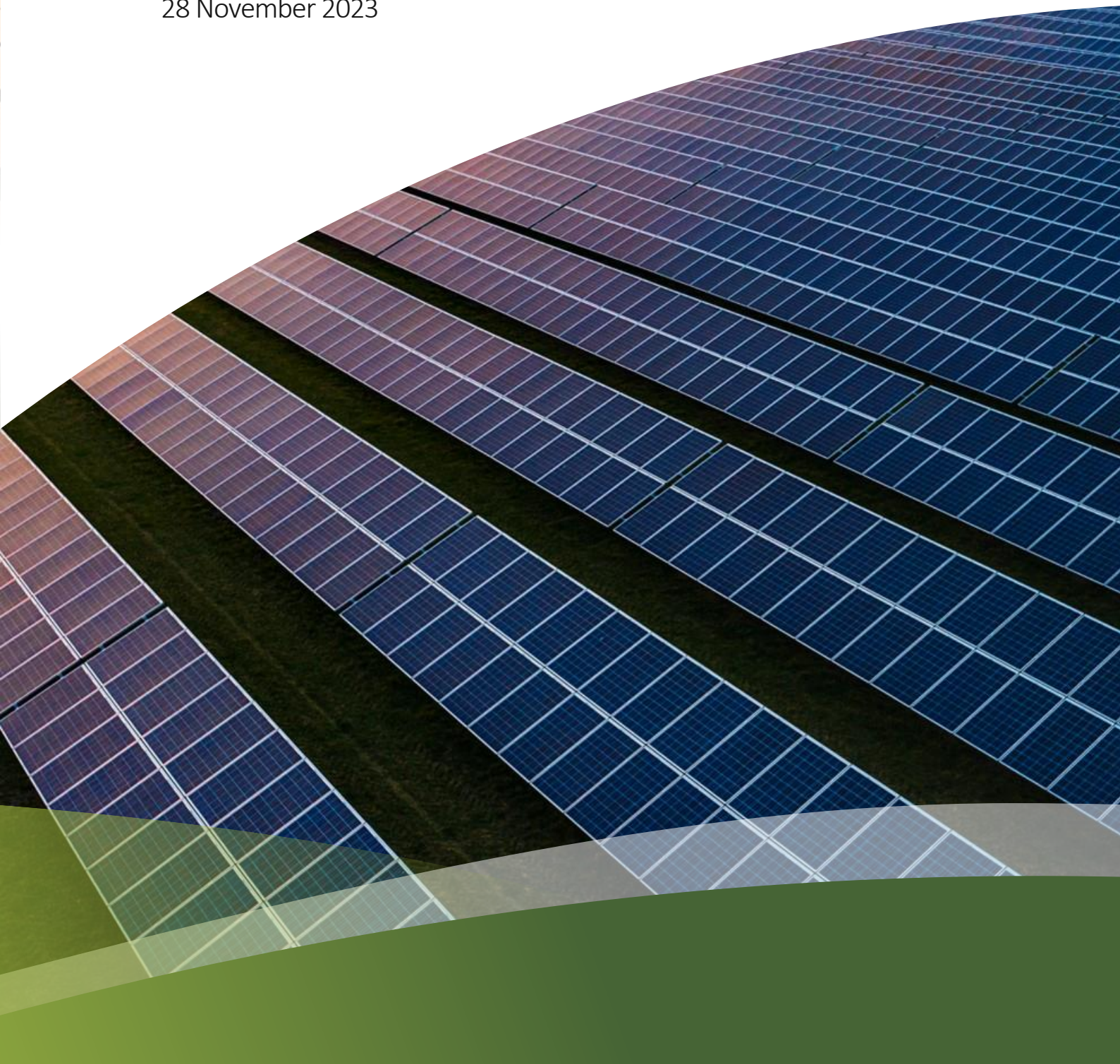




Gunsynd Solar Farm

Environmental Risk Assessment

28 November 2023



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Environmental Risk Assessment

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Abbreviations

AC	alternating current
Accent	Accent Environmental Pty Ltd
ACH Act	<i>Aboriginal Cultural Heritage Act 2003 (Qld)</i>
AEP	annual exceedance probability
AHD	Australian Height Datum
AHS	Australian Heritage Specialists
Athena Energy	Athena Energy Australia (Holdings) Pty Ltd
BHAMP	Bushfire Hazard Assessment and Management Plan
Biosecurity Act	<i>Biosecurity Act 2014 (Qld)</i>
BNTAC	Bigambul Native Title Aboriginal Corporation
CHMP	cultural heritage management plan
Cth	Commonwealth
DAF	Department of Agriculture and Fisheries
DC	direct current
DN	decision notice
DES	Department of Environment and Science
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
EAR	Environmental Assessment Report (Redleaf 2023b)
Echo Consultants	Echo Consultants Pty Ltd
EMP	environmental management plan
EP Act	<i>Environment Protection Act 1994 (Qld)</i>
EPC	engineering, procurement and construction
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999 (Cth)</i>
ESCP	erosion and sediment control plan
Fisheries Act	<i>Fisheries Act 1994 (Qld)</i>
FPA	Flood Planning Area
FPL	Flood Planning Level
GRC	Goondiwindi Regional Council

Green Tape	Green Tape Solutions
Gunsynd SF	Gunsynd Solar Farm
ha	hectares
HSE	health, safety and environmental
HVR	high value regrowth
km	kilometre
KWM	King & Wood Mallesons
m	metres
MCU	Material Change of Use
Metis Energy	Metis Energy Ltd
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
MW	megawatts
N/A	not applicable
NC Act	<i>Nature Conservation Act 1992 (Qld)</i>
NEM	National Electricity Market
NJKHT	non-juvenile koala habitat tree
NSP	Network Service Provider
PCL	PCL Constructors Pacific Rim Pty Ltd
Planning Scheme	Goondiwindi Regional Planning Scheme
PV	photovoltaic
RE	Regional Ecosystem
Redleaf	Redleaf Environmental
RPS	RPS Australia East Pty Ltd
SMP	Species Management Program
SPP	State Planning Policy
SWMP	Stormwater Management Plan
TEC	threatened ecological community
VM Act	<i>Vegetation Management Act 1999 (Qld)</i>
Water Act	<i>Water Act 2000 (Qld)</i>

1 Introduction

The Gunsynd Solar Farm (Gunsynd SF) is a solar farm development located in southern Queensland that will generate up to 94 megawatt (MW) alternating current (AC). Metis Energy Ltd (Metis Energy) is the project owner and has engaged PCL Constructors Pacific Rim Pty Ltd (PCL) as the engineering, procurement and construction (EPC) company to manage the project development.

Energy will be generated through the conversion of solar radiation to electricity via photovoltaic modules (solar panels). The solar panels will generate DC electricity that will be converted to alternating current (AC) electricity via the use of power conversion units. This electricity will be transmitted to the National Electricity Market (NEM) through the adjacent 132 kilovolt (kV) Bulli Creek – Waggamba electricity transmission line via an overhead connection with the Network Service Provider (NSP) Switchyard and solar farm substation.

1.1 Purpose and scope of this document

This Environmental Risk Assessment has been prepared by Accent Environmental Pty Ltd (Accent) on behalf of PCL to identify the major risks of environmental harm from the construction and operation of the Gunsynd SF project.

1.2 Project background

The project site is located on land identified as Lot 51 on MH115 'Glenoe', Jacksons Road, Goondiwindi.

Planning permission for the project has been granted by Goondiwindi Regional Council (GRC), as the assessment manager for a Material Change of Use (MCU) - Application Number: 19/04W. The Decision Notice (DN) permitted the development of the of the Gunsynd SF subject to the conditions of consent (CoCs) prescribed in Attachment 1 of the DN. The granting of planning permission for the project was based on the Planning Report for Material Change of Use Development Application (the Planning Report) prepared by Echo Consultants Pty Ltd for the proponent (then SkyLab Australia Pty Ltd) (Echo Consultants 2019).

2 Previous environmental assessment information

2.1 Planning Report

Echo Consulting was engaged to provide the planning report for the site (Echo Consultants 2019). The aim of this report was to describe the site, the proposed land use, and to address the relevant town planning and design issues with respect to the development. To assist in the assessment of the application, this report addresses the relevant town planning considerations relating to the proposed solar farm. This included:

- the location and surrounding land uses
- climate
- zoning
- biodiversity
- bushfire
- flood hazard
- infrastructure
- natural resources
- visual impact
- traffic management
- surface water and drainage
- environmental management considerations of:
 - noise
 - air
 - regulated vegetation
 - flora and fauna
 - soil and contamination management
- Aboriginal and historical heritage
- existing residences
- electromagnetic interference.

Location and surrounding land uses

The project site is surrounded by clear farmland used for grazing with some patches of remnant and high value regrowth along the waterways. Field assessments confirmed that the project site does not include any patches of remnant vegetation and is a mostly-cleared area with regenerating vegetation along the boundary fences). No threatened flora was identified within the proposed development area of the project site. An existing above ground powerline dissects Lot 51 MH115, traversing from the north-east corner to the south-west corner.

Land uses surrounding the project site include:

- grazing and cropping farming properties and piggery operations surrounding the development area
- the Murri Murri Creek traversing the southern boundary of the project site
- the Leichardt and Gore Highways located approximately 2.4 km to the west of the development area
- unimproved rural properties around and near the development area
- the nearest residential house located over 2 km north of the development area.

Overall, the land uses within the development area and surrounding region were identified as predominantly grazing, cropping and unimproved land.

Climate

The Goondiwindi region is described as a warm and temperate climate in which rainfall is distributed throughout the year, although experiences higher mean rainfall during the warmer months (November to March). According to the Bureau of Meteorology, the mean annual rainfall is 621.1 mm. In the warmer months (November to March) mean temperatures generally range from 16.6-34.1°C and in the cooler months (April to October) between 4.8-28°C.

Zoning

The development area is located within the Rural Zone of the Goondiwindi Regional Planning Scheme (the Planning Scheme).

Biodiversity

The project site contains Matters of State Environmental Significance (MSES) – Regulated vegetation overlays under the State Planning Policy (SPP) Interactive Mapping System.

The project site has been previously cleared for grazing purposes. The area surrounding the Project is predominantly grazing and unimproved land. The land parcels surrounding the development area are cleared of trees except for along boundary fence lines.

The development has been sited to avoid the MSES ecological areas. Ecologically significant features including any watercourses and significant vegetation are retained and buffered from potential impacts of development. Features or items that are ecologically significant will not be impacted by the project, therefore, these areas will continue to support existing ecological connectivity.

Bushfire

The northern and parts of the eastern site boundary are mapped as bushfire prone areas under the SPP Interactive Mapping System. The development area has been sited to avoid these mapped overlays, however the development has been assessed against the Bushfire hazard overlay code, to ensure thorough assessment against the Planning Scheme.

Flood hazard

The investigation area contains a small area subject to the flood hazard overlay as identified on the overlay maps contained in Schedule 2 (Mapping) of the Planning Scheme. This identified area is along Murri Murri Creek.

Infrastructure

The development area contains major electricity infrastructure on the maps contained in Schedule 2 (Mapping) of the Planning Scheme and major electricity infrastructure (Ergon Energy) is also shown in the SPP Interactive Mapping System.

Natural resources

The development area is subject to agricultural land classification – class A and B identified in the SPP Interactive Mapping System.

Visual impact

The development area does not contain road frontage to (and is not visible from) existing public roads, with the nearest township of Goondiwindi 14 km away. With current nearby land uses consisting of grazing and unimproved land, the potential for significant visual impacts is very low. The nearest residential dwelling is located over 2 km from the development area. Furthermore, the surrounding properties are screened from the development area by existing mature vegetation which further mitigates any visual impacts. It is not anticipated that the solar panels will create unacceptable visual impacts for local residents or visitors to the area.

Given the project's location, distance from existing road and residences and the extent of existing vegetation in the area, it has been assessed that no glare hazard potential is likely to be generated at sensitive receptors as a result of the operation of the project.

Traffic management

At the peak of construction, approximately 90 personnel (including project staff and contractors) will be on the project site, and up to two to three full time workers during the operational phase of the project. It is assumed that workers will drive to the site in private vehicles or carpool; and that all labour will originate from Goondiwindi, or within a one hour driving catchment from the project.

Construction is expected to generate approximately 60 light vehicle, 25 heavy vehicle and 10 oversized vehicle movements per day. Traffic that will be generated during operation is expected to include three light vehicles per day, one heavy vehicle per week and one oversized vehicle for the duration of operation.

Construction and operation access to the site will be provided via Jacksons Road. This will require the construction of an intersection incorporating a section of the existing road reserve to form Jacksons Road up to Lot 51 MH115 (currently the formed section of Jacksons Road terminates at the north-eastern corner of Lot 52 MH115, also owned by the development's landowner). Reconstruction of the full length of the existing road reserve of Jacksons Road through to the Leichhardt Highway is not proposed, but only to extend to allow for access to the proposed development.

Surface water and drainage

The project site is adjacent to Murri Murri Creek (which is located along the southern boundary of the investigation area and joins Commoron Creek further downstream), although the development area is located away and set back from the watercourse. The majority of the proposed development area is outside the flooding overlay, with only a minor portion within the flood overlay. However, as described in Section 2.4, there is interconnectivity between Murri Murri Creek and flooding along Commoron Creek.

