

BUSHFIRE ASSESSMENT REPORT

Maison Dieu Solar Farm

Maison Dieu Road, Maison Dieu

Prepared for RPS AAP Consulting Pty Ltd



Bushfire Planning Australia

Stuart Greville

Accredited Bushfire Practitioner

BPAD-26202

☎ 0400 917 792

✉ stuart@bfpa.com.au

BPA Reference: 2285 Maison Dieu

Prepared for RPS AAP Consulting Pty Ltd on
behalf of Terrain Solar Pty Ltd

Attention: Luke Wiggins

✉ Luke.Wiggins@rpsgroup.com.au



Disclaimer and Limitation

This report is prepared solely for RPS AAP Consulting Pty Ltd on behalf of Terrain Solar Pty Ltd (the 'Applicant') for the specific purposes of only for which it is supplied (the 'Purpose'). This report is not for the benefit of any other person; either directly or indirectly and is strictly limited to the purpose and the facts and matters stated in it and will not be used for any other application.

This report is based on the site conditions surveyed at the time the document was prepared. The assessment of the bushfire threat made in this report is made in good faith based on the information available to Bushfire Planning Australia at the time.

The recommendations contained in this report are considered to be minimum standards and they do not guarantee that a building or assets will not be damaged in a bushfire. In the making of these comments and recommendations it should be understood that the focus of this document is to minimise the threat and impact of a bushfire.

Finally, the implementation of the adopted measures and recommendations within this report will contribute to the amelioration of the potential impact of any bushfire upon the development, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

Document Status: 2285 - Solar Farm

Version	Status	Purpose	Author	Review Date
1	Draft	Draft for review	Katrina Greville	20 October 2023
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BPAD Certification

As the author of this Bushfire Assessment Report (BAR), I certify this BAR provides the detailed information required by the NSW Rural Fire Service under Clause 45 of the Rural Fires Regulation 2022 and Appendix 2 of Planning for Bushfire Protection 2019 in accordance with the requirements of section 4.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Stuart Greville

Accredited Bushfire Practitioner
BPAD-26202

Date: 30 April 2024



In signing the above, I declare the report is true and accurate to the best of my knowledge at the time of issue.



Executive Summary

Bushfire Planning Australia (BPA) was engaged by RPS AAP Consulting Pty Ltd (RPS) to conduct a Bushfire Assessment of the Maison Dieu Solar Farm at Maison Dieu, near Singleton in NSW (the Project) for Terrain Solar Pty Ltd (the Applicant).

The Project will involve the construction, operation and decommissioning of a photovoltaic (PV) solar farm, Battery Energy Storage System (BESS) and associated infrastructure.

Large scale battery storage systems technologies are continually evolving and not all systems have the same level of risk. The principles of risk-based design must be adopted to reduce the potential for ignition and the consequences of fire should it occur. Facilities with battery energy storage systems must be designed with an ultimate goal of fire prevention.

The National Construction Code (NCC) does not provide for any *bushfire* specific performance requirements for the Project; being a development that will facilitate the construction of non-habitable buildings. The general fire safety construction provisions of the NCC are taken as acceptable solutions in this instance.

Planning for Bushfire Protection 2019 (PBP 2019) refers to the Project as 'Other development'. Given the unique features of these developments, compliance with PBP is strongly focused in satisfying the aims and objectives of PBP 2019.

A bushfire hazard assessment has been completed and found the Project Area was exposed to a high bushfire hazard located to the east. The predominant vegetation surrounding the Project Area is consistent with a *forest* vegetation formation as described in the NSW Rural Fire Service document Planning for Bushfire Protection 2019 (PBP 2019).

The following recommendations when implemented will reduce the impact of a bushfire to an acceptable level for the proposed industrial (non-habitable) buildings and demonstrate the Project is able to comply with PBP 2019:

1. The area indicated as the Disturbance Footprint on **Figure 12 & 13** shall be managed as an Inner Protection Area (IPA) as outlined within Appendix 4 of PBP 2019 and the RFS document *Standards for asset protection zones*;
2. A firebreak 10 metres wide as shown on **Figure 12 & 13** shall be provided and be managed as an Inner Protection Area (IPA) as outlined within Appendix 4 of PBP 2019 and the RFS document *Standards for asset protection zones*;
3. No part of the Project BESS, including any ancillary structures, buildings, containers or equipment shall be installed within the APZ identified in **Figure 12 & 13**;
4. Property access roads are to be constructed in accordance with Table 5.3b and Chapter 7.4a of PBP 2019 as seen in **Table 9 & 10** of this report;
5. A minimum of three (3) separate water tanks each with a capacity of 45,000 litres must be provided dedicated for firefighting purposes located within the Inner Protection Area (IPA) the northern extent of the Project BESS Area. The water storage tanks shall be located adjacent to an internal access road and within 120 metres of all infrastructure associated with the BESS. The third water storage tank shall be provided at the main entrance to the facility;
6. Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site;
7. All hazardous materials to be stored on land within 100 metres of any designated bushfire prone land shall be stored in a secure enclosure away from the bushfire hazard; and
8. The operators of the facility shall prepare a Bushfire Emergency Management and Operations Plan.



Should the above recommendations be implemented, the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying the Project Area, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

This assessment has been made based on the bushfire hazards observed in and around the Project Area and subject site at the time of inspection (October 2023) and report production (April 2024).





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Terms and Abbreviations

Abbreviation	Meaning
Applicant	Terrain Solar Pty Ltd
APZ	Asset Protection Zone
AS2419 -2005	Australian Standard – Fire Hydrant Installations
AS3959-2018	Australian Standard – Construction of Buildings in Bush Fire Prone Areas
BAR	Bushfire Assessment Report
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BESS	Battery Energy Storage System
BEMOP	Bushfire Emergency Management and Operations Plan
BFPL	Bush Fire Prone Land
BFPLM	Bush Fire Prone Land Map
BFRMP	Bush Fire Risk Management Plan
BLMP	Biodiversity and Land Management Plan
BMP	Bush Fire Management Plan
BMZ	Bushfire Management Zones
BPA	Bush Fire Prone Area (Also Bushfire Prone Land)
BPM	Bush Fire Protection Measures
DoE	Commonwealth Department of the Environment
DPI Water	NSW Department of Primary Industries – Water
EP&A Act	NSW Environmental Planning and Assessment Act 1979
FCC	Fire Control Centre
FDI	Fire Danger Index
FSS	Fire Safety Study
ha	hectare
IPA	Inner Protection Area
LGA	Local Government Area
NCC	National Construction Code
OPA	Outer Protection Area
OEH	NSW Office of Environment and Heritage
PBP or PBP (2019)	Planning for Bushfire Protection 2019
Project	The solar farm as described in Section 3 of the EIS to which this Application applies
Project Area	Red boundary shown on key figures to which the Application applies
RF Act	Rural Fires Act 1997
RF Regulation	Rural Fires Regulation
RFS	NSW Rural Fire Service
SC	Singleton Council
SEARs	Secretary's Environmental Assessment Requirements
Subject Site	The summation of all lots included for the Project

Introduction

Bushfire Planning Australia (BPA) was engaged by RPS AAP Consulting Pty Ltd (RPS) to conduct a Bushfire Assessment of the Maison Dieu Solar Farm at Maison Dieu, near Singleton in NSW (the Project) for Terrain Solar Pty Ltd (the Applicant).

The impacts and proposed mitigation for bushfires from the proposed construction, operation and decommissioning phases of the Project are addressed in this report in accordance with relevant regulatory requirements and guidelines (this assessment).

Section 8.3 of Planning for Bushfire Protection 2019 (PBP 2019) refers to any type of development that are not residential/ rural residential subdivisions, special fire protection purposes (SFPP) or residential infill development as 'Other development'. The proposed industrial development seeks consent for the construction of several non-habitable buildings on the Project Area in addition to the BESS.

The National Construction Code (NCC) does not provide for any bush fire specific performance requirements for other development, such as the proposed industrial development. The general fire safety construction provisions of the NCC are taken as acceptable solutions in this instance.

Nevertheless, in order to demonstrate the proposed development is able to satisfy the aims and objectives of PBP 2019, this Bushfire Assessment Report (BAR) was completed to determine the bushfire hazard that has the potential to threaten the proposed development. Based on this assessment, a series of bushfire protection measures that will provide for an increased level of protection on property and life from the threat of bushfire have been recommended; thereby satisfying the aims and objectives of PBP 2019.

This report supports a State Significant Development (SSD) Development Consent approval under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (SSD-48160216), as an appendix to the Environmental Impact Statement (EIS) for the Project. Each is listed in **Table 1** which also indicated where each is addressed.

1.1. Purpose of this report

This BAR has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) (SSD-48160216) issued for the proposal on 4 October 2022. The SEARs relevant to this BAR are detailed in Table 1.

Table 1: SEARs - Bushfire Risk Assessment

SEARS	Section addressed
☐ Hazards - including: - An assessment of potential hazards and risks including but not limited to fires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields. - Identify potential hazards and risks associated with bushfires / use of bushfire prone land including the risks that a solar farm would cause bush fire and demonstrate compliance with Planning for Bush Fire Protection 2019.	Section 3 of this report contains a Bushfire Hazard Assessment. Section 4 demonstrates the proposed Solar Farm and BESS is able to satisfy the Aims and Objectives of PBP 2019. This report does not assess the electromagnetic fields potentially generated from the Solar Farm and/or BESS of any impacts associated with the grid connection.

The BAR has been prepared in accordance with the Submission requirements detailed in Appendix A2.1 of PBP 2019.



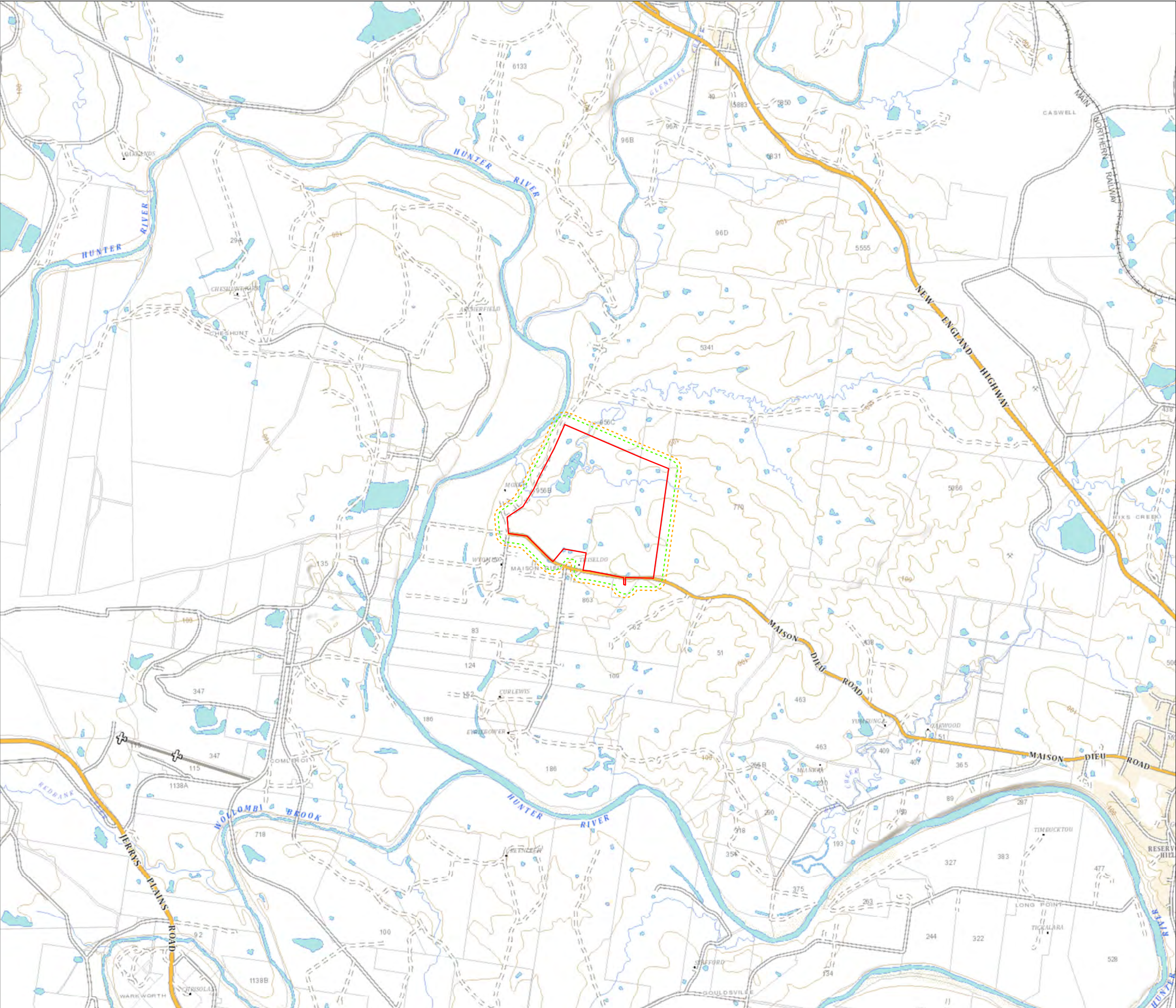
2. Subject Site Description

2.1. Overview

The Project spans across multiple lots known as the subject site and is required to be assessed and considered in its entirety as part of this bushfire hazard assessment.

