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Landscape and Visual Impact Assessment

Miriam Vale Solar Farm

Client Reference No. PO000018
Prepared for: Attexo Group Pty Ltd
27 May 2024

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SMEC Company Details

Approved by	Dale Young
Address	Collins Square, Tower 4, Level 20, 727 Collins St, Melbourne, VIC, 3008, Australia
Phone	+61 409 955 307
Email	Dale.Young@smec.com
Website	www.smec.com
Signature	

Suitably Qualified Persons

The author of this document, Durwin Dharmaraj, is an Associate Landscape Architect with a Bachelor of Horticultural Science, PostGradDip in Planning and Design, and a Masters in Landscape Architecture. Durwin has over 20 years of experience in landscape architecture, master planning, LVIA and visualisation production.

The reviewer of this document, Dale Young, is a Principal Planner with a Bachelor of Applied Science. Dale has 19 years of experience in land use planning and impact assessments.

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Executive Summary

Attexo has been engaged by Private Energy Partners (PEP) to prepare a development application for a solar farm in the Gladstone Regional Council LGA, the Miriam Vale Solar Farm (the 'Project'). PEP is proposing to develop a photovoltaic solar farm of up to 1 GW across the site including associated infrastructure, including a substation and interconnecting transmission line infrastructure. The Project site is approximately 1,080 hectares contained within 14 land parcels.

SMEC was commissioned by Attexo Group Pty Ltd to undertake a landscape and visual impact assessment (LVIA), two photomontages and a landscape mitigation plan to support the development application for the Project.

The LVIA considered the visual impact of the solar farm, ancillary infrastructure and substation components of the Project on publicly accessible locations within the study area. No visits to private property were undertaken. A qualitative assessment of glare was also undertaken, focussing on the solar farm. The interconnecting transmission lines were not considered for assessment as they were assumed to be underground, therefore would not have a visual impact.

The review of the legislation and policy context revealed several clauses relating to the protection of landscape and visual amenity within Gladstone Regional Council. These included the requirement for development to visually integrate with natural topographical features and to avoid adverse impacts to key scenic view lines from prominent locations. Adverse impacts may include disruption of views to ridgelines, visual scarring or siting of developments on ridgelines and major visual modifications to natural topographical features. Where adverse impacts are unavoidable, mitigation measures should be used such as vegetation screening whilst preserving views of key landscape features.

Key landscape and visual values within the study area include the ridgelines to the west of the Project. These provide a scenic backdrop from many vantagepoints. To a lesser extent, Farmland also contributes to scenic amenity, even though it is a heavily modified landscape with numerous human made elements. Bushland contributes to scenic amenity however it tends to impede views across the landscape due to vegetation. There would be no views of the Project from the township of Miriam Vale.

The viewpoint locations that were assessed were selected to show a representative sample of locations and demonstrate the worst case scenario wherever possible. Despite this, the study has found that the visual impact of the Project would be Negligible from most locations due to intervening terrain and vegetation. The highest visual impact was Minor at locations directly adjacent to the Project site. This is due to the relatively low profile of the Solar Farm in comparison to the elevated ridgelines of the Hilly Forest. Existing roadside and other vegetation conceals views of the Project from most of the other locations.

The glare impact of the Project was found to be Negligible given the minimal visibility of the Project from most locations within the study area. In addition, Solar panels are designed to absorb rather than reflect sunlight. For this reason, there are many surfaces and features within the existing landscape that have the capacity to create greater glare effects than the solar farm.

Recommendations for mitigation measures as well as a landscape mitigation plan were also provided to assist with further visual integration of the Project into the surrounding landscape. There may also be opportunities to promote tourism and sustainability values through interpretive signage and the provision of designated viewing locations of the Project.

The study found that the Project is well sited to minimise impact to landscape and visual amenity of the site and surrounding area.

1. Introduction

Attexo has been engaged by Private Energy Partners (PEP) to prepare a development application for a solar farm in the Gladstone Regional Council LGA, the Miriam Vale Solar Farm (the 'Project'). PEP is proposing to develop a photovoltaic solar farm of up to 1 GW across the site including associated infrastructure, including a substation and interconnecting transmission line infrastructure. The Project site is approximately 1,080 hectares contained within 14 land parcels.

SMEC was commissioned by Attexo Group Pty Ltd to undertake a landscape and visual impact assessment (LVIA), two photomontages and landscape mitigation plan to support the development application for the Project. The assessment focussed on the following key visual elements of the Project:

- Photovoltaic solar farm
- Localised ancillary infrastructure (E.g. Inverter stations)
- Electrical substation

The following components were not assessed:

- Interconnecting transmission lines (assumed to be underground)

The assessment was undertaken from publicly accessible locations only, with no visits to private property. In addition, Zone of Theoretical Visibility (ZTV) or viewshed mapping was not undertaken. The level of detail provided in the report is commensurate with the low visual prominence of the Project that was anticipated and confirmed through the site visit and assessment.

The LVIA considered the visual impact and proposed mitigation measures of the solar farm and substation components of the Project. The impact assessment has been included in Section 7.

2. Methodology

The methodology for carrying out this LVIA was drawn from and is generally in accordance with *The Landscape Institute and Institute for Environmental Management and Assessment LIIEMA, (2013), Guidelines for Landscape and Visual Impact Assessment, Routledge 3rd Edition* (GLVIA). The methodology has been adapted from GLVIA to address the scoping requirements and to relate to the specific issues of this Project. This guidance is considered best practice nationally. Further details on the methodology adopted is described in the following sections.

2.1 Site visit

A site visit was undertaken between 14th and 16th February 2024 to observe and photograph the site and surrounding area. The key purpose of the visit was to establish a firsthand account of the existing landscape and visual conditions and views toward the Project from various locations. The observations, notes and photographs from the site visit were used to inform the assessment. Weather conditions were generally cloudy to overcast with occasional showers. However, there were reasonably clear views toward the Project and surrounding area and weather conditions did not affect the assessment. Figure 2–1 shows the locations that were observed during the site visit.

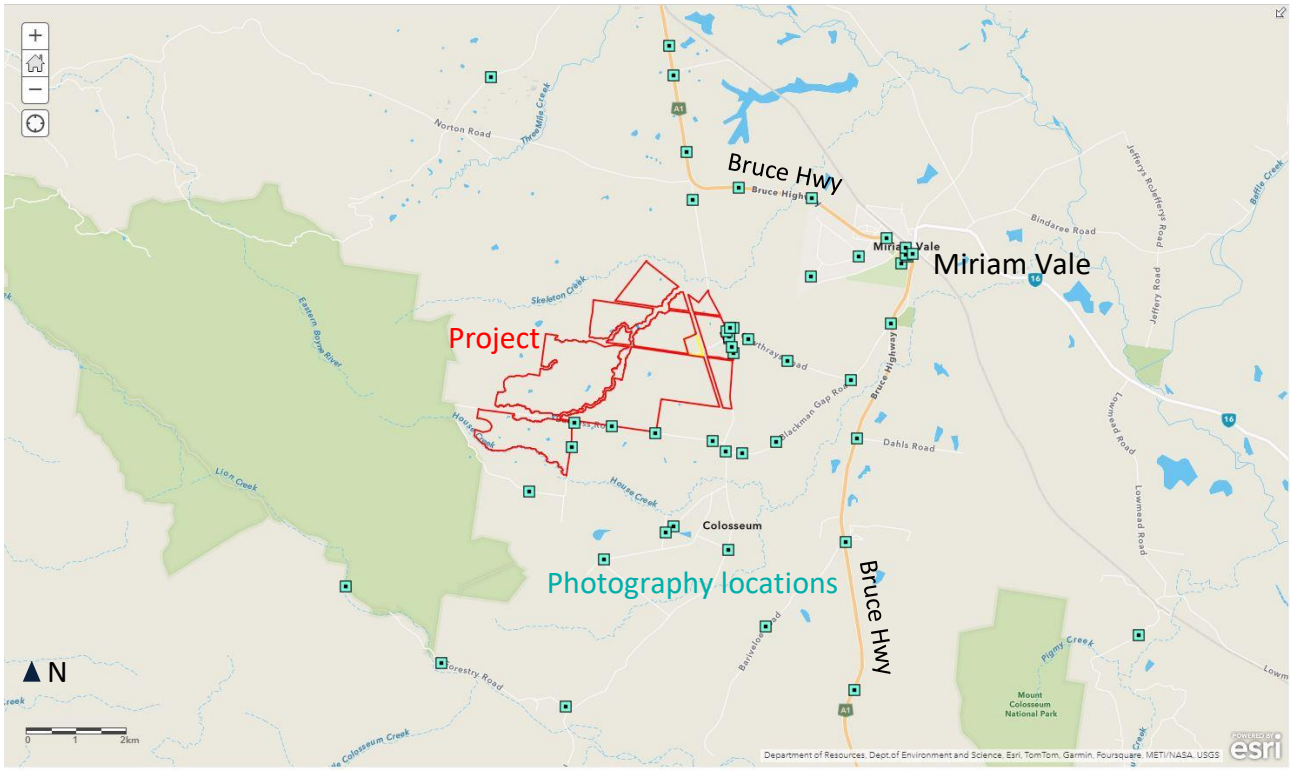

Figure 2–1: Photography locations

2.2 LVIA approach

The approach to the LVIA is described as follows:

- *Project description.* Identifies the main visually prominent Project components and forms the basis of the assessment.
- *Study area.* Nominates the extent to which the addition of the Project may bring about a discernible visual change to the landscape. Locations outside this extent are not considered as the Project would not be discernible.
- *Legislative and planning context*. Provides a summary of relevant planning scheme provisions and polices which has informed the assessment.

- *Existing landscape and visual context*. The existing landscape was analysed in terms of topography, vegetation, settlement patterns, existing infrastructure, human made modifications and other key characteristics to determine its capacity to visually absorb the Project.
- *Visual impact assessment*. The visual impact assessment was undertaken from a range of publicly accessible locations within the study area. Views toward the Project were used as a basis to assess the magnitude of change as well as the sensitivity of the landscape to visual changes. These representative sample of locations were then used to assess the visual impact of the Project as a whole. Photomontages were used to inform the assessment where applicable. Further details of the assessment methodology have been provided in Section 7.
- *Glare impact assessment*. A qualitative glare impact assessment on key sensitive receptors (e.g. roads, railways and aviation) has been provided and was informed by the visual impact assessment and background research.
- *Mitigation measures*. A range of mitigation measures were nominated to assist in reducing visual impact. A landscape mitigation plan was prepared to demonstrate how these measures can be implemented.
- *Conclusion.*

2.3 Photography

A Nikon D810 digital camera was used together with a 50mm lens in accordance with typical industry standards for LVIA photography. The camera was held at eye level, approximately 1.8m above ground level to take the photographs. Global Positioning System (GPS) positions and site observations were also recorded on a separate handheld device at the locations from which the photographs were taken. The assessment was based on firsthand observations with photos and site notes serving as supporting evidence.