The northern half of the development area is generally flat with levels varying from RL 215 m to RL 215.5 m Australian Height Datum (AHD). The southern half of the development area gently falls ~0.3% from the north-east to the south-west, ranging from RL 215.5 m to 212.5 m, which is roughly the high bank of Murri Murri Creek. Access roads within the development area will be constructed as all-weather access tracks, matching the existing terrain profile. The gentle fall of the site and the absence of minor tributaries or flow altering levees (access roads) will result in the pre-development flow regime (sheet flow) being maintained in the post-development scenario.

Environmental management considerations

Noise

The operation of the proposed solar farm 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 Project will not create any noise nuisances.

Operationally, noise levels from the proposed use will be very minimal and are not expected to exceed existing background noise levels for this area.

Air

Minor discharges will likely occur during the construction phase (e.g. dust and vehicle emissions); however these are considered negligible due to the lack of nearby sensitive receptors and other rural processes that occur in the area (e.g. grazing).

The operations phase of the proposed solar farm will not involve any discernible airborne discharge activities.

Note: Subsequent advice is that dust generated on unsealed public roads past sensitive receptors will be significant.

Regulated Vegetation

The assessment identified the development area as Category X (non-remnant vegetation) and is therefore not regulated under the *Vegetation Management Act 1999 (Qld)* (VM Act). The Project land has been previously cleared for grazing purposes and the only mature vegetation that exists within the investigation area is along boundary fence lines and adjacent to Murri Murri Creek. The Regulated Vegetation Map showed that the project site contained Category C (high-value regrowth vegetation) regulated vegetation along the lower western boundary and along the southern boundary (alongside Murri Murri Creek). The development area for the

Gunsynd SF has intentionally avoided the Category C regulated vegetation and is set back from the mapped vegetation by a minimum of 30 m (at the nearest point).

Flora and fauna

A search of the Queensland Department of Environment and Science (DES) Wildlife Online database was undertaken for the investigation area and the area within a 2 km radius, to provide a list of protected species for the locality. The search identified no species of conservation significance recorded in the search area.

A search within high-risk areas for protected plant species was also undertaken using the Protected Plants Flora Survey Trigger Map. The search showed that the proposed Gunsynd SF is not located in a high-risk area, and consequently there is no requirement under the *Nature Conservation Act 1992 (Qld)* (NC Act) for a comprehensive flora survey prior to undertaking any clearing.

A search of the Australian Government Department of Climate Change, Energy, the Environment and Water's (DCCEEW)'s EPBC Act Protected Matters Search Tool identified several Matters of National Environmental Significance (MNES) located near the project site. These MNES, which are regulated under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) are as follows:

- three listed Threatened Ecological Communities (TECs)
- 14 listed threatened species (5 bird species, 3 mammal species, 3 plant species and 3 reptile species)
- eight listed migratory Species.

A desktop ecological survey and assessment was completed over the project site, Lot 51 MH115, to understand the environmental sensitivities across the site. The site chosen for the development of the Gunsynd SF is constrained to a site consistent of non-remnant vegetation, with a total area of ~185 ha. The desktop survey of the project site identified mapped RE:

- 11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines - listed as of concern under the VM Act
- 11.4.3 - *Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains - listed as endangered under the AM Act
- 11.4.10 - *Eucalyptus populnea* or *E. woollsiana*, *Acacia harpophylla*, *Casuarina cristata* open forest to woodland on margins of Cainozoic clay plains - listed as endangered under the VM Act.

RE 11.4.3 is analogous with a TEC listed under the EPBC Act, being Brigalow (*Acacia harpophylla* dominant and co-dominant). There is no adopted or made Recovery Plan for this ecological community, and it must be noted the proposed development will not encroach into or impact on the RE or possible TEC. The other REs are not analogous with a TEC listed under the EPBC Act.

As a result of the searches and ecological desktop assessment undertaken, SkyLab (the previous developer) sited the Solar Farm development to ensure that these environmental sensitivities are avoided. As a result, the following layout considerations were accounted for:

- Development Area setback from the REs, possible TEC, regulated vegetation and watercourse
- Setback minimum distance of 200 m from adjacent named watercourse (Murri Murri Creek)
- No remnant vegetation will be cleared or impacted as a result of the development.

Note: There will be clearing to an extent to allow construction of the site entrance. The DN condition is only for mature native vegetation to remain on the property boundaries. There will be clearing of large natives for the causeway widening (public roads).

Soil and contamination management

The proposed Gunsynd SF has been set back to avoid Murri Murri Creek and there are no established significant drainage lines. The Surface Water and Drainage Assessment concluded the variance in run-off quality from the site between pre and post-development is expected to be negligible, and it is not anticipated the development will alter the existing quality of the identified potential Environmental Values.

Heritage

A search of the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts (DTATSIPCA)'s Aboriginal and Torres Strait Islander Cultural Heritage Database and Register under the *Aboriginal Cultural Heritage Act 2003 (Qld)* (ACH Act) was completed in November 2018 and the results indicated that there were no records of Cultural Heritage over the development area or nearby. Based on desktop and visual assessment of the site and anecdotal advice of previous clearing over the subject area, the development area was assessed as a Category 4 area.

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

Note: A recent cultural heritage survey has been completed and a Cultural Heritage Management Plan (CHMP) has been commissioned – as noted in Section 2.7 below.

Existing residences

The nearest residential dwelling is located over 2 km to the north of the development area. There are vegetation buffers around all property boundaries and between the residences and the project layout.

Electromagnetic interference

The subject site is not located near sensitive receptors, with the nearest residential dwelling located over 2 km away. Furthermore, the proposed development area is traversed by an existing 132 kV distribution power line.

2.2 Environmental Assessment Report

Metis Energy engaged Redleaf Environmental (Redleaf) to conduct an environmental assessment of the site and the resulting report - the Environmental Assessment Report (EAR). The purpose of the EAR was to identify environmental features on the project site, in particular

MSES and Matters of National Environmental Significance (MNES) that may be impacted by the project. The EAR also completed a risk assessment of a number of environmental aspects. In addition, this report identified legislative constraints and provides appropriate recommendations to guide site works (this aspect is not discussed here).

2.2.1 Identified environmental features

The EAR (Redleaf 2023b) identified the following environmental features.

Flora

The project site is surrounded by clear farmland used for grazing with some patches of remnant and high value regrowth along the waterways. Field assessment confirmed that the project site is a non-remnant, mostly-cleared area with regenerating vegetation along the boundary fences). No threatened flora was identified within the proposed area.

Habitat and threatened ecological communities

No essential habitat was identified as being present on the Project Site and no TECs were identified within the project site

Restricted invasive plants

From the botanical inspections, four species were identified as a 'restricted invasive plant' under the *Biosecurity Act 2014 (Qld)* (Biosecurity Act), often in high densities. These included:

- Mother of Millions
- Harrisia cactus
- Prickly pear
- African boxthorn.

Fauna

No threatened fauna or habitat for threatened fauna were found during the field survey.

Animal breeding places and essential habitat

A number of birds were observed on site and numerous log piles and habitat trees which have potential to be fauna habitat/breeding places were found on site. No essential habitat was identified as being present on the project site.

Koalas

Some non-juvenile koala habitat trees (NJKHTs) were recorded within the road reserve surrounding the site and these individual trees should be avoided when clearing the access track.

2.2.2 Risk assessment

The EAR (Redleaf 2023b) also completed a risk assessment of:

- vegetation regulated under the VM Act
- threatened flora and fauna and threatened ecological communities (TECs) regulated under the EPBC Act

- threatened flora and fauna and TECs regulated under the NC Act
- fauna management regulated under the NC Act
- wetlands and watercourses regulated under the *Water Act 2000 (Qld)* (Water Act); *Fisheries Act 1994 (Qld)*(Fisheries Act)
- noise, air and vibration regulated under the *Environment Protection Act (1994)*_(Qld) (EP Act)
- erosion and sediment control
- waste management and resource use
- biosecurity - pest plants regulated under the Biosecurity Act.

The risk assessment classified environmental risk into three categories; high, medium and low. The description of these categories is as follows:

- **High risk** - a matter which is expected to present a significant environmental constraint or liability and will require further detailed investigation. A red alert is used to flag a matter of environmental concern which may be a potential 'showstopper' or require considerable effort to investigate and address.
- **Medium risk** - a matter which may present an environmental constraint or liability and further investigation may be necessary. In some cases, the investigation may be to fulfil duty of care obligations. A matter which could cause public complaint (during construction). An amber alert matter is not anticipated to be a 'showstopper' issue, but further minor works may be required to support a Development Application or better understand the potential impact of the matter.
- **Low risk** - a matter that is not considered to present an environmental constraint or liability and does not require any further investigation.

The risk assessment for the Gunsynd SF presented in the EAR is shown in Table 2.1. The preliminary risk assessment does not take into consideration the application of risk controls.

Table 2.1 Risk Rating and comments from the EAR (Redleaf 2023)

Environmental matter	Risk rating	Potential impact / opportunity	Recommended mitigation / Further assessment	Potential approvals
VM Act vegetation	Low	The project site is mapped Category X (Non-remnant), clearing of which is an exempt activity. Clearing of high value regrowth (HVR) for the	Not applicable (N/A)	N/A

Environmental matter	Risk rating	Potential impact / opportunity	Recommended mitigation / Further assessment	Potential approvals
		establishment of a vehicular track will need to meet the Accepted Development Requirements		
EPBC Act flora, fauna and TECs	Low	No risk to EPBC Act flora, fauna or TECs	N/A	N/A
NC Act flora, fauna and TECs	Low	The Department of Environment and Science (DES) flora trigger mapping indicates that the project site does not fall within the mapped high-risk areas. No threatened flora was found on site	N/A	N/A
NC Act fauna	Medium	Construction may require the removal of some vegetation on site. This may involve the removal of habitat features including termite mounds, nests, and trees with significant hollows	Where possible, avoid damage to or removal of large habitat trees. A fauna spotter catcher is strongly recommended to be present to supervise tree clearing and topsoil stripping	Low or High-risk Species Management Program (SMP) may be required if Active breeding places are tampered with
Wetlands and watercourses	Low	Impacts to water quality and watercourse are considered low risk, mapping of these features are marginally present on site	Erosion and sediment control plan (ESCP) Controls to be implemented and responsible storage and mitigation of fuels and chemicals. An ESCP may be required, and a	N/A

Environmental matter	Risk rating	Potential impact / opportunity	Recommended mitigation / Further assessment	Potential approvals
			site-specific management plan details the storage location and specifics	
Noise, air and vibration	Low	-	Minimise noise, dust, vibration, impacts	N/A
Erosion and sediment control	Low	Sediment from the Project Site entering local watercourses	Erosion and sediment controls will be required during the construction and for post-construction permanent controls. An ESCP is required	N/A
Waste management and resource use	Low	Generation of waste over the duration of the project and failure to comply with approval/permit/license conditions for disposal	Disposal of regulated wastes to a licensed waste facility adhering to appropriate record keeping for any trackable wastes. A site-specific management plan that details the disposal of wastes from site will be required	N/A
Biosecurity - pest plants	Medium	A number of restricted species were present on site, often in high densities (Restricted Matter as defined in the Biosecurity Act)	Pest species should be managed during construction with a high standard of weed hygiene for machinery	N/A

2.3 Bushfire assessment

2.3.1 Bushfire compliance assessment

Echo Consultants engaged RPS Australia East Pty Ltd (RPS) to conduct a bushfire compliance assessment for the site (RPS 2019). The aims of the assessment were to consider and assess the bushfire hazard and associated potential threats relevant to such a proposal, and to re-affirm the minimum mitigative measures which would be required to provide for the protection of human life and to minimize impacts on property.

A desktop assessment indicated a medium potential for bushfire hazard on the northern and western boundaries of the site. A follow-up site inspection found that levels of surface and near surface fire fuels present surrounding and in the site were insufficient to support fire behaviour.

2.3.2 Bushfire Hazard Assessment and Management Plan

Green Tape Solutions (Green Tape) were engaged to prepare a Bushfire Hazard Assessment and Management Plan (BHAMP) for the site (Green Tape 2023). The aims of the BHAMP were to provide a site-specific assessment of bushfire hazard and to assess compliance of the proposed development and to provide a plan for bushfire risk management including building construction requirements, asset protection zones, fuel management, access requirements and emergency responses measures.

The results of the assessment show that vegetation associated with the brigalow forest to the north and west of site has a potential bushfire hazard class of 'medium'. All other vegetation within 150 m of the development site is not classified as bushfire-prone and therefore, calculation of radiant heat flux/bushfire attack level is not applicable.

2.4 Flood assessment

Two reports pertaining to flood risks were commissioned for the Gunsynd SF.

- Torrent Consulting (Torrent 2023) produced 'Flood Assessment for Proposed Gunsynd Solar Farm at Lot 51 MH115 Gore Highway, Goondiwindi QLD' in March 2023.
- PSD Energy and Southfront (PSD and Southfront 2023) produced 'Gunsynd SF Stormwater Management Plan' in October 2023.