Table 2: Subject Site Details

Address	Maison Dieu Road, Maison Dieu	
Title	Lot 104 DP817010	Lot 1 DP1133341
	Lot 3 DP252505	Lot 1 DP 616940
	Lot 51 DP1133756	
LGA	Singleton Council	
Project Area	203 hectares	
Land Use Zone	RU1 Primary Production	
Context	The subject site is located north of Maison Dieu Road, east of the Hunter River, west of the New England Highway and spans across multiple lots. The subject site currently contains multiple dams and vegetation present on all lots, which continue beyond the subject site to the north and east, although the vegetation on Lot 104 DP817010 is mostly managed. This lot also contains dwellings and sheds, which will not be affected by the Project. To the south-east of the subject site, the Ausgrid Singleton Substation also exists. Managed land, large rural dwellings and associated industrial infrastructure exist to the south-west and west of the subject site.	
Topography	Undulating terrain with elevation at the subject site ranging from 47-166 metres AHD. There is an increasing upslope on the north-eastern lot and primary along the Hunter River. The remainder of the subject site ranges from 0-5° slope.	
Fire Danger Index	The subject site lies within a local government area with a Fire Danger Index (FDI) rating of 100.	



Project: Maison Dieu Solar Farm
Job No: 2285

Figure 1

Site Location

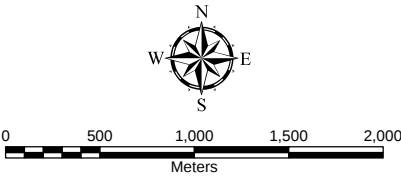


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- Project area
- 100m buffer
- 140m buffer

SOURCE:
Cadastral Boundary: NSW Department of Finance,
Services and Innovation 2023
Basemap: NSW Department of Customer Service
2022



A3 Scale: 1:40,000

File:2285-MaisonDieu-Fig1-SiteLocation-240326 Date: 26/03/2024

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2.2. Bushfire Prone Land

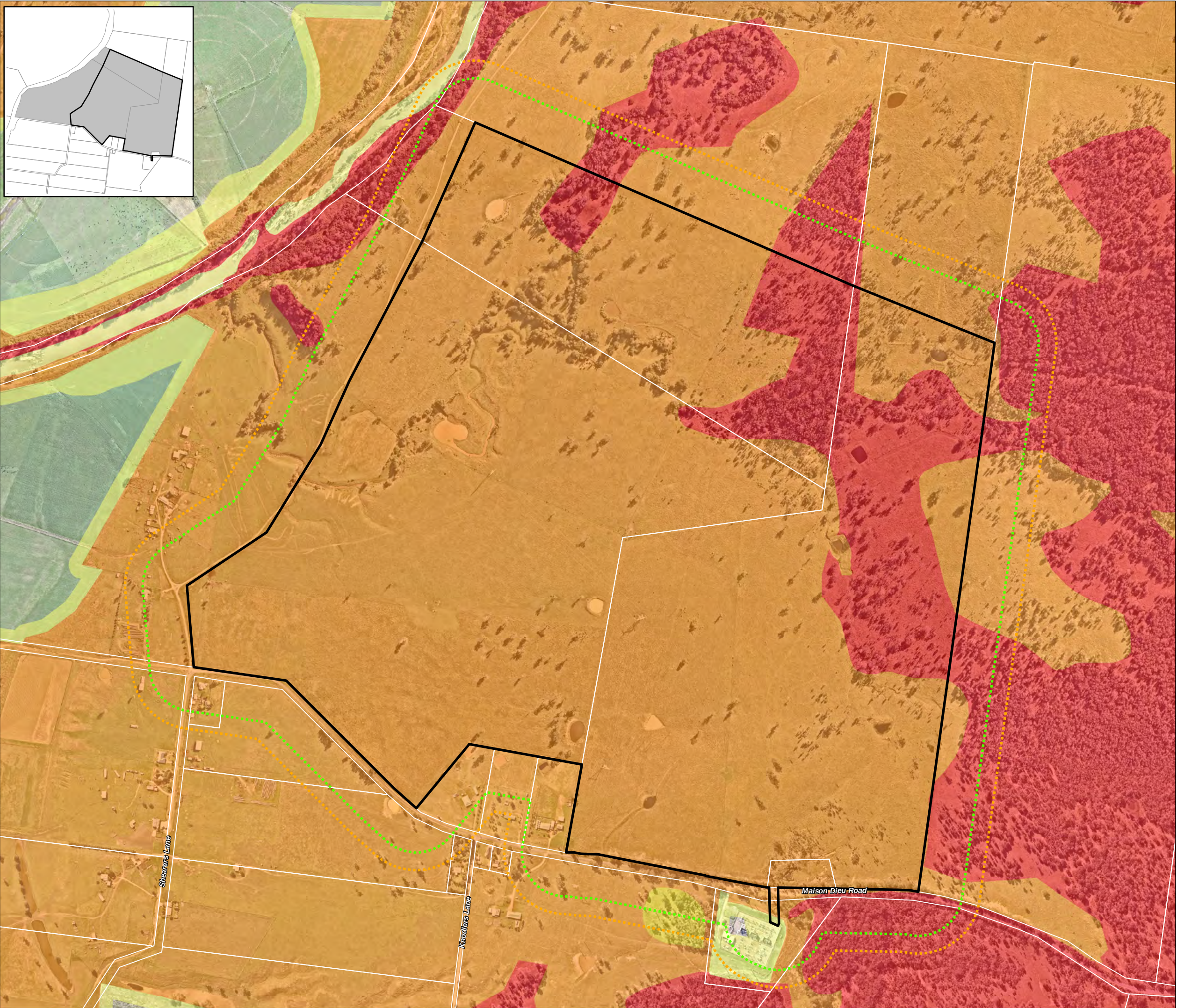
Bushfire activity is prevalent in landscapes that carry fuel and the two predominant bushfire types are grassland and forest fires. Factors such as topographic characteristics and quantity of fuel loads influence the intensity and spread of fire. The scale of a bushfire hazard is tailored to the characteristics of the hazard, the size and characteristics of the affected population, types of land use exposed to bushfire, predicted development growth pressures and other factors affecting bushfire risk.

Figure 2 demonstrates majority of the subject site is identified as bushfire prone land being Vegetation Category 3. Additionally, there are isolated portions of Vegetation Category 1 bushfire prone land located largely to the north and east within the Project Area.

Vegetation Category 3 bushfire prone land exists within 140 metres of the site to the south, east and sections to the north. There is also isolated Vegetation Category 1 bushfire prone land north and north-west within 140 metres of the Project Area.

Vegetation Category 1 bushfire prone land is also identified to the east and south-east of the subject site and is identified as the primary bushfire hazard.





Project: Maison Dieu Solar Farm
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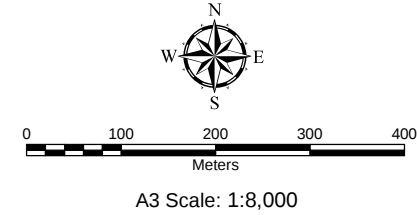
Figure 2

NSW Bush Fire Prone Land



- Subject site
- Project area
- 100m buffer
- 140m buffer
- Bushfire Prone Land**
 - Vegetation Category 1
 - Vegetation Category 2
 - Vegetation Category 3
 - Buffer

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2023
NSW Bush Fire Prone Land: NSW Rural Fire Service 2022
Aerial Photo: NearMap 06/05/2022



File:2285-MaisonDieu-Fig2-BFPL-240326 Date: 26/03/2024

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2.3. Fire History

The Singleton region experiences a warm temperature climate. Seasonal variation in conditions produces hot summers and cool to mild winters with occasional severe frosts, and the bush fire season generally runs from September to March. Prevailing weather conditions associated with the bush fire season in the Singleton Bush Fire Management Committee (BFMC) area is north-west to westerly winds accompanied by high day-time temperatures and low relative humidity. At Singleton the average maximum temperature for January is 30.6°C and for July is 17.2°C. The average minimum temperature for January 17.9°C and for July is 5.1°C.

There have been a number of bushfires recorded within 10km of the site dating back to 1993 although these have been relatively small in size and impact. The closest bushfire occurred in 2017 near Camberwell, approximately 3.5kms north of the proposed development site. The largest bushfire recorded occurred in 1993, 8km to the south beyond the open cut coal mines at Bulga and Warkworth. There are no recorded bushfires within the site or the immediate vicinity.

Figure 3 demonstrates the NSW State Fire History within a 10km radius from the development site. The RFS Fire History data does not identify any hazard reduction burns that have been completed with the land holding.





Project: Maison Dieu Solar Farm
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Figure 3

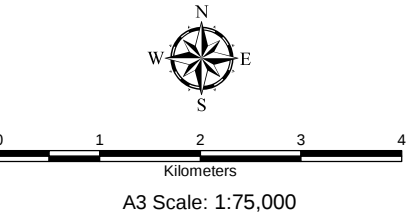
NSW State Fire History



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	Subject site		2013
	Project area		2014
	10km Buffer		2016
Year of Fire			2017
	1993		2018
	2006		2019
	2009		2020
	2012		

SOURCE:
Aerial Photo: Maxar 2023
NSW State Fire History: NSW Rural Fire Service,
NSW National Parks and Wildlife Service, Forestry
Corporation, Water NSW (2023)



File:2285-MaisonDieu-Fig7-FireHistory10Km-240326 Date: 26/03/2024

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2.4. Bush Fire Risk Management Plan

The New South Wales *Rural Fires Act 1997* (RF Act) requires each bushfire management committee to prepare a Bush Fire Risk Management Plan (BFRMP) for a nominated area; commonly defined by local government area boundaries. A BFRMP is a strategic document that identifies community assets at risk across a fire district and sets out coordinated treatment measures to reduce the risk of bushfire to the assets.

BFRMPs are often not site specific, and individual sites or development do not have a statutory obligation to prepare a BFRMP, however it is often recommended as part of preparedness, a BFRMP is completed.

2.4.1. Singleton Bush Fire Risk Management Plan

The Singleton Bush Fire Management Committee developed the Singleton Bush Fire Risk Management Plan (SBFRMP) which was approved on 7 March 2011. The SBFRMP investigated the high risk human settlements in the Singleton Local Government Area and ranked them according to the assessed bushfire risk and the likely consequence of a bushfire attack.

The Singleton BFRMC includes a series of treatment actions for each asset and nominates the responsible agencies required to undertake the treatment actions. **Table 3** details the available treatment actions for Asset 68 - Ausgrid Substation Maison Dieu.

The Project Area is located north of Ausgrid Substation Maison Dieu (Asset 68) as shown in **Figure 4**. This asset is recognised by the Singleton Bush Fire Management Plan Committee as a priority 4 (Medium) risk with an *unlikely* likelihood of being affected by fire. However the consequences of the asset being affected by are *major*.

