved compared with the proposed modification is shown in Table 2-1. In accordance with the conditions of the Development Consent, detailed plans of the final layout of the development will be submitted to the Secretary prior to the commencement of construction, including details on the siting of solar panels and ancillary infrastructure.

Table 2-1 Solar panel area increase comparison

	Approved	Proposed
Panels	Approx. 152,000	Approx. 158,000
PCUs (i.e. inverters)	Approx. 20	Probably 24; Max 26 (to be confirmed in final design)

The increase in generation capacity is required because the proposal needs to be fully optimised to compete with other electricity generation projects on the national grid and secure a long-term Power Purchase Agreement.



LEGEND

- Proposal site
- Aboriginal heritage exclusion zone
- Ancillary infrastructure corridor (to include delivery station substation, carpark, operation and maintance office)
- Essential Energy 66kV transmission line
- Temporary offices, car park and laydown area
- Indicative area to be considered for landscaping
- Potential location of solar arrays
- Site access

Paper Size A4

0 100 200 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Neoen Australia Pty Ltd
Gilgandra Solar Farm
Modification 1 SSD 6785
Temporary offices, car park and laydown area

Job Number	21-25942
Revision	A
Date	08 Feb 2019

Figure 2-1

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2.4 Subdivision

The site layout presented in the publicly exhibited EIS identified Lot 7 DP 752575 as the proposal site which was allocated to the development of the Gilgandra Solar Farm and its key infrastructure. This EIS showed one polygon for the ancillary infrastructure including substation, carpark, operation and maintenance office. It did not describe the need to separate out Essential Energy assets. Progress of design has now identified that Lot 7 requires subdividing for the Essential Energy substation.

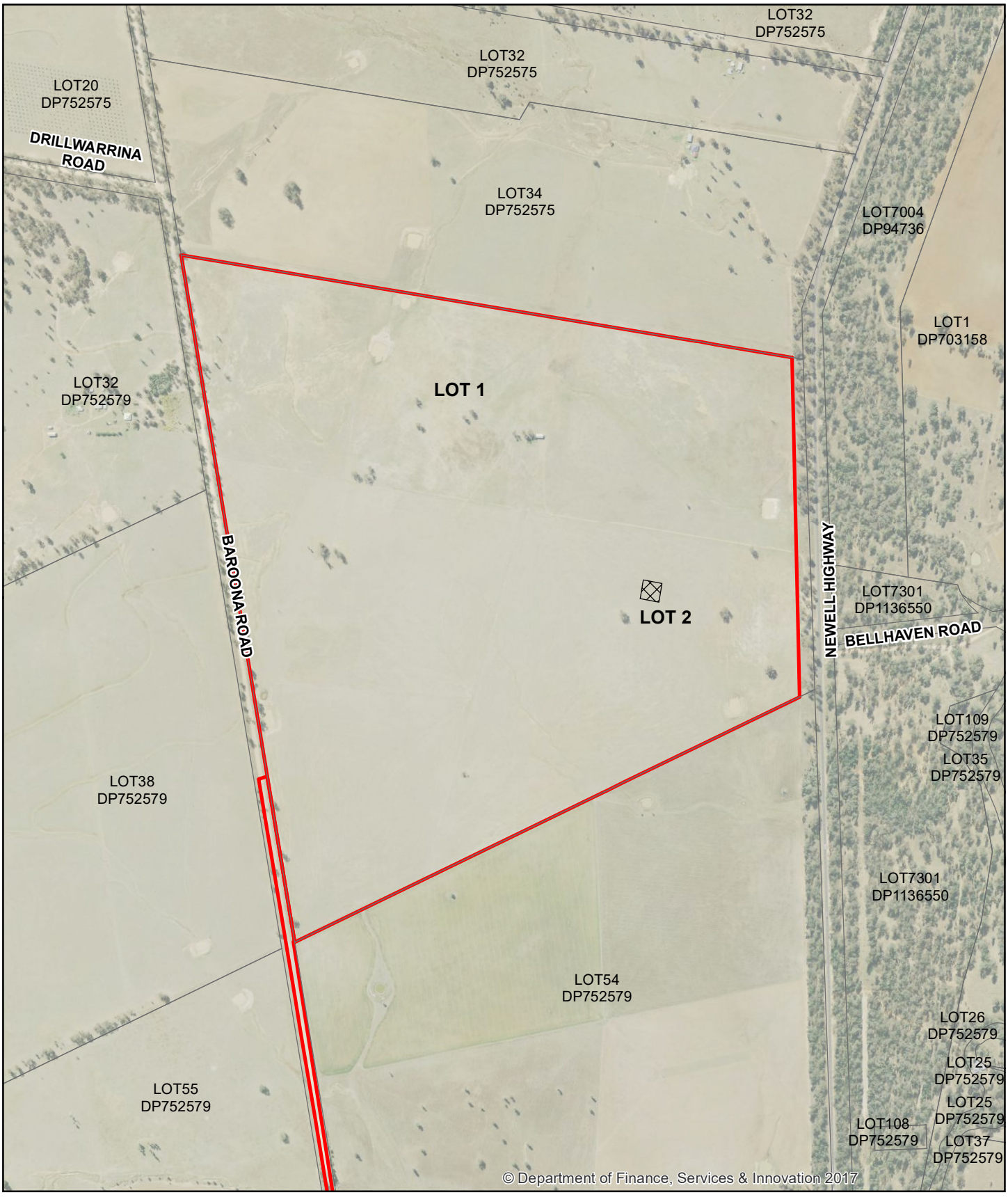
The proposed subdivision as part of this modification is for Lot 7 DP 752575 to be subdivided into two lots. Lot 1 will incorporate the Gilgandra Solar Farm development and Lot 2 will incorporate the Essential Energy substation components. Following construction of the project, ownership of Lot 2 would be transferred to Essential Energy for ongoing maintenance and operation.

The subdivision would not have any adverse impacts on the environment, the site is considered to be suitable for the proposed subdivision and would not result in a material change to the development. Figure 2-2 shows the cadastral information for the proposed subdivision and Figure 2-3 overlays this with environmental and project features.

Table 2-2 outlines the change in development subject land for the publicly exhibited EIS and this MOD1 application.

Table 2-2 Comparison of proposed Lot details

Layout proposed	Lot	Purpose
EIS	7	Solar Farm
MOD1	1	Gilgandra Solar Farm infrastructure
	2	Essential Energy components of the substation and telecommunications equipment.



LEGEND

Proposal site

Lot to be transferred to Essential Energy

Paper Size A4

0 112.5 225 450

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GHD

Neoen Australia Pty Ltd
Gilgandra Solar Farm
Modification 1 SSD 6785
Subidivion Layout and
Modified Project