Torrent (2023) assessed the risk to property and life due to flooding from waterways adjacent to the project site. The flood assessment assessed flood risks according to a 1% annual exceedance probability (AEP) design flood event. A freeboard (typically 0.5 m) was added to the 1% AEP flood level to account for uncertainty and cover some level of residual risk. This is termed the Flood Planning Level (FPL). Land below the FPL is termed the Flood Planning Area (FPA).

Torrent (2023) observed that parts of the landscape (including the Gunsynd SF project site) are pockmarked by small local topographic depressions. These depressions will fill with local runoff during intense or prolonged periods of rainfall, presenting a risk to any infrastructure located

within them. To identify additional flood risks, a TUFLOW simulation simulating local runoff from rainfall events was also undertaken and combined with the 1% AEP flood risk assessment. This is presented in Figure 2.1.

In its assessment, Torrent (2023) noted that ample flood-free refuge is available on-site if people are present during a flood event. Due to the nature of the local topography, higher ground can be readily accessed by travelling in an uphill direction to avoid rising flood waters.

It was also determined that 900 mm of rainfall is sufficient to fill depressions in the landscape. Torrent (2023) noted that additional considerations for infrastructure located in these depressions would be needed. This includes the elevation of floor levels, damageable components and solar panels located within the H3 hazard classification in Figure 2.1.

It was recommended that any buildings or critical infrastructure at the project site be placed outside of the FPA. Where critical infrastructure must be placed within the FPA then any damageable components should be raised to a level above the FPL. It is understood that the solar panel tracker arrays can be exposed to flood depths of around 0.5 m without undue risk. The extent of 0.5 m inundation is readily identifiable from the areas of an H3 or higher hazard classification, with H1 and H2 areas being subject to depths of no more than 0.5 m.

In addition to the Torrent (2023) assessment, PSD and Southfront (2023) produced a flood risk analysis focusing on flood flows from Commoron Creek on Murri Murri Creek. As there is some uncertainty regarding how the interconnecting Commoron Creek contributes to flooding in Murri Murri Creek, a sensitivity analysis was conducted using three scenarios (0%, 50% and 80% Commoron Creek breakout into Murri Murri Creek) using the 0.5% AEP event. The result of this sensitivity analysis is illustrated in Figure 2.2.

Figure 2.2 showed that a 50% breakout of the Commoron Creek into the Murri Murri Creek will result in the flooding of some solar panel modules and access tracks within the 0.5% AEP flood plain. There are no other structures or buildings within the flood plain area which are vulnerable to the effects of flooding in this scenario. However, more comprehensive flood modelling is expected to be undertaken by Metis Energy to assess the impacts of flooding against Metis Energy's requirements, which stipulate that 'the front lower edge of solar panel modules shall not be lower than 100 mm above the 0.5% AEP flood level.' This site risk assessment will be reviewed, and updated as required, based on the findings of any additional flood modelling.

Based on the findings of both reports, the risk to life is therefore minimal and no specific management measures are required to mitigate flood-related risks.

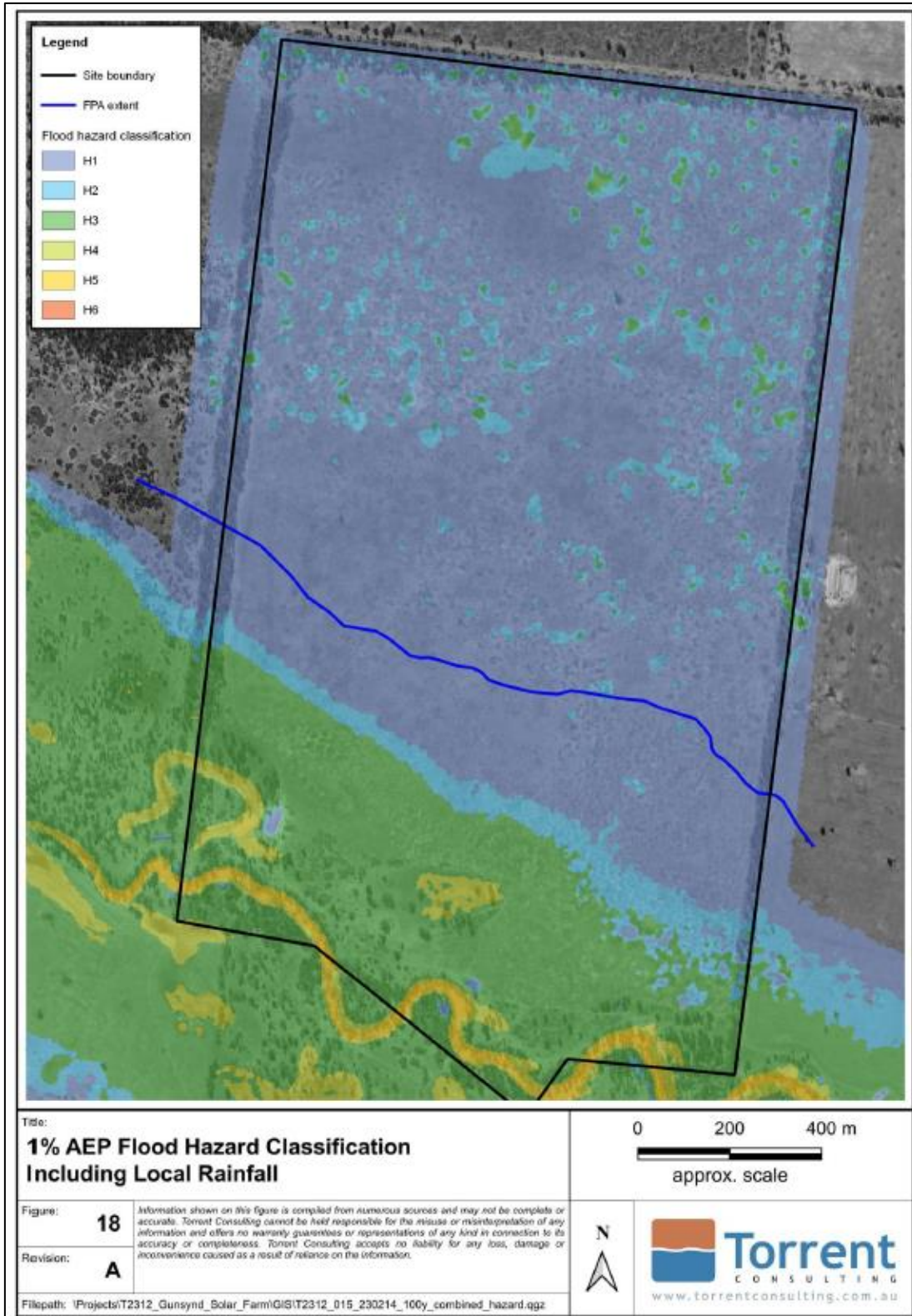


Figure 2.1 The 1% AEP flood hazard classification (from Torrent 2023)

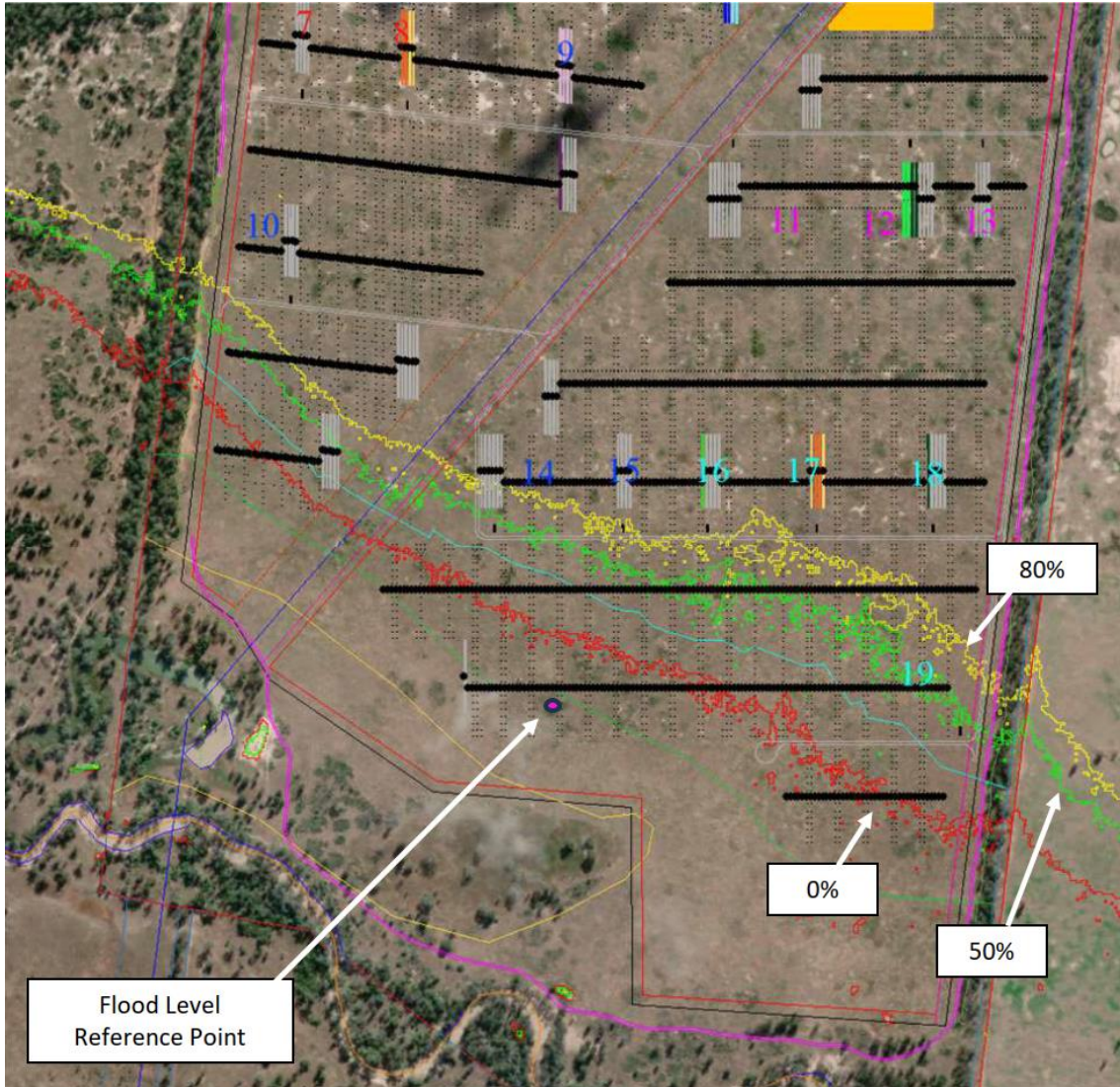


Figure 2.2 Flood inundation at 0.5% AEP (based on 50% scenario) (PSD and Southfront 2023)

2.5 Surface water assessment

2.5.1 Surface water and drainage assessment

Northern Consulting Engineers (NCE) was engaged to conduct a surface water and drainage assessment for the site (NCE 2019). NCE noted that Murri Murri Creek flows westerly across the southern portion of the site before traversing the Leichhardt Highway and joining Commonon Creek, approximately 4.5 km west of the site. Murri Murri Creek is a 2nd order stream and is listed as minor in hierarchy and is non perennial. Murri Murri Creek is shown on Figure 2.3.

to construction traffic may affect the existing vegetation growth and/or regrowth and soil remediation may be required. The ESCP recommended undertaking soil testing prior to construction to ascertain the nature of the in-situ soils, including determining potential for dispersive soils (if any).

The SWMP concluded that, during the operations phase of the project, the increase in effective impervious surfaces as a result of the development would be negligible as runoff will fall from the panels to a grassed surface. Due to the minimal change in topography and insignificant increase in impervious surfaces, it was considered any increase in pollutant loads would also be insignificant. Conveyance of runoff over vegetated areas (i.e. buffer zones) would be sufficient to remove any entrained pollutants. If there is any chance that runoff may be concentrated by the formation of the access tracks, it should be conveyed by a swale drain and discharged via a level spreader to reduce the risk of erosion occurring along the tracks. The SWMP recommended that, where possible, collection of roof runoff for non-potable re-use (i.e. toilet flushing) be undertaken.

2.6 Fish passage assessment

Metis Energy engaged Redleaf to prepare a fish passage assessment report for the proposed upgrade of a culvert on Scudamores Road, Goondiwindi (Redleaf 2023a).

2.6.1 Waterway

The proposed culvert project site occurs on Wondalli Creek, approximately 8.2 km south of the proposed solar farm on Scudamores Road and approximately 8 km northeast of Goondiwindi township centre. Wondalli Creek flows east from Brigalow Creek, beginning 5 km west from the existing culvert. Regional Ecosystem (RE) vegetation mapping indicated the site contained non-remnant Category X within the road reserve.

The riparian vegetation adjacent to the culvert was characterised as being moderately vegetated primarily with native tree species dominated by Eucalypts. Smaller shrubs and bushes were sparsely scattered along the banks as well ground cover comprising of both native and exotic grasses at the culvert crossing as well as both up and down stream.