2.4 Photomontages

Photomontages have been used to assist in the assessment by illustrating the scale, form and location of the Project over base photographs. Topographical data as well as the Project are modelled within a computer program (3DS Max). A virtual camera is set up in the 3D model at the GPS coordinates where the photograph was taken. Using geo-referenced markers, aerial photos, terrain, roads and property boundaries as a guide, a computer rendered image was overlain and incorporated within the photograph to produce a spatially accurate, visual representation of the Project. The photomontages have been displayed as panoramic images. These were constructed from four photographs arranged horizontally to capture more of the surrounding landscape context. Photomontages have been arranged to show both the existing view and view post construction as a basis of comparison to support the assessment.

2.5 Landscape mitigation plan

A landscape mitigation plan was prepared to show proposed landscaping to assist in minimising the visual impact of the Project from key viewing locations. It has been included in **Appendix B**.

3. Project description

The Project site is located approximately 4 kilometres (km) southwest of the town centre of Miriam Vale, Queensland. The site is generally bordered by Cawthrays Road to its east and Burgess Road and Mossman Road to its south and southwest, respectively. The site covers an area of approximately 1,080 Hectares (Ha). Figure 3–1 shows the Project location and main Project components.

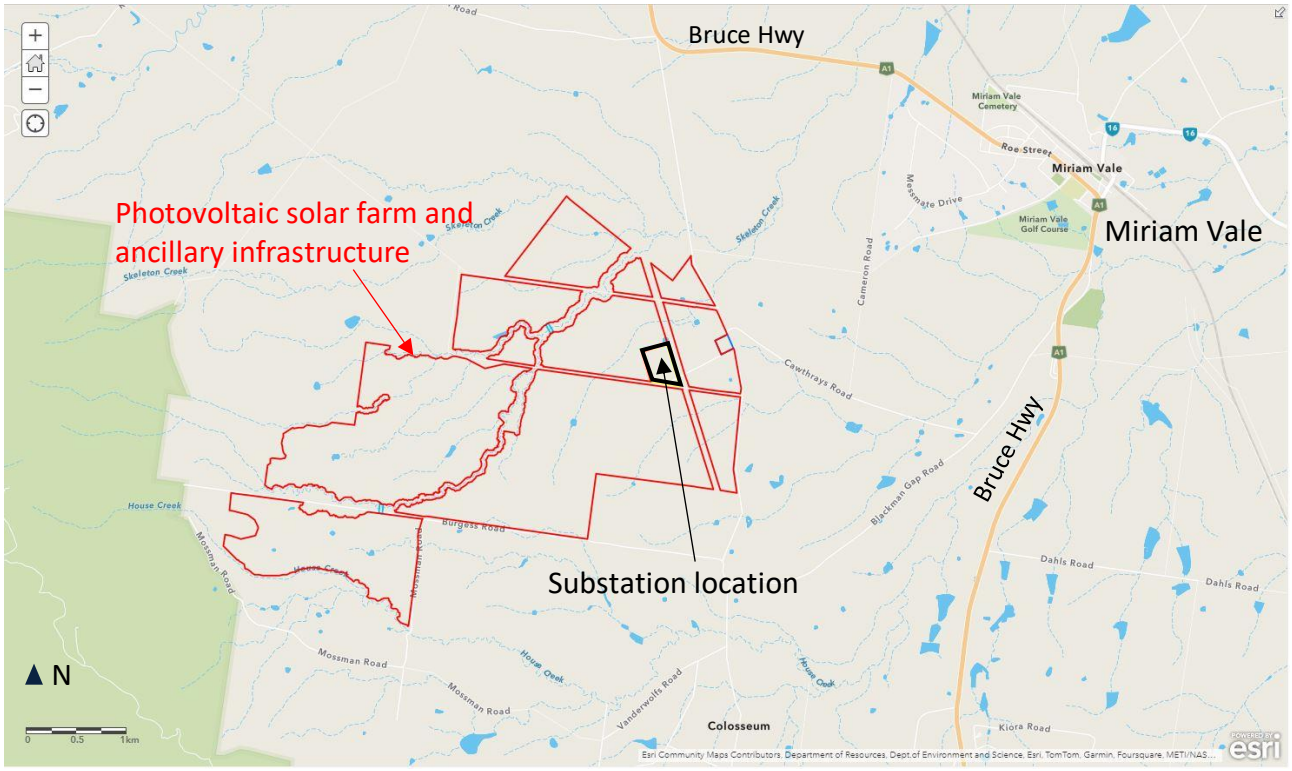

Figure 3–1: Project location

The following sections provide further details on specific Project components that have been considered for the assessment.

3.1 Photovoltaic solar farm

The photovoltaic solar farm comprises numerous rows of solar panels arranged in a north to south orientation, occupying most of the site. A mounting system allows the panels to rotate through approximately 120°, as it tracks the suns' movement across the sky, thereby achieving maximum solar exposure. At its most vertical configuration, the top of the solar panel is 2.7 metres (m) above ground level. There are occasional gaps in the arrangement of solar panels to accommodate access roads and surface features. Figure 3–2 shows a side elevation of the solar panels and mounting system associated with the photovoltaic solar farm. Figure 3–3 shows a plan view of the typical arrangement of solar panels in one portion of the site (colours shown are symbolic only).

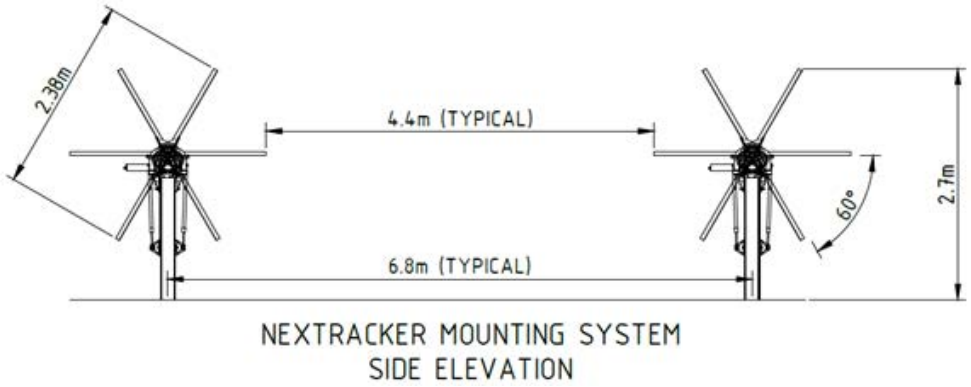

Figure 3–2: Photovoltaic solar farm side elevation (Source: QGE Pty Ltd).

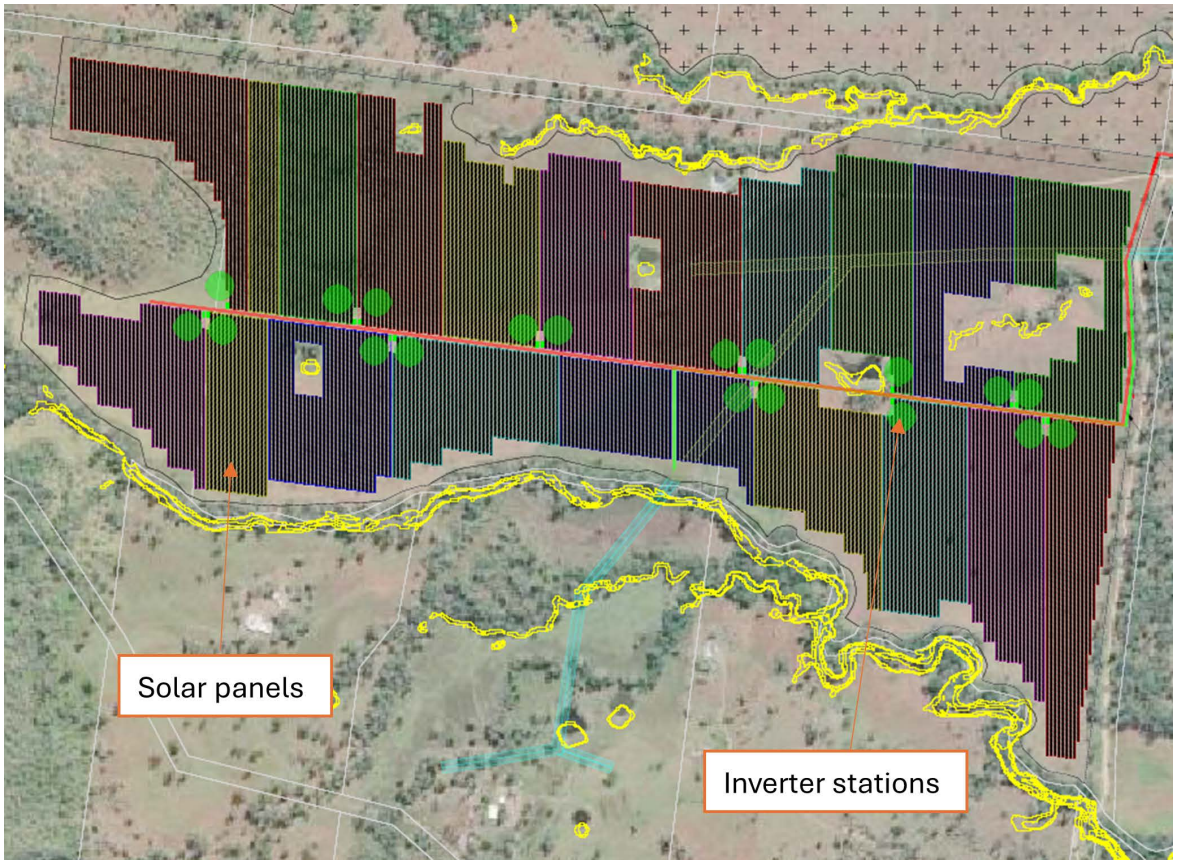

Figure 3–3: Photovoltaic solar farm plan view (Source: QGE Pty Ltd).

