

Bushfire Risk Management Plan

Battery Energy Storage System Facility

438 Lobbs Road, Glenbrae

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April 2023

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Bushfire Risk Management Plan

Battery Energy Storage System Facility – 438 Lobbs Road, Glenbrae

April 2023

Report by Julian Drummond

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PE project number: ACE 3461
PE file location: \\svr2019\core\Pyrenees\438
Lobbs Road, Glenbrae BESS

Version	Date	Author	Reviewer	Notes
0.0	17/10/2022	Julian Drummond	Lincoln Kern	Draft for internal review
0.1	07/11/2022		Jane Bai	Draft for client review
0.2	16/03/2023		Jane Bai	Updated in response to new plans
1.0	21/04/2023			Final for submission

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EXECUTIVE SUMMARY

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Practical Ecology has been commissioned by ACEnergy to evaluate the bushfire risks and safety requirements for the proposed Battery Storage Facility at 438 Lobbs Road, Glenbrae.

This facility will be built in the north-western corner of this property with road access onto Forest Road along the northern boundary and will contain 264 Battery Energy Storage System (BESS) units, 88 inverters, a switching station, a connection asset area containing transformers and a control room, and internal access/parking areas. There will also be powerlines connecting the proposed switching station to the existing transmission lines which run through the site. The site is within a Bushfire Prone Area so a risk assessment is required under Clause 13.02-1S Bushfire Planning.

The site consists of open farmland with a small section of Forest along the northern boundary and a few patches of unidentified vegetation which was potentially Woodland or Shrubland. The proposed development will only take up a small portion of the north-west corner so our assessment focused on the vegetation within 100m of this. This consisted of Level/Upslope Forest within this small patch and Grassland across the remainder of this area. There is access to the developed area along the northern boundary along Forest Road.

The wider landscape is mostly cleared farmland similar to the site although it does become more vegetated to the north-west with several State Forests and conservation reserves among the vegetated hills of the Pyrenees Ranges. There have only been a few bushfires in the surrounding landscape due to the management in consultation and grassfire can potentially approach from the north-west or south-west. This can potentially threaten the development or ignite the adjacent Forest vegetation but would likely be contained before reaching the site or could be contained from the site.

The risk assessment process for this development was divided into two portions; an assessment of the bushfire risk and recommended responses as per the *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022) and a review against Clause 13.02-1S (which was also a requirement of the Guidelines). The assessment against Clause 13.02-1S showed no significant risks to human life considering the results of the site and landscape assessment and also found that the development has the potential to reduce the hazard to the community during an emergency.

The surrounding landscape is predominantly level farmland with locations to the east and south being very similar to the site so there was no benefit to considering these locations. The landscape to the north-west contains the more vegetated areas surrounding Lexton which the development is as far as possible from while still having clear access to the powerlines. The facility will only have 5 permanent staff following construction which will be over a set period and can have any hazard mitigated through proper emergency management and the control measures proposed within the facility should address any outstanding concerns.

With this facility built, the electrical grid for the surrounding region has additional security which will reduce the chances of a bushfire impacting the surrounding community when powerlines carrying power to the local area are affected during an emergency event. Proper communication during an emergency is key and obtaining this information is dependent on a proper electricity supply for surrounding residents. Providing this additional security for the power grid will reduce the chances of a blackout and allow emergency services to operate unimpeded from panicking residents.

A full list of requirements which need to be addressed through the Risk Management Plan is provided in Section 1.2 below and a summary of how these items have been addressed and where is provided in Table 1 below.

Table 1. Responses to requirements from Design Guidelines and Model Requirements – Renewable Energy Installations (CFA 2022)

Item required	Response
a. Describe the risks and hazards at the facility to and from the battery energy storage system and related infrastructure.	Sections 2 & 3
b. Specify and justify, in accordance with Section 6.2 of the Guidelines: <ul style="list-style-type: none"> – The location of the battery energy storage system on-site and in the landscape. – Emergency vehicle access to and within the facility that: <ul style="list-style-type: none"> o Includes site access points of a number suitable to the size and hazard of the facility (a minimum of two). o Provides access to battery energy storage systems, substations and fire service infrastructure. – Firefighting water supply for the facility. – A fire break width of 10m or greater, based on radiant heat flux (output) as an ignition source: <ul style="list-style-type: none"> o Around the perimeter of the facility. o Between any landscape buffer/vegetation screening and battery energy storage systems (and related infrastructure). – The separation distance, based on radiant heat flux (output) as an ignition source, between: <ul style="list-style-type: none"> o Adjacent battery containers/enclosures. o Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation. – All other controls for the management of on and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems). 	<p>Section 4.2</p> <p>Section 4.3.1</p> <p>Section 4.3.2</p> <p>Section 4.3.3</p> <p>Section 4.3.4</p> <p>Section 4.4</p>
c. Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.	None of the recommended safety systems have been omitted and the conditions have been determined through an assessment against <i>Australian Standards 3959-2018: Construction of Buildings in Bushfire Prone Areas</i>
d. Be peer-reviewed by a suitably qualified, independent third party.	This report was internally reviewed and reviewed by the CFA as part of the application.
e. Form the basis for the design of the facility.	The site plans do not include many of the proposed measures at present but the layout has been designed to account for them.

1. INTRODUCTION

Practical Ecology has been commissioned by ACenergy to evaluate the bushfire safety requirements for the proposed Battery Storage Facility at 438 Lobbs Road, Glenbrae. This facility will cover approximately 10 ha of existing farmland within a larger property. The site is within Farming Zone and is subject to the Environmental Significance Overlay – Schedule 1 (ESO1) as well as being within a Bushfire Prone Area.

This report is aiming to address any outstanding requirements for the planning application in regards to bushfire safety. To this end, we are assessing the site against the requirements of Clause 13.02–1S which details larger scale developments and settlement planning within Bushfire Prone Areas and the most recent guidelines regarding bushfire safety requirements within renewable energy installations.

1.1 Clause 13.02–1S Bushfire Planning

As the site is within a Bushfire Prone Area, consideration of bushfire risk is normally only required at the building permit stage. However, *Clause 13.02–1S Bushfire* of the Pyrenees Planning Scheme does require that bushfire risk be considered as a part of the planning application for the following developments within Bushfire Prone Areas:

- Subdivisions of more than 10 lots.
- Accommodation.
- Childcare centre.
- Education centre.
- Emergency services facility.
- Hospital.
- Indoor recreation facility.
- Major sports and recreation facility.
- Place of assembly.
- Any application for development that will result in people congregating in large numbers.

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The proposed facility can only be considered a development that will result in people congregating in large numbers for a short period during construction (a 20-week period during which time it will employ up to ~50 people) as the completed facility will only have ~5 permanent staff. This Clause is still relevant however to address the concerns from CFA and from council regarding facilities of this nature. Concerns have been raised previously regarding their risk as a potential bushfire ignition source and there are also implications to settlement planning since the facility will form part of the power grid and be at risk of bushfire as a result.

1.2 Design Guidelines and Model Requirements – Renewable Energy Installations

The CFA have recently updated the *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022) (herein referred to as the Guidelines) which details the bushfire requirements for the layout and management of renewable energy installations in relation to fire safety (including large scale battery storage). The Guidelines require the bushfire risk to be considered via a Risk Management Plan to review the hazards and a Fire Management Plan to address them.

The Risk Management Plan provides the framework for the planning, design, construction and operation of these facilities. As per the Guidelines, the following factors need to be considered for all facilities:

- Location and siting within the landscape,
- Layout,
- Fuel load and vegetation onsite,
- Infrastructure (electrical, chemical, technological, etc.),
- Site activities and operations,
- Site occupancy, and
- Local weather conditions.

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The Guidelines contain requirements for Wind Energy Facilities, Solar Energy Facilities and Battery Energy Storage Facilities. In addition to the factors above, the following needs to be considered for Battery Energy Storage Facilities:

- Electrical hazards, such as battery faults; overcharging; rapid discharge; loss of remote monitoring systems; internal short circuits; overheating; water ingress; lightning strike (leading to thermal events/runaway).
- Chemical hazards, such as the inherent hazards of the stored dangerous goods; spills and leaks of transformer oil/diesel spills/leaks, refrigerant gas/coolant; chemical reactions from ignition.
- Potential fire spread due to proximity of batteries (and containers/enclosures) to each other, on-site infrastructure and vegetation (including screening vegetation).
- Mechanical damage to battery containers/enclosures due to vehicular impact.
- Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers, radiant heat and flame contact.

The Guidelines also recommend a 'Fire Safety Study' be performed in line with NSW Planning's *Hazardous Industry Planning Advisory Paper No. 2, Fire Safety Study Guidelines* (Government 2011). Our assessment will focus on the bushfire risk but the information presented in this report can be used to develop such a plan if it is deemed necessary.

The Guidelines also stipulate that Battery Energy Storage Facilities must develop a Risk Management Plan, in conjunction with the CFA, before development starts which must include the following:

- a) Describe the risks and hazards at the facility to and from the battery energy storage system and related infrastructure.
- b) Specify and justify, in accordance with Section 6.2 of the Guidelines:
 - The location of the battery energy storage system on-site and in the landscape.
 - Emergency vehicle access to and within the facility that:
 - Includes site access points of a number suitable to the size and hazard of the facility (a minimum of two).
 - Provides access to battery energy storage systems, substations and fire service infrastructure.
 - Firefighting water supply for the facility.
 - A fire break width of 10m or greater, based on radiant heat flux (output) as an ignition source:
 - Around the perimeter of the facility.
 - Between any landscape buffer/vegetation screening and battery energy storage systems (and related infrastructure).
 - The separation distance, based on radiant heat flux (output) as an ignition source, between:
 - Adjacent battery containers/enclosures.
 - Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation.
 - All other controls for the management of on and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).
- c) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.
- d) Be peer-reviewed by a suitably qualified, independent third party.
- e) Form the basis for the design of the facility.

In order to meet these requirements, we have considered the bushfire hazards from the site and landscape perspectives in order to provide the best possible assessment of the bushfire hazards and provide appropriate responses based on the requirements above.

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2. BUSHFIRE HAZARD SITE ASSESSMENT

Map 1 provides an overview of the subject site and Map 2 provides the details of the Bushfire Hazard Site Assessment which includes the land within 100 metres of the development boundary (the overall assessment area within 150m of the property boundary is presented on Figure 1).

2.1 Site shape, dimensions, size

The shape of the site:	Approximately rectangular
The dimensions of the site:	Approximately 904m x 1,251m along the eastern and southern boundaries
The site has a total area of:	Approximately 116 ha

2.2 Existing use and development on the site

The current use of the site	Farmland
The buildings or works located on the site:	The site currently contains fenced paddocks and some internal roads throughout the site. There is an existing dwelling and agricultural infrastructure in the south-western corner with driveway access onto Lobbs Road. There is some scattered vegetation including a large timber plantation on the northern boundary and several farm dams.

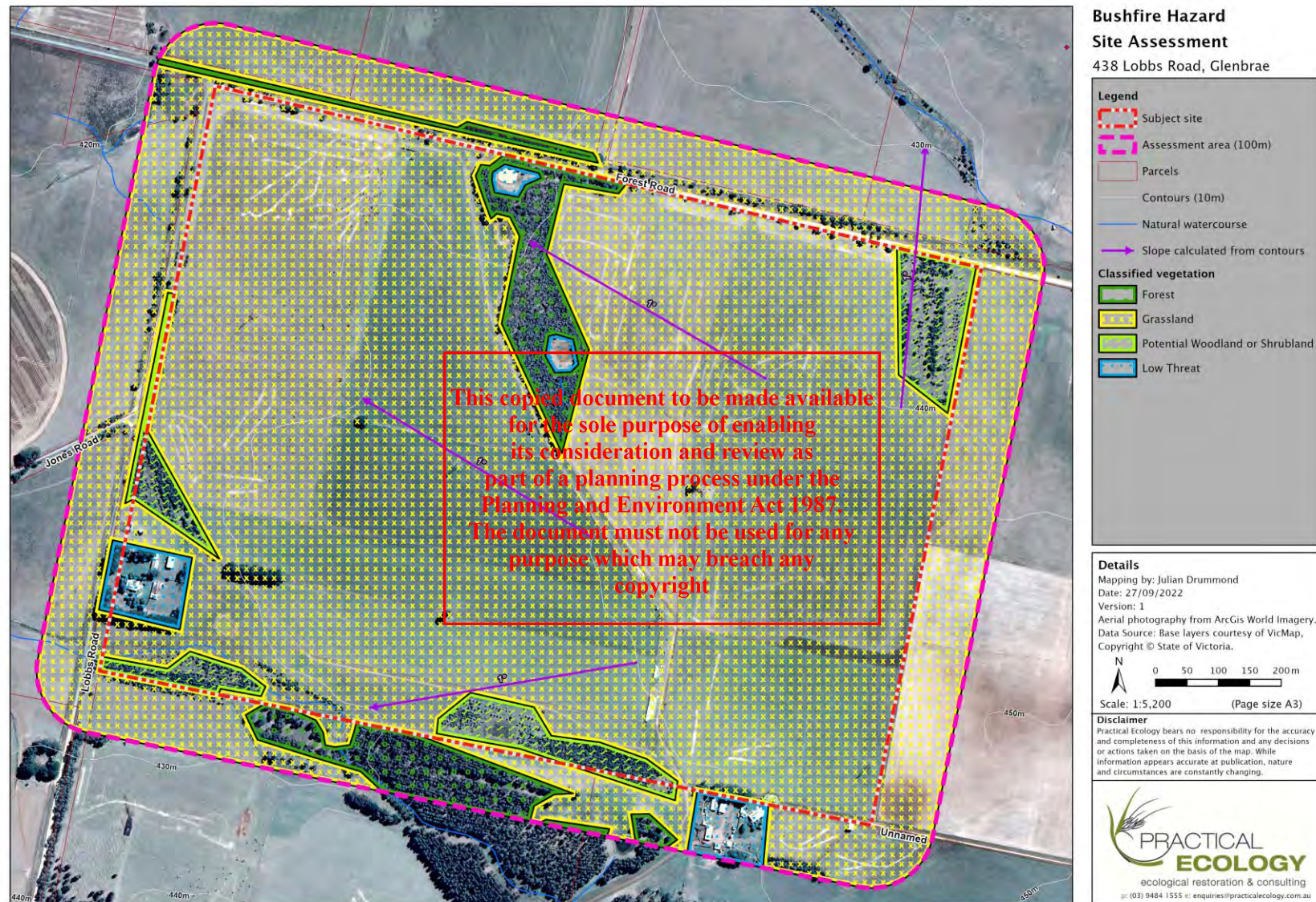
2.3 Existing access and infrastructure connections

Roads and access:	Forest Road runs along the northern boundary and Lobbs Road runs along the western boundary (both of which are unsealed). The proposed development will have access along Forest Road.
Power	The facility on the site will form part of the mains power grid
Water	The site will have access to tank water
Nearest fire hydrant	None are available but the development will have its own fire suppression system

2.4 Vegetation and topography

The majority of the site and adjacent land within 100m (see Figure 1) are farmland. This is vegetation which is actively being cultivated rather than controlled so we need to consider it as classified vegetation as per *Australian Standards 3959–2018: Construction of Buildings in Bushfire Prone Areas* (AS3959–2018) (Standards Australia 2018). There are some managed Low Threat areas and some Forest vegetation along the northern boundary. There is also some potential Woodland or Shrubland vegetation although we cannot confirm the classification.

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Figure 1. Bushfire Hazard Site Assessment

As the proposed development only covers a small section in the north-western corner of the site, the bushfire hazard site assessment will only focus on the terrain within 100m of this location. Refer to Map 2 and Table 2 for the results of the vegetation and slope assessment as per AS3959–2018.

Table 2. Bushfire hazard site assessment

Patch	1	2	3
Direction relative to site	North and East	All directions	East
Vegetation type	Forest	Grassland	Low Threat
Effective slope (up/down)	Flat	Flat	Flat
Effective slope (degrees)	0–1°	0–1°	0–1°
Setback required for BAL–12.5 (m)	48	19	N/A
Setback required for BAL–19 (m)	35	13	N/A
Setback required for BAL–29 (m)	19	9	N/A

Grassland vegetation as per AS3959–2018 is the most common vegetation class present and it is dominated by grass and herb species and can contain canopy and elevated fuel layers of varying heights as long as the foliage cover is less than 10%. This vegetation was present as managed farmland across the majority of the site which is being considered Grassland since the crops or pasture are not being managed to reduce their fuel levels and will be periodically cultivated instead of being controlled (see Figure 2 and Figure 3).

Forest vegetation as per AS3959–2018 consists of a canopy layer between 10–30m high (can be taller) with foliage cover of between 30–70%. There is also an elevated fuel layer of shrubs along with groundstory fuels (grasses and herbs). This vegetation is typically dominated by Eucalypts but also includes Pine plantations and denser covering of exotic trees. There is a large patch of trees to the east of the proposed development area which is being considered as Forest due to the density (it appears to be a timber plantation) (see Figure 4).

In addition to the onsite Forest, there is a row of trees along the northern boundary of the site along Forest Road (see Figure 5). While this patch only consists of a single row of trees which would normally be considered exempted in a landscape that is substantially cultivated, the proximity to the larger Forest patch to the east means we cannot rule it as exempted under AS3959–2018. Despite this, this patch is not considered to be a severe hazard due to the separation from the proposed assets as well as the size. The Low Threat vegetation was around the managed farm dam to the east.

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2.5 Photographs of the site and assessment area



Figure 2. Grassland to the south-east of the development area



Figure 3. Grassland to the south-west of the development area



Figure 4. Forest vegetation to the east of the development area



Figure 5. Potential Forest along the northern boundary

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3. BUSHFIRE HAZARD LANDSCAPE ASSESSMENT

The bushfire hazard landscape assessment provides information on the bushfire hazard more than 100 m away. This information is presented in Map 4 and discussed further below.

3.1 Adjacent and nearby land

Map 3 and Figure 6 shows the adjoining and nearby land.

The site is surrounded by managed farmland in every direction although the landscape to the north-west becomes more undulating and has more vegetation scattered throughout it. The Township of Lexton is to the north-west of the site and the Township of Waubra is to the south-east. The majority of the surrounding landscape is Farming Zone except for the undulating terrain to the west which is Rural Conservation Zone leading into Public Conservation and Resource Zone around the Waterloo State Forest to the west.