Wondalli Creek is a stream order two Moderate Risk (amber) waterway on the Department of Agriculture and Fisheries (DAF)'s waterways for waterway barrier works mapping. The study area is at 218 m elevation with Wondalli Creek flowing through relatively flat to hilly land. The surrounding catchment upstream and immediately adjacent is dominated by cleared farmland. This has been the case for many decades until at least 1953 when aerial photos were checked. The Wondalli Creek is a well-defined channel with trees and shrubs scattered along the edges. The river was running at the time of survey.

Its stream bed comprised of sandy soil as the dominant substrate observed within the watercourse. The top of bank width (riparian) at the site is approximately 47 m wide upstream and 63 m wide downstream, approximately 50 m from the crossing. Wondalli Creek has a typical stream morphology of a flat bottom and shallow banks. Low flow width is 1-2 m downstream and upstream within the smaller single box culvert and 5-6 m upstream and downstream at the larger three-box culvert. There were minimal instream microhabitats at the site including large woody debris.

2.6.2 Upstream and downstream aquatic habitats

Wondalli Creek flows east on cracking clay across mostly cleared farmland. Wondalli Creek has several road crossings east of the culvert whereas no natural or artificial waterway barriers were observed to the west.

2.6.3 Aquatic fauna

Of the 40 aquatic fauna species that Redleaf identified as potentially inhabiting Wondalli Creek, eight species were likely to occur and, of those, five are native species. This included the Unspecked Hardyhead, Fly-Specked Hardyhead, Spangled Perch, Golden Perch and Bony Bream.

This project on Wondalli Creek will have no significant residual impact and not adversely impact any of the above criteria for fish passage pending final designs of the culvert upgrade.

2.7 Cultural Heritage assessment

2.7.1 Cultural Heritage research

Initial research of cultural heritage showed two locations that were identified in the creek bed of Murri Murri Creek. These locations are outside of the project development window, as shown on Figure 2.4 and were noted by Ergon Energy when the transmission line was constructed (shown in green on the left in the figure). The conclusion from this initial research was that as there has been significant grazing and cropping on the property since the transmission line was built, it is thought that the impact on cultural heritage from the project will be minimal.



Figure 2.4 Cultural heritage sites in Murri Murri Creek

2.7.2 Early works monitoring

Australian Heritage Specialists (AHS) in conjunction with the Bigambul Native Title Aboriginal Corporation (BNTAC) were engaged in July 2023 to conduct monitoring of the early works on the project and produced a report summarising this engagement (BNTAC and AHS 2023) – the Goondiwindi Gunsynd Solar Farm Early Works Monitoring report.

The report noted that the project site has undergone some previous ground disturbance for the use of farmland where the majority of the project site had been cleared from vegetation. During monitoring of the test pitting conducted, no Aboriginal cultural heritage was identified. During the monitoring of the clearance of vegetation for access tracks and pads for early works, four isolated artefacts were identified 36 m east of BH10 and 10 m north of the cleared access track. These flakes were removed by BNTAC and relocated outside of the project site to avoid harm. During a brief inspection of a small section surrounding the creek outside of the project site, adjacent to the southern side, two Scarred Trees, two isolated artefacts, and lithic scatters were identified. These were noted and communicated to ensure that works do not extend across the main track and into this area. This area was not fully inspected during the first week of monitoring.

During monitoring of early works, no Aboriginal cultural heritage was identified. Electrical resistivity testing (ERT) works presented the most readily visible subsurface material of the three activities, whilst pile load testing (PLT) and bore holes (BH) works were inspected intermittently once machinery and testing had concluded at each location. Further investigation of the creek along the southern boundary of the project site uncovered large lithic scatters, with upwards of 100 artefacts positively identified. As directed by BNTAC, certain artefacts were relocated away from exposed sections of the creek bank that were heavily eroding. Flakes were also identified along the main track that formed the southern boundary of the project site. These flakes were relocated as directed by BNTAC to outside of the development area to avoid harm. An Exclusion Zone was established from the southern border of the main track, extending across the creek line, so that no works will harm Aboriginal cultural heritage in this zone.

Due to the presence of Aboriginal cultural heritage within and surrounding the project site, there is a high potential for further surface and sub-surface artefacts to be uncovered during future works. Figure 2.5 shows the results of the Aboriginal cultural heritage monitoring conducted by BNTAC and AHS and also shows the Exclusion Zone that has been established.

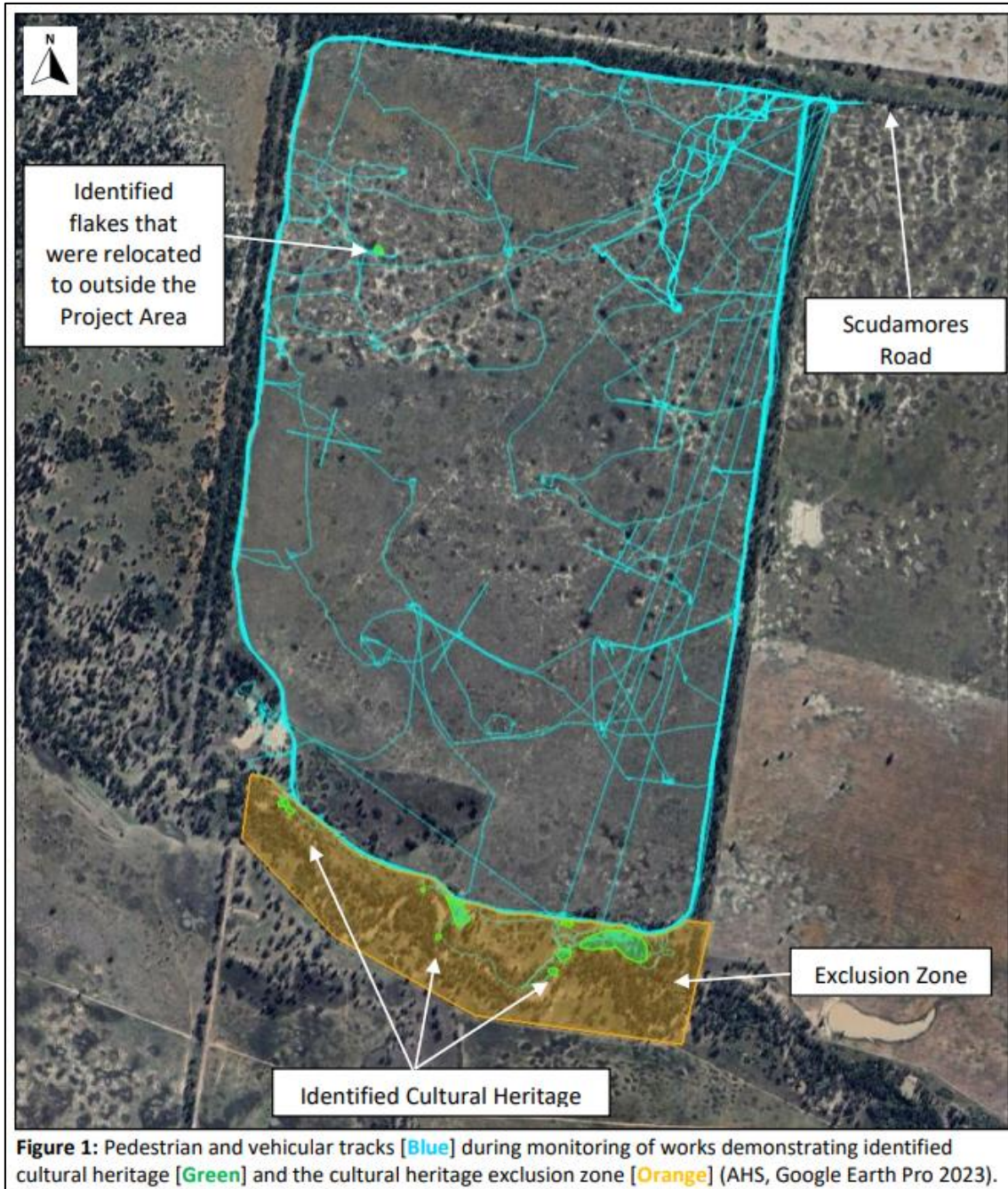


Figure 2.5 Results of the Cultural heritage monitoring (BNTAC and AHS 2023)

2.7.3 Cultural Heritage Management Plan

Metis Energy has commissioned consultants King & Wood Mallesons (KWM) to complete a cultural heritage management plan (CHMP) to manage the risk of impact to cultural heritage. The objectives of the CHMP are to establish suitable mechanisms to avoid or minimise harm to Aboriginal cultural heritage by:

- providing guidance to the proponent and personnel involved in the Gunsynd SF in the identification, protection and management of Aboriginal cultural heritage

- providing the cultural heritage awareness training material to the proponent and personnel involved in the Gunsynd SF providing the necessary information and requirements for recognition of Aboriginal cultural heritage and the respect for Aboriginal knowledge, culture and traditions
- outlining a clear and agreed process for Gunsynd SF personnel and BNTAC to manage Aboriginal cultural heritage, including new discoveries
- providing a basis for the inclusion of Aboriginal cultural heritage in project management decisions and planning
- outlining processes for ongoing effective communication between the Gunsynd SF and BNTAC
- recognising Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage
- ensuring that the project proceeds with minimum delay or impediment.

3 Risk assessment overview

Risk assessment is a key tool that enables management of environmental impacts. This assists with identification of the higher risk/greater impact activities and where management and mitigation efforts should be focused. Risk assessment will be undertaken using a risk-based approach, based on international best-practice standards such as AS/NZS ISO 31000:2018: Risk management - Guidelines (Standard).

Environmental risk assessment identifies, evaluates and controls risks that may lead to impacts on the environmental aspects of a project. It includes identifying a clear pathway to one or more sensitive receptors and assessing the risk of potential impacts on the sensitive receptors as a result of the project.

Key risk assessment terms and definitions are provided in Table 3.1.

Table 3.1 Key risk assessment terms and definitions

Term	Definition
Risk	The potential for an event to occur that impacts on a sensitive receiver, assessed by considering likelihood and consequence. For each risk, the inherent and residual risk is considered: <ul style="list-style-type: none"> • An inherent risk is a risk before the application of risk controls. • A residual risk is the risk remaining after the application of risk controls.
Likelihood	The likelihood of the event occurring, determined based on the history of similar incidents occurring and/or professional judgment
Consequence	The consequence of the event occurring determined based on the history of similar incidents occurring and/or professional judgment
Standard controls	Risk management controls are considered accepted practice in industry for reducing the likelihood and/or consequence of a potential impact on a sensitive receiver. Standard controls are recognised procedures, guidelines, methods, and codes of practice that can be sourced from regulations, policies, guidelines and leading practice references
Non-standard controls	Risk management controls that are specific to the site or the project, or are required in response to a specific project commitment or regulator/community requirement.

4 Risk assessment process

The risk assessment process adopted for the Gunsynd SF (derived from AS/NZS ISO 31000:2018) is summarised in Table 4.1 and shown conceptually in Figure 4.1.

Table 4.1 Steps in the risk assessment process

Step No.	Step name	Tasks
1	Sensitive receptor identification	Sensitive receptors are identified, corresponding to potentially 'at risk' aspects or components of the environment.
2	Hazard and risk source identification	The hazards and risk sources that are applicable to the project and the development site are identified.
3	Impact identification	Project-related events that may result in an impact on a sensitive receiver are identified.
4	Likelihood and consequence category definition	Likelihood and consequence categories are defined, including different definitions of consequence for different environmental aspects.
5	Inherent risk assessment	The inherent risk of each potential event occurring is assessed by assigning a likelihood and consequence category, and using a risk matrix (Figure 4.2) to assign a risk rating.
6	Application of risk control measures	Standard and non-standard risk controls are applied, based on the management and mitigation measures identified during the environmental investigations, to reduce the likelihood and/or consequence of each event occurring and thereby reduce its overall risk rating).
7	Residual risk assessment	The risk of each potential impact event occurring after the application of the risk control measure(s) is assessed and a new risk rating assigned.
8	Sign-off that measures have reduced residual risk	Sign off from an approved authority to recommence work.