3.2 Inverter stations

Inverter stations are devices that convert direct current (DC) electricity, generated from the solar panels, to alternating current (AC) for supply to the electricity grid. Inverter stations would be located at intervals along the internal access road network. Figure 3–3 shows a typical arrangement of inverter stations in relation to the solar panels (as indicated by the green circles). Figure 3–4 shows a typical cross section of an inverter station in relation to a solar panel. The inverter station is located to the right in the image.

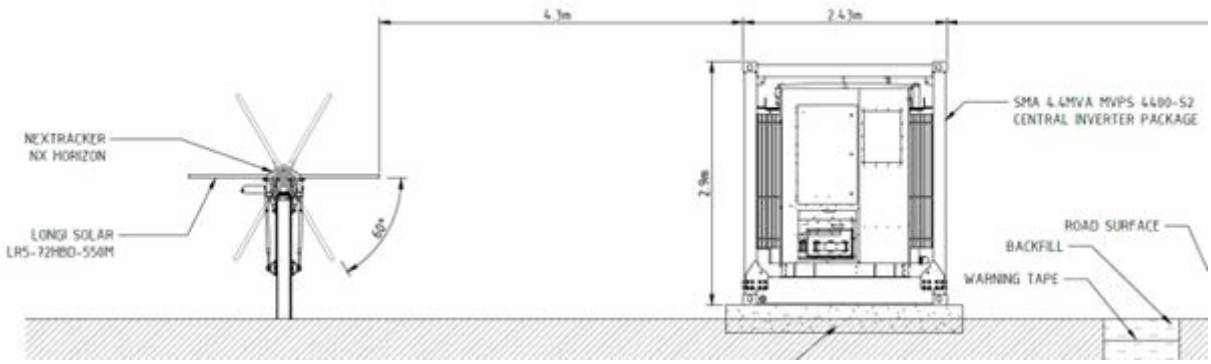

Figure 3–4: Inverter station typical cross section (Source: QGE Pty Ltd).

3.3 Electrical substation

The electrical substation would be located to the northeast of the solar development area. It comprises an array of structures including transformers, switchyard and control building (i.e. site office, workshop) associated with the dispatch of electricity from the solar farm to the electricity grid. The substation and switchyard are shown in Figure 3–5.

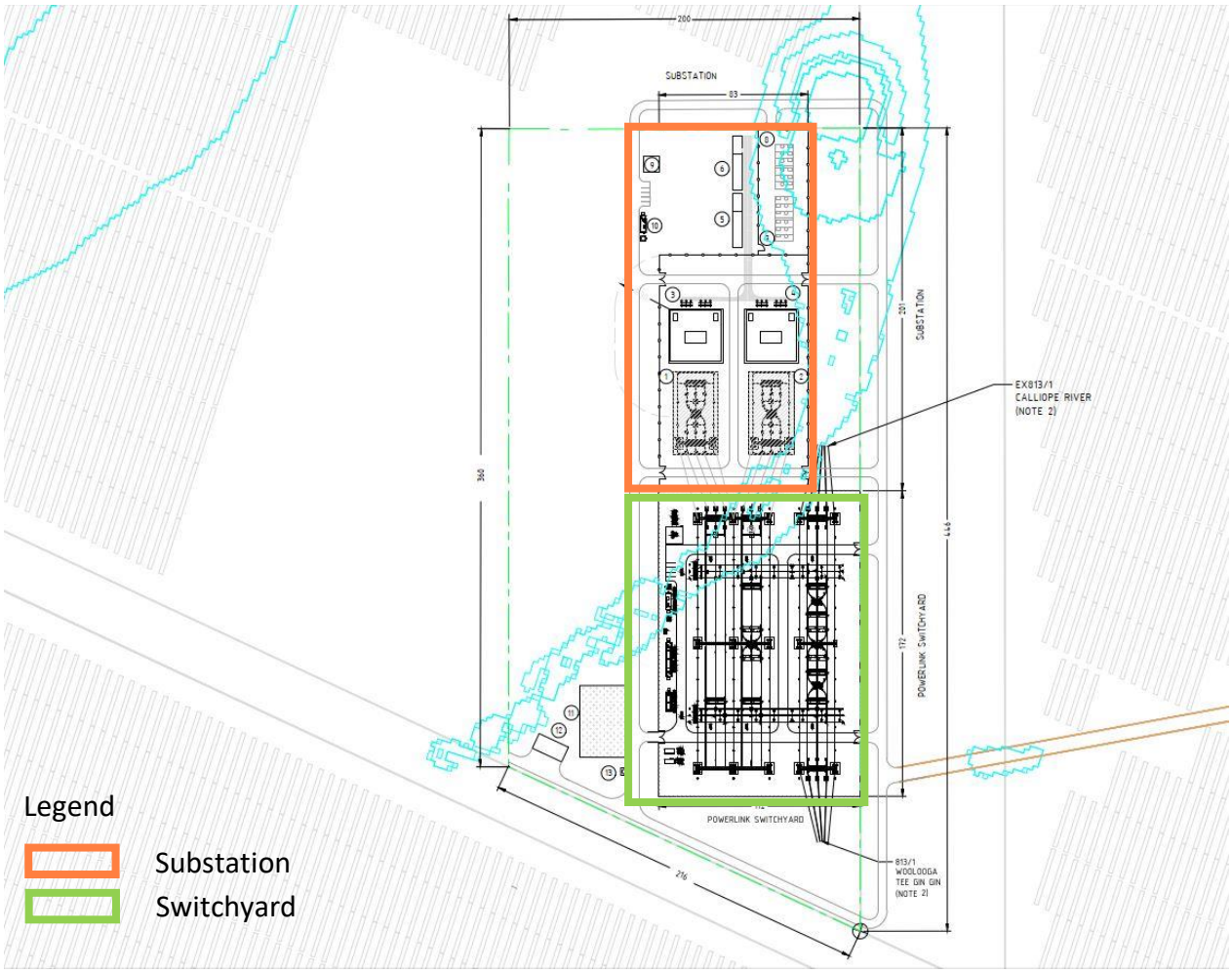

Figure 3–5: Electrical substation layout (Source: QGE Pty Ltd).

4. Study area

The study area has been based on the limit of discernibility of the most visually prominent Project elements as described in Section 3. Beyond this limit, the Project is not likely to be discernible therefore the visual impact would be negligible. The study area for the Project has been defined as those locations within a 10 km radius of the site boundary of the solar development area as shown in Figure 4–1. This study area has been derived from site observations and has been informed by other projects with a similar visual profile.

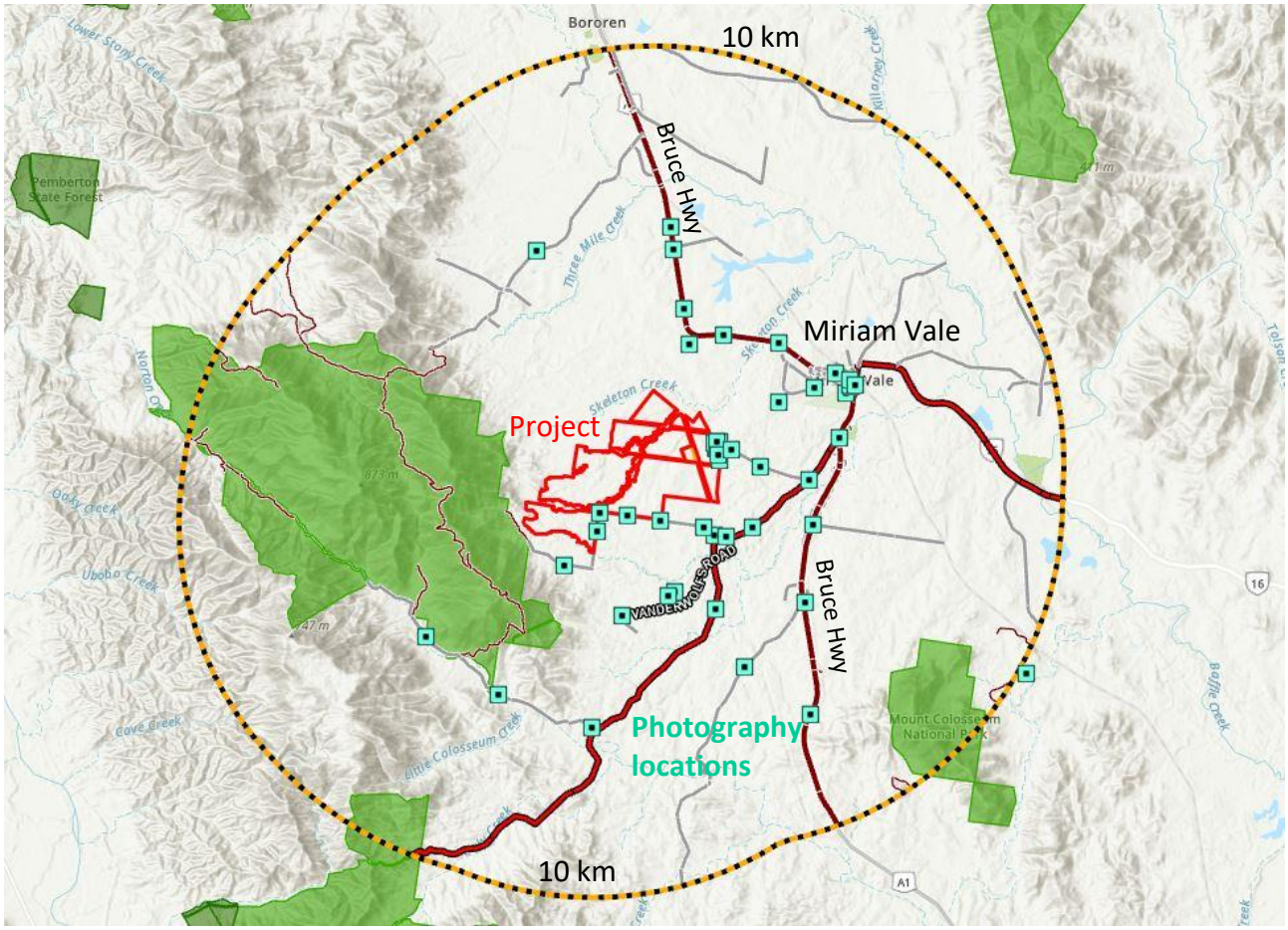

Figure 4–1: Study area

5. Legislation and policy context

The following sections provide an overview of the key planning provisions with respect to landscape and visual amenity.