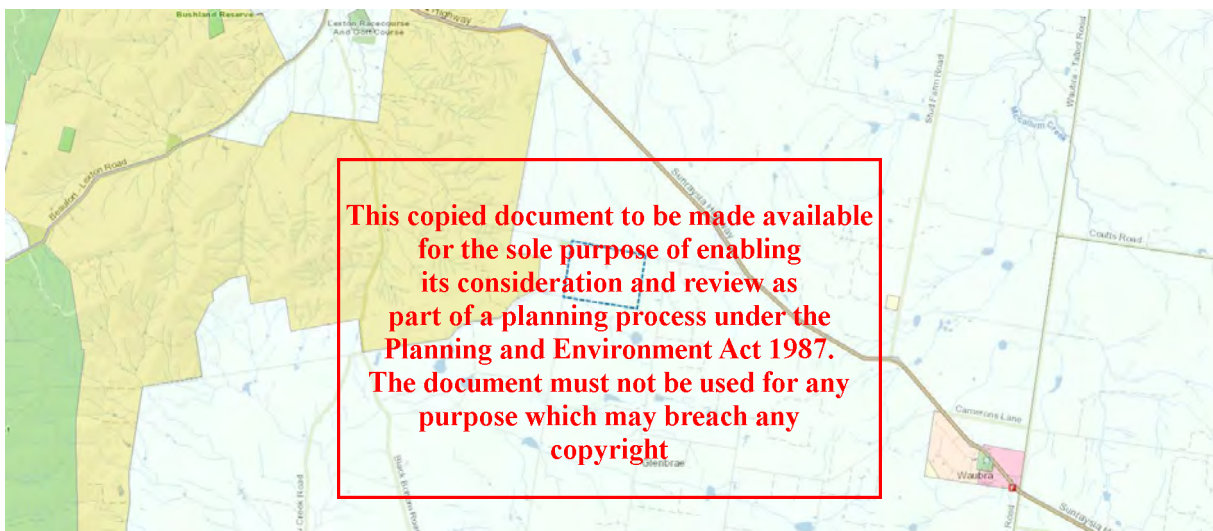


Figure 6. Zoning and overlays on adjacent land

3.2 Landscape

The landscape is shown on Map 4 and Figure 7.

The wider landscape also consists mainly of farmland although there are several large vegetation patches scattered to the north-east, west and north-west including the various state forests and conservation reserves surrounding Talbot and Maryborough to the north-east, the Waterloo State Forest, Ben Major State Forest and Ben Major Flora Reserve to the west, and the Pyrenees Ranges to the north-west. There are several townships scattered within this landscape although only a couple are developed towns while others are districts with no town centre.

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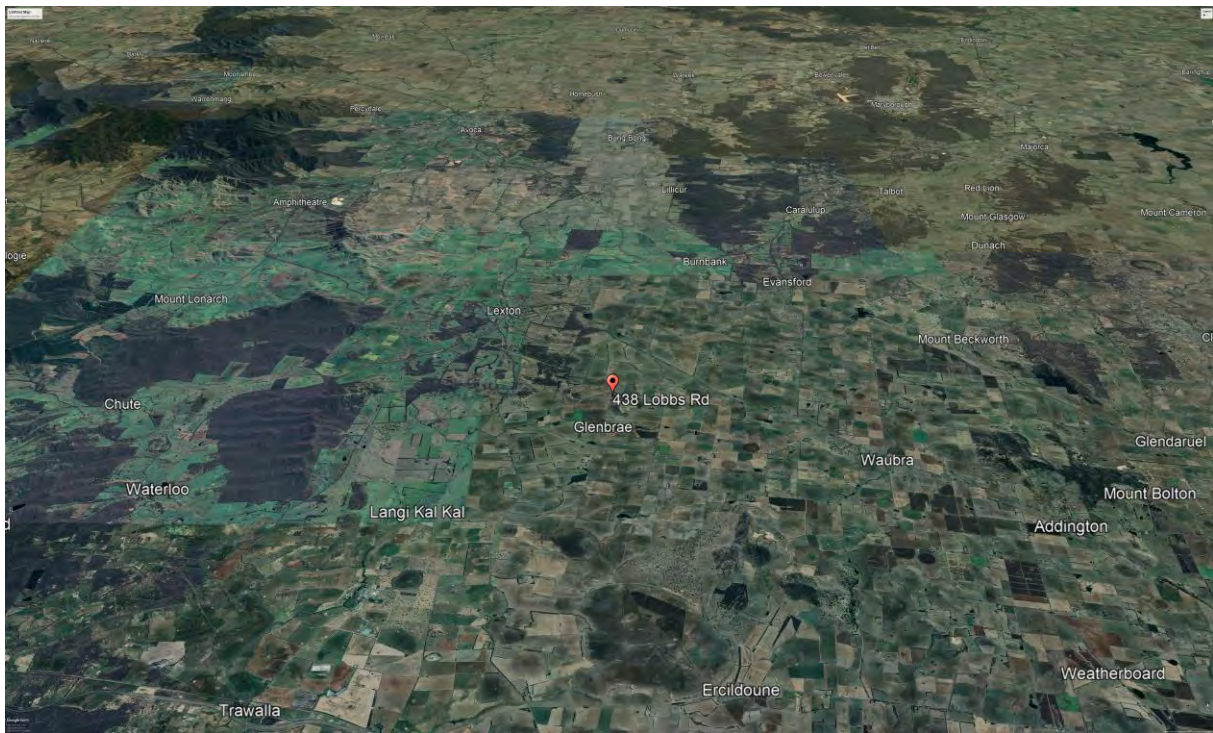


Figure 7. Landscape

3.3 Bushfire history

There was a large bushfire to the north-east of the site in 1980, another large fire to the south-east in 1977, some small fires around Waubra to the south-east in 2018, and a few small bushfires occurred to the north-west of Lexton in 2020. Aside from a small planned burn near Lexton in 2008, there has been no other fire activity in the wider landscape although the extent seen here does not included the Pyrenees Ranges or the vegetation around Maryborough (these areas are considered too far away to be a threat to the site).

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3.4 Potential fire behaviour

Weather data for the surrounding landscape including minimum and maximum temperature averages, rainfall, humidity and average wind speeds/direction are provided in Appendix 1.

Bushfire season across most of the Victoria is from mid to late Autumn and over Summer (October to February) although the season can extend into March and April under the right conditions. This is attributed to hot dry summers with rain being limited to summer storms. The data from the Maryborough Weather Station reinforces this with steady temperature increases peaking February but remaining high from October until April. This landscape also gets more rain and has more days with rain during Winter but appears to have a relatively dry climate overall.

Bushfire conditions appear to be strongest in the afternoon with the 3pm weather data showing higher temperatures, lower humidity and stronger winds. Winds predominantly approach from the south but northerly and westerly winds are also present. There are very few easterly winds which matches the movement of high- and low-pressure systems across the state and the normally observed conditions which propel bushfires during bushfire season.

Bushfires are propelled by powerful north–westerly winds before a south–westerly change occurs. These winds are normally cooler and more humid due to the air they bring from over the Southern Ocean but since the site is more than 200km from the ocean, we can expect them to remain warm and dry for a considerable period and be just as likely to propel grassfires as the north–westerly winds. Considering the lack of vegetation and infrastructure in the surrounding landscape, a fire can only really approach the site as a grassfire.

This type of fire will move quickly but will only pose minimal threat until it is directly adjacent as grassfires produce minimal amounts of embers and do not result in pyro–cumulus effects. They are also likely to be contained long before they reach the site through access on the extensive local road network so the hazard they pose is considered to be minimal. There is a potential risk if the Forest onsite is ignited but this is a small patch and is placed to the east and south–east of the site so prevailing conditions are unlikely to bring this bushfire into the developed areas.

Any threat posed from a forest fire or grassfire can therefore be addressed through suppression measures onsite and good emergency and bushfire planning.

3.5 Shelter and refuge options

A facility of this nature will require an Emergency Management Plan which considers bushfire risk and includes evacuation and fire–fighting measures. If occupants need to evacuate the site (recommended in the event of an approaching grassfire), they should proceed south–east towards Waubra (if it is considered safe to do so) or potentially north–west to Lexton (both towns contain Neighbourhood Safer Places). Although the risk is low, Waubra is considered a preferable location to Lexton as the evacuation route will move through more vegetated areas where a bushfire may approach from.

3.6 Landscape typology

Planning Practice Note 65 provides a typology of bushfire landscapes in Table 3 below.

Despite the potential for a bushfire in Grassland fuel loads to approach from two aspects which is more typically part of Landscape Types 3 and 4, this is considered a Type 2 Landscape as the surrounding crops and pasture is significantly lower risk than native grasslands. The presence of farmland means that ignitable fuel loads will only exist intermittently and will have greater monitoring so there is less chance of a grassfire occurring at all which reduces the risk from the multiple approach aspects. The presence of a widespread road network also provides assurance of safe egress so Type 2 is considered appropriate and accurate.

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Table 3. Landscape typology as presented in Planning Practice Note 65 (DTPLI 2014)

Type 1	Type 2	Type 3	Type 4
<ul style="list-style-type: none"> – There is little vegetation beyond 150 metres of the site (except grasslands and low-threat vegetation). – Extreme bushfire behaviour is not possible. – The type and extent of vegetation is unlikely to result in neighbourhood scale destruction of property. – Immediate access is available to a place that provides shelter from bushfire. 	<ul style="list-style-type: none"> – The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site. – Bushfire can only approach from one aspect and the site is in a suburban, township or urban area managed in a minimum fuel condition. – Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area. 	<ul style="list-style-type: none"> – The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site. – Bushfire can approach from more than one aspect. – The site is in an area that is not managed in a minimum fuel condition. – Access to an appropriate place that provides shelter from bushfire is not certain. 	<ul style="list-style-type: none"> – The broader landscape presents an extreme risk. – Evacuation options are limited or not available.

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4. RISK MANAGEMENT PLAN

The following section reviews how the identified risks around the site are managed as per the *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022) (herein referred to as the Guidelines).

4.1 Development Proposal

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ACEnergy Pty Ltd are proposing to place a Battery Energy Storage System (BESS) facility in the north-eastern corner of the property. This facility will be placed within an existing paddock with a single access point along the northern boundary onto Forest Road.

Within the development area, there will be approximately 10 ha containing 264 Battery Energy Storage System (BESS) units, 88 inverters, a switching station, a connection asset area containing transformers and a control room, and internal access/parking areas. There will also be powerlines connecting the proposed switching station to existing transmission lines running through the site.

This facility will be constructed over a 20-week period, during which time it will employ up to 50 people (including local workers). Once completed the facility will have 5 permanent staff. The plans for this facility are displayed in Appendix 3. Further requirements for this site in terms of bushfire safety are recommended below and are included on the plans where appropriate.

4.2 Facility location

As per Section 6.1 of the Guidelines, 'Renewable energy facilities must be located in low-risk environments wherever possible, to eliminate or reduce the risk of external fire impacting the facility and its consequences.' The site and the majority of the surrounding landscape is within a Bushfire Prone Area which is considered higher risk although there are factors which reduce this risk. The model requirements for citing a renewable energy facility in a higher risk location are provided in Table 4 below.

Table 4. Model requirements for higher risk locations

Source: Section 6.1 of *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

Model requirements
Planning applications for all renewable energy facilities proposed in high-risk environments must address the following, in addition to providing an assessment against policy at Clause 13.02-1S (Bushfire Planning):
<ul style="list-style-type: none"> a) The impact of any ignitions arising from the infrastructure (solar panels, wind turbines, battery energy storage systems, electrical infrastructure) on nearby communities, infrastructure and assets. b) The impact of bushfire on the infrastructure (eg. ember attack, radiant heat impact, flame contact). c) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.

While Bushfire Prone Areas are considered to be higher risk, there are mitigating factors listed under the Guidelines which are attributed to low-risk locations which are present at this site. These attributes include:

- Grassland vegetation being the dominant/only vegetation type present.
- No continuous other vegetation types within 1–20km of the project site.
- Generally flat topography, some undulation may be present.
- Slopes are less than 5 degrees.
- Good road access with multiple routes available to and from the project site.
- No Bushfire Management Overlay applies.

Grassland is the dominant vegetation type in this landscape although there are scattered patches of Forest onsite and within 20km in the surrounding landscape. There is some undulating land present in the wider landscape but the site itself is level. There is also immediate gravel road access around the site although sealed roads would be safer access so there are elements which mean we should consider this a higher risk landscape.

This higher risk can be addressed though when we consider the facility and the hazards against Clause 13.02–1S. The objective of Clause 13.02–1S is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. This policy must be applied to all planning and decision making under the Planning and Environment Act 1987 relating to land which is:

- Within a designated bushfire prone area;
- Subject to a Bushfire Management Overlay or
- Proposed to be used or developed in a way that may create a bushfire hazard.

The strategies of this clause are presented in detail below.

4.2.1 Protection of Human Life

Protection of Human Life

Give priority to the protection of human life by:

- Prioritising the protection of human life over all other policy considerations.
- Directing population growth and development to low-risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.
- Reducing the vulnerability of communities to bushfire through the consideration of bushfire risk in decision-making at all stages of the planning process.

Proposal meets measure Yes ☒ No ☐ N/A ☐

After considering the proposed usage and the bushfire threat from the site and surrounding landscape, it is concluded that this development poses no threat to human life as it does not increase the bushfire risk for the landscape in terms of unplanned ignition events, increased fuel levels or causing changes in population. The facility is isolated within the landscape with very few developed areas present. There is the Township of Lexton to the north-west and the Township of Waubra to the south-east but these are too distant to be at risk considering only grassfires can move through this landscape.

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There are some scattered agricultural developments but indications of any development that would result in permanent increases in population. A well-developed fire management plan and proper fire suppression systems will therefore reduce any risk from this development as an ignition source while the nature of the facility will not result in significantly more people in the area or the adjacent population centres. Waubra is in a very low risk area while Lexton does have some surrounding vegetation but is only considered a moderate risk. This risk can also potentially be lowered as a result of this development.

Upgrades to the electrical network can also assist with population growth as this type of power storage facility will increase the reliability of the power supply to adjacent areas. Smaller towns such as Lexton and Waubra will benefit from this reliability and be at lower risk of power outages as a result. This provides additional assurance that the towns can continue to have electricity during an emergency. Therefore, if the appropriate risk management is applied (through this report at each development stage) this proposal adequately considers the safety of human life as per this Clause.

4.2.2 Bushfire hazard identification and assessment

Bushfire hazard identification and assessment

Identify bushfire hazard and undertake appropriate risk assessment by:

- Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard.
- Considering the best available information about bushfire hazard including the map of designated bushfire prone areas prepared under the Building Act 1993 or regulations made under that Act.
- Applying the Bushfire Management Overlay in planning schemes to areas where the extent of vegetation can create an extreme bushfire hazard.
- Considering and assessing the bushfire hazard on the basis of:
 - Landscape conditions – meaning the conditions in the landscape within 20 kilometres and potentially up to 75 kilometres from a site;
 - Local conditions – meaning conditions in the area within approximately 1 kilometre from a site;
 - Neighbourhood conditions – meaning conditions in the area within 400 metres of a site; and,
 - The site for the development.
- Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures. Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals properly assess bushfire risk and include appropriate bushfire protection measures.
- Not approving development where a landowner or proponent has not satisfactorily demonstrated that the relevant policies have been addressed, performance measures satisfied or bushfire protection measures can be adequately implemented.

Proposal meets measure Yes ☒ No ☐ N/A ☐

The Bushfire Management Overlay is present to the west of the site around the vegetation patches near Lexton but should not be needed here. Sections 2 and 3 of this report aim to identify bushfire hazards within the site and the surrounding landscape. The results of this assessment are being considered as per the requirements of Clause 13.02-1S and against the Guidelines. The prescribed precautionary and protection measures from this assessment and the Guidelines are detailed across Section 4.

4.2.3 Settlement planning

Settlement Planning

Plan to strengthen the resilience of settlements and communities and prioritise protection of human life by:

- Directing population growth and development to low-risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959–2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).
- Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959–2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.
- Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.
- Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reduce bushfire risk overall.
- Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction.
- Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.
- Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959-2009.

Proposal meets measure	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
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These strategies are designed to ensure larger scale developments that potentially impact the population of an area are carried out so that there is no substantial risk to the new occupants and no increased risk to the existing occupants of surrounding areas. This is primarily applied to residential developments and/or facilities designed to accommodate a larger population (schools, aged-care facilities, hospitals, etc.) so it questionable as to whether these strategies apply. Regardless, this facility does not increase the risk and the strategies above can be applied.

The main thing to consider is the location of the facility and whether there are any lower risk alternatives. The landscape to the east and the south is very similar to the site so the risk would be unchanged from moving the facility while the landscape to the north-west enters the more vegetated areas around Lexton. The development could be further away from these area but considering it needs to be adjacent to the powerlines running through the site, the location is considered to be acceptable as long as proper measures are taken.

The facility will employ approximately 50 local workers over a 20-week period so there will be no substantial population increase in the local area. Once completed, there will be 5 permanent staff and minimal impact on surrounding areas. The landscape risk is very low so any new risk posed (either from potential ignition sources during construction or once its completed) can be easily mitigated. The separation present from this facility and adjacent facilities or townships means any scenarios generated can be contained long before they threaten these areas.

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If it is determined that these strategies need to be considered, the bulk of this report provides the required response (see below for details):

- The distances displayed on Table 2 show the required distances for defendable space under AS3959–2018. These indicate that BAL–12.5 can be attained although it is not necessarily required since no habitable structures are proposed,
- Section 3.5 demonstrates the access to BAL–LOW areas is acceptable,
- The details given above detail how there is no net increase in bushfire risk and Section 4.3 provides details on how the existing risk can be mitigated further, and
- Sections 2 and 3 provide a comprehensive assessment of the bushfire risk which is considered extremely low from a site and landscape perspective.

It will be left to the relevant governing/referral authority as to whether these strategies are relevant to this proposal, but an adequate response has been presented if required.

4.2.4 Areas of high biodiversity conservation value

Areas of high biodiversity conservation value			
Ensure settlement growth and development approvals can implement bushfire protection measures without unacceptable biodiversity impacts by discouraging settlement growth and development in bushfire affected areas that are of high biodiversity conservation value.			
Proposal meets measure	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
<p><i>Clause 52.17 Native Vegetation</i> of the Planning and Environment Act 1987 provides for the removal and/or impact of native vegetation. This clause provides an exemption for these requirements for the safe and efficient function of minor utility installations which can potentially be applied here but an ecological survey should and are being performed.</p>			

ACEnergy have commissioned *Okologie Consulting Pty Ltd* (October 2022) to perform an assessment and determine the extent of the impacts to biodiversity. This report found that the site was dominated by exotic species with no native habitat recorded and no rare or threatened species occurring or likely to occur within the site so there should be no problem meeting this strategy.

4.2.5 Use and development control in a Bushfire Prone Area

Use and development control in a Bushfire Prone Area
<p>In a bushfire prone area designated in accordance with regulations made under the Building Act 1993, bushfire risk should be considered when assessing planning applications for the following uses and development:</p> <ul style="list-style-type: none"> • Subdivisions of more than 10 lots. • Accommodation. • Child care centre. • Education centre. • Emergency services facility • Hospital. • Indoor recreation facility.