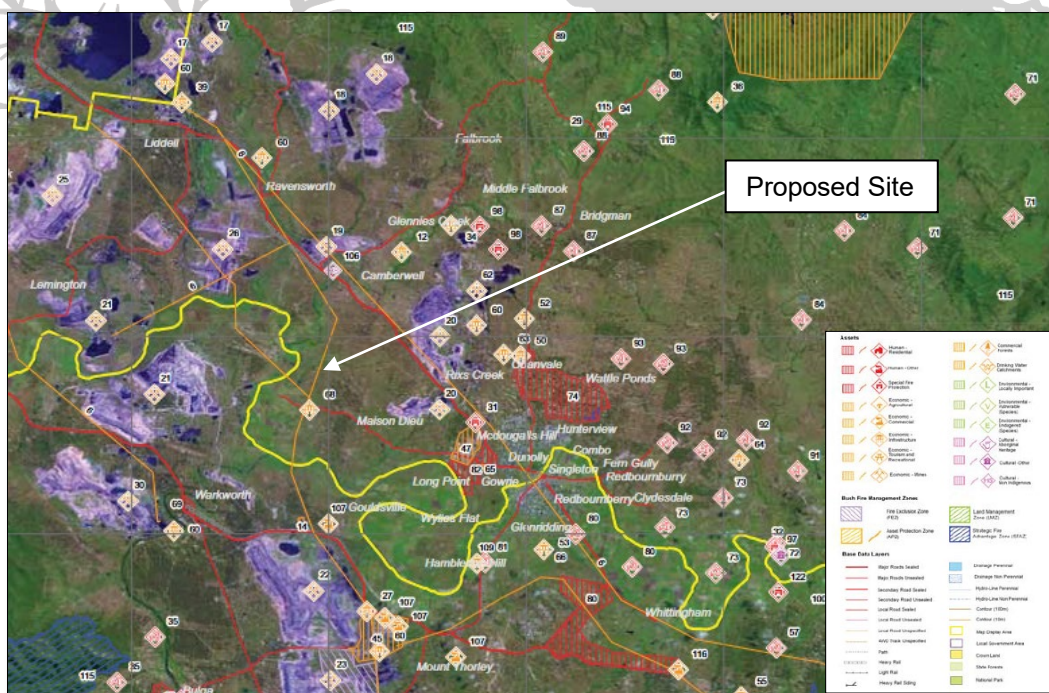


Figure 4: Singleton Bushfire Risk Management Plan

Table 3: Asset specific treatments for Asset 68 - Maison Dieu Substation

Strategy	Targeted treatments used in the BFRMP
Hazard Reduction	Maintain the Asset Protection Zone (APZ).



2.5. Project Description

The Project will involve the construction, operation and decommissioning of a photovoltaic (PV) solar farm, Battery Energy Storage System (BESS) and associated infrastructure.

The Project is within the Project Area as shown on **Figure 5** and generally includes:

1. Construction:

- ☐ Up to 18 months with maximum number of workers up to 150 Full Time Equivalent (FTE) personnel;
- ☐ Hours of work generally between 7 am to 6 pm, Monday to Friday and 8 am to 1 pm, Saturday;
- ☐ Pre-construction activities and site establishment;
- ☐ Civil works and access upgrades;
- ☐ Major components transported via Port of Newcastle or Port Botany;
- ☐ PV array construction utilising external equipment;
- ☐ Installation and use of temporary infrastructure (including office, parking, amenities, laydown, waste storage, stockpile, power supply, fencing, communications, services and utilities);
- ☐ Ancillary activities (including import of gravel, sand and aggregate; and water);
- ☐ Rehabilitation;

2. Operation:

- ☐ Approximately 110,000 PV solar panels with a total capacity of 60 MWac;
- ☐ BESS with a capacity of 40 MW / 80 MWh;
- ☐ Electrical infrastructure including:
 - Solar PV power conversion units with inverters;
 - Substation compound and switching station;
 - Electrical reticulation grid and infrastructure connecting to the existing Ausgrid Singleton Substation;
- ☐ Site access and external transport;
- ☐ Other associated infrastructure (including retained temporary construction infrastructure and its maintenance);
- ☐ Internal and external ancillary activities;
- ☐ 24 hours a day, 7 days a week with up to five FTE personnel;

3. Decommissioning:

- ☐ Individual components are expected to operate for up to 30 years, after which one of the following actions will be taken:
 - Replace the existing project components within the project description and impacts assessed in this EIS and continue operations in consultation with relevant associated holders; or
 - Seek relevant approvals should technological advances not confirm the viability of Option 1; or
 - Decommission the Project and rehabilitate the site.

A plan of the Project Area is shown in **Figure 5**.

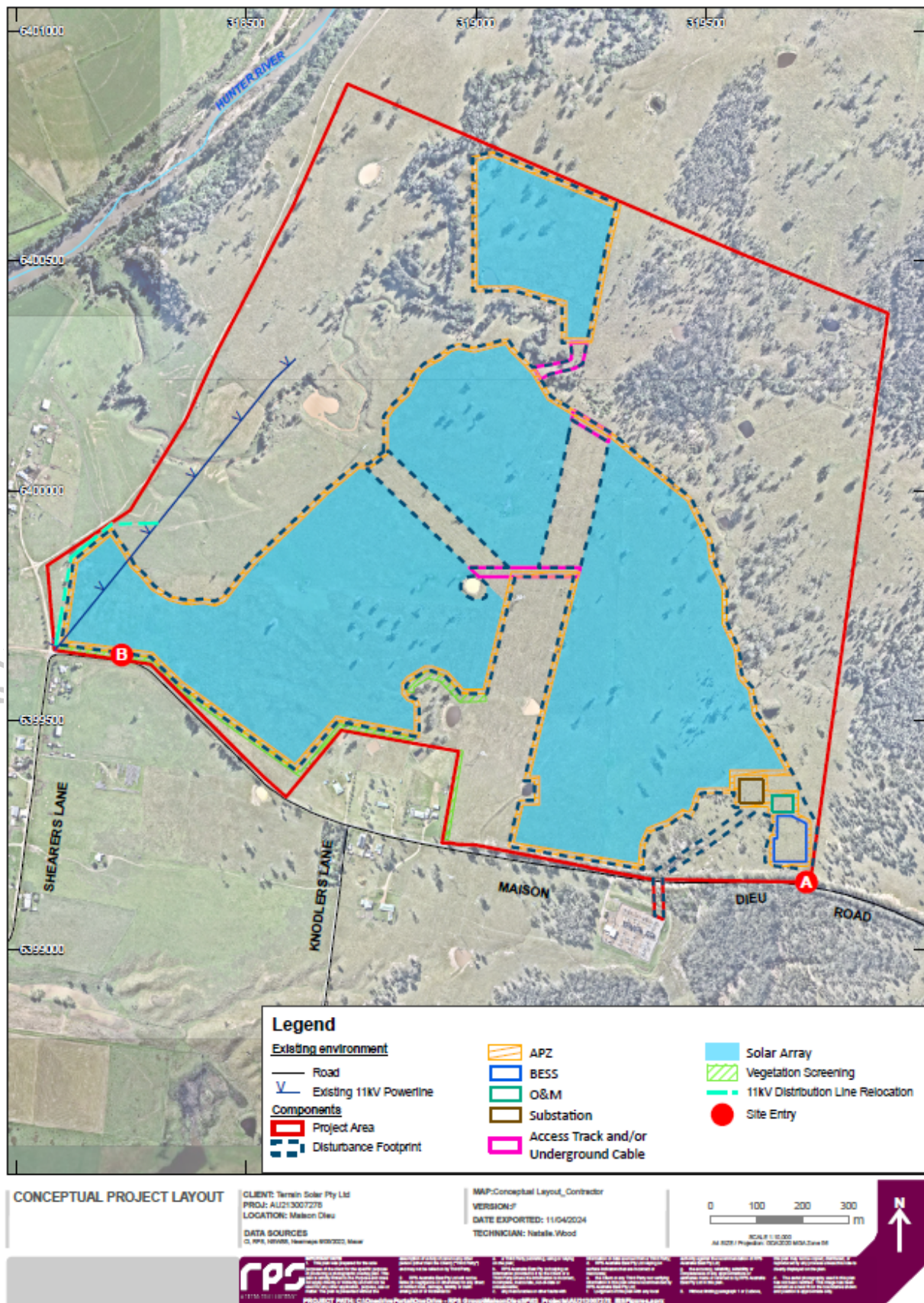


Figure 5: Project Area

2.6. Industrial Development

Section 8.3 of PBP 2019 provides specific advice for developments that are not residential subdivision, special fire protection purposes (SFPPs) or residential infill. The Project is limited to Class 5-8 and 10 buildings of the National Construction Code: Building Code of Australia (NCC). These classes of buildings include factories, warehouses, offices and other industrial facilities. Residential development and habitable buildings are not permissible within the Project Area.

The general aims and objectives of PBP 2019 apply in relation to matters such as access, water and services, emergency planning and landscaping/ vegetation management. However, it is prudent that a suitable package of bushfire protection measures be proposed commensurate with the assessed level of risk of the future development. Accordingly, this BAR will recommend areas cleared of vegetation are maintained at the hazard interface to ensure defensible space is provided for firefighting purposes.

Notwithstanding the available bushfire protection measures outlined in PBP 2019, the NCC does not provide for any bushfire specific performance requirements for industrial (non-habitable buildings) and as such Australian Standard *AS3959-2018 Construction of buildings in bushfire prone areas* (AS3959-2018) does not apply as a set of deemed-to-satisfy provisions. However, the following objectives apply in relation to access, water and services, and emergency and evacuation planning:

- ❑ To provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation;
- ❑ To provide suitable emergency and evacuation (and relocation) arrangements for occupants of the development;
- ❑ To provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building; and
- ❑ Consideration of storage and hazardous materials away from the hazard wherever possible.

2.7. Renewable Energy Facilities Design Guidelines

The Victorian Country Fire Authority (CFA) published a set of guidelines for renewable energy facilities in August 2023. Whilst the guidelines apply to a separate jurisdiction, as there is limited documentation and guidance material in NSW or other jurisdictions, the CFA guideline has quickly become a source of best practice requirements for the renewable energy industry.

PBP 2019 does not have a set of specific Acceptable Solutions for large scale solar or wind farms, or large-scale battery installations. The RFS provides a set of considerations and provisions for solar and wind farms, limited to a nominal 10 metres managed APZ separating the infrastructure from combustible vegetation. As such, the model requirements outlined in the CFA guideline have been adopted to demonstrate the Project is able to satisfy the aims and objectives of PBP 2019.

3. Bushfire Hazard Assessment

A bushfire hazard assessment has been completed in accordance with the submission requirements detailed in Appendix 2 of PBP 2019; including an assessment of the predominant vegetation surrounding the Project Area and the effective slope underneath the classified vegetation.

3.1. Vegetation Assessment

Vegetation classification over the Project Area and surrounding areas within 140 metres from the Project Area has been carried out as follows:

- ❑ Aerial Photograph Interpretation to map the vegetation classification and extent;
- ❑ Reference to NSW State Vegetation Type NSW Department of Planning, Industry and Environment 2021 **Figure 9**; and
- ❑ Site inspection on 11 October 2023.

In accordance with PBP 2019, an assessment of the vegetation over a distance of 140 metres in all directions from the Project Area was undertaken. An additional assessment of vegetation within 5km of the Project Area was completed. The results of the site inspection and photo points are represented in **Figures 6, 7 & 8** and **Plates 1 to 8**.

Vegetation that may be considered a bushfire hazard was identified in all directions from the Project Area. The vegetation classification is based on the revised Table 2.3 in AS3959-2018 and Appendix 1 of PBP 2019. The inconsistencies between the mapping sources listed above was quantified during the site inspection and compared to the Keith Vegetation Formations (2004). It was confirmed a *forest* and *forested wetland* vegetation is located within and surrounding the Project Area, namely *Hunter Macleay Dry Sclerophyll Forest* and *Coastal Floodplain Wetlands*.

The results of the vegetation assessment are shown in **Figure 12** and **Figure 13** and **Table 4**.