5.1 Gladstone Regional Council – Rural Zone Code

The Project site is situated within the Gladstone Regional Council's Rural Zone Code. Key clauses relating to landscape and visual amenity include the following (bolding by the author):

5.1.1 Purpose

The purpose of the rural zone code is to:

- Ensure appropriately sized lots, being predominantly very large lots, display rural and **landscape character** and provide for a wide range of rural uses including cropping, intensive horticulture, intensive animal industries, animal husbandry, grazing, animal keeping and other primary production activities.
- Provide opportunities for non–rural uses that are compatible with agricultural and rural activities, and the **landscape character** of the rural area where they do not compromise the long–term use of the land for rural purposes.
- Protect or manage **significant natural features**, resources, and processes, including the capacity for primary production and extractive industry in designated areas.

5.1.2 Assessment benchmarks

PO7 (Amenity)

- Development does not adversely impact on the amenity of the surrounding rural or residential land uses or rural **landscape character**.

PO10 (Land use)

Development:

- is consistent with the **rural character** of the locality
- supports the primary rural function of the zone, and
- protects rural, **natural** and **scenic values** of the locality.

PO14 (Design and amenity)

Development does not unduly impact on the existing **amenity** and **character** of the locality having regard to:

- the scale, siting and design of buildings and structures
- **visibility** from roads and other **public view points**, **screening vegetation** and **landscaping**
- the **natural landform** and **avoidance** of **visual scarring**, and
- vibration, odour, dust, spray drift and other emissions.

5.2 Gladstone Regional Council – Scenic Amenity Overlay Code

A minor section of the Project site (Lot 5 on FD112) is within the Gladstone Regional Council - Scenic Amenity Overlay Code. Key clauses relating to landscape and visual amenity include the following (bolding by the author):

5.2.1 Purpose

- The purpose of the Scenic Amenity Overlay Code is to ensure that development in areas of high scenic amenity is sited and designed to **minimise adverse impacts** on those **scenic amenity** values.

- The purpose of the code will be achieved through the following overall outcomes:
    - Development **avoids** areas of **high scenic amenity**, or, is sited and designed to **minimise the impact** on the **scenic qualities** of the area to the maximum extent possible.
    - The **scenic qualities** of headlands, landmarks and lookouts are **not diminished** by inappropriate development.
    - Development **avoids or minimises** adverse impacts on the **scenic amenity** of important **views** and vistas.

Note—For the purpose of this code 'scenic amenity' is defined as 'a measure of the relative contribution of each place in the landscape to the collective appreciation of open space as viewed from places that are important to the public'.

5.2.2 Assessment benchmarks

PO1 / AO1 (siting of development)

- Any buildings or structures are sited to **minimise** the **impact** on the **natural landscape** and **topographical** features.
- Any buildings or structures are **not located** on **ridgelines**.

PO2 (siting and design of development)

- Development is **visually integrated** with the **landscape** elements to maintain or enhance the **landscape** and **scenic amenity** values.
- Note—The scenic amenity values of and visible from the land must be assessed and confirmed in a Scenic Amenity Assessment report prepared by a suitably qualified and experienced person. The report is to address strategies and design responses in order to demonstrate compliance with this performance criterion.

PO3 (siting and design of development)

The building design:

- **minimises visual impact** and prevents buildings from dominating the natural landscape
- is **compatible** with the **natural characteristics** of the area, and
- avoids **skyline intrusion**.

PO7 (visibility of development)

- Development visible from identified significant **viewer locations** does not adversely impact upon significant **views** and **landscape** and **scenic amenity** values.

5.3 Gladstone Regional Council – Landscaping Code

In accordance with the Planning Scheme, a Renewable Energy Facility must be assessed against the Landscaping Code. Key clauses relating to landscape and visual amenity include the following (bolding by the author):

5.3.1 Purpose

- The purpose of the landscape code is to ensure landscaping in both the private and public domain:
    - Complements built form, **topography** and existing **landscape elements**.
    - Enhances the **visual appeal** and local identity of different places throughout the region.
- The purpose of the code will be achieved by the following overall outcomes:
    - Landscape design is used to **integrate** the **natural** and **built form** elements of the site and the locality.
    - Landscaping is used for **screening** to **soften** built form, **mitigate** adverse **aesthetic** impacts, improve amenity and provide privacy.

- Mature on–site **vegetation** is **retained**, **protected** and **integrated** into the site design wherever practicable.

5.3.2 Assessment benchmarks

PO5 (general landscape design and works)

- Wherever possible, landscape design facilitates the **retention** and **integration** of mature **existing vegetation**, both within and external to the site.

PO6 (landscaping along boundaries and edges)

- Planting and landscape elements along boundaries and edges assist in:
  - protecting local **views**, **vistas** and **sightlines**
  - enhancing the **visual appearance** of the built form

5.4 Summary of legislation and policy context

The review of the legislation and policy context has revealed several clauses relating to the protection of landscape and visual amenity within Gladstone Regional Council. These include the requirement for development to visually integrate with natural topographical features and to avoid adverse impacts to key scenic view lines from prominent locations. Adverse impacts may include disruption of views to ridgelines or siting of developments on ridgelines and major visual modifications to natural topographical features. Vegetation removal and visual scarring should also be avoided. Where avoidance is not feasible, measures should be undertaken to remedy such impacts such as screening vegetation and landscaping. This should be done in such a way that views towards topographical features and landscape elements are preserved where possible.

6. Existing landscape and visual context

The existing landscape in the central part of the study area is characterised by large expanses of flat to gently undulating farmland interspersed with creeklines and farm dams. Vegetation consists primarily of established native trees located along water courses, roads and property boundaries. Vegetation also occurs as scattered trees across private allotments and occasionally in dense groups. Buildings are located sporadically, consisting of farm homesteads and associated sheds. There is an existing electrical substation located along Burgess Road approximately 160 m northwest of the intersection of Burgess Road and Blackman Gap Road. Dirt and gravel local and private access roads are also a characteristic feature of the landscape. Hilly forest can be observed immediately to the west of the Project. The town centre of Miriam Vale is located approximately 4 km northeast of the Project. The area between the Project and Miriam Vale is occupied by numerous bushland blocks containing dense stands of established native trees.

Figure 6–1 shows the general configuration of Landscape Character Types (LCTs) within the study area. Further details on these LCTs have been provided in the following sections.

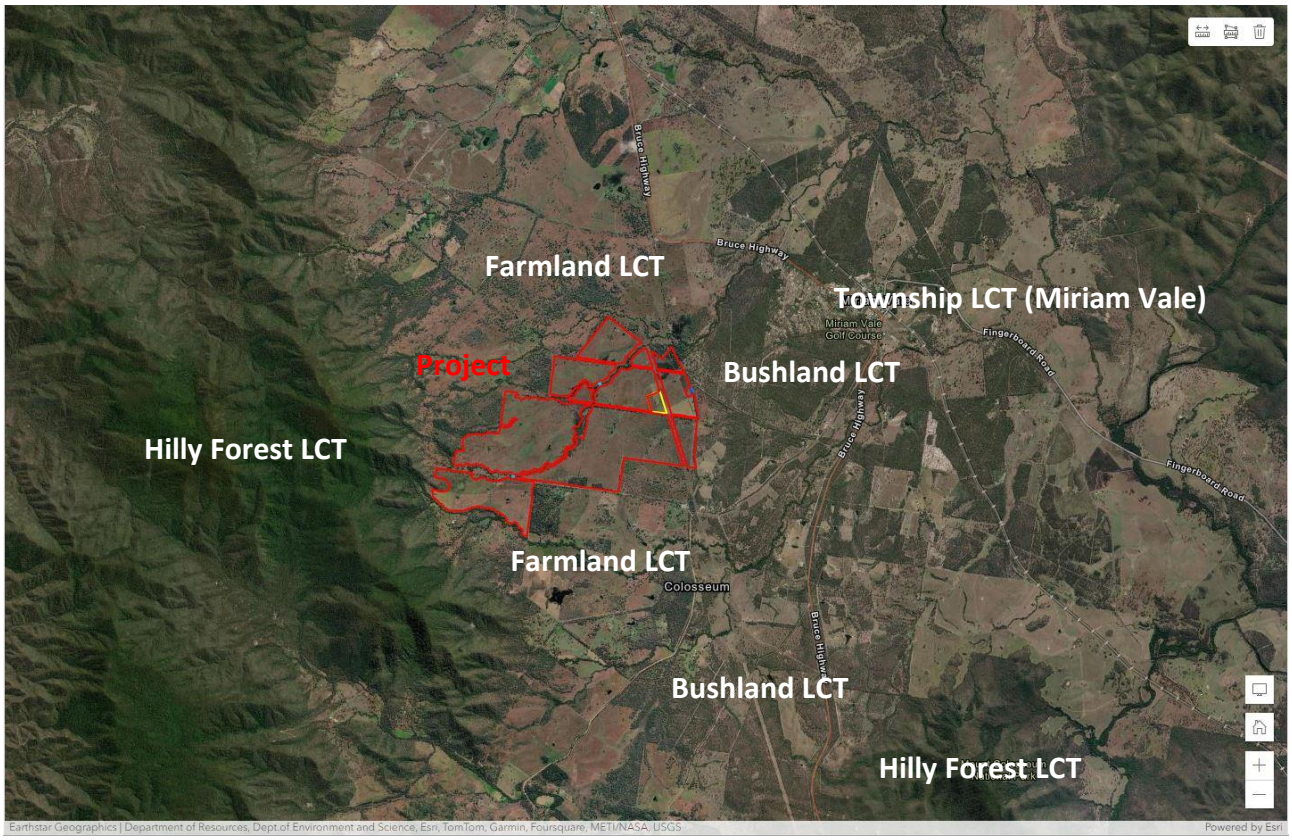

Figure 6–1: Landscape character types within the study area

6.1 Farmland LCT

Farmland within the study area consists of large expanses of flat to gently undulating land which has been historically cleared for grazing and other agricultural purposes. Vegetation is typically concentrated along property boundaries, roadsides, creek lines and watercourses, with scattered trees and isolated groups of trees also a characteristic feature. There are occasional signs of human made modifications to the landscape such as agricultural sheds for housing machinery, isolated dwellings, fence lines, gates, cattle grids, dams, water storage tanks and private access tracks. It is a landscape which has undergone a process of continual change since European settlement. However, it also has scenic amenity value in many areas, with dramatic mountainous backdrops providing a contrast to the generally flat terrain. This is provided the mountains are visible through vegetation.