Job Number	21-25942
Revision	A
Date	14 Dec 2018

Figure 2-2

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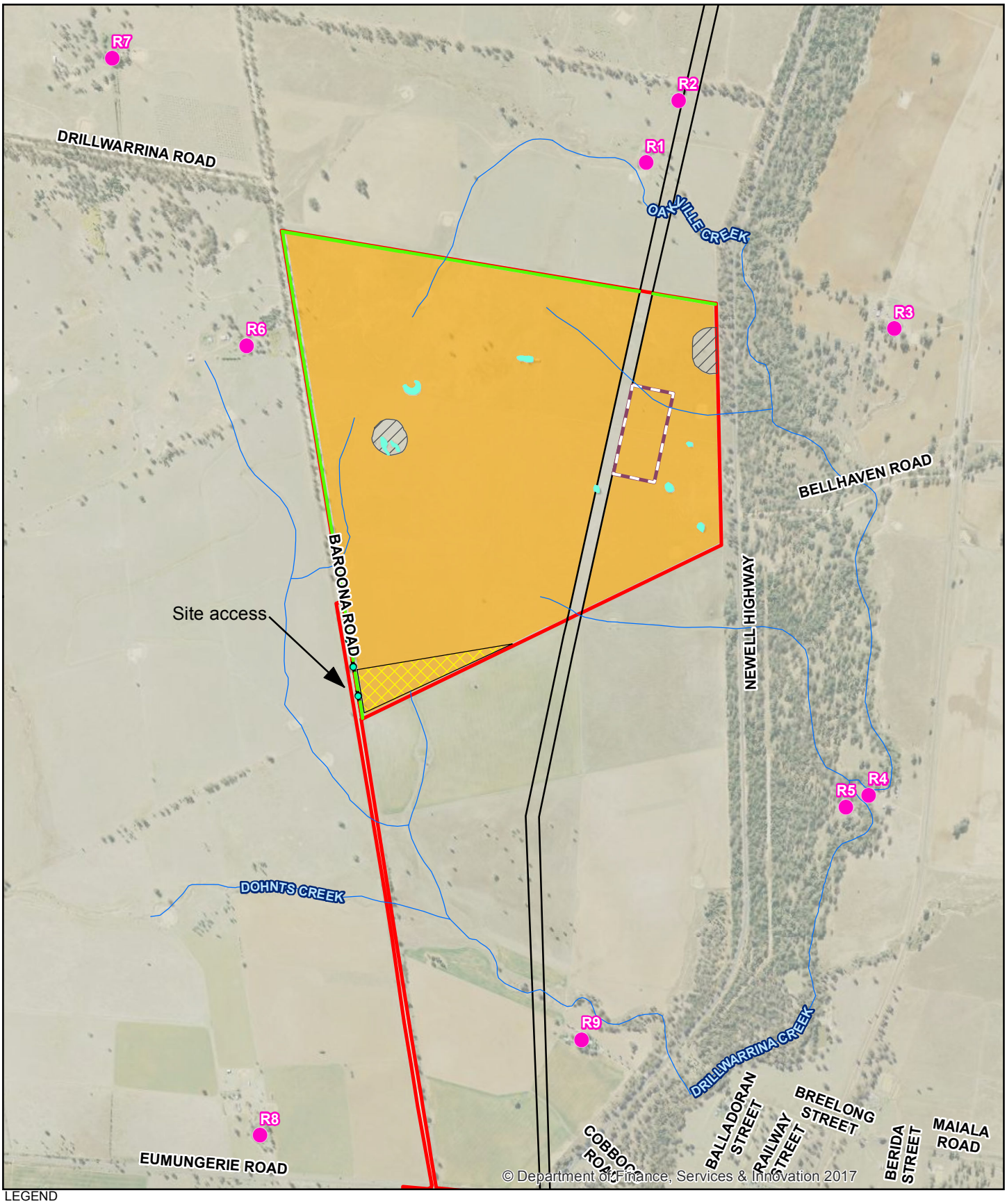

LEGEND

- Proposal site
- Aboriginal heritage exclusion zone
- Ancillary infrastructure corridor (to include delivery station substation, carpark, operation and maintance office)
- Essential Energy 66kV transmission line
- Construction laydown area/ car parking
- Indicative area to be considered for landscaping
- Potential location of solar arrays
- Site access
- Sensitive receiver
- Waterways crossing the site

Vegetation types

- Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion (CW165, Moderate/good – poor)

Paper Size A4

0 100 200 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Neoen Australia Pty Ltd
Gilgandra Solar Farm
Modification 1 SSD 6785
Subdivision Layout and
Modified Project

Job Number	21-25942
Revision	A
Date	08 Feb 2019

Figure 2-3

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3. Legislative context

3.1 Environmental Planning and Assessment Act 1979

3.1.1 Modification of a development consent

The relevant clauses from Part 4, Section 4.55 of the EP&A Act states:

(1A) Modifications involving minimal environmental impact

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

> (a) it is satisfied that the proposed modification is of minimal environmental impact, and
>
> (b) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all), and
>
> (c) it has notified the application in accordance with:
>
> > (i) the regulations, if the regulations so require, or
> >
> > (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and
>
> (d) it has considered any submissions made concerning the proposed modification within any period prescribed by the regulations or provided by the development control plan, as the case may be.
>
> Subsections (1), (2) and (5) do not apply to such a modification.

The proposed modification is of minimal environmental impact and is substantially the same development as the development for which the consent was originally granted. Refer to Section 5 for further information on the impact assessment.

3.2 Environmental Planning and Assessment Regulation 2000

Division 12, Clause 115 of the Environmental Planning and Assessment Regulation 2000 (the Regulation) states that an application for modification of a development consent under Section 4.55 (1), (1A) or (2) or 4.56 (1) of the EP&A Act must contain the tabulated in Table 3-1.

Table 3-1 Information required for a modification application

Clause	Requirement	Section addressed
1(a)	the name and address of the applicant,	Chapter 1
1(b)	a description of the development to be carried out under the consent (as previously modified),	Chapters 1 and 2
1(c)	the address, and formal particulars of title, of the land on which the development is to be carried out,	Chapter 1
1(d)	a description of the proposed modification to the development consent,	Chapter 2

Clause	Requirement	Section addressed
1(e)	a statement that indicates either:	
i)	that the modification is merely intended to correct a minor error, misdescription or miscalculation, or	N/A
ii)	that the modification is intended to have some other effect, as specified in the statement,	Chapter 2
1(f)	a description of the expected impacts of the modification,	Chapter 5
1(g)	an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved,	Chapter 3
1(g1)	in the case of an application that is accompanied by a biodiversity development assessment report, the reasonable steps taken to obtain the like-for-like biodiversity credits required to be retired under the report to offset the residual impacts on biodiversity values if different biodiversity credits are proposed to be used as offsets in accordance with the variation rules under the *Biodiversity Conservation Act 2016*,	N/A
1(h)	if the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner),	Appendix A
1(i)	a statement as to whether the application is being made to the Court (under section 4.55) or to the consent authority (under section 4.56), and, if the consent authority so requires, must be in the form approved by that authority.	N/A

3.3 Approvals required

As outlined in the above section, the proposed modification requires development consent under Part 4, Clause 4.55 (1A) of the EP&A Act.

4. Consultation

4.1 Landowner

The applicant consulted with the landowner and Lot 7 DP 752575 and the landowner has agreed to the proposed modification. Consent is provided in Appendix A.

4.2 Neighbouring landowners

The applicant consulted with neighbouring landowners at Gilgandra. This consultation was undertaken on 6, 7 and 12 December 2018 with the residents shown in Figure 4-1. The outcomes of this consultation are provided in Table 4-1.