Table 4: Vegetation formations

Direction of Bushfire Attack / Transect	Vegetation or Other Infrastructure	Classification of Vegetation Formations PBP 2019
T1 North	Access road and managed vegetation between the Project Area (BESS) and APZ	<i>Excluded</i> (disturbed land)
T2 East	Vegetation from the disturbance footprint within and beyond the subject sites eastern boundary	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)
T3 East	Vegetation adjacent to the Project Area (BESS) east of the subject site	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)
T4 South	Managed corridor of vegetation between the Project Area (BESS) and the disturbance footprint	<i>Excluded</i> (disturbed land)
T5 South	Narrow corridor (~21 metres) of forest vegetation between the disturbance footprint and vegetation screening along the southern boundary of the subject site	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)
T6 South	Forest vegetation transitioning to forested wetlands south of the Project Area, separated by Maison Dieu Road	<i>Forested Wetlands</i> (Coastal Floodplain Wetlands)
T7 West	Vegetation from the disturbance footprint, west of the Project Area (BESS) towards the grid connection easement	<i>Excluded</i> (low-threat vegetation)
T8 North-west	Managed land north-west of the Project Area (BESS) to the south-eastern corner of the Project Area (substation)	<i>Excluded</i> (disturbed land)
T9 North-west	Corridor (~21 metres) from the Project Area (substation) to the commencement of the Project Area (solar array), including the APZ	<i>Excluded</i> (disturbed land and APZ)
T10 North	Narrow corridor (~10 metres) north of the Project Area (substation) to the beginning of the APZ	<i>Excluded</i> (disturbed land)
T11 North	Corridor (~20 metres) north of the Project Area (substation) to the commencement of the Project Area (solar array), including the APZ	<i>Excluded</i> (disturbed land and APZ)



Figure 6: Site Inspection Mapped Photo Points - North-western section of Project Area



Figure 7: Site Inspection Mapped Photo Points - Central section of Project Area



Figure 8: Site Inspection Mapped Photo Points - South-eastern section of Project Area



Plate 1: Forest vegetation along Maison Dieu Road (Photo Point 3)



Plate 2: Typical vegetation along the southern boundary looking north (Photo Point 5)



Plate 3: Typical grazed lands (*grassland*) in the vicinity of the subject site (Photo Point 12)



Plate 4: Typical grazed lands (*grassland*) in the vicinity of the subject site (Photo Point 13)



Plate 5: Typical grazed lands (*grassland*) in the central section of the subject site (Photo Point 21)



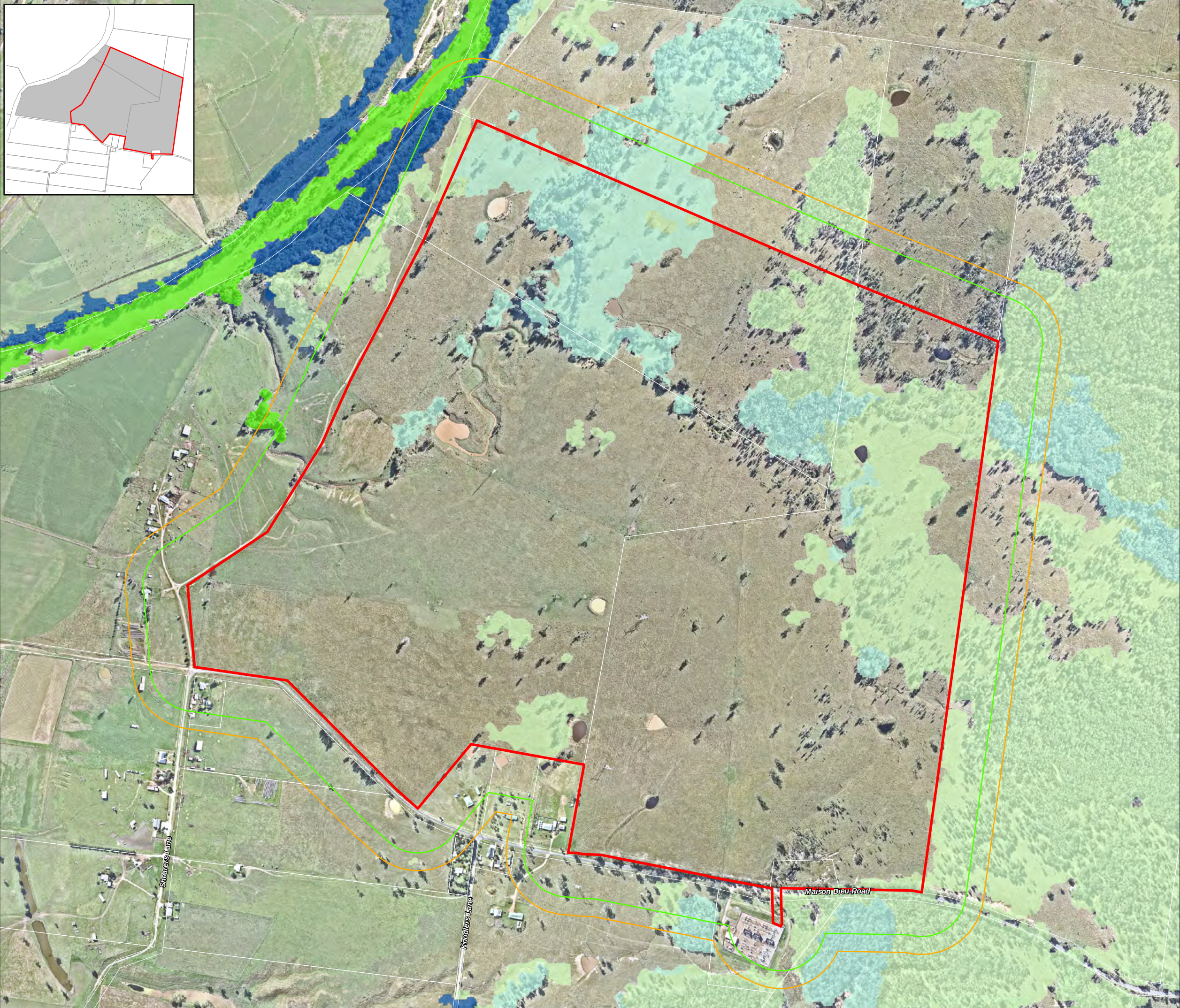
Plate 6: Looking towards south-eastern corner of subject site - grazed lands (*grassland*) transitioning to *forest* vegetation (Photo Point 23)



Plate 7: South-eastern corner of the subject site looking east towards forest vegetation (Photo Point 26)



Plate 8: Existing transmission line easement running through the middle of the subject site (Photo Point 29)



Project: Maison Dieu Solar Farm
Job No: 2285

Figure 9

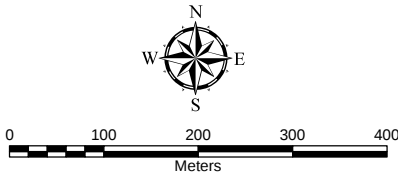
NSW State Vegetation Type (Class)



- Subject site
- Project area
- 100m Buffer
- 140m Buffer

- Vegetation Class**
- Coastal Floodplain Wetlands
 - Western Slopes Grassy Woodlands
 - Hunter-Macleay Dry Sclerophyll Forests
 - Inland Riverine Forests
 - Dry Rainforests
 - Not native vegetation

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2023
NSW Vegetation Type: NSW Department of Planning, Industry and Environment 2022
Aerial photo: NearMap 06/05/2022



A3 Scale: 1:8,000

File:2285-MaisonDieu-Fig3-Vegetation-NSW-SVT-240326 Date: 26/03/2024

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3.2. Slope Assessment

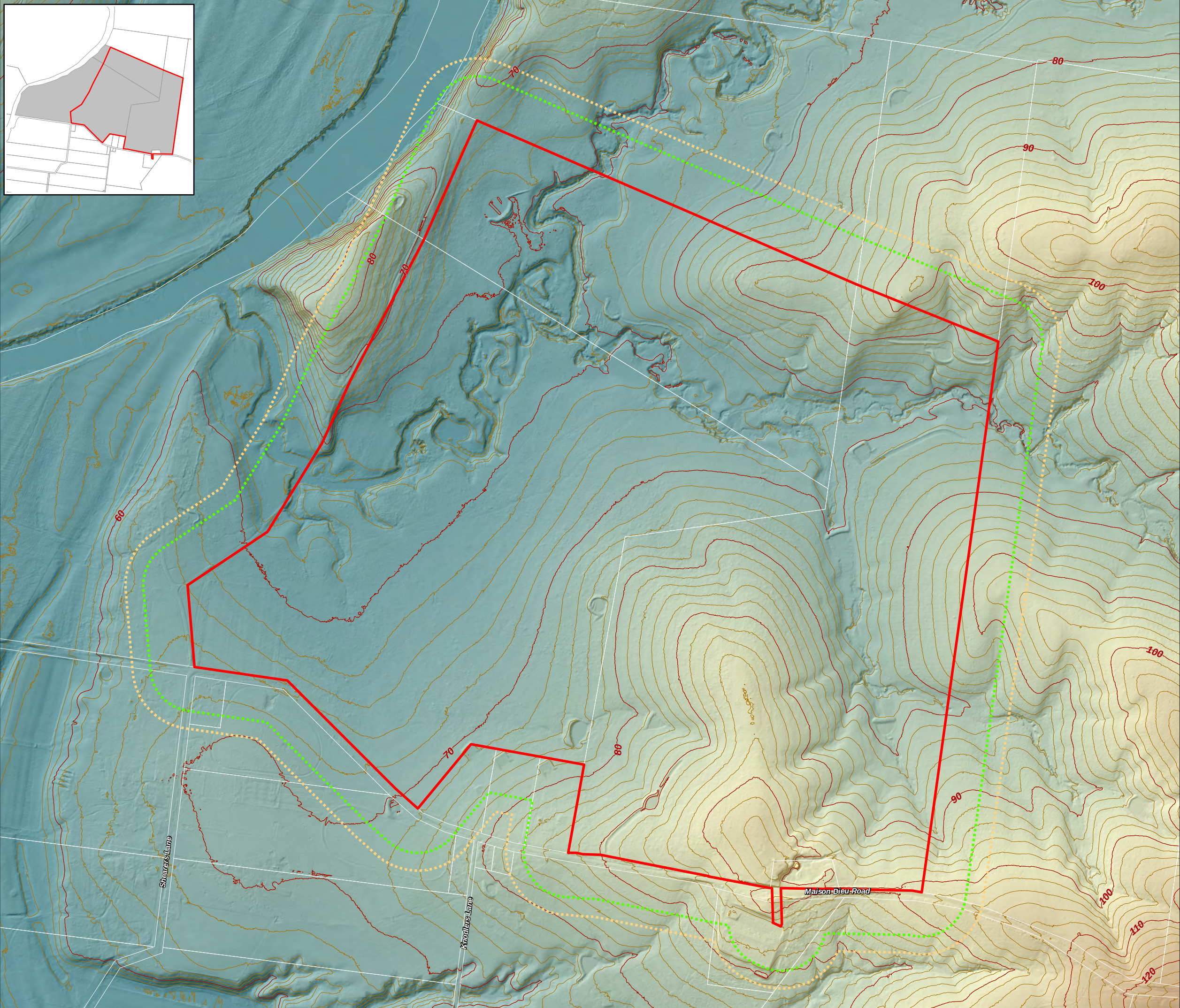
The slope assessment was undertaken as follows:

- ❑ Review of LiDAR point cloud data – including DEM (NSW LPI)
- ❑ Slope Analysis (5 degree increments); and
- ❑ Detail survey of existing contours.

An assessment of the slope over a distance of 140 metres in the hazard direction from the subject site boundary was undertaken. The effective slope was then calculated under the classified vegetation where there was a fire run greater than 50 metres. The topography of the subject site has been evaluated to identify both the average slope and by identifying the maximum slope present. These values help determine the level of gradient which will most significantly influence the fire behaviour of the Project.

The effective slope in all directions is shown in **Figure 10**, **Figure 11** and **Table 5**.





Project: Maison Dieu Solar Farm
Job No: 2285

Figure 10

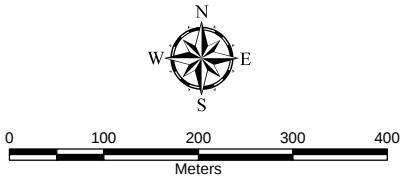
Digital Elevation Model



BUSHFIRE
PLANNING
AUSTRALIA

- Subject site
- Project area
- 100m Buffer
- 140m Buffer
- Contour (10m)
- Contour (2m)
- Elevation (AHD)
 - High : 166m
 - Low : 47m

SOURCE:
Cadastral Boundary: NSW Department of Finance,
Services and Innovation 2023
Surface analysis: Derived from CAMBERWELL
(2017) and CESSNOCK (2011) 1m resolution
LiDAR: © Department Finance, Services and
Innovation

