



Report

Clare Solar
Farm
Development

AUSTRALIA



Planning Report for Material Change of Use Development Application

8 December 2014
42627398/2/0

Prepared for:
FRV Services Australia Pty Ltd

Prepared by URS Australia Pty Ltd



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- Appendix C Material Change of Use Proposal Plans
- Appendix D Title Searches and Registered Plans
- Appendix E Surface Water Assessment Report
- Appendix F Ecology Assessment Report
- Appendix G Glare Assessment Report
- Appendix H Planning Scheme Code

EXECUTIVE SUMMARY

URS has been engaged by FRV Services Australia Pty Ltd (FRV) to seek a Development Permit for a Material Change of Use (Use Not Defined) for the Clare Solar Farm Development (the Project). The proposed solar farm use and associated infrastructure is planned over three freehold properties located at 82 Shadforth Road, Clare QLD 4807, 124 Shadforth Road, Clare QLD 4807 and 196 Shadforth Road, Clare QLD 4807, legally described as Lot 241 SP199878, Lot 242 GS1028 and Lot 243 GS1029 respectively.

The Project will comprise the installation and operation of a solar farm that will utilise photovoltaic (PV) modules to generate electricity (with or without a battery energy storage system), inverters to convert the direct current electricity into alternating current, and a transformer to increase the voltage to a level suitable for injection into the national electricity grid via the existing Clare substation which is adjacent to the site.

The relevant site and application details are provided in Table ES 1 and ES 2 below.

Table ES 1 Location Details

Site Details			
Site Address	82 Shadforth Road, Clare QLD 4807	124 Shadforth Road, Clare QLD 4807	196 Shadforth Road, Clare QLD 4807
Tenure	Freehold	Freehold	Freehold
Real Property Description	Lot 241 SP199878	Lot 242 GS1028	Lot 243 GS1029
Registered Owner	Lyndsay George Russell Hall	Lyndsay George Russell Hall	Lyndsay George Russell Hall
Current Use	Cane Farm	Cane Farm	Cane Farm

Table ES 2 Application Details

Application Details	
Applicant	FRV Services Australia Pty Ltd C/- URS
Application Type	Development Permit – Material Change of Use (Use Not Defined)
Level of Assessment	Assessable Development (Impact Assessment)
Description of Proposal	Establishment of solar farm covering a maximum area of 300 ha.
Assessment Manager	Burdekin Shire Council
Referral agencies	Concurrence agencies: <ul style="list-style-type: none"> • Nil. Advice agencies: <ul style="list-style-type: none"> • Ergon Energy • Powerlink.
Contact Person	Alexandra Isgro Environmental Planner GPO Box 302 QLD 4001 Telephone: (07) 3243 2192 Fax: (07) 3243 2199 Email: alexandra.isgro@urs.com
Applicant Reference	42627398 20000

In support of this application, specialised stormwater and glare assessments have been undertaken to determine the likely impacts of the Project and how these impacts can be managed. A desktop ecological assessment of the site has also been completed.

Following an assessment of the proposal against the relevant provisions of the *Burdekin Shire IPA Planning Scheme 2011*, *Sustainable Planning Act 2009* and *Sustainable Planning Regulation 2009* in this Planning Report, it is considered that there are sufficient grounds to warrant its approval based on the following points:

- The solar farm will utilise PV modules to generate a clean and renewable energy
- The solar farm will represent a positive diversification of the local economy, in addition to the dominant agricultural industries in the area
- The solar farm will greatly benefit the local economy through the creation of up to 200 jobs during the construction phase, up to 5 permanent jobs during the operational phase and indirect benefits to local businesses, contractors and suppliers
- The proposed development area represents an ideal location as it is already highly disturbed through sugar cane growing uses and it directly adjoins the Clare substation
- The construction phase of the solar farm will be appropriately managed to ensure negative impacts to the surrounding environment and community are not caused
- The specialised surface water, glare and ecological assessments have determined the solar farm will not cause detrimental impacts.

Overall, the Project will not negatively impact the character, ecological values and amenity of the sites and the nearby settlement of Clare. As such it is recommended that Burdekin Shire Council, as Assessment Manager, favourably consider the application, and impose reasonable and relevant conditions on the development approval.

1 INTRODUCTION

This Planning Report has been prepared by URS on behalf of FRV Services Australia Pty Ltd (FRV) in support of a Material Change of Use (Use Not Defined) development application that is required for the proposed Clare Solar Farm Development (the Project). The purpose of this Planning Report is to provide an overview of the development, undertake a town planning assessment of the works against the relevant local and State legislation and to put forward a recommendation for approval where the proposal presents a beneficial and appropriate use for the area.

1.1 Project Overview

The Project will be established over three freehold rural properties located at 82 Shadforth Road, Clare QLD 4807 (Lot 241 SP199878), 124 Shadforth Road, Clare QLD 4807 (Lot 242 GS1028) and 196 Shadforth Road, Clare QLD 4807 (Lot 243 GS1029), within the Burdekin Shire Council area.

The main component of the Project will involve the development of a large scale, grid-connected solar farm covering a maximum area of 340 hectares (ha) over all three above listed properties. The solar farm will cover the majority of the three affected properties, excluding the set-back areas required around existing electricity transmission infrastructure, neighbouring property boundaries and road frontages. The development will comprise the construction and operation of a solar farm utilising PV modules, with or without a battery energy storage system (BESS).

Based on the preliminary design, the Project will utilise PV modules with a tracking system to ensure the modules are exposed to the optimal amount of solar irradiation every day by rotating the PV modules east to west, following the sun across the sky. Inverters housed in shipping containers will be used to convert the direct current electricity generated by the PV modules into alternating current, along with transformers, which will increase the voltage of the electricity before it is sent via underground cabling to a solar plant substation.

Depending on final design settings and economic considerations during the financing phase, the Project may also incorporate a BESS. There are a number of BESS technology options currently available on the market and at this stage of development no decision has been made to select any particular technology.

The solar plant substation will be newly built adjacent to the existing Clare substation, which is in the north-east corner of the development area, off Shadforth Road. The solar plant substation will include a step-up transformer to increase the voltage of the electricity sent out by the inverters to a level suitable for injection into the electricity grid. The connection of the new solar farm substation into the Clare substation will be via an electricity transmission line (ETL) which will run over a short distance of Lot 152 SP199878.

The final design of the Project prior to construction will confirm the plant configuration, layout and specific equipment to be used, as well as the solar farm's electricity generating capacity.

The relevant Integrated Development Assessment System (IDAS) forms for this development application are included in Appendix A and owner's consent from the registered owner of Lot 241 SP199878, Lot 242 GS1028 and Lot 243 GS1029 for the lodgement of this application is included in Appendix B. The proposed development details for each property are summarised in Table 1-1.

Table 1-1 Assessable Development Summary by Property

Location of works and ownership	Address: 82 Shadforth Road, Clare QLD 4807 Lot and Plan: Lot 241 SP199878 Tenure: Freehold	Address: 124 Shadforth Road, Clare QLD 4807 Lot and Plan: Lot 242 GS1028 Tenure: Freehold	Address: 196 Shadforth Road, Clare QLD 4807 Lot and Plan: Lot 243 GS1029 Tenure: Freehold
Description of assessable development	Material Change of Use, with following infrastructure components: <ul style="list-style-type: none"> - Solar PV modules - PV modules mounted on a tracking system - Inverters housed in shipping containers along with transformers - Batteries (to be considered) - Cabling - Solar farm substation including step-up transformer - Internal access tracks - Warehouse and O&M building - Electricity Transmission Line - Perimeter fence 	Material Change of Use, with following infrastructure components: <ul style="list-style-type: none"> - Solar PV modules - PV modules mounted on a tracking system - Inverters housed in shipping containers along with transformers - Batteries (to be considered) - Cabling - Solar farm substation including step-up transformer - Internal access tracks - Warehouse and O&M building - Electricity Transmission Line - Perimeter fence 	Material Change of Use, with following infrastructure components: <ul style="list-style-type: none"> - Solar PV modules - PV modules mounted on a tracking system - Inverters housed in shipping containers along with transformers - Cabling - Internal access tracks - Perimeter fence
Approvals triggered	Material Change of Use (Use Not Defined) under <i>Burdekin Shire IPA Planning Scheme 2011</i>	Material Change of Use (Use Not Defined) under <i>Burdekin Shire IPA Planning Scheme 2011</i>	Material Change of Use (Use Not Defined) under <i>Burdekin Shire IPA Planning Scheme 2011</i>

The proposal plans for the proposed material change of use are located in Appendix C of this Planning Report. Figure 1-1 below illustrates the location of the proposed development.

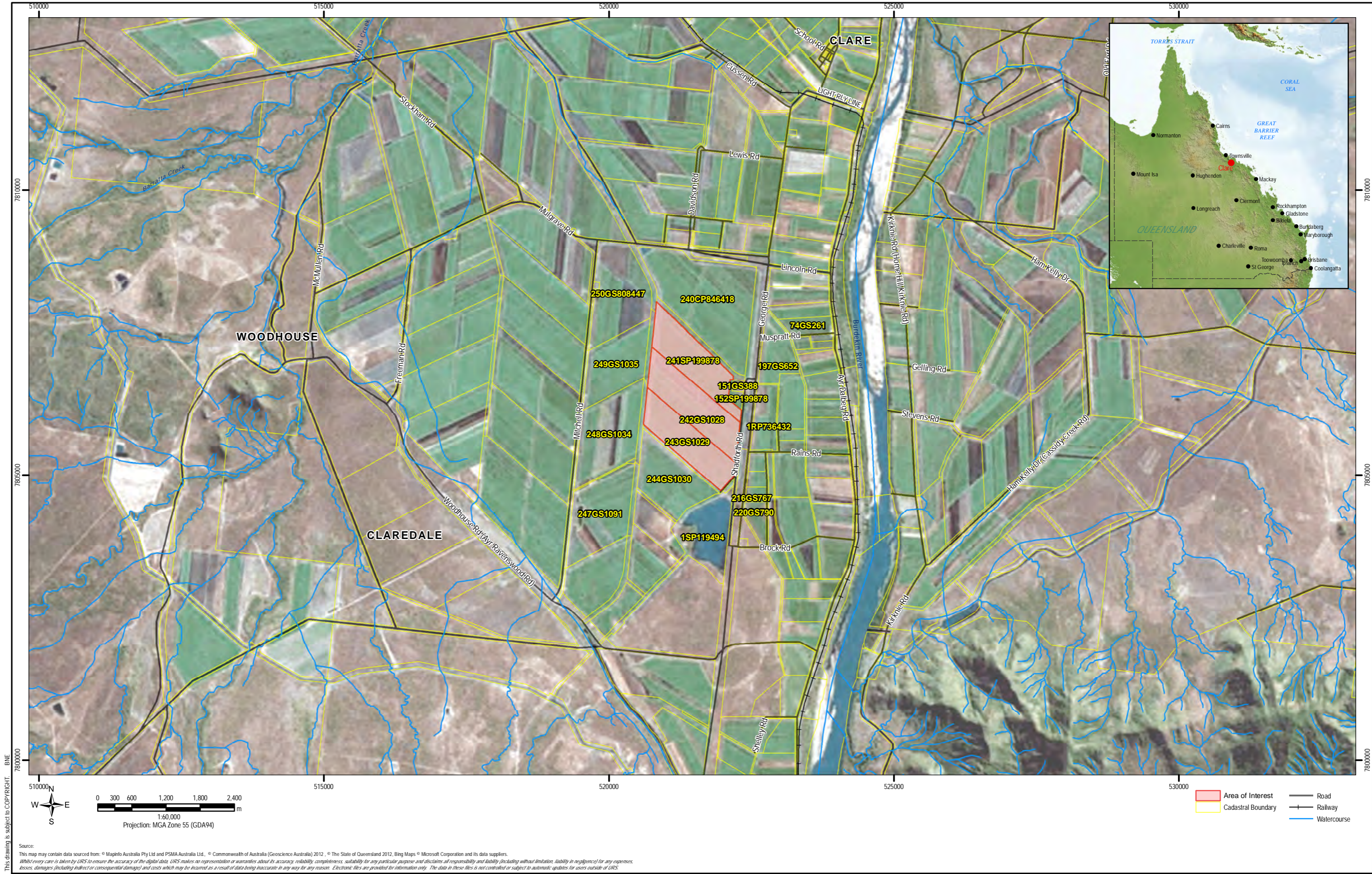
1.2 FRV and Project Drivers

FRV is a leading global company that specialises in the comprehensive management of solar assets for the generation of electricity using the sun as the source. Since being founded in 2006, FRV has developed and managed numerous large projects based on photovoltaic and

solar thermal technologies (FRV 2014). Its activities are focused on the development, construction, financing, operation and maintenance of solar plants.

Within Australia, FRV have successfully sought and obtained development approvals for large scale solar farm projects in New South Wales and the Australian Capital Territory, including Australia's largest operating solar development; Royalla Solar Farm near Canberra.

The Clare development area has been chosen by FRV as it presents very high levels of solar irradiation which will drive the effectiveness of the solar farm and the site is directly adjoining the existing Clare substation, which will reduce the costs associated with transporting the generated electricity.



FRV SERVICES
AUSTRALIA
PTY LTD

FRV QUEENSLAND SOLAR FARM DEVELOPMENT APPROVAL CONSULTANCY SERVICES

**LOCATION OF CLARE
SOLAR FARM
DEVELOPMENT**



PLANNING REPORT FOR MATERIAL CHANGE OF USE DEVELOPMENT APPLICATION

File No: 42627398-g-058.mxd

Drawn: RG

Approved: DD

Date: 05-12-2014

Figure: 1-1

Rev. A A3



1.3 Pre-lodgement Advice

The following pre-lodgement advice was obtained by URS and FRV prior to the submission of this Material Change of Use development application.

1.3.1 Pre-lodgement meeting with Burdekin Shire Council

URS and FRV representatives attended a pre-lodgement meeting with Burdekin Shire Council on the 14 October 2014 to discuss the proposal outlined within this Planning Report. The meeting was attended by Damian Delmanowicz (URS Associate Environmental Planner), Killian Wentrup (FRV Project Developer) and Shane Great (Burdekin Shire Council Planning and Development Manager).

During the meeting it was confirmed by Burdekin Shire Council that the application would be assessable against the rural zone code only within the *Burdekin Shire IPA Planning Scheme 2011* and that the car trips to be generated by the Project was to be included in the application. It was recommended by Burdekin Shire Council that the Project be called a 'renewable energy facility' to align with the new use definitions under the Queensland Planning Provisions (QPP). Council also suggested the economic benefits of the solar farm be enforced within the application to outweigh the loss of good quality agricultural land (GQAL).

No formal meeting minutes are available from this pre-lodgement meeting.

1.3.2 Pre-lodgement meeting with SARA

A State Assessment Referral Agency (SARA) pre-lodgement meeting was held on 14 October 2014 at the Department of State Development, Infrastructure and Planning (DSDIP) North Queensland Regional Office in Townsville to discuss the major components of the development proposal and to determine if there were any major concerns with the proposal from a State perspective.

The meeting attendees were:

- Catherine Hobbs – DSDIP Senior Planner
- Kristy Nau – DSDIP Principal Planner
- June Powell – DSDIP Economic Development Officer
- Damian Delmanowicz – URS Associate Environmental Planner
- Killian Wentrup – FRV Project Developer.

It was confirmed by DSDIP at this meeting that there would be no Schedule 7 referral triggers as per the Sustainable Planning Regulation 2009 applicable to the Project and as such SARA would not act as a referral agency for the development application. Minutes from this meeting are not available.

1.3.3 Pre-lodgement teleconference with Powerlink

A pre-lodgement teleconference was conducted on the 27 October 2014 with Powerlink representatives Michael Craig (Connections Manager) and Michael Sandaver (Technical Assessment Coordinator) to discuss the Project and Powerlink's role as advice agency.

Powerlink confirmed they had no concerns with the Project as the actual solar farm development was outside their easement. FRV explained that the proposed access road traversing Powerlink's Easement C on CP GS1028 on the eastern side of Lot 242 GS1028 would not create impacts to the overhead line. Powerlink advised a consent application would need to be sought closer to construction to receive approval for this access road. No minimum setback requirements were recommended by Powerlink due to this area being outside their jurisdiction.

Overall, Powerlink did not have any issues with the proposal.

1.3.4 Pre-lodgement teleconference with Ergon Energy

Ergon Energy will be triggered as an advice agency for this development application due to their easement over the development area and their joint ownership/management of the Clare substation which is within 100 m of the site.

A teleconference was arranged with Ian Turton (Ergon Energy Principal Town Planner) on 27 October 2014 to discuss the Project. Ergon Energy had no major concerns with the proposed development and advised there are no future easement requirements which would impact on the proposed layout of the solar farm.

1.4 Other Approvals

It is understood that additional statutory approvals may be required prior to the establishment of the Project, including approval for operational works (filling and excavation). If triggered, these approvals will be obtained at a later stage when construction commencement is imminent.

No previous approvals have been obtained for the Project.

1.5 Supporting Documentation

Supporting documentation to this report includes:

- Appendix A – IDAS Forms and Checklists
- Appendix B – Evidence of Owner's Consent
- Appendix C – Material Change of Use Proposal Plans
- Appendix D – Title Searches and Registered Plans
- Appendix E – Stormwater Assessment Report
- Appendix F – Ecological Assessment Report
- Appendix G – Glare Assessment Report
- Appendix H – Planning Scheme Code.

2 SITE ANALYSIS

2.1 Location and Surrounding Land Uses

The Project's development area is located approximately 35 kilometres (km) from the township of Ayr in North Queensland and falls within the Burdekin Shire Council area. The selected development area for the Project is an area of approximately 340 ha of rural land currently used for growing sugar cane. Of this area, a maximum of 300 ha will be used for the overall solar farm use, with electricity generating equipment (i.e. modules, inverters and substation) making up approximately 240 ha.

The north-eastern corner of the development area directly adjoins the existing Clare substation, which is jointly managed by Powerlink and Ergon Energy. Rural land used for cane farming is located to the north, south and west of the development area. The site is bordered to the east by Shadforth Road, Clare. Burdekin River is approximately 2.5 km to the east of the development area.

Overall, the land uses within the development area and surrounding region are predominantly irrigated sugar cane farming.

2.2 Site Details

Table 2-1 Site Details

	Lot 241 SP199878	Lot 242 GS1028	Lot 243 GS1029
Address	82 Shadforth Road, Clare QLD 4807	124 Shadforth Road, Clare QLD 4807	196 Shadforth Road, Clare QLD 4807
Site Area	110.7 ha	120.1 ha	108.302 ha
Tenure	Freehold	Freehold	Freehold
Property Ownership	Lyndsay George Russell Hall	Lyndsay George Russell Hall	Lyndsay George Russell Hall
Easements, Encumbrances and Interests over property	<ul style="list-style-type: none"> Easements D and E on CP GS1027 burdening the land to Queensland Electricity Transmission Corporation Limited (Powerlink) Easement F on CP GS1027 burdening the land to The North Queensland Electricity Board (Ergon Energy) 	<ul style="list-style-type: none"> Easement G on CP GS1028 burdening the land to Queensland Electricity Transmission Corporation Limited (Powerlink) Easement C on CP GS1028 burdening the land to Queensland Electricity Transmission Corporation Limited (Powerlink) 	<ul style="list-style-type: none"> Easement H on CP GS1029 burdening the land to Queensland Electricity Transmission Corporation Limited (Powerlink) Easements A and B on CP GS1029 burdening the land to Queensland Electricity Transmission Corporation Limited (Powerlink)

The title searches and registered plans for the above properties are included in Appendix D of this Planning Report.

2.3 Planning Context

The planning context of the lands surrounding the properties subject to this development application are summarised in Table 2-2 below.

Table 2-2 Planning Context

	Lot 241 SP199878	Lot 242 GS1028	Lot 243 GS1029
Area Classification under <i>Burdekin Shire IPA Planning Scheme 2011</i>	Rural zone	Rural zone	Rural zone
Applicable overlays under <i>Burdekin Shire IPA Planning Scheme 2011</i>	<ul style="list-style-type: none"> Burdekin Shire Infrastructure Map 1 - Powerlink Burdekin Shire Natural Features Map 4 - Good Quality Agricultural Land Burdekin Shire Natural Features Map 9 - Low Bushfire Hazard 	<ul style="list-style-type: none"> Burdekin Shire Infrastructure Map 1 – Powerlink Burdekin Shire Natural Features Map 4 - Good Quality Agricultural Land Burdekin Shire Natural Features Map 9 - Low Bushfire Hazard 	<ul style="list-style-type: none"> Burdekin Shire Infrastructure Map 1 – Powerlink Burdekin Shire Natural Features Map 4 - Good Quality Agricultural Land Burdekin Shire Natural Features Map 9 - Low Bushfire Hazard
DSDIP DA Mapping Layers	<ul style="list-style-type: none"> Climatic regions – stormwater management design objectives Flood hazard area – Level 1 – Queensland floodplain assessment overlay 	<ul style="list-style-type: none"> Climatic regions – stormwater management design objectives Flood hazard area – Level 1 – Queensland floodplain assessment overlay 	<ul style="list-style-type: none"> Climatic regions – stormwater management design objectives Flood hazard area – Level 1 – Queensland floodplain assessment overlay

The DSDIP DA mapping layers that are applicable over Lot 241 SP199878, Lot 242 GS1028 and Lot 243 GS1029 are illustrated in Figure 2-1.



Figure 2-1 DSDIP DA Mapping - Lot 241 SP199878, Lot 242 GS1028 and Lot 243 GS1029

2.4 Site Characteristics

The following site characteristics have been identified based on site inspection findings and searches of local and State government records.

2.4.1 Existing use and built form

The proposed development area is currently used for irrigated sugar cane farming, which is consistent with the dominant land use in the surrounding area. The site is serviced by a system of irrigation channels which flow from the Burdekin River and are controlled by the Clair Weir which is approximately 1.5 km east of the development area.

There are no buildings located over the development area. The only built elements over the site include vehicular tracks that extend around the paddocks of cane, irrigation channels and pumps, perimeter fencing and gates and overhead transmission lines (refer to Plates 2-1 and 2-2).

As illustrated in the registered survey plans for the three affected properties (see Appendix D), Powerlink and Ergon Energy easements run across the eastern and northern edges of the development area, and diagonally from the south-western corner to the Clare substation in the north-eastern corner of the site.

Plate 2-1 Irrigation channel and pump over development area



Plate 2-2 Overhead transmission line over development area



2.4.2 Waterways

The proposed Clare development area is located within the Haughton River and Barratta Creek sub-catchment of the Lower Burdekin Basin; it is also adjacent to the main channel of the Burdekin River (the main channel is within the Burdekin Delta (Home Hill) sub-catchment). The site drains to a partly engineered irrigation channel (named Clay Creek in downstream reaches), which begins at the northern edge of the site and flows to Barratta Creek. Barratta Creek flows north for approximately 35 km before discharging to the Coral Sea near the small township of Jerona, within Bowling Green Bay National Park.

More detailed information on the waterways that exist over the Project's development area is available in the Stormwater Assessment Report within Appendix E.

2.4.3 Flooding

An assessment of flooding has not been undertaken for the proposed Clare development area. Based on discussions with stakeholders in the area, the proposed development area drains efficiently as a result of the advanced irrigation scheme in the area.

2.4.4 Topography

The proposed development area is low-lying; the property slopes gently from an elevation of 30 metres above sea level (masl) towards a low point of 26 masl in the north-west. This topography has made the site ideal for irrigated sugar cane cropping in the past.

2.4.5 Fauna and Flora

A desktop ecological assessment of the development area was undertaken to identify the potential occurrence of terrestrial flora and fauna values, with particular reference to the occurrence of conservation significant species and communities. The results of this assessment identified that significant ecological values are unlikely to occur given the existing land use of the development area is cropping, for sugar cane.

Additional information on the fauna and flora values of the site are contained in the Ecological Assessment Report in Appendix F.

2.4.6 Sensitive Receptors

Potential sensitive receptors for glare impacts arising from the proposed solar farm development at Clare include residential dwellings external to the site, and adjoining travel paths (Ayr Dalberg Road and Ayr Ravenswood Road). These receptors were identified on the basis of their location within a 'viewshed extent'. The viewshed extent was defined by the location of potential sensitive receptors relative to the Clare site, and view lines between receptors and the site. This extent was then plotted using GIS, and used to identify potential sensitive receptors that would potentially be impacted by glare as a result of the solar farm development. The results of the glare assessment are that there is no glare hazard potential and the likely impacts on sensitive receptors are insignificant.

Further detail regarding these sensitive receptors and the assessment methodology employed is contained in Appendix G (Glare Assessment Report).

2.4.7 Cultural Heritage

A search of the Department of Environment and Heritage Protection (DEHP) Aboriginal and Torres Strait Islander Cultural Heritage Database and Register under the *Aboriginal Cultural Heritage Act 2003* was completed in May 2014 and the results indicate that there are no records of Cultural Heritage over the development area or nearby.

2.4.8 European Heritage

A search on the Queensland Heritage Register has confirmed there are no listed European Heritage sites within the development area or in close proximity.

3 PROPOSAL

3.1 Overview of Proposal

The overall project involves the construction and operation of a large scale solar farm that will cover a maximum area of 300 ha and be capable of generating electricity through the exposure of PV modules (solar panels) to the sun. The PV modules will be mounted in rows on a tracking system that will rotate the panels east to west each day to ensure the optimal amount of exposure of the panels to the sun. The Direct Current (DC) electricity that is generated will be converted to alternating current (AC) through the use of inverters. These inverters will be contained in shipping containers along with transformers, which will increase the voltage of the electricity before it is sent to the solar plant substation.

The Project could incorporate a BESS in conjunction with the solar farm, which would enable the plant to inject additional electricity into the grid at optimal times. As the decision to incorporate batteries would add significant costs to the Project, such a decision can only be made at a later point in time when the full range of design decisions are being made (see below). A number of battery technologies could be considered at that time.

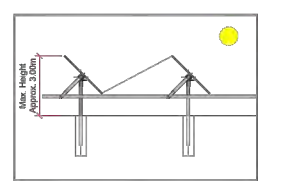
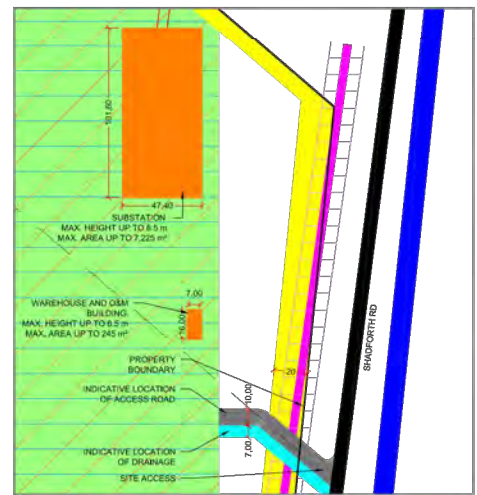
To ensure the generated electricity can be transferred to the electricity grid, a new substation including a step-up transformer will be installed on the site immediately adjacent to the existing Clare substation. The exact location of the proposed solar plant substation is not yet known, as the connection arrangements are still being negotiated with Ergon and Powerlink, however, its indicative location is shown on Figure 3-1 in the “substation zone” (orange hashed area). An ETL will connect this new substation to the existing Clare substation over Lot 152 SP199878 or Lot 151 GS388.

The Project’s detailed design, specific layout and electricity generating capacity has not been confirmed at this stage, including row spacing, internal access tracks, number of modules and inverters and the choice of whether to incorporate battery storage technology or not. There are a number of factors which will drive the final design of the plant, including its size such as conditions in the national electricity market (NEM), potential changes to the Renewable Energy Target (RET) and detailed site investigations such as geotechnical studies. Ultimately, the final design work will be undertaken by an engineering, procurement and construction (EPC) contractor. The EPC contractor for the Project has not yet been engaged by FRV and would normally not be engaged until the time of financial close. In any event, the contractor for the Project will be engaged following obtainment of the material change of use approval as outlined in this Planning Report.

3.2 Project Drivers

The main driving forces for the choice of location of the proposed Clare solar farm include the solar irradiation levels of the site and grid connectivity. The chosen location is among sites with the highest levels of solar irradiation in Australia, which will drive the effectiveness of the PV plant’s ability to generate electricity. Secondly, the site directly adjoins the Clare substation, which reduces the costs associated with transporting the generated electricity to end users and allows for a greater capacity of power to be provided. Considering these two factors, the Clare site is first class as it has a well-supported electrical network with grid connectivity via the existing Clare substation.

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- PHOTOVOLTAIC PLANT OCCUPIED AREA
- SUBSTATION ZONE
- WAREHOUSE AND O&M BUILDING ZONE
- BUFFER POWER LINES
- BUFFER PROPERTY BOUNDARY

THIS INDICATIVE DESIGN IS FOR REVIEW ONLY AND SHOULD NOT BE USED FOR CONSTRUCTION

GENERAL NOTE

THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS. IT IS INTENDED THAT COMPLETE ELECTRICAL SYSTEMS BE PROVIDED WITH ALL NECESSARY EQUIPMENT, APPURTENANCES, AND CONTROLS, COMPLETELY COORDINATED WITH ALL DISCIPLINES.

NOTES:

1. MEASURES IN METERS

SITE BASIC INFORMATION:	
Location:	Clare, Shire of Burkedn. Queensland, (Australia).
Latitude:	19° 57' 36.80" S
Longitude:	147° 12' 32.33" E
Elevation:	32 m.a.m.s.l.
TOTAL LAND AREA FOR EACH PROPERTY INVOLVED IN THE PROPOSED DEVELOPMENT:	
Lot 241 =	110.7 ha
Lot 242 =	120.1 ha
Lot 243 =	107.3 ha
Total =	338.1 ha
AREA	
Approximate Solar Farm Land :	236.82 ha
PROPERTY ADDRESS:	
374 George Rd, Clare QLD 4807	

Source: Client supplied drawing (114-0053-ING-GEN-002)
Whilst every care is taken by URS to ensure the accuracy of the digital data, URS makes no representation or warranties about its accuracy, reliability, completeness, suitability for any particular purpose and disclaims all responsibility and liability (including without limitation, liability in negligence) for any expenses, losses, damages (including indirect or consequential damage) and costs which may be incurred as a result of data being inaccurate in any way for any reason. Electronic files are provided for information only. The data in these files is not controlled or subject to automatic updates for uses outside of URS.

3.3 Material Change of Use

3.3.1 Solar Farm Use

The key infrastructure elements that will make up the solar farm are explained below:

3.3.1.1 PV Modules

PV modules will make up the majority of the solar farm and will convert energy from solar radiation into electrical energy. The PV modules will be mounted to tracking systems which will ensure the panels remain positioned towards the sun for the optimal amount of time throughout the day. The extent of the PV modules over the development area is represented by green in Figure 3-1. The detailed layout of the modules will be confirmed at a later stage when the engineering, procurement and construction (EPC) contractor for the Project is engaged.

3.3.1.2 Tracking system

The tracking system will comply with the latest Australian loading code for wind AS1170 and will have a maximum height of 3 m from the ground surface level (refer to inset E on Figure 3-1). The tracking systems will rotate the rows of PV modules from east to west each day to ensure optimal exposure to the sun.

3.3.1.3 Inverters

The inverters will be housed in shipping containers along with transformers and be placed on a foundation for support, such as a concrete slab. The electricity put out by the inverters is stepped up in voltage by the transformers for reticulation via underground cables to the solar plant substation. The number of inverters that will be required for the Project will not be known until the detailed design phase, which will determine the electricity generating capacity of the plant. The inverters will ensure the DC electrical energy generated by the PV modules is converted to AC energy.

Subject to later design decisions, a battery storage system could be integrated into the solar farm. The batteries would be housed in the shipping containers along with the inverters, or in similar structures.

The maximum height of each inverter shipping container will be 4m, with a maximum area of 35m² (see inset D within Figure 3-1).

Gravel service roads will be constructed around the site to provide access to the inverters and a security fence will be installed around the perimeter of the solar farm.

3.3.1.4 Substation

A new solar plant substation is proposed as part of the Project to ensure the voltage level of the electricity put out by the inverters is then elevated to a level suitable to feed into the electricity grid. The substation will be located on the eastern side of the development area immediately adjacent to the existing Clare South substation. However, its exact location is subject to final plant design. The maximum height of the substation will be 8.5 m and the maximum area will be 7,225 m² (refer to inset C of Figure 3-1).

3.3.1.5 *Warehouse and O&M building*

There will be one warehouse and operations and maintenance (O&M) building located in the eastern side of the development area. At this stage the exact location of this building has not been confirmed, however a zone of where it will be located is provided in Figure 3-1. Based on preliminary designs, the warehouse and O&M building will be one storey and contain a control room, storage room for spare parts and staff facilities, such as toilets and a kitchenette. As detailed in inset C of Figure 3-1, the maximum height of the building will be 8.5 m and the maximum area will be 245 m².

3.3.1.6 *Access Road*

Access to the development area will be via an existing track that extends from Shadforth Road and connects to the eastern corner of Lot 242 GS1028. The track, which is currently used for rural purposes, will be upgraded to a standard suitable for the traffic generated by the Project. The access road will be a maximum of 10 m in width, and a drainage line will run in parallel with the access road (refer to inset C in Figure 3-1).

3.3.1.7 *Staff and Operating Hours*

The solar farm facility will be managed by up to 5 on-site staff and will generally operate during daylight hours only, except in the case a battery system is used to enable operation at other times.

3.3.1.8 *Design Certification*

All of the machinery that will be installed within the solar farm will comply with the applicable Australian standards and be signed off by a qualified Registered Professional of Queensland (RPEQ) prior to operation. All components will be capable of withstanding all climatic, aerodynamic and electrical induced loads during the Operational Design Life as specified in the relevant standards.

3.3.1.9 *Utilities*

No council water, sewerage or stormwater connections to the development area are proposed. Rainwater will be trapped via water tanks and will be used on site for non-potable purposes. Bottled drinking water will be brought to site. A supply of water for firefighting purposes will also be maintained on site in accordance with bushfire management guidelines.

Sewerage will be managed by a septic system and be removed off-site by a certified contractor.

3.3.1.10 *Worker's accommodation*

Construction and operation workers will be accommodated in surrounding townships. A worker's accommodation camp is not proposed.

3.3.1.11 *Life of Project*

The economic life of the solar panels and facility is 30 years. After this time, the facility will either be refurbished or decommissioned.

Decommissioning would consist of removal of all above ground infrastructure for recycling or disposal, revegetation of all disturbed land, and returning the land to agricultural use.

3.4 Electricity Transmission Line

The Project includes the connection of the solar farm via a high voltage (HV) ETL to the existing Clare South substation that resides over Lot 152 SP199878 and Lot 151 GS388.

The existing Clare South substation site is managed by both Ergon Energy and Powerlink. As connection negotiations are still underway with both parties, the exact alignment of the ETL is yet to be confirmed. The connection could be into either the section of the Clare South substation controlled by Ergon (southern section), or the section of the substation controlled by Powerlink (northern section). Either way, the line connecting the solar plant would cover a very short distance due to the possibility for locating the solar farm substation immediately next to the existing Clare South substation.

It is noted that the ETL alignment as proposed within this development application will not encroach within Lot 152 SP199878 or Lot 151 GS388.

All specifications for the ETL, substation design and switching gear will be designed and built to Australian Standards.

3.5 Construction Methods

Due to the preliminary stage of design, the definite construction methods for the installation of the Project have not yet been established. It is likely that standard construction methods and techniques will be adopted to ensure potential impacts to the environment and third party infrastructure are well understood and easily managed. It is probable that major earthworks will not be required to level the land of the subject sites as the existing site is relatively flat. However, some grading and vegetation clearance is envisaged to be required.

The engaged construction contractor will be instructed by FRV to adopt methods of construction that minimise, to the greatest extent practicable, disruption or damage to the environment. A key component in ensuring potential construction impacts are appropriately managed will be the preparation and implementation of a project specific construction environmental management plan (CEMP). The CEMP will ensure the hazards of the Project are identified and appropriate mitigation measures are adopted during the construction phase. The proposed mitigation measures will ensure the works are undertaken in accordance with the requirements of relevant environmental legislation and guidelines and that adequate information and instruction is provided to ensure personnel comply with the CEMP on-site.

A CEMP will be developed for the Project closer to construction commencement and can be provided at this time if requested.

3.6 Project Delivery Timeframes

A final investment decision has not yet been made. FRV will make the decision to invest in the proposed solar farm development after the material change of use permit has been obtained. The decision will also be subject to other considerations such as the investment climate for renewable energy in Australia and the demand for electricity generated by the solar farm. Based on current expectations, it is envisaged that an investment decision will be made in the

timeframe of the second half of 2015 to the end of 2016, and that accordingly construction would commence in the timeframe of first half of 2016 to the end of 2017. The construction phase is expected to take between 12 to 18 months, subject to the final plant design and the requirements of FRV, its financiers and the preferences of the EPC contractor engaged to undertake the construction.

3.7 Potential Impacts and Mitigation Measures

The potential impacts that will be generated by the Project have been identified and evaluated. Where negative impacts are possible, established mitigation measures will be enforced to ensure the Project does not cause significant adverse impacts to the receiving environment and community. These impacts and measures are detailed below.

3.7.1 Visual Amenity/Glare

The desktop assessment identified that no glare hazard potential is likely to be generated as a result of the operation of the Project. This assessment took into consideration the operation of the solar farm during daylight hours throughout the year. As no glare potential was identified, the likely impact on sensitive receptors within the viewshed was determined to be insignificant. The results of the glare impact assessment are detailed further in Appendix G (Glare Assessment Report).

3.7.2 Acoustic

The operation of the Project is anticipated to generate minor levels of audible noise. Noise will be generated during the construction of the Project; however due to the nature of the surrounding rural land uses and the absence of nearby sensitive receptors, it is considered that the proposal will not create any noise nuisances.

A tailored CEMP will be developed in the later stages of the Project which will ensure noise emissions are monitored and managed appropriately. Solar PV facilities are generally very silent during the operation phase, with no noise nuisances expected.

3.7.3 Air

The operational phase of the Project will not involve any airborne discharge activities. Minor discharges will occur during the construction phase (i.e. dust); however these are considered negligible due to the lack of nearby sensitive receptors.

All construction impacts will be managed in accordance with a site specific CEMP that will be developed in the later stages of the Project. The selected construction contractor will construct the Project in a manner that minimises dust generation from the site, including wind-blown and traffic-generated dust.

All project related activities on the site will be undertaken with the objective of preventing visible emissions of dust from the site. Should visible dust emissions attributable to the Project occur during construction, the construction contractor will identify and implement all practicable dust mitigation measures within the CEMP.

3.7.4 Traffic

It is anticipated the works will generate a maximum of approximately 200 full time workers in the construction phase for up to 18 months and 5 full time workers during the operational phase of the Project. It is conservatively assumed that all workers will drive to the site in private vehicles, within a one hour driving catchment from the subject site.

A new driveway connection to Shadforth Road is proposed to provide access to the Project.

As the solar farm is neither a consumer of raw materials, nor a generator of waste products there will be limited need for deliveries during the operational phase. Heavy vehicle movements during the operational phase are expected to be sporadic and infrequent. Overall, the traffic generation of the Project post construction is likely to be minimal.

Increased road usage resulting from the Project is expected to be greatest during the construction period; however it is believed these additional trips can be accommodated by the existing road. The traffic generated by the operation of the facility will be negligible.

Based on the above, construction and operational traffic impacts associated with the Project have not been assessed given the low traffic generating potential and the quality of the existing Shadforth Road.

3.7.5 Surface Water

The following potential impacts to surface water (via changes in stormwater quantity and quality relating to proposed development activities at Clare) have been identified:

- Discharge of sediments (both air and water-borne) from exposed ground during construction phase resulting in adverse impacts on receiving environment surface water quality.
- Discharge of stormwater from the site during operational phase resulting in adverse impacts on receiving environment surface water quality.
- Presence of stream crossings resulting in adverse impacts on receiving environment surface water geomorphology (e.g. stream bank erosion and scouring), quality (e.g. increased sediment load to stream caused by stream bank erosion and scouring) and flooding.
- Discharge of stormwater from the site during operational phase resulting in adverse impacts on receiving environment surface water geomorphology (e.g. stream bank erosion and scouring)
- Spills/leaks from chemical (e.g. fuel and oil) storage areas into surface water bodies during the construction phase resulting in adverse impacts on receiving environment surface water quality.
- Discharge of treated or untreated wastewater from on-site waste water treatment facilities during the operational phase resulting in adverse impacts on the surface water environment.

The environmental values potentially impacted by proposed development activities are outlined in Section 5 of the Stormwater Assessment Report (attached as Appendix E), along with assessment of the sensitivity, magnitude and significance of both pre-mitigated and post-

mitigated impacts to surface water. Without any mitigation measures in place, all of the impacts above were assessed to have low to negligible significance. A range of mitigation measures were then identified to minimise these potential impacts; these mitigation measures are summarised as follows:

- Development of construction and operations management plans, which will in turn describe:
 - Methods for minimising sediment-laden runoff during the construction phase, in accordance with best practice guidelines
 - Delineation of set-backs for development in proximity to watercourses, in accordance with the Rural Zone Code of the Burdekin Shire Planning Scheme
 - Weed control program for removal of noxious weeds and prevention of further invasions
 - Procedures for safe storage of hydrocarbon materials, to ensure that any spillages are contained
- Use of water for dust suppression, to minimise airborne contaminants.
- Vegetation of ground beneath solar panels with native grasses and other low growing herbaceous species, to stabilise the land, reduce peak stormwater flows and reduce sediment discharge via stormwater runoff.
- Use of glyphosate-based products (or similar non-residual and non-persistent herbicides) to manage vegetation on-site, to minimise the potential risk of harmful herbicide by-products entering the surface water receiving environment.
- Design, construction and maintenance of stream crossings in accordance with industry best practice.
- A septic tank will be installed on site to service the operations and maintenance building; this will be designed and operated in accordance with relevant statutory requirements and Australian Standards. Effluent will be removed from site and disposed in a suitable facility by a licensed operator.