Table 4-1 Neighbouring landowner consultation

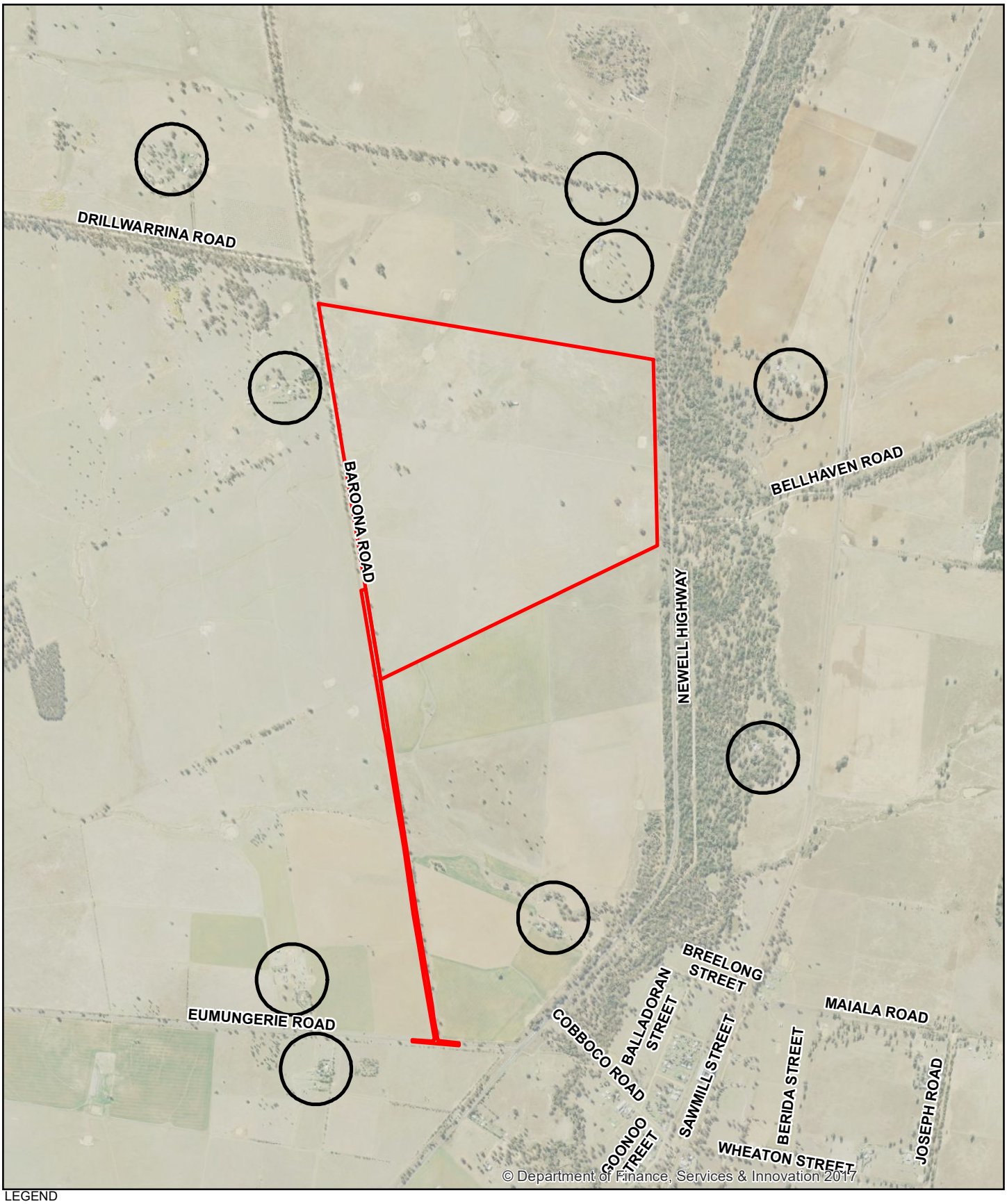
Date and method	Landowner consultation summary
06/12/2018 Consultation in person	- Two main concerns are potential decrease in value of the property and visual impact. (As advised during the meeting, property values are influenced by a range of factors and it is therefore difficult to determine if solar farms (or other similar infrastructure) can cause land values on neighbouring agriculture properties to increase or decrease. There is little available research on the impact of solar farms on property value however a study undertaken in 2016 into the impacts of wind farms on the value of neighbouring agricultural properties found that: For rural properties used for primary production, there is no direct loss of productivity resulting from wind farms; therefore, they are unlikely to negatively impact the value of such properties. Property values for neighbouring properties within the local area may be influenced by the solar farm (potentially positively or negatively). This is difficult to quantify; however, it is not expected that the Gilgandra Solar Farm would affect productivity of neighbouring agricultural properties). - Acknowledges the proposed increase in maximum height of the panels but wants faster growing vegetation screen to reduce visual impact. Landowner suggested that artificial screening (e.g. green material on the fence) be used until the vegetation screen matures to a sufficient size. (Neoen advised during the meeting that a fully compliant Landscape Management Plan (which includes the vegetation screening approach) would be implemented in accordance with the Conditions of Consent. A local landscape specialist has subsequently been engaged to provide guidance regarding the most suitable vegetation and water supply considerations). - Landowner will be quite happy with a vegetation screen if it serves its purpose and it well maintained.
06/12/2018 Consultation in person	- Not concerned about increase in height of panels. Main concerns are repeat of operational and maintenance issues that he's experienced as landowner for the Dubbo Solar Farm including: o Grass not being cut regularly enough, which increases the risk of bush fire (note – he has requested that his own equipment be used to address this). o No sheep grazing on site as originally proposed. Sheep grazing would keep the grass height low. Landowner has expressed an interest in providing sheep for grazing on site. (Neoen passed on comments internally to address these points. The grass at Dubbo Solar Farm has subsequently been cut to the satisfaction of the landowner, and he is now grazing sheep on site as desired).

Date and method	Landowner consultation summary
	- Shortage of water supply has not allowed vegetation screening to grow to a sufficient size (Neoen advised during the meeting that a fully compliant Landscape Management Plan (which includes the vegetation screening approach) would be implemented in accordance with the Conditions of Consent. A local landscape specialist has subsequently been engaged to provide guidance regarding the most suitable vegetation and water supply considerations).
06/12/2018 Consultation in person	- Suggests contacting local landscape/vegetation specialist for input into the landscaping plan. Previous advice from this local landscape/vegetation specialist will be considered in the final design of landscaping. - Has a preference for planting of wilgas. - Believes that a 5-metre vegetation screening zone along the western boundary of the project site (as represented in the latest version of the project layout design) is too narrow. Would prefer 2-3 layers of screening, which is believed would require a broader width than 5 metres (Neoen advised during the meeting that a fully compliant Landscape Management Plan (which includes the vegetation screening approach) would be implemented in accordance with the Conditions of Consent. As requested by this landowner, a local landscape specialist has subsequently been engaged to provide guidance regarding the most suitable vegetation and water supply considerations. Neoen also provided the latest layout design for the project and advised that the design is continually evolving and will likely be subject to further changes until it is finalised just before construction starts. We will provide details of the final design in due course). - A water bore is situated on their property. Landowner is open to discussing the potential of selling water from the bore to the project if not enough water can be sourced from elsewhere. - Has no major concern re: the increase in panel height, as long as the relevant planning permit condition is fulfilled. Landowner will be quite happy with a vegetation screen if it serves its purpose and it well maintained.
06/12/2018 Consultation in person	- Has no major concerns regarding the increase in panel height. - Greatest concern is dust being generated on Baroona Rd during the construction period. Neoen representative advised that they will be informed about the dust management plan for the project once it is created (Neoen advised during the meeting that a Dust Management Plan will form part of a compliant Construction Management Plan).
06/12/2018 Consultation via phone call	- Has no major concerns regarding the increase in panel height, nor any other issues. - Very supportive of the project.
07/12/2018 Consultation via phone call	- Has no major concerns regarding the increase in panel height. - Main concern is dust and upgrading of Baroona Rd. Neoen representative advised that they will be informed about the dust management plan for the project once it is created (Neoen advised during the meeting that a Dust Management Plan will form part of a compliant Construction Management Plan).
07/12/2018 Consultation via phone call	- Has no major concerns regarding the increase in panel height, nor any other issues.

Date and method	Landowner consultation summary
12/12/2018 Consultation via phone call	- Has no major concerns regarding the increase in panel height as the site is shielded by thick groups of trees running along the eastern side of the Newell Highway. - Expressed an interest in leasing or selling his land for future developments.

4.3 Gilgandra Shire Council

The applicant consulted with Gilgandra Shire Council regarding the proposed modification. Consultation is provided in Appendix A.



LEGEND

Proposal site

Residence

Paper Size A4

0 205 410 820

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Neoen Australia Pty Ltd
Gilgandra Solar Farm
Modification 1 SSD 6785

Consultation

Job Number 21-25942
Revision A
Date 12 Dec 2018

Figure 4-1

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5. Impact assessment

This section assesses the potential environmental, social and economic impacts arising from the proposed modification. An initial assessment by the proponent of environmental impacts, indicated that visual impacts associated with the solar panel height increase were the primary issue. Consideration of the other environmental, social and economic aspects as a consequence of the proposed modification is provided in Section 5.2.

The environmental factors were addressed in the original EIS have been considered in respect of the proposed modification, refer to:

- Biodiversity
- Aboriginal heritage
- Visual
- Noise and vibration
- Land use and land capability
- Hydrology, groundwater and water quality
- Electric and magnetic fields
- Bushfire
- Soils
- Socio-economic
- Air quality and climate change
- Non-Aboriginal heritage
- Waste management

5.1 Proposed panel height amendment

5.1.1 Visual

GHD prepared a visual impact assessment for the proposal as part of the environmental impact statement (EIS), which included an assessment of the likely visual impacts of the proposal (including visual character, and impacts at viewpoints comprising glare, reflectivity and lighting) on surrounding residences and road corridors.