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Use and development control in a Bushfire Prone Area

- Major sports and recreation facility.
- Place of assembly.
- Any application for development that will result in people congregating in large numbers.

When assessing a planning permit application for the above uses and development:

- Consider the risk of bushfire to people, property and community infrastructure.
- Require the implementation of appropriate bushfire protection measures to address the identified bushfire risk.
- Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts.

Proposal meets measure Yes ☒ No ☐ N/A ☐

This development can be considered a Place of Assembly and/or a place that will result in people congregating in large numbers (50 workers will be present during construction) within a Bushfire Prone Area. The bulk of this report and the subsequent recommendations have been prepared in response to this requirement.

4.2.6 Policy Guidelines

Policy guidelines

Planning must consider as relevant:

- Any relevant approved State, regional and municipal fire prevention plan
- AS 3959–2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2018).
- Building in bushfire-prone areas – The CSIRO & Standards Australia (SAA-HB36– 1993, May 1993).
- Any Bushfire Prone Area map prepared under the Building Act 1993 or regulations made under that Act.

Proposal meets measure Yes ☒ No ☐ N/A ☐

These items have been considered within the bulk of this report along with CFA and DELWP guidelines regarding developments of this nature. As stated previously, this facility is well separated from adjacent developments so any risks will be low and can easily factored into existing local and municipal fire management plans. The remaining bushfire related policies and legislation can be addressed through this assessment and the subsequent prescription of fire prevention measures.

4.3 Facility design

As per Section 6.2 of the Guidelines, 'Renewable energy facilities must be designed to eliminate or reduce the risk of fire occurring at, or entering, the facility and its consequences.' This section includes requirements for vehicle access, a firefighting water supply, landscape screening and onsite vegetation, fire breaks and design specific requirements for Battery Energy Storage Systems. Responses to these requirements are detailed in the sections below.

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4.3.1 Emergency vehicle access

The model requirements for emergency vehicle access for all renewable emergency facilities (there are no additional requirements for emergency vehicle access for Battery Energy Storage Systems) are provided in Table 5 below.

While the design has not been shown on the site plans yet, an area around the perimeter has been set aside for a fuel break and for the perimeter road which will meet the requirements below. This road will connect to the proposed access throughout the site and to the proposed entrances/emergency exits. The emergency exit is also not shown on the plans but the design allows it to be included in a suitable location in the detailed design stage so there will be an alternative exit regardless of where a bushfire may approach from or may be onsite.

Table 5. Model requirements for emergency vehicle access

Source: Section 6.2.1 of *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

Model requirements
<ul style="list-style-type: none"> a) Construction of a four (4) metre perimeter road within the perimeter fire break. b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes. c) Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface. d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than fifty (50) metres. e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle. f) Roads must incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated. g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure. h) The provision of at least two (2) but preferably more access points to the facility, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points must be informed through a risk management process.

4.3.2 Firefighting water supply

The model requirements for firefighting water supplies for all renewable emergency facilities and the additional requirements for Battery Energy Storage Systems are provided in Table 6 below. Since there is no reticulated water available at the site, a 288,000L static water supply will be provided as per the conditions below. The location of this tank has been reserved but has not been shown on the plans.

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Table 6. Model requirements for firefighting water supplies

Source: Section 6.2.2 of *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

Model requirements

The model requirements for all facilities are:

- a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.
- b) Static water storage tank installations must comply with AS 2419.1–2005: Fire hydrant installations – System design, installation and commissioning.
- c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.
- d) The static water storage tank(s) must be capable of being completely refilled automatically or annually within 24 hours.
- e) 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, wind turbines, battery energy storage systems, etc.).
- f) The hard-suction point must be provided, with a 150mm full bore isolation valve (see Figure 8) equipped with a Storz connection, sized to comply with the required suction hydraulic performance. Adapters that may be required to match the connection are: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters (see Figure 8) with a matching blank end cap to be provided.
- g) The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.
- h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.
- i) The road access and hardstand must be kept clear at all times.
- j) The hard-suction point must be protected from mechanical damage (eg. bollards) where necessary.
- k) Where the access road has one entrance, a ten (10) metre radius turning circle must be provided at the tank.

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The additional model requirements for Battery Energy Storage Systems are:

- a) A fire hydrant system that meets the requirements of AS 2419.1–2005: Fire hydrant installations, Section 3.3: Open Yard Protection, and Table 3.3: Number of Fire Hydrants Required to Flow simultaneously for Protected Open Yards. Except, that fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.

OR

- b) Where no reticulated water is available, a fire water supply in static storage tanks, where:
 - i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1–2005 flowing for a period of no less than four hours at 20L/s, whichever is the greater.
 - ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1–2005, Table 3.3.
 - iii. Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.
 - iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings).

Model requirements

- v. The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency (see Figure 9). (Eg., Fire water tanks are to be located closer to the site entrance than the battery energy storage system).
- vi. The fire water supply must comply with AS2419.1–2005: Fire hydrant installations – Section 5: Water storage.



Figure 1: 150mm full bore isolation valve.



Figure 2: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters.

Figure 8. Connections requirements for static water supplies

Figure 1 and 2 of the *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

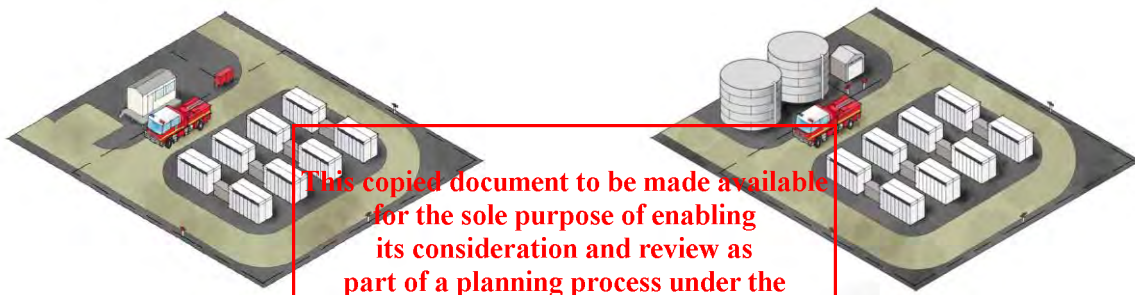


Figure 9. Best practise arrangement for fire service infrastructure

Figure 5 and 6 of the *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

4.3.3 Vegetation management and fuel breaks

The model requirements for fuel breaks all renewable emergency facilities and the additional requirements for Battery Energy Storage Systems are provided in Table 7 below.

The only vegetation within the development area is Grassland and any Grassland which is still present once the facility is built will be slashed regularly so the interior of the site will be considered Low Threat as per AS3959–2018. The development area is within an open paddock with no surrounding infrastructure so no thermal barriers or shielding will be required and there is an existing row of trees along Forest Road to the north which can be considered a thermal barrier to north–westerly bushfire conditions.

In regards to the fuel breaks, these will need to be placed around the perimeter of the site and around the control room, switching station and around the BESS units. Since these fire breaks need to be a non–combustible ground covering, they can potentially be incorporated into the access roads around the facility. The vegetation outside of the facility is Grassland except for some Forest to the east and the north which is either well separated from the facility or can be seen as a thermal barrier so the standard width of 10m should be sufficient.

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Table 7. Model requirements for firefighting water supplies

Source: Section 6.2.4 of *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

Model requirements

The model requirements for all facilities are:

- The perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.
- The perimeter of control rooms, electricity compounds, substations and all other buildings onsite.

The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.

The additional model requirements for Battery Energy Storage Systems are that a fire break must be established and maintained around battery energy storage systems and related infrastructure.

4.3.4 Design specific requirements for Battery Energy Storage Systems

The model requirements for Battery Energy Storage System designs are provided in Table 8 below.

As shown on the site plans in Appendix 3 and with separation distances shown on Map 2, The BESS units are in groups of 6 units. The spaces between any two groups and between adjacent two units conform to spacing guideline from the BESS manufacturer with fire protection considerations. The BESS units will be placed on a non-combustible surface which will prevent a fire within one unit from impacting adjacent units and spreading. The units also have their own fire suppression systems which will prevent an internal fire from lasting long enough to spread. The switching stations is also located a significant distance from the units so a fire here is highly unlikely to impact this area and vice versa.

As mentioned previously, there will be a 10m fuel break around the perimeter of the facility and any remaining vegetation within the facility will be managed in perpetuity. Our assessment indicates that no additional separation is required since the surrounding vegetation is predominantly Grassland except for a Forest patch to the north and the east. The forest to the north is ~69m from the BESS units and this thin patch is considered more of a thermal break from bushfires to the north-west. The patch to the east is ~48m from the units which is sufficient for BAL-12.5 conditions under the AS3959-2018 which the units can be designed to withstand if they're not already.

The open design with significant separation between all of the proposed assets in an open level paddock means emergency services can safely move around the site to either protect the units and other infrastructure or prevent a fire from within these units from spreading. The individual fire suppression measures built into the units are designed to prevent a fire from spreading and ensure the units remains safe for emergency services to contain a fire around it (cooling systems, electrical shut-off, etc.). With this location, proper site management and the proposed layout, the internal design of the units can address all of the other concerns listed below.

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Table 8. Model requirements for Battery Energy Storage Systems

Source: Section 6.2.5 of *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

Model requirements

1. The design of the facility must incorporate:

- a) A separation distance that prevents fire spread between battery containers/enclosures and:
 - Other battery containers/enclosures.
 - On-site buildings.
 - Substations.
 - The site boundary.
 - Any other site buildings.
 - Vegetation.

Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements.

- b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m, or greater where determined in the Risk Management Plan. Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.
- c) A layout of site infrastructure that:
 - i. Considers the safety of emergency responders.
 - ii. Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system.
 - iii. Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure.

2. Battery energy storage systems must be:

- a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).
- b) Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of fire at the battery energy storage system.).
- c) Provided with in-built detection and suppression systems. Where these systems are not provided, measures to effectively detect and/or suppress fires within containers must be detailed within the Risk Management Plan.
- d) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.
- e) Provided with suitable access roads for emergency services vehicles, to and within the site, including to battery energy storage system(s) and fire service infrastructure.
- f) Installed on a non-combustible surface such as concrete.
- g) Provided with adequate ventilation.
- h) Provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers/enclosures.
- i) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.
- j) Provided with spill containment that includes provision for management of fire water runoff.

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4.4 Facility construction

Considering that this facility will employ up to ~50 people during its construction and only ~5 permanent staff once the facility is complete, the highest risk time is arguably during the construction period so bushfire risk will need to be considered. Section 7 of the Guidelines provides risk controls for the construction and commissioning of renewable energy facilities which need to be considered here. The first and best step would be timing the construction outside of bushfire season to significantly reduce the risk.

As stated in Section 4.3 above, BESS units will need to be placed on non-combustible surfaces, fuel breaks will be required around the perimeter along with an access road, at least two entrances/emergency exits will be required and the vegetation onsite will need to be managed. This can all be carried out before the infrastructure is installed which will reduce the bushfire risk from the construction and also reduce the risk for any workers present as any threat can be contained before it enters the site. The proposed static water supply can also be installed since a water source will likely be needed for construction crews.

These measures should be sufficient to allow construction to proceed during bushfire season if it cannot proceed at any other time but risk management measures should still be required such as limiting work on Total Fire Ban days or during higher risk conditions. Having the access track ready when the construction of infrastructure begins will also reduce the hazard and other measures such as no smoking or open flames onsite where possible should also be enforced. These units can be constructed offsite and installed on the non-combustible surface so the amount of works on the site can potentially be minimised.

The main thing that workers will need to be aware of is reducing the fire hazards from their works will be the evacuation procedures. With the number of people present during construction and the condition of the surrounding roads, getting everyone out at the first sign of danger is essential. Construction should not proceed during Extreme or Catastrophic conditions (if can be contained to outside bushfire season, that would be ideal from a risk reduction standpoint and to reduce potential delays) and it is essential that a designated offsite evacuation point is present with all workers knowing the route and alternative route in the event of the unforeseen.

4.5 Facility operation

The model requirements for facility for all renewable emergency facilities and the additional requirements for Battery Energy Storage Systems are provided in Table 9 below.

The Fire Management Plan also required under the Guidelines will need to detail how the facility will incorporate the recommendations from this plan and manage bushfire safety as part of its day-to-day operation. This plan will be incorporate domestic fire safety and suppression measures which fall outside of this assessment although the following recommendations can be incorporated into this plan in addition to the passive measures which will be built into the facility from this assessment.

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Vegetation management should be easy to manage with the existing vegetation consisting of just pasture and with a reasonable amount of this pasture to be removed to provide access tracks, fuel breaks and non-combustible surfaces to place infrastructure on. The remaining grassland can be managed through periodical mowing which can easily be carried out via a ride-on mower by the permanent staff as these vehicles require no additional training or licencing to operate and will be more cost-effective and efficient than landscaping services.

The BESS units will need to be managed and inspected as per the manufacturer and Australian Standard requirements and these inspections can also include the inspections for the vegetation management, the conditions of the access tracks and fuel breaks and the water supply. Since the site is predominantly cleared paddock, there should be no issue regarding leaf litter or other detritus around the units as long the grass is well managed and regular inspections can address any hazard the units themselves pose.

Outside of these measures and the passive protection measures provided by the Guidelines, any other hazards, both internally and externally, can be addressed through proper facility management and emergency planning. Since there are only going to be ~5 permanent staff onsite then evacuation should be convenient and no-one should be present during a bushfire emergency or higher risk conditions unless the staff are full trained in fire suppression and can defend the site during an emergency.

This facility should be factored into municipal fire management planning as a piece of vital infrastructure. With the measures in place the main goal will be to protect the facility itself from bushfire hazards but this can be addressed through a single truck with the control and maintenance systems proposed.

Table 9. Facility operation requirements for Battery Energy Storage Systems

Source: Section 8 of *Design Guidelines and Model Requirements – Renewable Energy Installations* (CFA 2022)

Model requirements

Vegetation management

Facility operators must undertake the following measures during the Fire Danger Period:

- Grass must be maintained at or below 100mm in height during the declared Fire Danger Period.
- Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation.
- Restrictions and guidance must be adhered to during the Fire Danger Period, days of high (and above) fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au).
- All vehicles and heavy equipment must carry at least a nine (9)-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-site during the Fire Danger Period.

Maintenance

Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. Maintenance must be in line with any relevant Australian Standards and the manufacturer's requirements.

Facility and Systems Monitoring

Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.

4.6 Conclusion

In conclusion, while the site can be considered higher risk due to it being within a Bushfire Prone Area and with the presence of Forest vegetation, the risk is reduced due to the managed paddocks, the distance from the Forest vegetation along with its potential use as a thermal barrier from north-westerly bushfire scenarios and the successful review against Clause 13.02-1S which shows that the development can be installed without increasing the hazard to the surrounding community and can assist in reducing the hazard with the additional security provided to the power grid.

The facility has also been well designed with plenty of separation being provided between BESS unit groups along with separation from boundaries and between infrastructure which not only reduces the risk from external and internal hazards but also provides plenty of room to install the required fuel break and access track around the perimeter and the required internal access tracks. Two entrances/emergency exits are proposed along with the required water storage. The remaining vegetation onsite will be regularly managed so any remaining hazards can be handled via proper site and emergency planning.

Emergency management during construction will be essential since this will be the period when the most people are present within the site. Scheduling construction outside of bushfire season reduces the risk substantially but installing all of the proposed fire safety measures prior to installing any infrastructure is also advised. Making sure there is a proper evacuation plan is also essential considering the potential exposure to bushfire. Once the facility is complete, the passive protection measures should be sufficient to reduce any hazard from the facility itself so emergency services can focus on protecting this vital piece of infrastructure.

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5. REFERENCES

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- Standards Australia (2018) *Australian Standard 3959–2018 Construction of buildings in bushfire-prone areas (incorporating Amendment No. 1)*. SAI Global, Sydney.

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Appendix 1. Weather data

The closest weather station to Glenbrae which provides 9am and 3pm temperature and wind conditions in addition to max/min temperatures and rainfall data was the Maryborough Weather Station approximately 35km to the north-east of the site. The following information was obtained from the Bureau of Meteorology on the 28th September 2022 and this data was last updated on the 22nd September 2022 (Meteorology 2022).