Although peak flow stormwater runoff from the site is expected to increase post-development, this runoff is expected to form a very small percentage of peak flow in the receiving environment (the sub-catchment containing the development area covers only 0.4% of the land area of the Barratta Creek catchment). A complete assessment of potential changes in the quality and quantity of stormwater discharges from the site (both pre- and post-development), including estimates of peak flows calculated using the Rational Method, is contained within Section 5 of the Stormwater Assessment Report (Appendix E, attached).

With the exception of those mitigation measures listed above, specific mitigation measures to control stormwater discharge from site are not considered necessary given the small volume discharged in the context of the Barratta Creek catchment. Stormwater will be discharged diffusely across the site via vegetated surfaces, which will assist in reducing any impacts to stream water quality and geomorphology.

Overall, it was considered that the potential impacts to surface water associated with the Project could be appropriately managed by implementing the identified range of mitigation measures during the various phases of the Project.

3.7.6 Services

The Project will intersect and be located in close proximity to Powerlink and Ergon Energy overhead power lines. These power lines are protected by numerous easements over all three affected properties, as detailed in Table 2-1 and illustrated in the title searches and registered survey plans in Appendix D. As the design of the Project is still preliminary at this stage, the proposed construction methods in the vicinity of these services have not yet been confirmed.

The final detailed design of the Project, including construction techniques and setbacks to existing infrastructure will be agreed to in writing with the individual service providers prior to construction. As explained in Sections 1.3.3 and 1.3.4, pre-lodgement discussions have been undertaken with Powerlink and Ergon Energy and no issues have been highlighted by either party.

The future CEMP for the Project will also detail how the construction of the solar farm will be managed in the vicinity of these existing (known and unknown) underground and above ground services.

No adverse impacts to existing infrastructure are anticipated as a result of the Project.

3.7.7 Ecology

Potential impacts on ecological values are considered negligible given the development area currently supports cropping land. Mitigation measures such as the implementation of a weed management plan and erosion and sediment control measures, developed as part of the CEMP will further reduce potential impacts on the broader ecological landscape values.

3.7.8 Cultural Heritage

With reference to Section 23(1) of the *Aboriginal Cultural Heritage Act 2003*, a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage, which is implied to be the cultural heritage duty of care.

Matters considered in determining whether a person has complied with the cultural heritage duty of care include:

- the nature of the activity, and the likelihood of it causing harm to Aboriginal cultural heritage
- whether the person searched the database and register for information about the area affected by the activity
- the extent to which the person complied with the cultural heritage duty of care guidelines
- the nature and extent of past uses in the area affected by the activity.

A search of the DEHP Aboriginal and Torres Strait Islander Cultural Heritage Database and Register under the *Aboriginal Cultural Heritage Act 2003* was completed in May 2014 and the results indicate that there are no records of Cultural Heritage over the development area or nearby.

Based on URS' high level assessment of the site and previous sugar cane farming over the subject properties, it is assumed the development area is a Category 4 area as per the *Aboriginal Cultural Heritage Act 2003* Duty of Care Guidelines. A CEMP will be developed for the delivery phase of the Project that will incorporate management measures to ensure compliance with the *Aboriginal Cultural Heritage Act 2003* Duty of Care Guidelines.

4 LEGISLATIVE FRAMEWORK

4.1 Statutory Requirements

All development is exempt development under the *Sustainable Planning Act 2009* unless otherwise declared self-assessable or assessable development through either Schedule 3 of the Sustainable Planning Regulation 2009 or a local government planning scheme.

This section of the Planning Report provides an evaluation of the proposal against the relevant local, State and Federal legislation.

4.2 Sustainable Planning Act 2009 and *Burdekin Shire IPA Planning Scheme 2011*

4.2.1 *Material Change of Use*

The local planning scheme that is applicable to the subject site is the *Burdekin Shire IPA Planning Scheme 2011*. Burdekin Shire Council has confirmed the proposed Clare solar farm development falls within the 'Use Not Defined' use definition, which is defined as:

"A development use not defined in this Schedule 1 will be considered to have its ordinary meaning and will be assessed as impact assessable development."

The relevant Zone Map 8 – Clare found within the *Burdekin Shire IPA Planning Scheme 2011* categorizes the proposed solar farm development area as residing within the 'rural zone'.

As per the Assessment Criteria for the Rural Zone located within Table 1 of the *Burdekin Shire IPA Planning Scheme 2011*, a 'Use Not Defined' use within the rural zone is 'impact assessable' against the entire planning scheme.

To demonstrate compliance with the *Burdekin Shire IPA Planning Scheme 2011*, the proposal has been assessed against the Rural Zone Code within Appendix H of this Planning Report. No other zone codes or overlay codes are applicable.

4.2.2 *Referral Agencies*

Following a review of Schedule 7 of the Sustainable Planning Regulation 2009, it has been determined there are two relevant referral triggers for the proposal. They include:

- Schedule 7, Table 3, Item 7 as all three affected lots are encumbered by easements in favour of Powerlink and/or Ergon Energy, who are distribution and transmission entities under the *Electricity Act 1994*. As such, the Chief Executives of Powerlink and Ergon Energy will be advice agencies for this application as per their referral powers under the *Electricity Act 1994* and the *Electrical Safety Act 2002*.
- Schedule 7, Table 3, Item 8 as the development area is located within 100 m of the Clare substation site. As this site is managed by both Powerlink and Ergon Energy, the Chief Executives of both organisations will be advice agencies for this application as per their referral powers under the *Electricity Act 1994* and the *Electrical Safety Act 2002*.

A review of the State Development Assessment Provisions (SDAP) Version 1.5 has confirmed there are no applicable SDAP codes that require assessment.

4.2.3 **State Planning Policy**

The State Planning Policy (SPP) defines the Queensland Government's policies about matters of state interest in land use planning and development and came into effect on 2 December 2013.

The SPP includes interim development assessment requirements to ensure that state interests are appropriately considered by local government when assessing development applications where the local government planning scheme has not yet appropriately integrated the state interests in the SPP. The applicable *Burdekin Shire IPA Planning Scheme 2011* does not integrate the state interests in the SPP. As such, the relevant components of the SPP have been considered.

The mapping layers that are applicable over Lot 241 SP199878, Lot 242 GS1028 and Lot 243 GS1029 include:

Water Quality

- Climatic regions – stormwater management design objectives

Management strategies to minimise potential impacts associated with stormwater have been identified and are detailed in the Stormwater Assessment Report in Appendix E. These strategies will be enforced through the implementation of a site specific CEMP.

Natural Hazards Risk and Resilience

- Flood hazard area – Level 1 – Queensland floodplain assessment overlay

An assessment of flooding has not been undertaken for the proposed Clare development area. Based on discussions with stakeholders in the area, the proposed development area drains efficiently as a result of the advanced irrigation scheme in the area.

- Potential bushfire impact buffer

A supply of water for firefighting purposes will be maintained on site and appropriate setbacks will be incorporated into the design in compliance with the *Burdekin Shire IPA Planning Scheme 2011* and bushfire management guidelines.

Overall, the detailed information provided in this Planning Report and the supporting appendices are considered to appropriately address the matters of state interest within the SPP that are applicable to the affected sites.

4.2.4 **State Planning Regulatory Provisions**

An assessment of the proposed works against the current State planning regulatory provisions has been undertaken and it has been determined that none of the provisions are applicable.

Table 4-1 Current State Planning Regulatory Provisions

Date	Current State Planning Regulatory Provisions	Applicable to Proposed Development
2 May 2014	South East Queensland Regional Plan 2009-2031 State planning regulatory provisions (as amended)	No
27 September 2013	Guragunbah State Planning Regulatory Provision	No
2 August 2013	State planning regulatory provision (adopted charges)	Yes
23 September 2014	Yeerongpilly Transit Oriented Development State Planning Regulatory Provision 2014	No
October 2010	Off-road motorcycling facility on State-owned land at Wyaralong	No
July 2010	State Planning Regulatory Provisions (Adult stores)	No
May 2010	South East Queensland Koala Conservation State Planning Regulatory Provisions	No

The State planning regulatory provision (adopted charges) prescribes the maximum Burdekin Shire Council may charge FRV for infrastructure charges associated with the proposal. Burdekin Shire Council have advised that no infrastructure charges are payable for the Project.

5 CONCLUSION OF ASSESSMENT

5.1 Statement of Sufficient Grounds

This Planning Report has been prepared by URS, on behalf of FRV Services Australia Pty Ltd, in support of a development application for a Material Change of Use (Use Not Defined) for the Clare Solar Farm Development.

The proposed solar farm use is proposed over three freehold properties located at 82 Shadforth Road, Clare QLD 4807, 124 Shadforth Road, Clare QLD 4807 and 196 Shadforth Road, Clare QLD 4807, legally described as Lot 241 SP199878, Lot 242 GS1028 and Lot 243 GS1029 respectively.

Following an assessment of the proposal against the relevant provisions of the *Burdekin Shire IPA Planning Scheme 2011* and *Sustainable Planning Act 2009*, it is considered that there are sufficient grounds to warrant its approval based on the following points:

- The solar farm will generate a clean and renewable energy and represent a positive diversification of the local economy
- The solar farm will greatly benefit the local economy through the creation of up to 200 jobs during the construction phase, up to 5 ongoing jobs during the operational phase and indirect benefits to local businesses, contractors and suppliers
- The Project meets the intent and desired outcomes of the *Burdekin Shire IPA Planning Scheme 2011*
- The proposal is consistent with the applicable codes of the planning scheme
- Overall, the proposed temporary works will not negatively impact the character and amenity of the site and the adjoining land uses.

The Project will positively contribute to the economy and community of the region. It is recommended that Burdekin Shire Council, as Assessment Manager, favourably consider the application, and impose reasonable and relevant conditions on the development approval.

REFERENCES

FRV 2014, About Us, <http://www.frv.com/about-us/>, viewed on 19 November 2014.

BoM 2014 'Australian Water Information Dictionary', Bureau of Meteorology, Commonwealth of Australia, accessed 20 November 2014, <http://www.bom.gov.au/water/awid/index.shtml>

DNRM 2014 'Interactive FloodCheck Map', last updated 11 November 2014, accessed 20 November 2014, <http://flood.dnrm.esriaustraliaonline.com.au/floodcheck/>

NQ Dry Tropics 2009 *Burdekin Water Quality Improvement Plan – Catchment Atlas*, North Queensland Dry Tropics, 30pp.

LIMITATIONS

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of FRV Services Australia Pty Ltd and only those third parties who have been authorised in writing by URS to rely on this Report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Report.

It is prepared in accordance with the scope of work and for the purpose outlined in the contract dated 9 May 2014.

Where this Report indicates that information has been provided to URS by third parties, URS has made no independent verification of this information except as expressly stated in the Report. URS assumes no liability for any inaccuracies in or omissions to that information.

This Report was prepared in November 2014 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

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It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the site.

Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

IDAS form 1—Application details

(Sustainable Planning Act 2009 version 4.1 effective 4 July 2014)

This form must be used for **ALL** development applications.

You **MUST** complete **ALL** questions that are stated to be a mandatory requirement unless otherwise identified on this form.

For all development applications, you must:

- complete this form (*IDAS form 1—Application details*)
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

Attach extra pages if there is insufficient space on this form.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* (SPA) or the Sustainable Planning Regulation 2009.

This form and any other IDAS form relevant to your application must be used for development applications relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994* and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*. Whenever a planning scheme is mentioned, take it to mean land use plan for the strategic port land, Brisbane core port land or airport land.

PLEASE NOTE: This form is not required to accompany requests for compliance assessment.

This form can also be completed online using MyDAS at www.dsdip.qld.gov.au/MyDAS

Mandatory requirements

Applicant details (Note: the applicant is the person responsible for making the application and need not be the owner of the land. The applicant is responsible for ensuring the information provided on all IDAS application forms is correct. Any development permit or preliminary approval that may be issued as a consequence of this application will be issued to the applicant.)

Name/s (individual or company name in full)

FRV Services Australia Pty Ltd C/- URS

For companies, contact name

Alexandra Isgro

Postal address

GPO Box 302

Suburb	Brisbane		
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State	QLD	Postcode	4000
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Country	Australia		
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Contact phone number

(07) 3243 2192

Mobile number (non-mandatory requirement)

0432632567

Fax number (non-mandatory requirement)

(07) 3243 2199

Email address (non-mandatory requirement)

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Applicant's reference number (non-mandatory requirement)

42627398

1. What is the nature of the development proposed and what type of approval is being sought?

Table A—Aspect 1 of the application (If there are additional aspects to the application please list in Table B—Aspect 2.)

a) What is the nature of the development? (Please only tick one box.)

Material change of use Reconfiguring a lot Building work Operational work

b) What is the approval type? (Please only tick one box.)

Preliminary approval under s241 of SPA Preliminary approval under s241 and s242 of SPA Development permit

c) Provide a brief description of the proposal, including use definition and number of buildings or structures where applicable (e.g. six unit apartment building defined as a *multi-unit dwelling*, 30 lot residential subdivision etc.)

Establishment of solar farm covering a maximum area of 300 ha.

d) What is the level of assessment? (Please only tick one box.)

Impact assessment Code assessment

Table B—Aspect 2 of the application (If there are additional aspects to the application please list in Table C—Additional aspects of the application.)

a) What is the nature of development? (Please only tick one box.)

Material change of use Reconfiguring a lot Building work Operational work

b) What is the approval type? (Please only tick one box.)

Preliminary approval under s241 of SPA Preliminary approval under s241 and s242 of SPA Development permit

c) Provide a brief description of the proposal, including use definition and number of buildings or structures where applicable (e.g. six unit apartment building defined as a *multi-unit dwelling*, 30 lot residential subdivision etc.)

d) What is the level of assessment?

Impact assessment Code assessment

Table C—Additional aspects of the application (If there are additional aspects to the application please list in a separate table on an extra page and attach to this form.)

Refer attached schedule Not required

2. Location of the premises (Complete Table D and/or Table E as applicable. Identify each lot in a separate row.)

Table D—Street address and lot on plan for the premises or street address and lot on plan for the land adjoining or adjacent to the premises (Note: this table is to be used for applications involving taking or interfering with water). (Attach a separate schedule if there is insufficient space in this table.)

- Street address **and** lot on plan (All lots must be listed.)
- Street address **and** lot on plan for the land adjoining or adjacent to the premises (Appropriate for development in water but adjoining or adjacent to land, e.g. jetty, pontoon. All lots must be listed.)

Street address					Lot on plan description		Local government area (e.g. Logan, Cairns)
Lot	Unit no.	Street no.	Street name and official suburb/ locality name	Post-code	Lot no.	Plan type and plan no.	
i)		82	Shadforth Rd, Clare	4807	241	SP199878	Burdekin
ii)		124	Shadforth Rd, Clare	4807	242	GS1028	Burdekin
iii)		196	Shadforth Rd, Clare	4807	243	GS1029	Burdekin

Planning scheme details (If the premises involves multiple zones, clearly identify the relevant zone/s for each lot in a separate row in the below table. Non-mandatory)

Lot	Applicable zone / precinct	Applicable local plan / precinct	Applicable overlay/s
i)	Rural	n/a	<ul style="list-style-type: none"> - Burdekin Shire Infrastructure Map 1 - Powerlink - Burdekin Shire Natural Features Map 4 – Good Quality Agricultural Land - Burdekin Shire Natural Features Map 9 – Low Bushfire Hazard
ii)	Rural	n/a	<ul style="list-style-type: none"> - Burdekin Shire Infrastructure Map 1 - Powerlink - Burdekin Shire Natural Features Map 4 – Good Quality Agricultural Land - Burdekin Shire Natural Features Map 9 – Low Bushfire Hazard
iii)	Rural	n/a	<ul style="list-style-type: none"> - Burdekin Shire Infrastructure Map 1 - Powerlink - Burdekin Shire Natural Features Map 4 – Good Quality Agricultural Land - Burdekin Shire Natural Features Map 9 – Low Bushfire Hazard

Table E—Premises coordinates (Appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay.) (Attach a separate schedule if there is insufficient space in this table.)

Coordinates (Note: place each set of coordinates in a separate row)				Zone reference	Datum	Local government area (if applicable)
Easting	Northing	Latitude	Longitude			

					<input type="checkbox"/> GDA94 <input type="checkbox"/> WGS84 <input type="checkbox"/> other	
--	--	--	--	--	--	--

3. Total area of the premises on which the development is proposed (indicate square metres)

3,000,000m²

4. Current use/s of the premises (e.g. vacant land, house, apartment building, cane farm etc.)

Cane farm

5. Are there any current approvals (e.g. a preliminary approval) associated with this application? (Non-mandatory requirement)

No Yes—provide details below

List of approval reference/s	Date approved (dd/mm/yy)	Date approval lapses (dd/mm/yy)

6. Is owner's consent required for this application? (Refer to notes at the end of this form for more information.)

No
 Yes—complete either Table F, Table G or Table H as applicable

Table F	
Name of owner/s of the land	
I/We, the above-mentioned owner/s of the land, consent to the making of this application.	
Signature of owner/s of the land	
Date	

Table G	
Name of owner/s of the land	Lyndsay George Russell Hall
<input checked="" type="checkbox"/> The owner's written consent is attached or will be provided separately to the assessment manager.	

Table H	
Name of owner/s of the land	
<input type="checkbox"/> By making this application, I, the applicant, declare that the owner has given written consent to the making of the application.	

7. Identify if any of the following apply to the premises (Tick applicable box/es.)

- Adjacent to a water body, watercourse or aquifer (e.g. creek, river, lake, canal)—complete Table I
- On strategic port land under the *Transport Infrastructure Act 1994*—complete Table J
- In a tidal water area—complete Table K
- On Brisbane core port land under the *Transport Infrastructure Act 1994* (No table requires completion.)
- On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008* (no table requires completion)
- Listed on either the Contaminated Land Register (CLR) or the Environmental Management Register (EMR) under the *Environmental Protection Act 1994* (no table requires completion)

Table I
Name of water body, watercourse or aquifer

Table J	
Lot on plan description for strategic port land	Port authority for the lot

Table K	
Name of local government for the tidal area (if applicable)	Port authority for the tidal area (if applicable)

8. Are there any existing easements on the premises? (e.g. for vehicular access, electricity, overland flow, water etc)

No Yes—ensure the type, location and dimension of each easement is included in the plans submitted

9. Does the proposal include new building work or operational work on the premises? (Including any services)

No Yes—ensure the nature, location and dimension of proposed works are included in plans submitted

10. Is the payment of a portable long service leave levy applicable to this application? (Refer to notes at the end of this form for more information.)

No—go to question 12 Yes

11. Has the portable long service leave levy been paid? (Refer to notes at the end of this form for more information.)

No
 Yes—complete Table L and submit with this application the yellow local government/private certifier's copy of the receipted QLeave form

Table L		
Amount paid	Date paid (dd/mm/yy)	QLeave project number (6 digit number starting with A, B, E, L or P)

12. Has the local government agreed to apply a superseded planning scheme to this application under section 96 of the Sustainable Planning Act 2009?

No
 Yes—please provide details below

Name of local government	Date of written notice given by local government (dd/mm/yy)	Reference number of written notice given by local government (if applicable)

13. List below all of the forms and supporting information that accompany this application (Include all IDAS forms, checklists, mandatory supporting information etc. that will be submitted as part of this application. Note: this question does not apply for applications made online using MyDAS)

Description of attachment or title of attachment	Method of lodgement to assessment manager
Planning Report, including IDAS form 5, owner's consent, proposal plans, title searches and registered plans, surface water assessment, ecology assessment, glare assessment and planning scheme code assessment.	Hard copy and electronic

14. Applicant's declaration

By making this application, I declare that all information in this application is true and correct (Note: it is unlawful to provide false or misleading information)

Notes for completing this form

- Section 261 of the *Sustainable Planning Act 2009* prescribes when an application is a properly-made application. Note, the assessment manager has discretion to accept an application as properly made despite any non-compliance with the requirement to provide mandatory supporting information under section 260(1)(c) of the *Sustainable Planning Act 2009*

Applicant details

- Where the applicant is not a natural person, ensure the applicant entity is a real legal entity.

Question 1

- Schedule 3 of the Sustainable Planning Regulation 2009 identifies assessable development and the type of assessment. Where schedule 3 identifies assessable development as "various aspects of development" the applicant must identify each aspect of the development on Tables A, B and C respectively and as required.

Question 6

- Section 263 of the *Sustainable Planning Act 2009* sets out when the consent of the owner of the land is required for an application. Section 260(1)(e) of the *Sustainable Planning Act 2009* provides that if the owner's consent is required under section 263, then an application must contain, or be accompanied by, the written consent of the owner, or include a declaration by the applicant that the owner has given written consent to the making of the application. If a development application relates to a state resource, the application is not required to be supported by evidence of an allocation or entitlement to a state resource. However, where the state is the owner of the subject land, the written consent of the state, as landowner, may be required. Allocation or entitlement to the state resource is a separate process and will need to be obtained before development commences.

Question 7

- If the premises is listed on either the Contaminated Land Register (CLR) or the Environmental Management Register (EMR) under the *Environmental Protection Act 1994* it may be necessary to seek compliance assessment. Schedule 18 of the Sustainable Planning Regulation 2009 identifies where compliance assessment is required.

Question 11

- The *Building and Construction Industry (Portable Long Service Leave) Act 1991* prescribes when the portable long service leave levy is payable.
- The portable long service leave levy amount and other prescribed percentages and rates for calculating the levy are prescribed in the Building and Construction Industry (Portable Long Service Leave) Regulation 2002.

Question 12

- The portable long service leave levy need not be paid when the application is made, but the *Building and Construction Industry (Portable Long Service Leave) Act 1991* requires the levy to be paid before a development permit is issued.
- Building and construction industry notification and payment forms are available from any Queensland post office or agency, on request from QLeave, or can be completed on the QLeave website at www.qleave.qld.gov.au. For further information contact QLeave on 1800 803 481 or visit www.qleave.qld.gov.au.

Privacy—The information collected in this form will be used by the Department of State Development, Infrastructure and Planning (DSDIP), assessment manager, referral agency and/or building certifier in accordance with the processing and assessment of your application. Your personal details should not be disclosed for a purpose outside of the IDAS process or the provisions about public access to planning and development information in the *Sustainable Planning Act 2009*, except where required by legislation (including the *Right to Information Act 2009*) or as required by Parliament. This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002*.

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Reference numbers

NOTIFICATION OF ENGAGEMENT OF A PRIVATE CERTIFIER

To

Council. I have been engaged as the private certifier for the building work referred to in this application

Date of engagement	Name	BSA Certification license number	Building classification/s

QLEAVE NOTIFICATION AND PAYMENT (For completion by assessment manager or private certifier if applicable.)

Description of the work	QLeave project number	Amount paid (\$)	Date paid	Date receipted form sighted by assessment manager	Name of officer who sighted the form

The *Sustainable Planning Act 2009* is administered by the Department of State Development, Infrastructure and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agency.

IDAS form 5—Material change of use assessable against a planning scheme

(Sustainable Planning Act 2009 version 3.0 effective 1 July 2013)

This form must be used for development applications for a material change of use assessable against a planning scheme.

You **MUST** complete **ALL** questions that are stated to be a mandatory requirement unless otherwise identified on this form.

For all development applications, you must:

- complete *IDAS form 1—Application details*
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

Attach extra pages if there is insufficient space on this form.

All terms used on this form have the meaning given in the Sustainable Planning Act 2009 (SPA) or the Sustainable Planning Regulation 2009.

This form must also be used for material change of use on strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994* and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008* that requires assessment against the land use plan for that land. Whenever a planning scheme is mentioned, take it to mean land use plan for the strategic port land, Brisbane core port land or airport land.

This form can also be completed online using MyDAS at www.dsdip.qld.gov.au/MyDAS

Mandatory requirements

1. Describe the proposed use. (Note: this is to provide additional detail to the information provided in question 1 of *IDAS form 1—Application details*. Attach a separate schedule if there is insufficient space in this table.)

General explanation of the proposed use	Planning scheme definition (include each definition in a new row) (non-mandatory)	No. of dwelling units (if applicable) or gross floor area (if applicable)	Days and hours of operation (if applicable)	No. of employees (if applicable)
Solar farm	Use Not Defined	300ha	7 days, daylight hours	Approximately 5

2. Are there any current approvals associated with the proposed material change of use? (e.g. a preliminary approval.)

No Yes—provide details below

List of approval reference/s	Date approved (dd/mm/yy)	Date approval lapses (dd/mm/yy)
------------------------------	--------------------------	---------------------------------

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3. Does the proposed use involve the following? (Tick all applicable boxes.)

- | | | | | |
|--|-------------------------------------|----|--------------------------|-----|
| The reuse of existing buildings on the premises | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Yes |
| New building work on the premises | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Yes |
| The reuse of existing operational work on the premises | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Yes |
| New operational work on the premises | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | Yes |

Mandatory supporting information

4. Confirm that the following mandatory supporting information accompanies this application

Mandatory supporting information	Confirmation of lodgement	Method of lodgement
All applications		
<p>A site plan drawn to an appropriate scale (1:100, 1:200 or 1:500 are recommended scales) which shows the following:</p> <ul style="list-style-type: none"> the location and site area of the land to which the application relates (<i>relevant land</i>) the north point the boundaries of the relevant land any road frontages of the relevant land, including the name of the road the location and use of any existing or proposed buildings or structures on the relevant land (note: where extensive demolition or new buildings are proposed, two separate plans [an existing site plan and proposed site plan] may be appropriate) any existing or proposed easements on the relevant land and their function the location and use of buildings on land adjoining the relevant land all vehicle access points and any existing or proposed car parking areas on the relevant land. Car parking spaces for persons with disabilities and any service vehicle access and parking should be clearly marked for any new building on the relevant land, the location of refuse storage the location of any proposed retaining walls on the relevant land and their height the location of any proposed landscaping on the relevant land the location of any stormwater detention on the relevant land. 	<input checked="" type="checkbox"/> Confirmed	Hard copy and electronic
A statement about how the proposed development addresses the local government's planning scheme and any other planning instruments or documents relevant to the application.	<input checked="" type="checkbox"/> Confirmed	Hard copy and electronic
A statement about the intensity and scale of the proposed use (e.g. number of visitors, number of seats, capacity of storage area etc.).	<input checked="" type="checkbox"/> Confirmed	Hard copy and electronic
<p>Information that states:</p> <ul style="list-style-type: none"> the existing or proposed floor area, site cover, maximum number of storeys and maximum height above natural ground level for existing or new buildings (e.g. information regarding existing buildings but not being reused) the existing or proposed number of on-site car parking bays, type of vehicle cross-over (for non-residential uses) and vehicular servicing arrangement (for non-residential uses). 	<input checked="" type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	Hard copy and electronic

A statement addressing the relevant part(s) of the State Development Assessment Provisions (SDAP).	<input checked="" type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	Hard copy and electronic
When the application involves the reuse of existing buildings		
Plans showing the size, location, existing floor area, existing site cover, existing maximum number of storeys and existing maximum height above natural ground level of the buildings to be reused.	<input type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	
When the application involves new building work (including extensions)		
Floor plans drawn to an appropriate scale (1:50, 1:100 or 1:200 are recommended scales) which show the following: <ul style="list-style-type: none"> the north point the intended use of each area on the floor plan (for commercial, industrial or mixed use developments only) the room layout (for residential development only) with all rooms clearly labelled the existing and the proposed built form (for extensions only) the gross floor area of each proposed floor area. 	<input type="checkbox"/> Confirmed	
Elevations drawn to an appropriate scale (1:100, 1:200 or 1:500 are recommended scales) which show plans of all building elevations and facades, clearly labelled to identify orientation (e.g. north elevation)	<input type="checkbox"/> Confirmed	
Plans showing the size, location, proposed site cover, proposed maximum number of storeys, and proposed maximum height above natural ground level of the proposed new building work.	<input type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	
When the application involves reuse of other existing work		
Plans showing the nature, location, number of on-site car parking bays, existing area of landscaping, existing type of vehicular cross-over (non-residential uses), and existing type of vehicular servicing arrangement (non-residential uses) of the work to be reused.	<input type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	
When the application involves new operational work		
Plans showing the nature, location, number of new on-site car parking bays, proposed area of new landscaping, proposed type of new vehicle cross-over (non-residential uses), proposed maximum new vehicular servicing arrangement (non-residential uses) of the proposed new operational work.	<input type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	

Privacy—Please refer to your assessment manager, referral agency and/or building certifier for further details on the use of information recorded in this form.

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The *Sustainable Planning Act 2009* is administered by the Department of State Development, Infrastructure and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agency.

Schedule 3 Assessable Development

Checklist 1—Various aspects of development

(Sustainable Planning Act 2009 version 3.2 effective 1 October 2014)

This checklist applies to the carrying out of various aspects of development, as specified in the Sustainable Planning Regulation 2009, Schedule 3, Part 1, Table 5.

You may complete this checklist as part of your development application. The checklist will:

- help you identify whether you need to make a development application for the proposed development
- help you identify the relevant Integrated Development Assessment System (IDAS) form you need to complete as part of your application
- assist in identifying the assessment manager or referral agency for development that is assessable development under schedule 3 of the Sustainable Planning Regulation 2009.

If your development involves a material change of use, reconfiguring a lot, operational work or building work, it is recommended you complete the relevant checklists: *Checklist 2—Material change of use*, *Checklist 3—Reconfiguring a lot*, *Checklist 4—Operational work*, or *Checklist 5—Building work*.

If you are unsure how to answer any questions on this checklist, phone or visit your local government, or go to the Department of State Development, Infrastructure and Planning's (DSDIP) website at www.dsdip.qld.gov.au.

All terms used in this checklist have the meaning given in the *Sustainable Planning Act 2009* or the Sustainable Planning Regulation 2009.

Part 1—General questions

1.1 Is any part of the proposed development intended to be carried out on a Queensland heritage place under the *Queensland Heritage Act 1992*?

- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> No | • Continue to question 1.2 |
| <input type="checkbox"/> Yes | • Complete part 2 of this checklist |

1.2 Does the proposal involve development on a local heritage place?

- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> No | • Continue to question 1.3 |
| <input type="checkbox"/> Yes | • Complete part 3 of this checklist |

1.3 Is any part of the development on strategic port land or airport land (other than development for a material change of use that is inconsistent with the land use plan for the strategic port land or airport land mentioned in the Sustainable Planning Regulation 2009, Schedule 3, Part 1, Table 2, item 3 or 4)?

- | | |
|--|--|
| <input checked="" type="checkbox"/> No | • End of checklist – A development permit is not required for this aspect of development under Sustainable Planning Regulation 2009, Schedule 3, Part 1, Table 5 |
| <input type="checkbox"/> Yes | • Complete part 4 of this checklist |

Part 2—Queensland heritage place

2.1 Do any of the following apply to the proposal?

The proposed development is only ongoing maintenance or minor work permitted by a general	<input type="checkbox"/> Yes	<input type="checkbox"/> No
---	------------------------------	-----------------------------

exemption certificate issued under section 75 of the <i>Queensland Heritage Act 1992</i> .	
An exemption certificate has been issued under the <i>Queensland Heritage Act 1992</i> .	<input type="checkbox"/> Yes <input type="checkbox"/> No
The proposed development is liturgical development under section 78 of the <i>Queensland Heritage Act 1992</i> .	<input type="checkbox"/> Yes <input type="checkbox"/> No
The work is being carried out by the state.	<input type="checkbox"/> Yes <input type="checkbox"/> No
The work is being carried out in a priority development area.	<input type="checkbox"/> Yes <input type="checkbox"/> No
The development is mentioned in schedule 4 of the Sustainable Planning Regulation 2009.	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If you answered **no** to all of the above, a development permit is required and this application requires assessment by the chief executive of DSDIP as assessment manager or concurrence agency against the *Queensland Heritage Place State Code* in the SDAP.
- Your application must include *IDAS form 3—Queensland heritage place*.
- If you answered **yes** to any of the above, a development permit is not required. End of part 2 of this checklist.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 5, item 2
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 19

Part 3—Local heritage place

3.1 Do any of the following apply to the proposal?

The development is building works to be carried out by or on behalf of the state, a public sector entity or a local government	<input type="checkbox"/> Yes <input type="checkbox"/> No
The development is for public housing	<input type="checkbox"/> Yes <input type="checkbox"/> No
The development is to be carried out by the state on land designated for community infrastructure under the <i>Sustainable Planning Act 2009</i> .	<input type="checkbox"/> Yes <input type="checkbox"/> No
The development is mentioned in schedule 4 of the Sustainable Planning Regulation 2009.	<input type="checkbox"/> Yes <input type="checkbox"/> No
The local heritage place is on an airport lessee's airport land under the <i>Airport Assets (Restructuring and Disposal) Act 2008</i> .	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If you answered **no** to all of the above, a development permit is required and your application to the local government, as assessment manager, must include *IDAS form 4—Local heritage place*.
- If you answered **yes** to any of the above, a development permit is not required.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 5, item 3
- Sustainable Planning Regulation 2009, schedule 3, part 2, table 1, item 1
- *Airports Assets (Restructuring and Disposal) Act 2008*, section 54

Part 4—Strategic port land or airport land

4.1 Does the land use plan for the strategic port land or airport land state that the development is assessable development?

<input type="checkbox"/> No	• A development permit is not required for this aspect of development; end of this checklist.
-----------------------------	---

<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • A development permit is required and your application may include, where applicable: <ul style="list-style-type: none"> • for a material change of use—<i>IDAS form 5—Material change of use assessable against a planning scheme</i> • for building or operational work—<i>IDAS form 6—Building or operational work assessable against a planning scheme</i> • for reconfiguring a lot—<i>IDAS form 7—Reconfiguring a lot</i> • The assessment manager will either be the local government or the port authority or DSDIP.
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Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 5, items 6 and 7

Privacy—Please refer to your assessment manager for further details on the use of information recorded in this checklist.

Disclaimer:

While DSDIP believes that the information contained on this checklist and provided as part of this process will be of assistance to you, it is provided on the basis that you will not rely on the information. It is your responsibility to make your own enquiries regarding the interpretation and application of the applicable legislation to your circumstances.

To the full extent permitted by law, DSDIP expressly disclaims all liability (including but not limited to liability for negligence) for errors or omissions of any kind or for any loss (including direct and indirect losses), damage or other consequence which may arise from your reliance on this process and the information contained on this checklist.

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The Sustainable Planning Act 2009 is administered by DSDIP. This checklist and all other required application materials should be sent to your assessment manager and any referral agency.

Schedule 3 Assessable Development Checklist 2—Material change of use

(Sustainable Planning Act 2009 version 3.2 effective 1 October 2014)

This checklist only applies when the development application seeks approval for a material change of use of premises. Before completing this checklist, please complete *Checklist 1—Various aspects of development*.

You may complete this checklist as part of your development application. The checklist will:

- help you identify whether you need to make a development application for the proposed development
- help you identify the relevant Integrated Development Assessment System (IDAS) forms you need to complete as part of your application
- assist in identifying the assessment manager or referral agency for development that is assessable development under schedule 3 of the Sustainable Planning Regulation 2009.

If your development involves reconfiguring a lot, building work or operational work, it is recommended you complete the relevant checklists: *Checklist 3—Reconfiguring a lot*, *Checklist 4—Operational* or *Checklist 5—Building work*, where relevant.

If you are unsure how to answer any questions on this checklist, phone or visit your local government, or go to the Department of State Development, Infrastructure and Planning's (DSDIP) website at www.dsdip.qld.gov.au

All terms used in this checklist have the meaning given in the *Sustainable Planning Act 2009* or the Sustainable Planning Regulation 2009.

Part 1—General questions

1.1 Is the proposed material change of use of premises for a brothel?

- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> No | • Continue to question 1.2 |
| <input type="checkbox"/> Yes | • Complete part 2 of this checklist |

1.2 Is the proposed material change of use of premises on strategic port land?

- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> No | • Continue to question 1.3 |
| <input type="checkbox"/> Yes | • Complete part 3 of this checklist |

1.3 Is the proposed material change of use of premises on airport land?

- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> No | • Continue to question 1.4 |
| <input type="checkbox"/> Yes | • Complete part 4 of this checklist |

1.4 Is the proposed material change of use of premises for a major hazard facility or proposed major hazard facility?

- | | |
|--|----------------------------|
| <input checked="" type="checkbox"/> No | • Continue to question 1.5 |
|--|----------------------------|

<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • A development permit is required. • The chief executive of DSDIP will be assessment manager or concurrence agency for the development application. • You must complete <i>IDAS form 22—Major hazard facility</i>.
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Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 5
- Sustainable Planning Regulation 2009, schedule 6, table 3, item 4
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 8

1.5 Is the proposed material change of use of a potentially affected premises?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none"> • Continue to question 1.6
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • Complete part 5 of this checklist

1.6 Is the proposed development a potentially sensitive material change of use of premises?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none"> • Continue to question 1.7
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • Complete part 6 of this checklist

1.7 Is the proposed material change of use of premises for aquaculture?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none"> • Continue to question 1.8
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • Complete part 7 of this checklist

1.8 Is the proposed material change of use of premises for an environmentally relevant activity that, under the Environmental Protection Regulation 2008, section 16, is identified as a concurrence ERA (the relevant ERA)?

<input checked="" type="checkbox"/> No	<ul style="list-style-type: none"> • End of part 1 of checklist
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • Complete part 8 of this checklist

Part 2—Brothel

2.1 Do any of the following apply?

More than five rooms in the proposed brothel are proposed to be used for providing prostitution.	<input type="checkbox"/> Yes <input type="checkbox"/> No
Any land, the subject of the development, is in, or within 200 metres of the closest point on any boundary of, a primarily residential area, or an area approved for residential development or intended to be residential in character (measured according to the shortest route a person may reasonably and lawfully take, by vehicle or on foot, between the land the subject of the development and the other land).	<input type="checkbox"/> Yes <input type="checkbox"/> No
Any land, the subject of the development, is within 200 metres of the closest point on any boundary of land on which there is a residential building, place of worship, hospital, school, kindergarten or any other facility or place regularly frequented by children for recreational or cultural activities (measured according to the shortest route a person may reasonably and lawfully take, by vehicle or on foot, between the land the subject of the development and the other land).	<input type="checkbox"/> Yes <input type="checkbox"/> No

Any land, the subject of the development, is within 100 metres of the closest point on any boundary of land on which there is a residential building, place of worship, hospital, school, kindergarten or any other facility or place regularly frequented by children for recreational or cultural activities, measured in a straight line.	<input type="checkbox"/> Yes <input type="checkbox"/> No
The land, the subject of the development, is in a town with a population of less than 25 000, the local government for the local government area has required that all material changes of use for such development within the area be prohibited, and the Minister has agreed that the development should be prohibited.	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **yes** to any of the above, this aspect of the development is prohibited development and a development application cannot be made.
- If **no** to all of the above, a development permit is required. You must complete *IDAS form 9—Brothel*, and submit your application to the local government if the development is completely in a single local government area.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 2
- Sustainable Planning Regulation 2009, schedule 6, table 1, item 1(a)(iv)
- *Sustainable Planning Act 2009*, schedule 1, item 5

Part 3—Strategic port land

3.1 Do any of the following apply?

The proposed material change of use of premises is inconsistent with the land use plan approved under the <i>Transport Infrastructure Act 1994</i> .	<input type="checkbox"/> Yes <input type="checkbox"/> No
The proposed material change of use of premises is assessable development under the land use plan approved under the <i>Transport Infrastructure Act 1994</i> , but is not inconsistent with it.	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **yes** to either of the above, a development permit is required. The port authority may be the assessment manager for the development application (see schedule 6 of the Sustainable Planning Regulation 2009).
- If the proposed material change of use of premises is inconsistent with the land use plan, you are also required to refer the application to the Minister under the *Transport Infrastructure Act 1994* as concurrence agency.
- You must complete *IDAS Form 10—Inconsistent development on strategic port land or Brisbane core port land*.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 3
- Sustainable Planning Regulation 2009, schedule 3, part 1, table 5, item 6
- Sustainable Planning Regulation 2009, schedule 6
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 6

Part 4—Airport land

4.1 Do any of the following apply?

The proposed material change of use of premises is inconsistent with the land use plan approved under the <i>Airport Assets (Restructuring and Disposal) Act 2008</i> .	<input type="checkbox"/> Yes <input type="checkbox"/> No
The proposed material change of use of premises is assessable development under the land use plan approved under the <i>Airport Assets (Restructuring and Disposal) Act 2008</i> for the airport land, but is not inconsistent with it.	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **yes** to either of the above, a development permit is required for this aspect of development. The chief executive of DSDIP may be the assessment manager (see schedule 6 of the Sustainable Planning Regulation 2009).
- If the proposed material change of use of premises is inconsistent with the land use plan approved under the *Airport Assets (Restructuring and Disposal) Act 2008*, you are also required to refer the application to the chief executive of DSDIP as concurrence agency, if the chief executive of DSDIP is not the assessment manager.
- You must complete *IDAS Form 5—Material change of use assessable against a planning scheme*.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 4
- Sustainable Planning Regulation 2009, schedule 3, part 2, table 5, item 7
- Sustainable Planning Regulation 2009, schedule 6, table 2, item 2

Part 5—Potentially affected premises

5.1 Do any of the following apply?

A suitability statement has been given for the premises, a site management plan has been approved in relation to the proposed use and the material change of use only involves: <ul style="list-style-type: none"> • the fit-out of a building, or • minor site excavation (e.g. post holes for open-sided non-habitable structures). 	<input type="checkbox"/> Yes <input type="checkbox"/> No
The proposed use is industrial and only involves minor site excavation (e.g. post holes for open-sided non-habitable structures).	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **no** to both of the above:
 - A development permit is required for this aspect of development
 - The development application will require assessment by the chief executive of DSDIP, as assessment manager or concurrence agency
 - You must complete *IDAS form 24—Contaminated land*
- If **yes** to either of the above, this aspect of development is not assessable development but it is recommended that you provide a copy of any suitability statement or approved site management plan to the assessment manager to support your claim for exemption if any other aspects of your proposed use are assessable development.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 6
- Sustainable Planning Regulation 2009, schedule 6
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 23

Part 6—Potentially sensitive material change of use

6.1 Do either of the following apply?

All or part of the premises is used for, or if there is no existing use, was last used for, an industrial activity (other than a mining activity or chapter 5A activity).	<input type="checkbox"/> Yes <input type="checkbox"/> No
All or part of the premises is in an area for which an area management advice has been given for natural mineralisation or industrial activity (other than for a mining activity or a chapter 5A activity).	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **yes** to either of the above:
 - A development permit is required
 - The development application requires assessment by the chief executive of DSDIP as assessment manager or concurrence agency
 - You must complete *IDAS form 24—Contaminated land*
- If **no** to all of the above, this aspect of development does not require a development permit.