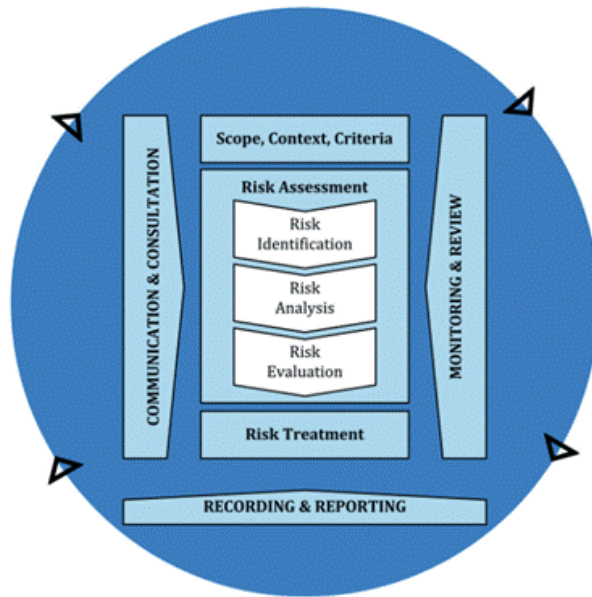


Figure 4.1 The risk assessment process overview (from AS/NZS ISO 31000:2018)

4.1 Likelihood and consequence

A risk matrix is used to assign a risk rating to an impact by assigning a likelihood and consequence category. The risk matrix is presented in Figure 4.2

Consequence	Critical (5)	Medium	High	Very high	Very high	Very high
	Major (4)	Medium	Medium	High	Very high	Very high
	Moderate (3)	Low	Medium	Medium	High	Very high
	Minor (2)	Low	Low	Medium	Medium	High
	Insignificant (1)	Low	Low	Low	Medium	Medium
		Rare (1)	Unlikely (2)	Possible (3)	Likely (4)	Almost Certain (5)
		Likelihood				

Figure 4.2 Risk matrix showing classification of risk ratings

4.1.1 Likelihood

The likelihood category definitions are summarised in Table 4.2. The likelihood is based on what is known about the risk event and the way circumstances and activities affect the risk event and associated consequence(s).

Likelihood is a qualitative concept and is typically a subjective assessment of the chance of an event occurring. For some hazards it may be possible to provide a more quantitative evaluation and a probability can be assigned on a scale of zero to one, where a probability of zero indicates that the hazard can never become an event and one indicates that it is guaranteed to become an event. Probabilities are usually determined on the basis of the frequency with which an event has arisen previously for similar conditions. In many situations

frequency data is not available and if probabilities are assigned on the basis of limited historical data then they are also subjective. Depending on their sensitivity to the harm that may arise or their prior knowledge, different people will often assign different probabilities to an event for the same hazard.

To help establish the likelihood of an event, answers are sought to the following questions:

- Has there been a previous occurrence of this risk event?
 - Considering what has happened previously, such as incidents and near misses, can assist in establishing the likelihood. It is important not to just consider your business but think about occurrences across the industry.
- Are there any design features of the project that increase or decrease the likelihood of this risk event occurring?
 - Consider how effective these features are.
- Are operating or environmental conditions likely to change?
 - Operating or environmental conditions change over time and vary throughout the year. These changes can influence the likelihood of a risk event occurring.
- How does people’s behaviour affect the likelihood?
 - The way people act or behave can affect the likelihood of a risk event occurring. For example, they can make mistakes, misuse items or act spontaneously.

Table 4.2 Likelihood categories and description

Category	Definition
Rare	May occur only in exceptional circumstances. This risk event is known to not have occurred elsewhere (likelihood < 5%).
Unlikely	Could occur at some time. This risk event is not expected to occur but could occur at some time (likelihood 5% to 30%).
Possible	Might occur at some time. This risk event could occur at any time during planned works (likelihood > 30% to 70%).
Likely	Will probably occur in most circumstances. This risk event will likely occur several times during the planned works (likelihood > 70% to 90%).
Almost certain	Expected to occur in most circumstances. This risk event will likely occur frequently during the planned works (likelihood > 90%).

4.1.2 Consequence

The consequence category definitions are summarised in Table 4.3. Consequence is the severity of harm the risk event could cause when it occurs. The following questions are used to help assess the consequences of a risk event:

- What kinds of harm could be caused?
 - a risk event may impact on more than one of the sensitive receptors under consideration: any member of the public, land, property and infrastructure or the environment.
- What factors could influence the severity of harm?
 - the consequence of a risk may vary under different circumstances. For example, weather conditions may increase the consequences of the risk event.
- In what ways could any member of the public be harmed?
- In what ways could any land, property or infrastructure be harmed?
- In what ways could the air, water, soil, vegetation, or flora and fauna species be harmed?

Table 4.3 Consequence categories and description

Category	Environment	Heritage	Community	Project design and management
Critical	Major, irreversible impacts on viability of threatened ecological communities or species.	Irreversible damage to places or objects of very high cultural heritage significance.	Widespread, unplanned loss of major individual or community assets or infrastructure. Widespread, irreversible loss of land capability. Major debilitating injury or loss of life.	Requires extensive changes in design, construction and operation that threaten the viability of the wider organisation, and additional resources are required that may exceed the organisation's resource capability to resolve.
Major	Localised impacts on threatened ecological communities or species.	Irreversible damage to places or objects of high cultural heritage significance. Excavation and salvage of objects of high or very high cultural heritage significance.	Significant deterioration in community assets or infrastructure. Long-term loss of land capability or incompatibility of project with surrounding land use. Non-life-threatening and non-permanent injury. Substantial loss of local amenity.	Requires changes in design, construction and operation adversely impact the project's success, and additional resources are required that may exceed the project's resource capability to resolve.
Moderate	Localised, irreversible impacts on non-threatened ecological communities or species.	Irreversible damage to places or objects of moderate cultural heritage significance. Excavation and salvage of objects of moderate cultural heritage significance.	Moderate, reversible loss of land capability or land use. Occasional moderate level or frequent low-level impacts on amenity. Minor injury, requiring first aid.	Changes in design, construction and operation may be required and additional resources are required and may result in disruption to the project's timelines and activities.
Minor	Localised, reversible impacts on non-threatened ecological communities or species.	Excavation and salvage of objects of low cultural heritage significance.	Minor, reversible loss of land capability or current land use. Low level or occasional nuisance impacts on amenity. Minor injury, not requiring first aid.	Can be managed with no change in design, construction and operation, but may need to be prioritised and requires additional resources.

Category	Environment	Heritage	Community	Project design and management
Insignificant	Localised, temporary disruption to non-threatened species.	No impact on places or objects of cultural heritage significance.	Negligible impacts on amenity, land capability , current land use or health.	Can be managed with no change in design, construction and operation or additional resources.

4.2 Sensitive receptor identification

The following main categories of sensitive receptors that are at risk of impacts from the project have been identified:

- community – including local landholders (residences), local businesses, Aboriginal groups, the broader community, council and other regulatory agencies
- environment – including terrestrial and aquatic flora and fauna, ecosystems and waterways
- heritage – including places and objects of Aboriginal or historic heritage significance.

4.2.1 Community receptors

Residential receptors

The Planning Report (Echo Consulting 2019) identified that the nearest residential dwelling is located over 2 km to the north of the development area. The Planning Report also noted that there are vegetation buffers around all property boundaries and between the residence and the project layout.

Further investigation completed as part of the Landscape Plan has identified 32 residences within 5 km of the site – as shown on Figure 4.3, with the closest being residence R1 (located approximately 2.05 km to the north of the site).

Local businesses

Local businesses in nearby towns (such as Goondiwindi) also have the potential to be impacted by the project – particularly in the construction phase, in which significant impacts on local accommodation and services may be expected.

Aboriginal groups

Based on the DTATSIPCA's Cultural Heritage Database and Register (2023), the local Aboriginal Group in the area is the Bigambul People Part B.

Council and other regulatory agencies

The local government area in which the Gunsynd SF project is located is the Goondiwindi Regional Council. Other regulatory agencies include Ergon Energy, Department of Resources, DES, DAF and Department of State Development, Infrastructure, Local Government and Planning (DSDILGP).

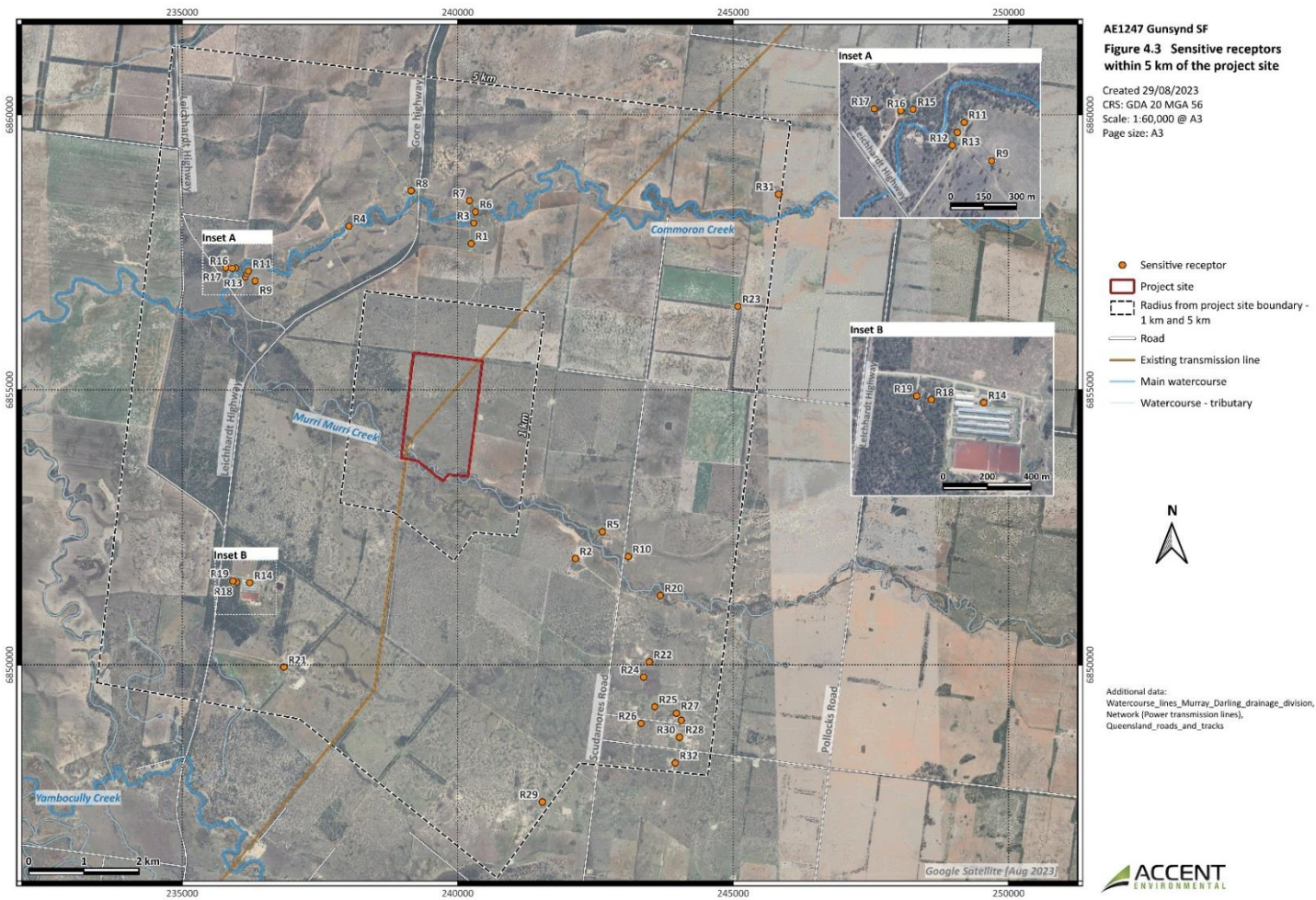


Figure 4.3 Sensitive receptors within 5 km of the site

4.2.2 Environmental receptors

Terrestrial flora and fauna receptors

Based on Redleaf's assessment (Redleaf 2023b), no threatened flora, fauna or habitat for threatened fauna were found during the field survey.

Koala habitat

Redleaf's assessment (Redleaf 2023b) identified some NJKHTs within the road reserve surrounding the site and individual trees should be avoided when clearing the access track.

Ecosystems

Based on Redleaf's assessment (Redleaf 2023b), no essential habitat was identified as being present on the Project Site and no TECs were identified within the Project Site.

Aquatic flora and fauna receptors

Redleaf's assessment of the culvert upgrade on Scudamores Road crossing Wondalli Creek (Redleaf 2023a) identified five native fish species were likely to occur.

Waterways

As noted in the Surface Water and Drainage Assessment (NCE 2019), Murri Murri Creek flows westerly across the southern portion of the site before traversing the Leichhardt Highway and joining Commoron Creek, approximately 4.5 km west of the site. Murri Murri Creek is a 2nd order stream and is listed as minor in hierarchy and is non perennial.

Redleaf (2023b) noted that the free movement of fish along waterways and floodplains is required for survival and breeding of Australian fish. Murri Murri Creek is mapped Orange "Moderate Risk" under DAF's 'Queensland Waterways for Waterway Barrier Works' data layer (Figure 4.4). The footprint of the proposed solar farm will not intersect with this waterway.