The original visual impact assessment (undertaken as part of the EIS) assumed a maximum height of 3 metres. To assess the impacts of the proposed panel height amendment, the visibility of project infrastructure at the proposed maximum height of 4.2 m has been assessed using viewshed analysis (undertaken 28 November 2018). For consistency, the updated viewshed analysis has been conducted from the viewpoints considered as part of the visual impact assessment from the EIS.

A comparison has been made between the visual impacts of the approved project and the proposed modification. The updated viewshed analysis shows that there is a small increase in visibility to the solar panels. The impact change is considered to be minimal and could generally be alleviated over time with the implementation of mitigation measures and establishment of vegetation.

The amendment to solar panel type and height would not change the visual impacts during construction.

The visual impact assessment of the proposed modification is provided in Appendix B.

Mitigation measures

The development consent contains a number of conditions relating to visual impacts (refer Section 9 of conditions of consent), including vegetation buffers to screen views. Due to the minimal impact anticipated from the proposed modification, this condition is considered suitable to manage the visual impacts of the project and proposed modification.

No new or additional mitigation measures are proposed.

5.1.2 Traffic

Traffic impacts were assessed as part of the EIS. The result of this assessment predicted that the project would not significantly impact on the surrounding road network.

The proposed modification would not increase the type or number of heavy vehicle movements to and from the site. The heavy vehicle movements specified in the conditions of consent will continue to be adequate for the project.

Section 2.2 and Figure 2-1 outline the laydown area to be used during construction of the project. By using this location as the site entry, car traffic would be reduced within the site. Construction deliveries for the project (excluding the substation) would be unloaded in this area and on the ring road around the solar arrays. Therefore, the heavy vehicle haulage traffic within the site would also be reduced.

No other changes to traffic and transport impacts will occur as a result of the proposed modification.

5.2 Assessment of changes to impact types

In order to assess whether the modification would result in any changes to nature or magnitude of impacts, the modification was evaluated against the EIS carried out for the project.

The assessment of the environmental impacts is outlined in Sections 5.1.1, 5.1.2 and the other environmental, social, and economic aspects are included in Table 5-1.

No adverse impacts are expected as a result of the proposed modification and there would be additional impact types compared to those assessed in the EIS.

No new or amended mitigation measures are required as a result of the proposed modification and the current conditions of consent for the project are suitable for the proposed modification.

Table 5-1 Other environmental, social and economic aspects

Environmental aspect	Assessment
Biodiversity	A biodiversity assessment report was prepared as part of the EIS. There would be no change to the development footprint or additional surface disturbance associated with the proposed modification and therefore no additional impact on biodiversity.
Aboriginal heritage	An Aboriginal heritage due diligence assessment undertaken by OzArk as part of the EIS. There would be no change to the development footprint or additional surface disturbance associated with the proposed modification and therefore no additional impact on Aboriginal heritage.

Environmental aspect	Assessment
Noise and vibration	A noise and vibration assessment was undertaken by GHD as part of the EIS. There would be no additional construction traffic as a result of the proposed modification. There will be no significant change to the project's construction and operations which have the potential to generate noise emissions at nearby sensitive receivers. Therefore, no additional noise and vibration impacts are anticipated.
Land use and land capability	A rural lands study was undertaken by GHD as part of the EIS. The proposed modification includes subdivision of Lot 7 into two lots. However, there would be no change to the development footprint or additional surface disturbance associated with the proposed modification and therefore no additional impact on land use or land capability.
Hydrology, groundwater and water quality	Hydrology, groundwater and water quality were assessed as part of the EIS. No change is anticipated as a result of the proposed modification.
Electric and magnetic fields	Electric and magnetic fields were assessed as part of the EIS. No change is anticipated as a result of the proposed modification.
Bushfire	Bushfire was assessed as part of the EIS. No change is anticipated as a result of the proposed modification.
Soils	Soils were assessed as part of the EIS. No change is anticipated as a result of the proposed modification.
Socio-economic	Socio-economic impacts were assessed as part of the EIS. Minor long-term positive impacts are anticipated as a result of the proposed modification due to increased capacity for solar generation and long-term reduction in greenhouse gasses from other fuel sources.
Air quality and climate change	Air quality and climate change impacts were assessed as part of the EIS. Short term positive construction impacts are anticipated due to the location of the laydown area (refer to Figure 2-1). This location is expected to reduce traffic on site and therefore improve dust impacts. Minor long-term positive impacts are anticipated as a result of the proposed modification due to reliance on sustainable energy sources and long-term reduction in greenhouse gasses from other fuel sources.
Non-Aboriginal heritage	Non-Aboriginal heritage was assessed as part of the EIS. No change is anticipated as a result of the proposed modification.
Waste management	Waste management was assessed as part of the EIS. No change is anticipated as a result of the proposed modification.

6. Conclusion

The proposed modification involves increasing the maximum height of the solar panels, subdividing the project site into two allotments, providing an additional area for temporary office, car parking and laydown, amending the approved 'ancillary infrastructure corridor' and increasing the proposed generation capacity of the solar farm.

Subdivision of Lot 7 DP 752575 would be undertaken to allow the land tenure for the Essential Energy owned components of the substation and telecommunications equipment to be separated from the solar farm. There would be no additional environmental, social, or economic impacts as a result of this proposed subdivision.

A viewshed analysis has been completed for the solar panels at the proposed maximum height of 4.2 m. The updated viewshed analysis shows that there is a small additional area that would be visible to the solar panels, however there are no additional residences or additional view points and therefore, the impact change is considered to be minimal.

The proposed modification to the Gilgandra Solar Farm for the inclusion of bifacial panels and increased solar panel system height presents an opportunity to improve the energy generating efficiency of the project.

The proposed modification is not anticipated to result in significant changes to visual impacts compared to the approved project, nor changes to other environmental, social and economic aspects considered as part of the EIS. No additional heavy vehicle movements are required to transport the larger panels and therefore, no change to the noise and vibration assessment has been undertaken.

Additional mitigation measures are not warranted. The visual impacts from the proposed modification will be generally consistent with the approved project and therefore the existing conditions of consent would be applied. The proposed modification is of minimal environmental impact and the development, as modified, would be substantially the same development as the development for which the consent was originally granted.

Appendices

Appendix A – Council Consultation

From: Lindsay Mathieson
To: Damien Hegarty
Cc: Randall Medd
Subject: Gilgandra Sloar farm
Date: Friday, 14 December 2018 7:21:23 AM
Attachments: image6b2bc9.PNG
imaged63401.PNG
image1132b1.PNG

Hi Damien – In relation to the proposed Subdivision of Lot 7 DP 752575, to create two allotments to allow the land tenure for the Essential Energy owned components of the substation and telecommunications equipment to be separated from the solar farm. Council is satisfied that the proposed subdivision can proceed under the SEPP (Exempt and Complying Development codes) 2008 , 2.75 Specified development, as the intended use is for a public authority.

75 Specified development

The subdivision of land, for the purpose only of any one or more of the following, is development specified for this code:

widening a public road,

a realignment of boundaries:

that is not carried out in relation to land on which a heritage item or draft heritage item is situated, and

) that will not create additional lots or increase the number of lots with a dwelling entitlement or increase the opportunity for additional dwellings, and

) that will not result in any lot that is smaller than the minimum size specified in an environmental planning instrument in relation to the land concerned (other than a lot that was already smaller than that minimum size), and

) that will not adversely affect the provision of existing services on a lot, and

that will not result in any increased fire risk to existing buildings, and

) if located in Zone RU1, RU2, RU3, RU4, RU6, E1, E2, E3 or E4—that will not result in more than a minor change in the area of any lot, and

i) if located in any other zone—that will not result in a change in the area of any lot by more than 10%,

(Repealed)

rectifying an encroachment on a lot,

creating a public reserve,

excising from a lot land that is, or is intended to be, used for public purposes, including drainage purposes, rural fire brigade or other emergency service purposes or public toilets.