Figure 6–2 shows a view of Farmland LCT from Reedbed Road, approximately 4.8 km northwest of the Project. Hilly Forest LCT is also visible in the background in the image. Figure 6–3 shows a view of an existing electrical substation located along Burgess Road, approximately 700 m south of the Project.

Figure 6–2: Farmland and Hilly forest LCTs

Figure 6–3: Existing electrical substation

6.2 Bushland LCT

Bushland is characterised by dense stands of established native trees and understorey species. It is a landscape which is typically sensitive to visual modifications such as vegetation clearance. However, it can also assist with minimising or eliminating visual impact by impeding views of a development beyond it. Within the study area, bushland is most common between the Project and the township of Miriam Vale. It also commonly occurs along Bruce Highway, to the south of Miriam Vale. Figure 6–4 shows a view of Bushland LCT from Cawthrays Road, approximately 360 m east of the Project.

Figure 6–4: Bushland LCT from Cawthrays Road

6.3 Hilly Forest LCT

To the west, south and southeast of the Project are numerous outstanding geographical formations associated with Bulburin National Park and Mount Colosseum National Park, among others. The steep slopes associated with these hilly forested areas have historically made it difficult for agriculture and other large-scale modifications to the landscape. They have therefore retained a densely vegetated, naturalistic appearance. These dynamic landforms are a key contributor to the scenic amenity of the region. No viewing decks or picnic areas to capitalise on views of these features were observed during the site visit, however. In addition, no hiking trails to raised vantage points were noted, therefore elevated views of the Project from these ridgelines are highly unlikely if not impossible. Figure 6–5 shows a view of Hilly Forest LCT to the west of the Project from Mossman Road.

Figure 6–5: Hilly Forest LCT

6.4 Township LCT

Miriam Vale is the only substantial population centre within the study area. The town centre is located approximately 4 km northeast of the Project. The Township LCT comprises developed areas associated with Miriam Vale. This includes the main commercial precinct along Roe and Blomfield Streets, which are orientated northwest to southeast, and surrounding residential areas. Buildings within the commercial centre are typically single storey, detached buildings of weatherboard construction. Vegetation along the main street comprises a mix of native and exotic tree species occurring as isolated specimens along the northern side of the road and within recreation reserves.

Residential areas close to the town centre comprise single detached homes within typical suburban blocks. Vegetation mainly comprises native and exotic tree species along roadsides and within private allotments. To the west of the town centre, there are more generous sized rural residential allotments within a bush setting. These are mainly located along Messmate Drive and interconnecting roads.

Key recreational areas within the town include Miriam Vale Golf Course, which is to the south of the town and Lions Park, located along Blomfield Street. Views toward the Project and extended views across the broader landscape from Miriam Vale are limited by intervening terrain and vegetation.

Figure 6–6 shows a view of Township LCT, which is a view southeast along Blomfield Street, Miriam Vale.

Figure 6–6: Township LCT (Miriam Vale)

6.5 Summary of landscape and visual context

Key landscape and visual values within the study area include the ridgelines to the west of the Project, comprising Hilly Forest LCT. These provide a scenic backdrop from many vantagepoints. To a lesser extent, Farmland LCT also contributes to scenic amenity, even though it is a heavily modified landscape with numerous human made elements. Bushland contributes to scenic amenity to a moderate extent, however it tends to impede views across the landscape due to intervening vegetation. The Township LCT would be moderately sensitive to visual changes in the landscape given it is a built-up environment which is undergoing a process of continual change. However, observers and residents would still have a sense of attachment to the visual character of the town and how it may change in future. Nevertheless, views of the Project from the township of Miriam Vale is highly improbable due to intervening terrain, vegetation and buildings.

Table 6–1 shows the sensitivity of each LCT to visual changes.

Table 6–1: Sensitivity of LCT to visual changes

LCT	Sensitivity
Farmland LCT	Medium
Bushland LCT	Medium
Hilly Forest LCT	High
Township LCT	Medium

7. Visual impact assessment

The assessment of visual impact follows a process of evaluating a range of publicly accessible locations with a potential view of the Project. By assessing a representative range of viewpoints that are at different distances and directions from the Project and from a range of LCTs, one can evaluate the visual impact of the Project on the broader landscape as a whole.

Each viewpoint has been assessed using combined ratings of:

- The sensitivity of the landscape to visual changes from the viewpoint
- The magnitude of visual changes that would be brought about by the development.

Table 7–1 shows further details on the way in which this is carried out. Where applicable, commentary will be provided on the differences in the level of visual impact for each of the separate Project components, namely the Solar Farm and Substation. The Inverter stations will be considered as part of the Solar Farm.

Table 7–1 Evaluating Visual Impact

VISUAL IMPACT ASSESSMENT			Magnitude of change in views caused by development			
			Dominant change	**Considerable change**	**Noticeable change**	**Barely perceptible change ***
			Major changes in view, typically at close distances and/or affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of view.	Clearly perceptible changes in views, typically at intermediate distances and/or resulting in either a distinct new element in a significant part of the view, or a wider ranging, less concentrated change across a wider area.	Minor changes in views typically at longer distances or visible for a short duration, and/or are expected to blend in with the existing view to a moderate extent.	Change which is barely visible, typically at a very long distance and/or visible for a very short duration, and/or are expected to blend with the existing view.
Sensitivity of viewpoints to proposal	**High**	**Indicator** Large numbers of viewers or those with primary interest and prolonged viewing opportunities such as residents and users of attractive and/ or well-kept recreational areas. Views from a regionally important location such as a scenic lookout whose interest is specifically focussed on a scenic landscape.	**Major**	**Moderate to Major**	**Moderate**	**Negligible to Minor**
	Medium	Medium numbers of residents and moderate numbers of visitors with an interest in their environment e.g. visitors to State Forests, including bush walkers, horse riders, trail bikers. Larger numbers of travellers with an interest in their surroundings.	**Moderate to Major**	**Moderate**	**Minor to Moderate**	**Negligible to Minor**
	Low	Small number of visitors with a passing interest in their surroundings e.g., those travelling along principal roads. Viewers whose interest is not specifically focussed on the landscape e.g., workers, commuters. Landscape is highly modified or commonly occurring	**Moderate**	**Minor to Moderate**	**Minor**	**Negligible to Minor**
	Negligible	Very occasional numbers of viewers with a passing interest in their surroundings e.g., those travelling along minor roads e.g., those travelling along minor routes. Highly degraded landscape where the Project would be an unnoticeable addition.	**Minor to Moderate**	**Minor**	**Negligible to Minor**	**Negligible**

* If ***no*** **changes** would be perceptible an overall visual impact rating of **Negligible** would apply.

Figure 7–1 shows the viewpoint (VP) locations that were assessed for visual impact as a representative sample of all locations documented during the site visit. These locations have been selected to show a worst-case scenario or locations from key viewing areas, such as Bruce Highway and Miriam Vale.

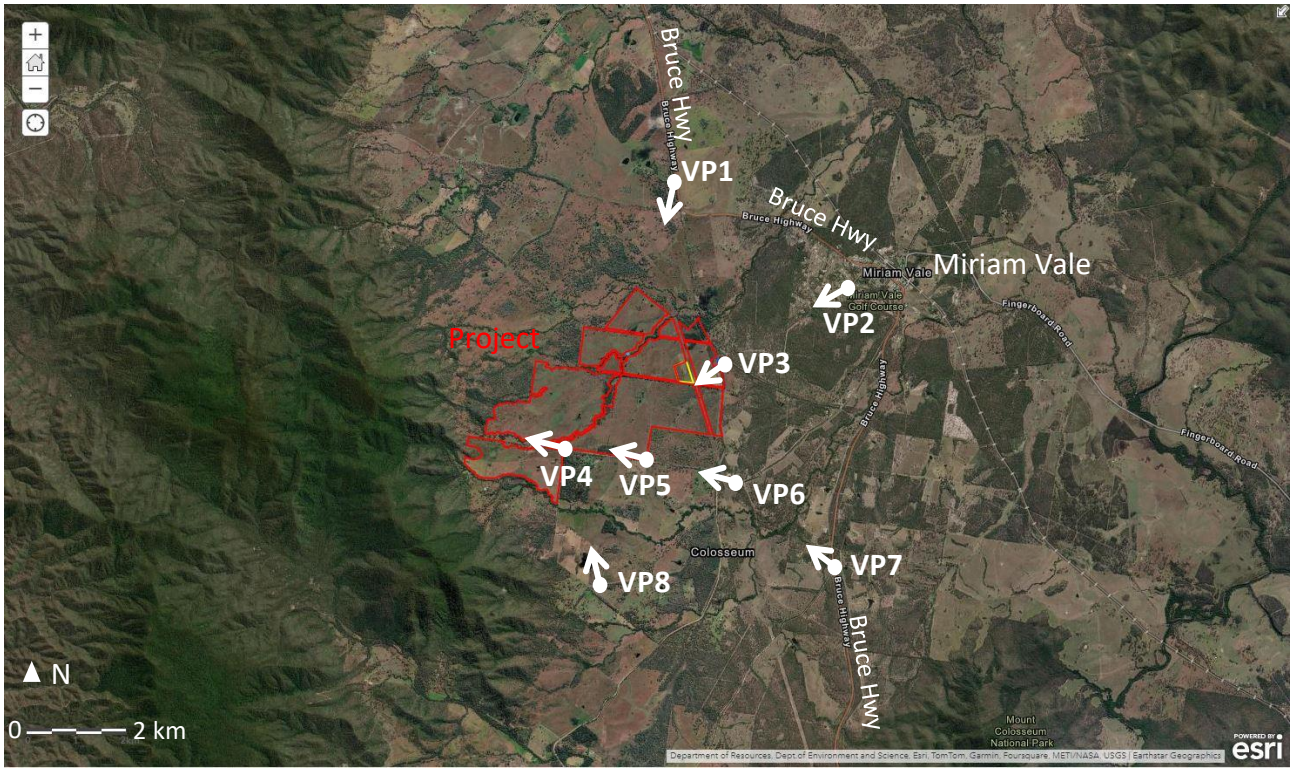

Figure 7–1: Viewpoint locations

Photomontages were prepared from Viewpoint 3 and Viewpoint 4 and these have been included in **Appendix A**. The following sections provide an assessment of visual impact from these Viewpoints.