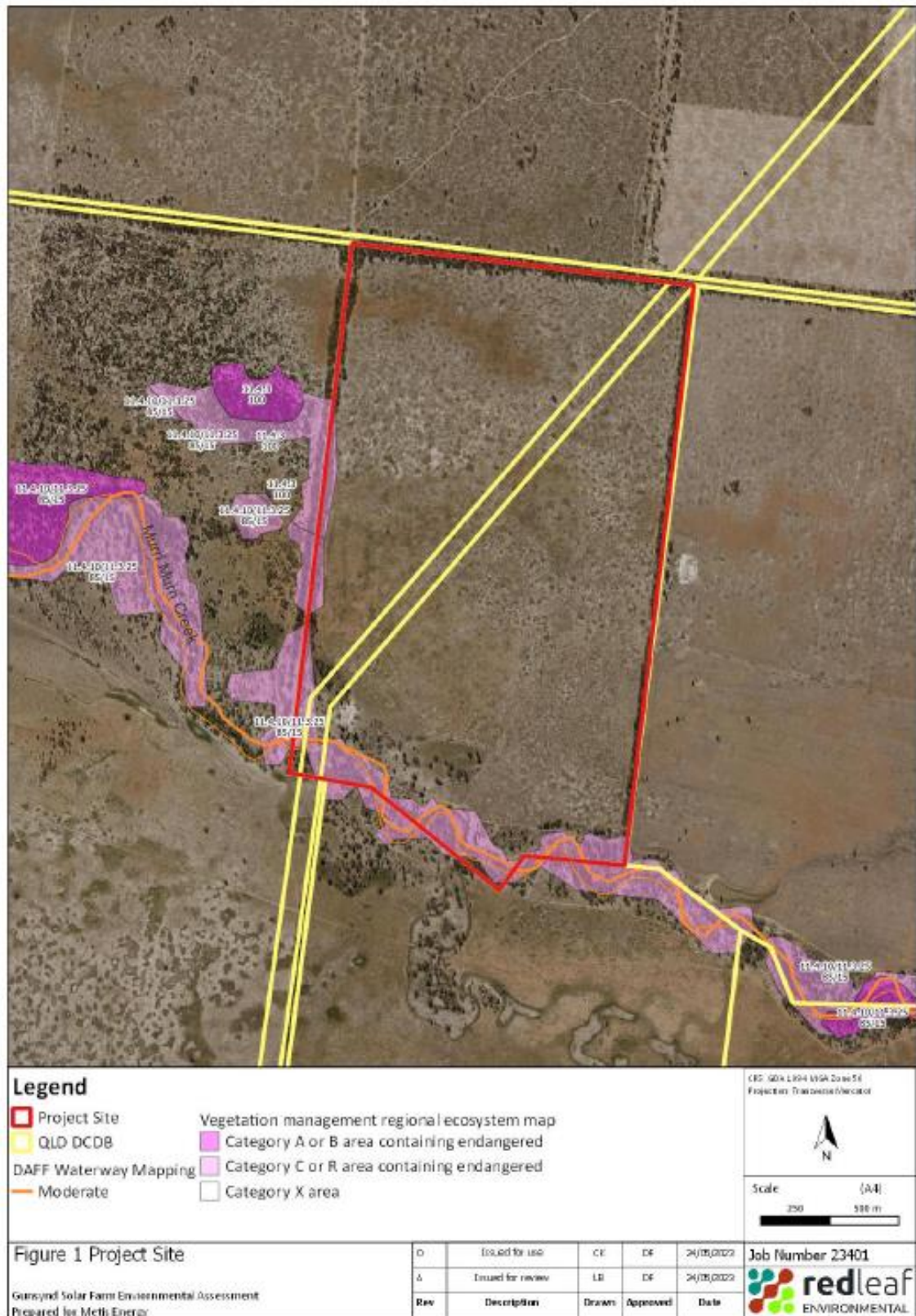


Figure 4.4 The Project site showing DAF Waterway Mapping (from Redleaf 2023b)

As part of the project, a culvert on Scudamores Road (approximately 8.2 km south of the site) is to be upgraded. The culvert location is shown on Figure 4.5.

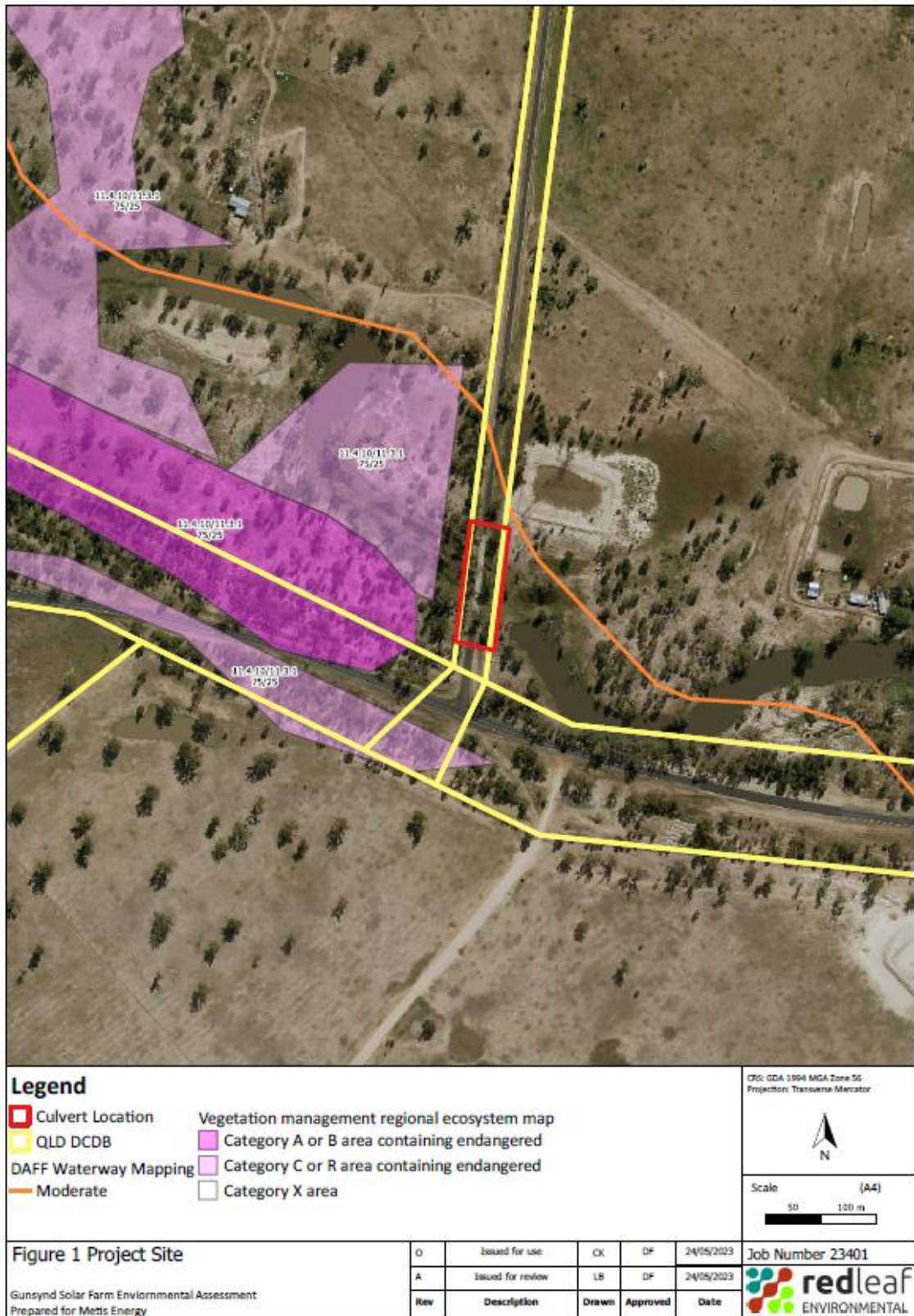


Figure 4.5 The culvert on Scudamores Road (from Redleaf 2023a)

4.2.3 Heritage receptors

The following main categories of sensitive receptors that are at risk of impacts from the project have been identified.

Aboriginal heritage

The Planning Report (Echo Consulting 2019) noted that, based on desktop and visual assessment of the site and anecdotal advice of previous clearing over the subject area, the development area has been assessed as a Category 4 area as per the Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines. The guidelines describe a Category 4 area as follows:

'Where an activity is proposed in an area, which has previously been subject to Significant Ground Disturbance it is generally unlikely that the activity will harm Aboriginal cultural heritage and the activity will comply with these guidelines.

In these circumstances...it is reasonable and practicable that the activity proceeds without further cultural heritage assessment.'

During monitoring undertaken by BNTAC and AHS during Early Works, large lithic scatters were identified in Murri Murri Creek along the southern boundary of the project site. To avoid harm to Aboriginal cultural heritage, an Exclusion Zone has been established from the southern border of the main track, extending across the creek line, so that no works will harm Aboriginal cultural heritage in this zone (as shown in Figure 2.5).

BNTAC and AHS (2023) concluded that, due to the presence of Aboriginal cultural heritage within and surrounding the project site, there is a high potential for further surface and sub-surface artefacts to be uncovered during future works.

As discussed in Section 2.7, a CHMP has been commissioned to appropriately manage the risk of Aboriginal cultural heritage impacts.

Non-Aboriginal heritage

The Planning Report (Echo Consulting 2019) noted that a search of the Queensland Heritage Register confirmed there are no listed European Heritage sites within the development area or in close proximity.

5 Risk identification

Based on an understanding of the sensitive receptors potentially affected by the project, and a review of project location, design, configuration and activities, the following risks have been considered:

- loss of threatened ecological communities or species adversely impacting on biodiversity values
- injury and death of non-threatened fauna impacting on local biodiversity
- weed and pest introduction and spread impacting on local biodiversity and agriculture
- harm of Aboriginal or historic cultural heritage
- dust or other emissions affecting nearby dwellings
- increased electromagnetic interference potentially affecting public health
- increase in bushfires or electrical fires as a result of the development
- increase in downstream flood risk as a result of the development
- loss of containment of hazardous materials affecting surface waters, groundwater, soils or ecology
- loss of land capability affecting agricultural and other uses
- erosion and sedimentation affecting agricultural and other uses
- conflict with land use in surrounding areas
- noise from site activities or traffic affecting local landholders
- altered property values and reduced agricultural viability affecting the local community
- traffic accidents involving the public
- reduced visual amenity affecting nearby landholders or adjacent road users
- nuisance glint and glare affecting nearby dwellings
- excessive resource use or waste generation degrading natural capital
- cumulative impacts.

The applicability of these risks to different phases of the project phases (construction, operation and decommissioning) is summarised in Table 5.1.

Table 5.1 Potential impacts and applicability to project phases

Risk categories	Project Phase		
	Construction	Operation	Decommissioning
Biodiversity impacts	Yes	Yes	Yes
Biosecurity impacts	Yes	Yes	Yes
Heritage impacts	Yes	-	Yes
Dust/air emissions	Yes	Yes	Yes
Electromagnetic field impacts	-	Yes	-
Fire and bushfire issues	Yes	Yes	Yes
Flood and hydrology impacts	Yes	Yes	Yes
Hazardous substances issues	Yes	Yes	-
Land use impacts	Yes	Yes	Yes
Light emissions	-	Yes	-
Noise pollution	Yes	Yes	Yes
Socioeconomic and community impacts	Yes	Yes	Yes
Soils, erosion and sedimentation	Yes	Yes	Yes
Traffic and transport impacts	Yes	Yes	Yes
Visual amenity impacts	Yes	Yes	-
Resource use and waste generation	Yes	Yes	Yes

5.1 Assessment of inherent risk

An assessment of inherent risk for the Gunsynd SF is shown in Table 5.2. The assessment of inherent risk does not consider the application of risk controls.

Table 5.2 Assessment of inherent risk

Aspects	Sensitive receptor	Potential hazard/risk	Likelihood	Consequence	Risk
Biodiversity	Environment	Loss of VM Act vegetation	Possible	Major	High
	Environment	Loss of EPBC Act flora, fauna and TECs	Possible	Major	High
	Environment	Loss of NC Act flora and TECs	Possible	Major	High
	Environment	Loss of NC Act fauna	Possible	Moderate	Medium
	Environment	Loss of non-juvenile koala habitat trees in the road reserve surrounding the site	Possible	Moderate	Medium
	Environment	Injury and death of non-threatened fauna	Possible	Moderate	Medium
Wetlands and watercourses	Environment	Impacts to water quality and watercourse (Murri Murri Creek)	Possible	Minor	Medium
	Environment	Impacts to native fish species (Wondalli Creek)	Possible	Moderate	Medium
Biosecurity	Environment	Weeds introduction and spread	Possible	Minor	Medium
	Environment	Pest introduction and spread	Possible	Minor	Medium
Heritage (Aboriginal and historic)	Heritage	Harm of Aboriginal cultural heritage	Unlikely	Major	Medium

Aspects	Sensitive receptor	Potential hazard/risk	Likelihood	Consequence	Risk
	Heritage	Harm of historic heritage	Unlikely	Minor	Low
Dust/air emissions	Community	Nuisance emissions	Likely	Moderate	High
Electromagnetic fields	Community	Exposure to electromagnetic fields at project boundary	Possible	Insignificant	Low
Bushfire	Community/ Environment	Development causing increase in fires	Unlikely	Critical	High
Electrical fire	Community/ Environment	Fire caused by equipment failure	Possible	Major	High
Flood and hydrology	Community/ Environment	Development causing flooding impacts downstream	Possible	Moderate	Medium
Hazardous substances	Environment	Impact to soils and/or water following spills	Possible	Major	High
	Environment	Impact to vegetation from use of chemicals to control weeds	Possible	Moderate	Medium
	Environment	Fire linked to usage of flammable substances	Possible	Major	High
Land use	Community/ Environment	Loss of land capability	Possible	Moderate	Medium
	Community	Conflict with adjacent land use	Possible	Moderate	Medium
Light emissions	Community	Operations causing nuisance light	Possible	Moderate	Medium
Noise pollution	Community	Nuisance noise	Possible	Moderate	Medium

Aspects	Sensitive receptor	Potential hazard/risk	Likelihood	Consequence	Risk
	Community	Cumulative project noise impacts	Possible	Moderate	Medium
Socioeconomic and community impacts	Community	Altered property values, reduced agricultural viability, reduced local accommodation options	Possible	Minor	Low
Soils, erosion and sediment control	Environment	Erodible soils and sedimentation from construction and rehabilitation	Likely	Minor	Medium
	Community	Erodible soils and sedimentation from construction and rehabilitation	Possible	Moderate	Medium
Traffic and transport	Community	Traffic accidents involving public	Possible	Critical	Very high
	Community	Reduced amenity	Unlikely	Minor	Low
	Community	Increased traffic from cumulative projects	Unlikely	Minor	Low
Visual amenity	Community	Local amenity reduced	Possible	Moderate	Medium
	Community	Nuisance glint and glare	Possible	Moderate	Medium
Resource use and waste generation	Environment	Excessive resource use	Unlikely	Minor	Low
	Environment	Excessive waste generation	Possible	Minor	Medium

5.2 Risk management and controls

Twenty-nine risks associated with the development were identified as potentially having medium, high or very high risk rating in the absence of controls.