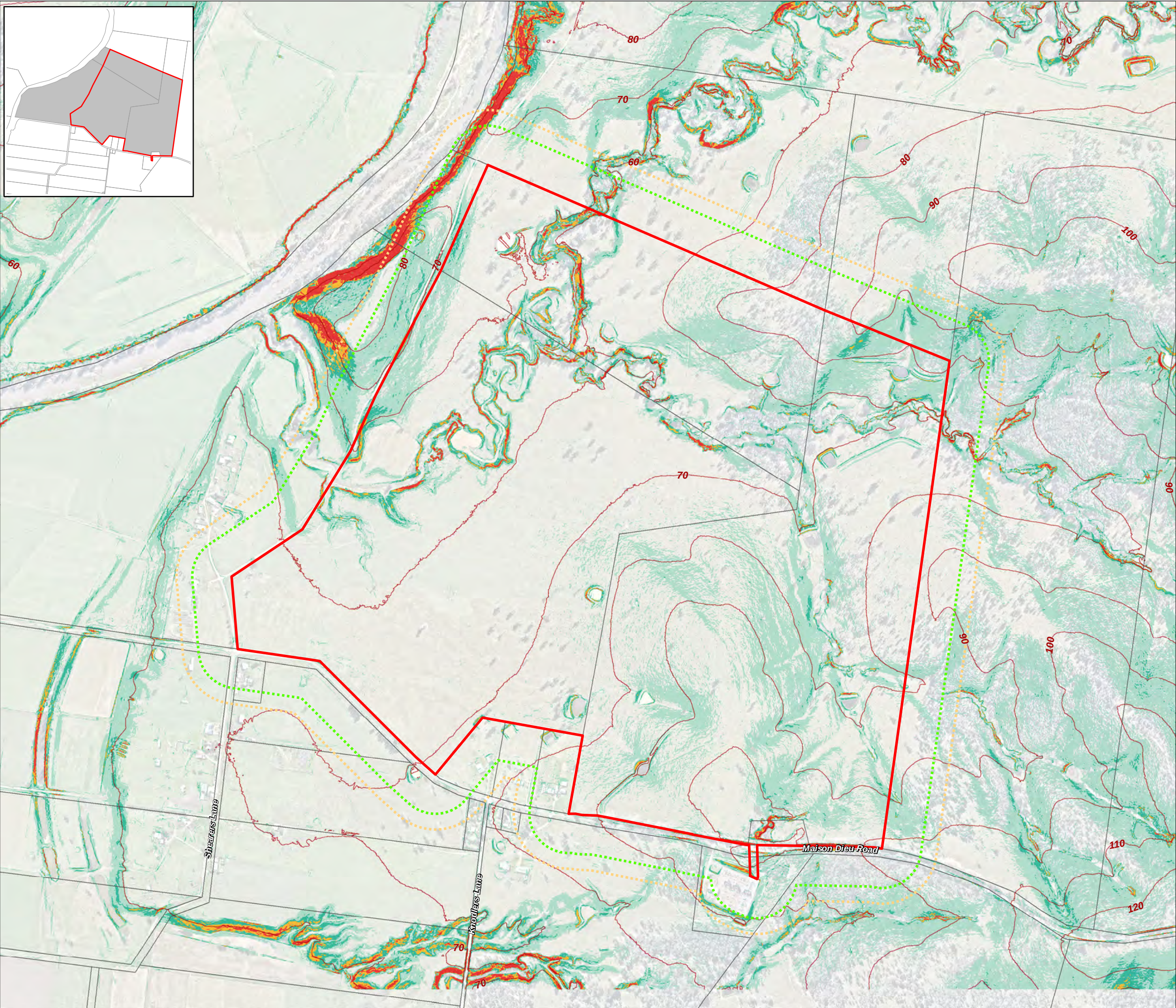


A3 Scale: 1:8,000

File:2285-MaisonDieu-Fig4-DEM-240326 Date: 26/03/2024

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Project: Maison Dieu Solar Farm
Job No: 2285

Figure 11

Slope Analysis: LiDAR

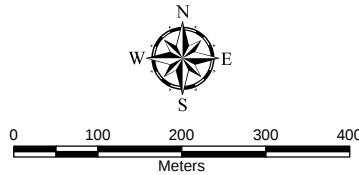


BUSHFIRE
PLANNING
AUSTRALIA

- Subject site
- Project area
- 100m Buffer
- 140m Buffer
- Contour (2m)

- Slope
- 0° - 5°
 - 5° - 10°
 - 10° - 15°
 - 15° - 20°
 - >20°

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2023
Surface analysis: Derived from CAMBERWELL (2017) and CESSNOCK (2011) 1m resolution LiDAR: © Department Finance, Services and Innovation
Aerial photo: NearMap 06/05/2022



A3 Scale: 1:9,000

File:2285-MaisonDieu-Fig5-SlopeLiDAR-240326 Date: 26/03/2024

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3.3. Results

All vegetation identified within the current Bush Fire Prone Land map (**Figure 2**) was confirmed during the site inspection. The predominant vegetation classification presenting as a bushfire hazard was identified as a *forest* and *forested wetlands*, specifically, *Hunter Macleay Dry Sclerophyll Forest* and *Coastal Floodplain Wetland* vegetation formations respectively, in accordance with the descriptions contained in Keith's Ocean Shores to Desert Dunes (2004).

Land within 10 metres to 20 metres surrounding the Project Area are highly disturbed (grazed) therefore assessed as low-threat vegetation and not required to be considered for the purposes of PBP.

Currently, vegetation located towards the north and north-western portion of the Project Area consists of forested wetlands (*Coastal Floodplain Wetlands*) and forest (*Hunter Macleay Dry Sclerophyll Forest*) formations. *Hunter Macleay Dry Sclerophyll Forest* continues to the eastern portion of the Project Area, within and beyond 140 metres of the subject sites eastern boundary and is identified as the primary bushfire hazard.

South of the Project Area, there is a narrow corridor (approximately 21 metres) of forest vegetation between the disturbance footprint and the existing vegetation screening that lines the Project Area's southern boundary.

All other land within the south-eastern corner and the western portion of the subject site is considered low-threat vegetation. Additionally, the existing electrical transmission easement that exists through the mid-section of the Project Area and extends west towards the western subject site boundary is considered low-threat vegetation. In both instances, low-threat vegetation is not required to be considered for the purposes of PBP.

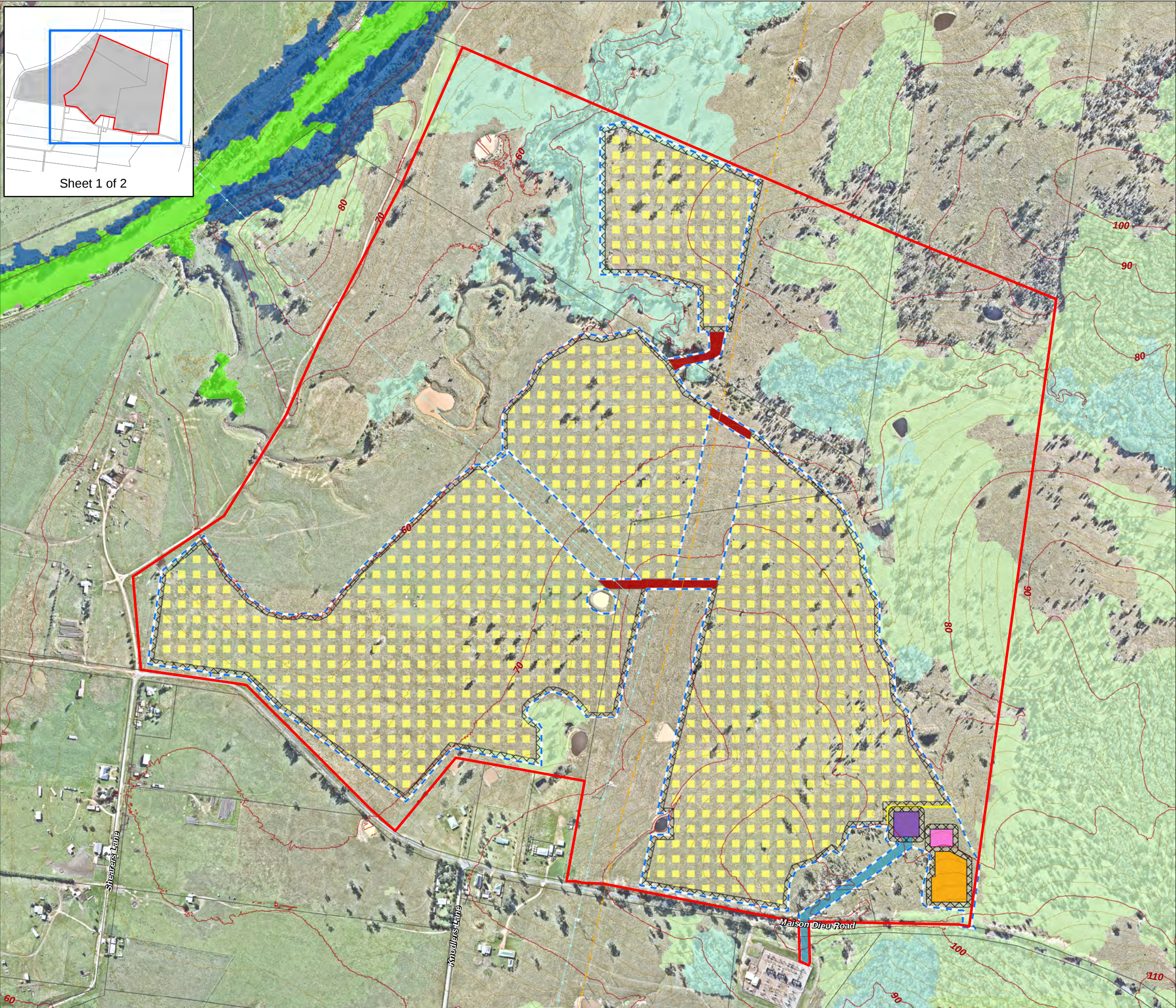
Within and beyond 140 metres south of the subject site, an ecotone of *Hunter Macleay Dry Sclerophyll Forest* and *Coastal Floodplain Wetlands* exist, although separated by Maison Dieu Road.

The results of the Bushfire Hazard Assessment are presented in **Table 5** and **Figure 12** and **Figure 13**.



Table 5: Slope and Vegetation Assessment results

Transect / Direction	Classification of Vegetation Formations PBP 2019	Slope
T1 North	<i>Excluded</i> (disturbed land)	4.2° Downslope
T2 East	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)	-1.3° Upslope
T3 East	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)	-0.4° Upslope
T4 South	<i>Excluded</i> (disturbed land)	-3.5° Upslope
T5 South	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)	-2.5° Upslope
T6 South	<i>Forested Wetlands</i> (Coastal Floodplain Wetlands)	3.7° Downslope
T7 West	<i>Excluded</i> (low-threat vegetation)	-1.3° Upslope
T8 North-west	<i>Excluded</i> (disturbed land)	4.5° Downslope
T9 North-west	<i>Excluded</i> (disturbed land and APZ)	-0.3° Upslope
T10 North	<i>Excluded</i> (disturbed land)	4.0° Downslope
T11 North	<i>Excluded</i> (disturbed land and APZ)	2.9° Downslope
	<i>Grassland</i>	< 5.0° Downslope



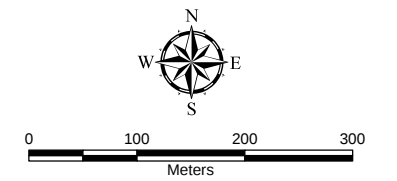
Project: Maison Dieu Solar Farm
Job No: 2285

Figure 12 Slope & Vegetation Assessment



- | | | | |
|-----------------------------|--|--------------------------|------------------------------------|
| Project area | Disturbance footprint | 132kV | 330kV |
| Contour (10m) | Contour (2m) | APZ | Access Track and Underground Cable |
| Coastal Floodplain Wetlands | Hunter-Macleay Dry Sclerophyll Forests | Inland Riverine Forests | Dry Rainforests |
| Not native vegetation | Disturbance Footprint | Grid Connection Corridor | O&M |
| | BESS | Solar Array | Substation |

SOURCE:
Cadastral Boundary: NSW Department of Finance, Services and Innovation 2023
Surface analysis: Derived from CAMBERWELL (2017) and CESSNOCK (2011) 1m resolution LiDAR: © Department Finance, Services and Innovation
Aerial photo: NearMap 06/05/2022