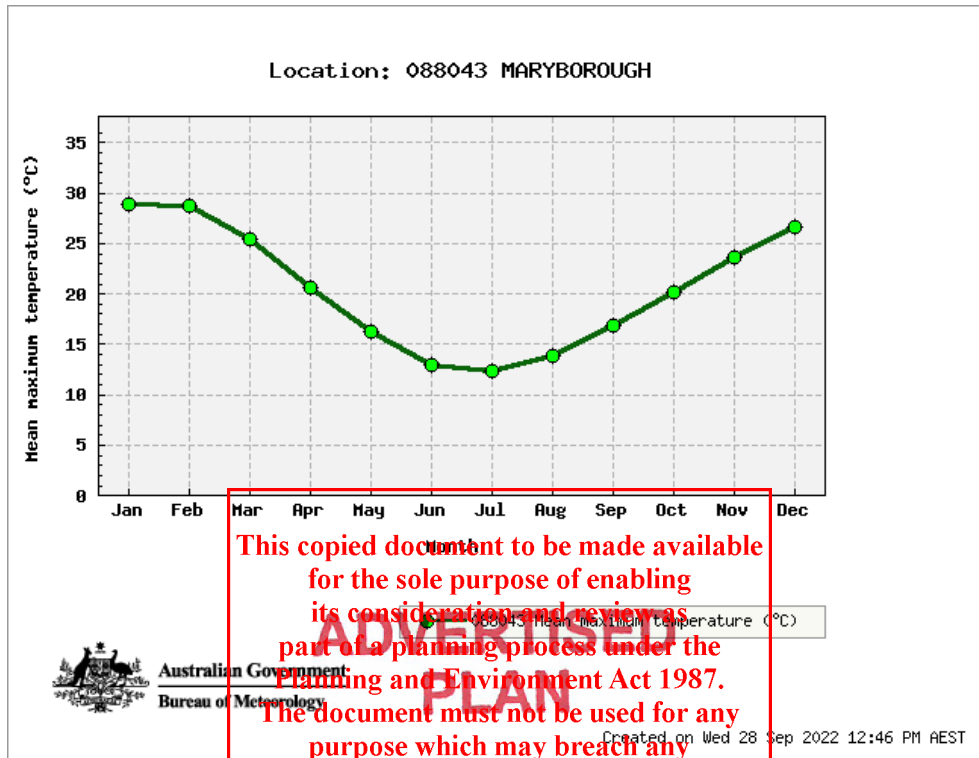


Figure 10. Mean maximum temperatures (°C) from 1899–2022

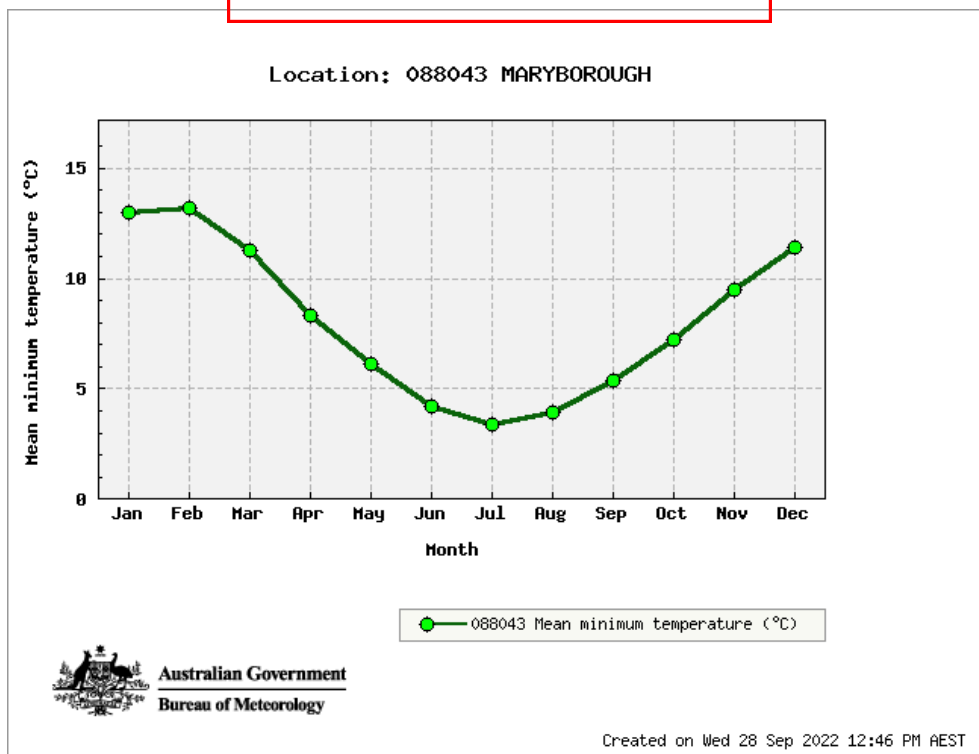


Figure 11. Mean minimum temperatures (°C) from 1899–2022

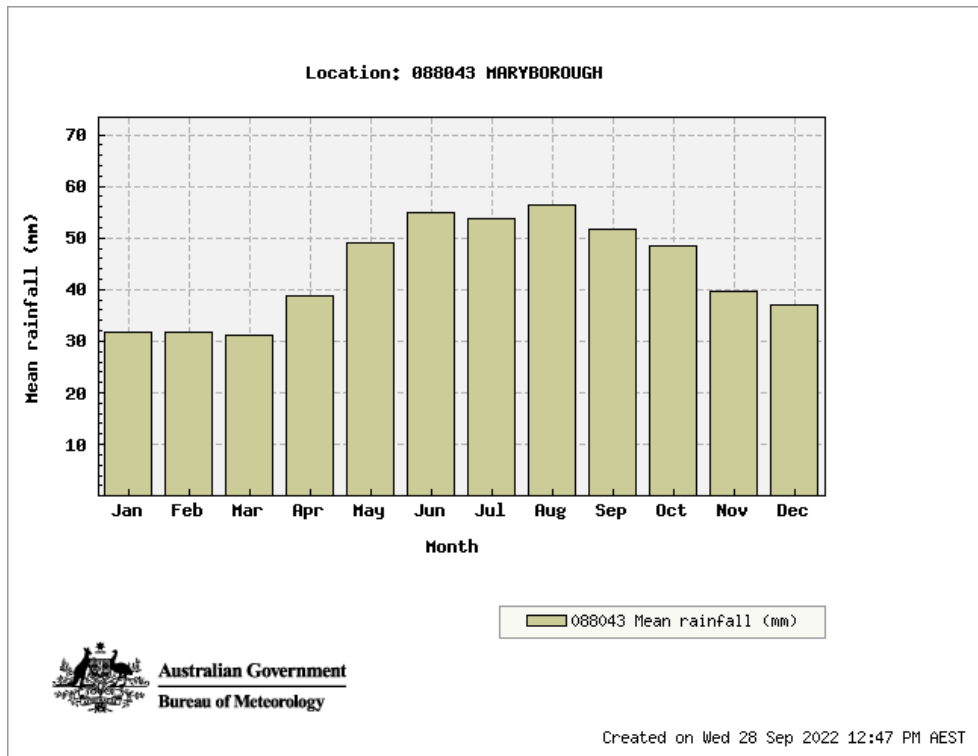


Figure 12. Mean rainfall (mm) from 1878–2022

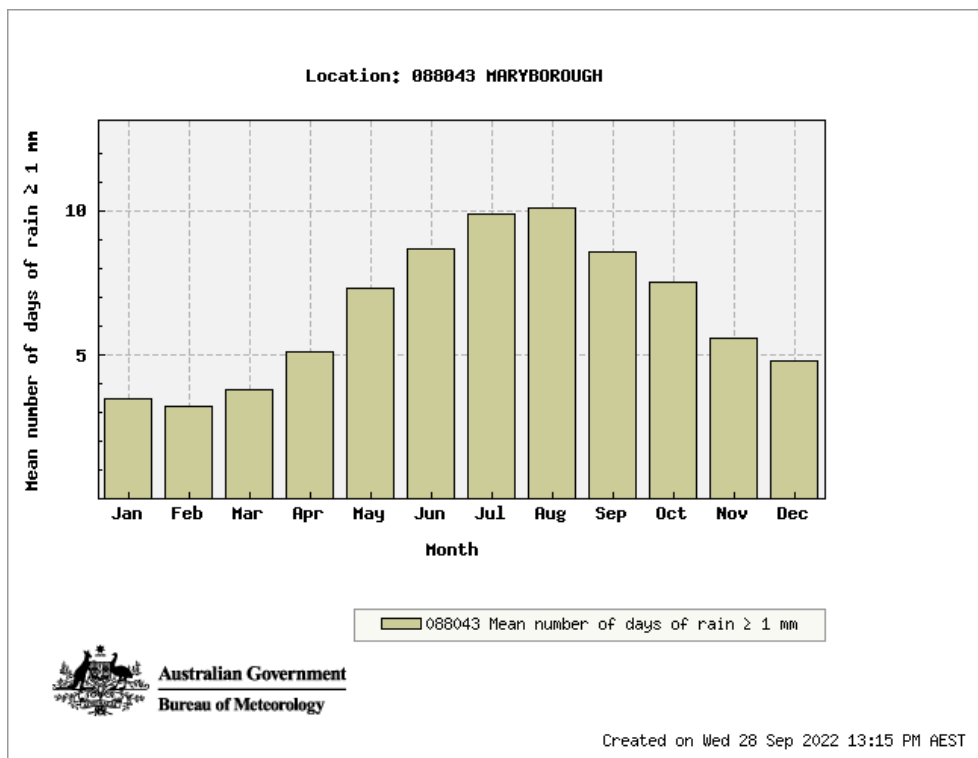


Figure 13. Mean number of days with rainfall ≥ 1 mm from 1878–2022

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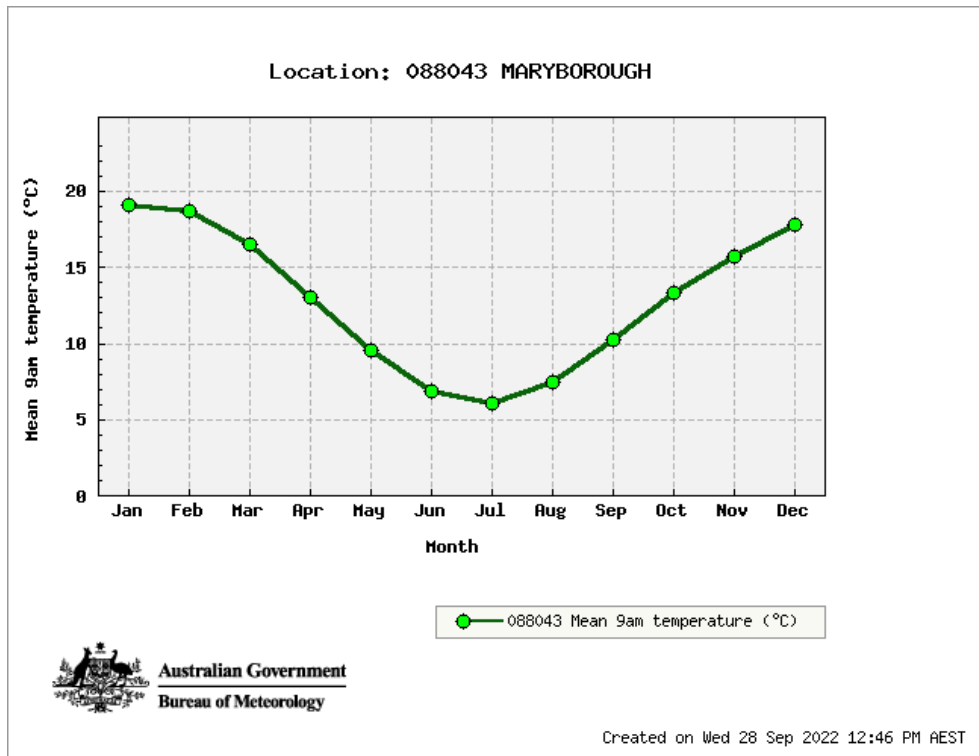


Figure 14. Mean 9am temperatures (°C) from 1908–2022

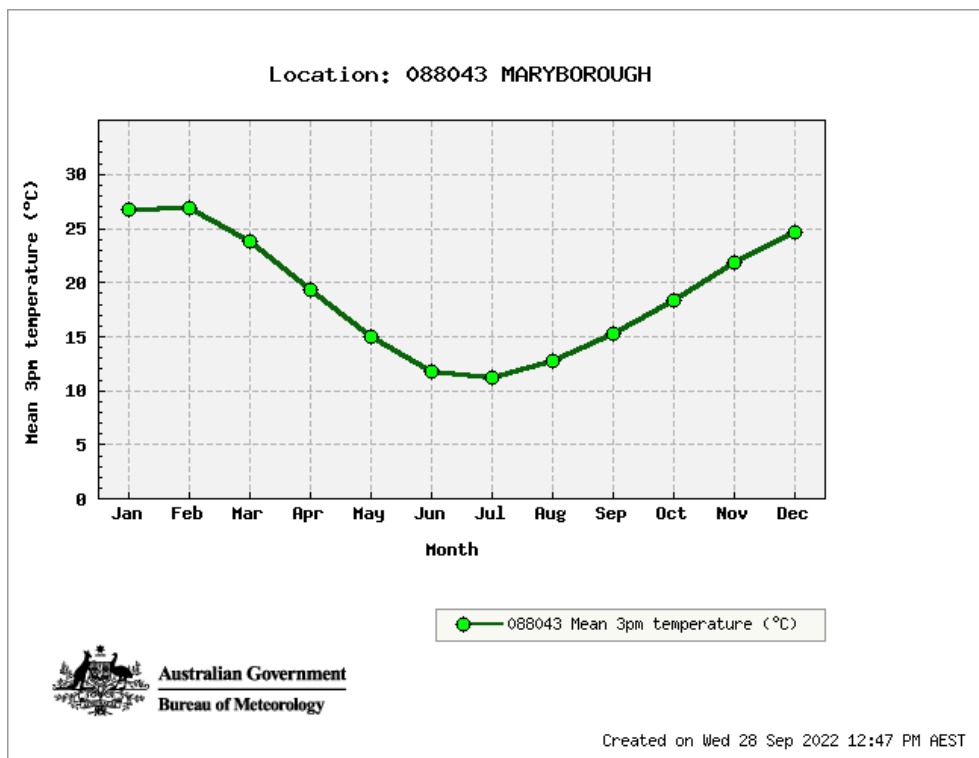


Figure 15. Mean 3pm temperatures (°C) from 1908–2022

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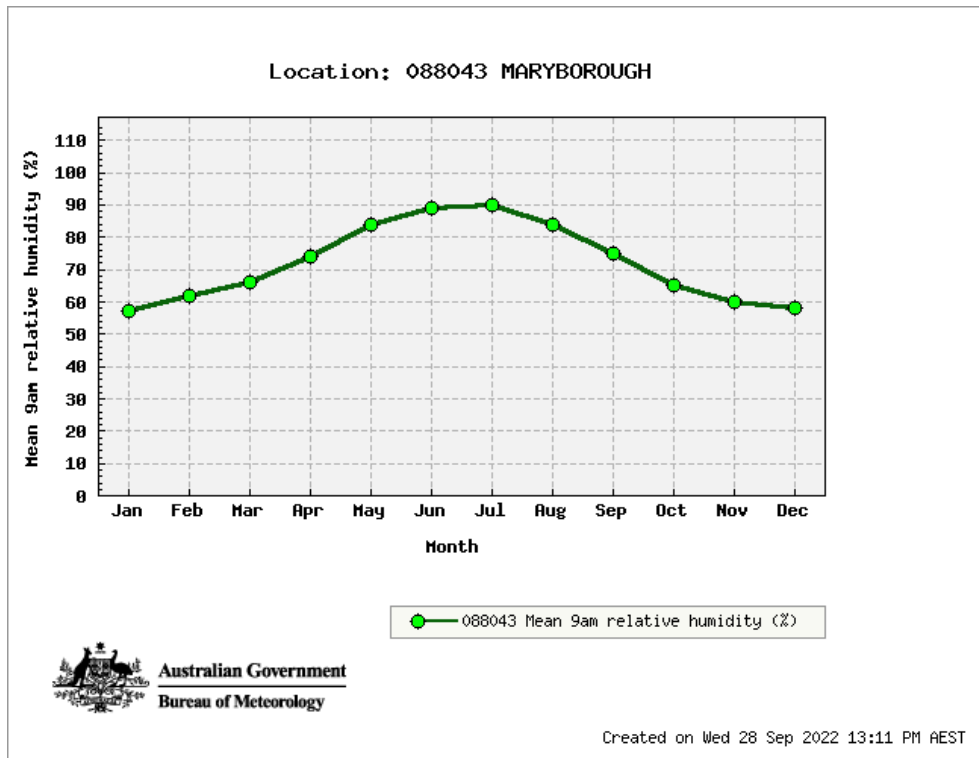


Figure 16. Mean 9am relative humidity (%) from 1908–2022

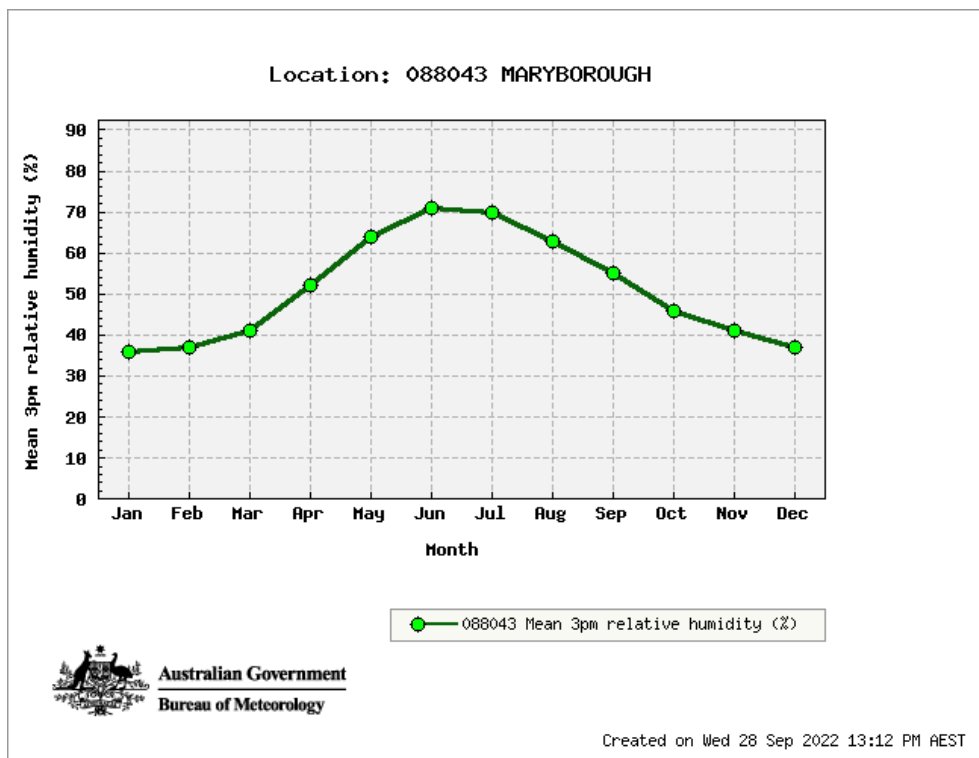


Figure 17. Mean 3pm relative humidity (%) from 1908–2022

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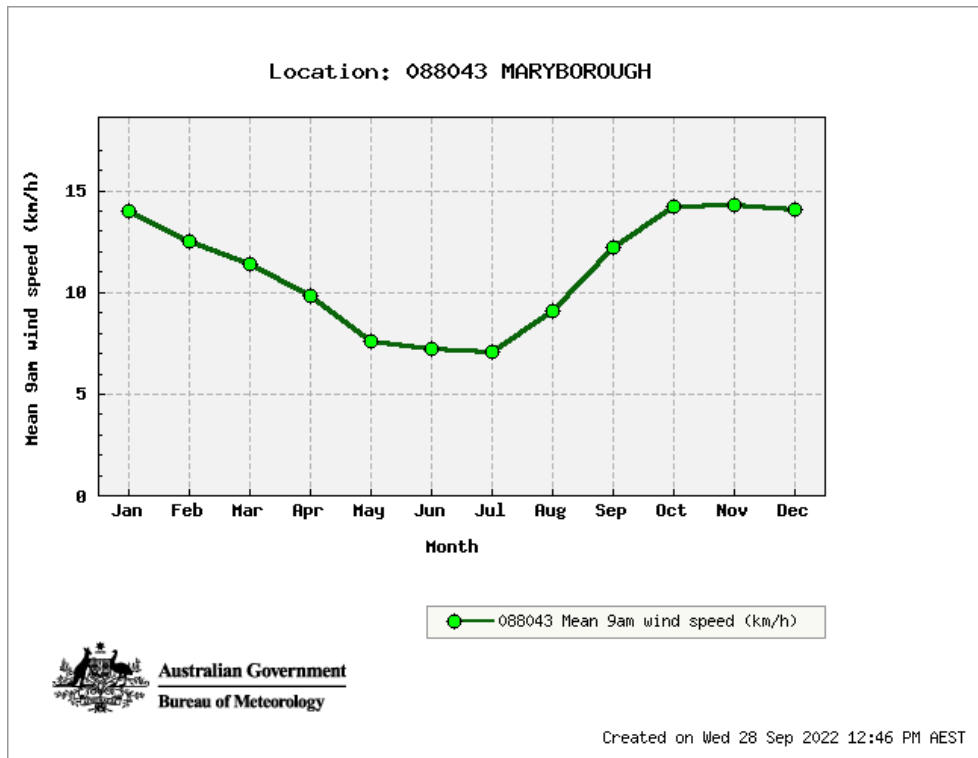