7.1 Viewpoint 1 – Bruce Highway #1

Figure 7–2 shows a view toward the Project. The location description is provided in Table 7–2 and the assessment is provided in Table 7–3.

Figure 7–2: View towards the project from Viewpoint 1 – Bruce Highway #1

Table 7–2: Viewpoint 1 information

Viewpoint information	
Location description	Bruce Highway, approximately 2.3 km northeast of the Project
Coordinates	24° 18' 41"S, 151° 31' 07"E
View direction	South
Existing conditions	This location is at the top of a crest on approach south towards Miriam Vale. The forested ridgelines associated with Mount Colosseum is visible to the left of the image. Extensive roadside vegetation and bushland inhibits views toward the Project.
Expected visual change	The Project would not be visible from this location (all components).

Table 7–3: Assessment of visual impact – Viewpoint 1

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Medium	The view is characterised primarily by Bushland with minor portions of Hilly Forest also visible.
Magnitude of change	No change	The Project would not be visible (all components).
Visual impact	**Negligible**	The Project would not be visible (all components).

7.2 Viewpoint 2 – Miriam Vale

Figure 7–3 shows a view toward the Project. The location description is provided in Table 7–4 and the assessment is provided in Table 7–5.

Figure 7–3: View towards the project from Viewpoint 2 – Miriam Vale

Table 7–4: Viewpoint 2 information

Viewpoint information	
Location description	Messmate Drive, Miram Vale, approximately 3 km northeast of the Project
Coordinates	24° 19' 48"S, 151° 33' 09"E
View direction	Southwest
Existing conditions	This location is on a rural residential road within the township of Miriam Vale. Extensive roadside vegetation and bushland inhibits views toward the Project.
Expected visual change	The Project would not be visible from this location (all components).

Table 7–5: Assessment of visual impact – Viewpoint 2

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Medium	The view is characterised primarily by Bushland and Township with minor portions of Hilly Forest also visible.
Magnitude of change	No change	The Project would not be visible (all components).
Visual impact	**Negligible**	The Project would not be visible (all components).

7.3 Viewpoint 3 – Cawthrays Road

Figure 7–4 shows a view toward the Project. The location description is provided in Table 7–6 and the assessment is provided in Table 7–7.

Figure 7–4: View towards the Project from Viewpoint 3 – Cawthrays Road

Table 7–6: Viewpoint 3 information

Viewpoint information	
Location description	Cawthrays Road, at the northeastern site boundary and proposed alternative access location
Coordinates	24° 20' 41"S, 151° 31' 37"E
View direction	Southwest
Existing conditions	This location is at an infrequently used dirt road which provides access to various private properties in the area. Views toward the Project mainly comprise Farmland with Hilly Forest providing a dramatic backdrop. It is noted that extensive roadside vegetation inhibits most views across the landscape apart from a few locations such as this.
Expected visual change	The Solar Farm would be visible in the middle distance but would not appear above the ridgelines or interrupt views of the Hilly Forest. The Substation would be located to the right of the image but would be partially concealed by vegetation. A Photomontage which supports these statements has been prepared from this location and is included in **Appendix A**.

Table 7–7: Assessment of visual impact – Viewpoint 3

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Low	Although the presence of Hilly Forest has scenic amenity value, this location is on an infrequently used local road.
Magnitude of change	Noticeable change	Project would be partially concealed by vegetation (all components).
Visual impact	**Minor**	Does not significantly impact on visual amenity (all components).

7.4 Viewpoint 4 – Burgess Road #1

Figure 7–5 shows a view toward the Project. The location description is provided in Table 7–8 and the assessment is provided in Table 7–9.

Figure 7–5: View towards the Project from Viewpoint 4 – Burgess Road #1

Table 7–8: Viewpoint 4 information

Viewpoint information	
Location description	Burgess Road at the intersection of Mossman Road
Coordinates	24° 21' 36"S, 151° 29' 47"E
View direction	West
Existing conditions	This location is at an infrequently used dirt road which provides access to various private properties in the area. Views toward the Project mainly comprise Farmland with Hilly Forest providing a dramatic backdrop. It is noted that extensive roadside vegetation inhibits most views across the landscape apart from sections of the road such as this.
Expected visual change	The Solar Farm would be visible in the middle distance but would not appear above the ridgelines or interrupt views of the Hilly Forest. The Substation would not be visible from this location due to intervening terrain and vegetation. A Photomontage which supports these statements has been prepared from this location and is included in **Appendix A**.

Table 7–9: Assessment of visual impact – Viewpoint 4

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Low	This location is on an infrequently used local road.
Magnitude of change	Noticeable change	The Project would be visible but would not significantly affect scenic amenity of the ridgelines in the distance.
Visual impact	**Minor**	The Substation would have a **negligible** impact.

7.5 Viewpoint 5 – Burgess Road #2

Figure 7–6 shows a view toward the Project. The location description is provided in Table 7–10 and the assessment is provided in Table 7–11.

Figure 7–6: View towards the Project from Viewpoint 5 – Burgess Road #2

Table 7–10: Viewpoint 5 information

Viewpoint information	
Location description	Burgess Road, approximately midway between Mossman Road and Blackman Gap Road
Coordinates	24° 21' 42"S, 151° 30' 45"E
View direction	West
Existing conditions	This location is at an infrequently used dirt road which provides access to various private properties in the area. Views toward the Project mainly comprise Farmland with some Hilly Forest visible between the vegetation.
Expected visual change	The Solar Farm would be visible in the foreground and middle distance to the right but is not expected to appear above the ridgelines or interrupt views of the Hilly Forest. Vegetation clearance may result in more of the ridgelines being visible from this location. The Substation would not be visible from this location due to intervening terrain and vegetation.

Table 7–11: Assessment of visual impact – Viewpoint 5

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Low	This location is on an infrequently used local road.
Magnitude of change	Noticeable change	The Project would be visible but would not significantly affect scenic amenity of the ridgelines in the distance.
Visual impact	**Minor**	The Substation would have a **negligible** impact.

7.6 Viewpoint 6 – Blackman Gap Road

Figure 7–7 shows a view toward the Project. The location description is provided in Table 7–12 and the assessment is provided in Table 7–13.

Figure 7–7: View towards the Project from Viewpoint 6 – Blackman Gap Road

Table 7–12: Viewpoint 6 information

Viewpoint information	
Location description	Blackman Gap Road, approximately 900 m southeast of the Project
Coordinates	24° 21' 56"S, 151° 31' 47"E
View direction	West
Existing conditions	Blackman Gap Road is a minor bitumen Road connecting the locality of Colosseum with Bruce Highway. This elevated section of road is one of few places that allow filtered views across the landscape and toward the Project. Views toward the Project mainly comprise Farmland with some Hilly Forest visible between the vegetation.
Expected visual change	All Project components would not be visible from this location due to intervening terrain and vegetation.

Table 7–13: Assessment of visual impact – Viewpoint 6

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Medium	The view is characterised primarily by Bushland with portions of Hilly Forest also visible to a moderate extent.
Magnitude of change	No change	The Project would not be visible (all components).
Visual impact	**Negligible**	The Project would not be visible (all components).

7.7 Viewpoint 7 – Bruce Highway #2

Figure 7–8 shows a view toward the Project. The location description is provided in Table 7–14 and the assessment is provided in Table 7–15.

Figure 7–8: View towards the Project from Viewpoint 7 – Bruce Highway #2

Table 7–14: Viewpoint 7 information

Viewpoint information	
Location description	Bruce Highway, approximately 3.5 km southeast of the Project
Coordinates	24° 22' 53"S, 151° 33' 00"E
View direction	Northwest
Existing conditions	This location is at the intersection of Bruce Highway and Kiora Road. Extensive roadside vegetation and Bushland inhibits views toward the Project.
Expected visual change	The Project would not be visible from this location (all components).

Table 7–15: Assessment of visual impact – Viewpoint 7

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Medium	The view is characterised primarily by Bushland.
Magnitude of change	No change	The Project would not be visible (all components).
Visual impact	**Negligible**	The Project would not be visible (all components).

7.8 Viewpoint 8 – Vanderwolfs Road

Figure 7–9 shows a view toward the Project. The location description is provided in Table 7–16 and the assessment is provided in Table 7–17.

Figure 7–9: View towards the Project from Viewpoint 8 – Vanderwolfs Road

Table 7–16: Viewpoint 8 information

Viewpoint information	
Location description	Vanderwolfs Road, approximately 1.8 km southeast of the Project
Coordinates	24° 23' 04"S, 151° 30' 08"E
View direction	Northwest
Existing conditions	This location is at an infrequently used dirt road which provides access to various private properties in the area. Views toward the Project mainly comprise Farmland with Hilly Forest providing a dramatic backdrop. It is noted that roadside vegetation and terrain inhibits most views across the landscape apart from limited sections of the road such as this.
Expected visual change	The Project would not be visible from this location due to terrain (all components).

Table 7–17: Assessment of visual impact – Viewpoint 8

Assessment criteria	Value	Supporting comments
Viewpoint sensitivity	Medium	The view is characterised primarily by Farmland with some Hilly Forest.
Magnitude of change	No change	The Project would not be visible (all components).
Visual impact	**Negligible**	The Project would not be visible (all components).

7.9 Summary of visual impact

Table 7–18 provides a summary of visual impact of the Project from the Viewpoint locations assessed.

Table 7–18: Sensitivity of LCT to visual changes

Viewpoint	Visual Impact (Solar Farm)	Visual Impact (Substation)
Viewpoint 1 – Bruce Highway #1	Negligible	Negligible
Viewpoint 2 – Miriam Vale	Negligible	Negligible
Viewpoint 3 – Cawthrays Road	Minor	Minor
Viewpoint 4 – Burgess Road #1	Minor	Negligible
Viewpoint 5 – Burgess Road #2	Minor	Negligible
Viewpoint 6 – Blackman Gap Road	Negligible	Negligible
Viewpoint 7 – Bruce Highway #2	Negligible	Negligible
Viewpoint 8 – Vanderwolfs Road	Negligible	Negligible

The locations assessed represent, as far as practical, a worst-case scenario in terms of visual impact. The visual impact of the Project would be negligible from most locations given intervening terrain and vegetation. The Project was assessed as having a minor visual impact at locations directly adjacent to the Project site. This is due to the relatively low profile of the Solar Farm in comparison to the elevated ridgelines of the Hilly Forest. Existing roadside and other vegetation conceal the view of the Substation from most other locations that were assessed.