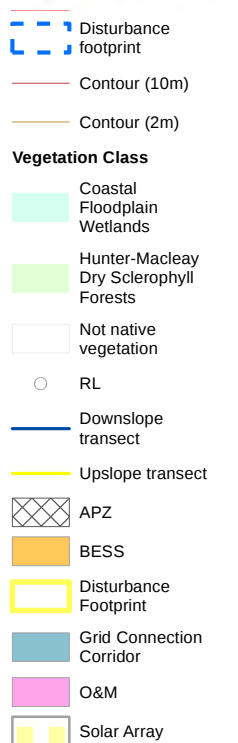


A3 Scale: 1:7,000

File:2285-MaisonDieu-Fig6-SlopeVeg-240514 Date: 14/05/2024

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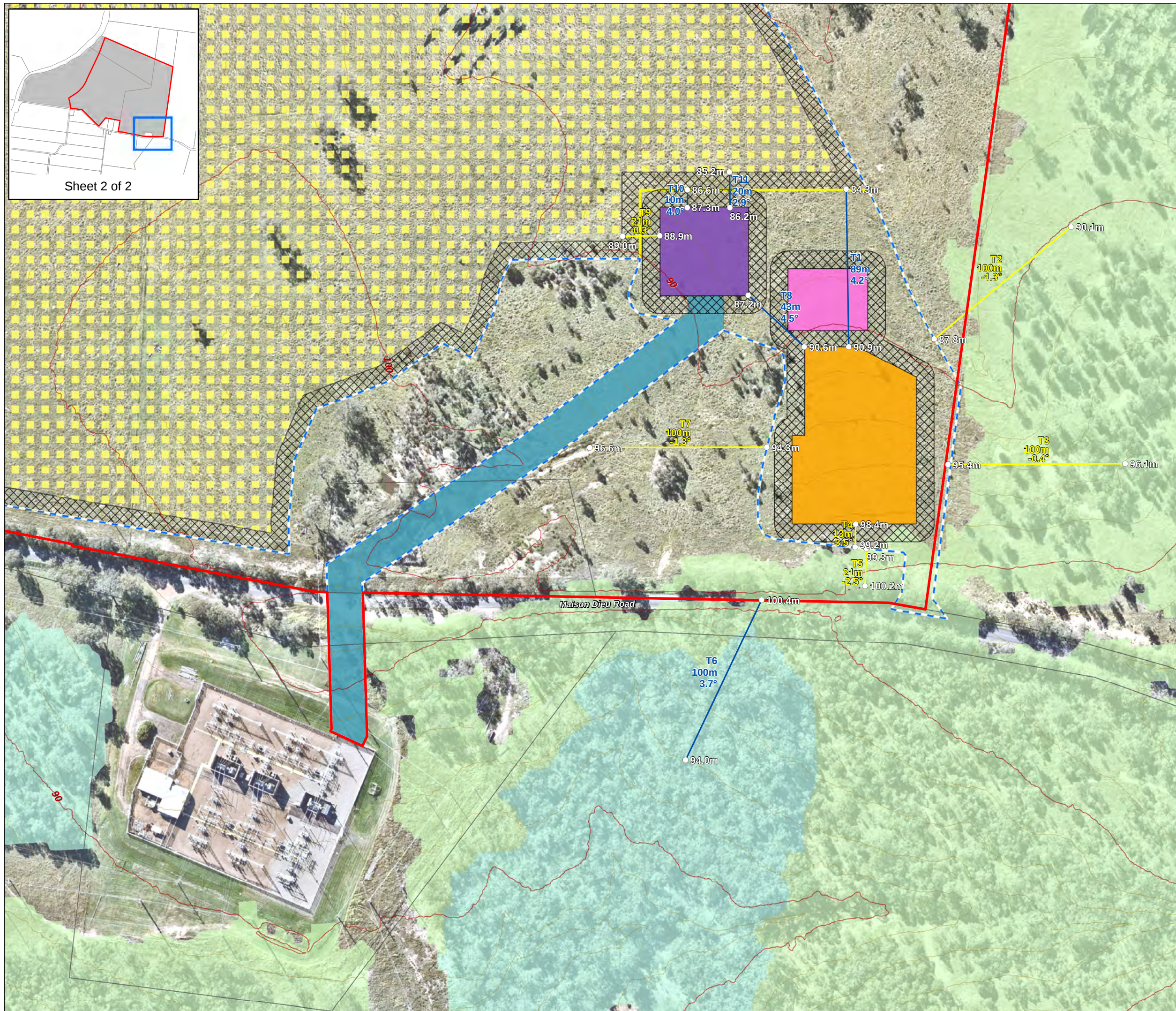
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3.4. Significant Environmental Features

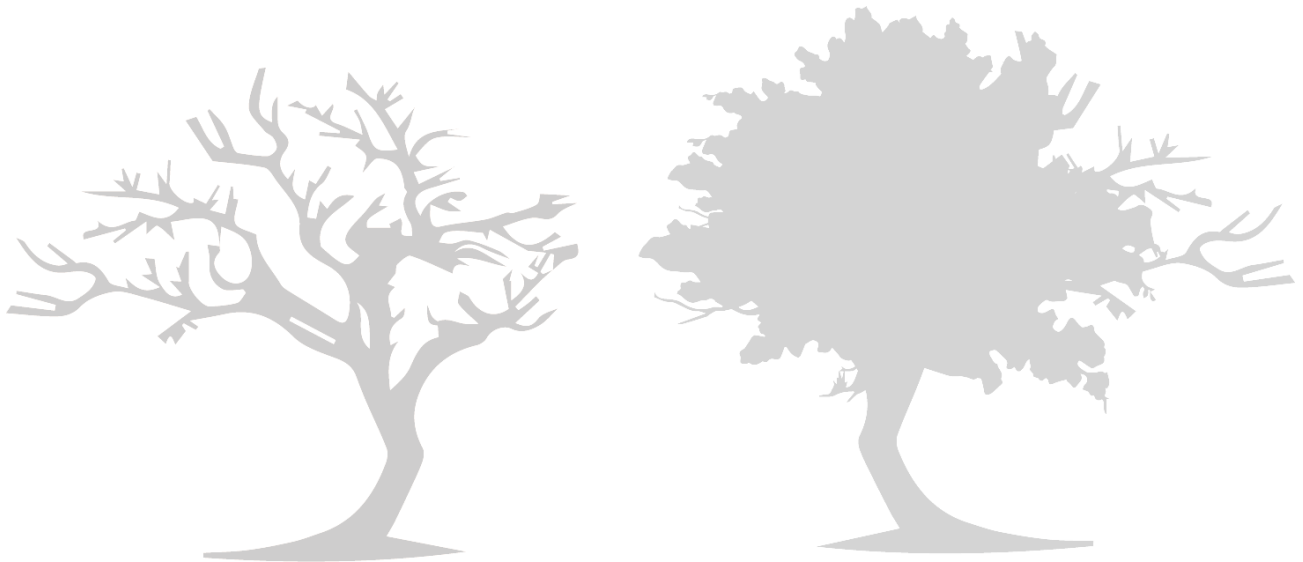
There are no known environmental features of significance within the development footprint or the balance of the Project Area. The bushfire mitigation measures are recommended to minimise any potential disturbance to any significant environmental features.

3.5. Threatened Species, populations or ecological communities

An independent Biodiversity Assessment Report has been completed as part of the EIS.

3.6. Aboriginal Objects

A separate Aboriginal heritage cultural impact statement has been prepared as part of the EIS.





4. Bush Fire Protection Measures

PBP 2019 refers to the Project as 'Other development'. In order to comply with PBP, the development should:

- ☐ Note the range of available Bush Fire Protection Measures (BPMs);
- ☐ Satisfy the aims and objectives of PBP 2019;
- ☐ Consider any matters listed for the specific purpose; and
- ☐ Propose an appropriate combination of BPMs.

As part of the BAR, the recommended BPMs demonstrate the aims and objectives of PBP 2019 are able to be satisfied; including the matters considered by the RFS necessary to protect persons, property and the environment from the danger that may arise from a bushfire.

Section 8.3.9 of PBP 2019 requires the BPMs to be commensurate with the bushfire hazards and associated risks. The recommended BPMs have been assessed for compliance against Section 5.3 of PBP 2019; being BPMs for residential and rural residential subdivisions. Whilst the Project is not required to provide BPMs relevant to residential land development, in this instance given the absence of any development specific criteria (e.g. for large scale battery storage systems), the BPMs for residential development have been proposed as part of adopting a precautionary approach.

4.1. Asset Protection Zones (APZ)

An APZ is an area surrounding a development that is managed to reduce the bushfire hazard to an acceptable level to mitigate the risk to life and property. The required width of the APZ varies with slope and the type of hazard. The foremost effective treatment for reducing bushfire risk is the establishment of an APZ. This involves the removal and continual management of vegetation to create a buffer zone that reduces the effect of flame contact and radiant heat on the asset/s as well as providing access for firefighting operations. An APZ also reduces the chances of a fire escaping from a site and entering surrounding bushland by ensuring a fuel-free (fuel-reduced) environment whereby fire cannot propagate and spread.

4.1.1. Determining the Appropriate Setbacks

A leading factor when determining the APZ for the Project Area is the ability for firefighters to gain access. A secondary consideration is the vulnerability of the asset, such as what is required to prevent exposure to bushfire attack from exceeding a threshold that may result in material combustion or ignition, or more importantly, the threat to life.

The methodology to determine the appropriate APZ setback has adopted a performance-based solution. Based on the unique site characteristics identified by the BAR, the intensity of a bushfire event presented as the radiant heat exposure was calculated at several locations throughout the development site using a bushfire assessment model (known as NBC Bushfire Attack Assessor V4.1). The nominated fuel loads for the respective vegetation classifications as published by the RFS in March 2019 have been used to determine the APZs and the effective slope obtained from the Digital Elevation Model (DEM) for each transect.

PBP 2019 does not explicitly require the Project to provide an APZ in accordance with Appendix 1 of PBP 2019, however Section 8.3.5 of PBP 2019 nominates a minimum 10 metre APZ for the structures and associated buildings/ infrastructure. It is also noted the CFA Model Requirements nominates a minimum 10 metre firebreak around BESS, large scale solar farms and related infrastructure. Accordingly, this is recommended for the Project Area as shown in **Table 6**.



Table 6: Recommended Asset Protection Zones

Transect/ Direction	Classification of Vegetation Formations PBP 2019	Slope	APZ (Table A1.12.2) (metres = m)	APZ 29kW/m ² (Method 2) (metres = m)	Recommended APZ (PBP 8.3.5) (metres = m)
T1 North	<i>Excluded</i> (disturbed land)	4.2° Downslope	N/A	N/A	N/A
T2 East	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)	-1.3° Upslope	24m	15m	10m
T3 East	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)	-0.4° Upslope	24m	15m	10m
T4 South	<i>Excluded</i> (disturbed land)	-3.5° Upslope	N/A	N/A	N/A
T5 South	<i>Forest</i> (Hunter Macleay Dry Sclerophyll Forest)	-2.5° Upslope	24m	15m	10m
T6 South	<i>Forested Wetlands</i> (Coastal Floodplain Wetlands)	3.7° Downslope	12m	12m	10m
T7 West	<i>Excluded</i> (low-threat vegetation)	-1.3° Upslope	N/A	N/A	N/A
T8 North-west	<i>Excluded</i> (disturbed land)	4.5° Downslope	N/A	N/A	N/A
T9 North-west	<i>Excluded</i> (disturbed land and APZ)	-0.3° Upslope	N/A	N/A	N/A
T10 North	<i>Excluded</i> (disturbed land)	4.0° Downslope	N/A	N/A	N/A
T11 North	<i>Excluded</i> (disturbed land and APZ)	2.9° Downslope	N/A	N/A	N/A
	<i>Grassland</i>	< 5.0° Downslope	<12m	<12 m	10 m

Notwithstanding the required APZs, in accordance with the precautionary principle, all components of the Project Area will be maintained as an inner protection area to minimise exposure to excessive radiant heat levels.



Table 7: Asset Protection Zone Compliance Table (PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
5.3.1 ASSET PROTECTION ZONES Table 5.3a To provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact.	Potential building footprints must not be exposed to radiant heat levels exceeding 29kW/m ² .	APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	✓	The recommended setbacks are to be managed as an APZ ensure that no components of the Project Area is exposed to radiant heat levels greater than 29kW/m ² . The APZs would need to be 10 metres based on the type of vegetation adjacent to the asset.
	APZs are managed and maintained to prevent the spread of a fire towards the building.	The APZ is managed in accordance with the requirements of Appendix 4.	✓	The land indicated on Figure 12 & 13 as the Disturbance Footprint shall be managed in perpetuity as an IPA.
	The APZ is provided in perpetuity.	APZs are wholly within the boundaries of the development site.	✓	All recommended APZs are located within the subject site and will be maintained for the life of the project.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	The APZ is not located on lands with a slope exceeding 18°.	✓	All APZs are located on slopes less than 18°.



4.2. Landscaping and Vegetation Management

The design and management of the landscaped areas in the vicinity of any buildings or structures have the potential to improve the chances of survival of people and buildings. Any landscaping within the Project Area and in and around a bushfire hazard should consider the following:

- ☐ Priority given to retaining species that have a low flammability;
- ☐ Priority given to retaining species which do not drop much litter in the bushfire season and which do not drop litter that persists as ground fuel in the bush fire season;
- ☐ Priority given to retaining smooth barked species over stringy bark; and
- ☐ Create discontinuous or gaps in the vegetation to slow down or break the progress of fire towards the dwellings.

The principles of landscaping for bushfire protection aim to:

- ☐ Prevent flame impingement on buildings;
- ☐ Provide a defendable space for property protection;
- ☐ Reduce fire spread;
- ☐ Deflect and filter embers;
- ☐ Provide shelter from radiant heat; and
- ☐ Reduce wind speed.

Careful thought must be given to the type and physical location of any proposed site landscaping. Inappropriately selected and positioned vegetation has the potential to 'replace' any previously removed fuel load.