- biodiversity impacts, including:
 - loss of NC Act fauna
 - loss of non-juvenile koala habitat trees in the road reserve surrounding the site
 - injury and death of non-threatened fauna
- impact to wetlands and watercourses
- introduction and spread of weeds and pests
- loss of Aboriginal cultural heritage
- dust generated on unsealed public roads have the potential to impact project safety/social amenity
- increase in bushfire and electrical fire risks
- impact to soils and/or water following spills of hazardous substances.
- impact to the community and environment from the loss of land capability and from conflict with neighbouring land uses
- impact to the community from light and noise emissions
- traffic accidents involving public
- impact to the community from loss of amenity and from glint and glare
- impact to the community from waste generated by the site.

These risks required detailed investigation and assessment to assess potential risks in greater detail and develop management and mitigation measures to reduce risks and avoid or mitigate impacts.

Using standard controls (as described in the Site EMP), all of these risks are reduced. The proposed management and mitigation of the potential impacts associated with these key risks are described in the Site EMP and the supporting management plans. Key risk controls include:

- locating the development site to avoid and minimise impacts on threatened ecological communities or species
- committing to having a licenced wildlife salvage team (including a fauna spotter catcher) on site during vegetation removal when active hollows are identified and to supervise topsoil stripping
- committing to avoiding non-juvenile koala habitat trees within the road reserve surrounding the site when clearing for the access track
- committing to measures in a Species Management Program (SMP) to ensure active breeding places are managed appropriately

- locating the development site to avoid scarred trees, and following protocols if cultural heritage artefacts are identified
- managing project-related traffic in accordance with a Traffic Management Plan to minimise the risk of accidents
- committing to measures in an Erosion and Sediment Control Plan (ESCP) and store and manage of fuels and chemicals responsibly to minimise impacts to soil and waterways
- committing to measures in a Weed and Pest Management Plan (WPMP) to minimise the potential for the introduction and spread weeds and pests
- committing to measures in a Bushfire Management Plan (Bushfire MP) to minimise the potential for the impact of fire on the project and from the project on to the broader environment
- locating the development site away from nearby dwellings.

5.3 Assessment of residual risk

An assessment of residual risk was undertaken taking risk controls into account and is shown in Table 5.3. The revised risk rating considers the proposed management and mitigation measures for the project as described in the Site EMP and specific management plans.

Table 5.3 Assessment of residual risk

Aspects	Sensitive receptor	Potential hazard/risk	Likelihood	Consequence	Risk
Biodiversity	Environment	Loss of VM Act vegetation	Rare	Minor	Low
	Environment	Loss of EPBC Act flora, fauna and TECs	Rare	Insignificant	Low
	Environment	Loss of NC Act flora and TECs	Rare	Insignificant	Low
	Environment	Loss of NC Act fauna	Rare	Moderate	Low
	Environment	Loss of non-juvenile koala habitat trees in the road reserve surrounding the site	Rare	Moderate	Low
	Environment	Injury and death of non-threatened fauna	Rare	Moderate	Low
Wetlands and watercourses	Environment	Impacts to water quality and watercourse (Murri Murri Creek)	Rare	Minor	Low

Aspects	Sensitive receptor	Potential hazard/risk	Likelihood	Consequence	Risk
	Environment	Impacts to native fish species (Wondalli Creek)	Rare	Insignificant	Low
Biosecurity	Environment	Weeds introduction and spread	Unlikely	Minor	Low
	Environment	Pest introduction and spread	Unlikely	Minor	Low
Heritage (Aboriginal and historic)	Heritage	Harm of Aboriginal cultural heritage	Rare	Major	Medium
	Heritage	Harm of historic heritage	Rare	Minor	Low
Dust/air emissions	Community	Nuisance emissions	Rare	Minor	Low
Electromagnetic fields	Community	Exposure to electromagnetic fields at project boundary	Possible	Insignificant	Low
Bushfire	Community/ Environment	Development causing increase in fires	Rare	Critical	Medium
Electrical fire	Community/ Environment	Fire caused by equipment failure	Unlikely	Major	Medium
Flood and hydrology	Community/ Environment	Development causing flooding impacts downstream	Unlikely	Minor	Low
Hazardous substances	Environment	Impact to soils and/or water following spills	Unlikely	Minor	Low
	Environment	Impact to vegetation from use of chemicals to control weeds	Unlikely	Minor	Low
	Environment	Fire linked to usage of flammable substances	Rare	Major	Medium
Land use	Community/ Environment	Loss of land capability	Unlikely	Minor	Low

Aspects	Sensitive receptor	Potential hazard/risk	Likelihood	Consequence	Risk
	Community	Conflict with adjacent land use	Unlikely	Minor	Low
Light emissions	Community	Operations causing nuisance light	Rare	Insignificant	Low
Noise pollution	Community	Nuisance noise	Rare	Insignificant	Low
	Community	Cumulative project noise impacts	Rare	Minor	Low
Socioeconomic and community impacts	Community	Altered property values, reduced agricultural viability, reduced local accommodation options	Rare	Insignificant	Low
Soils, erosion and sediment control	Environment	Erodible soils and sedimentation from construction and rehabilitation	Rare	Insignificant	Low
	Community	Erodible soils and sedimentation from construction and rehabilitation	Rare	Insignificant	Low
Traffic and transport	Community	Traffic accidents involving public	Unlikely	Critical	High
	Community	Reduced amenity	Rare	Minor	Low
	Community	Increased traffic from cumulative projects	Rare	Minor	Low
Visual amenity	Community	Local amenity reduced	Rare	Minor	Low
	Community	Nuisance glint and glare	Rare	Insignificant	Low
Resource use and waste generation	Environment	Excessive resource use	Unlikely	Minor	Low
	Environment	Excessive waste generation	Unlikely	Minor	Low

6 Site- and task-specific assessments and register

The Environmental Risk Register for the project is attached as Appendix A.

During the various phases of the project, PCL will create and maintain risk registers in consultation with Metis Energy that will be used to record identified hazards, risk assessment and risk control methods.

Site- and task-specific risk assessments will be undertaken by PCL that consider all health, safety and environmental (HSE) risks associated with the works. The risk assessments will be used to populate HSE risk registers. The risk registers will specifically include, identify and address environmental risks. The risk assessment process will be broadly consistent with the *ISO 31000, Risk management* standard (or Australian Standard equivalent).

The risk registers will be live documents that are consistently updated as the works progress, with risks and control methods added, reviewed, modified and retired as appropriate. Roles and responsibilities for updating the risk register are shown in Table 6.1.

The risk register will be housed within and managed through PCL's safety management centre (SMC) system.

Table 6.1 Roles and responsibilities for maintaining risk register

Aspect	Detail
Company with primary responsibility for maintain risk register	PCL Constructors Pacific Rim Pty Ltd
Role responsible	Lead project manager
Responsibilities	<p>Ensuring risk register is regularly maintained and updated (e.g. in response to changing project or site conditions or activities, incident investigation outcomes, new risk knowledge).</p> <p>Providing updated risk register to Metis Energy.</p> <p>Actively managing risks by being responsive to changing circumstances and through continual improvement of mitigation measures.</p>

7 References

BNTAC and AHS (2023). Aboriginal Cultural Heritage Monitoring; Goondiwindi Gunsynd Solar Farm Early Works Monitoring. 8 August 2023.

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Redleaf (2023b). Environmental Assessment Report - Gunsynd Solar Farm, Goondiwindi, Queensland. Redleaf Environmental prepared for Metis Energy. June 2023.

RPS (2019). Solar farm development on Lot 51 Mh115, Goondiwindi, Bushfire Compliance Assessment. RPS, prepared for Echo Consultants, 31 January 2019. PCL Document No. GSF-ENE-ZB-001_1.2

Torrent (2023). Flood Assessment for proposed Gunsynd Solar Farm at Lot 51 Mh115 Gore Highway, Goondiwindi Qld. Torrent Consulting, prepared for Efficacy Advisors, 31 March 2023. PCL Document No. GSF-ENH-SR-002_1



Appendix A: Environmental Risk Register

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
Biodiversity	Vegetation clearing.	Loss of <i>Vegetation Management Act 1999</i> (VM Act) (Qld) vegetation.	High (3-4)	The project site is mapped Category X (non-remnant), clearing of which is an exempt activity. Clearing of high value regrowth (HVR) for the establishment of a vehicular track will need to meet the Accepted Development Requirements. Measures outlined in the Site EMP implemented.	Low (1-2)	Accepted development vegetation clearing code Site EMP
Biodiversity	Vegetation clearing.	Loss of <i>Environmental Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) (Cth) flora, fauna and threatened ecological communities (TECs).	High (3-4)	No risk to EPBC Act flora, fauna or TECs. Measures outlined in the Site EMP implemented.	Low (1-1)	Site EMP
Biodiversity	Vegetation clearing.	Loss of <i>Nature Conservation Act 1992</i> (NC Act) (Qld) flora and TECs.	High (3-4)	The Department of Environment and Science (DES) flora trigger mapping indicates that the project area does not	Low (1-1)	Site EMP

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				fall within the mapped high-risk areas. No threatened flora was found on site. Measures outlined in the Site EMP implemented.		
Biodiversity	Removal of vegetation involving the removal of habitat features including termite mounds, nests, and trees with significant hollows.	Loss of NC Act fauna.	Medium (3-3)	Where possible, avoid damage to or removal of large habitat trees. A fauna spotter catcher to be present to supervise tree clearing and topsoil stripping. Implementing the Species Management Plan (SMP) if active breeding places are likely to be tampered with.	Low (1-3)	Species Management Plan (SMP) (Green Tape 2023)
Biodiversity	Vegetation clearing in the road reserve surrounding the site.	Loss of non-juvenile koala habitat trees (NJKHT).	Medium (3-3)	Avoid clearing NJKHT within the road reserve surrounding the site when clearing the access track.	Low (1-3)	Site EMP SMP (Green Tape 2023)
Biodiversity	Vegetation clearing in the road reserve surrounding the site.	Injury and death of non-threatened fauna.	Medium (3-3)	Ensure works completed in accordance with Goondiwindi Regional Council (GRC)-approved SMP.	Low (1-3)	SMP (Green Tape 2023) Site EMP

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				<p>Stop work immediately on the identification of any listed species in the vicinity of the project site.</p> <p>Measures outlined in the Site EMP implemented.</p>		
Wetlands and watercourses	Water quality is impacted by increases in sedimentation or hazardous substance spills.	Impacts to water quality and watercourse (Murri Murri Creek).	Medium (3-2)	<p>Develop and undertake works in accordance with an Erosion and Sediment Control Plan (ESCP).</p> <p>Ensure exposed surfaces are stabilised and covered as soon as practicable following disturbance.</p> <p>Establish erosion and sediment controls prior to onset of construction works.</p> <p>Ensure adequate drainage and surface water management implemented during Construction in accordance with the Queensland Urban Drainage Manual and Best Practice Erosion and Sediment Control document.</p> <p>Measures outlined in the Site EMP implemented.</p>	Low (1-2)	ESCP/SWMP (Topo 2023) Site EMP
Wetlands and watercourses	Culvert upgrade on Scudamores Road.	Impacts to native fish species (Wondalli Creek).	Medium (3-3)	Design of the culvert upgrade includes measures to minimise impacts and the upgrade is implemented as designed.	Low (1-1)	Culvert upgrade design documents

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				Accepted development guidelines or conditions of operational works approval for waterway barrier works involving the culvert upgrade on Scudamores Road.		Fish Passage Assessment (Redleaf Environmental 2023a) Operational Works development approval for waterway barrier works
Biosecurity	Weeds introduction and spread.	Project introduces and/or enhances the spread of weeds.	Medium (3-2)	Measures outlined in the Weed and Pest Management Plan (WPMP) implemented.	Low (2-2)	WPMP (Green Tape 2023) Ecological Assessment Report (Redleaf Environmental 2023b)
Biosecurity	Pests introduction and spread.	Project introduces and/or enhances the spread of pests.	Medium (3-2)	Measures outlined in the WPMP implemented.	Low (2-2)	WPMP (Green Tape 2023) Ecological Assessment Report (Redleaf