8. Glare impact assessment

The following sections provide a qualitative assessment of the potential impact of glare from sunlight reflecting from the solar panels. The assessment has been undertaken in consideration of public viewing locations only. Private residences were out of scope and not considered. Emphasis was placed on movement networks such as road, rail and air traffic as key receptors of glare impact.

8.1 Reflectivity

The purpose of a solar panel is to absorb as much light as possible for conversion to electricity. Any light reflected from solar panels would reduce their efficiency and is therefore avoided by design. Studies in Germany and the USA, based on existing solar farms, indicate that solar panels generally emit less glare than many other elements common in the environment. The solar panels are therefore not expected to noticeably alter the amount of reflected and indirect sunlight currently within the site and surrounding area. Figure 8–1 shows a comparative reflection analysis of various materials and surfaces common in the landscape. Solar panels are generally far less reflective than still water such as farm dams and lakes for instance.

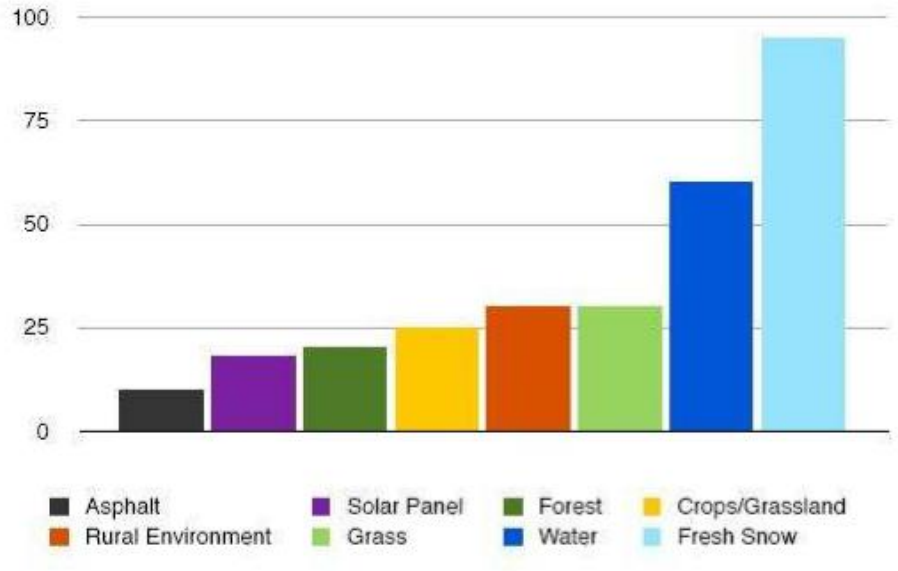

Figure 8–1: Comparative reflection analysis (Source: Solar Choice)

Furthermore, the solar panels of the Project are mounted on a tracking system designed to angle the panels toward the sun throughout the day. This further reduces the amount of sunlight being reflected onto adjacent areas, resulting in less glare impacts.

8.2 Road network

The only major road within the study area is Bruce Highway, which is generally orientated in a north to south direction and located on the eastern side of the Project. The visual impact assessment has shown that there will be no visibility of the Project from anywhere along Bruce Highway due to intervening terrain and vegetation. The only roads from which the Project would be visible are local dirt roads which service private properties and minor localities. Such roads include Cawthrays Road, Burgess Road and Mossman Road. Some glare effects may be witnessed from these local roads from certain angles and at certain times of the day. However, these effects are expected to be minor and may be mitigated through screen planting if required.

8.3 Rail network

The only railway line within the study area is the North Coast Line, which passes through Miriam Vale. Site observations indicated that the Project would not be visible from the railway line due to terrain and vegetation. For this reason, glare impacts to the railway line would be Nil.

8.4 Air traffic

Gladstone airport, being the closest major airport, is located approximately 60 km to the northwest of the Project. Aircraft passing over the Project would be at such an altitude that glare effects would not be an issue. Large water bodies such as lakes and the ocean would have far greater glare effects. In addition, there are several precedents, particularly in the USA, of solar farms being successfully installed directly adjacent to airports without causing glare issues. For these reasons, glare effects on air traffic would be Negligible to Nil.

8.5 Summary of glare impact assessment

Glare impact from the Project overall would be Negligible given the minimal visibility of the Project from most locations within the study area. Solar panels are also designed to absorb rather than reflect sunlight. Furthermore, there are many surfaces and features within the existing landscape that have the capacity to create greater glare effects than the Project.

9. Mitigation measures

The following mitigation measures may assist in reducing visual impact during the construction and operational phases of the project.

9.1 Construction

Recommended mitigation measures to reduce visual impact during construction include:

- Landscaping and rehabilitation work on disturbed areas are undertaken as soon as possible
- Using locally endemic vegetation species in rehabilitation that are known to be well adapted to the area and soils
- Minimising vegetation clearing at sensitive sites and elsewhere as far as practical
- Native vegetation near Project site boundary should be cordoned off to minimise the risk of accidental disturbance
- Minimising temporary hoarding of barriers, traffic management, signage and construction materials
- Restricting lighting of compounds and worksites to low impact lighting
- Locating storage facilities away from residential areas
- Storing materials and machinery neatly during the works, and where possible behind solid hoardings
- Maintaining access roads to site compounds and works areas as free of dust and mud as far as reasonably practicable
- Access tracks should be constructed from locally sourced gravel that matches the colour of the existing site surface as far as practicable
- Vehicles should remain on designated paths during construction to avoid degradation of the landscape
- Removing all construction materials to a suitable location upon completion of construction. Construction equipment and infrastructure should be demobilised from site as soon as practicable and all unnecessary project flagging and signage should be removed and disposed of at the completion of construction.

9.2 Operation

Recommended mitigation measures to reduce visual impact during operation include:

- Design and siting of above ground structures to achieve the best fit with the existing contours, vegetation and earthworks. This would assist with screening and integrating the Project within the existing landscape
- Underground cabling would be used where possible
- Screening planting and encouraging natural regeneration around the Project site, whilst maintaining views of key landscape features. In these instances, low growing shrubby vegetation would be preferred over tall trees
- Considering the form and finish of structures, including minimising the size of structures where possible, using darker, earthen colours which match the surroundings and less reflective materials
- Consider the installation of interpretive signage with viewing areas toward the Project to promote tourism and sustainability values and offer a diversity of viewing experiences in the region. Figure 9–1 shows a sheltered information board located adjacent to the Windorah Solar Farm in Queensland

A Landscape mitigation plan has been prepared for the Project and is included in **Appendix B**.

Figure 9–1: Windorah Solar project interpretive sign (Source: Exploroz)

10. Conclusion

The LVIA considered the visual impact of the solar farm, ancillary infrastructure and substation components of the Project on publicly accessible locations within the study area. A qualitative assessment of glare was also undertaken, focussing on the solar farm.

Key landscape and visual values within the study area include the ridgelines to the west of the Project, comprising Hilly Forest LCT. These provide a scenic backdrop from many vantagepoints. To a lesser extent, Farmland LCT also contributes to scenic amenity, even though it is a heavily modified landscape with numerous human made elements. Bushland and roadside vegetation also contribute to scenic amenity however they tend to impede views across the landscape. There would be no views of the Project from Miriam Vale.

The viewpoint locations that were assessed were selected to show a representative sample of locations and demonstrate the worst case scenario wherever possible. Despite this, the study has found that the visual impact of the Project would be Negligible from most locations. The highest visual impact was Minor at locations directly adjacent to the Project site. This is due to the relatively low profile of the solar farm in comparison to the elevated ridgelines of the Hilly Forest. Elsewhere within the study area, views of the Project would be concealed by vegetation and terrain.

The glare impact of the Project was found to be Negligible given the minimal visibility of the Project from most locations within the study area. In addition, there are many surfaces and features within the existing landscape that have the capacity to create greater glare effects than the solar farm. Some glare effects may be witnessed from minor local roads from certain angles and at certain times of the day. However, these effects are expected to be minimal and may be mitigated through screen planting if required.

The recommended mitigation measures may assist with further visual integration of the Project into the surrounding landscape. There may also be opportunities to promote tourism and sustainability values through interpretive signage and the provision of designated viewing locations of the Project.

Given the above reasons, the Project is well sited to minimise impact to landscape and visual amenity of the site and surrounding area.

11. References

- Gladstone Regional Council Planning Scheme (accessed 20/03/2024):
  - https://www.grcplanningscheme.com.au/version-2/part-6/6-2-zone-codes/6-2-22-rural
  - https://www.grcplanningscheme.com.au/version-2/part-8/8-2-overlay-codes/8-2-11-scenic-amenity
  - https://www.grcplanningscheme.com.au/version-2/part-9/9-3-use-codes/9-3-5-landscaping
- Solar Choice, 2013, Solar farm projects near airports: Is glare an issue? (accessed 20/03/2024)
  - https://www.solarchoice.net.au/blog/solar-panels-near-airports-glare-issue/
- The Landscape Institute and Institute for Environmental Management and Assessment LIIEMA, (2013), Guidelines for Landscape and Visual Impact Assessment, Routledge 3rd Edition (GLVIA).

Appendix A

Photomontages

Photomontage Viewpoint 3 - Cawthrays Road

Existing view looking southwest from Cawthrays Road

Photomontage of Project and block model of substation. The substation has been shown in front of foreground vegetation to indicate its location.