Whilst it is recognised that fire-retardant plant species are not always the most aesthetically pleasing choice for site landscaping, the need for adequate protection of life and property requires that a suitable balance between visual and safety concerns be considered.

Table 8: Landscaping Compliance Table (PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Landscaping is in accordance with APZ standards (see Appendix 4). Fencing is constructed in accordance with section 7.6.	Able to Comply	All new landscaping will consider the requirements of APZs per PBP 2019 Appendix 4. All new fencing will comply with PBP 2019 section 7.6.

4.3. Access

In the unlikely event of a serious bushfire, it will be essential to ensure that adequate ingress / egress and the provision of defensible space are afforded in the development layout. PBP 2019 requires an access design that enables safe operational access to structures and water supply whilst facilitating adequate emergency and operational response. All bushfire prone areas should have an alternate access or egress option depending on the bushfire risk, the siting of the development and the chances of the primary access road being obstructed or cut by fire for a prolonged period.

The following design specifications detailed in PBP 2019 are relevant to the Project:

- ☐ All property access roads shall be two-wheel drive all weather roads;
- ☐ Be through roads, but if unavoidable then dead ends should be not more than 200 metres in length, incorporate a minimum 12 metres turning circle (either in cul-de-sac or T-head formation) and should be clearly sign posted as dead ends;
- ☐ The capacity of road surfaces is sufficient to carry fully loaded fire fighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes for all other areas);
- ☐ Non perimeter roads comply with table – Road widths for Category 1 Tanker;
- ☐ Curves of roads (other than perimeter roads) are a minimum inner radius of 6 metres and minimal in number, to allow for rapid access and egress;
- ☐ Maximum grade for sealed roads do not exceed 12.5°;
- ☐ Have a minimum vertical clearance to a height of four metres at all times;
- ☐ Should they exist, no services or hydrants are located within the parking bays.

Primary access to the Project will continue to be from Maison Dieu Road which forms the southern boundary. Direct access to the Project Area will be provided by a newly constructed internal access road established along the subject sites eastern boundary. Access will be security controlled for emergency ingress and egress.

Furthermore, there are multiple tracks that provide access from the northern and southern Project Area (solar arrays) and an existing easement that runs through the mid-section of the Project Area.

All proposed internal roads satisfy the requirements for property access roads required by PBP 2019 as they are designed to suit large heavy vehicles and provide clear egress.

Tables 9 and 10 demonstrate the Project Area and associated access network are able to satisfy the Acceptable Solutions detailed in Tables 5.3b and 7.4a of PBP 2019.



Table 9: Access Table 5.3b Compliance Table (Residential Subdivision - PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
5.3.2 ACCESS (GENERAL REQUIREMENTS) Table 5.3b To provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from the area.	Fire fighters are provided with safe all weather access to structures.	Property access roads are two-wheel drive, all-weather roads.	Able to Comply	The Project Area is located wholly within private land and no new public roads are required. The new access road will connect directly to this section of Maison Dieu Road and provide direct access to the Project Area.
		Perimeter roads are provided for residential subdivisions of three or more allotments.	N/A	
		Subdivisions of three or more allotments have more than one access in and out of the development.	N/A	
		Traffic management devices are constructed to not prohibit access by emergency services vehicles.	Able to Comply	
		Access roads must provide suitable turning areas in accordance with Appendix 3.	Able to Comply	
		Maximum grades for sealed roads do not exceed 15° and an average of not more than 10° or other gradient specified by road design standards, whichever is the lesser gradient.	✓	Slopes are less than 5° across the Project Area.
		All roads are through roads.	✓	
		Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.	N/A	
		Where access / egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.	✓	
		One way only public access roads are no less than 3.5m wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	N/A	



Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
ACCESS ROAD CAPACITY	The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	Able to Comply	The capacity of the new property access roads will have sufficient load capacity for all firefighting vehicles.
ACCESS TO WATER	There is appropriate access to water supply.	Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.	Able to Comply	An all-weather road access and hardstand must be provided to the hard-suction point and/ or hydrant. The hardstand must be maintained to a minimum of 23 tonne GVM, eight (8) metres long and six (6) metres wide.
		Hydrants are provided in accordance with AS2419.1:2005	Able to Comply	
		There is suitable access for Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	Able to Comply	
PERIMETER ROADS	Perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	There are two-way sealed roads. Minimum 8m carriageway width kerb to kerb. Parking is provided outside of the carriageway width. Hydrants are to be located clear of parking areas. There are through roads, and these are linked to the internal road system at an interval of no greater than 500m. Curves of roads have a minimum inner radius of 6m. The maximum grade road is 15° and average grade is 10°. The road crossfall does not exceed 3°. A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches is provided.	N/A	No new public perimeter roads are included in the Project Area.
NON-PERIMETER ROADS	Non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	Minimum 5.5m width kerb to kerb. Parking is provided outside of the carriageway width. Hydrants are to be located clear of parking areas. There are through roads, and these are linked to the internal	✓	A new non-perimeter road will provide access to the Project Area.



Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
		road system at an interval of no greater than 500 metres.		
		Curves of roads have a minimum inner radius of 6 metres.		
		The road crossfall does not exceed 3°.		
		A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches is provided.		
PROPERTY ACCESS	Fire fighting vehicles can access the dwelling and exit the property safely.	There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.	✓	The nearest public road is located within 70 metres south of the Project Area.
		In circumstances where this cannot occur, the following requirements apply: □ minimum 4m carriageway width; □ in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay; □ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; □ provide a suitable turning area in accordance with Appendix 3; □ curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; □ the minimum distance between inner and outer curves is 6m; □ the crossfall is not more than 10 degrees; □ maximum grades for sealed roads do not exceed 15 degrees and not more than 10	✓	All new property access roads are expected at a minimum to satisfy the design requirements for non-perimeter roads. All property access roads are a minimum 4 metres wide and capable of accommodation a vehicle with a 23 tonne capacity.



Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
		degrees for unsealed roads; and ☐ a development compromising more than three dwellings has access by dedication of a road and not by right of way. Note: Some short constructions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.		





Table 10: Access Table 7.4a Compliance Table (Infill Development - PBP 2019)

Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
Access	Fire fighters are provided with safe all weather access to structures.	Property access roads are two-wheel drive, all-weather roads.	Able to Comply	All new access roads within the Project Area will comply with the minimum engineering requirements of PBP 2019.
	The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.	Able to Comply	The capacity of the new property access roads will have sufficient load capacity (23 tonne) for all firefighting vehicles.
	There is appropriate access to water supply.	Hydrants are provided in accordance with AS2419.1:2005	N/A	The recommended static water supply will be provided and immediately accessible to responding firefighters.
		There is suitable access for Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	Able to Comply	It is not expected a new reticulated water supply will be installed to service the Project Area. As such, no new hydrants will be available.
	Fire fighting vehicles can access the dwelling and exit the property safely.	At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road	Able to Comply	A second access road connection to Maison Dieu shall be provided.
		There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.	Able to Comply	The nearest public road is less than 70 metres to the south of the Project Area.
		In circumstances where this cannot occur, the following requirements apply: □ minimum 4m carriageway width; □ in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long	Able to Comply	All new property access roads are expected at a minimum to satisfy the design requirements under Table 7.4a of PBP 2019.



Intent of Measure	Performance Criteria	Acceptable Solution	Compliance	Comment
		by 2m wide, making a minimum trafficable width of 6m at the passing bay; ☐ a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; ☐ provide a suitable turning area in accordance with Appendix 3; ☐ curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; ☐ the minimum distance between inner and outer curves is 6m; ☐ the crossfall is not more than 10 degrees; ☐ maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and ☐ a development compromising more than three dwellings has access by dedication of a road and not by right of way. Note: Some short constructions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.		

4.4. Services - water, electricity and gas

Adequate services of water for the protection of buildings during and after the passage of a bushfire is essential for firefighting purposes. In addition, gas and electricity services should be located and installed so as not to contribute to the risk of fire or impede the firefighting effort.

4.4.1. Water

In the event of a fire, sufficient water must be available and safely accessible to emergency responders and firefighting vehicles to ensure that fire suppression activities are safe, time, effective and not hindered in anyway.

Firefighting infrastructure must be designed to allow effective response to the risks and hazards at the facility. Fire water must be provided to cover buildings, control rooms, substations and grid connections

The Project Area will not be connected to a reticulated water supply. Accordingly, a static water supply is required for firefighting purposes. It is recommended the Project Area is suitably equipped to respond to any fires on site. The CFA provides a best practice guideline and states the minimum requirements for water supply are as follows:

1. Water access points must be clearly identifiable and unobstructed to ensure efficient access;
2. Static water storage tank installations must comply with *AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning*;
3. The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel;
4. The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours;
5. The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, battery energy storage systems, etc.);
6. The hard-suction point must be provided, with a 65mm and 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance;
7. The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel;
8. An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 23 tonne GVM, eight (8) metres long and six (6) metres wide;
9. The road access and hardstand must be kept clear at all times;
10. The hard-suction point must be protected from mechanical damage (eg., bollards) where necessary;
11. An external water level indicator must be provided to the tank and be visible from the hardstand area;
12. Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank; and
13. Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).

The minimum static water supplies shall be:

1. One (1) x 45,000l static water tank at the primary vehicle entrance to each part of the facility;
2. Additional static fire water tanks of at least 45,000l effective capacity must be provided for every 100 hectares within the Project Area;
3. A water storage tank with a capacity of at least 45,000l shall be provided adjacent to the access road to the northern portion of the solar array; and
4. A static fire water storage tank with a minimum capacity of 45,000l is provided within 120 metres of each battery container within the BESS.

4.4.2. Electricity

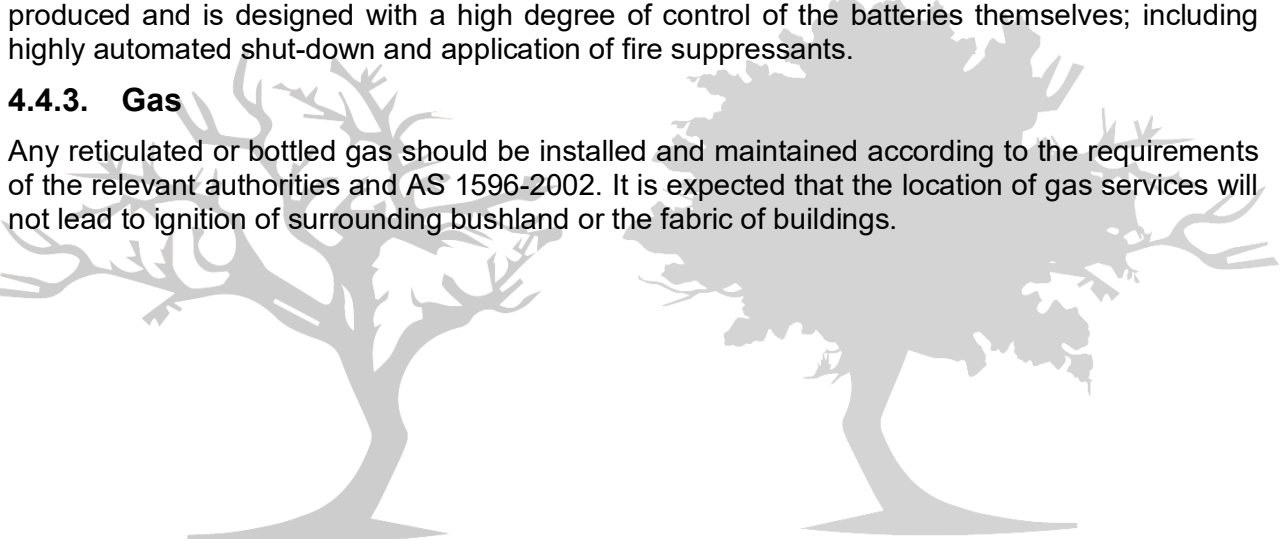
By design, the Project is part of the electricity transmission and generating network. The Project will be connected to the existing high voltage electrical switchyard, being the Ausgrid Substation.

Whilst the entire Project Area will be managed as an APZ, vegetation clearance to any connecting transmission lines shall comply with the ISSC3 Guideline for Managing Vegetation Near Power Lines and any applicable local network provider operating procedures.

The Project has a relatively low fire potential with no flammable material store, handled or produced and is designed with a high degree of control of the batteries themselves; including highly automated shut-down and application of fire suppressants.

4.4.3. Gas

Any reticulated or bottled gas should be installed and maintained according to the requirements of the relevant authorities and AS 1596-2002. It is expected that the location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.





4.5. Construction Standards - Bushfire Attack Level

The proposed land use zone permits a variety of non-habitable buildings including bulky goods premises, general industries, warehouses and distribution centres. The Project is a permissible land use on the subject site.