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
						Environmental 2023b)
Aboriginal heritage	Earthworks and vehicle movements on areas containing known or unknown heritage.	Harm of Aboriginal cultural heritage.	Medium (2-4)	<p>No-go zone fencing around areas of significant cultural heritage as defined in the Early Works Monitoring report (BNTAC and AHS 2023). – restricted access.</p> <p>Project induction – environmental and cultural safety overview and training with the Bigambul Native Title Aboriginal Corporation (BNTAC).</p> <p>Implementing unexpected finds protocol defined in the Cultural Heritage Management Plan (CHMP) (King and Wood Mallesons 2023) and Early Works Monitoring report (BNTAC and AHS 2023).</p> <p>Inspection of exclusion zone fencing.</p> <p>Complete works in accordance with Cultural Heritage Management Plan (King and Wood Mallesons 2023) and Early Works Monitoring report (BNTAC and AHS 2023).</p>	Medium (1-4)	<p>Site EMP</p> <p>Goondiwindi Gunsynd Solar Farm Early Works Monitoring report (BNTAC and AHS 2023)</p> <p>CHMP (King and Wood Mallesons 2023)</p>
Historic heritage	Earthworks and vehicle	Harm of historic heritage.	Low (2-2)	Measures outlined in the Site EMP implemented.	Low (1-2)	Site EMP

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
	movements on areas containing known or unknown heritage.					
Dust/air emissions	Dust emission impacts to surrounding community.	Impact to sensitive receptors. Environmental nuisance caused by dust, fumes, odour or smoke.	High (4-3)	<p>There is significant distance between the project site and sensitive receivers.</p> <p>Minimise the area of exposed surfaces at any one time where possible.</p> <p>Use of water trucks or other dust suppressants where required to minimise dust exposure beyond the boundary of the site.</p> <p>Stockpiles should be managed to minimise dust and erosion through the application of moisture where practical.</p> <p>Implementing a complaints and grievances platform as defined in the Community and Stakeholder Engagement Plan (CSEP).</p> <p>Measures outlined in the Site EMP implemented.</p>	Low (1-2)	Site EMP Environmental Protection (Air) Policy 2019 CSEP
Electromagnetic fields	Exposure to electromagnetic	Impact to sensitive receptors and community.	Low (3-1)	There is significant distance between the project site and sensitive receivers.	Low (3-1)	N/A

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
	fields at project boundary.			No specific measures.		
Bushfire	Development causing increase in fires.	Impact to on-site infrastructure and the off-site environment (including both the community and the ecology).	High (2-5)	Measures outlined in the Bushfire Hazard Assessment and Management Plan (BHAMP) implemented.	Medium (1-5)	BHAMP (Green Tape 2023)
Electrical fire	Development causing increase in fires.	Fire caused by equipment failure.	High (3-4)	Measures outlined in the BHAMP implemented.	Medium (2-4)	BHAMP (Green Tape 2023)
Plant and Equipment Use	Hot Work & Fire Prevention	Hot work such as welding, grinding, mechanical cutting or oxy-cutting pose a risk of unintentionally starting a small-scale on-site fire with minor safety risks or a large-scale	High (3-4)	Hot work permits must be issued for any works that could cause a fire. Hot work undertaken in accordance with a permit will have a full-time fire watch. Fire extinguishers will be readily available around the project site and hazardous material storage areas, in accordance with the Emergency Response Plan (ERP). Plant and vehicles may only travel on designated roads and work areas.	Medium (2-4)	Site EMP Fire Risk Assessment BHAMP (Green Tape 2023) Emergency Response Plan (ERP) (Mendham 2023)

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
		bushfire with significant environmental impact and public safety risks.		Smoking is permitted only in the designated areas and butts must be placed into the provided bins. Burning-off of vegetation will not be permitted unless a Permit to Light Fire is granted by the Queensland Fire and Emergency Service (QFES) and GRC.		
Flood and hydrology	Development causing flooding impacts downstream.	Impact to downstream communities.	Medium (3-3)	Measures outlined in the Stormwater Management Plan (SWMP) and in the Site EMP are implemented.	Low (1-2)	ESCP/SWMP (Topo 2023) Site EMP
Hazardous substances	Storage and management of hazardous substances.	Impact to soils and/or water following spills.	High (3-4)	Control of storage and quantities of hazardous materials stored at any one time. Store substances in accordance with Site EMP and the relevant Australian Standards, including AS1940-2017: The storage and handling of flammable and combustible liquids. Make spill kits and emergency reuipment readily available in areas where hazardous materials are stored or used, in accordance with the Emergency Response Plan (ERP).	Low (2-2)	Spill Response Plan Site EMP Work Health and Safety Management Plan (WHSMP) ERP (Mendham 2023) AS1940-2017: The storage and handling of flammable and

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				Implement the Spill Response Plan (see Site EMP, Appendix C) in the event of a spill. Measures outlined in the Site EMP, ERP implemented.		combustible liquids
Hazardous substances	Storage and management of hazardous substances.	Impact to vegetation from use of chemicals to control weeds.	Medium (3-3)	In addition to measures defined under the risk 'Impact to soils and/or water following spills', measures outlined in the Weed and Pest Management Plan (WPMP) and Workplace Health and Safety Management Plan (WHSMP) are implemented. Seeking landowner and regulator consent prior to use of chemical weed and pest control measures. Notifying neighbouring landholders in accordance with the CSEP.	Low (2-2)	WPMP WHSMP CSEP ERP (Mendham 2023)
Hazardous substances	Storage and management of hazardous substances.	Fire linked to usage of flammable substances.	High (3-4)	Control of storage and quantities of hazardous materials stored at any one time. Store substances in accordance with the relevant Australian Standards, including AS1940-2017: The storage and handling of flammable and combustible liquids.	Medium (1-4)	Spill Response Plan Site EMP WHSMP ERP (Mendham 2023)

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				<p>Make spill kits and other emergency equipment readily available in areas where hazardous materials are stored or used.</p> <p>Implement the Spill Response Plan (see Site EMP, Appendix C) in the event of a spill.</p> <p>Measures outlined in the Site EMP implemented.</p>		AS1940-2017: The storage and handling of flammable and combustible liquids
Land use	Presence of the project.	Loss of land capability.	Medium (3-3)	<p>Compatible grazing land uses during operation in accordance with the Livestock Grazing Management Plan (LGMP).</p> <p>Land capability will be restored when the project solar farm is decommissioned.</p> <p>Measures outlined in the Site EMP implemented.</p>	Low (2-2)	<p>Site EMP</p> <p>LGMP (Ecosite 2023)</p> <p>Decommissioning Plan</p>
Land use	Presence of the project.	Conflict with adjacent land use.	Medium (3-3)	<p>Compatible grazing land use during operation in accordance with the Livestock Grazing Management Plan (LGMP).</p> <p>Measures outlined in the Site EMP implemented.</p>	Low (2-2)	<p>Site EMP</p> <p>LGMP (Ecosite 2023)</p>
Light emissions	Nuisance light.	Operations lighting causing nuisance	Medium (3-3)	There is significant distance between the project site and sensitive receivers.	Low (1-1)	<p>Landscape Plan</p> <p>Site EMP</p>

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
		light impacts to sensitive receptors.		Use of motion sensitive, directional security lights that are angled or shaded. Artificial lighting provided on site will not produce illumination levels exceeding 8 lux at a distance of 1.5 m outside of the site and the maximum luminance will not exceed 350 candelas per m ² . Measures outlined in the Landscape Plan and Site EMP implemented.		
Noise pollution	Nuisance noise.	Noise and vibration impacts to sensitive receptors.	Medium (3-3)	There is significant distance between the project site and sensitive receivers. Compliance with acoustic quality objectives under Environmental Protection (Noise) Policy 2019. Works are conducted within specified operating hours. Measures outlined in the Site EMP implemented.	Low (1-1)	Environmental Protection (Noise) Policy 2019 Site EMP
Noise pollution	Cumulative project noise impacts.	Noise and vibration impacts to sensitive receptors.	Medium (3-3)	There is significant distance between the project site and sensitive receivers. Compliance with acoustic quality objectives under Environmental Protection (Noise) Policy 2019.	Low (1-2)	Environmental Protection (Noise) Policy 2019 Site EMP

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				Works are conducted within specified operating hours. Measures outlined in the Site EMP implemented.		
Socioeconomic and community impacts	Increase in the population during the construction phase of the project.	Altered property values, reduced agricultural viability, reduced local accommodation options.	Low (1-2)	Measures outlined in the Site EMP implemented. Measures outlined in the Accommodation and Employment Strategy (AES) implemented. Engagement with local businesses, local and state government, neighbouring landowners in accordance with CSEP.	Low (1-1)	Site EMP AES CSEP
Soils, erosion and sediment control	Erodible soils and sedimentation from construction and rehabilitation during heavy rainfall.	Erosion of batters and sedimentation of surface water runoff impacting the ecology.	Medium (4-2)	Design works and locate infrastructure with regard for the Gunsynd Solar Farm Flood Study (PSD Energy and Southfront 2023) Develop and undertake works in accordance with the ESCP and SWMP. Ensure exposed surfaces are stabilised and covered as soon as practicable following disturbance. Establish erosion and sediment controls prior to onset of construction works.	Low (1-1)	ESCP/SWMP (Topo 2023) Gunsynd Solar Farm Flood Study (PSD Energy and Southfront 2023)

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				Ensure adequate drainage and surface water management implemented during construction in accordance with Queensland Urban Drainage Manual' and Best Practice Erosion and Sediment Control		
Soils, erosion and sediment control	Erodible soils and sedimentation from construction and rehabilitation during heavy rainfall.	Erosion of batters and sedimentation of surface water runoff impacting the community.	Medium (3-3)	<p>Design works and locate infrastructure with regard for the Gunsynd Solar Farm Flood Study (PSD Energy and Southfront 2023)</p> <p>Develop and undertake works in accordance with the ESCP and SWMP.</p> <p>Ensure exposed surfaces are stabilised and covered as soon as practicable following disturbance.</p> <p>Establish erosion and sediment controls prior to onset of construction works.</p> <p>Ensure adequate drainage and surface water management implemented during Construction in accordance with Queensland Urban Drainage Manual' and Best Practice Erosion and Sediment Control.</p>	Low (1-1)	<p>ESCP/SWMP (Topo 2023)</p> <p>Gunsynd Solar Farm Flood Study (PSD Energy and Southfront 2023)</p>

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
Traffic and transport	Increased traffic.	Traffic accidents involving public.	Very high (3-5)	Use of car-pooling to reduce vehicle numbers. Use of controls at the site entrance Measures outlined in the Traffic Management Plan (TMP) implemented.	High (2-5)	TMP
Traffic and transport	Increased traffic.	Reduced amenity.	Low (2-2)	Use of car-pooling to reduce vehicle numbers. Measures outlined in the TMP implemented.	Low (1-2)	TMP
Traffic and transport	Increased traffic.	Increased traffic from cumulative projects.	Low (2-2)	Use of car-pooling to reduce vehicle numbers. Measures outlined in the TMP implemented.	Low (1-2)	TMP
Visual amenity	Local amenity reduced.	Amenity impacts to sensitive receptors.	Medium (3-3)	There is significant distance between the project site and sensitive receivers. Use of anti-glare coating and materials for all panels. Use of industry standard equipment designed to mitigate issues with reflection and glare. Measures outlined in the Site EMP implemented.	Low (1-2)	Site EMP

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
Visual amenity	Nuisance glint and glare.	Impacts to navigation for aviation/aerial activities. Amenity impacts to sensitive receptors. Disorientation of avifauna.	Medium (3-3)	There is significant distance between the project site and sensitive receivers. Use of anti-glare coating and materials for all panels. Use of Industry standard equipment designed to mitigate issues with reflection and glare. Measures outlined in the Site EMP implemented.	Low (1-1)	Site EMP
Resource use and waste generation	Excessive resource use.	Impact to local waste facilities.	Low (2-2)	Implement waste hierarchy system on site to encourage recycling/reuse of materials. All waste material is to be disposed of to an appropriately licensed facility. Measures outlined in the Waste Minimisation and Management Plan (WMMP) implemented.	Low (2-2)	WMMP
Resource use and waste generation	Excessive waste generation.	Contamination of surrounding areas should waste not be disposed of appropriately.	Medium (3-2)	All debris, rubbish and other material resulting from the project is to be contained onsite and removed daily, with all materials removed by practical completion. All waste material is to be disposed of to an appropriately licensed facility.	Low (2-2)	WMMP

Aspect	Hazard	Risk	Risk assessment/controls			
			Inherent environmental risk ranking (likelihood and consequence)	Management measures/controls/elements	Residual environmental risk ranking (likelihood and consequence)	Associated documents/information
				Measures outlined in the WMMP implemented.		