Figure 18. Mean 9am wind speeds (km/h) from 1908–2022

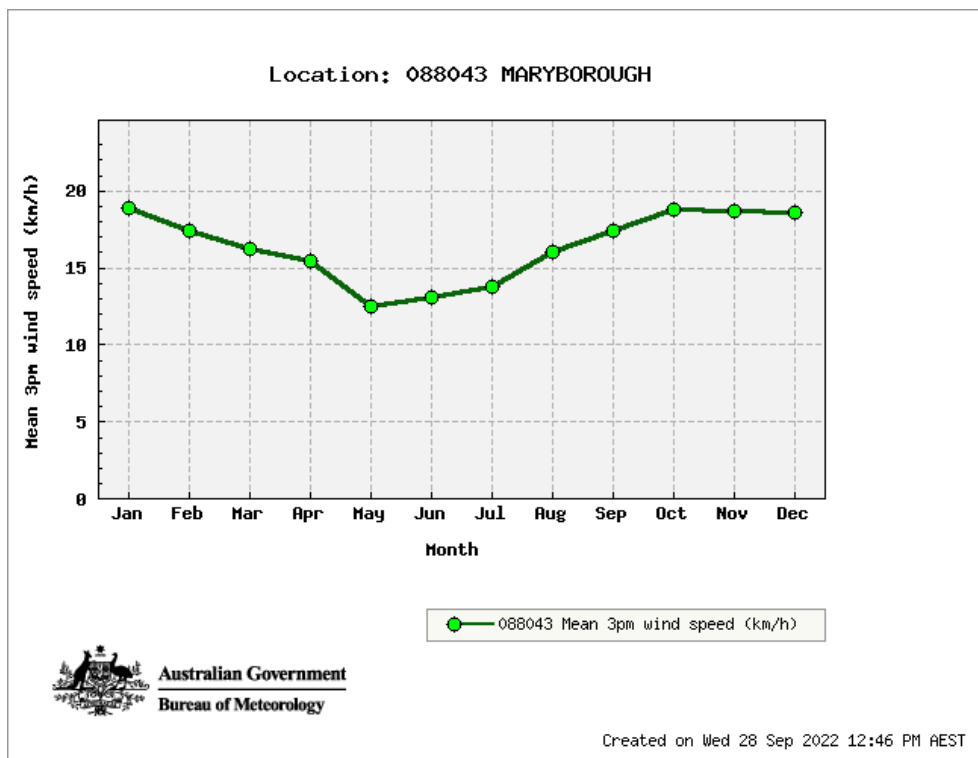


Figure 19. Mean 3pm wind speeds (km/h) from 1908–2022

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9 am
20430 Total Observations
Calm 9%

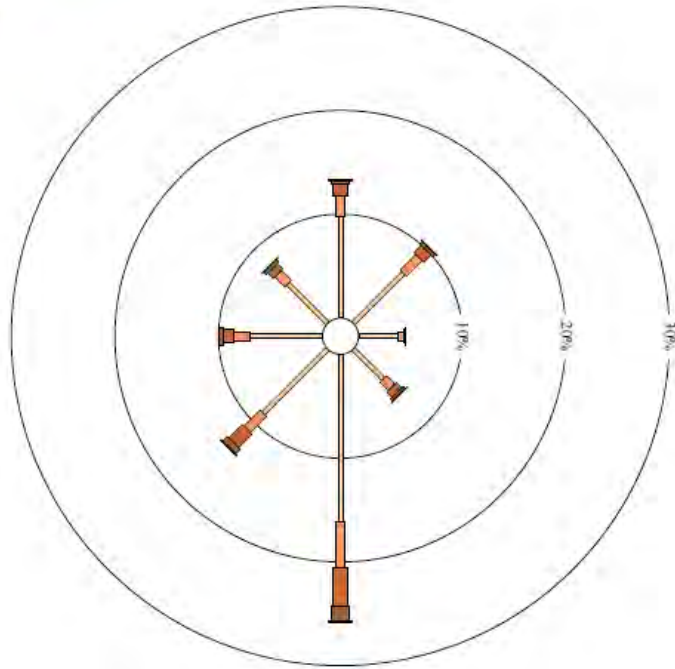


Figure 20. Mean 9am wind directions from 1908–2022

3 pm
16406 Total Observations
Calm 2%

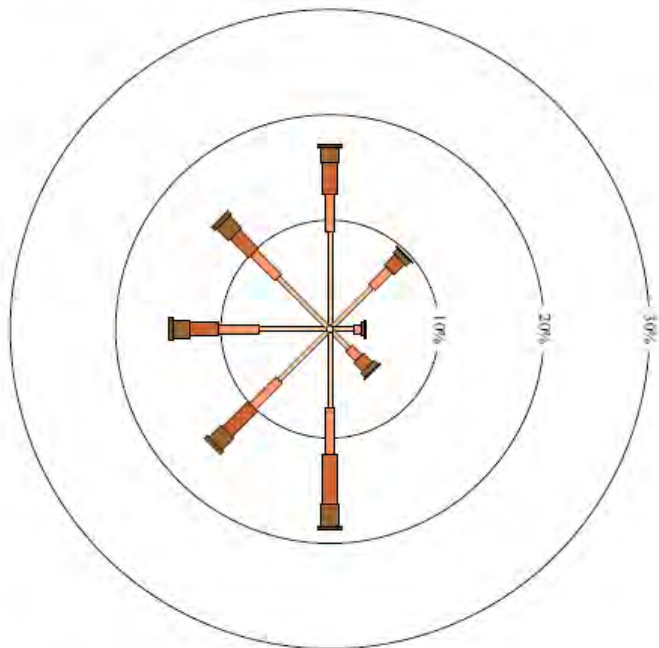


Figure 21. Mean 3pm wind directions from 1908–2022

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Appendix 2. Maps


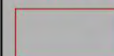
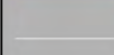
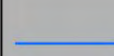
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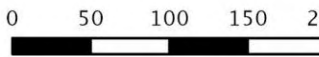
Map 1. Subject site
438 Lobbs Road, Glenbrae

Legend

-  Subject site
-  Parcels
-  Contours (10m)
-  Natural watercourse

Details

Mapping by: Julian Drummond
Date: 26/09/2022
Version: 1
Aerial photography from ArcGis World Imagery.
Data Source: Base layers courtesy of VicMap,
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
















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Map 2. Bushfire Hazard Site Assessment

438 Lobbs Road, Glenbrae

Legend

-  Subject site
-  Assessment area (100m)
-  Parcels
-  Contours (10m)
-  Natural watercourse
- Developments**
-  BESS area
-  Switching station area
-  Powerline easement
-  BESS units
-  Switching station
-  Connection asset area
-  Carpark
-  Loading area
-  Existing transmission lines
-  Proposed connection to substation
- Classified vegetation**
-  Forest
-  Grassland
-  Low Threat

Details

Mapping by: Julian Drummond
 Date: 16/03/2023
 Version: 1
 Aerial photography from ArcGIS World Imagery.
 Data Source: Base layers courtesy of VicMap,
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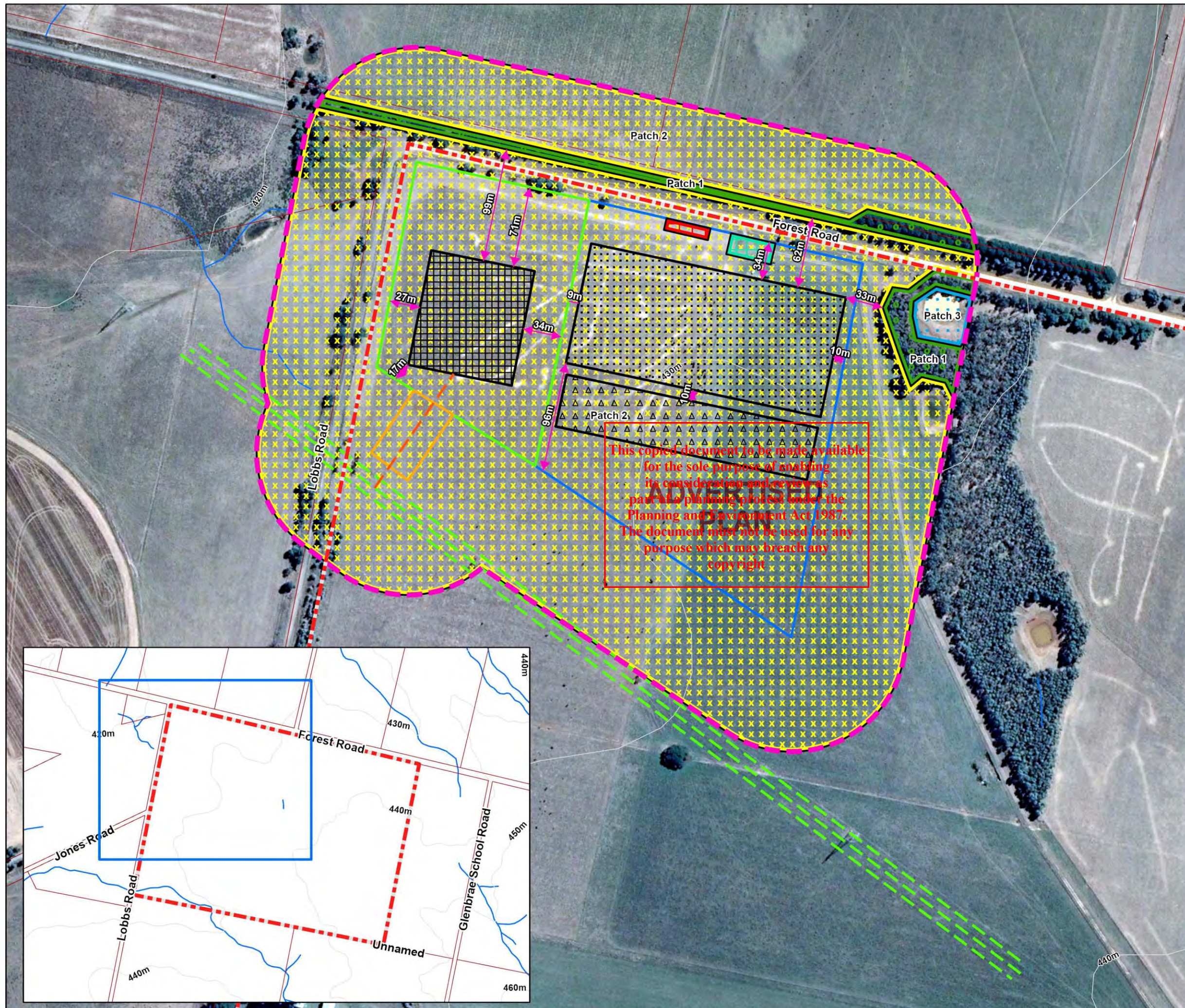
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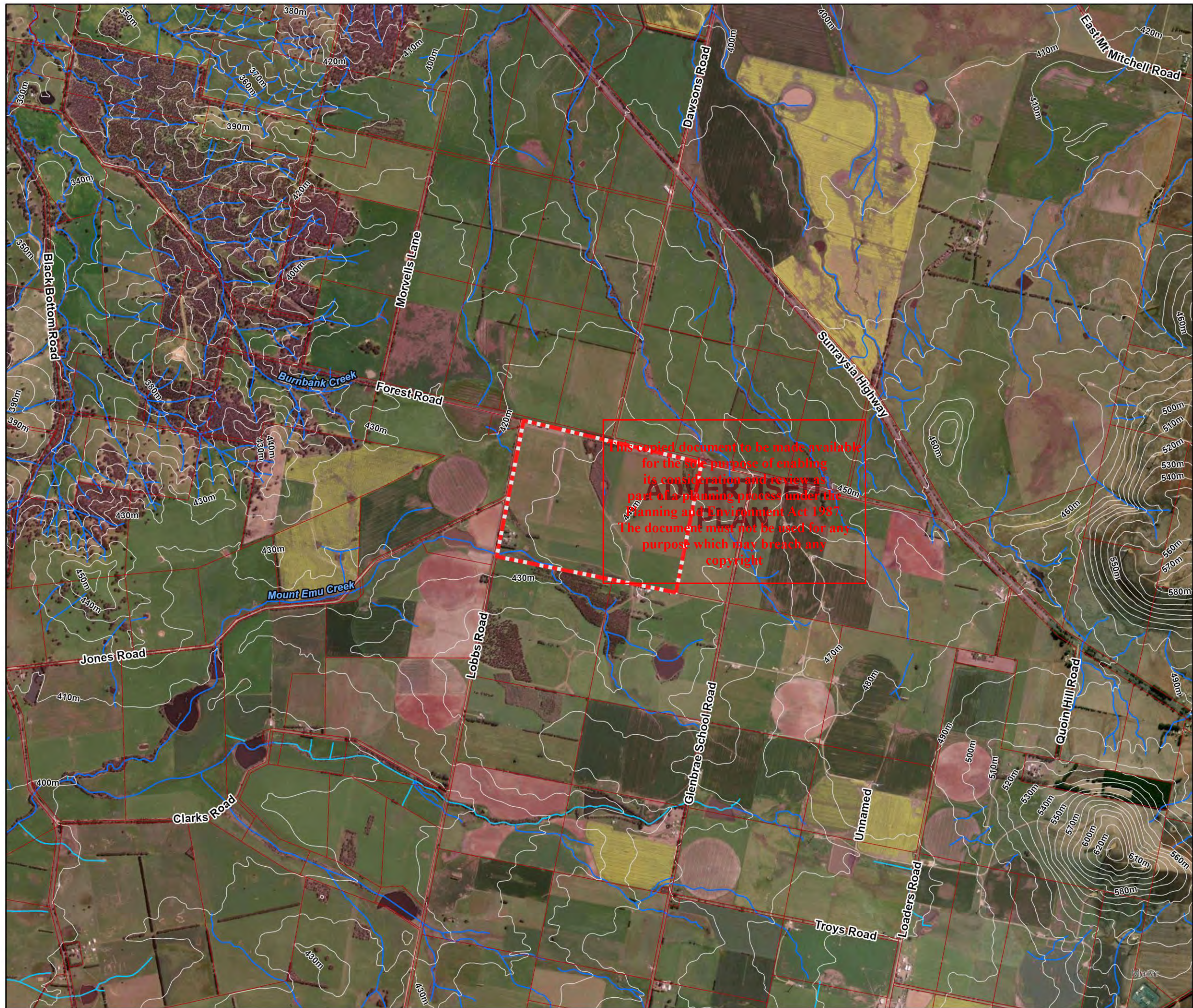
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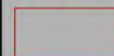
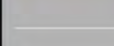
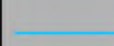
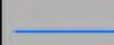




Map 3. Local Context


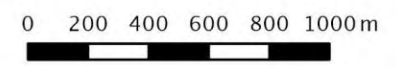
438 Lobbs Road, Glenbrae

Legend

-  Subject site
-  Parcels
-  Contours (10m)
-  Constructed watercourse
-  Natural watercourse

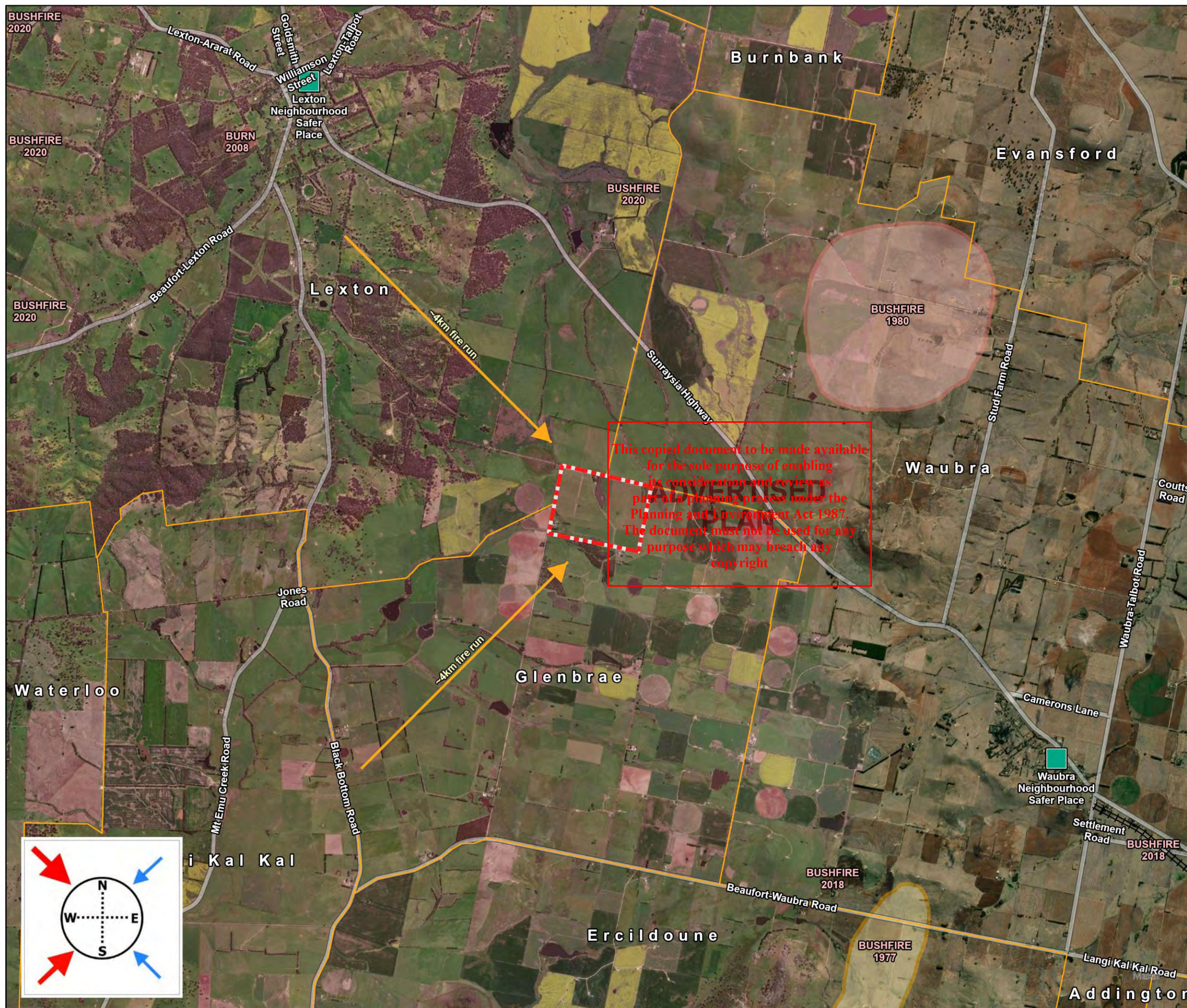
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Aerial photography from ArcGis World Imagery.
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Map 4. Bushfire Hazard Landscape Assessment