Regards Lindsay Mathieson
Director Planning & Environment

Lindsay Mathieson
Director Environmental Services

E: lmathieson@gilgandra.nsw.gov.au
A: P.O. Box 23, Gilgandra NSW, 2827
P: (02) 6817 8800 | **F:** (02) 6847 2521

Appendix B – Visual Impact Assessment

Memorandum

14 February 2019

To	NEOEN Australia Pty Ltd		
Copy to			
From	Laura Farrell	Tel	+61 3 8687 8899
Subject	Visual Impact Assessment Addendum	Job no.	2219941

1 Introduction

This memorandum has been prepared to identify the potential additional visual impacts on the previously identified sensitive receptors as part of the approved Gilgandra 40MW Solar Farm EIS. This has been completed via a desktop assessment using a viewshed analysis to predict any additional impacts. No site work was completed as part of the review.

2 Proposed modification

A modification to the approved project is sought, and the main visual changes include the following:

- Amendment to the proposed maximum height of the solar panels, from 3 metres to 4.2 metres. The initial visual impact assessment completed as part of the EIS, was based on the height of the solar panels being 3 metres above ground.
- Additional area for temporary offices, car parking and laydown proposed to be located in the south-west corner of the project site. This will be wholly located within Lot 7 DP 752575.
- Amendment to the location and arrangement of the approved 'Ancillary Infrastructure corridor' as shown in Figure 2-1 of the MOD report. The proposed substation and associated infrastructure would change in location from below the existing transmission easement in a square arrangement to the eastern side of the existing transmission easement in a rectangular arrangement.

Additional changes are being sought but would be unlikely to impact the landscape or visual environment.

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3 Existing environment

3.1 Landscape character

As previously discussed in the landscape and visual impact assessment as part of the approved EIS, the study area surrounding the project site is relatively flat. In the north-western corner of the site, the land is slightly elevated which provides some localised views of the surrounding landscape particularly to the north (see Figure 3.1), south and east.

Figure 3.1 View from north-western corner of site to the north/north-east

3.2 Viewpoints

A viewshed analysis (zone of theoretical visibility) was undertaken to determine the extent of available views from identified residential receptors. Figure 4.1, Figure 4.2, Figure 4.3 and Figure 4.4show the results of this analysis for residential receptors R1, R6, R8 and R9 respectively.

The analysis was run using ArcGIS 10.4.1 Viewshed analysis tool. The residential point (Offset A) was set to 1.75 metre. A digital terrain model was created using the 10 metre contour data and the mass of the approved (3 metre) or proposed (4.2 metre) solar farm included into this elevation model.

This analysis was run for the approved 3 metre and the proposed 4.2 metre height of the solar panels from each of the four residential receptor locations. Each of the maps produced compares the visibility

of the approved verses the proposed height. A number of potentially taller structures such as the substation and onsite buildings were excluded as they would be a similar size to existing farm buildings which are common within this landscape. The viewshed analysis only assesses views based on the terrain and does not factor in vegetation or existing structure screening.

As identified in the approved EIS the following key viewpoints in the vicinity of the project site are:

- Viewpoint 1 - residential dwelling north of the project site (includes views from the area to the north)
- Viewpoint 2 - residential dwelling to the west of the project site off Baroona Road
- Viewpoint 3 - residential property to the north-west
- Viewpoint 4 and 5 - residential dwelling to the south of the project site off the Newell Highway
- Viewpoint 6 and 7 - road users along the Newell Highway and Baroona Road

Distances from key viewpoints and residence are shown in Table 3-1.

Table 3-1 Distance from residential properties to project

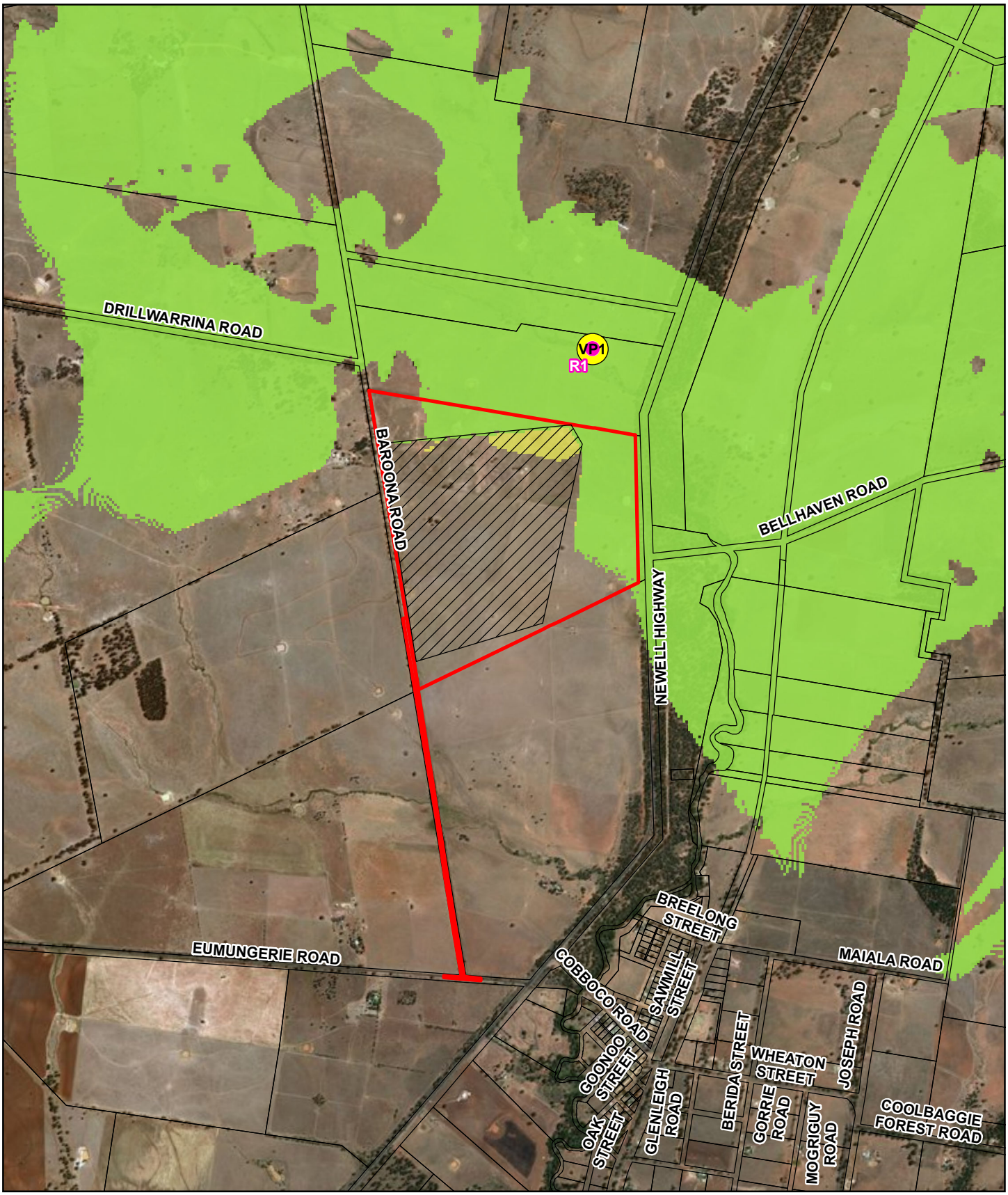
Name	Distance to Solar Panel (m)	Distance to Boundary (m)
R1	459	452
R2	705	689
R3	943	633
R4	1263	1033
R5	1218	1032
R6	200	188
R7	1136	858
R8	1679	539
R9	1476	596

The locations are shown on Figure 4.5

4 Potential impacts

4.1 Introduction

As previously discussed in the approved EIS the proposal would be visible from surrounding areas including a number of residential dwellings. The proposal would change land use at the site from one that is characterised by agricultural production to solar power generation, and this would change the visual character of the site. The majority of views to the site are partially screened by existing vegetation located along road reserves, around dwellings or scattered vegetation in paddocks.