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 7
- Sustainable Planning Regulation 2009, schedule 6
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 23

Part 7—Aquaculture

7.1 Will the proposed material change of use of premises for aquaculture cause discharge of waste into Queensland waters (as defined in section 36 of the *Acts Interpretation Act 1954*)?

- | | |
|------------------------------|---|
| <input type="checkbox"/> No | <ul style="list-style-type: none"> • Continue to question 7.2 |
| <input type="checkbox"/> Yes | <ul style="list-style-type: none"> • End of part 7 of this checklist |

7.2 Do any of the following apply?

<p>The aquaculture is:</p> <ul style="list-style-type: none"> • of indigenous freshwater fish species mentioned in the Fisheries Regulation 2008, schedule 10C • in a catchment listed in that schedule for that species for aquarium display or human consumption only • carried out in ponds, or using above-ground tanks, that have a total water surface area of no more than five hectares. 	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>The aquaculture is of indigenous freshwater fish for aquarium display or human consumption only, or non-indigenous freshwater fish for aquarium display only, and is carried out using only above-ground tanks that have:</p> <ul style="list-style-type: none"> • a floor area, excluding water storage area, of no more than 50m² • a roof impervious to rainwater. 	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>The aquaculture is of indigenous marine fish for aquarium display only and is carried out using only above-ground tanks that have a total floor area, excluding water storage areas, of no more than 50m².</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **no** to all of the above:
 - A development permit is required for this aspect of development and this aspect of development requires assessment by the chief executive of DSDIP as assessment manager or concurrence agency
 - You must complete *IDAS form 25—Aquaculture*
 - End of part 7 of this checklist
- If **yes** to any of the above:
 - A development permit is not required for this aspect of development, but the proposed material change of use will be self assessable development and must comply with applicable codes
 - End of part 7 of this checklist

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 10
- Sustainable Planning Regulation 2009, schedule 3, part 2, table 2, item 1
- Sustainable Planning Regulation 2009, schedule 6
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 28

Part 8—Environmentally relevant activities (ERA)

8.1 Has an environmental authority to carry out a concurrence ERA been approved for the premises?

<input type="checkbox"/> No	<ul style="list-style-type: none"> • Continue to question 8.4
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • Continue to question 8.2

8.2 Is the relevant ERA and the concurrence ERA approved under the environmental authority to be carried out under the environmental authority?

<input type="checkbox"/> No	<ul style="list-style-type: none"> • Continue to question 8.4
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • Continue to question 8.3

8.3 Does the relevant ERA have a lower aggregate environmental score than the concurrence ERA approved under the environmental authority, under the Environmental Protection Regulation 2008, section 14(1)?

<input type="checkbox"/> No	<ul style="list-style-type: none"> • Continue to question 8.4
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • This aspect of development does not require a development permit. End of checklist

8.4 Do all of the following apply?

The environmentally relevant activity is to be carried out in the North Stradbroke Island Region.	<input type="checkbox"/> Yes <input type="checkbox"/> No
The environmentally relevant activity is mentioned in the Environmental Protection Regulation 2008, schedule 2, part 4, section 16.	<input type="checkbox"/> Yes <input type="checkbox"/> No
The environmentally relevant activity involves dredging or extracting more than 10 000 tonnes of material a year.	<input type="checkbox"/> Yes <input type="checkbox"/> No

- If **yes** to all of the above, this aspect of development is prohibited development (to the extent it involves dredging or extracting more than 10 000 tonnes of material a year) and a development application cannot be made. If this is the only aspect of development, end of checklist, otherwise continue to question 8.5
- If **no** to any of the above, continue to question 8.5

8.5 Is the concurrence ERA devolved to local government under the Environmental Protection Regulation 2008?

<input type="checkbox"/> No	<ul style="list-style-type: none"> • A development permit is required and this application requires assessment by the chief executive of DSDIP as assessment manager or concurrence agency • Your application must include <i>IDAS form 8—Environmentally relevant activity</i> • End of checklist
<input type="checkbox"/> Yes	<ul style="list-style-type: none"> • A development permit is required and this application requires assessment by the local government as assessment manager or concurrence agency • End of checklist

Section reference:

- Sustainable Planning Regulation 2009, schedule 3, part 1, table 2, item 1
- Sustainable Planning Regulation 2009, schedule 6
- Sustainable Planning Regulation 2009, schedule 7, table 2, item 1
- *Sustainable Planning Act 2009*, schedule 1, item 13

Privacy—Please refer to your assessment manager, referral agency and/or building certifier for further details on the use of information recorded in this form.

Disclaimer:

While DSDIP believes that the information contained on this checklist and provided as part of this process will be of assistance to you, it is provided on the basis that you will not rely on the information. It is your responsibility to make your own enquiries regarding the interpretation and application of the applicable legislation to your circumstances.

To the full extent permitted by law, DSDIP expressly disclaims all liability (including but not limited to liability for negligence) for errors or omissions of any kind or for any loss (including direct and indirect losses), damage or other consequence which may arise from your reliance on this process and the information contained on this checklist.

OFFICE USE ONLY

Date received

Reference numbers

The Sustainable Planning Act 2009 is administered by DSDIP. This checklist and all other required application materials should be sent to your assessment manager and any referral agency.

APPENDIX B EVIDENCE OF OWNER'S CONSENT

Burdekin Shire Council
PO Box 974
AYR QLD 4807

Dear Sir/Madam,

RE: CONSENT OF LAND OWNER

I, Lyndsay George Russell Hall


Of 374 George Road, Clare QLD 4807
Ph: (07) 4782 7202

being the registered sole owner of land described as

Lot 241 SP199878, Lot 242 GS1028, Lot 243 GS1029,
374 George Road, Clare QLD 4807

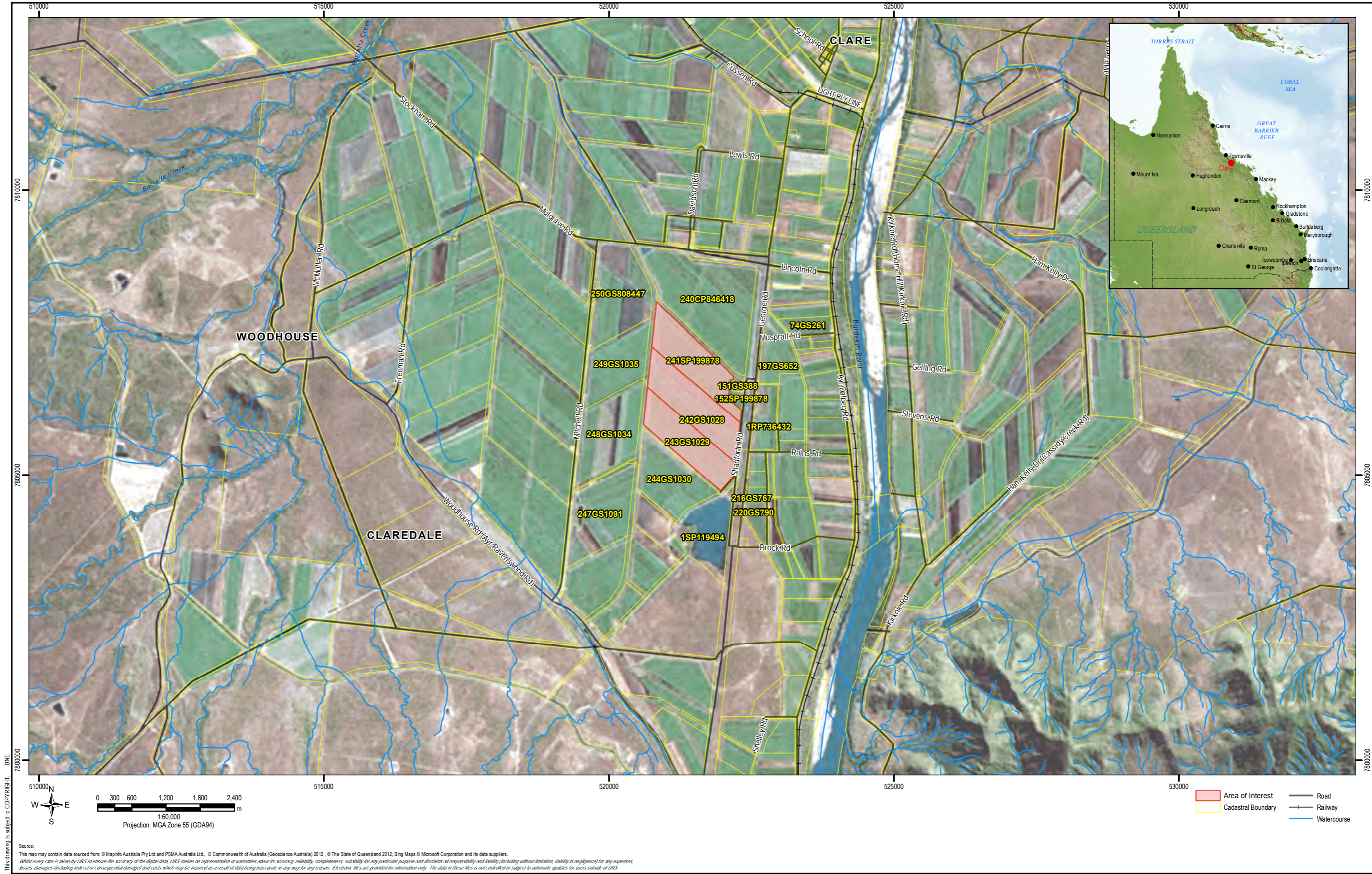
hereby consent to the lodgment of a Material Change of Use development application by FRV Services Australia
Pty Ltd c/- URS

over the site described above, as required for the Clare Solar Farm development project.

Sign and date:  3-11-2014

Lyndsay George Russell Hall, Sole Owner – Lot 241 SP199878, Lot 242 GS 1028, Lot 243 GS1029

APPENDIX C MATERIAL CHANGE OF USE PROPOSAL PLANS



FRV SERVICES
AUSTRALIA
PTY LTD

FRV QUEENSLAND SOLAR FARM DEVELOPMENT APPROVAL CONSULTANCY SERVICES

**LOCATION OF CLARE
SOLAR FARM
DEVELOPMENT**



PLANNING REPORT FOR MATERIAL CHANGE OF USE DEVELOPMENT APPLICATION

File No: 42627398-g-058.mxd Drawn: RG Approved: DD Date: 05-12-2014

Figure: **1-1**

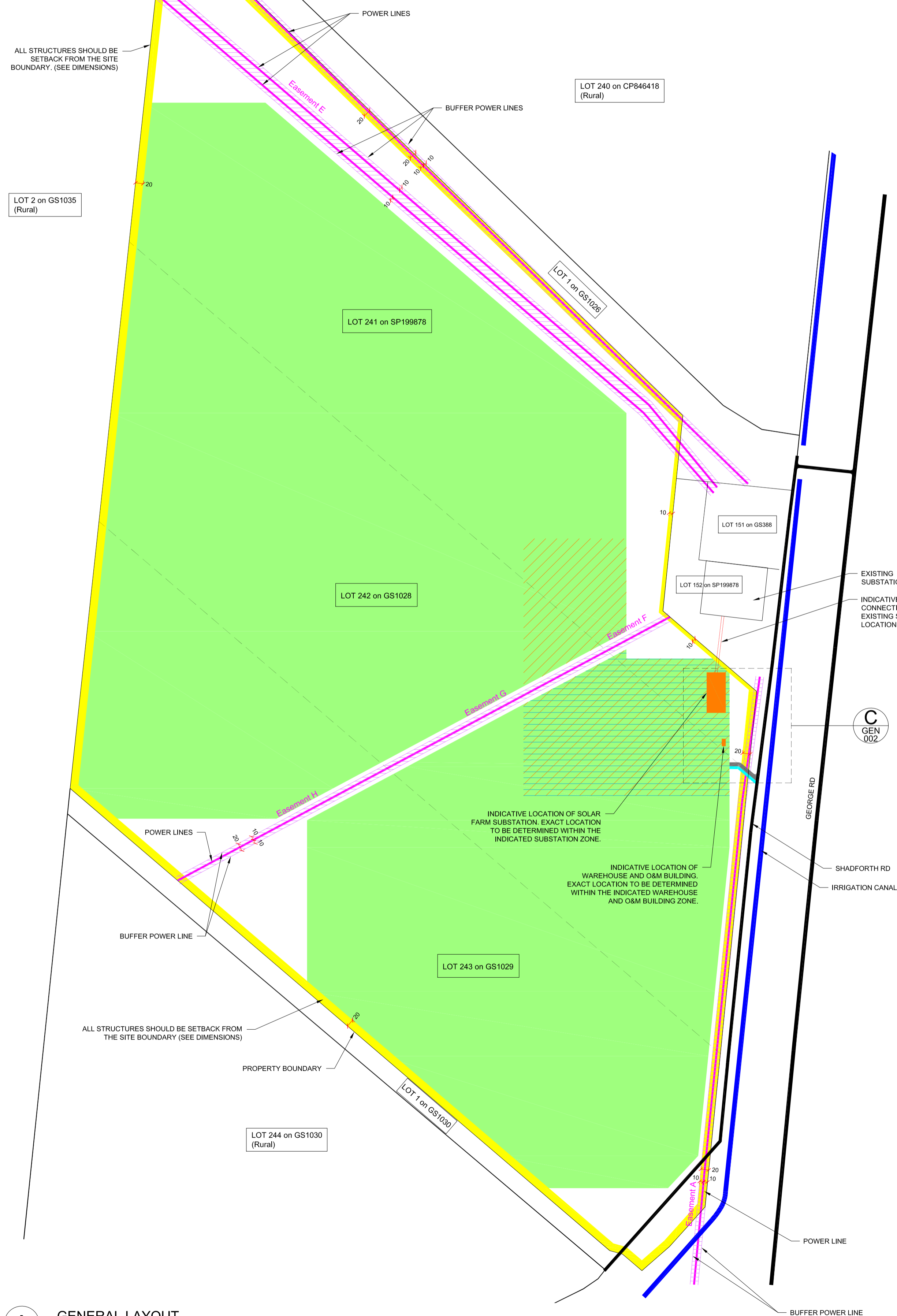
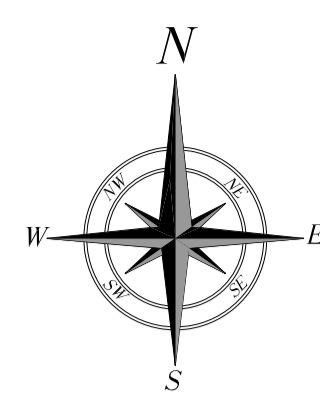
Rev. A A3

GENERAL NOTE

THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS. IT IS INTENDED THAT COMPLETE ELECTRICAL SYSTEMS BE PROVIDED WITH ALL NECESSARY EQUIPMENT, APPURTENANCES, AND CONTROLS, COMPLETELY COORDINATED WITH ALL DISCIPLINES.

NOTES:

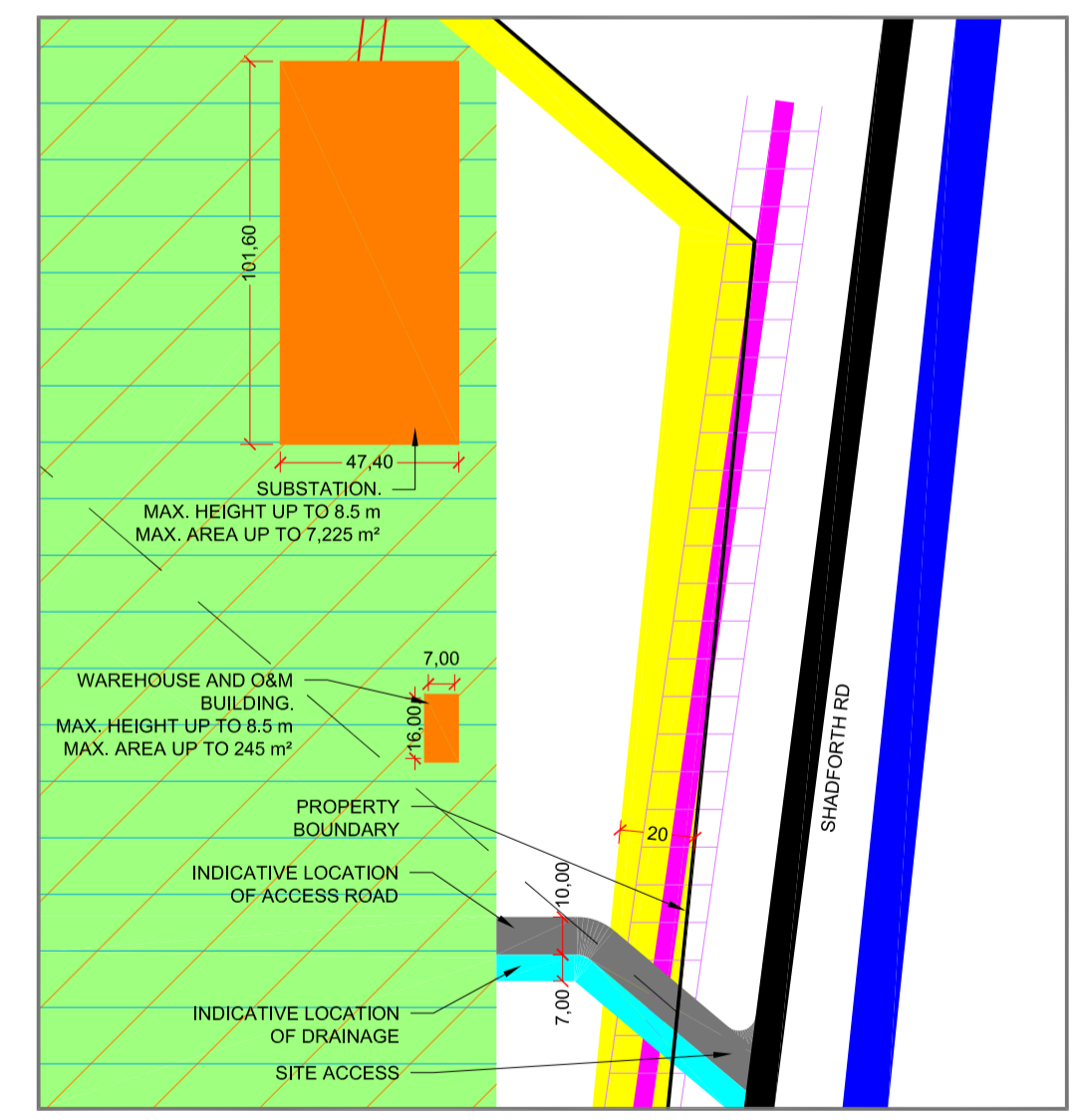
- MEASURES IN METERS



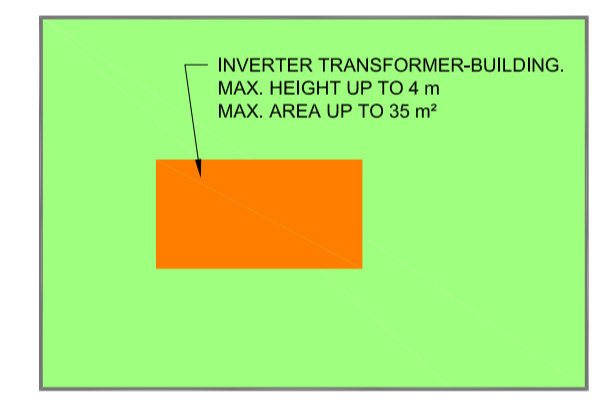
A GENERAL LAYOUT
Scale 1/7000



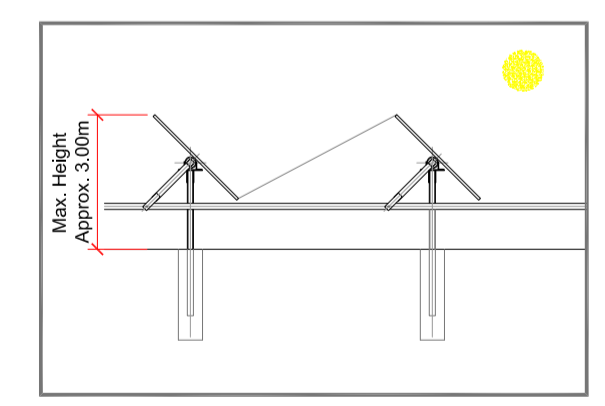
B SOLAR PARK LOCATION
Scale 1/60,000



C ACCESS AND BUILDING
Scale 1/2,000



D INVERTER TRANSFORMER BUILDING
Scale 1/300



E TRACKER DETAIL
NTS

THIS INDICATIVE DESIGN IS FOR REVIEW ONLY AND SHOULD NOT BE USED FOR CONSTRUCTION

SITE BASIC INFORMATION:

Location:	Clare, Shire of Burkedin, Queensland, (Australia).
Latitude:	19° 50' 36.80" S
Longitude:	147° 12' 32.33" E
Elevation:	32 m.a.m.s.l.

TOTAL LAND AREA FOR EACH PROPERTY INVOLVED IN THE PROPOSED DEVELOPMENT:

Lot 241 =	110.7 ha
Lot 242 =	120.1 ha
Lot 243 =	107.3 ha
Total =	338.1 ha

AREA

Approximate Solar Farm Land :	238.82 ha
-------------------------------	-----------

PROPERTY ADDRESS:

374 George Rd, Clare QLD 4807

REV.	DESCRIPTION	DATE	BY
0	INDICATIVE DESIGN	OCT-2014	IN



PROJECT:
CLARE SOLAR FARM DEVELOPMENT

SHEET TITLE
GENERAL LAYOUT

REFERENCE: I14-0053-ING	GEN-002
PAPER SIZE: A1: 840 x 594 mm.	

APPENDIX D TITLE SEARCHES AND REGISTERED PLANS

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 19764489

Search Date: 11/11/2014 10:29

Title Reference: 50699377

Date Created: 24/12/2007

Previous Title: 17749207

REGISTERED OWNER

Dealing No: 711151887 06/11/2007

LYNDSAY GEORGE RUSSELL HALL

ESTATE AND LAND

Estate in Fee Simple

LOT 241 SURVEY PLAN 199878
County of GLADSTONE Parish of MULGRAVE
Local Government: BURDEKIN

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 17749207 (Lot 241 on CP GS1027)
2. EASEMENT IN GROSS No 700599560 11/04/1995 at 08:43
burdening the land to
QUEENSLAND ELECTRICITY COMMISSION
over
EASEMENTS D AND E ON CROWN PLAN GS1027
UNDER SECTION 285 OF THE LAND ACT 1962
3. TRANSFER No 703437563 07/07/1999 at 09:41
EASEMENT IN GROSS: 700599560
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
4. EASEMENT IN GROSS No 700599564 11/04/1995 at 08:43
burdening the land to
THE NORTH QUEENSLAND ELECTRICITY BOARD
over
EASEMENT F ON CROWN PLAN GS1027
UNDER SECTION 285 OF THE LAND ACT 1962
5. MORTGAGE No 703248095 25/03/1999 at 16:08
PRIMARY INDUSTRY BANK OF AUSTRALIA LIMITED A.C.N. 001 621
129

ADMINISTRATIVE ADVICES - NIL

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 19764489

Search Date: 11/11/2014 10:29

Title Reference: 50699377

Date Created: 24/12/2007

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

COPYRIGHT THE STATE OF QUEENSLAND (DEPT OF NATURAL RESOURCES AND MINES) [2014]
Requested By: D APPLICATIONS CITEC CONFIRM

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 19764717

Search Date: 11/11/2014 10:39

Title Reference: 17749213

Date Created: 31/03/1995

REGISTERED OWNER

LYNDSAY GEORGE RUSSELL HALL

ESTATE AND LAND

Estate in Fee Simple

LOT 242 CROWN PLAN GS1028
County of GLADSTONE Parish of MULGRAVE
Local Government: BURDEKIN

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 17749213 (Lot 242 on CP GS1028)
2. EASEMENT IN GROSS No 700597642 10/04/1995 at 09:49
burdening the land to
THE NORTH QUEENSLAND ELECTRICITY BOARD
over
EASEMENT G ON CROWN PLAN GS1028
UNDER SECTION 285 OF THE LAND ACT 1962
3. TRANSFER No 703450779 13/07/1999 at 12:17
EASEMENT IN GROSS: 700597642
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
4. EASEMENT IN GROSS No 700597647 10/04/1995 at 09:49
burdening the land to
QUEENSLAND ELECTRICITY COMMISSION
over
EASEMENT C ON CROWN PLAN GS1028
UNDER SECTION 285 OF THE LAND ACT 1962
5. TRANSFER No 703437563 07/07/1999 at 09:41
EASEMENT IN GROSS: 700597647
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
6. MORTGAGE No 703248095 25/03/1999 at 16:08
PRIMARY INDUSTRY BANK OF AUSTRALIA LIMITED A.C.N. 001 621
129

ADMINISTRATIVE ADVICES - NIL

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 19764717

Search Date: 11/11/2014 10:39

Title Reference: 17749213

Date Created: 31/03/1995

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Requested By: D APPLICATIONS CITEC CONFIRM

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 19764720

Search Date: 11/11/2014 10:39

Title Reference: 17749214

Date Created: 31/03/1995

REGISTERED OWNER

LYNDSAY GEORGE RUSSELL HALL

ESTATE AND LAND

Estate in Fee Simple

LOT 243 CROWN PLAN GS1029
County of GLADSTONE Parish of MULGRAVE
Local Government: BURDEKIN

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
Deed of Grant No. 17749214 (Lot 243 on CP GS1029)
2. EASEMENT IN GROSS No 700597652 10/04/1995 at 09:50
burdening the land to
THE NORTH QUEENSLAND ELECTRICITY BOARD
over
EASEMENT H ON CROWN PLAN GS1029
UNDER SECTION 285 OF THE LAND ACT 1962
3. TRANSFER No 703450779 13/07/1999 at 12:17
EASEMENT IN GROSS: 700597652
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
4. EASEMENT IN GROSS No 700597656 10/04/1995 at 09:51
burdening the land to
QUEENSLAND ELECTRICITY COMMISSION
over
EASEMENTS A AND B ON CROWN PLAN GS1029
UNDER SECTION 285 OF THE LAND ACT 1962
5. TRANSFER No 703437563 07/07/1999 at 09:41
EASEMENT IN GROSS: 700597656
QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
A.C.N. 078 849 233
6. MORTGAGE No 703248095 25/03/1999 at 16:08
PRIMARY INDUSTRY BANK OF AUSTRALIA LIMITED A.C.N. 001 621
129

ADMINISTRATIVE ADVICES - NIL

UNREGISTERED DEALINGS - NIL

CERTIFICATE OF TITLE ISSUED - No

CURRENT TITLE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 19764720

Search Date: 11/11/2014 10:39

Title Reference: 17749214

Date Created: 31/03/1995

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

COPYRIGHT THE STATE OF QUEENSLAND (DEPT OF NATURAL RESOURCES AND MINES) [2014]
Requested By: D APPLICATIONS CITEC CONFIRM

Land Title Act 1994; Land Act 1994
Form 21 Version 2

SURVEY PLAN

Sheet 1 of 2



STN	TO	REMARKS	BEARING	DIST
1	OIP	58/GS1027	45°45'50"	1-006
2	OIP	8/GS1026	314°04'40"	1-585
3	OIP	49/GS1027	186°04'	1-895
4	OIP	48/GS1027	276°02'50"	2-24
5	OIP	50/GS1027	96°02'50"	1-554
6	OIP	52/GS1027	276°02'50"	10-058
8	OIP Gone	20/GS1027	96°03'35"	2-012
9	OIP	38/GS1027	276°03'35"	1-167
10	OIP	39/GS1027	96°03'35"	1-167
15	OIP	46/GS1027	227°51'	1-485
16	OIP Gone	44/GS1027	185°42'	1-136
18	OIP	61/GS1027	108°37'35"	7-202
20	OIP	18a/GS1027	42°26'10"	1-549
23	OIP	18/GS1027	335°29'10"	11-986
24	OIP Gone	17/GS1027	310°32'50"	1-025
25	ORT Gone	86/GS1027	322°18'	13-955
25	OIP	86/GS1027	174°27'	82-574
27	OIP	86/GS1027	171°43'20"	67-671
27	OIP	65/GS1027	130°32'50"	7-492
28	OIP	2/GS1026	280°44'50"	2-155

(New Ref)

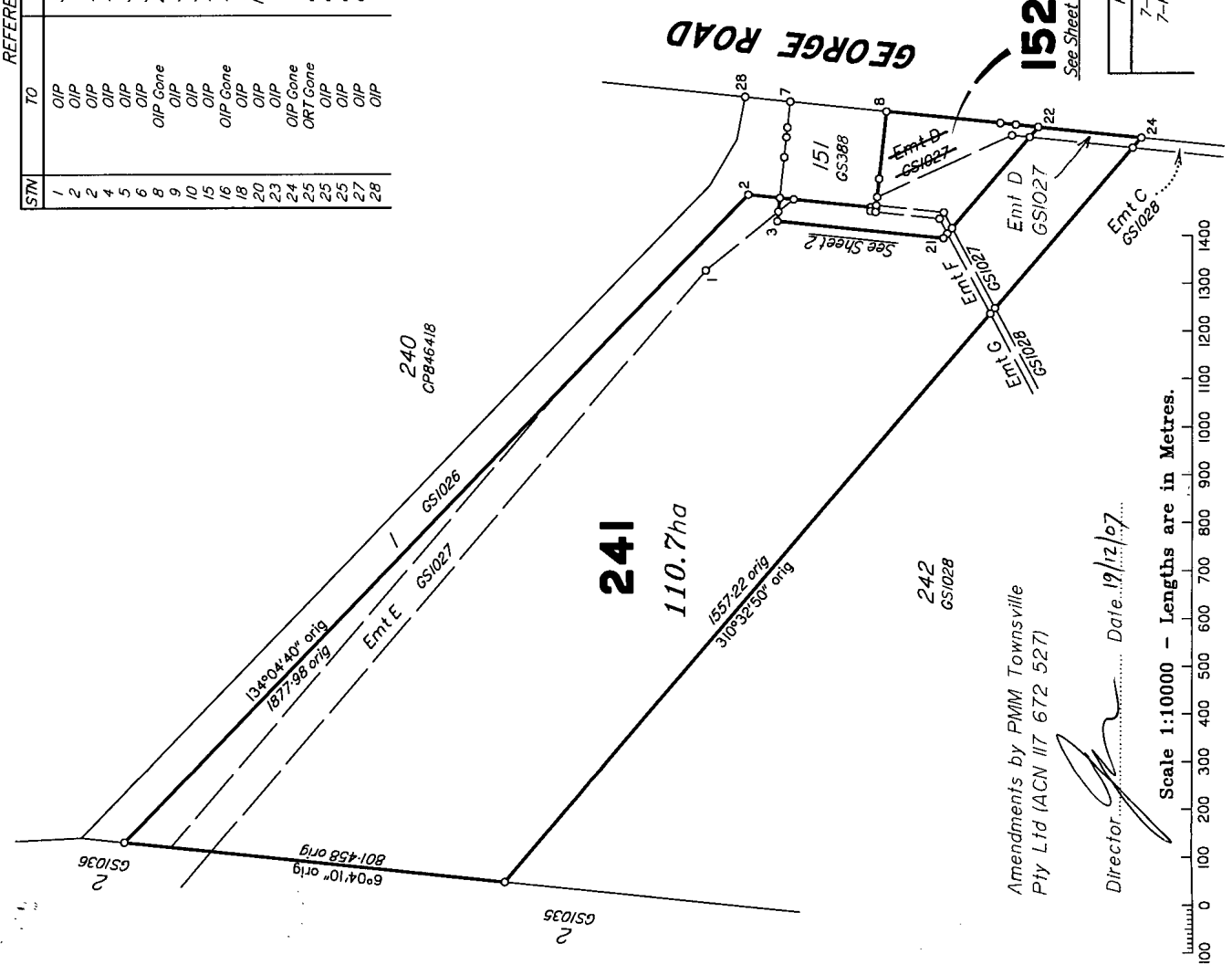
(New Conn)

(A24)
(Under Tower)

Placed at all new corners, unless otherwise stated.

Original information compiled from GS1027 in the Department of Natural Resources and Water.

PERMANENT MARKS	REMARKS	BEARING	DIST	NO
PM	7-OPM	96°02'50"	2-012	2195
	7-PM Fd	75°25'50"	57-204	91504



PMM TOWNSVILLE PTY LTD (ACN 117 672 572) hereby certify that the land comprised in this plan was surveyed by the corporation, by John Stewart HARKER, Cadastral Surveyor, for whose work the corporation accepts responsibility, and that the plan is accurate, that the said survey was performed in accordance with the Survey and Mapping Infrastructure Act 2003 and Surveyors Act 2003 and associated Regulations and Standards and that the said survey was completed on 8th May 2007.

[Signature]
Director
8/10/2007
Date

0 50mm 100mm 150mm State copyright reserved.

Plan of
LOT 152 & 241
Cancelling lot 241 on GSI027

PARISH: **MULGRAVE** COUNTY: **Gladstone**

Meridian: **MGA Zone 55 Vide GSI027** F/N's: **No**

Scale: **1:10000**

Format: **STANDARD**

SP199878

Plan Status:

CLARE SUBSTATION

**WARNING : Folded or Mutilated Plans will not be accepted.
Plans may be rolled.
Information may not be placed in the outer margins.**

711151887

\$375.30
06/11/2007 08:37

BE 400 NT

Registered

s. Lodged by

**QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED, P.O. BOX 1193,
VIRGINIA QLD. 4014
BOX 75 TELEPHONE 3860 2149**

(Include address, phone number, reference, and Lodger Code)

1. Certificate of Registered Owners or Lessees.

I/We LYNDSAY GEORGE RUSSELL HALL

(Names in full)

* as Registered Owners of this land agree to this plan and dedicate the Public Use Land as shown hereon in accordance with Section 50 of the Land Title Act 1994.

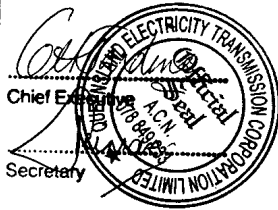
* as Lessees of this land agree to this plan.

Signature of *Registered Owners *Lessees

**QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED as
Constructing Authority of this land agrees to this plan.**

The official Seal of the
**QUEENSLAND ELECTRICITY
TRANSMISSION CORPORATION
LIMITED (ACN 078 849 233)** was
affixed in accordance with its
constitution in the presence of
Gordon Hugh Jardine
**Chief Executive and
Maurice Douglas Brennan
the Secretary**, who certify that they
**are the proper officers to affix such
a seal.**

Item No. 3360



* Rule out whichever is inapplicable

2. Local Government Approval.

*
hereby approves this plan in accordance with the :
%

Dated this day of

..... #

..... #

* Insert the name of the Local Government. % Insert Integrated Planning Act 1997 or
Insert designation of signatory or delegation Local Government (Planning & Environment) Act 1990

3. Plans with Community Management Statement :

CMS Number :

Name :

4. References :

Dept File :
Local Govt :
Surveyor : **82814_02**

6. Existing

Title Reference	Lot	Plan	Created		
			Lots	Interests	Road
17749207	241	GS1027	152 & 241		

ENCUMBRANCE EASEMENT ALLOCATIONS

Easement	Lots to be Encumbered
700599560 (Emt D & E on GS1027)	152 & 241
700599564 (Emt F on GS1027)	152 & 241

MORTGAGE ALLOCATIONS

Mortgage	Lots Fully Encumbered	Lots Partially Encumbered
703248095	152 & 241	

152 & 241	Lot 241 on CP GS1027
Lots	Orig

7. Portion Allocation :

a. Map Reference :
8358-31242

9. Locality :
Clare

10. Local Government :
BURDEKIN SHIRE COUNCIL

11. Passed & Endorsed :
By : **PMM Townsville Pty Ltd**
Date : 9/05/2007
Signed : *[Signature]*
Designation : **Liaison Officer**

12. Building Format Plans only.

I certify that :
* As far as it is practical to determine, no part of the building shown on this plan encroaches onto adjoining lots or road;
* Part of the building shown on this plan encroaches onto adjoining * lots and road

.....
Cadastral Surveyor/Director * Date
* delete words not required

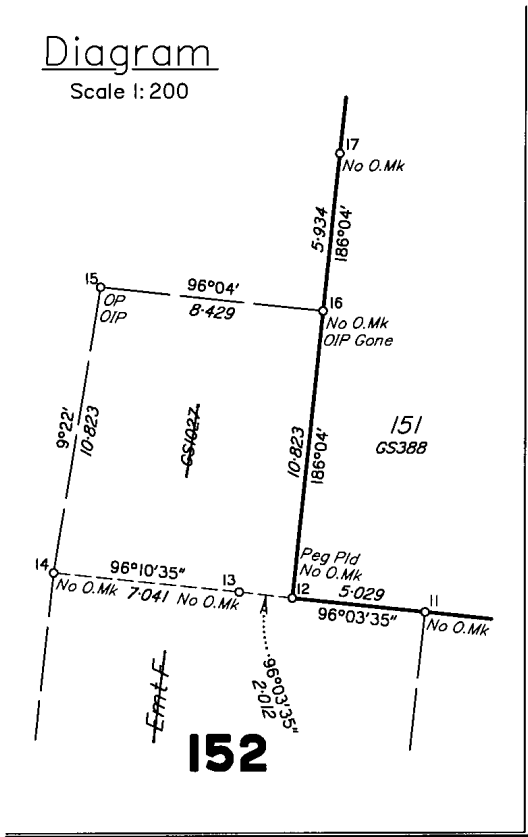
13. Lodgement Fees :

Survey Deposit \$
Lodgement \$
..... New Titles \$
Photocopy \$
Postage \$
TOTAL \$

14. Insert Plan Number
SP199878

Diagram

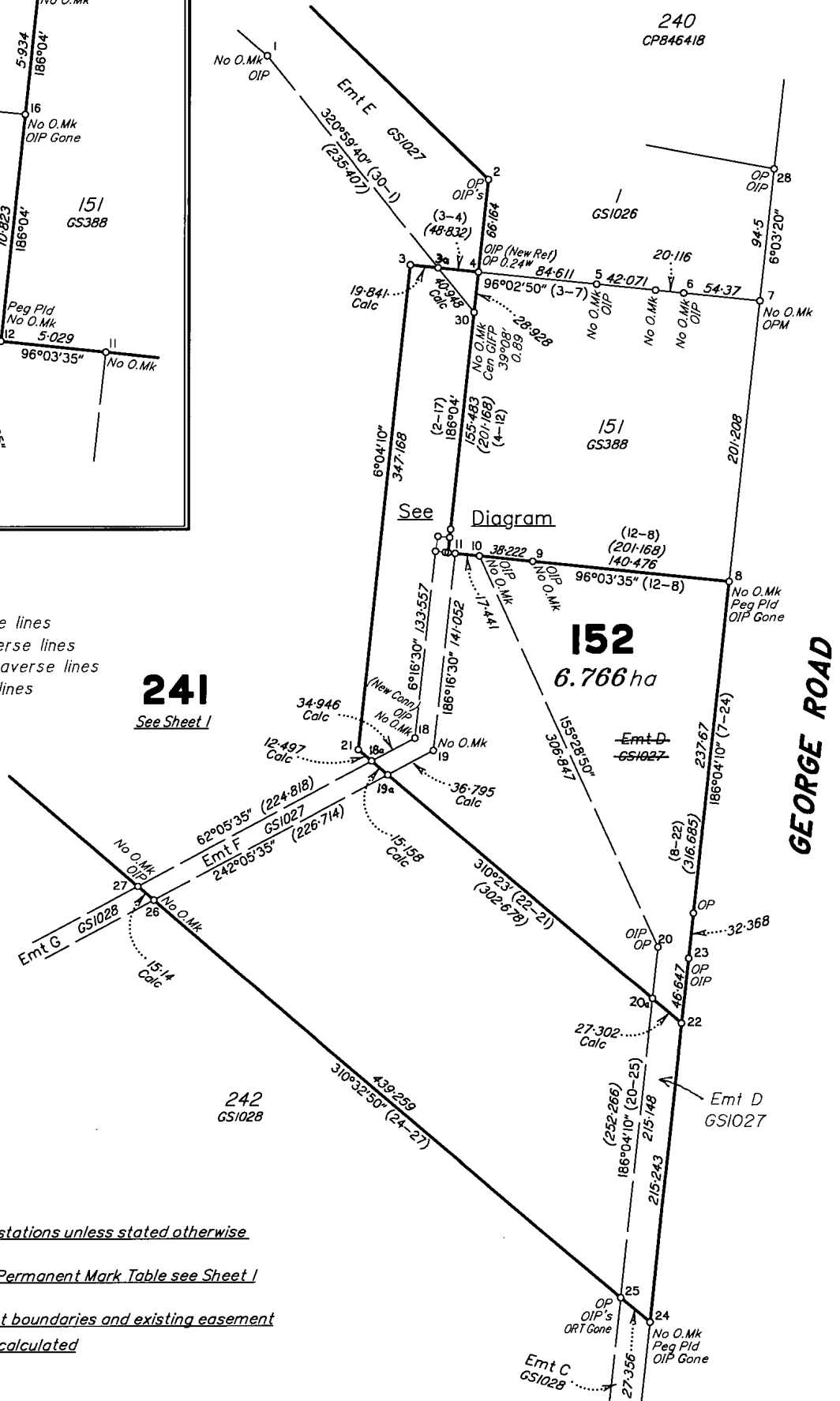
Scale 1: 200



Lines 11-19-19a are traverse lines
Lines 10-20-20a are traverse lines
Lines 6-15-14-18-18a are traverse lines
Line 3a-30 is a traverse lines

241

See Sheet 1

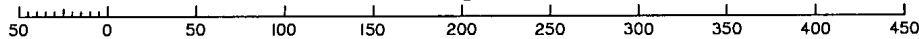


Peg placed at all new stations unless stated otherwise

For Reference Mark & Permanent Mark Table see Sheet 1

Intersections of new lot boundaries and existing easement boundaries have been calculated

Scale 1:3000 - Lengths are in Metres.