438 Lobbs Road, Glenbrae

Legend

- Subject site
- Railways
- Localities
- Major Roads
- Neighbourhood Safer Place
- Potential fire runs

Fire History

Bushfire

- Bushfire 1950–1979
- Bushfire 1980 onwards

Planned Burn

- Planned Burn 1980 onwards

Details

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Date: 26/09/2022

Version: 1

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0 500 1000 1500 2000m

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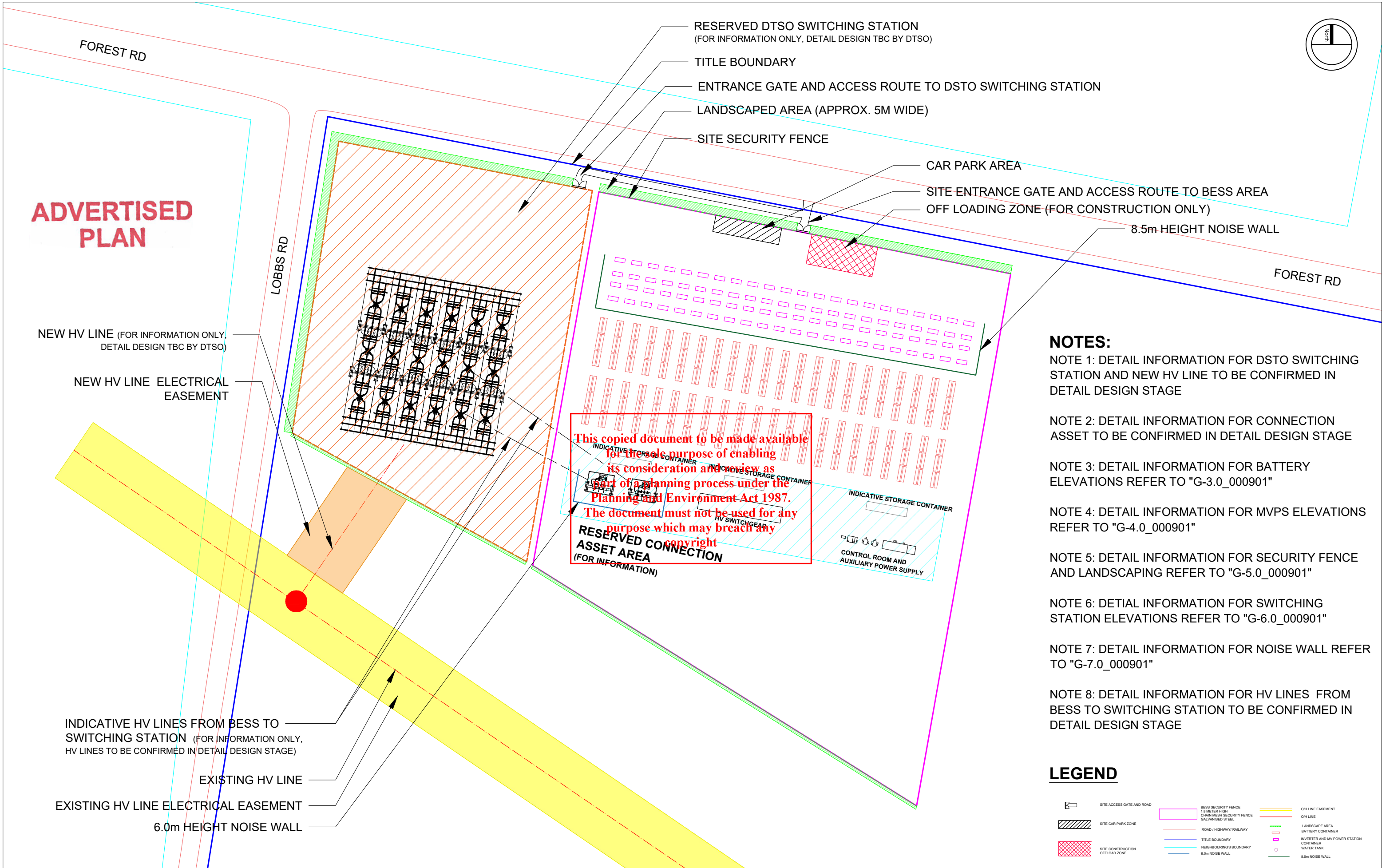
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Appendix 3. Site Plan and Proposed Layout

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6.0m HEIGHT NOISE WALL

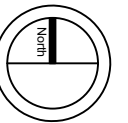
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	SITE ACCESS GATE AND ROAD		BESS SECURITY FENCE 1.8 METERS HIGH CHAIN MESH SECURITY FENCE GALVANIZED STEEL		GH LINE EASEMENT GH LINE
	SITE CAR PARK ZONE		ROAD / HIGHWAY/ RAILWAY		LANDSCAPE AREA BATTERY CONTAINER
	SITE CONSTRUCTION OFFLOAD ZONE		TITLE BOUNDARY		INVERTER AND MV POWER STATION CONTAINER
			NEIGHBOURING'S BOUNDARY		WATER TANK
			6.0m NOISE WALL		8.5m NOISE WALL

PROJECT DETAILS:	GLENBRAE BESS 438 Lobbs Rd Glenbrae -37.328781, 143.554825
CLIENT DETAILS:	ACENERGY PTY LTD
DRAWING TITLE:	SITE PLAN 1 OF 2

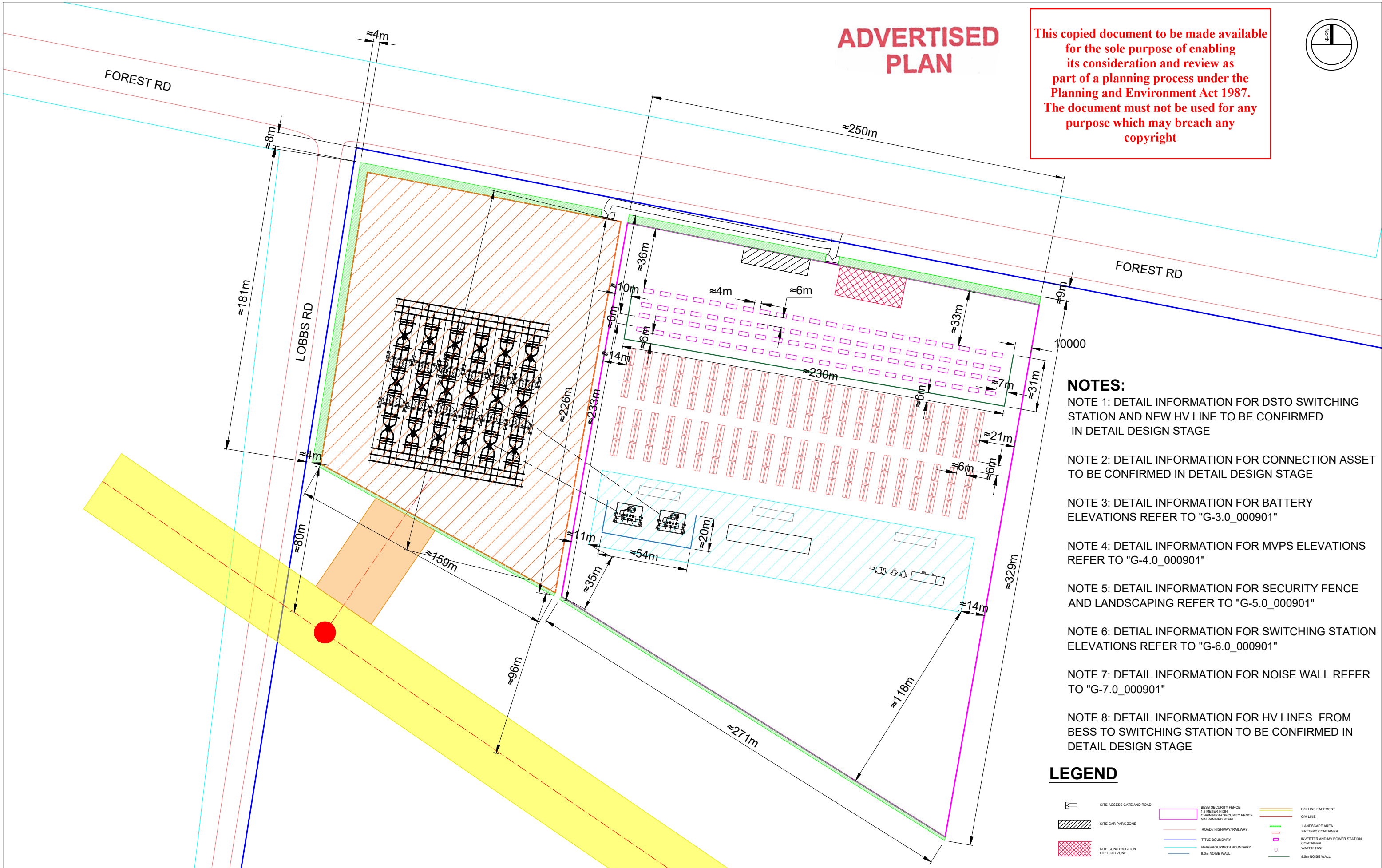
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SCALE : AS INDICATED		ISSUE : FOR APPROVAL		ISSUE DATE : 19/04/2023	
SHEET SIZE: A3		PROJECT NO: 901		REV. NO: C	





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- NOTES:**
- NOTE 1: DETAIL INFORMATION FOR DSTO SWITCHING STATION AND NEW HV LINE TO BE CONFIRMED IN DETAIL DESIGN STAGE
 - NOTE 2: DETAIL INFORMATION FOR CONNECTION ASSET TO BE CONFIRMED IN DETAIL DESIGN STAGE
 - NOTE 3: DETAIL INFORMATION FOR BATTERY ELEVATIONS REFER TO "G-3.0_000901"
 - NOTE 4: DETAIL INFORMATION FOR MVPS ELEVATIONS REFER TO "G-4.0_000901"
 - NOTE 5: DETAIL INFORMATION FOR SECURITY FENCE AND LANDSCAPING REFER TO "G-5.0_000901"
 - NOTE 6: DETIAL INFORMATION FOR SWITCHING STATION ELEVATIONS REFER TO "G-6.0_000901"
 - NOTE 7: DETAIL INFORMATION FOR NOISE WALL REFER TO "G-7.0_000901"
 - NOTE 8: DETAIL INFORMATION FOR HV LINES FROM BESS TO SWITCHING STATION TO BE CONFIRMED IN DETAIL DESIGN STAGE

LEGEND

- SITE ACCESS GATE AND ROAD
- SITE CAR PARK ZONE
- SITE CONSTRUCTION OFFLOAD ZONE
- BESS SECURITY FENCE 1.8 METER HIGH CHAIN MESH SECURITY FENCE GALVANISED STEEL
- ROAD / HIGHWAY / RAILWAY
- TITLE BOUNDARY
- NEIGHBOURING'S BOUNDARY
- 6.0m NOISE WALL
- O&H LINE EASEMENT
- O&H LINE
- LANDSCAPE AREA
- BATTERY CONTAINER
- INVERTER AND MV POWER STATION
- CONTAINER
- WATER TANK
- 8.5m NOISE WALL

REVISIONS					
REV	STATUS	DESCRIPTION	DATE	D.B.	C.B.
A	FA	INITIAL ISSUE	15/08/22	XT	RZ
B	FA	SITE PLAN UPDATED	05/03/23	XT	RZ
C	FA	UPDATED ACCORDING TO CUSTOMER COMMENTS	20/04/23	VS	RZ

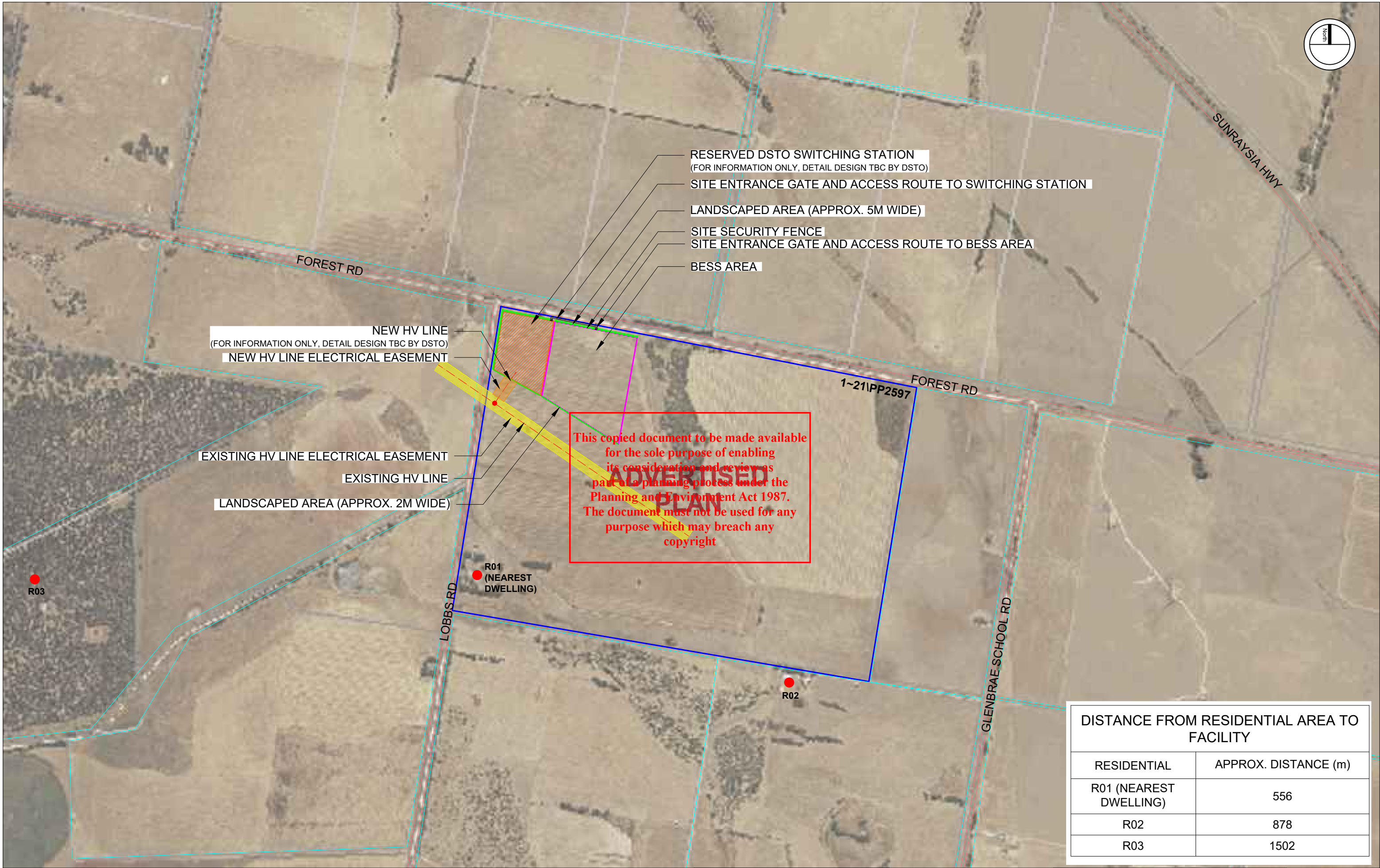
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CLIENT DETAILS:	ACENERGY PTY LTD
DRAWING TITLE:	SITE PLAN 2 OF 2

SCALE: 1:2000

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SCALE : AS INDICATED	ISSUE : FOR APPROVAL	ISSUE DATE : 20/04/2023
SHEET SIZE: A3	PROJECT NO: 901	REV. NO: C





DISTANCE FROM RESIDENTIAL AREA TO FACILITY

RESIDENTIAL	APPROX. DISTANCE (m)
R01 (NEAREST DWELLING)	556
R02	878
R03	1502

REVISIONS					
REV	STATUS	DESCRIPTION	DATE	D.B.	C.B.
A	FA	INITIAL ISSUE	15/08/22	XT	RZ
B	FA	LANDSCAPE UPDATED	05/03/23	XT	RZ

PROJECT DETAILS:	GLENBRAE BESS <small>438 Lobbs Rd Glenbrae -37.328781, 143.554825</small>
CLIENT DETAILS:	ACENERGY PTY LTD
DRAWING TITLE:	LOCALITY DIAGRAM 1 OF 2


SCALE: 1:10000

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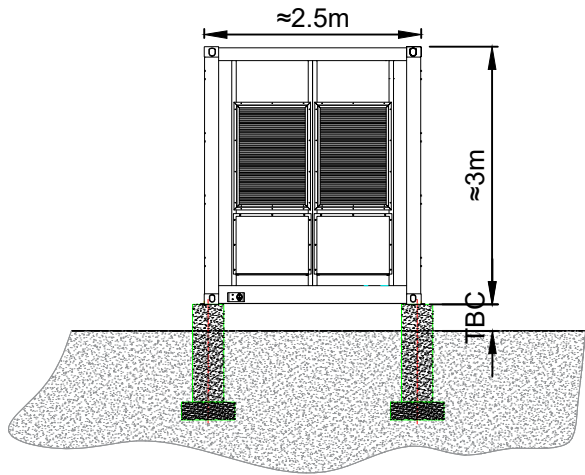


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REV	STATUS	DESCRIPTION	DATE	D.B.	C.B.	CLIENT DETAILS:				DRAWN BY :	APPROVED BY :	PROJECT MGR :			
A	FA	INITIAL ISSUE	15/08/22	XT	RZ	ACENERGY PTY LTD				XT	RZ	LZ			
B	FA	LANDSCAPE UPDATED	05/03/23	XT	RZ	DRAWING TITLE: LOCALITY DIAGRAM 2 OF 2				AS INDICATED	FOR APPROVAL	ISSUE DATE : 05/03/2023			
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ENERGY STORAGE CONTAINER ELEVATION
SCALE 1:85