Legend

- Residential receptors
- Key viewpoints
- Solar farm layout
- Proposal site
- Area of solar farm visible at both heights
- Area of solar farm visible at 3m
- Area of solar farm visible at 4.2m

This viewshed illustrates areas of visibility in the surrounding landscape, from the identified residential receptor. This analysis has taken account the height of the panels of the approved (3m) and proposed modification (4.2m) at Gilgandra Solar Farm. This analysis does not take into account vegetation or existing built form and is representative only.

Paper Size A4

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

NEOEN Australia Pty Ltd
Gilgandra Solar Farm
Modification 1 SSD 6785

Viewshed Residential receptor R1

Job Number 21-25942
Revision A
Date 13 Feb 2019

Figure 4.1

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

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Legend

- Residential receptors
- Key viewpoints
- Solar farm layout
- Proposal site
- Area of solar farm visible at both heights
- Area of solar farm visible at 3m
- Area of solar farm visible at 4.2m

This viewshed illustrates areas of visibility in the surrounding landscape, from the identified residential receptor. This analysis has taken account the height of the panels of the approved (3m) and proposed modification (4.2m) at Gilgandra Solar Farm. This analysis does not take into account vegetation or existing built form and is representative only.

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Modification 1 SSD 6785

Viewshed Residential receptor R6

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Figure 4.2

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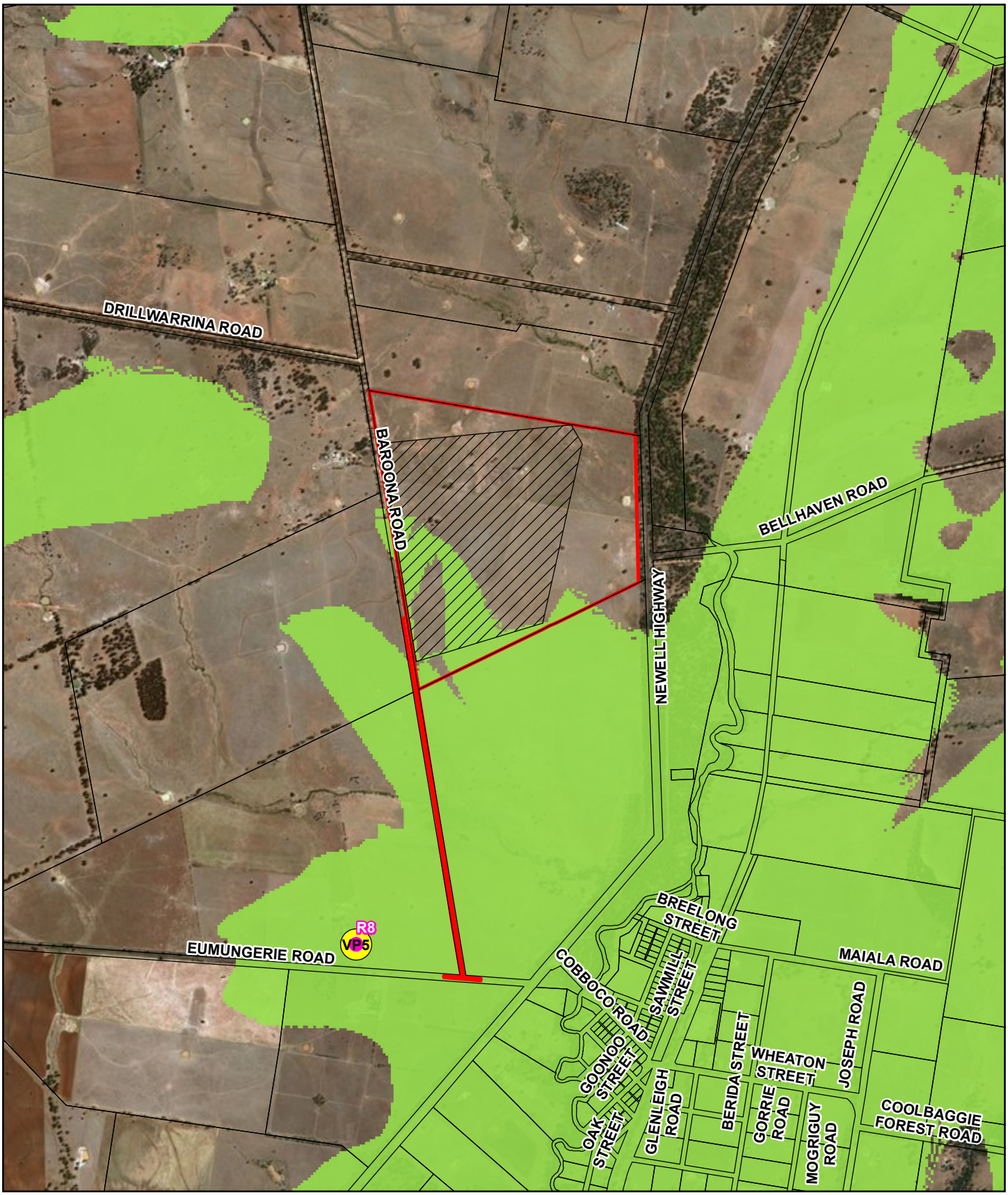

Legend

- Residential receptors
- Key viewpoints
- Solar farm layout
- Proposal site
- Area of solar farm visible at both heights
- Area of solar farm visible at 3m
- Area of solar farm visible at 4.2m

This viewshed illustrates areas of visibility in the surrounding landscape, from the identified residential receptor. This analysis has taken account the height of the panels of the approved (3m) and proposed modification (4.2m) at Gilgandra Solar Farm. This analysis does not take into account vegetation or existing built form and is representative only.

Paper Size A4

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Gilgandra Solar Farm
Modification 1 SSD 6785

Viewshed Residential receptor R8

Job Number	21-25942
Revision	A
Date	13 Feb 2019

Figure 4.3

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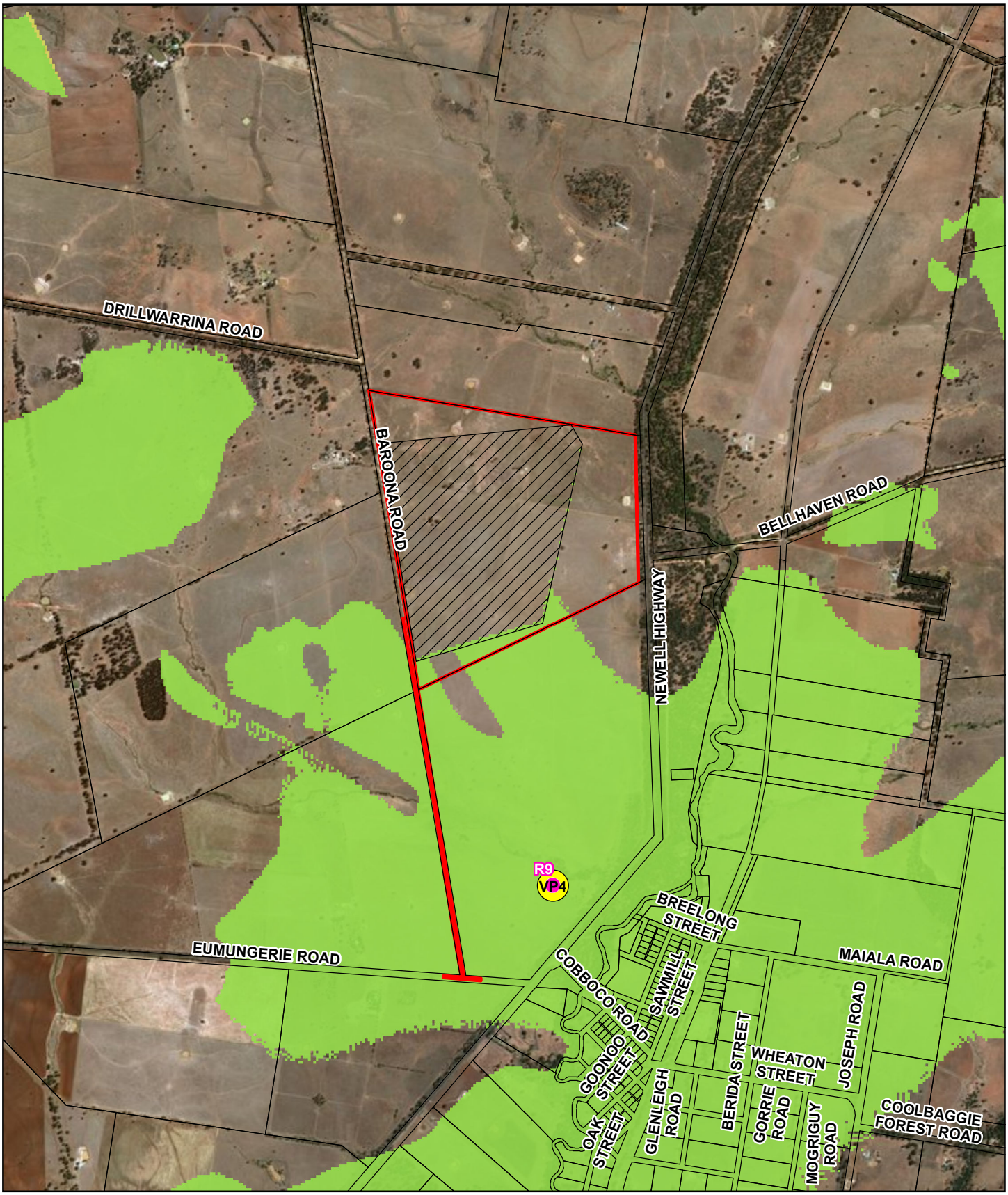