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Insert Plan Number **SP199878**

CLARE SUBSTATION

For Additional Plan & Document Notings Refer to CISP

DRAIN AREA

242

EMT G

Emt F G51027

243 G51029

8917 m²

241 G51027

DIAG B Not to Scale

242

241 G51027

DIAG A Not to Scale

EMT G

DIAG B

Emt F G51027

241 G51027

Emt H G51029

120.1 ha

SEE

242

EMT C

1.611 ha

STOCK ROUTE

243 G51029

This is one of three plans G51027, G51028 & G51029 drawn from the one Field Book For DATUM see plan G51029

Branded Peg Placed at Stns 15, 17, 64, 65, 78 & 83-87

Description of Country Lightly & thinly timbered with Poplar Gum M B Ash & Beefwood

DIAG A

SEE

STOCK ROUTE

243 G51029

EMT A G51029

REFERENCE MARKS

STN	TO	BEARING	DIST	REMARK
15	Pin	197° 20'	36.205	
17	Pin	310° 32' 50"	1.025	
65	Pin	130° 32' 50"	7.492	
78	Pin	310° 32' 50"	1.735	
83	Pin	310° 32' 50"	7.533	
85	Pin	130° 32' 50"	1.122	
	S Pkt	6° 05' 40"	37.563	OMRC BM B53239
86	Pin	171° 43' 20"	67.671	Under Tower
	Pop Gum	322° 18'	13.955	^ 241
87	Pin	310° 32' 50"	0.618	
87	S Pkt	186° 03' 06"	176.977	OMRC BM B53240
	S Pkt	6° 03' 50"	323.028	" " B53241

PREVIOUS DESCRIPTION

ORIGINAL FOR LOT Lot 242 :- Por 21 (Pt)

PREVIOUS PLAN G5927

PROCLAIMED SURVEY AREA

MINING FIELD

LAND AGENTS Townsville DISTRICT

LOCAL AUTHORITY Burdekin Shire Council


I, Colin Robert Hansen hereby certify that I/the company have surveyed the land comprised in this plan (either personally or by Personally) for whose work I/the company accept responsibility, that the plan is accurate, that the said survey was performed in accordance with the Surveyors Act 1977 and the Surveyors Regulations 1978 and that the said survey was completed on 17/12/1987

CR Hansen 17/12/1987
Licensed Surveyor Date

SURVEY RECORDS Field Notes LODGED

MERIDIAN		
LINE	PLAN BEARING	A.M.G. BEARING
	AMG Zone 55	
	vide G51027	
Subt.	6°03' for	C.A.M.

PLAN of Lot 242 and Easements C & G in Lot 242



SCALE 1:8000

AUTHORITY	D.M.S. REF.	DRAWN	REGISTERED	CHARTED	MAP REF.
	87K2/937	AM	20/15	PJA	8358-31
			15.1.88	31.8.88	

TOWN

PARISH MULGRAVE

County Gladstone

PLAN G51028

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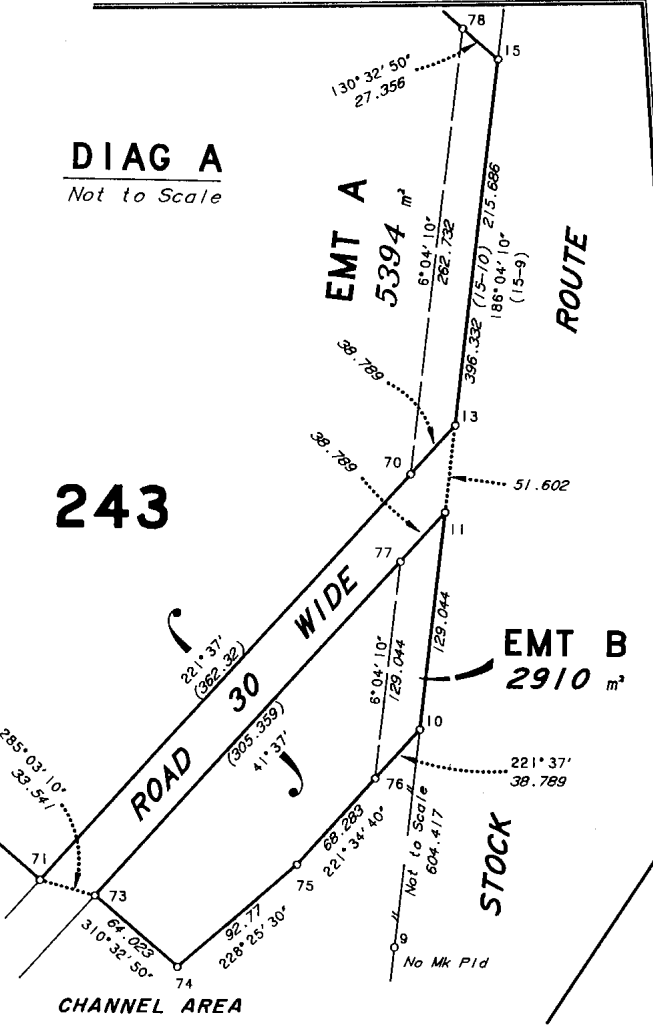
REFERENCE MARKS

STN	TO	BEARING	DIST	REMARK
1	OIP	6° 04' 10"	1.0	
2	OIP	96° 02' 30"	1.006	
3	OIP	186° 04' 10"	1.0	
4	O S Pkt	96° 02' 30"	0.993	
6	Pin	276° 04' 10"	6.246	
7	Pin	276° 04' 10"	2.228	
8	Pin	276° 04' 10"	1.968	
9	Pin	276° 04' 10"	2.329	
10	Pin	226° 52' 54"	14.612	
	Pin	224° 11' 40"	1.275	
	S Pkt	41° 40' 50"	35.823	
11	Pin	127° 56' 40"	1.37	
13	Pin	219° 22'	1.39	
15	Pin	197° 20'	36.205	
17	Pin	310° 32' 50"	1.025	
18	OIP	335° 29' 10"	11.986	New Conn
19	OIP Gone	46° 26' 10"	3.098	
20	OIP	96° 03' 35"	2.012	
70	Pin	188° 53'	2.11	
71	Pin	310° 32' 50"	1.335	
	Ramset	196° 29'	27.566	in Conc
73	Pin	130° 32' 50"	1.42	
74	Pin	310° 32' 50"	1.54	
75	Pin	314° 22'	1.3	
76	Pin	38° 27'	24.276	
77	Pin	0° 23'	1.105	
78	Pin	310° 32' 50"	1.735	
79	S Pkt	44° 39' 40"	4.98	OWRC BM 853247
80	Pin	310° 32' 50"	3.837	
	OIP	244° 14' 45"	235.648	Stn 5 GS684
	S Pkt	126° 16' 35"	66.933	OWRC BM 853249
82	Pin	309° 46'	1.956	
	S Pkt	6° 05' 15"	192.758	OWRC BM 853238
83	Pin	310° 32' 50"	7.533	
85	Pin	130° 32' 50"	1.122	
	S Pkt	6° 05' 40"	37.563	OWRC BM 853239

TRAVERSES

LINE	BEARING	DIST
1-3	6° 04' 10"	30.0
3-4	6° 04' 10"	30.0

For Additional Plan & Document Notings Refer to CISP



PERMANENT MARKS

PM	BEARING	DIST	NUMBER
1 - OPM	96° 02' 30"	2.012	2196
20 - OPM	6° 37' 23"	100.59	15805 Gone
22 - OPM	96° 02' 50"	2.012	2195
74 - PM	160° 11' 25"	42.012	91512

This is one of three plans
GS1027, GS1028 & GS1029
drawn from the one Field Book
For Datum See this Plan.
Branded Peg Placed at Stns
10, 11, 13, 15, 70, 73-79, 80, 81 & 83-85
Branded Post placed at Stns 71 & 82
Fence Post Branded at Stn 75

GG 1998.1.1463
New Road 1.002 ha
(13-11-73-71-13)

Description of Country
Lightly & thinly timbered with
Poplar Gum MB Ash & Beefwood

DIAG B

Not to Scale

PREVIOUS DESCRIPTION

ORIGINAL PORILOT Lot 243 - Por 21 (Pt)

PREVIOUS PLAN GS927

PROCLAIMED SURVEY AREA

MINING FIELD

LAND AGENT Townsville

DISTRICT

LOCAL AUTHORITY Burdekin Shire Council

I, Colin Robert Hansen
herby certify that I have personally surveyed the land comprised in this plan
Personally
for whose work I have accepted responsibility, that the plan is accurate, that the said survey was performed in accordance with the Surveyors Act 1977 and the Surveyors Regulations 1978 and that the said survey was completed on 28/12/1987

CR Hansen 17-12-1987
Licensed Surveyor Date

SURVEY RECORDS... Field Notes... LODGED

MERIDIAN		
LINE	PLAN BEARING	A.M.G. BEARING
	AMG Zone 55 vide GS1027	
Subst.	6°03' for	C.A.M.

PLAN OF Lot 243 and Easements A, B & H in Lot 243

SCALE 1:12,500

AUTHORITY	D.M.S. REF.	DRAWN	REGISTERED	CHARTED	MAP REF.
	87K2/937	AM	15.2.88	PJA 31.8.88	8358-31

TOWN
PARISH MULGRAVE
County Gladstone

PLAN **GS1029**



Report

Solar Farm
Development

AUSTRALIA



Stormwater Assessment - Clare

27 November 2014
42627398/R001/A

Prepared for:
FRV Services Australia Pty Ltd

Prepared by URS Australia Pty Ltd



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APPENDICES

Appendix A	Stormwater Flow Assessment for Clare site	
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ABBREVIATIONS

Abbreviation	Description
ANZECC	Australian and New Zealand Environment and Conservation Council
ARI	Average Recurrence Interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DNRM	Department of Natural Resources and Mines (Queensland)
EC	Electrical conductivity
EHP	Department of Environment and Heritage Protection (Queensland)
EPA	Environmental Protection Authority (Queensland; now defunct)
EPBC	Environmental Protection and Biodiversity Conservation Act 1999 (Cth)
EPP	Environmental Protection (Water) Policy 2009 (Qld)
EV	Environmental value
FRV	Fotowatio Renewable Ventures (FRV) Services Australia Pty Ltd
Ha	Hectare
HEV	High Ecological Value
IFD	Intensity-Frequency-Duration
IPA	<i>Integrated Planning Act 1997</i> (Qld)
Km	Kilometre
m ³ /s	Cubic metres per second
µg/L	Micrograms per litre
mg/L	Milligrams per litre
ML	Megalitre
MNES	Matter of National Environmental Significance
µS/cm	Microsiemens per centimetre
NPRSR	Department of National Parks, Recreation, Sport and Racing (Queensland)
NSW	New South Wales
NTU	Nephelometric Turbidity Units
NWQMS	National Water Quality Management Strategy
QLD	Queensland
ROP	Resource Operations Plan
RPI Act	<i>Regional Planning Interests Act 2014</i> (Qld)
SP Act	<i>Sustainable Planning Act 2009</i> (Qld)
TMR	Department of Transport and Main Roads (Queensland)
TSS	Total suspended solids
URS	URS Australia Pty Ltd
WQIP	Water Quality Improvement Plan
WQO	Water Quality Objective
WRP	Water Resource Plan

EXECUTIVE SUMMARY

FRV Services Australia Pty Ltd (FRV) is seeking approval for the development of a large scale, grid-connected solar farm (the Project) located near the township of Clare in North Queensland. The site is located approximately 35 kilometres (km) from the township of Ayr and falls within the Burdekin Shire Council area. The selected site for the Project is an area of approximately 340 hectares (ha) of agricultural land currently used for growing sugar cane. The Project will consist of the construction and operation of a solar farm utilising photovoltaic (PV) modules.

The site is located within the Haughton River and Barratta Creek sub-catchment of the Lower Burdekin Basin; it is also adjacent to the main channel of the Burdekin River (the main channel is within the Burdekin Delta (Home Hill) sub-catchment). The site drains to a partially engineered irrigation channel (named Clay Creek in downstream reaches), which begins at the northern edge of the site and flows to Barratta Creek. Barratta Creek flows north for approximately 35 km before discharging to the Coral Sea near the small township of Jerona, within Bowling Green Bay National Park.

Environmental values (EVs) associated with surface water within the project area and the immediate surrounds of the Burdekin Delta include:

- Aquatic ecosystems
- Aquaculture (Burdekin Delta only)
- Human consumption
- Irrigation
- Farm water supply (Burdekin Delta only)
- Stock watering
- Primary recreation (Burdekin Delta only)
- Secondary recreation
- Visual recreation
- Industrial uses (Burdekin Delta only)
- Cultural and spiritual values.

The potential impacts of stormwater discharges from the Project on surface water quality and quantity arise from a range of activities associated with the construction, operation and decommissioning phases. This investigation considers that the impacts associated with the Project could be appropriately managed by implementing a range of mitigation measures during the various phases of the Project.

1 INTRODUCTION

1.1 Project Overview

FRV Services Australia Pty Ltd (FRV) is seeking approval for the development of a large scale, grid-connected solar farm (the Project) located near the township of Clare in North Queensland. The site is located approximately 35 kilometres (km) from the township of Ayr and falls within the Burdekin Shire Council area. The selected site for the Project is an area of approximately 340 hectares (ha) of agricultural land currently used for growing sugar cane. The location of the development site and surface water environment is shown in Figure 1-1 below. The proposed layout of the site is shown in Figure 1-2 below.

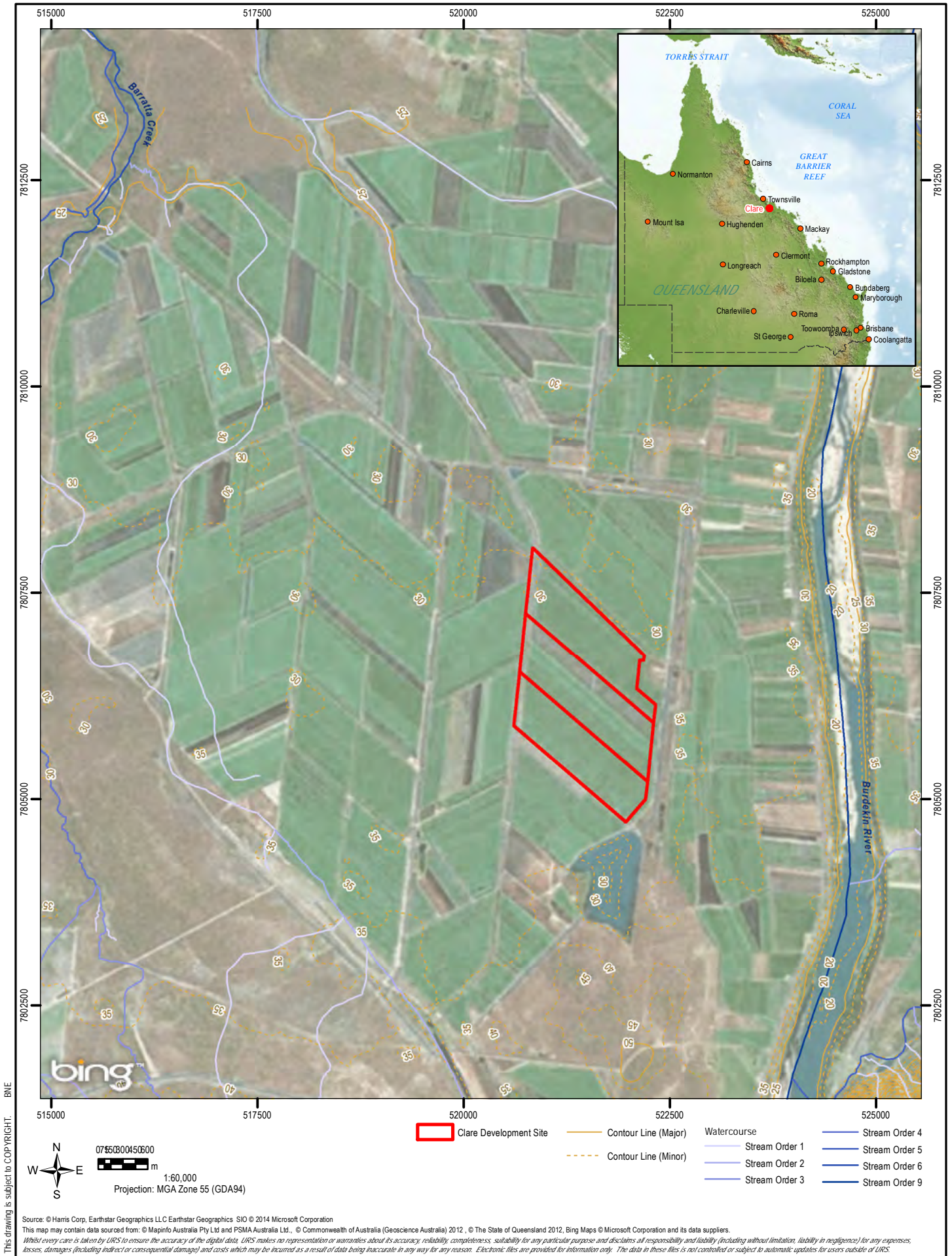
The Project will comprise the construction and operation of a solar farm utilising photovoltaic (PV) modules. The generation of electricity from the solar farm will provide a clean and renewable energy alternative to fossil fuel, such as coal and gas. Based on the preliminary design, the Project will utilise a tracking system to ensure the modules are exposed to the optimal amount of solar irradiation every day by rotating the PV modules east to west, following the sun across the sky. Inverters will be used to convert the direct current electricity generated by the PV modules into alternating current, and a transformer will increase the voltage to a level suitable for injection into the national electricity grid. The final design of the Project will confirm the plant configuration layout and specific equipment to be used, as well as the solar farm's electricity generating capacity.

The Project will connect into the electricity grid via the existing Clare substation, which is located immediately north-east of the proposed solar farm site.

FRV have previously sought and obtained development approvals for large scale solar farm projects in New South Wales and the Australian Capital Territory, including Australia's largest operating solar development; Royalla Solar Farm near Canberra.

1.2 Scope and Purpose of Stormwater Assessment

URS was engaged by FRV to identify all watercourses and other surface water bodies within and adjacent to the Clare development area; identify the environmental values (EVs) associated with the surface water environment; assess the potential impacts of the project (caused by changes to stormwater runoff during construction, operation and decommissioning of the solar farm), and develop strategies to minimise and manage any potential adverse impacts to the surface water environment.



FRV SERVICES
 AUSTRALIA
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FRV QUEENSLAND SOLAR FARM DEVELOPMENT
 APPROVAL CONSULTANCY SERVICES

**LOCATION OF CLARE
 DEVELOPMENT SITE AND
 SURFACE WATER ENVIRONMENT**



STORMWATER ASSESSMENT - CLARE

Figure: **1-1**

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Drawn: RG

Approved: JG

Date: 27-11-2014

Rev. A

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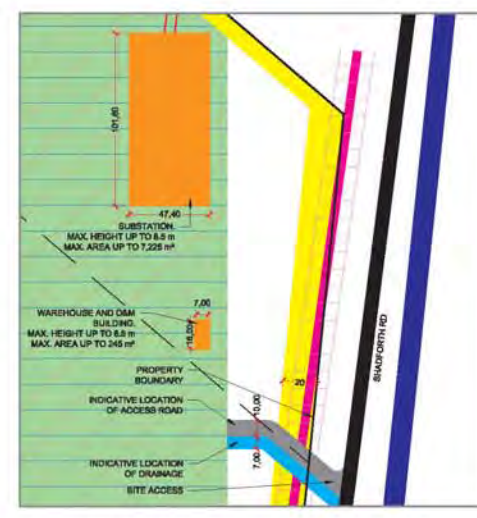




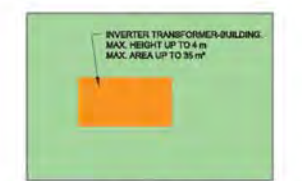
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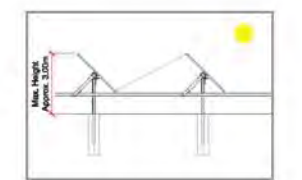
B SOLAR PARK LOCATION
Scale 1/60,000



C ACCESS AND BUILDING
Scale 1/2,000



D INVERTER TRANSFORMER BUILDING
Scale 1/300



E TRACKER DETAIL
NTS

- PHOTOVOLTAIC PLANT OCCUPIED AREA
- SUBSTATION ZONE
- WAREHOUSE AND O&M BUILDING ZONE
- BUFFER POWER LINES
- BUFFER PROPERTY BOUNDARY

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PROPOSED SITE LAYOUT FOR CLARE



STORMWATER ASSESSMENT - CLARE

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Figure: 1-2

Rev. A A3



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2 RELEVANT LEGISLATION

2.1 Commonwealth

Commonwealth legislation applicable to the management of stormwater for the proposed development at Clare is outlined in Sections 2.1.1 and 2.1.2 below.

2.1.1 *Environmental Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) outlines requirements relating to the management and protection of national and international flora and fauna of environmental significance, referred to as Matters of National Environmental Significance (MNES) (Volume 1, Chapter 2, Part 3, Division 1).

The MNES that are most relevant to the proposed project under the EPBC Act are as follows:

- World heritage properties
- National heritage places
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty these wetlands are listed)
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Great Barrier Reef Marine Park.

Barratta Creek, a watercourse that drains from the north-western corner of the proposed development site at Clare, discharges to the Coral Sea via the Bowling Green National Park. Lowland areas of the Bowling Green National Park are listed under the Ramsar Convention as a wetland of international importance, namely due to its provision of habitat for migratory birds. It is also home to rare and threatened species such as the green turtle; dugong; little tern, and eastern curlew (NPRSR 2000). Section 17B of the EPBC Act provides for the protection of wetlands of international importance, and outlines the penalties for offences relating to such wetlands. However, given that the site at Clare is located on Barratta Creek over 30 kilometres upstream of Bowling Green National Park it was determined that there would be an insignificant risk to the ecological value of the wetlands. As such, Section 17B (2b) of the EPBC Act (and sections relating to the additional MNES listed above) is not triggered by the proposed development.

2.2 State

State (Queensland) legislation applicable to the management of stormwater for the proposed development at Clare is outlined in Sections 2.2.1 to 2.2.4 below.

2.2.1 *Environmental Protection Act 1994 (Qld)*

The *Environmental Protection Act 1994* (EP Act) aims to:

[Protect] Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).

The primary instrument by which surface water management is achieved under the EP Act is the *Environmental Protection (Water) Policy 2009* (EPP Water; refer to Section 2.2.1.2). The EP Act is administered by the Queensland Department of Environment and Heritage Protection (EHP).

The following regulations and policies are also relevant under the EP Act:

- *Environmental Protection (Waste Management) Policy 2000*
- *Environmental Protection (Waste Management) Regulation 2000*
- *Environmental Protection Regulation 2008.*

2.2.1.1 *Environmental Protection (Water) Policy 2009*

The EPP Water defines the surface water EVs to be enhanced or protected, and outlines the indicators and water quality guidelines to be utilised for protecting those values. Water quality objectives for specific catchments are listed within Schedule 1. The Burdekin Basin is not scheduled under the EPP Water, and therefore surface water EVs and water quality objectives for the Clare site have been identified using alternative sources (as described in Sections 3.3 and 3.4 below).

2.2.2 *Water Act 2000*

The *Water Act 2000* (Water Act) provides a framework to deliver sustainable water planning, allocation management and supply processes to provide for the improved security of water resources in Queensland. The Water Act and its instruments are administered by the Queensland Department of Natural Resources and Mines (DNRM). Water Resource Plans (WRPs) and Resource Operations Plans (ROPs) are governed by the Water Act. WRPs establish a framework for sharing water between human consumptive needs and environmental values. ROPs are developed in parallel with WRPs and provide a framework by which objectives from which the WRPs are implemented, including water allocations and administrative directions.

2.2.2.1 *Water Resource (Burdekin Basin) Plan 2007*

The proposed development at Clare is located within Sub-catchment B (Haughton Water Management Area) of the Burdekin Basin. Any watercourses associated with the site are therefore subject to the provisions of the Water Resource (Burdekin Basin) Plan 2007 (WRP). The WRP provides a 'framework for sustainably managing water and the taking of water', and regulates interference with or taking of overland flow water. The latter is most relevant for the site of the proposed development at Clare, which has existing drainage channels and infrastructure to allow for the use of overland flow water in irrigation of sugar cane crops (as described in Section 3.2.2).

2.2.2.2 *Resource Operations (Burdekin Basin) Plan 2009*

The Resource Operations (Burdekin Basin) Plan (ROP) is applicable to the proposed development at Clare, because the site is located within the Burdekin Haughton Water Supply Zone (as outlined in Section 3.2.2 below). The ROP implements the provisions of the WRP by “specifying rules and operational requirements for managing surface water resources” (DNRM 2009, p3). This includes an outline of how supplemented water management schemes within the Burdekin Basin will be regulated, and how water allocations may be traded and/or altered. Activities within the Burdekin Haughton Water Supply Zone need to be managed in a way that supports both the human use and ecological requirements of the Burdekin River system.

2.2.2.3 *Water Regulation 2002*

The *Water Regulation 2002* provides guidance for watercourse identification, and has provisions for the use of water resources (such as water sharing and water licensing rules, and the establishment of water authorities and supply schemes). Under Section 61 (b) of the regulation, any operational work in the area controlling the flow of water into or out of the Burdekin River would be declared as an assessable development. The proposed site at Clare does not drain directly to the Burdekin River (within the Haughton River Drainage and Embankment Area, scheduled in Plan FN/DED/HA1 held by DNRM) due to topographic constraints. Therefore, the proposed development is not assessable under the *Water Regulation 2002*.

2.2.3 ***Nature Conservation Act 1992***

The objective of the *Nature Conservation Act 1992* is to conserve nature while allowing for human use values, such as those described in Section 3.3:

- a) *The involvement of indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition of Island custom;*
- b) *The use and enjoyment of protected areas by the community, and*
- c) *The social, cultural and commercial use of protected areas in a way consistent with the natural and cultural and other values of the areas.*

As a component of the natural landscape, surface waters are considered to be inherently linked with these values. Areas that are usually protected by this Act may include for example, national parks, dedicated conservation areas, wilderness areas, or forest reserves.

2.2.4 ***Sustainable Planning Act 2009***

The *Sustainable Planning Act 2009* (SP Act) is the principal item of legislation regulating both development and planning in Queensland. Under this act, the Integrated Development Assessment System (IDAS) is used as a common scheme for public authorities to adhere to when assessing development applications.

The Burdekin Shire Council IPA Planning Scheme (Burdekin Planning Scheme 2011) under which stormwater on the proposed development site will be managed (as per Section 2.3.1 below) is based on the over-arching principles and requirements outlined in the SP Act.

2.2.5 Regional Planning Interests Act 2014

The *Regional Planning Interests Act 2014* (RPI Act) identifies and protects areas of Queensland that are of regional interest. In doing this, the RPI Act seeks to manage the impact and support coexistence of resource activities and other regulated activities in areas of regional interest.

The proposed development will not involve any regulated activities as listed under Section 11 of the RPI Act and therefore it does not apply to the proposed development.

2.3 Local

Local (regional) planning instruments which regulate the management of stormwater for the proposed development at Clare are outlined in Section 2.3.1.

2.3.1 Burdekin Planning Scheme 2011

The proposed development site at Clare is located within the Burdekin Shire; a local jurisdiction governed by the Burdekin Shire Council. The Burdekin Shire Council developed a Planning Scheme under the *Integrated Planning Act 1997* (Qld); which is currently administered under the SP Act. The Burdekin Planning Scheme provides a strategic framework for planning development on a regional scale and is the primary instrument governing surface water resources (specifically stormwater) within the Burdekin Shire. Strategic objectives which apply to the proposed development at Clare (with regards to stormwater) are as follows:

Strategy 1: Flooding and Coastal Processes

Minimise the detrimental effects of inundation by storm surge, tidal surge or flood waters upon development

Relevant Outcomes:

- a) *Development (material change of use and reconfiguration of lot) is located to avoid detrimental inundation by floodwaters, stormwater or tidal surge and accommodates the dynamic relationship between the river catchments and the coastal processes.*
- b) *New development within the existing urban environment of the Burdekin is developed to accommodate any potential flooding impacts from floodwaters, stormwater or tidal surge.*

Strategy 2: Integrated Catchment Management

Implement integrated catchment management principles to protect the catchments and the sub-catchments of the Shire's creek and river systems.

Relevant Outcomes:

- a) *The biodiversity values of the Burdekin River catchment and other significant local catchments including but not limited to those of the Haughton River, Bowen River, Bogie River, Barramundi Creek and Barratta Creek, are recognised and protected for their environmental values.*

- b) *Development protects ground and surface water quality, retains native vegetation and riparian corridors and protects biodiversity to conserve valuable ecosystems.*

Strategy 3: Land and Water Management

Land and water resources are used sustainably for the economic, social and environmental wellbeing of the Shire.

Relevant Outcomes:

- a) *Development minimises adverse impacts including the capability of long-term consequences on land and water systems including surface and ground water quality;*
- b) *Development in all areas of the Shire protects existing drainage regimes and does not negatively impact on overland surface water flows.*
- c) *Land uses occur sustainably by utilising existing and available land and water resources, including irrigation and ground water recharge channels; and*
- d) *Development retains native vegetation, riparian corridors and protects biodiversity to conserve viable ecosystems.*

In addition to these over-arching strategies, the Burdekin Planning Scheme 2011 also lists specific outcomes and acceptable solutions within the Rural Zone Code (applicable to the Clare site) which need to be met by proposed development. Those relating specifically to stormwater management are listed in Table 2-1. Detailed information regarding how the proposed development at Clare will comply with the accepted solutions listed in the Burdekin Planning Scheme 2011 is included in Section 5.3 of this report.

Table 2-1 Specific outcomes and acceptable solutions from the Rural Zone Code for stormwater management applicable to the proposed Clare development (adapted from Table 1 of the *Burdekin Planning Scheme 2011*)

Reference	Specific outcome	Reference	Acceptable solution
O13	Development on land within 100m of a waterway protects the habitat and biodiversity values of the waterway.	S13	Riparian vegetation is retained and/or rehabilitated along each side of a waterway, within at least: a) 50m of each high bank of a river; and b) 25m of each bank of a creek or stream.
O14	Wetlands are adequately protected from the impacts of adjacent development.	S14	Development is set back: a) 50m from the maximum water level of freshwater wetlands; and b) 100m from the HAT line of a tidal wetland.

Reference	Specific outcome	Reference	Acceptable solution
O17	All activities maintain the water quality of Burdekin Shire's groundwater, waterways and surface water storages.	S17.1	<p>Premises:</p> <ul style="list-style-type: none"> a) with activities which involve the handling of water-borne pollutants are provided with bunded, impervious surfaces linked to an integrated drainage and treatment system; b) with activities which involve the storage of waste water are provided with properly designed and constructed, secure, sealed storage facilities; and c) contain all liquid wastes and discharge them to a sewer or removed from the site for treatment and disposal to an approved facility.
		S17.2	<p>Development is set back:</p> <ul style="list-style-type: none"> - 25m for stream orders 1 or 2; - 50m for stream orders 3 or 4; - 100m for stream orders 5 or greater <p>With stream orders determined by 1:100,000 DNRM topographic mapping (or 1:250,000 where 1:100,000 is unavailable).</p>
O18	Development has adequate provision for managing stormwater, to ensure that the environmental values of the surface and groundwater resources are not diminished.	S18	<p>Premises have:</p> <ul style="list-style-type: none"> a) adequate physical measures for intercepting and treating surface water drainage and spilled substances prior to their release to the waterway; b) bunding of sites or areas within sites or integrated drainage systems which include waste water treatment measures, where chemicals, fuels, lubricants and other soluble pollutants are being handled on site; and c) discharges to surface waterways meet ANZECC guideline standards.
O19	Development minimises erosion occurring on the site and sediments leaving the site.	S19	<p>Development incorporates soil erosion and sedimentation management by:</p> <ul style="list-style-type: none"> a) avoiding extensive land clearing and earthworks of land with a slope steeper than 15%; b) minimising the extent of disturbance on slopes steeper than 10% (1:10); c) managing and controlling surface drainage by using natural flow paths where ever possible; and d) incorporating sediment traps to prevent the movement of sediment off site.

Reference	Specific outcome	Reference	Acceptable solution
O20	All premises make adequate provision for stormwater and liquid wastes to be managed so that the: a) environmental values of surface and ground water resources are not diminished; and b) the health and wellbeing of the Shire's inhabitants are maintained.	S20	All liquid wastes are contained and discharged to a sewer or removed from the site for treatment and disposal to an approved facility.
O21	Site drainage is detained and treated for the removal of sediments and gross pollutants prior to the release to the environment.	S21	Sealed impervious areas are provided with receptors for spills and contamination to be treated or removed off-site.
O22	Soluble and insoluble pollutants do not flow to the environment either by stormwater flows or inadequate liquid waste management.	S22.1	Stormwater drainage from a high frequency storm event over the site is treated for the removal of sediments, gross particulates and oil residues prior to release to an approved point of discharge.
		S22.2	Bunded impervious areas are provided such that potential spills of contaminants are controlled, treated and removed off-site to an approved waste management facility.

3 SURFACE WATER ENVIRONMENT

3.1 Site Drainage and Surface Water Bodies

The site is located within the Haughton River and Barratta Creek sub-catchment of the Lower Burdekin Basin; it is also adjacent to the main channel of the Burdekin River (the main channel is within the Burdekin Delta (Home Hill) sub-catchment). The site drains to a partly engineered irrigation channel (named Clay Creek in downstream reaches), which begins at the northern edge of the site and flows to Barratta Creek. Barratta Creek flows north for approximately 35 km before discharging to the Coral Sea near the small township of Jerona, within Bowling Green Bay National Park.

The proposed Clare development site is located less than 2 km west of the left bank of the Burdekin River; however, it is separated from the channel by elevated topography. The site may be subject to inundation by the Burdekin River during significant flood events, but it does not drain to the River. The Burdekin River flows through the Burdekin Delta and discharges into the Coral Sea, 20 km downstream. The Burdekin Basin is a Great Barrier Reef catchment.

3.2 Land Use

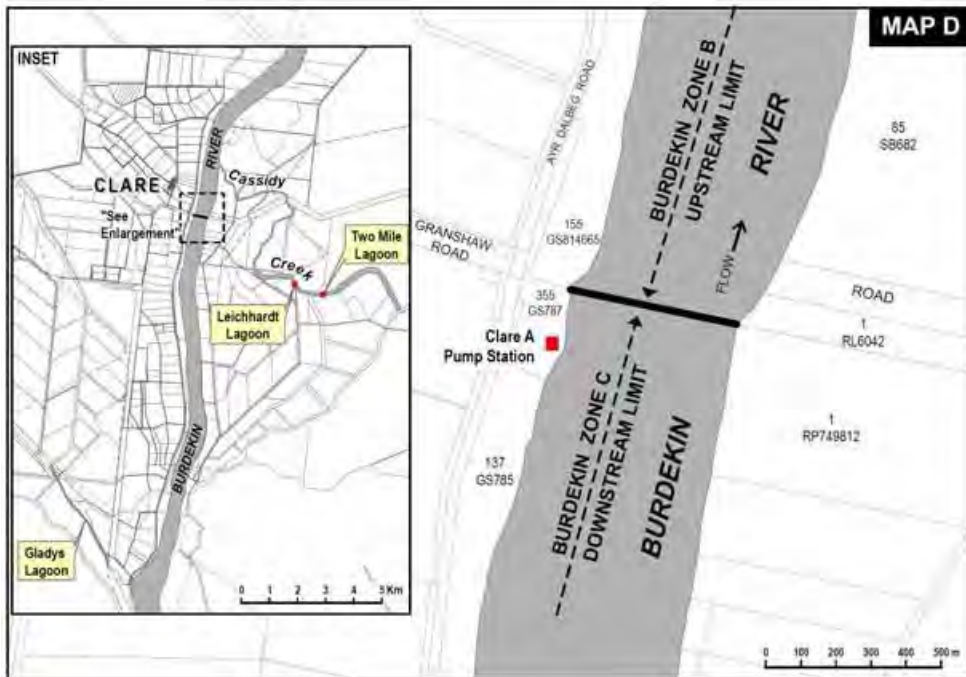
3.2.1 *Historic*

The township of Clare was officially established in 1882 (Burdekin Shire Council 2014). The first sugar cane mills began operating during the same period (late 1880s), with irrigation of sugar cane fields introduced to the area in 1885. The Inkerman irrigation scheme (which serviced sugar cane lands of Home Hill (then known as Inkerman) and surrounding districts began in 1922. This was followed by the establishment of the 7,500 ha Burdekin River Irrigation Area in the early 1950s, encompassing Clare and the neighbouring towns of Millaroo and Dalberg (SunWater n.d.). The irrigation scheme was supplied by the Gorge and Blue Valley Weirs, and the Eungella Dam on the Broken River from the 1980s onwards. Today's system of irrigation channels (on both banks of the Burdekin River) is serviced by major pump stations on the Clare Weir. The southernmost boundary of the proposed development location at Clare is approximately 1.5 km directly west of the Clare Weir.

3.2.2 *Current*

Irrigated sugar cane farming is currently the dominant land use activity within the Home Hill portion of the Burdekin Delta sub-catchment (NQ Dry Tropics 2009; p124). Most of the remaining land is utilised for livestock grazing. The Clare Weir regulates stream flow on the Burdekin River to supply local irrigation channels for broadacre crops (predominantly sugar cane). As such, Zone B of the Burdekin Haughton Water Supply Scheme is downstream of the proposed Clare development site (illustrated in Figure 3-1).

Figure 3-1 Burdekin Houghton Water Supply Scheme Zone Boundaries at Clare (DNRM 2009; Attachment 2, Map D)



Water users listed in the Burdekin Basin Resource Operations Plan for Zone B of the Burdekin Houghton Water Supply Scheme are summarised in Table 3-1. The maximum total nominal volume (ML) of water permitted for distribution under the Burdekin Houghton Water Supply Scheme in Burdekin Zone B is 350,000 ML (for medium priority allocations) and 20,000 ML for high priority allocations (DNRM 2009; Table 13, p25).

Table 3-1 Water allocations distributed and managed under the resource operations licence for the Burdekin Houghton Water Supply Scheme - Zone B (DNRM 2009; Attachment 6a)

Water allocation number	Family Name/Company	Purpose	Nominal volume (ML)	Priority
623	Poli	Rural	480	Medium
626	Kelly	Rural	966	Medium
627	Todd	Rural	660	Medium
628	M & T Populin Pty Ltd; Colevale Estates Pty Ltd; Twin Rock Pty Ltd	Any	74	Medium
631	Cvjetanovic	Rural	200	Medium
632	Lafrenz	Rural	800	Medium
634	Haselton	Rural	800	Medium
636	Paul	Rural	800	Medium
637	Marano	Rural	650	Medium
644	Cox; Robbie	Rural	11500	Medium
646	Haselton	Rural	800	Medium
647	Elax Pty Ltd; Lefab Pty Ltd; Delljon Pty Ltd	Rural	1044	Medium

Water allocation number	Family Name/Company	Purpose	Nominal volume (ML)	Priority
648	Poli	Rural	656	Medium
649	Poli	Rural	884	Medium
650	Cox	Rural	6200	Medium
652	Ivory	Rural	800	Medium

3.3 Environmental Values

There are currently no EVs scheduled under the EPP Water for the Lower Burdekin River and its tributaries. However, draft EVs indicated for the Burdekin Delta and Barratta Creek sub-catchments in the *Lower Burdekin Water Quality Improvement Plan* (NQ Dry Tropics 2009; p132) are outlined in Table 3-2.

Table 3-2 Applicable EVs for the Barratta Creek and Burdekin delta sub-catchments (adapted from NQ Dry tropics 2009; p128 and 132)

EV	Barratta Creek	Burdekin Delta
Aquatic ecosystems	Yes	Yes
Aquaculture	No	Yes
Human consumption	Yes	Yes
Irrigation	Yes	Yes
Farm water supply	No	Yes
Stock watering	Yes	Yes
Primary recreation	No	Yes
Secondary recreation	Yes	Yes
Visual recreation	Yes	Yes
Industrial uses	No	Yes
Cultural and spiritual values	Yes	Yes

In addition to these draft EVs, there are two areas within the wider Burdekin Delta sub-catchment (and downstream of the Clare location) which contain High Ecological Value (HEV) waters (NQ Dry tropics 2009; p131). These two areas are:

- a) Estuarine wetlands within Bowling Green Bay National Park (recognised internationally as a Ramsar wetland); including a portion of the wetlands contained within the Barratta Creek sub-catchment, and
- b) Estuarine wetlands at the mouth of the Burdekin River.