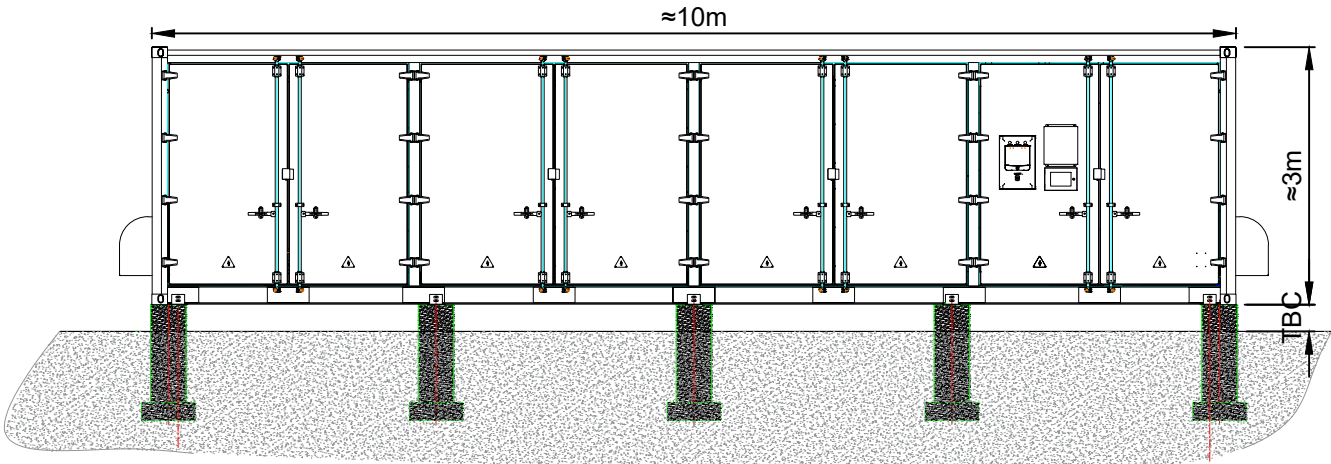
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ENERGY STORAGE CONTAINER SIDE VIEW



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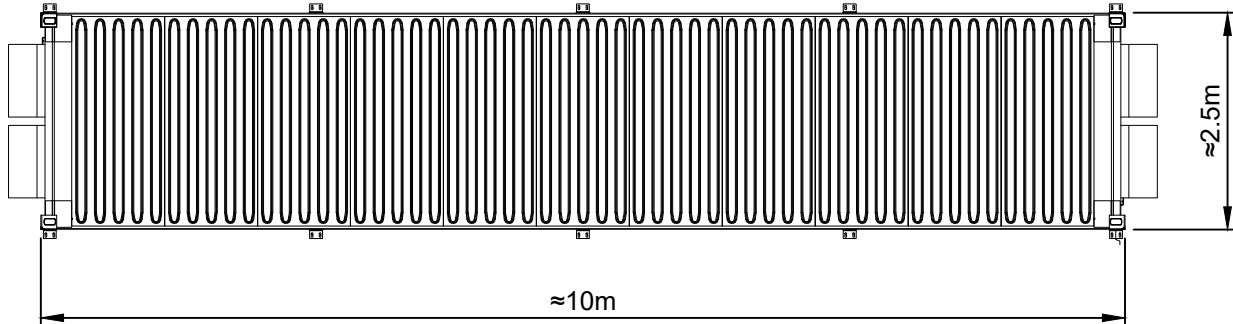
ENERGY STORAGE CONTAINER FRONT VIEW



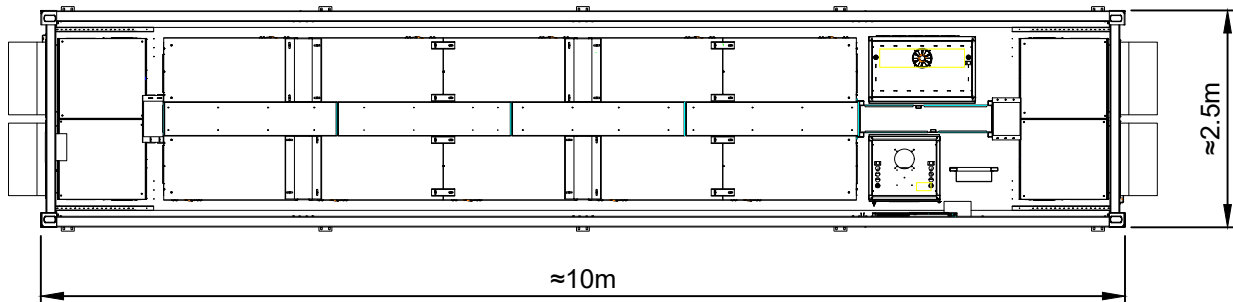
TYPICAL ENERGY STORAGE CONTAINER LAYOUT
MATERIAL: POWDER COATED STEEL
COLOR: GREY




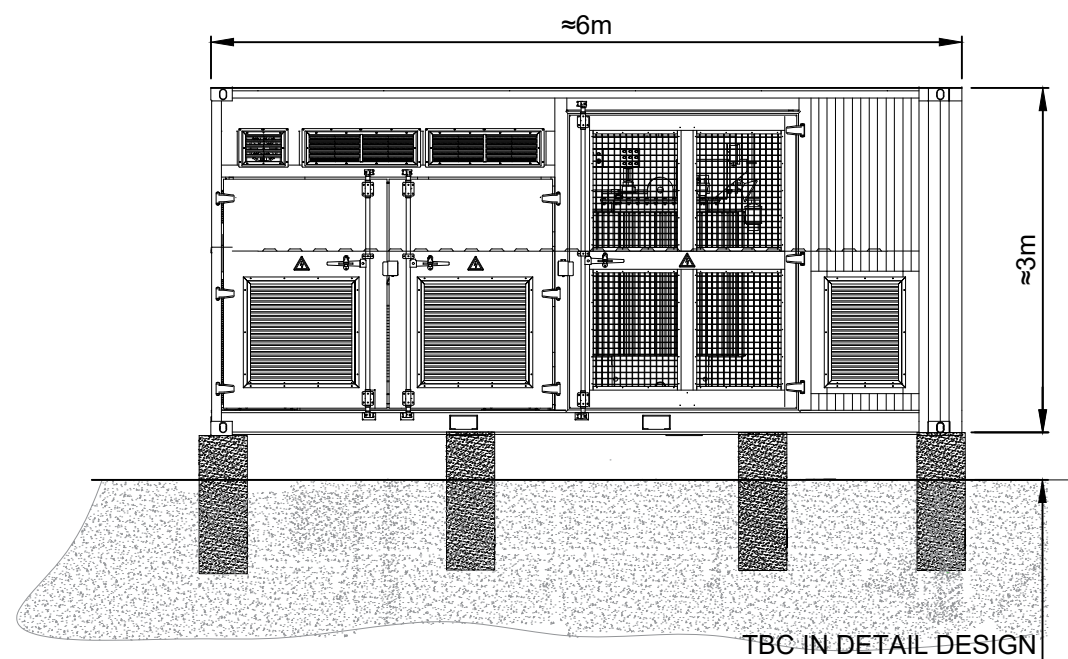
ENERGY STORAGE CONTAINER TOP VIEW



ENERGY STORAGE CONTAINER TOP VIEW - WITHOUT ROOF

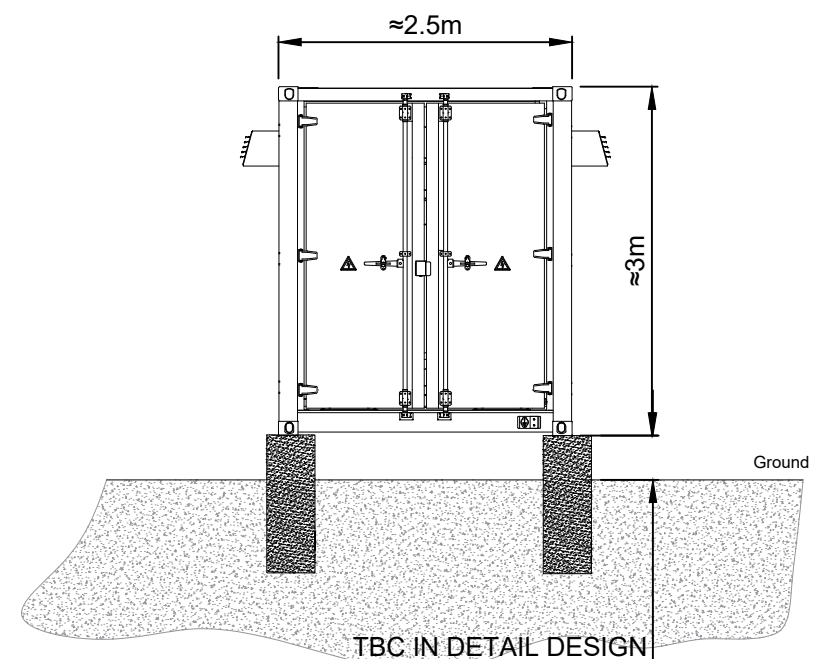


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REV	STATUS	DESCRIPTION	DATE	D.B.	C.B.	CLIENT DETAILS:						DRAWN BY :	APPROVED BY :			PROJECT MGR :
A	FA	INITIAL ISSUE	15/08/2022	XT	RZ	ACENERGY PTY LTD						VS	RZ			LZ
B	FA	UPDATED ACCORDING TO CUSTOMER COMMENTS	19/04/2023	VS	RZ							DRAWING TITLE:				SCALE :
						ENERGY STORAGE CONTAINER ELEVATIONS				AS INDICATED	FOR APPROVAL	20/04/2023				
										SHEET SIZE: A3	PROJECT NO: 901	REV. NO: B				



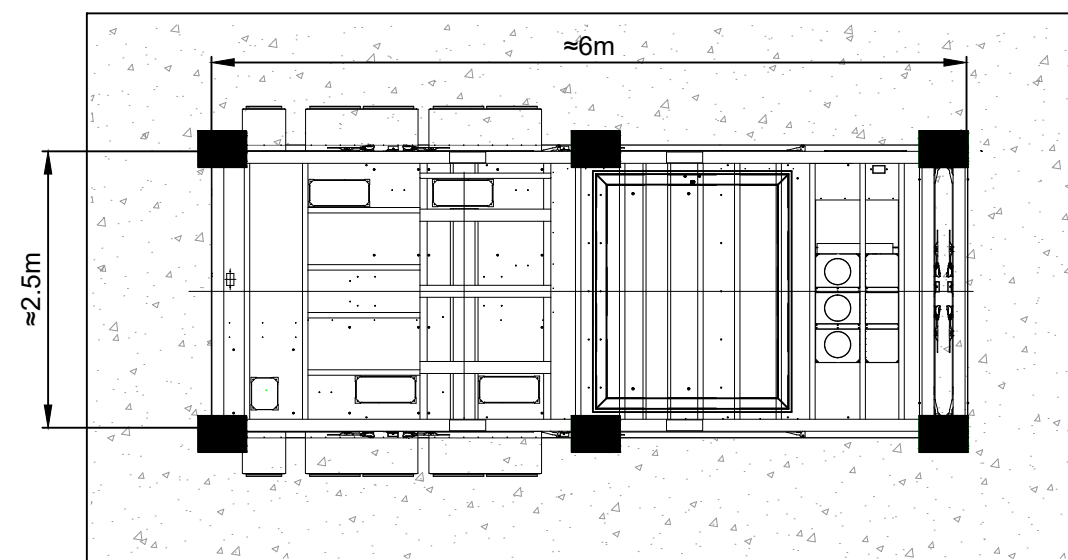
FRONT VIEW
SCALE 1:100

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SIDE VIEW
SCALE 1:100

TYPICAL MVPS CONTAINER




BOTTOM VIEW
SCALE 1:100

ADVERTISED PLAN



**GREY COLOUR
POWDER COATED STEEL**

REVISIONS						PROJECT DETAILS:			DRAWING NR: G-4.0_000901	DRAWN BY : XT	APPROVED BY : RZ	PROJECT MGR : LZ	SCALE : AS INDICATED	ISSUE : FOR APPROVAL	ISSUE DATE : 15/08/2022	SHEET SIZE: A3	PROJECT NO: 901	REV. NO: A	
REV	STATUS	DESCRIPTION	DATE	D.B.	C.B.	GLENBRAE BESS 438 Lobbs Rd Glenbrae -37.328781, 143.554825													
A	FA	INITIAL ISSUE	15/08/2022	XT	RZ	CLIENT DETAILS: ACENERGY PTY LTD													
						DRAWING TITLE: MVPS ELEVATION			COPYRIGHT OF THIS DRAWING RESERVED BY ACENERGY PTY LTD. NO PART OF THIS DOCUMENT MAY BE REPRODUCED OR COPIED IN ANY FORM OR BY ANY MEANS WITHOUT CONSENT OF ACENERGY.										

SECURITY FENCE FRONT VIEW

ADVERTISED
PLAN

3 STANDARD
BARBED WIRE

BESS SECURITY
FENCE

(APPROX. 1.8m HIGH, CHAIN MESH
SECURITY FENCE, GALVANIZED STEEL)

TBC IN DETAIL DESIGN

≈1.8m

SECURITY FENCE AND ONE ROW OF LANDSCAPE SIDE VIEW

1 ROW OF LANDSCAPED AREA

≈2m

≈1.8m

≥10m

ELECTRICAL
EQUIPMENT

SECURITY FENCE AND TWO ROWS OF LANDSCAPE SIDE VIEW

2 ROWS OF LANDSCAPED AREA

≈5m

≈1.8m

≥10m

ELECTRICAL
EQUIPMENT

REVISIONS

REV	STATUS	DESCRIPTION	DATE	D.B.	C.B.
A	FA	INITIAL ISSUE	15/08/22	XT	RZ
B	FA	LANDSCAPE UPDATED	05/03/22	XT	RZ

PROJECT DETAILS:

GLENBRAE BESS
438 Lobbs Rd Glenbrae
-37.328781, 143.554825

CLIENT DETAILS:

ACENERGY PTY LTD

DRAWING TITLE:

SECURITY FENCE & LANDSCAPE ELEVATIONS

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DRAWING NR:

G-5.0_000901

DRAWN BY :
XT

APPROVED BY :
RZ

PROJECT MGR :
LZ

SCALE :
AS INDICATED

ISSUE :
FOR APPROVAL

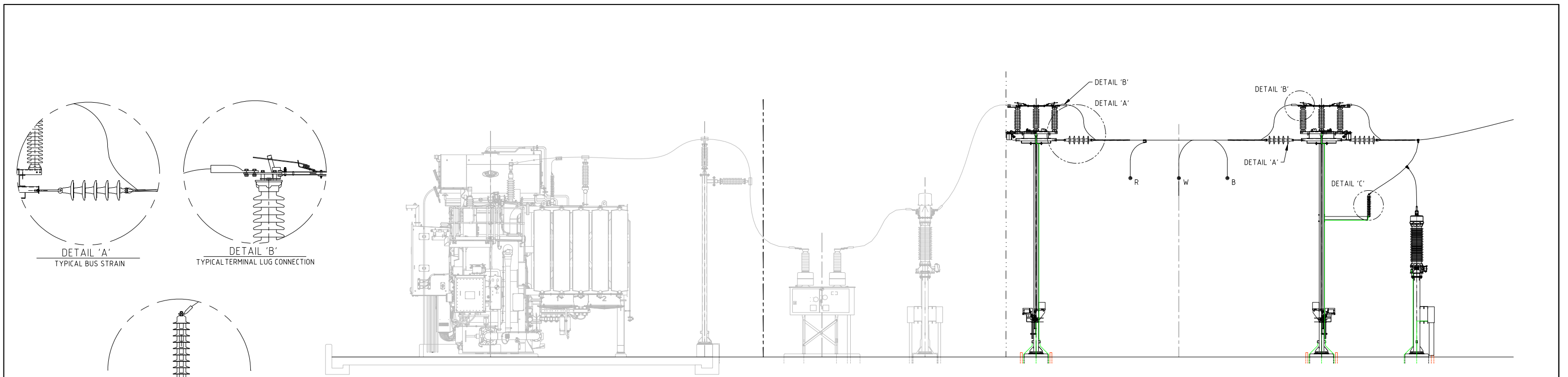
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05/03/2022