Legend

- Residential receptors
- Key viewpoints
- Solar farm layout
- Proposal site
- Area of solar farm visible at both heights
- Area of solar farm visible at 3m
- Area of solar farm visible at 4.2m

This viewshed illustrates areas of visibility in the surrounding landscape, from the identified residential receptor. This analysis has taken account the height of the panels of the approved (3m) and proposed modification (4.2m) at Gilgandra Solar Farm. This analysis does not take into account vegetation or existing built form and is representative only.

Paper Size A4

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Gilgandra Solar Farm
Modification 1 SSD 6785

Viewshed Residential receptor R9

Job Number	21-25942
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Figure 4.4

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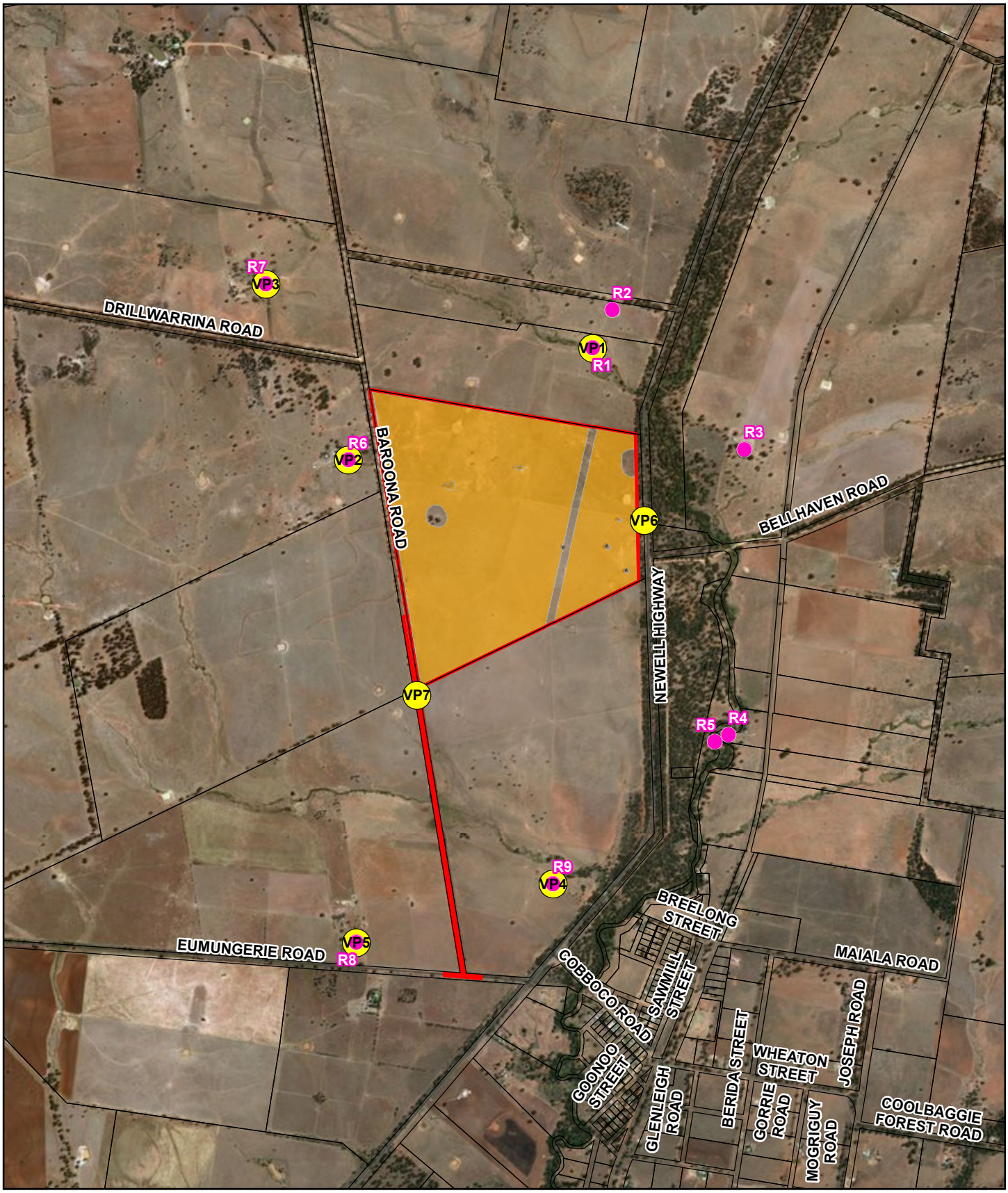

Legend

- Proposal site
- Lot boundaries
- Potential location of solar arrays
- Key viewpoints
- Residential receptors

Paper Size A4

0 100200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

NEOEN Australia Pty Ltd
Gilgandra Solar Farm
Modification 1 SSD 6785

Project location

Job Number	21-25942
Revision	A
Date	13 Feb 2019

Figure 4.5

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4.2 Viewpoint 1 - Residential dwelling to the north

This viewpoint is at the residential dwelling (R1) on the rural property located to the north of the project site. This dwelling is about 450 metres north of the north boundary of the project site. As shown in Figure 4.6, the views of the north boundary of the project site from this viewpoint are largely uninterrupted with only a number of small trees surrounding the dwelling. The project site is visible from this location at the top of the slight hill, however due to topography only a limited area of the site is visible as illustrated in Figure 4.1.

There would be a slight increase in visibility associated with the increase of height of the solar panels which will increase from 3 metres to 4.2 metres. As shown in Figure 4.1 a larger area of solar farm would be seen with the 3 metre configuration as views across the top of the panels would be available However with the 4 metre configuration only the first few rows of the solar panels would be visible in this view with the remaining solar farm not visible. The proposed amended substation location may also be partially discernible to the left of this view behind the existing transmission lines. However as previously discussed in the approved EIS, views from this dwelling would be limited to development located to the northern side of the site. This is because there is an increase in elevation to the south that would block view to the southern areas of the project site. There is limited existing vegetation along the northern boundary of the project site to screen views from this location, as shown.

Potential impacts on the visual amenity of this residence would be minimised by implementing mitigation measures that include developing a landscape plan as identified in the approved EIS. The northern boundary of the project site has been identified as a likely location for mitigation measures which would include a vegetation buffer. This screening would assist in filtering and blocking views to the project site over time from the residence to the north.