The aquatic ecosystem EVs of the Burdekin River and two of its tributaries (Plantation and Kalamia Creeks) have been assessed as 'Highly Disturbed' due to alterations to flow regime and inputs of irrigation tailwater arising from surrounding land use. A similar characterisation has been applied to the middle reaches of Barratta Creek, which are immediately downstream of the Clare site (NQ Dry Tropics 2009). The remainder of the Barratta Creek catchment is classified as only slightly to moderately disturbed.

According to a recent study the Burdekin Delta is losing approximately 108,074 tonnes of soil per year; 67% of this soil loss is attributable to stream bank erosion (NQ Dry Tropics 2009;

p130). In addition to water quality impacts caused by erosion, the water quality of the Burdekin river has been further affected by disrupted connectivity and salinity regimes as a result of the Clare weir (Lankester et al. 2007; p17).

The Barratta Creek sub-catchment loses an estimated 59,651 tonnes of soil per year; only 17% of which is attributable to stream erosion. The predominant contributor to soil loss is hillslope erosion (69%); this also affects the sediment and nutrient loads in the catchment (NQ Dry Tropics 2009; p126).

3.4 Water Quality Objectives

A study completed by Lankester *et al.* (2007) as part of a Burdekin Dry Tropics Natural Resource Management (NRM) Coastal Catchments Initiative identified preliminary water quality objectives (WQOs) for the protection of various EVs in the Lower Burdekin River. The WQOs were developed on the basis of data collected throughout the catchment for the Water Quality Improvement Plan (WQIP) Lower Burdekin Pesticides Investigation Project and the Burdekin Event Monitoring Program between 2005 and 2006. Values from existing guidelines such as those included in the ANZECC (2000) guidelines, and the National Water Quality Management Strategy (NWQMS), were also used to assess the characteristics of surface water within the catchment. The WQOs applicable to the Burdekin River (adjacent to the proposed Clare development site) are outlined in Table 3-3.

Table 3-3 Preliminary WQOs for the Lower Burdekin River (from Lankester *et al.* 2007; Table 2a, p22)

Long term WQOs – to achieve slight to moderate level of disturbance (in highly disturbed systems)				
Parameter	Units	Aquatic Ecosystems (Lowland streams) ¹	Primary Industries – Irrigation ²	Primary Industries – Stock water
Ammonia-N	µg/L	6	-	-
NOx - N	µg/L	15	-	400,000
Organic N	µg/L	225	-	-
Total Nitrogen	µg/L	250	5,000	-
Filterable Reactive Phosphorus	µg/L	15	-	-
Total Phosphorus	µg/L	30	50	-
Turbidity	NTU	25	-	-
Total suspended solids	mg/L	10	-	-

Notes:

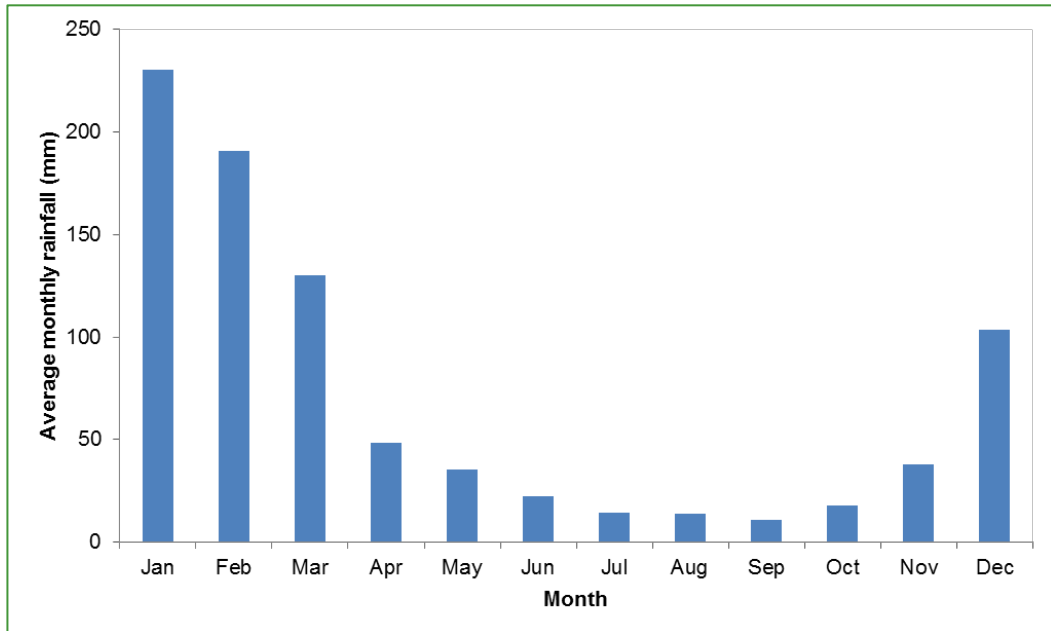
- 1 Derived using value from EHP 2009 *Queensland Water Quality Guidelines*, Department of Environment and Heritage Protection, Brisbane (originally cited as EPA 2006a in Lankester *et al.* 2007, p22)
- 2 Derived using value from ANZECC/ARMCANZ 2000 guidelines .

4 BASELINE ENVIRONMENTAL CHARACTERISATION

4.1 Climate

The Clare site is located within a tropical rainforest (monsoonal) climate region of Australia, according to the Köppen climate classification system. It is typically hot and humid during the summer months and dry and cooler in winter. The wet season lasts between approximately October and April. The average rainfall received during the wet season in the region is between 600 and 900 mm (BoM 2011). This decreases to an average of between 200 and 300 mm of rainfall during the dry season. Figure 4-1 shows that January has the highest rainfall on average (230 mm) at Clare, while the driest months are between July and September (less than 15 mm per month). This variation in rainfall between the dry and wet seasons has a significant effect on streamflow in the region, as discussed in Section 4.2.

Figure 4-1 Average monthly rainfall (mm) at Clare (BoM Station number 33122, data collected since 1895)



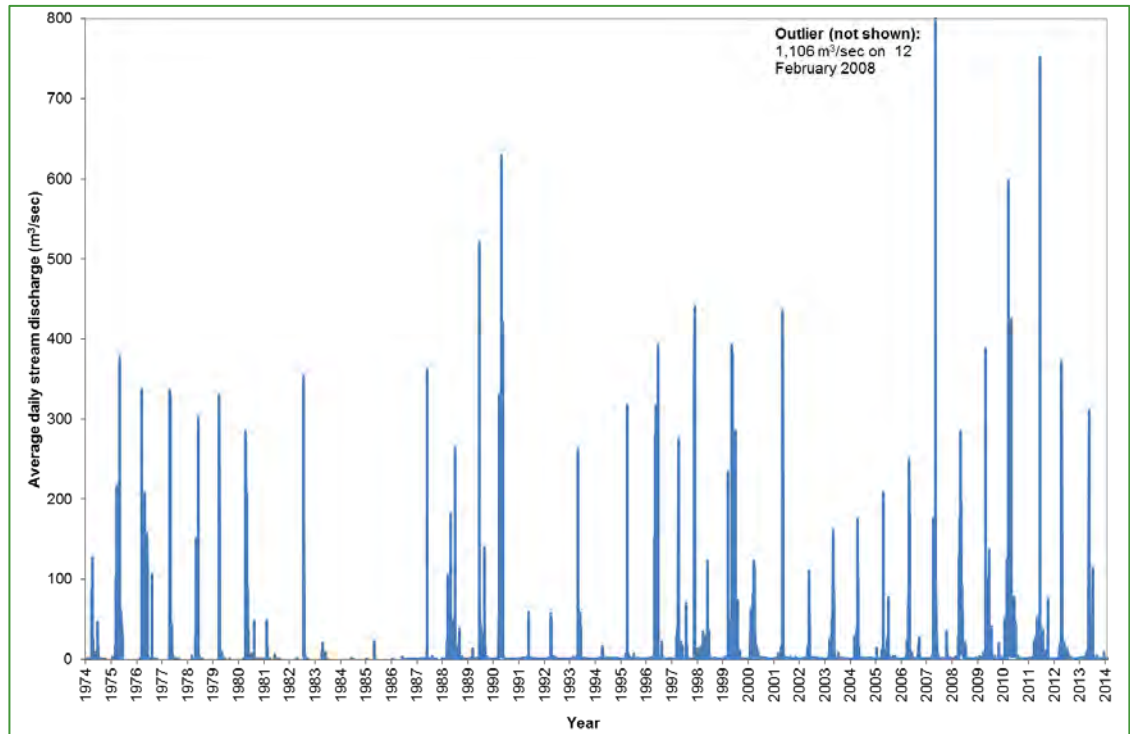
4.2 Surface Water Hydrology

The topography of the site at Clare indicates that stormwater runoff typically flows down-gradient from the south-eastern corner of the property, towards the north-west. A system of drainage channels on the site are understood to channel all stormwater runoff through an existing irrigation drain (sometimes referred to as ‘Clay Creek’) into the headwaters of Barratta Creek, approximately ten kilometres from the north-western corner of the site. A total catchment area of 375 ha was identified to quantify the expected stormwater volumes for the site under pre- and post-development scenarios, outlined further in Section 5.1.

Average daily streamflow measured at a DNRM gauge (119101A; Barratta Creek at Northcote) downstream of the Clare site indicated that stream discharge through Barratta Creek is typically less than 50 m³/sec during the dry season (May to September; when flow was present); but it can increase over ten-fold to more than 500 m³/sec during the monsoonal wet season. This variation is illustrated in Figure 4-2. The highest average daily stream

discharge on record was 1,106 m³/sec, which occurred on 12 February 2008. Based on the data available from DNRM Gauge 119101A, and climate information presented in Section 4.1, it was determined that Barratta Creek is highly ephemeral and exhibits the hydrological characteristics common to the ephemeral, tropical river systems which comprise the greater part of the Burdekin Basin.

Figure 4-2 Average daily stream discharge (m³/sec) at DNRM Gauge 119101A Barratta Creek at Northcote (1974 to 2014)



4.3 Flooding

An assessment of flood risk was not undertaken for the Clare development site.

4.4 Geomorphology

The geomorphic character of the surface water receiving environment associated with the Clare development site has been assessed at a high level. The desktop assessment was completed on the basis of data sourced from recent aerial photographs and LiDAR, analysed using ArcGIS software. There are three components to the surface water environment surrounding the Clare site:

- 1 Burdekin River (not hydrologically connected to the site, but is a major watercourse within close proximity and therefore a potential flood hazard)
- 2 Barratta Creek, within the Haughton River and Barratta Creek sub-catchment of the Burdekin Basin
- 3 An irrigation drain (occasionally referenced as 'Clay Creek' in the middle to downstream reaches) stretching approximately from the north-west corner of the Clare site to Barratta Creek.

4.4.1 Burdekin River

The Burdekin River where it flows adjacent to the township of Clare has been assigned a Strahler stream order number¹ of 9.. It is the primary channel of the Burdekin Basin, and one of the largest river systems in Queensland. The Burdekin River is a single channel with low sinuosity and extensive sediment supply, which is evident by the narrow width of the meandering thalweg compared to the width of the single channel itself (at bankfull). It is a suspended-load dominated system, which means that it will remain very stable (i.e. have a very low risk of migrating laterally across the floodplain) but transport large volumes of fine sediment and sand during high flow events.

4.4.2 Barratta Creek

Barratta Creek, immediately upstream of where the irrigation drain (Clay Creek) flows into the primary channel, has been assigned a Strahler stream order number of 6. From this location, the channel meanders passively downstream for approximately 25 km before flowing underneath the Bruce Highway (near the township of Barratta). From this point, the channel sinuosity becomes increasingly tortuous as it flows for another 15 km towards the delta within Bowling Green National Park. The tributaries of Barratta Creek within the delta are highly anastomosing, giving the landscape a dissected appearance in aerial photographs.

The aerial imagery also indicates the presence of ridge and swale topography in the delta, with anastomosing tributaries of the primary channel, however these features would need to be confirmed via ground-truthing in the field. Ridge and swale topography typically features ridges (paleo scroll bars (point bar sand/sediment deposits) that have been incorporated into a floodplain over time) and swales (low flow channels interspersed between ridges on the floodplain). These features indicate a highly active floodplain with lateral accretion (Brierley & Fryirs 2005).

The increasingly active meandering of the channel downstream, combined with high levels of lateral instability within the delta region, indicates that the Barratta Creek system has both a high capacity for streamflow, and an increasing supply of sediment downstream. The floodplains are likely to be comprised of paleo-deposits from historic lateral movement of the channel, and as such may be erosive. The primary channel of Barratta Creek is likely to be prone to lateral instability during periods of prolonged, high flow (as can occur during the wet season).

¹ Stream ordering provides an indication of the relative size of a watercourse based on the number of tributaries draining to it. The Strahler (1957) numbering system is widely used to identify the major watercourses within a network. A watercourse with no tributaries is assigned a stream order value of one. The stream order value increases as tributaries intersect.

4.4.3 Irrigation Drain (Clay Creek)

The irrigation drain (referred to as Clay Creek by some sources, namely Bing Maps (2014)) has a Strahler stream order number of between 1 (at the north-west corner of the Clare site) and 2 (further downstream, approaching Barratta Creek). This indicates that it is highly ephemeral, and as such would only flow during active periods of irrigation (by surrounding water users) and/or during periods of prolonged and intense rainfall such as during the monsoonal wet season. The appearance of a straightened channel in the upper reaches of the drain as seen from aerial photographs, indicate that the drain has been engineered over an existing drainage feature (Clay Creek). Approximately six kilometres downstream of the Clare site, the drain appears to resume its natural channel features. The channel meanders gently across open, grassed alluvial floodplains for approximately 3.5 km before joining Barratta Creek.

Due to the straightened nature of the channel in the upper reaches, it can be assumed that flow velocity would be highest in those reaches during a high flow event. This may create erosion in the lower reaches of the channel, where natural substrate is likely to be present.

4.5 Riparian Vegetation

Information about the riparian margins of Barratta Creek directly downstream of the Clare site is limited. However, remnant vegetation fringing the south-eastern boundary of the property was identified in August 2014. This vegetation was comprised of *Eucalyptus platyphylla* and *Corymbia spp.* woodland on alluvial plans (Regional Ecosystem 11.3.9). Given that these species are dominant across the wider Townsville Plains province surrounding Clare, it was assumed that they would also be common in vegetated margins of Barratta Creek.

Aerial photographs (Bing Maps 2014) of the headwaters of Barratta Creek, directly north-west of the Clare site, indicated that the channel features continuous riparian vegetation with an established canopy. The adjacent alluvial floodplains appear to be dominated by open grassland, interspersed by small tree and shrub species. The irrigation drain leading from the Clare site to Barratta Creek (adjacent to Stockham Road; in places named as 'Clay Creek') has very sparse riparian vegetation; the margins here are dominated by crops or grassland for at least six kilometres before the junction with Barratta Creek.

4.6 Surface Water Quality

Background surface water quality within the Burdekin River and Barratta Creek was characterised using data from two DNRM monitoring locations, each approximately 5 km downstream of the proposed Clare development site:

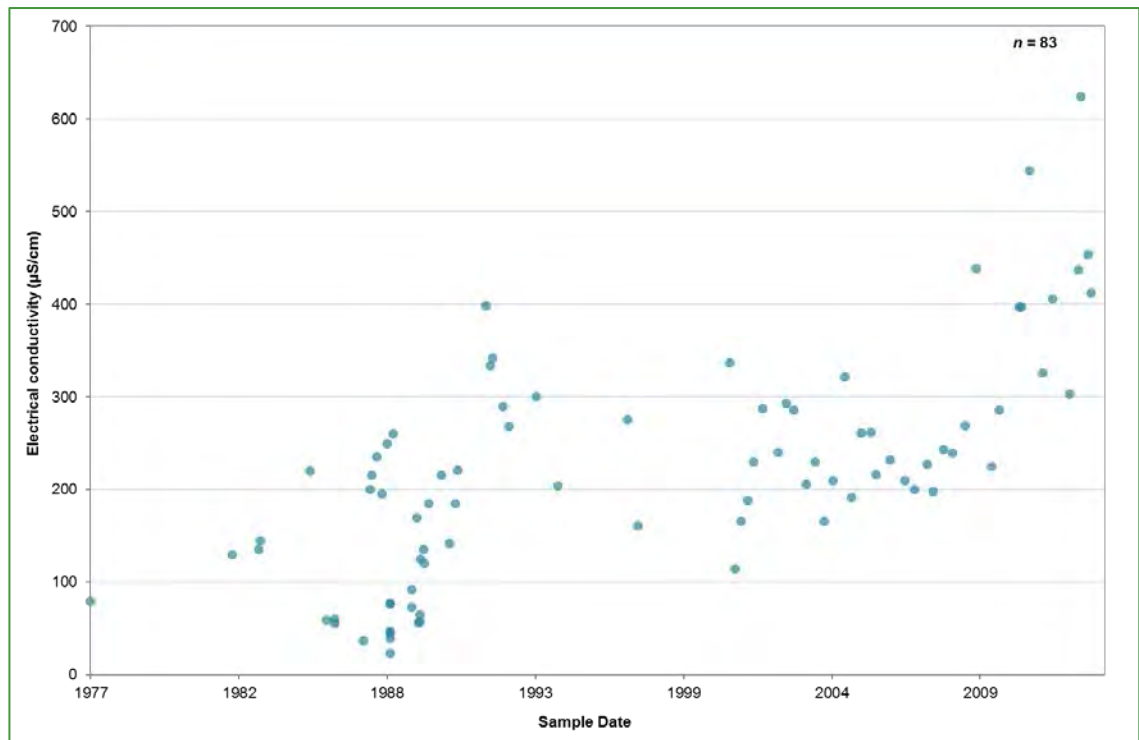
- Gauge 120006B: Burdekin River at Clare; and
- Gauge 119101A: Barratta Creek at Northcote

Ambient water quality data has been collected at both locations since the mid-1970s. Water quality parameters were selected from this dataset and used to develop a basic understanding of downstream water quality. The distribution of results for each parameter is discussed for Barratta Creek (Figure 4-3 to Figure 4-9, Section 4.5.1), then compared with the summary statistics for water quality in the Burdekin River in Table 4-1 at the end of this section. This comparison was included in the assessment to show how water quality within the downstream receiving environment (Barratta Creek) reflects the characteristics of surface waters across the wider region (Burdekin River). Where applicable, water quality in the Burdekin River and Barratta Creek has been compared with the preliminary WQOs for protection of aquatic ecosystem EVs in the Lower Burdekin River, described in Section 3.4 (Table 3-3).

4.6.1 Barratta Creek at Northcote (DNRM gauge 119101A)

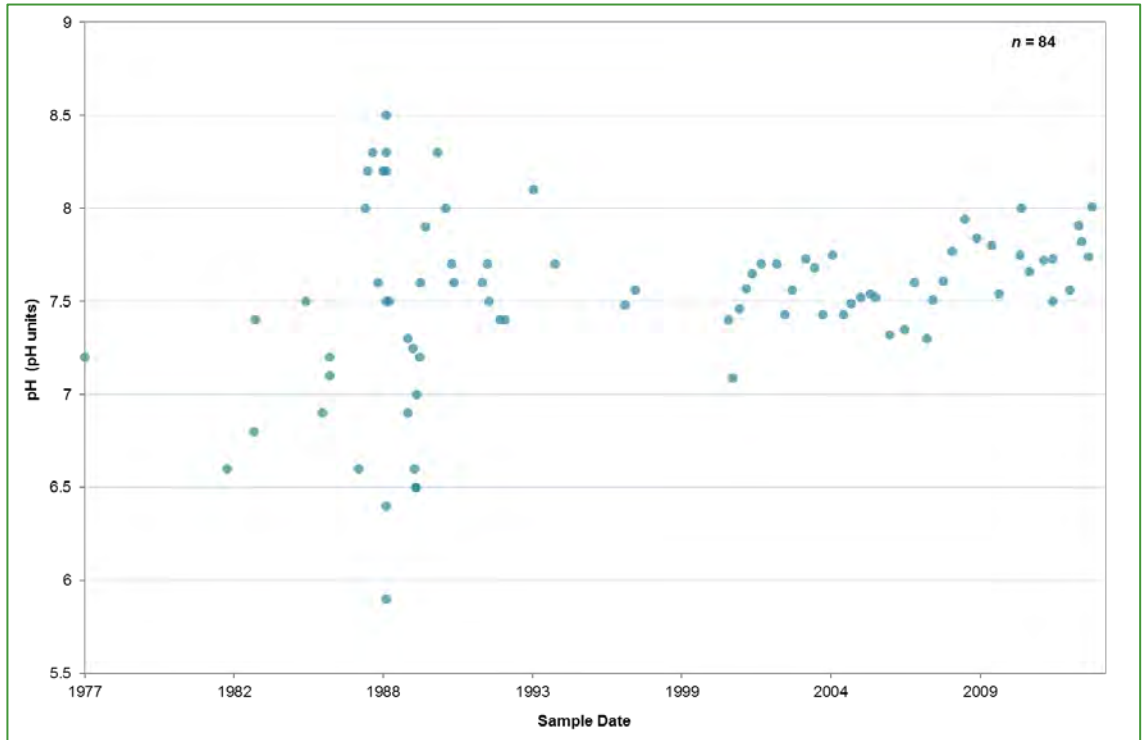
Electrical conductivity within Barratta Creek ranged between 23 $\mu\text{S/cm}$ and 624 $\mu\text{S/cm}$, with a median of 215 $\mu\text{S/cm}$ for data collected between 1977 and 2014. Figure 4-3 shows that EC has gradually been increasing since 2008, with no measurements below 198 $\mu\text{S/cm}$.

Figure 4-3 Electrical conductivity of ambient water samples collected at DNRM Gauge 119101A (1977 - 2014)



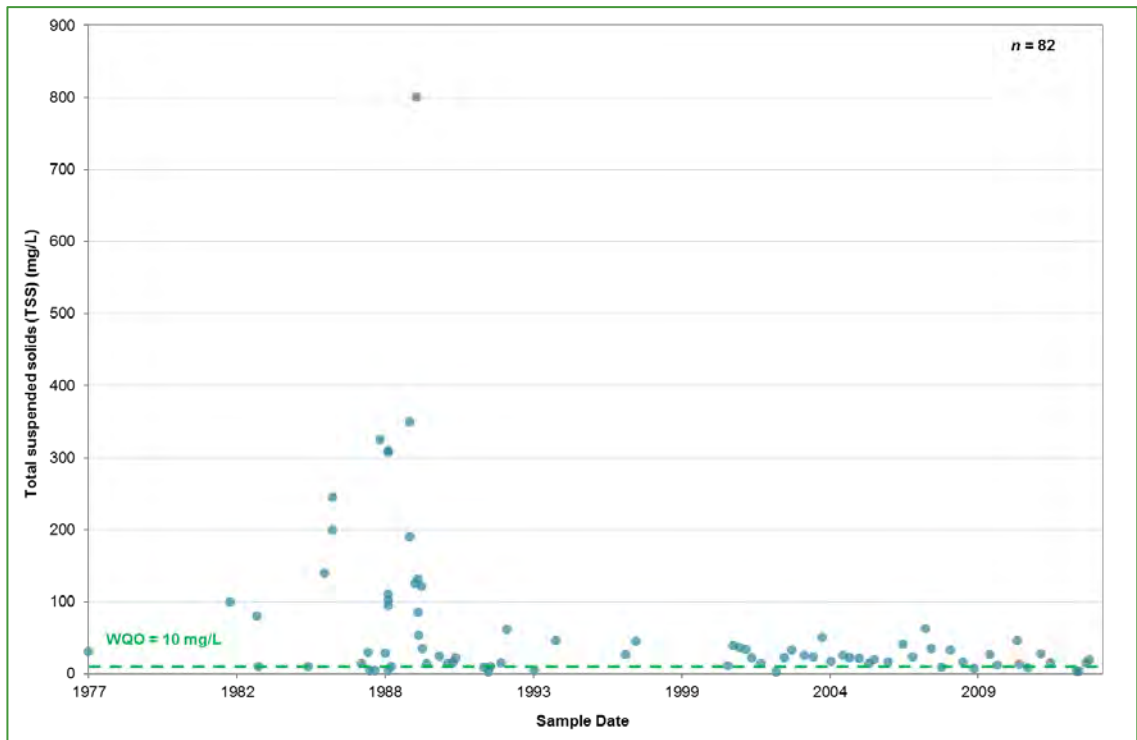
pH has a median value of 7.56 pH units for data collected since 1977 (Figure 4-4). The majority of samples were between 7.3 and 8.1. However, pH levels were more variable prior to 1989, where measurements ranged from a minimum of 5.9 (recorded in February 1988) to a maximum of 8.5 (recorded in March 1988). This historic change in pH indicates the influence of an external factor on water chemistry; for example, a change in land use or cease in point source discharges in approximately 1989.

Figure 4-4 pH of ambient water samples collected at DNRM Gauge 119101A (1977 - 2014)



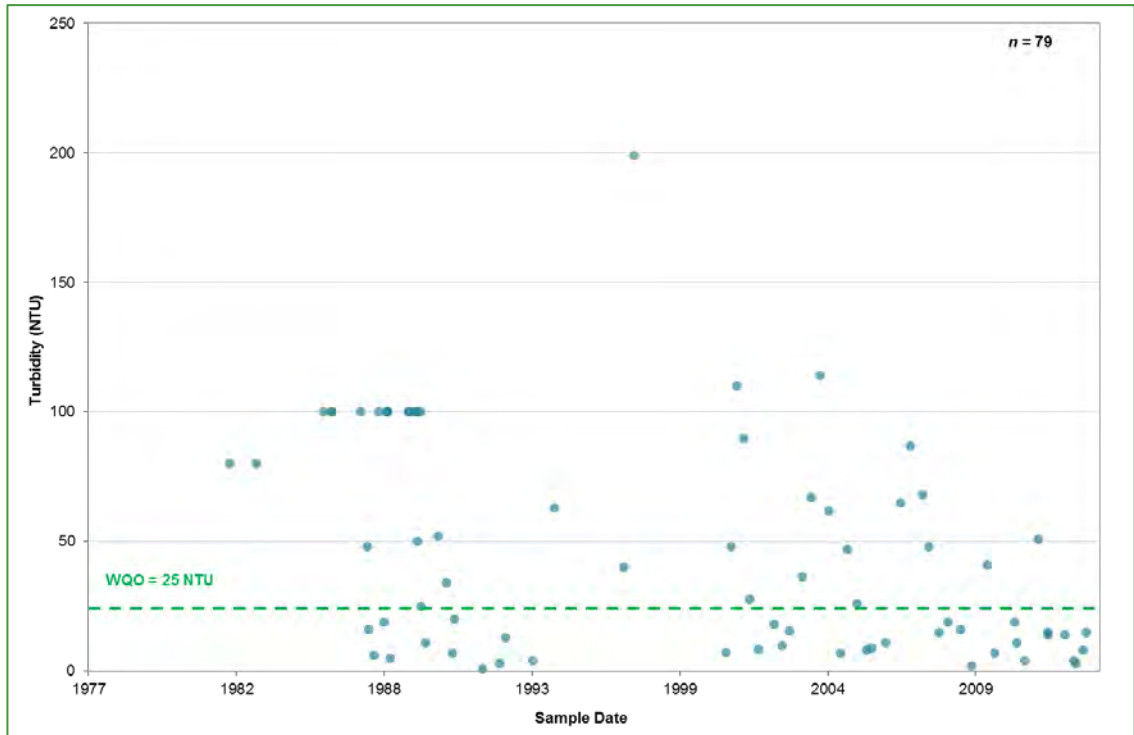
The majority of samples analysed at the DNRM Gauge (110101A) on Barratta Creek between 1977 and 2014 indicated concentrations of total suspended solids (TSS) that were predominantly above the WQO of 10 mg/L, as indicated in Figure 4-5. The highest recorded concentration of TSS was 801 mg/L (March 1989). However, TSS has remained below 62 mg/L since 1990.

Figure 4-5 Total suspended solids (TSS) concentration in ambient water samples collected at DNRM Gauge 119101A (1977 - 2014)



Turbidity has varied significantly since 1982, with no clear temporal trend of increase or decrease evident in the spread of data (illustrated in Figure 4-6). Measurements ranged between 1 NTU (considered a negative result) to 199 NTU, with a median of 36.4 NTU. The 80th percentile value for the dataset (100 NTU) is above the WQO of 25 NTU. This variability indicates that the system within Barratta Creek is most sensitive to seasonal fluctuations in stream flow; in wetter months, turbidity would be highest, while in drier months sediments and organic material settle over the stream substrate when stream flow is low to non-existent. This pattern is typical of ephemeral watercourses.

Figure 4-6 Turbidity of ambient water samples collected at DNRM Gauge 119101A (1982 - 2014)



Concentrations of nutrients (total nitrogen, total phosphorus and ammonia as N) within Barratta Creek were consistently elevated above the applicable WQOs. Total nitrogen (depicted in Figure 4-7) ranged between 0.29 mg/L and 2 mg/L, with greater variability observed from approximately 2008 onwards. Total phosphorus concentrations (shown in Figure 4-8) were between 0.03 mg/L and 0.17 mg/L, with a median value of 0.08 mg/L for all data collected between 1996 and 2014. This median value was almost three times that of the WQO (0.03 mg/L). Ammonia concentrations were less variable over time than total nitrogen and total phosphorus, with the majority of samples having concentrations below 0.04 mg/L. The median value for ammonia was 0.02 mg/L; over three times higher than the WQO of 0.006 mg/L. There were three isolated episodes where ammonia was significantly elevated within Barratta Creek compared to the historic record; during the wet season of 1996/1997; September 2000, and September 2013.

Figure 4-7 Total nitrogen concentration of ambient water samples collected at DNRM Gauge 119101A (2000 - 2014)

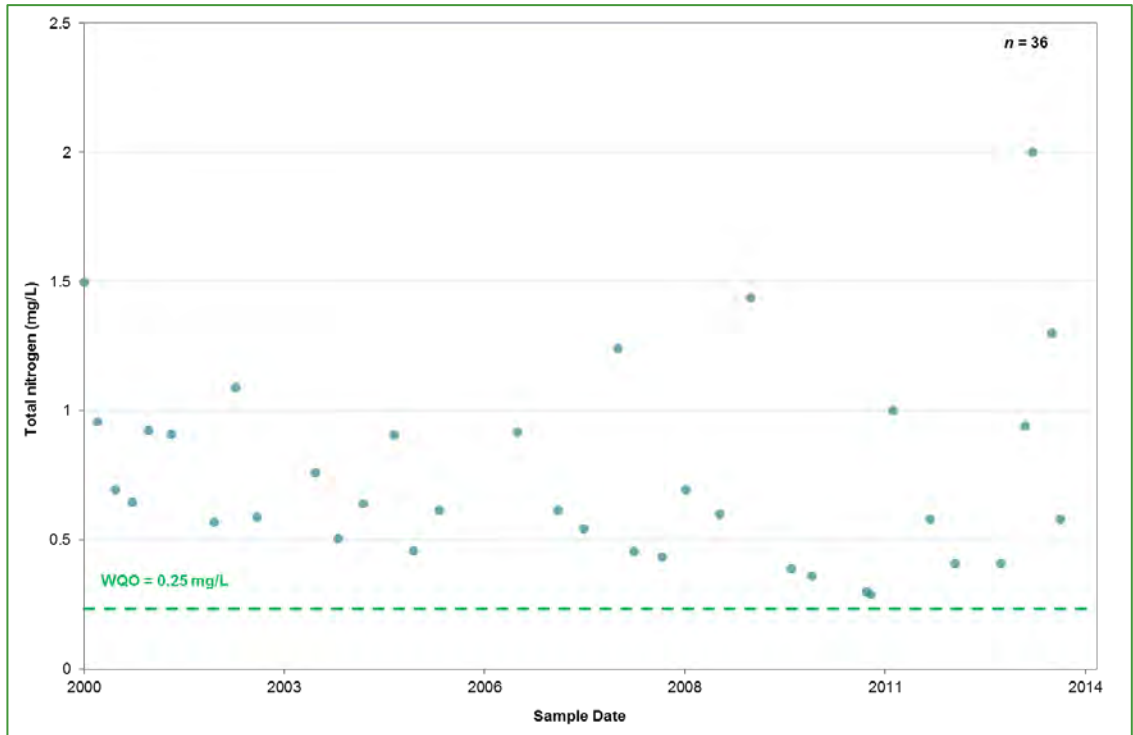


Figure 4-8 Total phosphorus concentration of ambient water samples collected at DNRM Gauge 119101A (1996 - 2014)

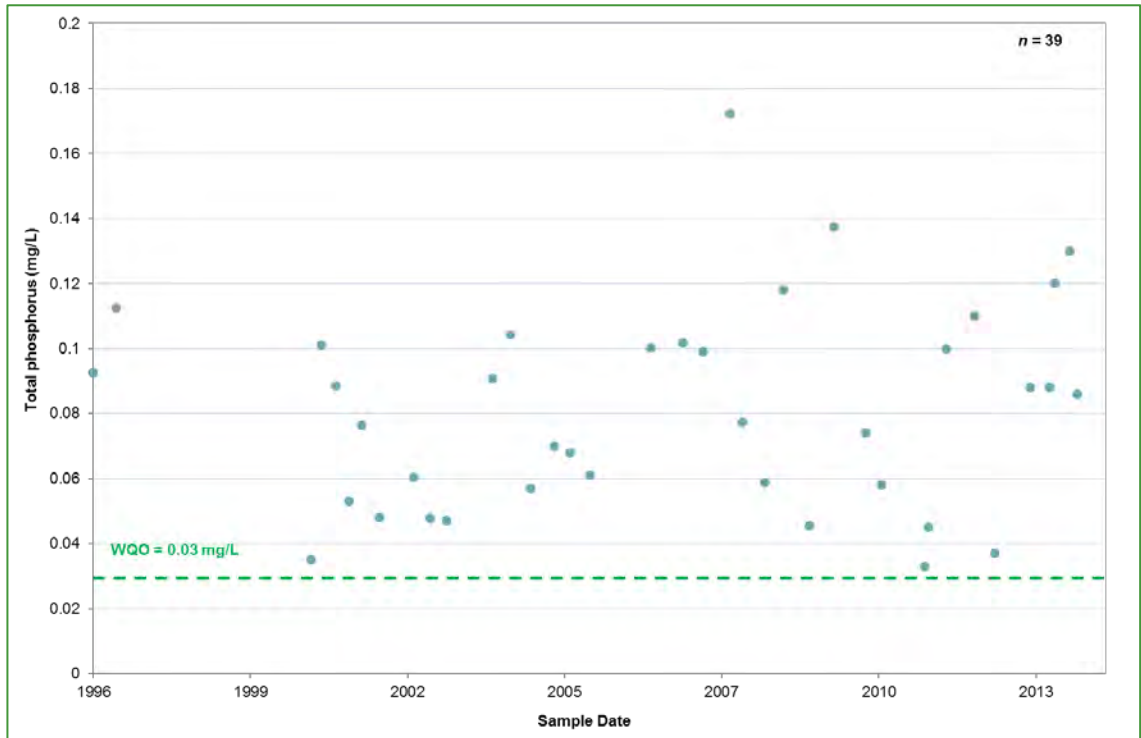


Table 4-1 Summary statistics for surface water quality at DNRM Gauges 12006B and 119101A

Parameter	Units	Burdekin River at Clare			Barratta Creek at Northcote		
		Number of samples (<i>n</i>)	Median value	80 th Percentile value	<i>n</i>	Median	80 th percentile
Electrical conductivity	µS/cm	177	195	280	83	215	297.2
pH	pH units	177	7.8	8.1	84	7.56	7.81
Total Suspended Solids	mg/L	168	29	142.4	82	25.5	84.8
Total Nitrogen	mg/L	47	0.36	0.49	36	0.63	0.96
Total Phosphorus as P	mg/L	54	0.04	0.07	39	0.08	0.10
Ammonia as N - soluble (Field Filtered)	mg/L	52	0.01	0.01	38	0.02	0.03
Turbidity	NTU	147	75.2	100	79	36.4	100

5 STORMWATER IMPACT ASSESSMENT

5.1 Quality and Quantity of Stormwater Discharges

5.1.1 Stormwater Quality

Stormwater draining off the solar panels is expected to be of a similar quality to rainwater given the impervious and inert nature of the panel material. This water will shed onto the ground surrounding the panels and be discharged to the surface water receiving environment via diffuse overland flow. There is the potential for this water to erode surficial soil layers as it travels across the site, thereby increasing the water's levels of suspended solids and adsorbed metals and nutrients. However given that the site will be vegetated with low-growing grass and other herbaceous species, the likelihood that stormwater generated from the Project site will contain levels of suspended solids significantly greater than baseline conditions, is low. Therefore, stormwater discharging from the Clare site post-development is anticipated to be of a quality that will not impact the surface water receiving environment, which is currently considered to be 'Highly Disturbed' due to alterations to flow regime and inputs of irrigation tailwater arising from surrounding land use (refer to Section 3.3).

It is anticipated that stormwater discharges from the site will meet the ANZECC 2000 guideline standards, as is required as part of S18 of the Burdekin Planning Scheme 2011 (refer to Section 2.3.1). Treatment and/or detention of stormwater for the removal of sediments and gross pollutants prior to the release to the environment is therefore not considered necessary.

5.1.2 Stormwater Quantity

Pre-development and post-development peak flows for the catchment containing the Clare development site were estimated using the Rational Method, in accordance with the Queensland Department of Transport and Main Roads (TMR) 2010 '*Road Drainage Manual*'.

Information sources and assumptions used in the calculations are presented in Table 5-1 below. Results are summarised in Table 5-2 below. Full calculations can be found in Appendix A.

The peak runoff was estimated using procedures outlined in TMR (2010) for an urban catchment, so that a consistent method was used for the pre-development and post-development scenarios. The project sites are located in rural areas, but the urban methodology was followed in TMR (2010) such that increases to peak flow rates (from development) were a direct reflection of increased imperviousness and not a reflection of the change in methods used to estimate peak flow (rural versus urban procedures outlined in TMR (2010)). The urban method allows for the impervious fraction to be considered (whereas this is not considered via rural method), however, it may overestimate runoff rates from the project sites. As such, the estimated runoff value should be used as a comparison of increased runoff rates due to development only.

For the post-development scenario, the area covered by solar panels were assumed to be 100% impervious and therefore peak flow estimates are considered to be conservatively high as they do not take into account the attenuation achieved when run-off from the solar panels flows across vegetated surfaces prior to discharge into the receiving environment.

Table 5-1 Stormwater Flow Calculations - Assumptions and Information Sources

Parameter	Information Source/Assumptions
Catchment area	The catchment for the Clare site was estimated using available Light Detection and Ranging (LiDAR) data. The total catchment area was estimated to be approximately 375 ha.
Rainfall intensity	Coordinate-specific design rainfall intensity data for Clare was obtained from the Bureau of Meteorology Rainfall Intensity-Frequency-Duration (IFD) data system.
Runoff coefficient	The runoff coefficient was estimated using the method outlined in TMR 2010. For existing (pre-development) conditions, it was assumed that each catchment had no impervious areas, medium density bush or good grass cover, and medium soil porosity. Post-development, it was assumed that approximately 77% of the catchment (290 ha) would be impervious, as estimated from the site layout plan shown in Figure 1-2. No allowance for on-site detention has been made.
Time of concentration	The Bransby-Williams formula was used to estimate the time of concentration. It has been assumed that there will be no formalised drainage system in place post-development, therefore the time of concentration pre and post-development remain the same.

Table 5-2 Summary of Stormwater Quantity Estimates for Clare Development Site

Annual Recurrence Interval (ARI)	Estimated Pre-Development Peak Flow (m ³ /s)	Estimated Post-Development Peak Flow (m ³ /s)	Increase in Peak Flow Post Development (m ³ /s)	Increase in Peak Flow Post Development (%)
1 Year ARI	12	15	3	22%
2 Year ARI	16	20	4	22%
5 Year ARI	23	29	5	22%
10 Year ARI	28	34	6	22%
20 Year ARI	34	41	7	22%
50 Year ARI	44	53	10	22%
100 Year ARI	51	60	10	19%

The results of peak flow calculations indicate that there will be an increase in peak stormwater flows from the site post-development of approximately 19 – 22%. The Barratta Creek catchment is estimated to cover an area of approximately 1009 km² (CSIRO, 2007). Given that the sub-catchment surrounding the Clare development site covers approximately 3.8 km² (representing approximately 0.4% of the Barratta Creek catchment), stormwater runoff from

the developed site are not anticipated to have a significant impact on the receiving environment considering the scale of discharges from other sub-catchments.

5.2 Potential Impacts to Identified EVs

Site activities and water-related discharges with the potential to impact the identified surface water EVs (refer to Section 3.3) include:

- Construction phase:
 - Earthworks associated with vegetation clearance (sugar cane)
 - Earthworks associated with construction of on-site infrastructure such as solar panels, road and buildings
 - Use and storage of chemicals such as fuel
- Operational phase:
 - Stormwater runoff from impervious surfaces such as solar panels and access roads
 - Use of herbicides for vegetation control
 - Discharges from on-site wastewater facilities
- Decommissioning phase:
 - Earthworks associated with decommissioning of on-site infrastructure
 - Use and storage of chemicals such as fuel
 - Stormwater runoff from final decommissioned landform.

Discharges of stormwater from these sources could result in adverse effects on EVs such as aquatic ecosystems, irrigation and stock watering.

Based on the proposed project plan, there will be no requirement to divert any surface water bodies at the site.