Location:	Cawthrays Road, at the northeastern site boundary and proposed alternative access location
Coordinates:	24° 20’ 41”S, 151° 31’ 37”E
View direction:	Southwest
Panorama configuration:	4 Photos @ 50mm
Date of photography:	14/02/2024
Date of photomontage:	21/03/2024
Sheet No.	1 OF 2

Miriam Vale Solar Farm

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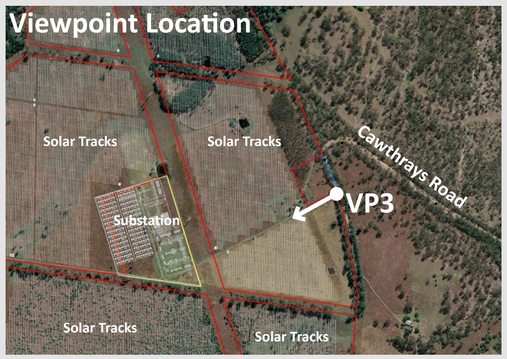

Photomontage Viewpoint 4 - Burgess Road #1

Existing view looking west from the intersection of Burgess Road and Mossman Road

Photomontage of Project

Location:	Burgess Road at the intersection of Mossman Road
Coordinates:	24° 21’ 36”S, 151° 29’ 47”E
View direction:	West
Panorama configuration:	4 Photos @ 50mm
Date of photography:	14/02/2024
Date of photomontage:	21/03/2024
Sheet No.	2 OF 2

Miriam Vale Solar Farm

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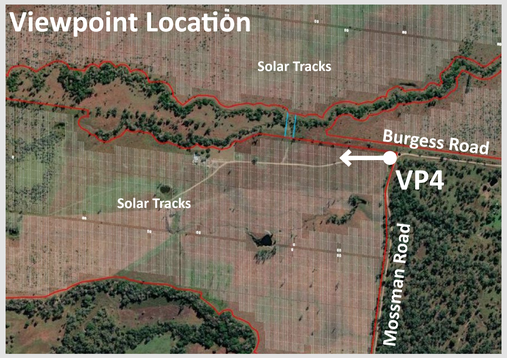
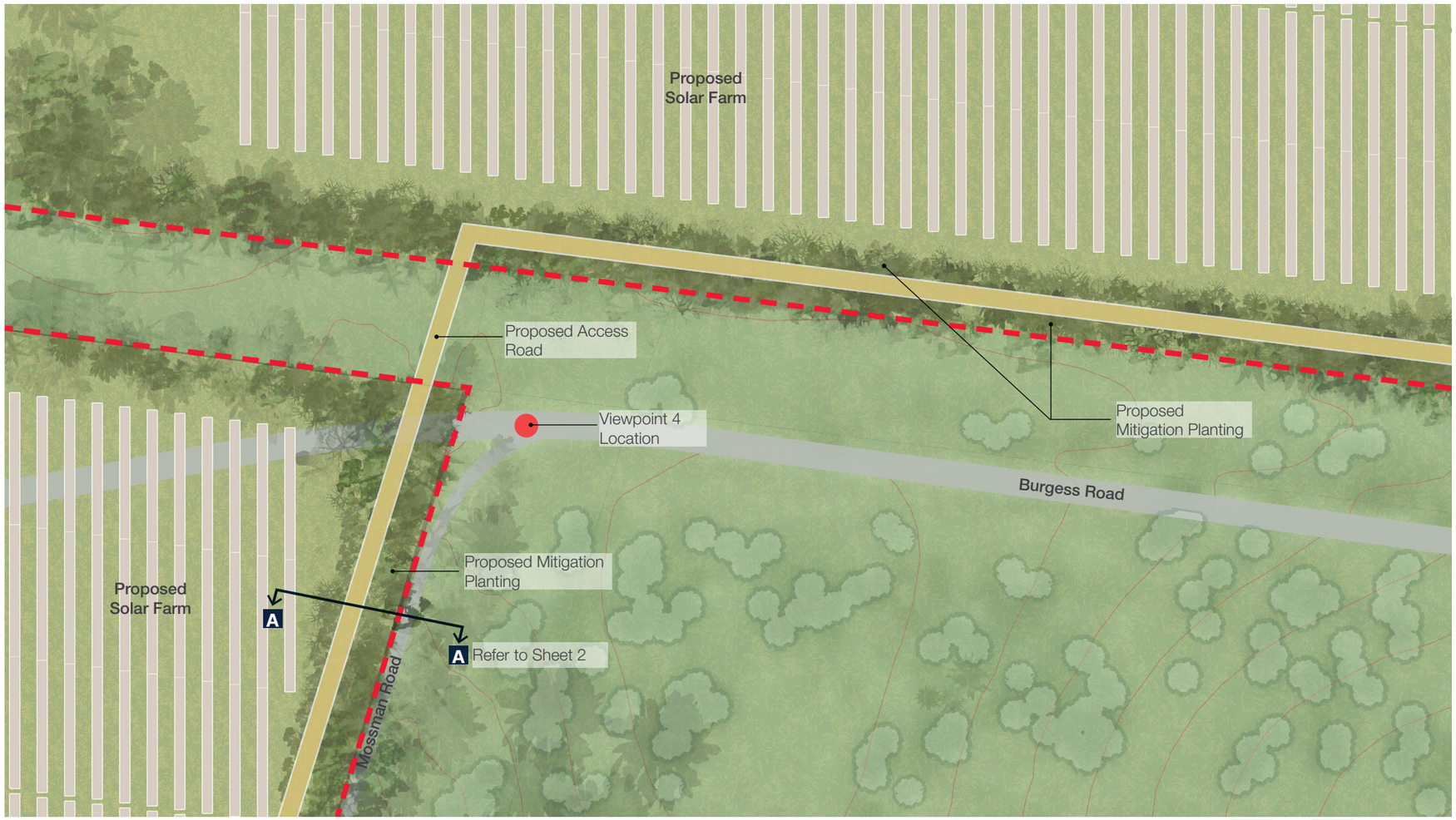


Appendix B

Landscape mitigation plan

1 Landscape Mitigation Plan - (Sample area only shown)

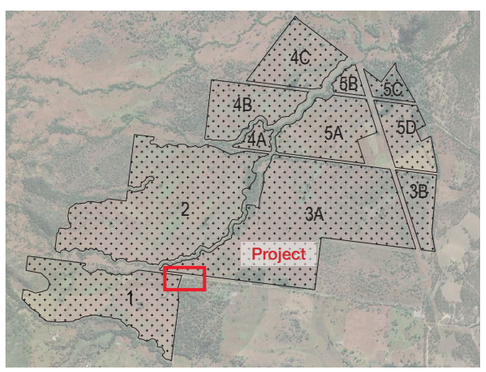


LEGEND

- Project Boundary
- 1 Metre Contours
- Existing Vegetation Group
- Existing Road
- Proposed Mitigation Planting
- Proposed Access Road

0 10 20 30 50m

KEY PLAN



Landscape Mitigation Plan Extents

PROPOSED SPECIES

Plant Species	Common Name	H x W (m)
SHRUBS & GRASS		
Baeckea virgata miniature	Miniature Baeckea	3 x 3m
Banksia oblongifolia	Fern Leaf Banksia	2 x 2m
Correa reflexa	Common Correa	1.2 x 1m
Dicanthium sericeum	Queensland Blue Grass	0.5 x 0.5m
Lomandra longifolia	Wattle Mat Rush	1 x 0.6m
Poa labillardierei	Tussock Grass	0.6 x 1m
Themeda triandra	Kangaroo Grass	0.3 x 0.2m

Note: Native plant species selected from Gladstone Regional Council Preferred Plant List

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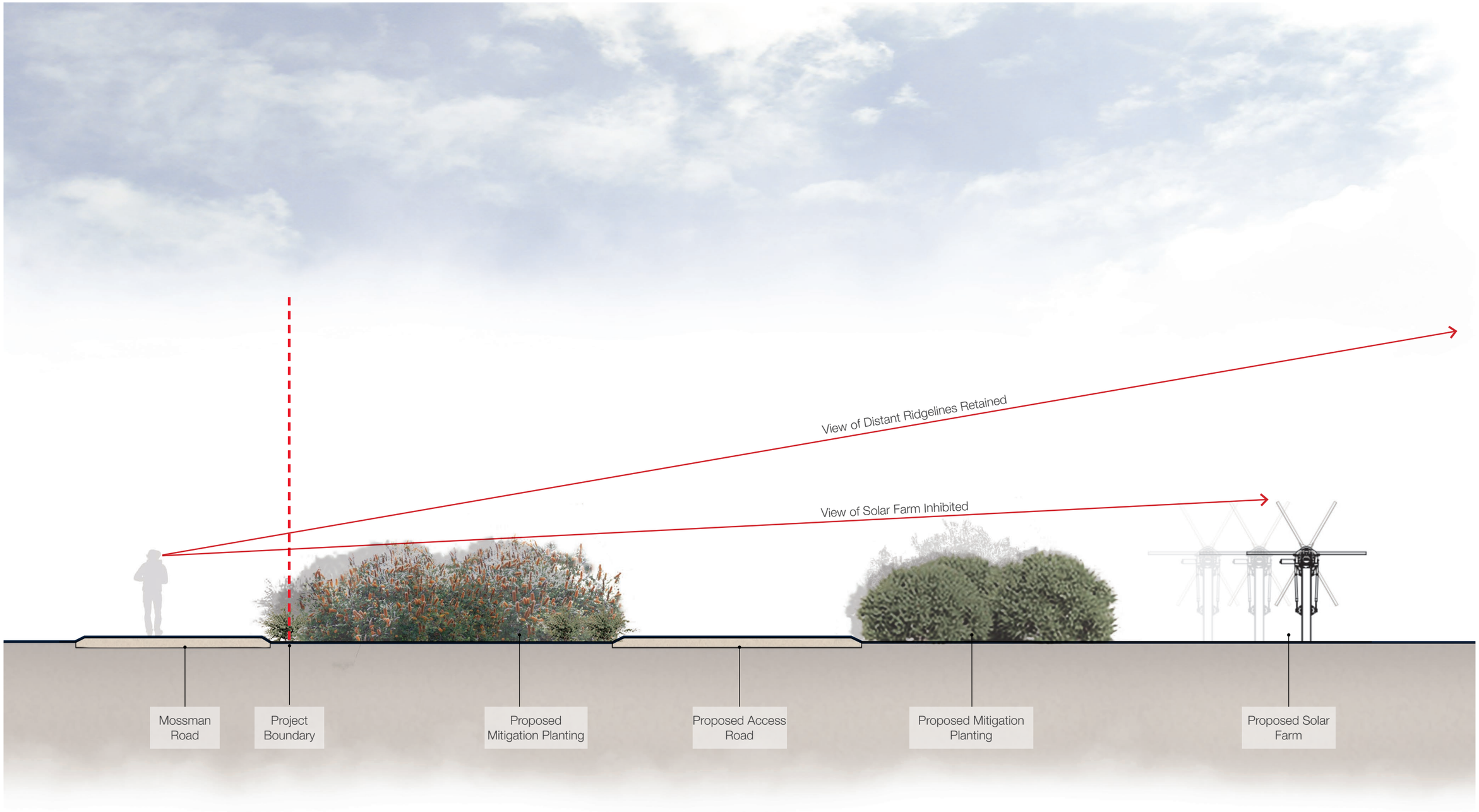
2 Section A-A



Notes: Low shrubs and grasses are proposed to screen views of the solar farm where required but maintain views to distant ridgelines.

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