Figure 4.6 Views south across project site from dwelling located to the north of the project site

4.3 Viewpoint 2 - Residential property to the west (Wetherby)

This viewpoint is from a residential dwelling (R6) located to the west of the project site. This dwelling is about 200 metres west of the boundary of the project site. Figure 4.7 shows the view towards the project site from the dwelling. Existing views are partially screened by vegetation located along Baroona Road and within the residential property, however there are gaps in this vegetation that provide open views of the project site (e.g. Figure 4.7 and Figure 4.8)

As previously identified as part of the approved EIS, there would be partial views of the project site from this location. However existing vegetation located on the eastern side of the property and along Baroona Road would partially screen views of the proposal. With the 4 metre configuration only the first few rows of the solar panels would be visible in these views with the remaining solar farm not visible. The proposed modification would result in additional visual impacts due to the increased height of the solar array by 1.2 metres.

The implementation of the proposed mitigation measures which would include a vegetation buffer (as mentioned in section 5) would, over time, provide visual screening between gaps in vegetation, removing potential partial views to the solar array from the residential property to the west (Wetherby).

Figure 4.7 View from Wetherby looking east

Figure 4.8 View from Wetherby looking south-east

4.4 Viewpoint 3 - Residential property to the north-west (Lindfield)

This viewpoint is located at a residential dwelling (R7) located about 860 metres north-west of the north-western corner of the project site. Views of the site are generally limited to filtered views (limited to largely the north-eastern part of the project site) through vegetation surrounding this dwelling as well as vegetation along Baroona Road (as shown in Figure 4.9). Given the distance to the project site the increase in height of the solar array would not be discernible. With the implementation of mitigation measures as previously approved and mentioned in section 5, impacts on views from this location are considered to be low.

Figure 4.9 View from Lindfield towards project site

4.5 Viewpoint 4 and 5 - Residential properties to the south and south-west (Colleraine and Westella respectively)

These viewpoints are at residential dwellings which are located about 1.2 kilometres to the south-west (R8) and south (R9) of the solar panels and 550 m from project site boundary. Views from the dwellings (refer to Figure 4.10 and Figure 4.11) are partially screened or blocked by intervening elevated topography or vegetation along Baroona Road and surrounding the dwelling.

Although indicated some visible in the viewshed assessments (Figure 4.3 and Figure 4.4), due to the distance from the site, any views of solar panels would be limited to the background of views and would not form a dominant element of the vista.

An additional area for temporary offices, car parking and laydown is proposed to be located in the south-west corner of the project site. Due to the distance and intervening topography and vegetation there would be limited opportunity for views towards the infrastructure.

The amended substation location would result in the substation appearing to the right of the existing transmission easement, rather than within the easement, in each viewpoint. Due to the effect of distance and presence of existing vegetation, particularly for viewpoint 4, the magnitude of this change would be relatively low, and able to be mitigated.

With the implementation of mitigation measures which would include the landscape plan and vegetation buffer (as mentioned in section 5 below), the establishment of vegetation screening would reduce visual impacts over time to both the solar panels, substation and infrastructure area.

Figure 4.10 Viewpoint 4 - view from Colleraine near dwelling (looking north)

Figure 4.11 Viewpoint 5 - view from Colleraine to west of dwelling (looking north)

4.6 Viewpoint 6 - Newell Highway

This viewpoint includes the users of the Newell Highway which runs along the eastern side of the project site. Existing vegetation within the road reserve between the project site and the highway provides some screening, however there are a number of gaps in the vegetation that provide views of the site (for example at the site entrance shown in Figure 4.12).

As a result of the modification, the solar panels would appear taller in view to motorists travelling along this section of the highway. The amended substation locations would also result in the substation appearing to the front of the existing transmission lines. Motorists would however only have glimpsed views of the project site for a very short period of time through existing vegetation, as vehicles would be traveling up to the designated speed limit of 110 km / hr. No additional mitigation would be required.

Figure 4.12 Views of site from Newell Highway at existing site entrance (looking west)

4.7 Viewpoint 7 - Baroona Road

This viewpoint is located on Baroona Road which runs along the western side of the project site. Views of the proposal site are readily available from the road (as shown in Figure 4.13), however in some locations views are partially screened by vegetation within the road reserve and along the northern part of the western boundary of the project site.

The sensitivity of road users to changes to the view from this location is relatively low due to the speed of travel and therefore short-term nature of the views experienced whilst passing through the area.

Due to the proposed modification, views would be of the increased height of the solar array (additional 1.2 metre) and an additional area for temporary offices, car parking and laydown proposed to be located in the south west corner of the project site.

Figure 4.13 View of project site from Baroona Road from south-western corner of the site looking north/north-east

5 Mitigation measures

As part of the development consent, a number of conditions relate to the mitigation measures for landscape and visual impact. The following conditions have been outlined:

Landscaping

Vegetation Buffer

9. The Applicant must establish and maintain a mature vegetation buffer around the site at the locations outlined …, to the satisfaction of the Secretary. This buffer must:

(a) be planted prior to the commencement of operations;

(b) include planting that is additional to existing vegetation within the curtilage of the site;

(c) consist of vegetation species that facilitate the best possible outcome in terms of visual screening;

(d) be effective at screening views of the solar panels and ancillary infrastructure on site from surrounding residences within 3 years of the commencement of construction;

(e) minimise the glare from the solar panels on road users;

(f) be properly maintained and kept free of weeds; and

(g) be fenced in the event that stock are kept on the site.

Landscaping Plan

10. Prior to the commencement of construction, the Applicant must prepare a detailed Landscaping Plan for the planting within the vegetation buffer in consultation with OEH and the owners of R1, R2 and R6, and to the satisfaction of the Secretary. The plan must:

(a) include a description of measures that would be implemented to ensure that the vegetated buffer achieves the objectives of condition 9(b)-(g) of this consent;

(b) include a program to monitor and report on the effectiveness of these measures; and

(c) include details of who would be responsible for monitoring, reviewing and implementing the plan, and timeframes for completion of actions.

Following approval, the Applicant must implement the plan.

Land Management

11. Following any construction or upgrading on site, the Applicant must:

(a) restore the ground cover of the site as soon as practicable, but within 12 months of completing any construction or upgrades, using suitable species;

(b) maintain ground cover; and

(c) keep this ground cover free of weeds.

As outlined in the development consent (and above) a landscape plan would be prepared for the proposal and this would consider opportunities to provide additional vegetation at certain locations around the site perimeter to assist in screening views of the proposal. The level of landscaping to occur within the project site would largely be driven by the screening provided by existing screening vegetation located offsite.

The development consent contains a number of conditions relating to visual impacts (refer Section 9 of conditions of consent), including vegetation buffers to screen views. Due to the minimal impact anticipated from the proposed modification, this condition is considered suitable to manage the visual impacts of the project and proposed modification.

No new or additional mitigation measures are proposed as part of this modification.

6 Conclusion

GHD prepared a visual impact assessment for the proposal as part of the environmental impact statement (EIS), which included an assessment of the likely visual impacts of the proposal on surrounding residences and road corridors.

The original visual impact assessment (undertaken as part of the EIS) assumed a maximum height of 3 metres. To assist in identifying the change of visibility of the proposed panel height compared to the approved height, a viewshed analysis was undertaken as shown in Figure 4.1 to Figure 4.4. The assessment was analysed from each of the identified residential receptors with the digital model taking account of the solar farm height.

This has led to some slight changes in theoretical visibility, however this does not change the overall assessment of impacts from the key viewpoints as identified or described. The impact change is considered to be minimal and could generally be alleviated over time with the implementation of mitigation measures and establishment of buffer vegetation.

The amendment to solar panel type and height, and location of substation, would not change the visual impacts during construction.

GHD

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	B. Wood	D. Mees	*D. Mees*	D. Mees	*D. Mees*	14/12/2018
1	B. Wood	D. Mees	*D. Mees*	D. Mees	*D. Mees*	04/02/2019
2	B. Wood	D. Mees	*D. Mees*	D. Mees	*D. Mees*	07/02/2019
3	B. Wood	D. Mees	*D. Mees*	D. Mees	*D. Mees*	07/02/2019
4	B. Wood	D. Mees		D. Mees		13/02/2019

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