5.3 Risk Assessment and Mitigation Measures

The risk assessment framework set out in Australian Standard/New Zealand Standard (AS/NZS) ISO 31000:2009 *Risk Management – Principles and Guidelines* (2009) was adopted for this report. Criteria used to rank the likelihood and consequences of potential impacts and how they are combined to determine the level of impact are set out in Table 5-3, Table 5-4 and Table 5-5 below. The classifications (major, high, moderate, low or negligible) for significance of an impact are as follows:

- **Major** significance of impact - arises when an impact will potentially cause irreversible or widespread harm to an EV that is irreplaceable because of its uniqueness or rarity. Avoidance through appropriate design responses is the only effective mitigation.
- **High** significance of impact - occurs when the proposed activities are likely to exacerbate threatening processes affecting the intrinsic characteristics and structural elements of the EV. While replacement of unavoidable losses is possible, avoidance through appropriate design responses is preferred to preserve its intactness or conservation status.

- **Moderate** significance of impact - although reasonably resilient to change, the EV would be further degraded due to the scale of the impact or its susceptibility to further change. The abundance of the EV ensures it is adequately represented in the region, and that replacement, if required, is achievable.
- **Low** significance of impact - occurs where an EV is of local importance and temporary and transient changes will not adversely affect its viability provided standard environmental management controls are implemented.
- **Negligible** significance of impact - impact on the EV will not result in any noticeable change in its intrinsic value and hence the proposed activities will have negligible effect on its viability. This typically occurs where the activities occur in industrial or highly disturbed areas.

Mitigation measures were applied to the potential (unmitigated) impacts to identify the residual (mitigated) impacts as shown in Table 5-6.

Table 5-3 Description of Sensitivity Criteria

Sensitivity	Description
High	<p>The EV is listed on a recognised or statutory state, national or international register as being of conservation significance.</p> <p>The EV is intact and retains its intrinsic value.</p> <p>The EV is unique to the environment in which it occurs. It is isolated to the affected system/area which is poorly represented in the region, territory, country or the world.</p> <p>It has not been exposed to threatening processes, or they have not had a noticeable impact on the integrity of the EV. Project activities would have an adverse effect on the value.</p>
Moderate	<p>The EV is recorded as being important at a regional level, and may have been nominated for listing on recognised or statutory registers.</p> <p>The EV is in a moderate to good condition despite it being exposed to threatening processes. It retains many of its intrinsic characteristics and structural elements.</p> <p>It is relatively well represented in the systems/areas in which it occurs but its abundance and distribution are limited by threatening processes.</p> <p>Threatening processes have reduced its resilience to change. Consequently, changes resulting from project activities may lead to degradation of the prescribed value.</p> <p>Replacement of unavoidable losses is possible due to its abundance and distribution.</p>
Low	<p>The EV is not listed on any recognised or statutory register. It might be recognised locally by relevant suitably qualified experts or organisations e.g., historical societies.</p> <p>It is in a poor to moderate condition as a result of threatening processes which have degraded its intrinsic value.</p> <p>It is not unique or rare and numerous representative examples exist throughout the system / area.</p> <p>It is abundant and widely distributed throughout the host systems / areas.</p> <p>There is no detectable response to change or change does not result in further degradation of the EV.</p> <p>The abundance and wide distribution of the EV ensures replacement of unavoidable losses is achievable.</p>

Table 5-4 Description of Magnitude Criteria

Magnitude	Description
High	An impact that is widespread, long lasting and results in substantial and possibly irreversible change to the EV. Avoidance through appropriate design responses or the implementation of site-specific environmental management controls are required to address the impact.
Moderate	An impact that extends beyond the area of disturbance to the surrounding area but is contained within the region where the project is being developed. The impacts are short term and result in changes that can be ameliorated with specific environmental management controls.
Low	A localised impact that is temporary or short term and either unlikely to be detectable or could be effectively mitigated through standard environmental management controls.

Table 5-5 Significance Assessment Matrix

Magnitude of Impact	Sensitivity of Environmental Value		
	High	Moderate	Low
High	Major	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Negligible

Table 5-6 Risk Assessment and Mitigation Measures

Potential Impact to Surface Water	Relevant Environmental Value/s	Pre-Mitigated Impact			Mitigation Measure	Residual (Mitigated) Impact	
		Sensitivity	Magnitude	Significance		Magnitude	Significance
<ul style="list-style-type: none"> Discharge of sediments (both air and water-borne) from exposed ground during construction and decommissioning phases resulting in adverse impacts on receiving environment surface water quality. 	<ul style="list-style-type: none"> Aquatic ecosystems Aquaculture Human consumption Irrigation Stock watering Recreation 	Low	Moderate	Low	<ul style="list-style-type: none"> A construction management plan will be developed for the site which will detail methods for minimising sediment-laden runoff in accordance with best practice guidelines. The plan will include allowance for sediment traps to prevent the movement of sediment off site where necessary, as per the requirements of S19 of the Rural Zone Code (Burdekin Planning Scheme). 	Low	Negligible
<ul style="list-style-type: none"> Discharge of stormwater from the site during operational phase resulting in adverse impacts on receiving environment surface water quality. 	<ul style="list-style-type: none"> Aquatic ecosystems Aquaculture Human consumption Irrigation Stock watering Recreation 	Low	Moderate	Low	<ul style="list-style-type: none"> An operational management plan will be developed for the site which will detail methods for minimising sediment-laden runoff in accordance with best practice guidelines. Ground beneath the solar panels will be vegetated with native grasses and other low growing herbaceous plant species in order to stabilise the land and reduce sediment discharge via stormwater runoff. A weed control program will be implemented for the study area to remove noxious weeds and reduce further weed invasion. In order to reduce the potential impact of pesticide use, glyphosate-based products, or similar non-residual and non-persistent herbicides, will be used to manage vegetation on-site. This type of pesticide breaks down rapidly after usage into non harmful by-products, and therefore not likely to impact the surface water receiving environment. Given that the quality of stormwater discharging from the site is expected to comply with ANZECC/ARMCANZ 2000 guidelines, treatment and/or detention of stormwater for the removal of sediments and gross pollutants prior to the release to the environment is not considered necessary. 	Low	Negligible
<ul style="list-style-type: none"> Discharge of stormwater from the site during operational phase resulting in adverse impacts on receiving environment surface water geomorphology (e.g. stream bank erosion and scouring) 	<ul style="list-style-type: none"> Aquatic ecosystems Aquaculture Human consumption Irrigation Stock watering Recreation 	Low	Moderate	Low	<ul style="list-style-type: none"> Although peak flow stormwater runoff from the site is expected to increase post-development, this runoff is expected to form a very small percentage of peak flow in the receiving environment (the sub-catchment containing the development site covers only 0.4% of the land area of the Barratta Creek catchment). Mitigation measures to control stormwater discharge from site are not considered necessary given the small volume discharged in the context of the Barratta Creek catchment. There will be no formal infrastructure on-site for directing stormwater discharges. Stormwater will be discharged diffusely across the site via vegetated surfaces, which will assist in reducing any impacts to stream water quality and geomorphology. 	Low	Negligible
<ul style="list-style-type: none"> Spills/leaks from chemical (e.g. fuel and oil) storage areas into surface water bodies during construction and decommissioning phases resulting in adverse impacts on receiving environment surface water quality. 	<ul style="list-style-type: none"> Aquatic ecosystems Aquaculture Human consumption Irrigation Stock watering Recreation Cultural and spiritual values 	Low	Moderate	Low	<ul style="list-style-type: none"> Chemicals such as hydrocarbon materials will be stored in accordance with relevant Australian Standards to ensure that any spillages are contained. Areas used for the storage and handling of chemicals will be bunded as per requirement S18 of the Rural Zone Code (Burdekin Planning Scheme). 	Low	Negligible
<ul style="list-style-type: none"> Untreated discharges from on-site waste water treatment facilities during operational phase into surface water environment. 	<ul style="list-style-type: none"> Aquatic ecosystems Aquaculture Human consumption Irrigation Stock watering Recreation Cultural and spiritual values 	Low	Moderate	Low	<ul style="list-style-type: none"> A septic tank will be installed on-site to service the operations and maintenance building. The septic tank will be designed and operated in accordance with relevant Australian Standards and statutory requirements. Effluent will be removed from site and disposed in a suitable facility by a licenced operator. 	Low	Negligible
<ul style="list-style-type: none"> Discharge of stormwater from the site following the decommissioning phase resulting in adverse impacts on receiving environment surface water quality and/or quantity 	<ul style="list-style-type: none"> Aquatic ecosystems Aquaculture Human consumption Irrigation Stock watering Recreation Cultural and spiritual values 	Low	Low	Negligible	<ul style="list-style-type: none"> Following the decommissioning phase of the project, it is assumed that land use will return to a similar use to pre-development (irrigated cropping). Mitigation measures are therefore not considered necessary post decommissioning. 	Low	Negligible

CONCLUSIONS

The potential impacts of stormwater discharges from the project on surface water quality and quantity arise from a range of activities associated with the construction, operation and decommissioning phases. This investigation considers that the impacts associated with the project could be appropriately managed by implementing a range of mitigation measures during the various phases of the project.

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

42627398 - FRV Clare Site: Pre-Development Calculations

Job Number:	42627398
Prepared By:	Khan Thorne
Date:	4/11/2014
Catchment:	Clare

Catchment Parameters:

A	Catchment Area	3.754 km ²	375.43 ha
L	Mainstream Length	3.289 km	
S _e	Equal Area Slope	0.84 m/km	
		= 0.001 m/m	
		= 0.084 %	
T _c	Time of Concentration	174.58 min	173.087
		= 2.91 hr	

Runoff Coefficient (from Chapter 5 of the Queensland Road Drainage Manual (TMR, 2010)):

ARI	10 Year ARI	
Duration	60 mins	
¹ I ₁₀	Rainfall Intensity (60 min, 10 yr)	76.4 mm/hr
f _i	fraction impervious	0.000
C ₁₀	Runoff Coefficient (10 year ARI)	0.70 Table 5.9.2 (b) & (c). Assumed good grass cover, medium permeability soil.

Peak Flow Estimates (Rational Method):

		10 Year ARI	20 Year ARI	50 Year ARI	100 Year ARI
C _{ARI}	Runoff Coefficient*	0.70	0.74	0.81	0.84
I _{ARI}	Rainfall Intensity (mm/hr)	38.2	44.1	51.8	57.8
Q _{ARI}	Estimated Peak Flow (m ³ /s)	27.9	33.8	43.5	50.6

* Based on TMR ratios to C₁₀ of 1.0, 1.05, and 1.2 for 10-yr, 20-yr and 100-yr respectively

Peak Flow Estimates (Rational Method):

ARI	Adjustment Factor (Table 5.9.1 (b))	C _y	I _{ARI}	Q _{ARI}
1 Year ARI	0.8	0.56	20.5	12
2 Year ARI	0.85	0.60	26.3	16
5 Year ARI	0.95	0.67	33.8	23
10 Year ARI	1	0.70	38.2	28
20 Year ARI	1.05	0.74	44.1	34
50 Year ARI	1.15	0.81	51.8	44
100 Year ARI	1.2	0.84	57.8	51

Relevant Formulae:

FORMULA SHEET

Rational Method: $Q = 0.278 \times C \times I \times A$

Bransby-Williams Formula: $T_c = \frac{58.5 \times L}{A^{0.1} \times S_e^{0.2}}$

Equal Area Slope Method: $S_e = \frac{2000}{L^2} \times \sum_{i=1}^n \left(\left(\frac{\Delta h_i + \Delta h_{i-1}}{2} \right) \Delta L \right)$

Interpolation for C10				
X0	0.6	X1	0.8	X
Y0	0.82	Y1	0.86	0.000

RUNOFF COEFFICIENT Reference Material (TMR, 2010):

Table 5.9.1(b) - Adjustment Factors for Runoff Coefficients for Other Average Recurrence Intervals

Average Recurrence Interval (years)	Rural Coefficient	Urban Coefficient
1	0.8 C ₁₀	0.80 C ₁₀
2	0.8 C ₁₀	0.85 C ₁₀
5	0.8 C ₁₀	0.95 C ₁₀
10	0.8 C ₁₀	1.00 C ₁₀
20	0.9 C ₁₀	1.05 C ₁₀
50	1.0 C ₁₀	1.15 C ₁₀
100	1.05 C ₁₀	1.20 C ₁₀

Notes:
 1. C₁₀ determined for rural catchments using Table 5.9.1(a)
 2. C₁₀ determined using method described in Section 5.9.2
 3. Where runoff coefficients calculated using the above table exceed 1.00, they should be arbitrarily set to 1.00

Table 5.9.2(a) - Fraction Impervious vs. Development Category

Development Category	Fraction Impervious (f)
Central Business	1.00
Commercial, Local Business, Neighbouring Facilities, Service Industry, General Industry, Home Industry	0.90
Significant Paved Areas eg. Roads and Carparks	0.90
Urban Residential - High Density	0.70 to 0.90
Urban Residential - Low Density (Including Roads)	0.45 to 0.85
Urban Residential - Low Density (Excluding Roads)	0.40 to 0.75
Rural Residential	0.1 to 0.2
Open Space & Parks etc.	0

Notes:
 1. The designer should determine the actual fraction impervious for each development. Local governments may specify default values.
 2. Typically for Urban Residential High Density developments:
 - townhouse type development f = 0.70
 - multi-unit dwellings > 20 dwellings per ha
 - highrise residential development f = 0.90.
 3. In Urban Residential Low Density areas f may vary depending upon road width, allotment size, house size and extent of paths, driveways etc.

Table 5.9.2(b) - C₁₀ Values

Intensity (mm/h) I ₁₀	Fraction Impervious f _i						
	0.00	0.20	0.40	0.60	0.80	0.90	1.00
39-44	Refer to Table 5.7.2(c)	0.44	0.55	0.67	0.78	0.84	0.90
45-49		0.49	0.60	0.70	0.80	0.85	0.90
50-54		0.55	0.64	0.72	0.81	0.86	0.90
55-59		0.60	0.68	0.75	0.83	0.86	0.90
60-64		0.65	0.72	0.78	0.84	0.87	0.90
65-69		0.71	0.76	0.80	0.85	0.88	0.90
70-90		0.74	0.78	0.82	0.86	0.88	0.90

I₁₀ = One hour rainfall intensity for a ARI 10 year event
 C₁₀ = Runoff Coefficient for a ARI 10 year event

Table 5.9.2(c) - C₁₀ Values for 0% Fraction Impervious

Land Description	Dense bushland	Medium density bush, or Good grass cover, or High density pasture, or Zero tillage cropping			Light cover bushland, or Poor grass cover, or Low density pasture, or Low cover bare fallows				
		Soil permeability			Soil Permeability				
		High	Med	Low	High	Med	Low		
Intensity (mm/h) I ₁₀									
39-44	0.08	0.24	0.32	0.16	0.32	0.40	0.24	0.40	0.48
45-49	0.10	0.29	0.39	0.20	0.39	0.49	0.29	0.49	0.59
50-54	0.12	0.35	0.46	0.23	0.46	0.58	0.35	0.58	0.69
55-59	0.13	0.40	0.53	0.27	0.53	0.66	0.40	0.66	0.70
60-64	0.15	0.44	0.59	0.30	0.59	0.70	0.44	0.70	0.70
65-69	0.17	0.50	0.66	0.33	0.66	0.70	0.50	0.70	0.70
70-90	0.18	0.53	0.70	0.35	0.70	0.70	0.53	0.70	0.70

Derived from Qld Department of Natural Resources & Mines (2005)

March 2010
5-20

42627398 - FRV Clare Site: Pre-Development Calculations

Equal Area Slope and Time of Concentration Calculations:

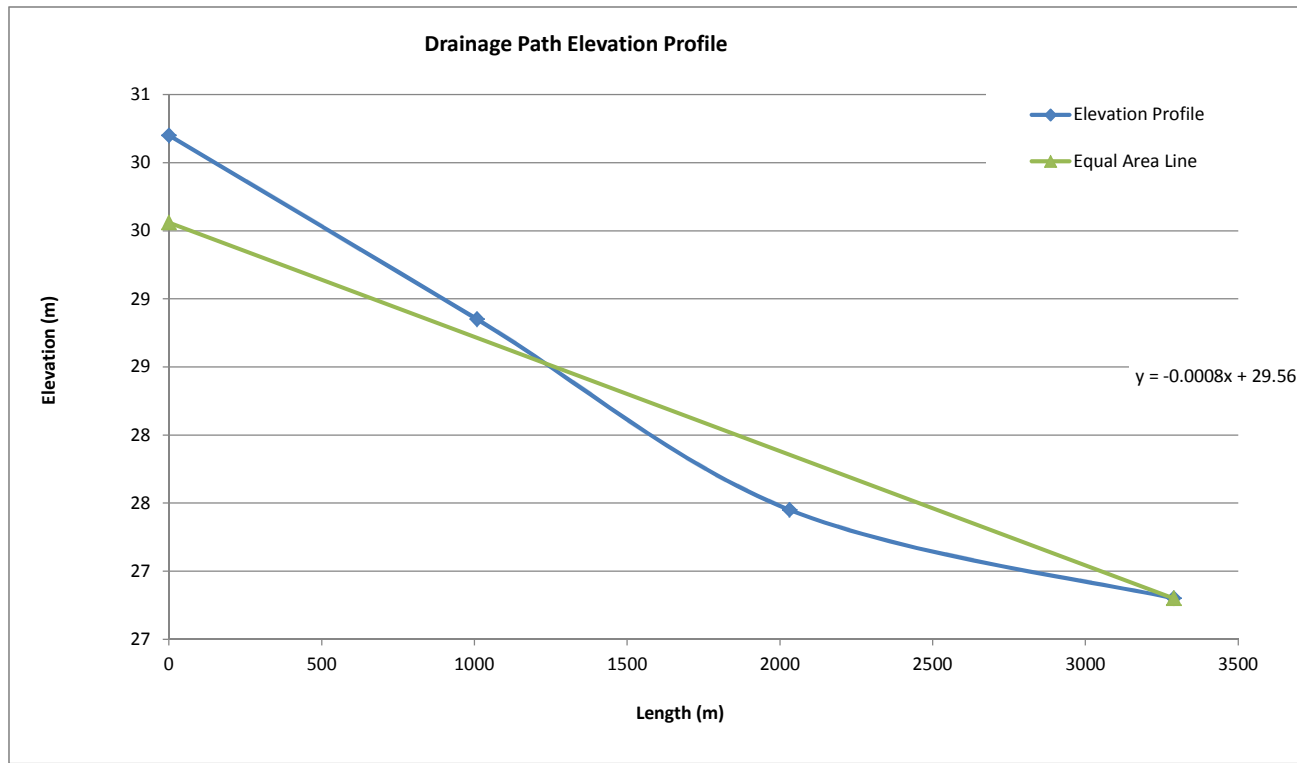


Table Row #	Chainage	Length	Elevation Profile	dA
1	3289	0	30.2	
2	2032	1009	28.85	2749.5
3	1009	2032	27.45	1381.1
4	0	3289	26.8	408.5

Equal Area Line

X_{min}	Minimum x coordinate	0
X_{max}	Maximum x coordinate	3289.0
Y_{min}	Minimum catchment elevation	26.8
Y_{max}	EA Line y-intercept	29.6
A_e	Total area under Equal Area Line	4539 m ²
S_e	Equal Area Slope	0.84 m/km
T_c	Time of Concentration	174.6 mins

KEY:

- value Elevation from here up derived from regional contours (SRTM30)
- value Elevation from here down derived from LiDAR data

Job Number: 42627398
Prepared By: Khan Thorne
Date: 4/11/2014
Catchment: Clare

Catchment Parameters:

A	Catchment Area	3.754 km ²	375.43 ha
L	Mainstream Length	3.289 km	
S _e	Equal Area Slope	0.84 m/km	
		= 0.001 m/m	
		= 0.084 %	
T _c	Time of Concentration	174.58 min	173.087
		= 2.91 hr	

Runoff Coefficient (from Chapter 5 of the Queensland Road Drainage Manual (TMR, 2010)):

ARI	10 Year ARI	
Duration	60 mins	
¹ I ₁₀	Rainfall Intensity (60 min, 10 yr)	76.4 mm/hr
f _i	fraction impervious	0.773 Developed Area/Catchment Area (Measured from Drawings)
C ₁₀	Runoff Coefficient (10 year ARI)	0.85 Table 5.9.2 (b) & (c)

Peak Flow Estimates (Rational Method):

		10 Year ARI	20 Year ARI	50 Year ARI	100 Year ARI
C _{ARI}	Runoff Coefficient*	0.85	0.90	0.98	1.00
I _{ARI}	Rainfall Intensity (mm/hr)	38.2	44.1	51.8	57.8
Q _{ARI}	Estimated Peak Flow (m ³ /s)	34.1	41.3	53.1	60.3

* Based on TMR ratios to C₁₀ of 1.0, 1.05, and 1.2 for 10-yr, 20-yr and 100-yr respectively

Peak Flow Estimates (Rational Method):

ARI	Adjustment Factor (Table 5.9.1 (b))	C _y	I _{ARI}	Q _{ARI}
1 Year ARI	0.8	0.68	20.5	15
2 Year ARI	0.85	0.73	26.3	20
5 Year ARI	0.95	0.81	33.8	29
10 Year ARI	1	0.85	38.2	34
20 Year ARI	1.05	0.90	44.1	41
50 Year ARI	1.15	0.98	51.8	53
100 Year ARI	1.2	1.00	57.8	60

Relevant Formulae:

FORMULA SHEET

Rational Method: $Q = 0.278 \times C \times I \times A$

Bransby-Williams Formula: $T_c = \frac{58.5 \times L}{A^{0.1} \times S_e^{0.2}}$

Equal Area Slope Method: $S_e = \frac{2000}{L^2} \times \sum_{i=1}^n \left(\left(\frac{\Delta h_i + \Delta h_{i-1}}{2} \right) \Delta L \right)$

X0	0.6	X1	0.8	X	0.773
Y0	0.82	Y1	0.86		

Table 5.9.2(b) - C₁₀ Values

Intensity (mm/h) ¹ I ₁₀	Fraction Impervious f _i						
	0.00	0.20	0.40	0.60	0.80	0.90	1.00
39-44	Refer to Table 5.7.2(c)	0.44	0.55	0.67	0.78	0.84	0.90
45-49		0.49	0.60	0.70	0.80	0.85	0.90
50-54		0.55	0.64	0.72	0.81	0.86	0.90
55-59		0.60	0.68	0.75	0.83	0.86	0.90
60-64		0.65	0.72	0.78	0.84	0.87	0.90
65-69		0.71	0.76	0.80	0.85	0.88	0.90
70-90		0.74	0.78	0.82	0.86	0.88	0.90

¹I₁₀ = One hour rainfall intensity for a ARI 10 year event
C₁₀ = Runoff Coefficient for a ARI 10 year event

Table 5.9.2(a) - Fraction Impervious vs. Development Category

Development Category	Fraction Impervious (f _i)
Central Business	1.00
Commercial, Local Business, Neighbouring Facilities, Service Industry, General Industry, Home Industry	0.90
Significant Paved Areas eg. Roads and Carparks	0.90
Urban Residential - High Density	0.70 to 0.90
Urban Residential - Low Density (Including Roads)	0.45 to 0.85
Urban Residential - Low Density (Excluding Roads)	0.40 to 0.75
Rural Residential	0.1 to 0.2
Open Space & Parks etc.	0

RUNOFF COEFFICIENT Reference Material (TMR, 2010):

Table 5.9.1(b) - Adjustment Factors for Runoff Coefficients for Other Average Recurrence Intervals

Average Recurrence Interval (years)	Rural Coefficient	Urban Coefficient
1	0.8 C ₅₀	0.80 C ₁₀
2	0.8 C ₅₀	0.85 C ₁₀
5	0.8 C ₅₀	0.95 C ₁₀
10	0.8 C ₅₀	1.00 C ₁₀
20	0.9 C ₅₀	1.05 C ₁₀
50	1.0 C ₅₀	1.15 C ₁₀
100	1.05 C ₅₀	1.20 C ₁₀

Notes:
1. C₆₀ determined for rural catchments using Table 5.9.1(a)
2. C₁₀ determined using method described in Section 5.9.2
3. Where runoff coefficients calculated using the above table exceed 1.00, they should be arbitrarily set to 1.00

Notes:
1. The designer should determine the actual fraction impervious for each development. Local governments may specify default values.
2. Typically for Urban Residential High Density developments:
• - townhouse type development f_i = 0.70
• - multi-unit dwellings > 20 dwellings per ha
• - highrise residential development f_i = 0.90
3. In Urban Residential Low Density areas f_i may vary depending upon road width, allotment size, house size and extent of paths, driveways etc.

Table 5.9.2(c) - C₁₀ Values for 0% Fraction Impervious

Land Description	Dense bushland	Medium density bush, or Good grass cover, or High density pasture, or Zero tillage cropping			Light cover bushland, or Poor grass cover, or Low density pasture, or Low cover bare fallows				
		Soil permeability			Soil Permeability				
		High	Med	Low	High	Med	Low		
Intensity (mm/h) ¹ I ₁₀									
39-44	0.08	0.24	0.32	0.16	0.32	0.40	0.24	0.40	0.48
45-49	0.10	0.29	0.39	0.20	0.39	0.49	0.29	0.49	0.59
50-54	0.12	0.35	0.46	0.23	0.46	0.58	0.35	0.58	0.69
55-59	0.13	0.40	0.53	0.27	0.53	0.66	0.40	0.66	0.70
60-64	0.15	0.44	0.59	0.30	0.59	0.70	0.44	0.70	0.70
65-69	0.17	0.50	0.66	0.33	0.66	0.70	0.50	0.70	0.70
70-90	0.18	0.53	0.70	0.35	0.70	0.70	0.53	0.70	0.70

Derived from Qld Department of Natural Resources & Mines (2005)

March 2010
5-20

42627398 - FRV Clare Site: Post-Development Calculations

Equal Area Slope and Time of Concentration Calculations:

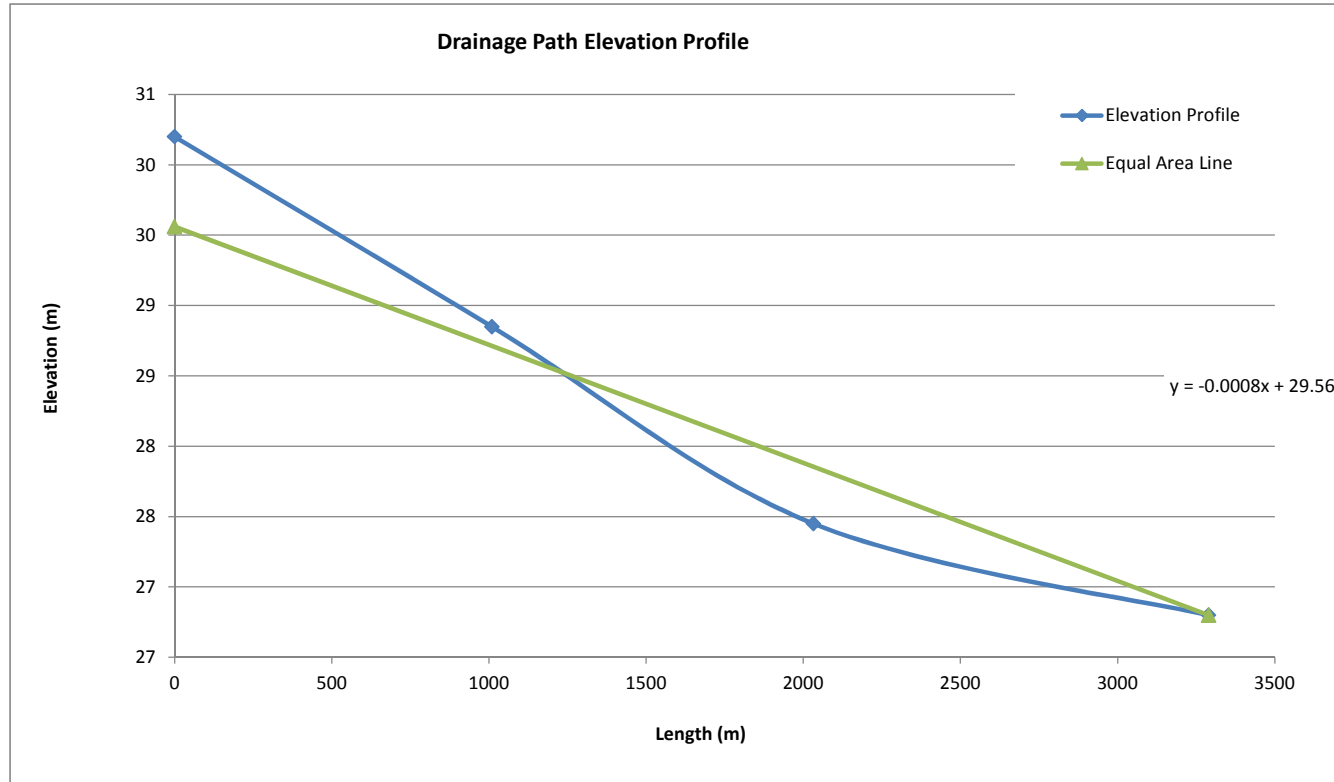


Table Row #	Chainage	Length	Elevation Profile	dA
1	3289	0	30.2	
2	2032	1009	28.85	2749.5
3	1009	2032	27.45	1381.1
4	0	3289	26.8	408.5

Equal Area Line

X_{min}	Minimum x coordinate	0
X_{max}	Maximum x coordinate	3289.0
Y_{min}	Minimum catchment elevation	26.8
Y_{max}	EA Line y-intercept	29.6
A_e	Total area under Equal Area Line	4539 m ²
S_e	Equal Area Slope	0.84 m/km
T_c	Time of Concentration	174.6 mins

KEY:

- value Elevation from here up derived from regional contours (SRTM30)
- value Elevation from here down derived from LiDAR data



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Report

Clare Ecology Assessment

AUSTRALIA



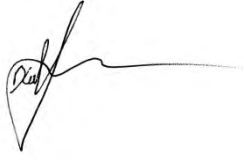


Clare Ecology Assessment

27 November 2014
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FRV Services Australia Pty Ltd

Prepared by URS Australia Pty Ltd



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EXECUTIVE SUMMARY

A desktop terrestrial ecology assessment was undertaken for FRV Services Australia Pty Ltd (FRV) by URS Australia Pty Ltd (URS) in August 2014 to determine the biodiversity values present within the Clare project area. The assessment analysed existing biodiversity data to identify conservation significant values including vegetation communities, flora and fauna species. Conservation significant values include values listed under:

- *Environment Protection and Biodiversity Conservation Act, 1999*
- *Nature Conservation Act, 1992*
- *Vegetation Management Act, 1999*

The likelihood of occurrence of conservation significant flora and fauna was determined following review of known habitat preferences against habitat values identified during the desktop review.

The ecological assessment identified that the project area and surrounding region is highly disturbed and dominated by cropping land. The few biodiversity values identified within the project area include:

- One least concern regional ecosystem is mapped immediately adjacent to the project area
- Thirteen conservation significant flora and fauna species are possibly occurring within the region. All were discounted as occurring within the project area given the lack of suitable habitat
- Eleven migratory fauna species possibly occur within the region, of which three possibly occur within the project area.

The potential impact of the project on biodiversity values is considered minimal given the existing high level of disturbance.

1 INTRODUCTION

A desktop terrestrial ecology assessment was undertaken for FRV Services Australia Pty Ltd (FRV) by URS Australia Pty Ltd (URS) in August 2014 to determine the biodiversity values present within the Clare project area. The assessment analysed existing biodiversity data to identify conservation significant values including vegetation communities, flora and fauna species. The outcome of this review determined that a field survey was not required.

1.1 Study Aim and Objectives

The aim of the ecology assessment was to document the terrestrial flora and fauna values within the project area, with particular reference to the occurrence of conservation significant species and communities. In meeting this aim the objectives of the study were to:

- Review existing terrestrial ecology data for the project area and surrounding areas
- Identify potential conservation significant values
- Identify the potential occurrence of weed species
- Determine the potential impacts from the proposed project on biodiversity values and provide mitigation measures to minimise potential impacts where possible.

1.2 Project Area

The project is located in the Northern Brigalow Belt Bioregion within the Bowen Basin. The project is approximately 6 kilometres (km) south west of the Clare and 75 km south east of Townsville, in northern Queensland. The nearest major regional centre is Townsville. The Burdekin River is located 2 km east of the project.

The project and surrounding region is dominated by cropping land, with expanses of remnant vegetation occurring to the south of the project area.

The project and its position within the region are presented in Figure 1-1 below. The 'project area' used in this report refers to land contained within the depicted project boundary.

1.3 Project Description

FRV is seeking approval for the development of a large scale, grid-connected solar farm (the Project) located near the township of Clare. The site is located approximately 35 km from the township of Ayr in North Queensland and falls within the Burdekin Shire Council area. The selected site for the Project is an area of approximately 338 hectares (ha) of rural land currently used for growing sugar cane. Of this area, approximately 240 ha will be used for the solar farm's electricity generating infrastructure itself (the rest will include access tracks, buffers around the existing electricity transmission infrastructure, an excluded patch of remnant vegetation and so on).

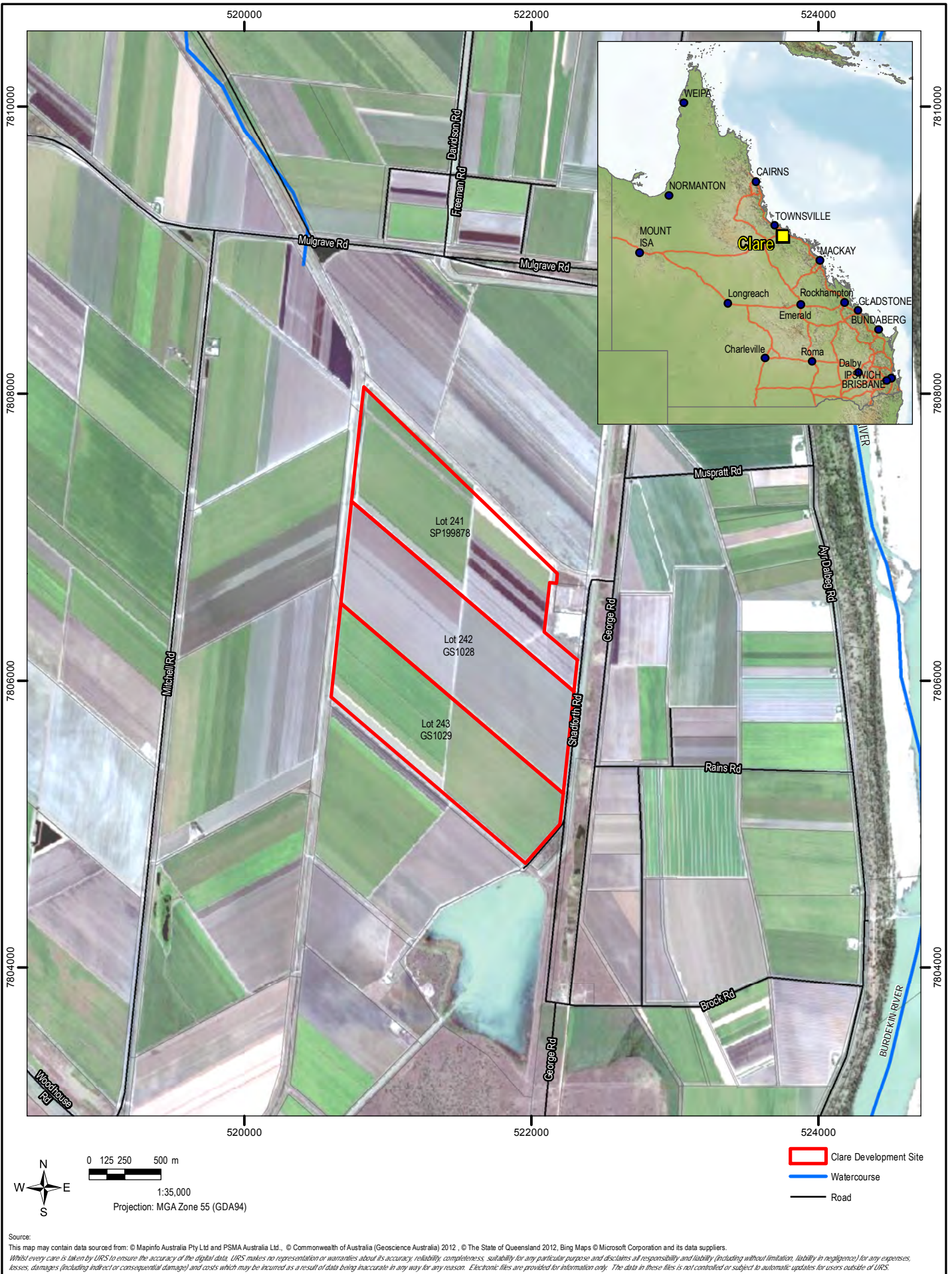
The Project will comprise the construction and operation of a solar farm utilising photovoltaic (PV) modules. The generation of electricity from the solar farm will provide a clean and renewable energy alternative to fossil fuel-based electricity generation, such as coal and gas-fired power stations. Based on the preliminary design, the Project will utilise a tracking system to ensure the modules are exposed to the optimal amount of solar irradiation every day by rotating the PV modules east to west, following the sun across the sky. Inverters will be used

to convert the direct current electricity generated by the PV modules into alternating current, and a transformer will increase the voltage to a level suitable for injection into the national electricity grid. The final design of the Project will confirm the plant configuration layout and specific equipment to be used, as well as the solar farm's electricity generating capacity.

The Project will connect into the electricity grid via the existing Clare substation, which is located immediately adjacent to the north-east corner of the proposed solar farm site.

Sugar cane and other forms of agriculture are the main industries in the region. The development of a large scale solar energy project will represent a positive diversification of the local economy, creating up to 200 jobs during construction and will have many indirect benefits for the local community. There will be the opportunity for local workers to participate in the civil and/or electrical works associated with the Project, as well as indirect opportunities for a range of local businesses, contractors and suppliers – e.g. accommodation providers, fuel suppliers, groceries and restaurants.

The main driving forces for the choice of location of the proposed Clare solar farm include the solar irradiation levels of the site and grid connectivity. The chosen location is among sites with the highest levels of solar irradiation in Australia, which will drive the effectiveness of the PV plant's ability to generate electricity. Secondly, the site directly adjoins a substation, which reduces the costs associated with transporting the generated electricity to end users and allows for a greater capacity of power to be provided. Considering these two factors, the Clare site is first class as it has a well-supported electrical network with national grid connectivity via the existing Clare substation.



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PROJECT AREA
 AND REGIONAL LOCATION



ECOLOGY REPORT - CLARE

Figure: 1-1

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Date: 28-11-2014

Rev. A

A4



2 LEGISLATIVE CONTEXT

2.1 Environmental Protection and Biodiversity Conservation Act, 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) provides for the protection of the environment, especially Matters of National Environmental Significance (MNES). The EPBC Act is administered by the Commonwealth Department of the Environment (DOE). The Act is designed to provide for the conservation of biodiversity through the protection of threatened species and ecological communities, migratory, marine and other protected species listed under the Act. In general, the Act aims to streamline national environmental assessment and approvals processes, protect Australian biodiversity and integrate management of MNES and heritage places.

2.2 Nature Conservation Act, 1992

The Queensland *Nature Conservation Act, 1992* (NC Act) is administered by the Department of Environment and Heritage Protection (EHP) and is the principal legislation for the conservation and management of the State's native flora and fauna. The primary objective of the NC Act is the conservation of biodiversity, namely the preservation of Endangered, Vulnerable and Near Threatened species of flora and fauna, as listed under the *Nature Conservation (Wildlife) Regulation, 2006*.

2.3 Land Protection (Pest and Stock Route Management) Act 2002

The Queensland *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) is administered by the Department of Agriculture, Fisheries and Forestry (DAFF) and provides pest management for agricultural lands. The LP Act lists species of flora and fauna that can have adverse economic, environmental and social impacts in Queensland. These pests are categorised into three classes, as defined below:

- Class 1 Pest: a flora or fauna species that has the potential to become a very serious pest in Queensland in the future
- Class 2 Pest: a flora or fauna species that has already spread over substantial areas of Queensland, but its impact is so serious that we need to try to control it, and avoid further spread onto properties that are still free of the pest
- Class 3 Pest: a flora or fauna species that is commonly established in parts of Queensland but its control by landowners is not deemed to be warranted unless the plant is impacting, or has the potential to impact, on a nearby 'environmentally significant area' (e.g. a national park).

2.4 Vegetation Management Act, 1999

The Queensland *Vegetation Management Act, 1999* (VM Act) regulates the clearing of native vegetation within Queensland. It also aims to maintain ecological processes and reduce greenhouse gas emissions. Additionally, areas of remnant vegetation specific to conservation significant species (listed under the NC Act) are further classified as essential habitat.

The Department of Natural Resources and Mines (DNRM) uses certified mapping of remnant vegetation and essential habitat to administer the VM Act. DNRM uses a state vegetation management codes to assess applications for clearing of native vegetation.

Vegetation is mapped as remnant where the dominant canopy has greater than 70 % of the height and greater than 50 % of the cover, relative to the undisturbed height and cover of that stratum (EHP, 2014). The vegetation community must also be dominated by species characteristic of the vegetation's undisturbed canopy.

3 METHODOLOGY

A desktop review of ecological data and literature was undertaken to characterise the biodiversity values and identify the potential occurrence of conservation significant vegetation communities, flora and fauna within the project area. The objectives of the literature review include:

- Review of relevant biodiversity databases and existing studies for the project area
- Assessment of the broad conservation values of vegetation communities, and fauna habitat present in the project area
- Identification of the potential presence of conservation significant flora and fauna species.

3.1 Data Sources

The acquisition of biodiversity data was undertaken and reviewed from the following key references:

- DOE online EPBC MNES database
- EHP Wildlife Online database
- EHP 1:100,000 RE mapping and high value regrowth map
- EHP Essential Habitat mapping
- Queensland Herbarium HERBRECS records
- Species distribution maps from current published field guides.

In order to identify the range of flora and fauna species present within the project area and the broader region, reviews of the above data sources was conducted. A summary of the various databases as listed above is presented below.