A Bushfire Attack Level (BAL) rating is typically applied to a residential building, or Class 9 buildings occupied by potentially vulnerable persons. PBP 2019 does not require BALs to be applied to infrastructure buildings or other non-habitable structures. As stated within Section 8.3.1 of PBP 2019, the NCC does not provide for any bushfire specific performance requirements for non-residential development, such as Class 5-8 and 10 buildings. As such, AS3959-2018 *Construction of buildings in bushfire prone areas* (AS3959-2018) are not considered as a set of deemed-to-satisfy provisions. However, compliance with AS3959-2018 and the NASH standard may be considered when meeting the aims and objectives of PBP 2019 – for future industrial buildings.

It is not proposed to apply a BAL rating to any component of the Project Area, however the methodology to determine BAL ratings as a derivative of determining radiant heat flux exposure has been adopted as an indicator to guide the design process when siting the various components of the BESS. Furthermore, the recommended APZs ensure no part of the Project Area will be exposed to direct flame contact.

The BALs for each transect have been calculated to provide the relevant BAL rating, both demonstrated in **Table 11**.

Table 11: Bushfire Attack Levels (BALs)

Transect	Vegetation Classification (PBP 2019)	Slope	Recommended APZ (PBP 8.3.5)	Distance from Hazard (metres = m)	Bushfire Attack Level (BAL)
T2, T3 & T5	Forest (Hunter Macleay Dry Sclerophyll Forest)	< -2.5° Upslope	10m	0m-<18m	BAL-FZ
				18m-<24m	BAL-40
				24m-<33m	BAL-29
				33m-<45m	BAL-19
				45m-<100m	BAL-12.5
T6	Forested Wetland (Coastal Floodplain Wetland)	3.7° Downslope	10m	0m-<9m	BAL-FZ
				9m-<12m	BAL-40
				12m-<18m	BAL-29
				18m-<26m	BAL-19
				26m-<100m	BAL-12.5
T1, T4, T7 to T11	Excluded (low-threat, disturbed, land)	Various	N/A	BAL-LOW	

4.6. Emergency Services

NSW RFS is the primary bushfire emergency response agency for any incident affecting the Project Area. There is a NSW Fire & Rescue station located at 1A Pitt Street, Singleton, approximately 11km or 13 minutes drive south-east of the Project Area (**Figure 14**) The closest NSW RFS brigade is the Singleton Fire Control Centre located 31km to the south at Bulga (**Figure 15**).

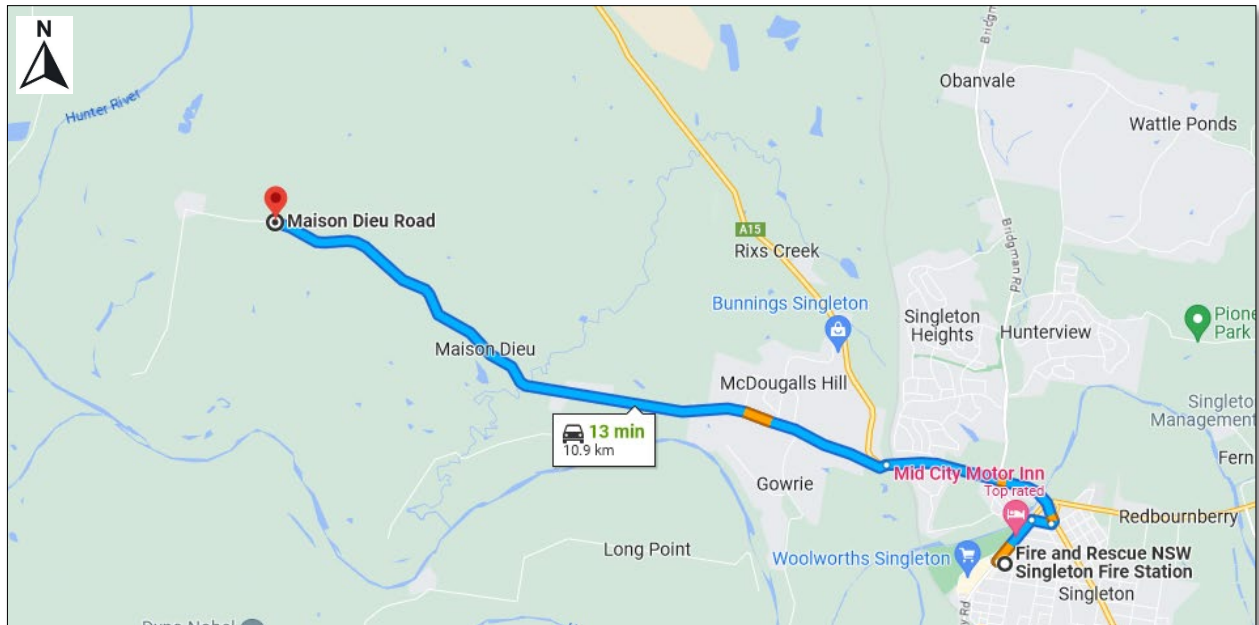


Figure 14: Fire and Rescue Singleton Station

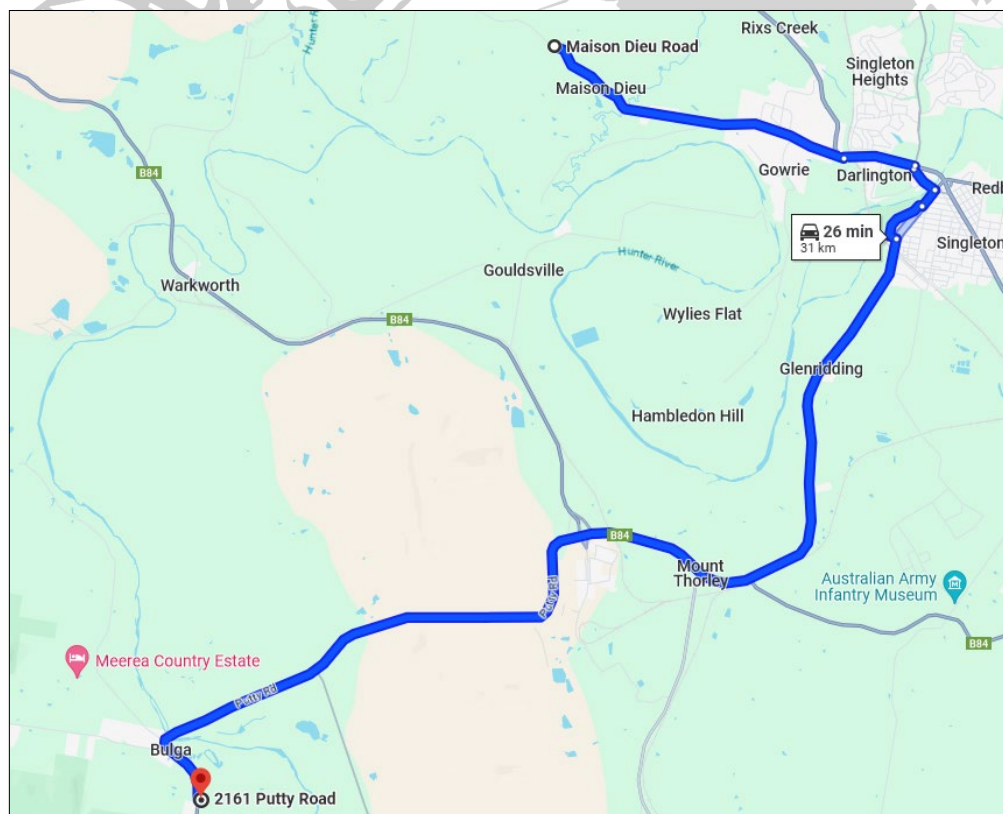


Figure 15: Singleton Fire Control Centre



4.7. Emergency Management Planning

It is recommended a 'Bushfire Emergency Management and Operations Plan' (BEMOP) be prepared in accordance with the RFS document 'A Guide to Developing a Bushfire Emergency Management and Evacuation Plan' for the construction and operational phases of the Project or as required by conditions of development consent. The BEMOP must be prepared in consultation with the local fire control centre (FCC) and address the following:

- ☐ Property Incident Plan;
- ☐ detailed measures to prevent or mitigate fires igniting;
- ☐ 24-hour emergency contact details including alternative telephone contact;
- ☐ work that should not be carried out during total fire bans;
- ☐ site infrastructure plan;
- ☐ fire fighting water supply plan;
- ☐ site access and internal road plan;
- ☐ availability of fire-suppression equipment, access and water;
- ☐ implementation of Asset Protection Zones (APZ) and their continued maintenance;
- ☐ storage and location of hazards (Physical, Chemical and Electrical) that will impact on fire fighting operations and procedures to manage identified hazards during fire fighting operations;
- ☐ notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate;
- ☐ any additional matters as required by the FCC (BFMP review and updates); and
- ☐ appropriate bush fire emergency management planning.



5. Conclusion and Recommendations

5.1. Conclusion

Bushfire Planning Australia was engaged by RPS AAP Consulting Pty Ltd to conduct a bushfire assessment of the Maison Dieu Solar Farm at Maison Dieu, near Singleton in NSW (the Project) for Terrain Solar Pty Ltd (the Applicant).

The Bushfire Assessment Report found the study area was exposed to a high bushfire hazard located to the east of the Project Area. The predominant vegetation surrounding the Project Area is consistent with a *forest* vegetation formation as described PBP 2019.

5.2. Recommendations

The bushfire protection measures recommended for the Project will address any residual risk, minimise bushfire impact on the proposed assets and reduce the risk of a fire initiating and spreading from the Project Area to the surrounding vegetation.

The following recommendations when implemented will reduce the impact of a bushfire to an acceptable level for the proposed industrial (non-habitable) buildings and demonstrate the Project is able to comply with PBP 2019:

1. The Disturbance Footprint on **Figure 12 & 13** shall be managed as an IPA as outlined within Appendix 4 of PBP 2019 and the RFS document *Standards for asset protection zones*;
2. A firebreak of 10 metres around the Disturbance Footprint as shown on **Figure 12 & 13** shall be provided and be managed as an APZ as outlined within Appendix 4 of PBP 2019 and the RFS document *Standards for asset protection zones*;
3. No part of the Project BESS, including any ancillary structures, buildings, containers or equipment shall be installed within the APZ identified in **Figure 12 & 13**;
4. Property access roads are to be constructed in accordance with Table 5.3b and Chapter 7.4a of PBP 2019;
5. A minimum of three (3) separate water tanks each with a capacity of 45,000 litres must be provided dedicated for firefighting purposes located within the Inner Protection Area (IPA) the northern extent of the Project BESS Area. The water storage tanks shall be located adjacent to an internal access road and within 120 metres of all infrastructure associated with the BESS. The third water storage tank shall be provided at the main entrance to the facility. ;
6. Consideration should be given to landscaping and fuel loads on site to decrease potential fire hazards on site;
7. All hazardous materials to be stored on land within 100 metres of any designated bushfire prone land shall be stored in a secure enclosure away from the bushfire hazard; and
8. The operators of the facility shall prepare a Bushfire Emergency Management and Operations Plan.

Should the above recommendations be implemented, the existing bushfire risk should be suitably mitigated to offer an acceptable level of protection to life and property for those persons and assets occupying the site, but they do not and cannot guarantee that the area will not be affected by bushfire at some time.

This assessment has been made based on the bushfire hazards observed in and around the Project Area and subject site at the time of inspection (October 2023) and report production (April 2024).



6. References

- ❑ Country Fire Authority (Victoria) Design Guidelines and Model Requirements for Renewable Energy Facilities v 4 (2023)
- ❑ Industry Safety Steering Committee (2005). *ISSC 3 Guideline for managing Vegetation Near Power Lines*
- ❑ Keith, David (2004). *Ocean Shores to Desert Dunes: The native vegetation of New South Wales and the ACT.*
- ❑ NSW Rural Fire Service (2005). *Standards for Asset Protection Zones.* NSW Rural Fire Service.
- ❑ NSW Rural Fire Service (2014). *A Guide to Development of a Bushfire Emergency Management and Evacuation Plan.*
- ❑ NSW Rural Fire Service (2019). *Comprehensive vegetation fuel loads*
- ❑ NSW Rural Fire Service (2019). *Planning for Bushfire Protection – A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.*
- ❑ Ramsay, GC and Dawkins, D (1993). *Building in Bushfire-prone Areas – Information and Advice.* CSIRO and Standards Australia.
- ❑ Rural Fires and Environmental Assessment Legislation Amendment Act 2002.
- ❑ Standards Australia (2018). *AS 3959 – 2018: Construction of Buildings in Bushfire-prone Areas.*