SHEET SIZE:
A3

PROJECT NO:
901

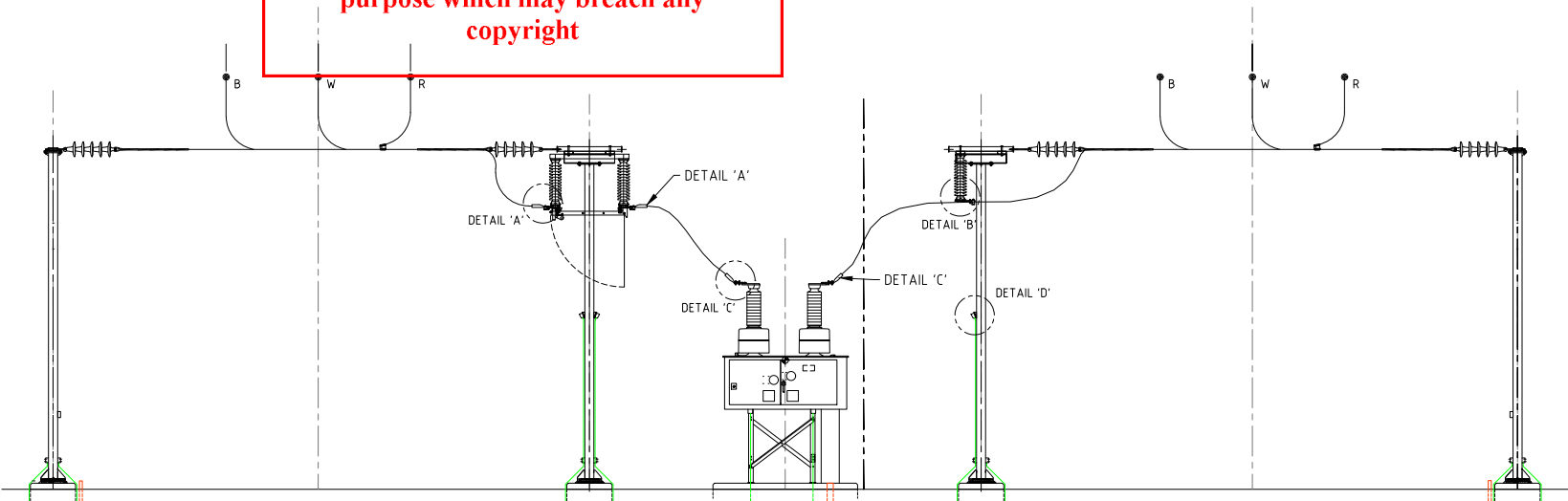
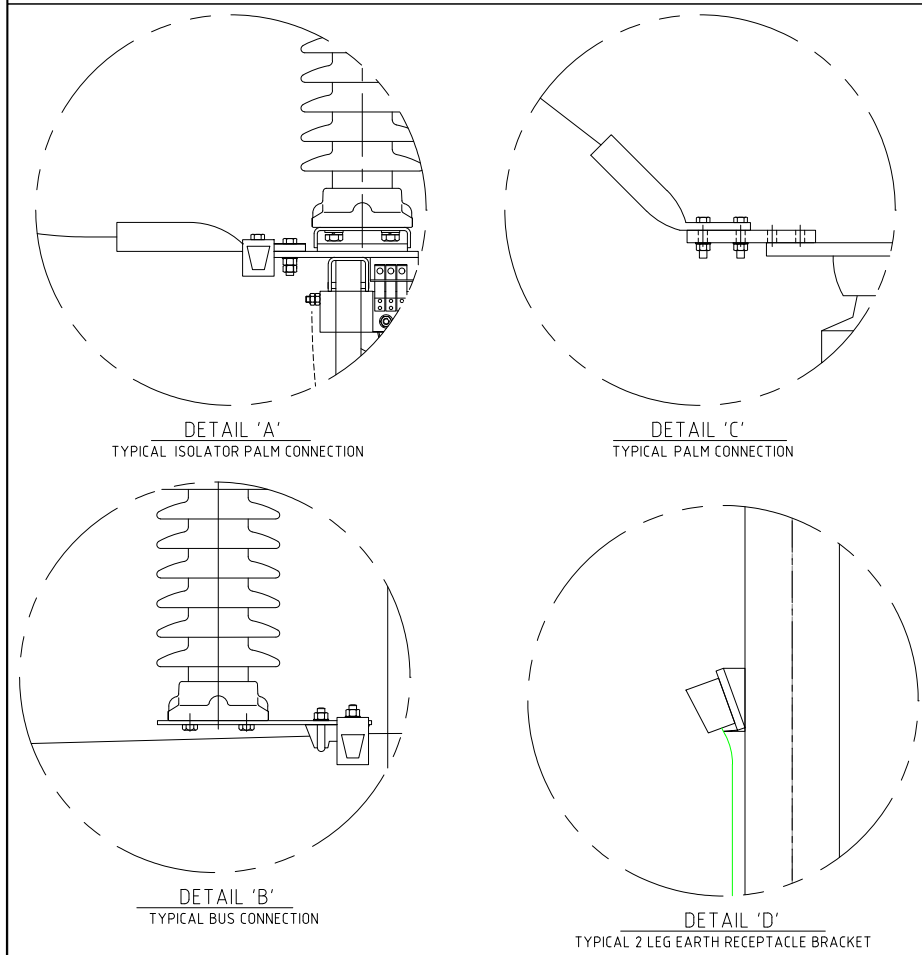
REV. NO:
B






TYPICAL SWITCHING STATION ELEVATION 1
INDICATIVE ONLY, DETAIL INFORMATION REFER TO DSTO DETAIL DESIGN

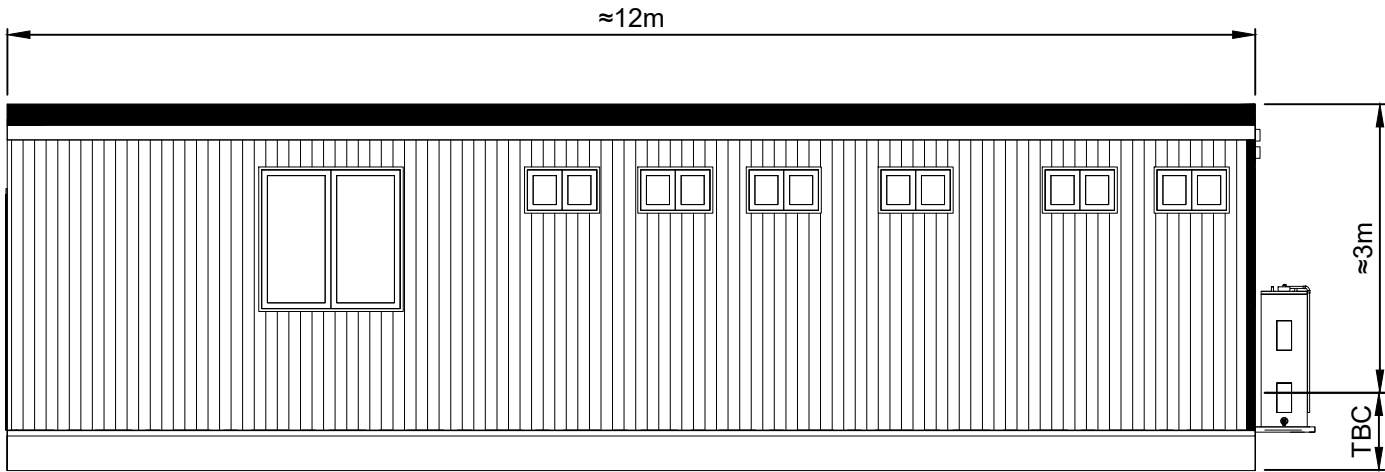
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TYPICAL SWITCHING STATION ELEVATION 2
INDICATIVE ONLY, DETAIL INFORMATION REFER TO DSTO DETAIL DESIGN

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A	FA	INITIAL ISSUE	15/08/22	XT	RZ	ACENERGY PTY LTD			SZ		RZ	LZ		
						DRAWING TITLE: SWITCHING STATION ELEVATIONS			SCALE :		ISSUE :	ISSUE DATE :		
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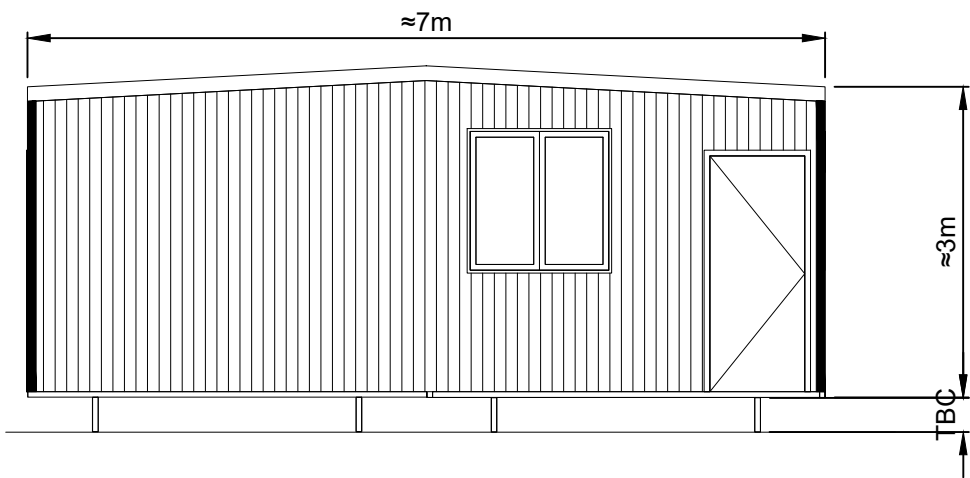
CONTROL ROOM FRONT VIEW
MATERIAL: POWDER COATED STEEL
COLOR: GREY



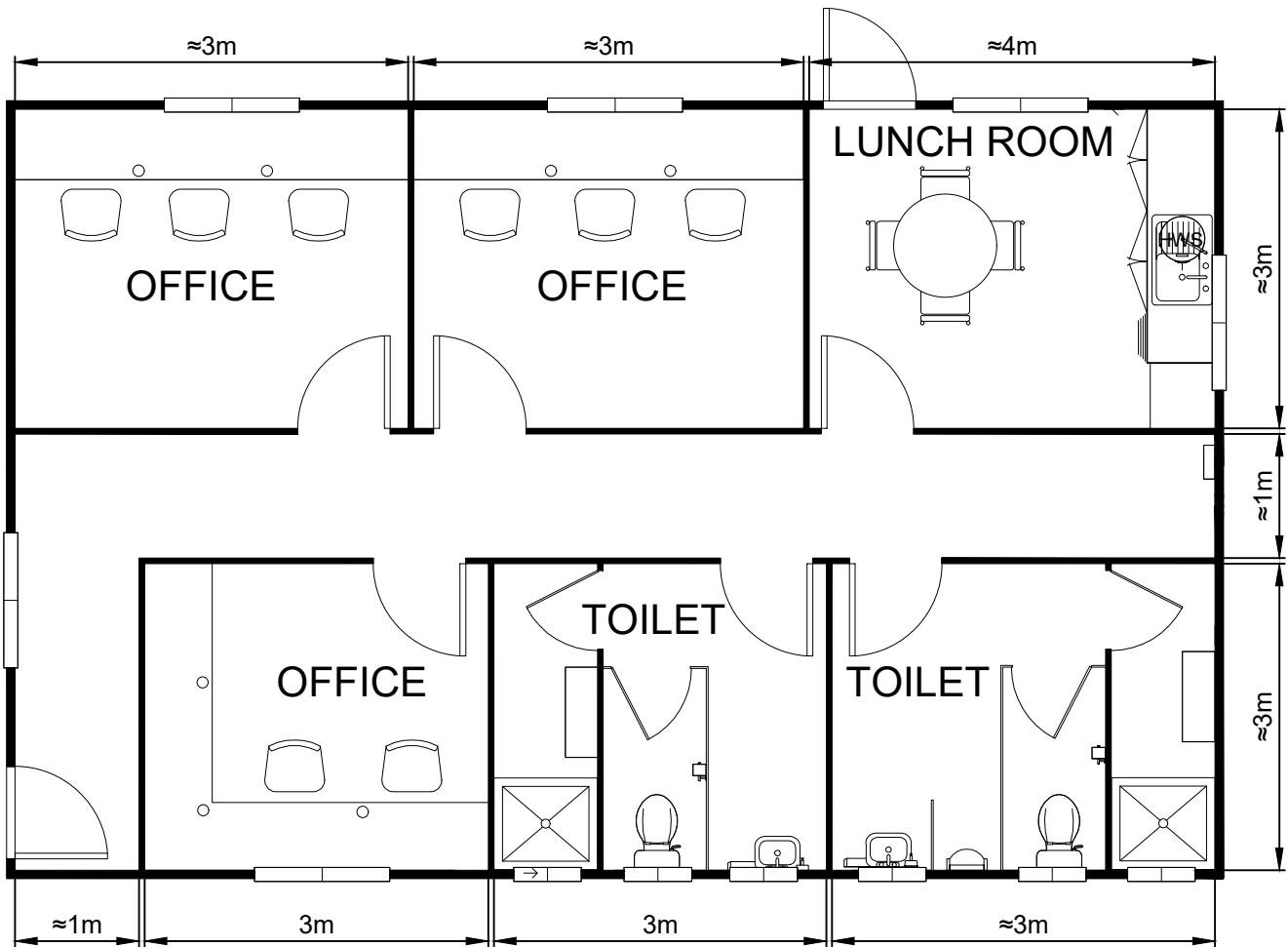
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CONTROL ROOM SIDE VIEW




CONTROL ROOM TYPICAL INTERNAL LAYOUT

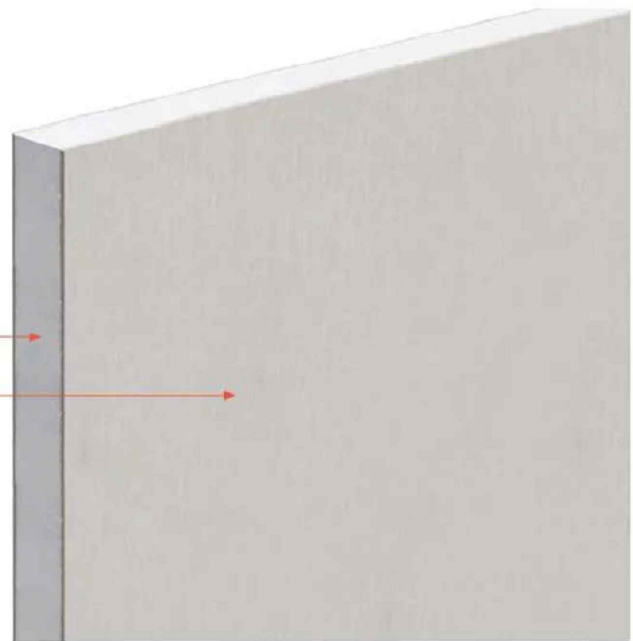


TYPICAL CONTROL ROOM

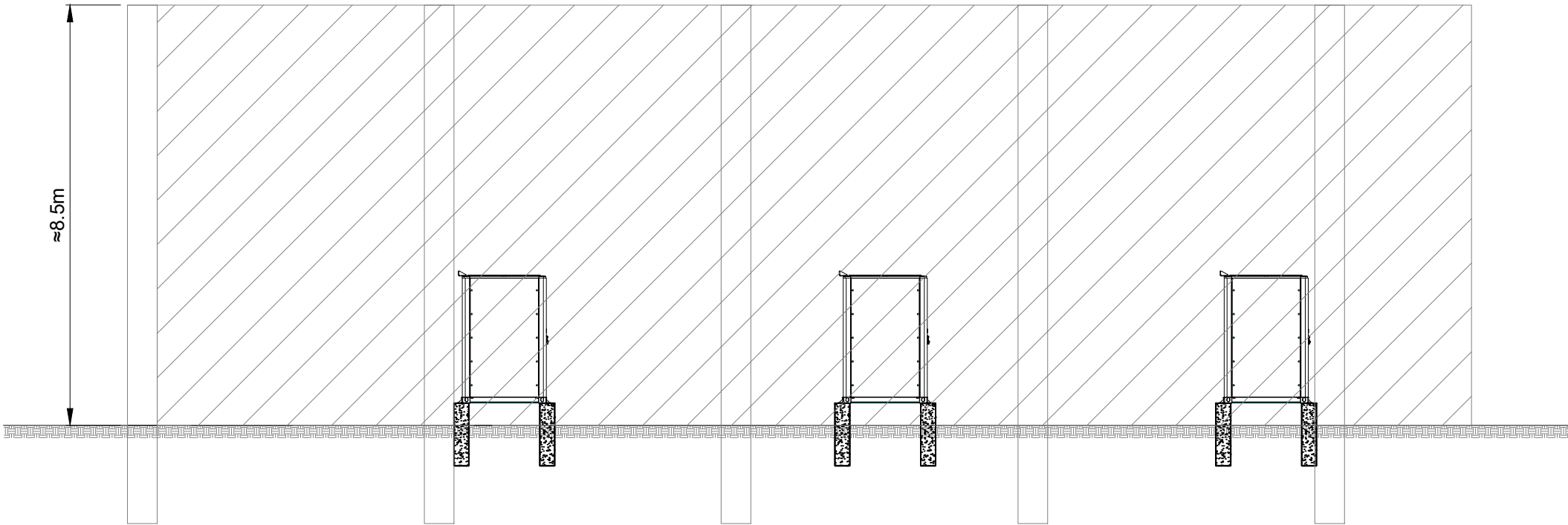


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B	FA	UPDATED ACCORDING TO CUSTOMER COMMENTS	19/04/23	VS	RZ	DRAWING TITLE: CONTROL ROOM ELEVATIONS																																																																				

INDICATIVE NOISE WALL
OUTER MATERIAL: FIBRE CEMENT
COLOR: GREY

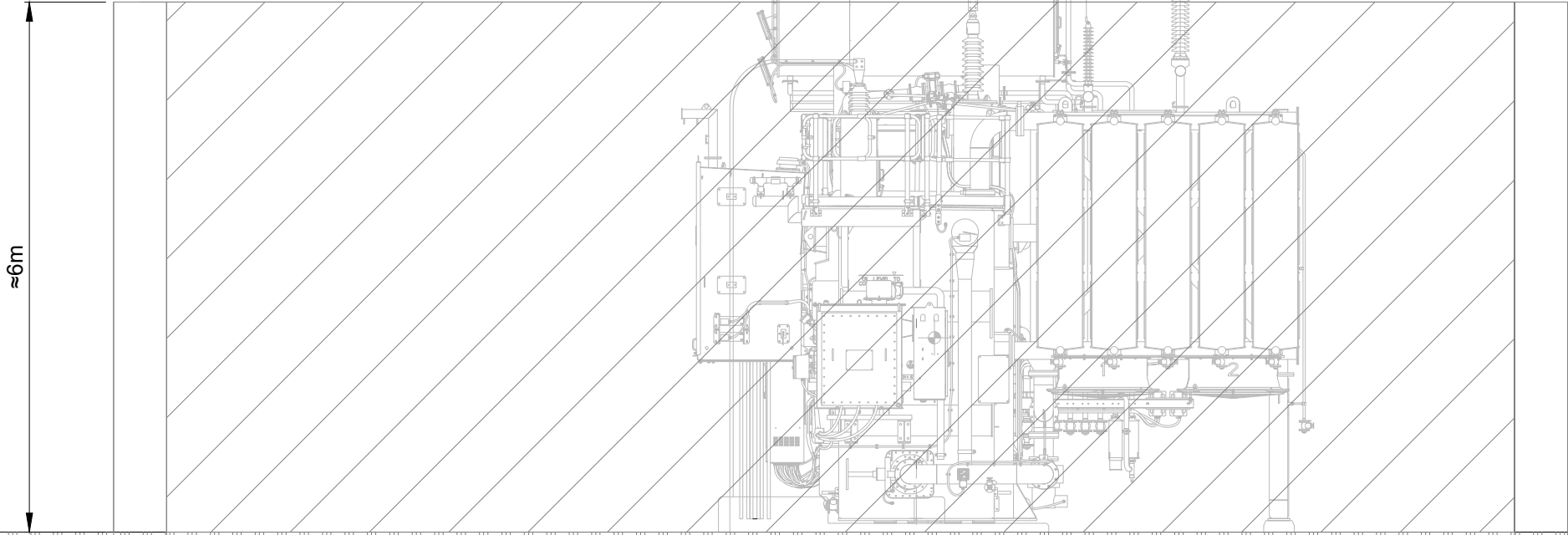


NOISE WALL AROUND MVPS
(DETAIL TO BE CONFIRMED UNDER DETAIL DESIGN)



NOISE WALL AROUND TRANSFORMER
(DETAIL TO BE CONFIRMED UNDER DETAIL DESIGN)

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PROJECT DETAILS:	GLENBRAE BESS 438 Lobbs Rd Glenbrae -37.328781, 143.554825
CLIENT DETAILS:	ACENERGY PTY LTD
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SCALE : AS INDICATED	ISSUE : FOR APPROVAL	ISSUE DATE : 19/04/2023
SHEET SIZE: A3	PROJECT NO: 901	REV. NO: B