3.2 Biodiversity Databases

A summary of the legislative context, reliability and limitations of the biodiversity databases used in the literature review (Section 3.1) is provided below.

3.2.1 *EPBC MNES Database*

The DOE MNES database generates a list of protected matters (listed as per the EPBC Act), that may potentially occur in or near the project area. The database incorporates information from a range of sources including government, research and community organisations.

The MNES database has inherent limitations, based on the accuracy of spatial data for some matters. In particular, confirmation of the presence of threatened or migratory species at a given site is not possible from the database, as data presented are for potential occurrences of species within a general area, rather than for known occurrences at a specific site.

The relative reliability of this database must be borne in mind, as species highlighted by this search do not necessarily correlate with an actual observation. Species are highlighted by the database if their currently known distribution overlaps with the search area by one degree of latitude or longitude (approximately 100 km). This indication of potential presence does not

consider if suitable vegetation, geology, soil, climate or habitat types are actually present, to support the occurrence of a significant species or ecological community.

3.2.2 Wildlife Online

The EHP Wildlife Online database contains recorded wildlife sightings and listings of plants, fungi, protists, mammals, birds, reptiles, amphibians, freshwater fish, marine cartilaginous fish and butterflies in Queensland. The database is based on collated species lists and wildlife records, acquired by EHP through a range of sources including specimen collections, research and monitoring programs and community wildlife recording programs. Whilst results from the database may represent actual observations or specimen collections, it does not indicate specific locality, habitat type and date of collection. As such, results from this database indicate a potential presence, and were only used to guide targeted surveys during the field study.

3.2.3 HERBRECS

HERBRECS is a database maintained by the Queensland Herbarium that provides a list of specimens kept within the Queensland Herbarium collections for a specified search area. Data provided is derived from specimen label information and includes details on specimen, geographic location and habitat.

3.2.4 Regional Ecosystem Mapping

EHP uses REs to describe the relationships between vegetation communities and the broader environment at the bioregional scale. REs are mostly derived from linking vegetation mapping units recognised at a scale of 1:100,000, to land zones that represent major environmental variables, in particular geology, rainfall and landform.

The Queensland Herbarium has developed a program for mapping remnant REs across Queensland; however, it should be noted that there are inaccuracies inherent in RE mapping at a scale of 1:100,000. As a result, these maps provide an indication of what is potentially present, and cannot be relied upon as an inherently correct source of vegetation mapping. On-site ground truthing is required to confirm the presence of RE types and extents, verify floristics and structure, and confirm conservation status.

Under the VM Act, REs are assigned a conservation status (vegetation management status (VM status)), based on an assessment of the pre-clearing and remnant extent of each RE. A second status rating (biodiversity status) is defined by EHP, and is based on an assessment of the condition of the remnant vegetation. Criteria for defining the VM status and the biodiversity status of REs are provided below.

Vegetation is mapped as remnant by EHP where the dominant canopy has greater than 70 % of the height, and greater than 50 % of the area, relative to the undisturbed height and cover of that stratum (EHP, 2013). The vegetation community must also be dominated by species characteristic of the REs undisturbed canopy.

3.2.4.1 Endangered

An RE is listed as having an endangered VM status when remnant vegetation is:

- Less than ten per cent of its pre-clearing extent across the bioregion; or
- Ten to thirty per cent of its pre-clearing extent remains, and the remnant vegetation is less than 10,000 ha.

An RE is listed as having an endangered biodiversity status when:

- Less than 10 per cent of the pre-clearing extent of remnant vegetation, remains unaffected by severe degradation and/or biodiversity loss; or
- Ten to thirty per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss, and the remnant vegetation is less than 10,000 ha; or
- It is a rare RE subject to a threatening process.

3.2.4.2 *Of Concern*

An RE is listed as having an Of Concern VM status when remnant vegetation is:

- Ten to thirty per cent of its pre-clearing extent across the bioregion; or
- More than thirty per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 ha.

An RE is listed as having an Of Concern biodiversity status when remnant vegetation is:

- Ten to thirty per cent of its pre-clearing extent across the bioregion; or
- More than thirty per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 ha, and if ten to thirty per cent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.

3.2.4.3 *Least Concern / No Concern at Present*

An RE is listed as Least Concern VM status when remnant vegetation is:

- Over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 ha.

An RE is listed as No Concern at Present biodiversity status when remnant vegetation is:

- Over 30 per cent of its pre-clearing extent across the bioregion, the remnant area is greater than 10,000 ha and the degradation criteria listed above for endangered or of concern REs are not met

3.2.4.4 *High Value Regrowth Mapping*

The Queensland Government introduced laws on 8 October 2009 to regulate the clearing of HVR and regrowth watercourse vegetation. HVR vegetation comprises “Regional ecosystems that are endangered, of concern and least concern, and have not been cleared since 31 December 1989” (DERM, 2009).

However, on 2 December 2013, reforms to the vegetation management laws were made. This included the clearing of high-value regrowth (native vegetation that has not been cleared since 31 December 1989) is no longer being regulated on freehold and Indigenous land, returning

regrowth regulation to a similar level to that which existed prior to regrowth reforms in late 2009. High-value regrowth will remain regulated on leasehold land for agriculture and grazing, and within 50 m of identified watercourses in the Burdekin, Mackay–Whitsunday and Wet Tropics Great Barrier Reef catchments on freehold land, Indigenous land and leasehold land for agriculture and grazing.

3.2.5 ***Essential Habitat Mapping***

To fulfil its obligation under the VM Act to regulate vegetation clearing in such a way as to prevent the loss of biodiversity, the EHP uses these essential habitat maps to help determine the habitat status of the vegetation when assessing applications to clear.

Essential habitat is shown on regulated vegetation management maps. While essential habitat indicates a species occurrence in a particular locality, no other information such as collection date is provided.

4 RESULTS

4.1 Regional Context

4.1.1 Bioregion

Queensland's bioregions are based on landscape patterns that reflect geology and climate, as well as floral and faunal assemblages at a broad scale, and are used as the fundamental framework for the planning and conservation of biodiversity (Young *et al.*, 1999).

The project area is located within the Brigalow Belt bioregion, which has experienced rapid and extensive loss of habitat. Major impacts upon vegetation of the Brigalow Belt include tree clearing, high grazing pressure, and the proliferation of exotic species such as *Opuntia** species (prickly pear). Additionally, the introduced pasture species *Pennisetum ciliare** (buffel grass), dominates much of the open landscape. As a consequence of habitat modification, many flora and fauna species in this bioregion have undergone severe range reductions, and localised extinctions have occurred for several fauna species (Young *et al.*, 1999).

Vegetation clearing has occurred on most of the lowland landscapes. Areas with more rugged topography associated with the sandstone and metamorphic ranges remain relatively undisturbed (Young *et al.*, 1999).

4.1.2 Subregion

The Brigalow Belt bioregion contains 36 sub-regions that delineate significant differences in geology and geomorphology (Young *et al.*, 1999). The project area is situated within the Townsville Plains province. The landscape of this province comprises predominantly quaternary alluvial and alluvial plains fringed by coastal and estuarine deposits in the east and igneous rocks in the west (Young *et al.*, 1999). Vegetation largely consists of *Eucalyptus platyphylla* (poplar gum) woodland with *Eucalyptus crebra* (narrow-leaved ironbark), *Corymbia dallachiana* (Dallachy's gum) and paperbark species (Young *et al.*, 1999).

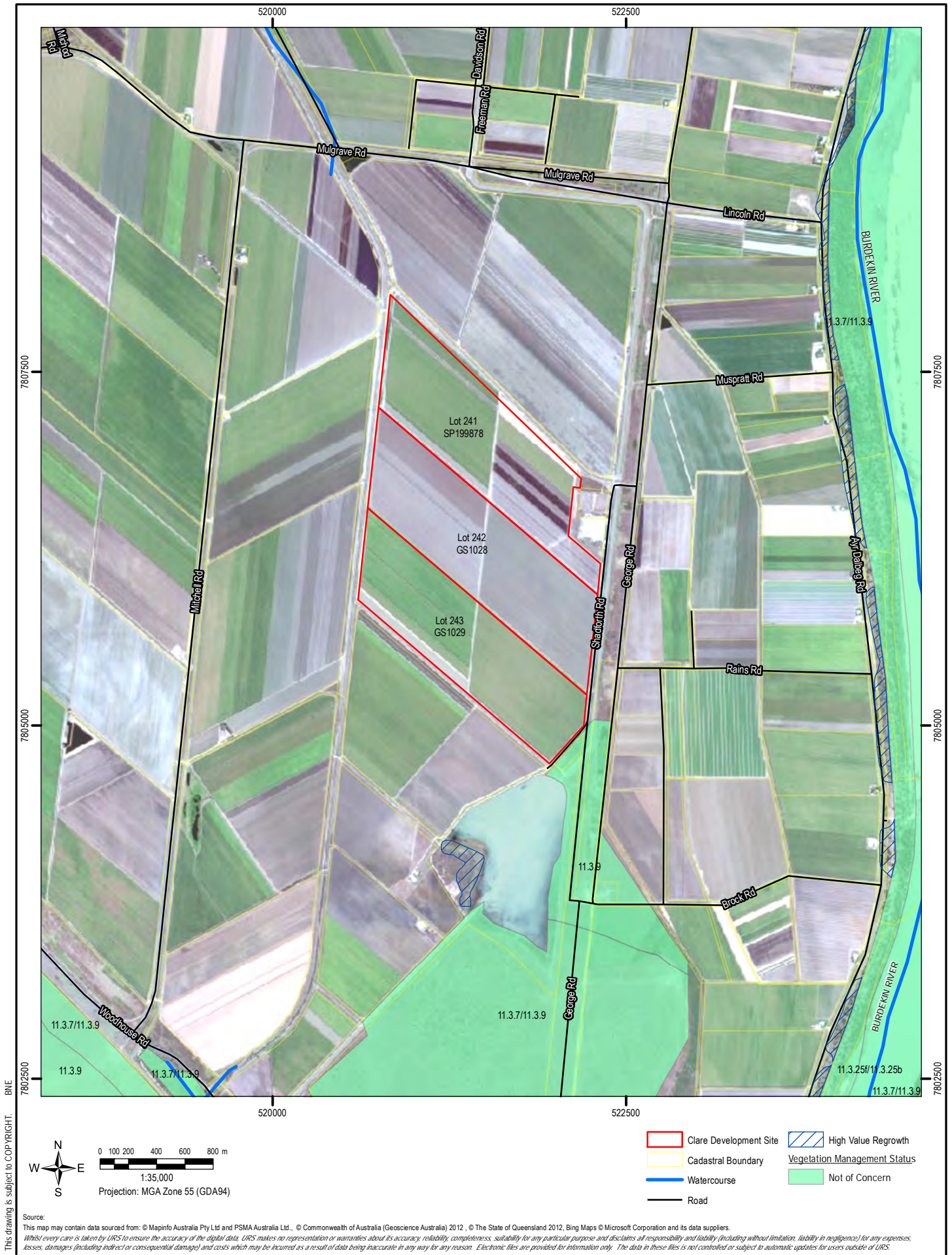
4.2 Project Characteristics

The project area is entirely used for cropping purposes, namely for growing sugar cane. Remnant vegetation is mapped in the south-eastern corner of the site, however no project infrastructure is proposed within this area. As such, no impact to this area of mapped remnant vegetation is anticipated.

4.3 Vegetation Communities

4.3.1 Regional Ecosystems

Current state mapping of depicts one least concern RE (RE11.3.9) immediately adjacent to the south-eastern corner of the project area. This RE can be described as *Eucalyptus platyphylla*, *Corymbia* spp. woodland on alluvial plains, and is depicted in Figure 4-1.



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Figure: 4-1

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Date: 28-11-2014

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4.3.2 Threatened Ecological Communities

No TECs were identified as a possible occurrence within the project area.

4.4 Conservation Significant Flora and Fauna

The literature review identified 13 conservation significant flora and fauna species as potentially occurring within the project area, including 2 flora and 11 fauna species (excluding migratory species). These species and their respective status (NC Act and EPBC Act) are detailed below in Table 4-1 below.

Table 4-1 Conservation significant flora and fauna potentially occurring within the project area

Common Name	Scientific Name	EPBC Status	NC Act Status
Plants			
Siah's backbone	<i>Streblus pendulinus</i>	E	-
black ironbox	<i>Eucalyptus raveretiana</i>	V	-
Birds			
red goshawk	<i>Erythrorichis radiatus</i>	V	E
star finch (eastern and southern)	<i>Neochmia ruficauda ruficauda</i>	E	E
black-throated finch	<i>Poephila cincta cincta</i>	E	E
Australian painted snipe	<i>Rostratula australis</i>	E, Mi	V
masked owl (northern)	<i>Tyto novaehollandiae kimberli</i>	V	V
black-necked stork	<i>Ephippiorhynchus asiaticus</i>	-	NT
Mammals			
northern quoll	<i>Dasyurus hallucatus</i>	E	-
koala ²	<i>Phascolarctos cinereus</i>	V	SLC
bare-rumped sheath-tail bat	<i>Saccolaimus saccolaimus nudicluniatus</i>	CE	E
Reptiles and Amphibians			
ornamental snake	<i>Denisonia maculata</i>	V	V
yakka skink	<i>Egernia rugosa</i>	V	V

1 E – Endangered; V – Vulnerable; Mi – Migratory; SLC – Special Least Concern

2 Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)

4.5 Migratory Fauna Species

Fourteen migratory species were identified as potentially occurring within the project area. These are listed in Table 4-2 below.

Table 4-2 Migratory fauna potentially occurring within the project area

Common name	Scientific Name
fork-tailed swift	<i>Apus pacificus</i>
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>

Common name	Scientific Name
white-throated needletail	<i>Hirundapus caudacutus</i>
barn swallow	<i>Hirundo rustica</i>
rainbow bee-eater	<i>Merops ornatus</i>
black-faced monarch	<i>Monarcha melanopsis</i>
spectacled monarch	<i>Monarcha trivirgatus</i>
satin flycatcher	<i>Myiagra cyanoleuca</i>
rufous fantail	<i>Rhipidura rufifrons</i>
great egret	<i>Ardea alba</i>
cattle egret	<i>Ardea ibis</i>
Latham's snipe	<i>Gallinago hardwickii</i>
sarus crane	<i>Grus antigone</i>
salt-water crocodile	<i>Crocodylus porosus</i>

4.6 Essential Habitat

No essential habitat is mapped within the project area or in the immediate environs.

4.7 Likelihood of Occurrence of Conservation Significant Flora and Fauna

A likelihood of occurrence assessment was undertaken for conservation significant flora and fauna identified above. This assessment involved the review of habitat requirements and known locations of these species against desktop values and aerial imagery interpretation. The results of this assessment determined that no conservation significant flora and fauna are expected to inhabit the project area given that the project area supports highly disturbed cropping land and thus lacks the habitat required to support these species.

Similarly to conservation significant flora and fauna, migratory fauna are unlikely to inhabit the project area due to the disturbance from cropping practices. However, three species were identified as a possible occurrence either within habitat immediate adjacent to the project area, or possible fly overs, including:

- fork-tailed swift (*Apus pacificus*)
- white-throated needletail (*Hirundapus caudacutus*)
- rainbow bee-eater (*Merops ornatus*)

5 POTENTIAL IMPACTS AND RECOMMENDATIONS

5.1 Potential Impacts

The proposed disturbance area of the project is depicted in Figure 5-1 below.

The project area is likely to support few biodiversity values given the level of existing disturbance associated within cropping practices. As a result, the potential impacts associated with the construction and operation of the project is considered minimal. Potential impacts from the project include:

- Introduction of weeds into the project area
- Mortality of fauna associated with vehicle strike
- Dust and noise related impacts on flora and fauna within remnant habitat adjacent to the project area.

5.1.1 *Introduction of Exotic Flora Species*

The construction of project infrastructure and disturbance of soil and vegetation, increase the risk of weed invasion. A number of introduced flora species are likely to occur within the region. Unmitigated construction has potential to introduce or exacerbate the extent of a known weed species.

5.1.2 *Fauna Mortality*

Fauna numbers are unlikely to be high within the project area given its current land use. However, a number of fauna species may inhabit the project area during construction activities, such as amphibians and reptiles. Thus, potential exists for the mortality of fauna species; however, this impact will be minimal given the likely low numbers of fauna present.

5.1.3 *Dust and Noise*

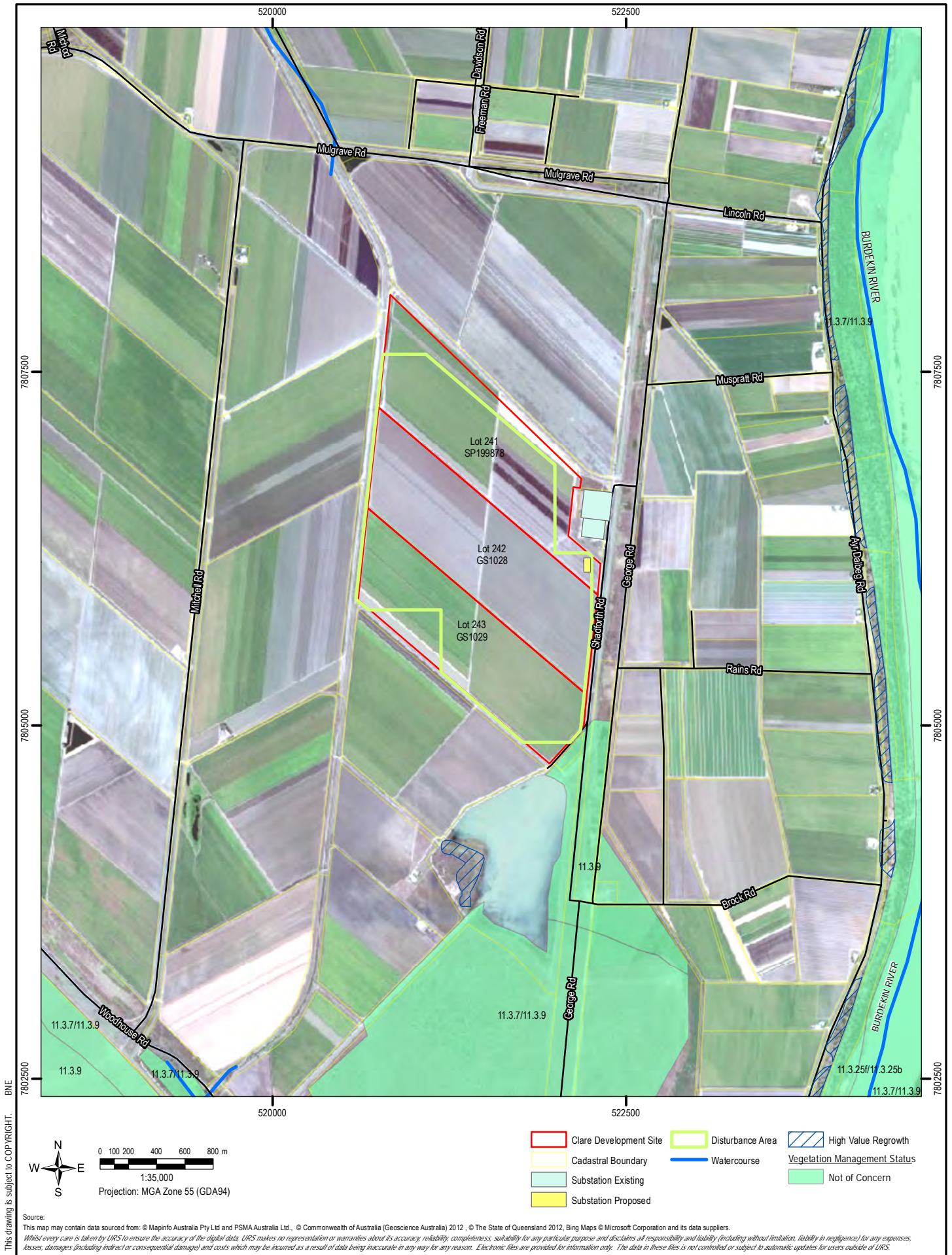
Deposition of dust, sand and soil resulting from construction and operational works may have potential impacts on vegetation adjacent to the project area if excessive levels are sustained over extended periods. Given works are considered temporary and only a small area of the project abut remnant vegetation, potential impacts are likely to be minimal.

Excessive noise generate will potentially cause disturbance to all groups of fauna, especially birds within adjacent vegetation communities. This will most likely result in avoidance of the area for the duration of these activities. As alternative habitats are available elsewhere, an overall loss of avian diversity as a result of construction will probably not occur. Upon the cessation of peak noise levels and construction activity, many, if not all species are likely to resume activities around the facility. Therefore, long-term impacts are not expected.

5.2 Recommendations

Considering the above potential impacts on biodiversity values, the following recommendations should be considered in minimising potential impacts.

- The project area will be managed for any declared weed species, listed under the LP Act, that may occur
- Dust mitigation measures such as the use of water suppression should be considered.



6 CONCLUSION

The desktop assessment of biodiversity values identified the following:

- The project area is situated within the Northern Brigalow Belt bioregion approximately 6 km from Clare, Qld (Section 4.1)
- The desktop review identified no regional ecosystems within the project area. One least concern regional ecosystem is mapped adjacent to the project area (RE11.3.9) (Section 4.3) in the south-eastern corner of the site.
- No threatened ecological communities are mapped or expected to occur within the project area (Section 4.3)
- The desktop review of biodiversity databases identified the potential occurrence of 13 conservation significant flora and fauna species within the project area, including 2 flora and 11 fauna (excluding migratory species) (Section 0)
- Fourteen migratory species listed under the EPBC Act were identified from database searches as a potential occurrence within the project area (Section 4.5)
- No essential habitat or wetlands are mapped within the project area (Section 4.6)
- The likelihood of occurrence assessment determined that no conservation significant flora or fauna are a possible occurrence due to the lack of suitable habitat and presence of existing disturbances (Section 4.7).
- Three species were identified as a possible occurrence either within habitat immediate adjacent to the project area, or possible fly overs (Section 4.7), including:
 - fork-tailed swift (*Apus pacificus*)
 - white-throated needletail (*Hirundapus caudacutus*)
 - rainbow bee-eater (*Merops ornatus*)

Overall the original vegetation patterns of the project area have been highly modified to facilitate cropping. It is considered that the proposed project area offers poor overall habitat values for native flora and fauna. The potential impacts on biodiversity values associated with project activities are considered negligible.

Young, Wilson, McCosker, Fensham, Morgan, Taylor, 1999. Chapter 11 Brigalow Belt, in: The Conservation Status of Queensland's Bioregional Ecosystems.

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Clare Solar Park

Glare Assessment Report

Prepared For FRV

December 2014



ENVIRONMENTAL
ETHOS



Prepared By Environmental Ethos on
behalf of FRV Services Australia Pty Ltd.

REF NO. 14001

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1. INTRODUCTION

This report has been prepared by Environmental Ethos on behalf of the proponent FRV Services Australia Pty Ltd (FRV) to assess the potential glare impact of the Clare Solar Park Project (the Project). The Project comprises of the construction and operation of a large scale, grid-connected solar farm utilising photovoltaic (PV) modules. The solar farm design is currently under development and while the layout has yet to be finalised, this report is based on the conservative assumption that the electricity generating components of the facility will cover an area of approximately 240 ha located across three lots, Lot 241 on SP199878, Lot 242 on GS1028, and Lot 243 on GS1029. The total footprint of the solar farm will cover almost the entire three lots, allowing for setbacks. The Project site is located within the Burdekin Shire Council area.

1.1. Location

The Project site is located approximately 5 km south of Clare and 35 km west from the township of Ayr in North Queensland. The closest roads to the site include Ayr Ravenswood Road to the north, and Ayr Dalbeg Road to the east, *refer Figure 1*. The total site is approximately 340 hectares (ha) of flat agricultural land currently used for growing sugar cane. An existing electricity substation adjoins the eastern boundary, with existing grid connected high voltage power lines to the north, east, and running through the site. Land use within the region is predominantly agricultural, with land surrounding the site mainly used for sugar cane production.

2. SCOPE OF THE ASSESSMENT

The scope of this Glare Assessment includes the following:

- Description of the methodology used to undertake the study;
- Description of the elements of the Project with the potential to influence glare including size, height, and angle of PV modules, and type and operation of the tracking system;
- Identification of the viewshed using GIS modelling
- Desktop mapping of potential glare at the location of sensitive receptors within the viewshed, based on Solar Glare Hazard Analysis and viewshed analysis,
- Assessment of the baseline conditions; and
- Assessment of the potential risk of glare on sensitive receptors during operation of the Project.

3. METHODOLOGY

3.1. Glare Assessment Parameters

Glare assessment modelling for solar farms is based on the following factors:

- the tilt, orientation, and optical properties of the PV modules in the solar array;
- sun position over time, taking into account geographic location;



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FIGURE 1
LOCATION PLAN

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- the location of sensitive receptors (viewers); and
- Screening potential of surrounding topography and vegetation.

3.2. Glare Intensity Categories

Glare refers to the human experience of reflected light. The potential hazard from solar glare is a function of retinal irradiance (power of electromagnetic radiation per unit area produced by the sun) and the subtended angle (size and distance) of the glare source.¹

Glare can be broadly classified into three categories: low potential for after-image, potential for after-image, and potential for permanent eye damage, *Figure 2* illustrates the glare intensity categories.

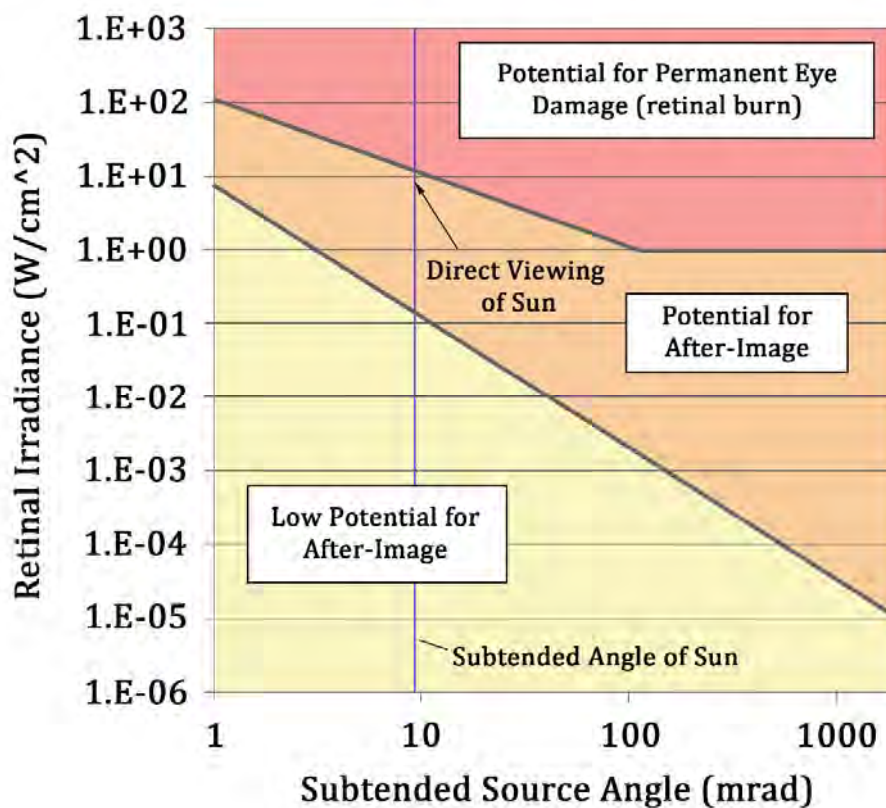


Figure 2. Ocular impacts and Hazard Ranges²

The amount of light reflected from a PV panel depends on the amount of sunlight hitting the surface as well as the surface reflectivity. The amount of sunlight interacting with the solar panel will vary based on geographic location, time of year, cloud cover, and solar panel orientation. 1000W/m² is generally used in calculations as an estimate of the solar energy interacting with a panel when no other information is available. This study also modelled scenarios using 2000 W/m²

¹ HO, C.K., C.M. Ghanbari, and R.B. Diver, 2011, Methodology to Assess Potential Glint and Glare hazards from Concentrated Solar Power Plants

² Source: Solar Glare Hazard Analysis Tool (SGHAT) Presentation (2013)
https://share.sandia.gov/phlux/static/references/glint-glare/SGHAT_Ho.pdf

in order to assess the implications of higher solar energy levels. Flash blindness for a period of 4-12 seconds (i.e. time to recovery of vision) occurs when 7-11 W/m² (or 650-1,100 lumens/m²) reaches the eye³.

3.3. Reflection and Angle of Incidence

PV modules are designed to maximise the absorption of solar energy and therefore minimise the extent of solar energy reflected. PV modules have low levels of reflectivity between 0.03 and 0.20 depending on the specific materials, anti-reflective coatings, and angle of incidence.⁴

The higher reflectivity values of 0.20, that is 20% of incident light being reflected, can occur when the angle of incidence is greater than 50°. *Figure 3 and 4* show the relationship between increased angles of incidence and increased levels of reflected light. Where the angles of incidence remains below 50° the amount of reflected light remains below 10%. The angle of incident is particularly relevant to specular reflection (light reflection from a smooth surface). Diffuse reflection (light reflection from a rough surface) may also occur in PV modules, however this is typically a result of dust or similar materials building up on the PV module surface, which would potentially reduce the reflection.

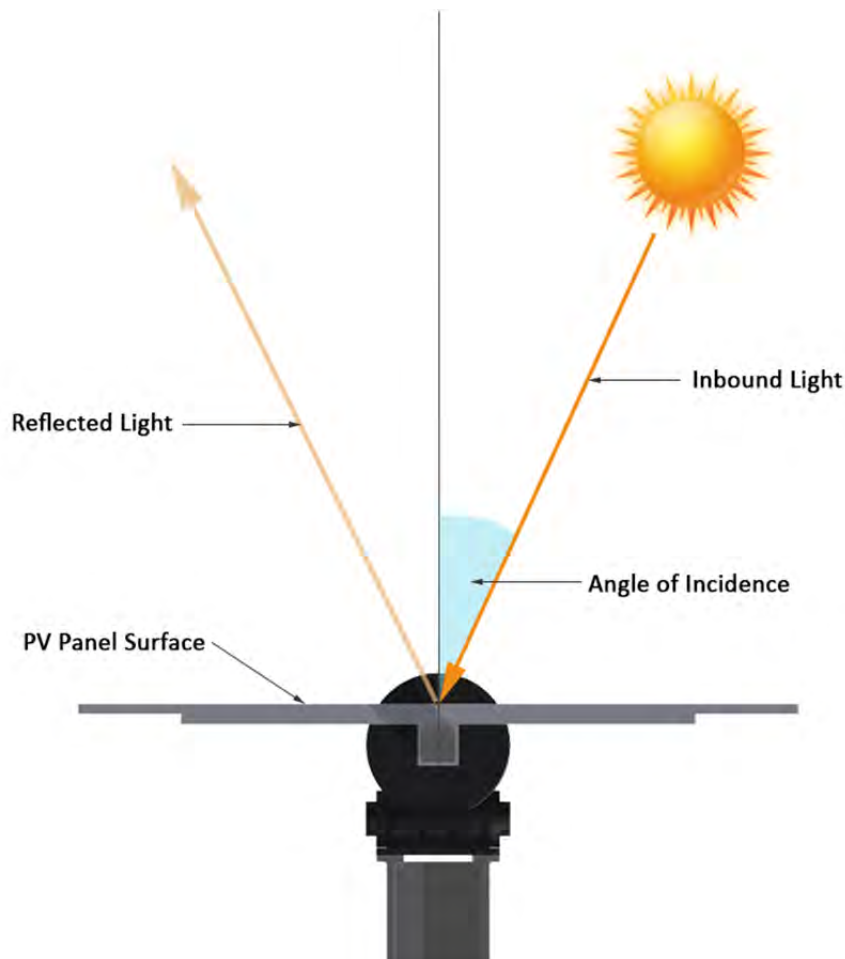


Figure 3. Angle of Incidence Relative to PV Panel Surface

³ Sandia National Laboratory, Solar Glare Hazard Analysis Technical Manual

⁴ Ho, C. 2013 *Relieving a Glare Problem*

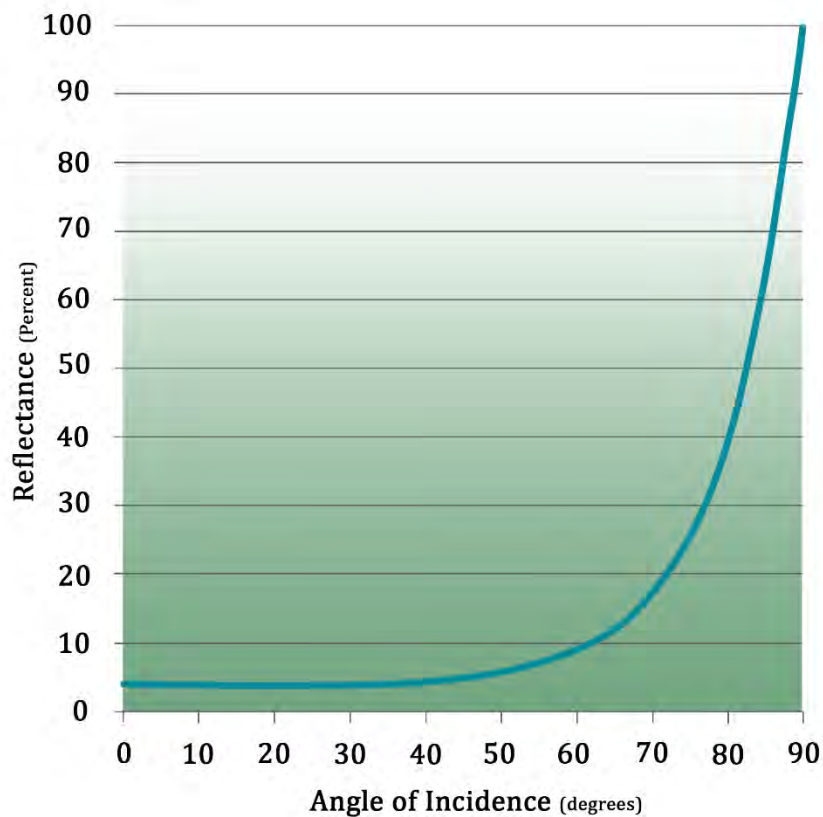


Figure 4. Angles of Incidence and Increased Levels of Reflected Light (Glass ($n=1.5$))

The sun changes its east-west orientation throughout the day, and it changes its north-south position throughout the year. The sun reaches its highest position at noon on the Summer Solstice (21 December in the Southern Hemisphere) and its lowest position at sunrise and sunset on the Winter Solstice (21 June in the Southern Hemisphere).

In a fixed PV solar array the angle of incidence varies as the sun moves across the sky, that is, the angle of incidence are at their lowest around noon where the sun is directly overhead and increase in the early mornings and late evenings as the incidence angles increase. If the PV array is mounted on a tracking system this variation is reduced because the panel is rotated to remain perpendicular to the sun. Therefore, a PV modular array using a tracking system has less potential to cause glare whilst it tracks the sun. Figure 5 illustrates a PV module mounted horizontal single axis tracking system following the east to west path of the sun.

Once the tracking mechanism reaches its maximum angle of rotation, the PV module's position relative to the sun becomes fixed and therefore the angle of incidence increases and the potential for glare increases. Some tracking systems utilise 'Backtracking' to avoid PV modules over shadowing each other. During the backtracking procedure (early morning and late afternoon) the tracking system begins to rotate away from the sun to reduce shadow casting to adjoining PV panels. During the backtracking phase, higher angles of incidence will occur in comparison to the tracking phase, and this may increase the potential for glare during that phase.

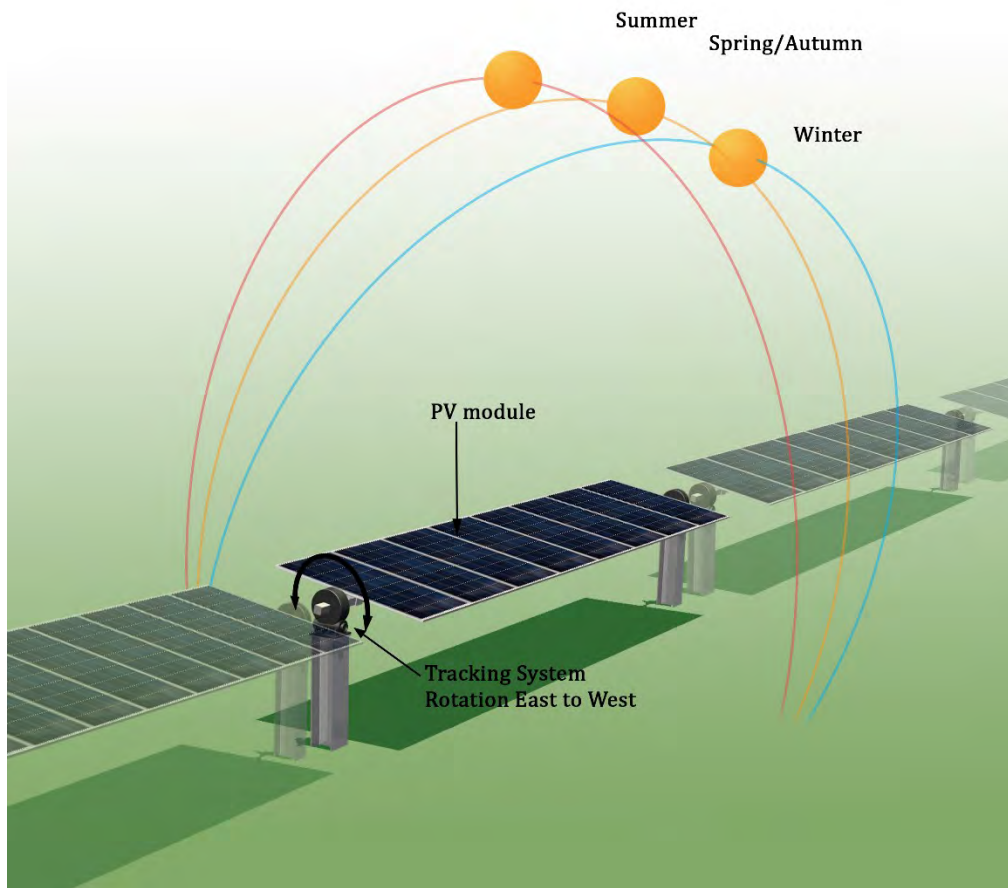


Figure 5. Diagrammatic illustration of sun position relative to PV module mounted on a horizontal single axis tracking system.

3.4. View shed Analysis

The viewshed analysis is generated in GIS by positioning a 3D model of the solar farm into a Digital Terrain Model (DTM). The Terrain Model (DTM) used in this study is based on a contour interval of 5 metres. The location of sensitive receptors (dwellings, roads, etc) are located relative to the location of the solar farm and view lines between the two assessed taken into consideration intervening topography. The result is a map showing the extent of the viewshed, potential visibility of the solar farm and therefore the potential for glare. The viewshed analysis is used in conjunction with solar hazard assessment software to assess the potential for solar glare hazard.

3.5. Solar Glare Hazard Analysis

This assessment has utilised the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandi National Laboratory⁵ to assess potential glare utilising latitude and longitudinal coordinates, elevation, sun position, and vector calculations. The PV module orientation, reflectance environment and ocular factors are also considered by the software. If potential glare is identified by the model, the tool calculates the retinal irradiance and subtended angle (size/distance) of the

⁵ https://share.sandia.gov/phlux/static/references/glint-glare/SGHAT_Technical_Reference-v5.pdf

glare source to predict potential ocular hazards according to the glare intensity categories (refer *Section 3.2*).

The sun position algorithm used by SGHAT calculates the sun position in two forms: first as a unit vector extending from the Cartesian origin toward the sun, and second as azimuthal and altitudinal angles. The algorithm enables determination of the sun position at every time step throughout the year.

The SGHAT is a high level tool and does not take into consideration the following factors:

- Backtracking or the effect of shading in relation to the PV array tracking system
- Gaps between PV modules
- Atmospheric conditions
- Topography and vegetation between the solar panels and the viewer (sensitive receptor)

SGHAT has been used extensively in the United States to assess the potential impact of solar arrays located in close proximity to airports. Used in conjunction with a viewshed analysis, the two tools represent a conservative assessment and can be considered as representative of a 'worse case' scenario.

3.6. Baseline Conditions

The baseline is a statement of the characteristics which currently exist in the Project area. The baseline glare condition assessment takes into consideration the following:

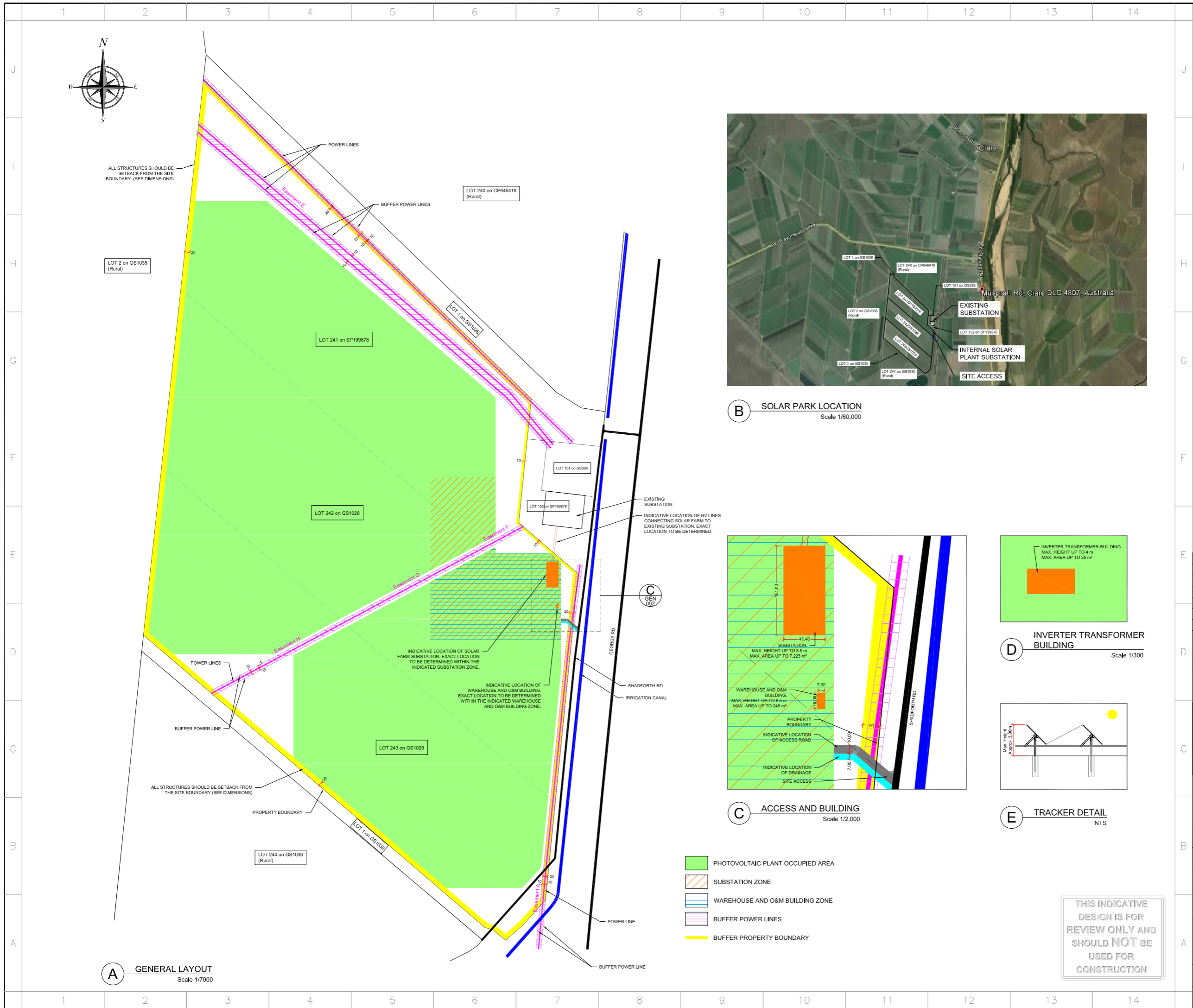
- Characteristics of the environment that may affect the potential for glare;
- Land use and human modifications to the landscape such as roads, buildings and existing infrastructure which may influence glare and sensitivity to glare.

3.7. Risk Assessment Approach

Once the potential for glare has been identified through the viewshed analysis and SGHAT, the potential magnitude of the glare hazard is considered relative to background conditions. A risk assessment approach is then used to identify the potential significance of the risk based on the magnitude of the glare hazard generated and the sensitivity of the receptors (viewers).

4. PROJECT DESCRIPTION

The general layout of the solar farm is as show in *Figure 6*. The main elements of the Solar Farm with the potential to influence glare are the tilt, orientation, and optical properties of the PV modules in the solar array, and the rotational capabilities of the tracking system. Whilst specific products are yet to be determined for the Project, the general technical properties of the main elements influencing glare are described below.



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FIGURE 6
GENERAL LAYOUT

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4.1. PV modules

The type of PV module utilised in the Project has yet to be determined and will not be finalised until around the time of construction commencing. However PV modules are generally consistent in form and function, and an illustrative example is provided below.

Each PV panel comprise of approximately 72 polycrystalline silicon solar cells overlaid by a 3.2 mm tempered glass front and held in an anodised aluminium alloy frame. The approximate dimensions for each panel are 2 metres x 1 metre. The PV panels are mounted on a horizontal single axis tracking system with rows aligned north-south, refer *Figure 7*.

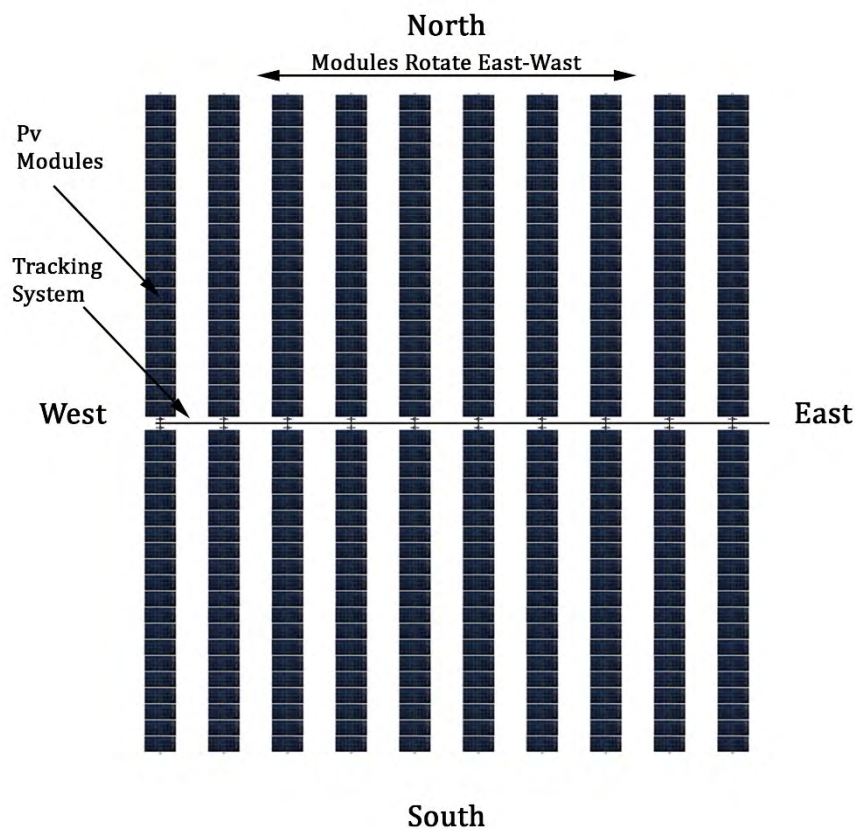


Figure 7. Illustration of PV Module Row Alignment

4.2. Horizontal single axis tracking system

The horizontal single axis tracking system rotates the PV panels across an east to west arc, following the sun's trajectory across the sky. The purpose of the tracking system is to optimize solar energy collection by holding the PV module perpendicular to the sun. The tracking system is capable of a maximum rotation range of 90° (+/- 45°) or 120° (+/- 60°) depending on the system used. For the purpose of this study a rotation range of 120° (+/- 60°) has been used, refer *Figure 8*.

This study has assumed the tracking system will utilise a 'backtracking' procedure to reduce the potential for over shadowing between panels.

The zenith tilt angle of the panels are assumed to be set at zero, that is, the panels are not tilted on a north – south alignment but remain horizontal along the plane of the tracker. This enables the height of the panel to remain consistent relative to each other and avoids potential over shadowing.

The maximum height of the PV panels above natural ground is approximately 2 to 3 metres, a conservative figure of 4 metres was used in the modelling to ensure any slight increases in height are captured within the modelling envelop.

The configuration of the tracking system rows may vary slightly dependent on the type of system used, in general the rows will be between 4 and 5 metres apart.

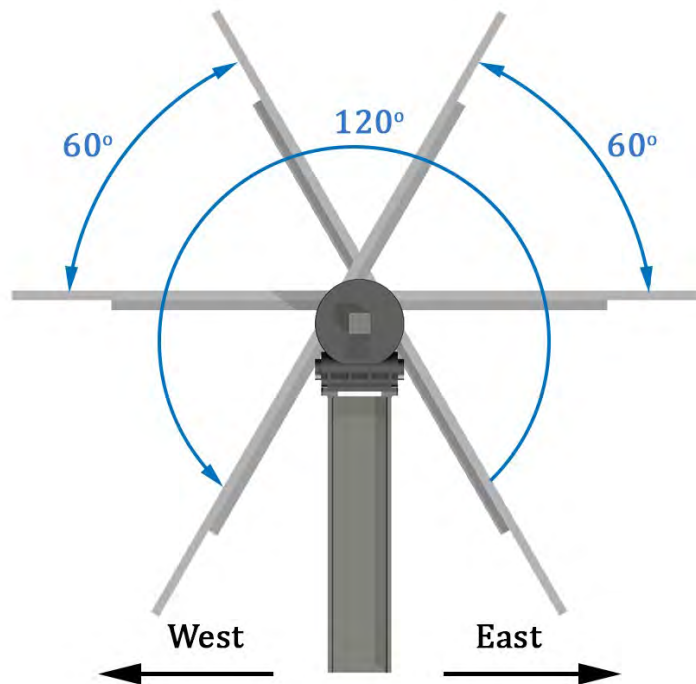


Figure 8. Illustration of PV Module Rotation Angles

5. DESKTOP GLARE ASSESSMENT

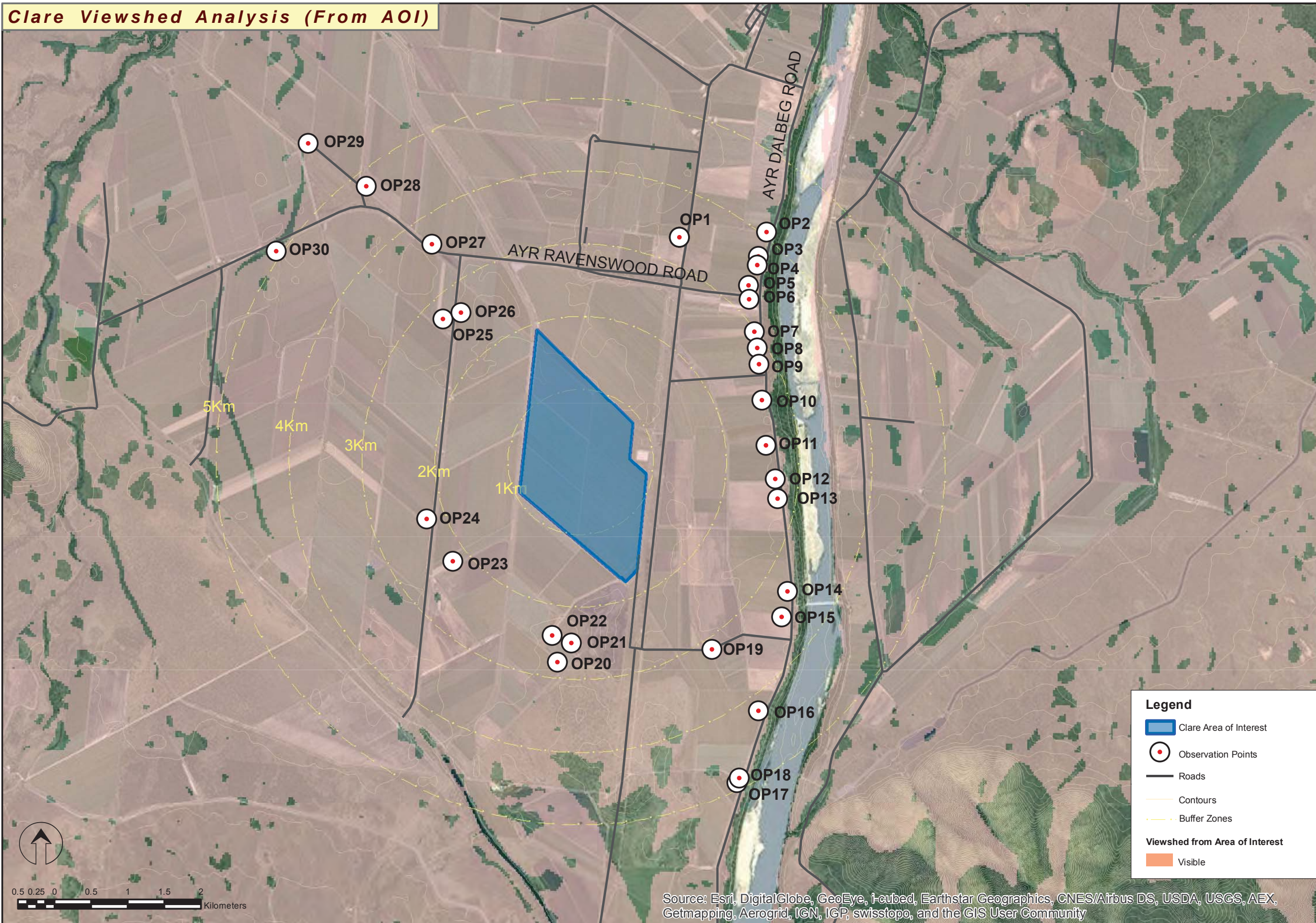
The aim of the desktop glare assessment is to identify if any sensitive receptors have the potential to be impacted by glare. The software modelling systems used in the desktop assessment include GIS viewshed modelling to identify the location of sensitive receptors with line of sight to the solar farm, and the SGHAT to identify the potential and ocular significance of glare.

5.1. Viewshed Analysis

The results of the viewshed analysis are shown in *Figures 9 and 10*.

Figure 9 shows the extent of the viewshed when modelled from the Project site (Area of Interest (AOI)) looking out across the landscape at a height of 4 metres above ground (representing the maximum height of the PV array). The mapping identifies the potential visibility of any part of the

Clare Viewshed Analysis (From AOI)



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FIGURE 9
VIEWSHED ANALYSIS FROM AOI

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Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Clare Viewshed Analysis (From Observation Points)



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FRV SERVICES AUSTRALIA PTY LTD

PROJECT
CLARE SOLAR PARK

SCALE: NTS
SOURCE: GENERAL
LAYOUT PREPARED BY
INGENIA



FIGURE 10
VIEWSHED ANALYSIS FROM OBSERVATION POINTS INCLUDING ROADS

DRAWING NUMBER
14001

ISSUE
A

solar farm from any point in the landscape. As the landscape surrounding the Project site is relatively flat, the potential for visibility based on topography alone is high. This is a conservative analysis approach as large areas of the landscape do not contain sensitive receptor (viewers) with the potential to be impacted by glare. In addition, the extent of visibility reduces over distance to the point of becoming visually insignificant at distances greater than 1 km. Based on the parameters of the human eye, a low profile object in the landscape such as the PV array at 4 metres above ground level, would appear as a thin line within the landscape at a distance greater than 1 km when viewed across flat terrain. The viewshed analysis does not account for vegetation screening in the landscape, which in the case of the Project site, would likely be sugar cane. The seasonal cycle of sugar cane production adjoining the site would affect visibility in that the Project would become partially screened by sugar cane when adjoining fields were in full growth phase. When these fields are harvested, this vegetation screening would be removed. The resulting impact on visibility of the Project would be partial screening, or a 'patchwork' of screening vegetation dependent on the sugar cane production cycle occurring across the surrounding fields.

Figure 10 shows the extent of visibility from key observation points within the viewshed, these being the closest dwellings, public buildings and roads, to the Project site. The mapping identifies the extent of potential visibility of the solar farm, or portions of the solar farm, as seen from these locations. The results of this analysis indicates the Project has the potential to be visible, or partially visible from these locations. As described above, this analysis was based on topography alone and does not take into consideration vegetation screening. The modelling also does not take into consideration the perception of the visible element, notably the effect of distance on the significance of the impact. Therefore this represents a conservative assessment of potential visibility of the solar farm within the landscape.

5.2. Solar Glare Hazard Analysis

The parameters used in the SGHAT model are detailed in *Table 1*.

Table 1. Input data for SGHAT Analysis

SGHAT Model Parameters	Values
Time Zone	UTC +10
Axis Tracking	Single
Tilt of tracking axis	0
Orientation of tracking axis	0
Offset angle of module	0
Module Surface material	Smooth glass without anti-reflective coating (ARC)
Maximum tracking angle	60
Height of panels above ground	4 m at rotational base

The assessment outcomes for the SGHAT are outlined in *Table 2*:

Table 2. SGHAT Assessment Results

Sensitive Receptor	Glare Potential
Observation Point 01- Residential Dwelling	No Glare
Observation Point 02 - Residential Dwelling	No Glare

Observation Point 03 - Residential Dwelling	No Glare
Observation Point 04 - Residential Dwelling	No Glare
Observation Point 05 - Residential Dwelling	No Glare
Observation Point 06 - Residential Dwelling	No Glare
Observation Point 07 - Residential Dwelling	No Glare
Observation Point 08 - Residential Dwelling	No Glare
Observation Point 09 - Residential Dwelling	No Glare
Observation Point 10 - Residential Dwelling	No Glare
Observation Point 11 - Residential Dwelling	No Glare
Observation Point 12 - Residential Dwelling	No Glare
Observation Point 13 - Residential Dwelling	No Glare
Observation Point 14 - Residential Dwelling	No Glare
Observation Point 15 - Residential Dwelling	No Glare
Observation Point 16 - Residential Dwelling	No Glare
Observation Point 17 - Residential Dwelling	No Glare
Observation Point 18 - Residential Dwelling	No Glare
Observation Point 19 - Residential Dwelling	No Glare
Observation Point 20 - Residential Dwelling	No Glare
Observation Point 21 - Residential Dwelling	No Glare
Observation Point 22 - Residential Dwelling	No Glare
Observation Point 23 - Residential Dwelling	No Glare
Observation Point 24 - Residential Dwelling	No Glare
Observation Point 25 - Residential Dwelling	No Glare
Observation Point 26 - Residential Dwelling	No Glare
Observation Point 27 - Residential Dwelling	No Glare
Observation Point 28 - Residential Dwelling	No Glare
Observation Point 29 - Residential Dwelling	No Glare
Observation Point 30 - Residential Dwelling	No Glare
Travel Path – Ayr Dalbeg Rd North to South	No Glare
Travel Path – Ayr Dalbeg Rd South to North	No Glare
Travel Path – Ayr Ravenswood Rd East to West	No Glare
Travel Path – Ayr Ravenswood Rd West to East 1	No Glare
Travel Path – Ayr Ravenswood Rd West to East 2	No Glare

6. BASELINE CONDITIONS

The baseline condition within the vicinity of the Project site is characterised by agricultural production, notably sugar cane. The grid like pattern of sugar cane fields is interspersed by gravel access tracks and irrigation channels. Topography is flat with minimal native vegetation.

To the south of the project site is a large dam, and to the east is the Burdekin River. Existing dwellings in the area include properties located along the Burdekin River, and scattered homes throughout the sugar cane production areas. The town of Clare is located approximately 5 km to the north of the site.

The existing features in the landscape with the potential to contribute to glare include the water bodies scattered throughout the landscape. However these are dispersed amongst the sugar cane fields and have limited cumulative potential.

Atmospheric conditions such as cloud cover, dust and haze will impact light reflection, however these factors have not been accounted for in this glare assessment. The Bureau of Meteorology statistics for Collinsville Post Office (100 km south of the Project site) recorded 73 cloudy days per year (mean number over the period 1957 to 2010)⁶. Cloudy days predominately occur during the summer months, November to February. Since atmospheric conditions have not been factored into this assessment modelling, statistically the glare potential represents a conservative assessment.

7. ASSESSMENT RESULTS

The results of the desktop assessment identified no glare hazard potential is likely to be generated as a result of the operation of the Clare Solar Park. This assessment took into consideration the operation of the Solar Park during daylight hours throughout the year. SGHAT testing was undertaken for assumed sun energy intensity of 1000 W/m² and 2000 W/m², with no attestable variation to the results.

Currently the SGHAT does not account for the 'backtracking' procedure, that is, the variable in the angle of incidence of the sun relative to the PV module where the tracking system accounts for over shadowing potential. Therefore during the early morning and late afternoon when the backtracking procedure is operating there may occur a variation to the angle of incidence of the sun relative to the PV module to that predicted in the modelling. Since the sun's energy levels are less during these hours of operation the resulting potential for glare hazard may correspondingly be reduced.

In summary, based on the assumptions and parameters of this desktop assessment, the following results were identified:

- No glare potential was identified for surrounding dwellings and roads, therefore the likely impact on these sensitive receptors within the viewshed was identified as insignificant.

⁶ http://www.bom.gov.au/climate/averages/tables/cw_033013.shtml

APPENDIX A:

SOLAR GLARE HAZARD ANALYSIS COMPILED REPORT

SOLAR GLARE HAZARD ANALYSIS REPORT

INPUTS

Analysis name	Clare 01
PV array axis tracking	single
Tilt of tracking axis (deg)	0.0
Orientation of tracking axis (deg)	0.0
Offset angle of module (deg)	0.0
Limit rotation angle?	True
Maximum tracking angle (deg)	60.0
Vary reflectivity	True
PV surface material	Smooth glass without ARC
Timezone offset	10.0
Subtended angle of sun (mrad)	9.3
Peak DNI (W/m ²)	1000.0 & 2000.0
Ocular transmission coefficient	0.5
Pupil diameter (m)	0.002
Eye focal length (m)	0.017
Time interval (min)	1
Slope error (mrad)	10.0

PV ARRAY VERTICES

ID	Latitude (deg)	Longitude (deg)	Ground Elevation (m)	Height of panels above ground (m)	Total elevation (m)
1	-19.8274664825	147.198879719	29.86	4.0	33.86
2	-19.8275270394	147.20154047	31.22	4.0	35.22
3	-19.834362415	147.209887505	32.83	4.0	36.83
4	-19.8396507309	147.209458351	32.42	4.0	36.42
5	-19.8424764765	147.212934494	31.26	4.0	35.26
6	-19.8505901233	147.211990356	33.48	4.0	37.48
7	-19.85204327	147.210745811	33.07	4.0	37.07
8	-19.852124	147.208342552	33.25	4.0	37.25
9	-19.8428801503	147.19684124	30.73	4.0	34.73

OBSERVATION POINTS - DWELLINGS

ID	Latitude (deg)	Longitude (deg)	Ground Elevation (m)	Eye-level height above ground (m)	SGHAT Result
1	-19.811311443	147.21794486	31.44	1.5	No Glare Found
2	-19.8105508702	147.229022384	33.84	1.5	No Glare Found
3	-19.8137336932	147.227979004	34.72	1.5	No Glare Found
4	-19.8148439946	147.227785885	36.45	1.5	No Glare Found
5	-19.8175255928	147.226758599	36.19	1.5	No Glare Found
6	-19.8191337225	147.226729095	33.91	1.5	No Glare Found
7	-19.8230650304	147.227490842	36.01	1.5	No Glare Found
8	-19.8250937287	147.227834165	35.04	1.5	No Glare Found
9	-19.827046705	147.228064835	34.63	1.5	No Glare Found
10	-19.8315076771	147.228456438	34.73	1.5	No Glare Found

11	-19.8371888013	147.229490429	35.0	1.5	No Glare Found
12	-19.8412659955	147.230187804	36.0	1.5	No Glare Found
13	-19.8437208398	147.230485529	34.97	1.5	No Glare Found
14	-19.8437208398	147.230485529	34.97	1.5	No Glare Found
15	-19.8584516315	147.231314331	37.0	1.5	No Glare Found
16	-19.8700228832	147.228117138	38.09	1.5	No Glare Found
17	-19.8790231295	147.225224376	38.51	1.5	No Glare Found
18	-19.8782966814	147.22555697	38.87	1.5	No Glare Found
19	-19.86241842	147.22191453	36.0	1.5	No Glare Found
20	-19.8640569955	147.201608866	36.24	1.5	No Glare Found
21	-19.8616782725	147.203455567	35.71	1.5	No Glare Found
22	-19.8605481171	147.200934291	37.0	1.5	No Glare Found
23	-19.8514560005	147.187932283	33.04	1.5	No Glare Found
24	-19.8462437649	147.184558064	32.83	1.5	No Glare Found
25	-19.8215130416	147.186644822	30.01	1.5	No Glare Found
26	-19.820670258	147.189077586	30.98	1.5	No Glare Found
27	-19.8122396526	147.185228616	28.66	1.5	No Glare Found
28	-19.8050038467	147.1765396	29.05	1.5	No Glare Found
29	-19.8004824891	147.168963701	27.49	1.5	No Glare Found
30	-19.8131597819	147.164888084	31.0	1.5	No Glare Found

OBSERVATION POINTS – AYR DALBEG ROAD

ID	Latitude (deg)	Longitude (deg)	Ground Elevation (m)	Eye-level height above ground (m)	SGHAT Result
1	-19.7928763355	147.233531356	32.74	1.5	No Glare Found
2	-19.8063162607	147.230870604	31.02	1.5	No Glare Found
3	-19.8185911206	147.228028715	36.67	1.5	No Glare Found
4	-19.8262215295	147.228490055	35.0	1.5	No Glare Found
5	-19.834839784	147.229840636	35.42	1.5	No Glare Found
6	-19.8402273201	147.230610609	35.88	1.5	No Glare Found
7	-19.8511666728	147.232069731	36.0	1.5	No Glare Found
8	-19.8566562483	147.232498884	36.13	1.5	No Glare Found

OBSERVATION POINTS – AYR RAVENSWOOD ROAD

ID	Latitude (deg)	Longitude (deg)	Ground Elevation (m)	Eye-level height above ground (m)	SGHAT Result
1	-19.8181777974	147.222901583	32.89	1.5	No Glare Found
2	-19.817410697	147.217494249	30.81	1.5	No Glare Found
3	-19.816350546	147.210381031	29.78	1.5	No Glare Found
4	-19.8150181961	147.203257084	28.49	1.5	No Glare Found
5	-19.814291455	147.197635174	29.04	1.5	No Glare Found
6	-19.8140192614	147.193268538	28.0	1.5	No Glare Found
7	-19.8134742025	147.189041376	28.69	1.5	No Glare Found
8	-19.8129590878	147.185447216	28.65	1.5	No Glare Found

BURDEKIN SHIRE IPA PLANNING SCHEME 2011 - RURAL ZONE CODE

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
SELF ASSESSABLE AND ASSESSABLE DEVELOPMENT		
Site Layout		
<p>O1 Any non-residential buildings, structures and open use areas are setback from site boundaries so as to ensure that the amenity of adjoining land and the rural character of the locality are maintained.</p>	<p>S1 Except where otherwise specified in a Specific Use code, non-residential buildings, structures and open use areas are setback not less than: a) 20m from any road frontage of the site; b) 10m from all other site boundaries; and c) 100m from any existing dwelling on an adjacent property.</p>	<p>Complies As illustrated in Figure 3-1, the proposed solar farm has been setback 20m from all road frontages and 10m from all other site boundaries. There are no dwellings within 100m of the development site.</p>
Lighting Nuisance		
<p>O2 The operation of the activity does not cause undue disturbance to any person or activity because of the light it emits.</p>	<p>S2 The vertical illumination resulting from direct, reflected or incidental light coming from a site does not exceed 8 lux when measured at any point 1.5m outside of the boundary of the property at any level from ground level up.</p>	<p>Complies The solar farm will operate during daylight hours only and minimal lighting is proposed overall. Impacts associated with lighting are considered negligible.</p>
Infrastructure Provision		
<p>O3 Premises have an appropriate level of infrastructure for the efficient functioning of the use while not impacting on adjoining land uses or the environment.</p>	<p>S3.1 Premises are connected to a reticulated water supply or a reliable supply of potable water.</p> <p>S3.2 Premises are either – a) Connected to reticulated sewerage system where one exists in the locality of the site; or b) Provided with an on-site sewerage treatment and</p>	<p>Complies Bottled drinking water will be brought to site to provide a reliable supply of potable water.</p> <p>An on-site sewerage treatment plant will be designed and operated in accordance with relevant statutory requirements and Australian Standards. Treated effluent will be removed from site and disposed in a suitable facility.</p>

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
	disposal system.	
ASSESSABLE DEVELOPMENT		
Bushfire Hazard Provisions		
<p>O4 Buildings in areas of high or medium bushfire hazard³⁹ as identified on Natural Features Overlay Map 9 are adequately separated from vegetation by firebreaks to remove potential fuel and allow emergency vehicle access.</p>	<p>S4.1 An area of at least 20m wide is allocated as a firebreak around the building with the first 10 metres from the building comprising a cleared area (fuel free inner zone), while the outer 10 metres (fuel reduced outer zone) should be planted with fire resistant vegetation species or grassed.</p> <p>OR</p> <p>S4.2 Firebreaks are provided by a perimeter road that separates lots from areas of bushfire hazard and that road:</p> <ul style="list-style-type: none"> a) has a minimum cleared width of 6m; b) has a minimum formed width of 4m;has a maximum gradient of 12.5%; c) allows for vehicle access at least every 200m; and d) provides passing and turning areas at least every 400m. 	<p>Not applicable None of the affected sites are in areas of high or medium bushfire hazard.</p>
<p>O5 Buildings are located away from areas of high or medium bushfire hazard as identified on Natural Features Overlay Map 9.</p>	<p>S5.1 Buildings are located on land with a slope gradient less than 15%;</p> <p>S5.2 Non-habitable buildings are sited between the hazardous vegetation and the habitable dwelling.</p>	<p>Not applicable None of the affected sites are in areas or located near areas of high or medium bushfire hazard.</p>
<p>O6 Development located on land identified as having a high or medium bushfire hazard on Natural Features Overlay Map 9 has sufficient, accessible supply of</p>	<p>S6.1 Premises are connected to a reticulated water supply having a minimum pressure and flow of 10 litres a second at 200kPa.</p>	<p>Not applicable None of the affected sites are in areas of high or medium bushfire hazard.</p>

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
water for fire-fighting purposes.	<p>OR</p> <p>S6.2 Premises have a:</p> <p>a) dam or lake providing a reliable supply of at least 5,000L of water for fire-fighting purposes in times of bushfire emergency; or</p> <p>b) an on-site water tank or swimming pool having a minimum capacity of 10,000L that could be made available, and is accessible, for firefighting purposes; and</p> <p>c) the outlet pipe is 50mm in diameter and fitted with a 50mm male camlock standard rural fire brigade fitting.</p>	
<p>O7 Buildings located in a high or medium bushfire hazard area identified on Natural Features Overlay Map 9 have roofs of a shape and pitch that minimises radiation pick up and the potential for debris build-up and fences are designed to avoid fuelling a fire.</p>	<p>S7.1 Buildings have roofs with pitches of between 12 and 21 degrees;</p> <p>S7.2 Any outbuilding is part of the main building or located no more than 5m from the main building.</p>	<p>Not applicable None of the affected sites are in areas of high or medium bushfire hazard.</p>
<p>O8 Premises are designed and sited to be compatible with nearby land uses by:</p> <p>a) Adopting appropriate setbacks to buildings and storage areas;</p> <p>b) Providing suitable vehicle access and manoeuvring areas;</p> <p>c) Providing suitable landscape areas; and</p> <p>d) Retaining existing vegetation.</p>	<p>S8.1 Buildings or other structures are screened by a landscaped buffer of 5m when adjoining residential or rural residential development.</p> <p>S8.2 Vehicle parking and access and manoeuvring areas are provided in accordance with Schedule 2 – Vehicle Parking Rates & Standards.</p> <p>S8.3 Existing vegetation is retained to minimise the impact on the visual amenity of the area.</p>	<p>Not applicable None of the affected sites are in areas of high or medium bushfire hazard.</p>
Site Suitability		

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
<p>O9</p> <p>Premises are developed on a site with physical characteristics suitable for the conduct of the proposed use, having regard to:</p> <ul style="list-style-type: none"> a) Slope stability and geotechnical matters; b) Bushfire protection and management; c) Scenic landscape values and urban design; and d) Availability of access. 	<p>S9</p> <p>None specified</p>	<p>Complies</p> <p>The proposed development site is generally level in nature, with a slope gently falling from an elevation of 30 metres above sea level (masl) towards a low point of 26 masl in the north-west. This existing ground conditions are suitable for the proposed solar PV modules and tracking systems.</p> <p>Rainwater will be trapped via water tanks and will be used on site for non-potable purposes. A supply of water for firefighting purposes will also be maintained on site in accordance with bushfire management guidelines.</p> <p>The land uses surrounding the development site are predominantly sugar cane farming, with little to none scenic landscape value present. The proposed solar farm use is suitable within the surrounding highly disturbed environment.</p> <p>A new access point from Shadforth Road is proposed and considered suitable for the development.</p>
Land Use Suitability		
<p>O10</p> <p>Premises are developed for a purpose which:</p> <ul style="list-style-type: none"> a) is compatible with the surrounding locality; b) has an adequate water supply; c) has appropriate vehicle access and manoeuvring and adequate car parking spaces to satisfy the anticipated traffic demand; d) has suitable provision for waste disposal; and e) generates limited demand for other services. 	<p>S10</p> <p>None specified</p>	<p>Complies</p> <p>The proposed solar farm is compatible with the surrounding locality for the following reasons:</p> <ul style="list-style-type: none"> - The development will not result in adverse impacts to the amenity of the surrounding area as stated in Section 5.1 of the Planning Report. - An adequate supply of water will be provided through bottled drinking water and on-site water tanks - A new access road off Shadforth Road and carparking and manoeuvring area will be provided to a standard suitable for traffic generated by the solar farm

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
		<ul style="list-style-type: none"> - Waste generated by the project will be picked up and disposed of by a registered contractor. - Limited demand for services will be generated by the project as it will not be connected to council water, sewerage or stormwater infrastructure.
Visual Amenity		
<p>O11 The scale and appearance of buildings:</p> <p>a) do not overwhelm the street or adjacent development by nature of their height, architecture and bulk; and</p> <p>b) achieve a high standard of visual amenity that is acceptable having regard to the character of the area.</p>	<p>S11 Any non-residential buildings or structures:</p> <p>a) are screened by a landscaped buffer to the side and rear boundaries of a site when adjoining land used for rural residential or residential development; and</p> <p>b) provide a building constructed of materials and colours compatible to surrounding development.</p>	<p>Complies The proposed solar PV modules will be erected no more than 3m above ground level and will be less visually intrusive than the overhead transmission lines and substation that run through/alongside the development area. As such the proposal is not likely to overwhelm the surrounding area.</p> <p>Appropriate setbacks from street frontages and adjoining properties have been incorporated into the solar farm design to mitigate the visual scale and appearance of the solar panels.</p>
Vegetation Management		
<p>O12 Premises minimise the loss of remnant native vegetation of conservation values situated on the site.</p>	<p>S12 Development is to be conducted within an existing cleared or otherwise disturbed area.</p>	<p>Not applicable As detailed in Section 2.4.5 of the Planning Report, significant ecological values are unlikely to occur given the existing land use of the project area being sugar cane farm.</p> <p>The presence of remnant vegetation over the site is highly unlikely.</p>
<p>O13 Development on land within 100m of a waterway protects the habitat and biodiversity values of the waterway.</p>	<p>S13 Riparian vegetation is retained and/or rehabilitated along each side of a waterway, within at least:</p> <p>a) 50m of each high bank of a river; and</p> <p>b) 25m of each bank of a creek or stream</p>	<p>Not applicable The site is not on land within 100m of a waterway.</p>
<p>O14 Wetlands are adequately protected from the impacts of adjacent development.</p>	<p>S14 Development is set back:</p> <p>a) 50m from the maximum water level of freshwater</p>	<p>Not applicable Wetlands do not exist on or near the development area.</p>

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
	wetlands; and b) 100m from the HAT line of a tidal wetland.	
Hazard Planning		
O15 In rural areas, all premises have safe access during emergencies and hazards such as flooding, cyclonic events and bushfires.	S15 None specified.	Complies A new access road off Shadforth Road will be constructed to provide a hazard free access/egress point.
Air Quality Maintenance		
O16 All activities maintain the air quality and consequently, public health standards, including: a) Minimising emission and odour levels; and b) Preventing the generation of dust.	S16 Activities are provided with: a) adequate physical measures for removing pollutants from emissions prior to discharge to the atmosphere; b) adequate physical measures for reducing the temperature gradient between emissions and the atmosphere prior to discharge; and c) effective operational systems, including monitoring systems for industry, which maintain emissions within ANZECC guideline standards.	Complies The operational phase of the Project will not involve any airborne discharge activities. Minor discharges will occur during the construction phase (i.e. dust); however these are considered negligible due to the lack of nearby sensitive receptors.
Water Quality Maintenance		
O17 All activities maintain the water quality of Burdekin Shire's groundwater, waterways and surface water storages.	S17.1 Premises: a) with activities which involve the handling of water-borne pollutants are provided with bunded, impervious surfaces linked to an integrated drainage and treatment system; b) with activities which involve the storage of waste water are provided with properly designed and constructed, secure, sealed storage facilities; and c) contain all liquid wastes and discharge them to a sewer or removed from the site for treatment and disposal to an approved facility.	Complies All potential impacts to groundwater, waterways and surface water will be managed through the implementation of a Construction Environmental Management Plan (CEMP). The management measures provided in the Stormwater Assessment for the proposal (see Appendix F) will also be enforced. There are no waterways over the development site.

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
	<p>S17.2</p> <p>Development is set back:</p> <ul style="list-style-type: none"> - 25 metres for stream orders 1 or 2; - 50 metres for stream orders 3 or 4; - 100 metres for stream orders 5 or greater <p>With stream orders determined by 1:100,000 DNRM topographic mapping (or 1:250,000 where 1:100,000 is unavailable).</p>	
<p>O18</p> <p>Development has adequate provision for managing stormwater, to ensure that the environmental values of the surface and ground water resources are not diminished.</p>	<p>S18</p> <p>Premises have:</p> <ul style="list-style-type: none"> a) adequate physical measures for intercepting and treating surface water drainage and spilled substances prior to their release to the waterway; b) bunding of sites or areas within sites or integrated drainage systems which include waste water treatment measures, where chemicals, fuels, lubricants and other soluble pollutants are being handled on site; and c) discharges to surface waterways meet ANZECC guideline standards. 	<p>Complies</p> <p>All potential impacts to groundwater, waterways and surface water will be managed through the implementation of a Construction Environmental Management Plan (CEMP). The management measures provided in the Stormwater Assessment for the proposal (see Appendix F) will also be enforced. There are no waterways over the development site.</p>
Sediment and Erosion Control		
<p>O19</p> <p>Development minimises erosion occurring on the site and sediments leaving the site.</p>	<p>S19</p> <p>Development incorporates soil erosion and sedimentation management by:</p> <ul style="list-style-type: none"> a) avoiding extensive land clearing and earthworks of land with a slope steeper than 15%; b) minimising the extent of disturbance on slopes steeper than 10% (1:10); c) managing and controlling surface drainage by using natural flow paths where ever possible; and d) incorporating sediment traps to prevent the movement of sediment off site. 	<p>Complies</p> <p>All potential impacts to groundwater, waterways and surface water will be managed through the implementation of a Construction Environmental Management Plan (CEMP). The management measures provided in the Stormwater Assessment for the proposal (see Appendix F) will also be enforced. There are no waterways over the development site.</p>
Liquid Waste Management		
O20	S20	Complies

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
<p>All premises make adequate provision for stormwater and liquid wastes to be managed so that the:</p> <p>a) environmental values of surface and ground water resources are not diminished; and</p> <p>b) the health and well being of the Shire's inhabitants are maintained.</p>	<p>All liquid wastes are contained and discharged to a sewer or removed from the site for treatment and disposal to an approved facility.</p>	<p>See Planning Report.</p>
<p>O21</p> <p>Site drainage is detained and treated for the removal of sediments and gross pollutants prior to the release to the environment.</p>	<p>S21</p> <p>Sealed impervious areas are provided with receptors for spills and contamination to be treated or removed off-site.</p>	<p>Complies</p> <p>All potential impacts to groundwater, waterways and surface water will be managed through the implementation of a Construction Environmental Management Plan (CEMP).</p> <p>The management measures provided in the Stormwater Assessment for the proposal (see Appendix F) will be enforced.</p>
<p>O22</p> <p>Soluble and insoluble pollutants do not flow to the environment either by stormwater flows or inadequate liquid waste management.</p>	<p>S22.1</p> <p>Stormwater drainage from a high frequency storm event over the site is treated for the removal of sediments, gross particulates and oil residues prior to release to an approved point of discharge.</p> <p>S22.2</p> <p>Bunded impervious areas are provided such that potential spills of contaminants are controlled, treated and removed off-site to an approved waste management facility.</p>	<p>Complies</p> <p>All potential impacts to groundwater, waterways and surface water will be managed through the implementation of a Construction Environmental Management Plan (CEMP).</p> <p>The management measures provided in the Stormwater Assessment for the proposal (see Appendix F) will be enforced.</p>
<p>Rural Settlement Sub-Area</p>		
<p>O23</p> <p>Rural residential uses are located in the Rural Settlement Sub-Areas and;</p> <p>a) have adequate separation or buffers from agricultural land uses to avoid adverse environmental effects from spray drift, dust, noise and odours;</p> <p>b) protect good quality agricultural land⁴⁰, unless there is an overriding need in terms of public benefit for the</p>	<p>S23.1</p> <p>Appropriate buffer or separation distances are provided in accordance with the Guidelines for Separating Agricultural and Residential land Uses.</p> <p>S23.2</p> <p>The development does not result in an unsustainable</p>	<p>Not applicable</p> <p>Rural residential uses are not proposed.</p>

COLUMN 1 SPECIFIC OUTCOMES	COLUMN 2 ACCEPTABLE SOLUTIONS	COMMENT
<p>proposal and the proposal cannot be located on alternative areas that are not identified as good quality agricultural land;</p> <p>c) There is a proven need or benefit for the rural residential development or small rural holdings, in step with current take-up rates; and</p> <p>d) avoid imposing impacts on waterways and ecological corridors.</p>	<p>demand by services and infrastructure in the locality.</p> <p>S23.3 Rural residential development includes:</p> <p>a) Roads – all lots 8m sealed and 20m in reserve width;</p> <p>b) Drainage – required to all roads and allotments; and</p> <p>c) Potable Water Supply – required to all allotments.</p>	

³⁹A bushfire management plan may be required in high hazard areas (refer Appendix 5B of the SPP1/03 Guideline).

⁴⁰Provisions of the SPP1.92 Good Quality Agricultural Land and Guidelines may apply.



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