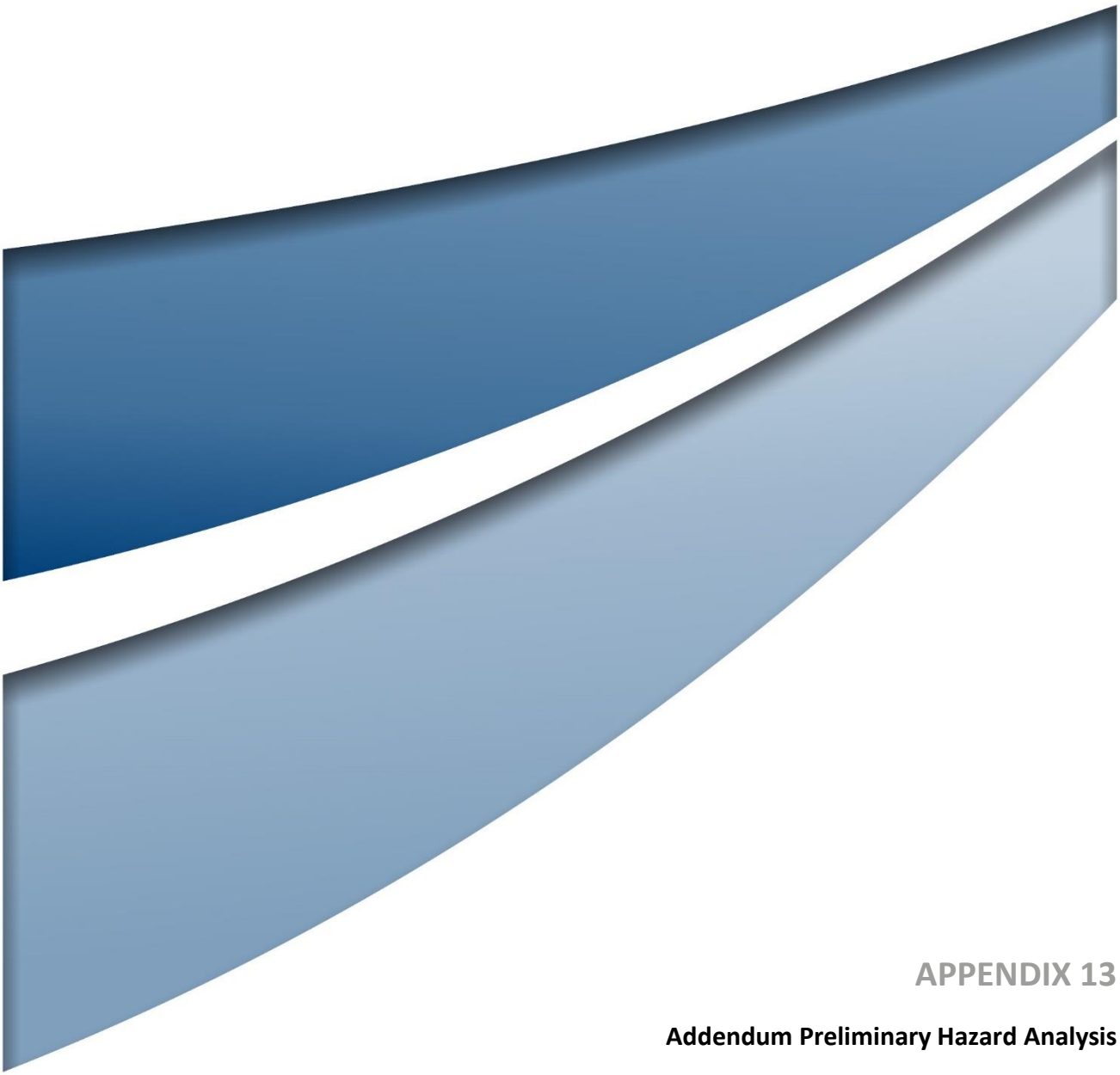

APPENDIX 13

Addendum Preliminary Hazard Analysis

TALLAWANG SOLAR FARM

Preliminary Hazard Analysis Addendum Report

FINAL

May 2024

TALLAWANG SOLAR FARM

Preliminary Hazard Analysis Addendum Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
RES Australia Pty Limited

Project Director: Malinda Facey
Project Manager: Marion O'Neil
Technical Director: Tim Procter
Report No. 21139 / R23
Date: May 2024

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V0	Tim Procter	14 March 2024	Malinda Facey	22 March 2024
V1	Tim Procter	15 April 2024	Tim Procter	15 April 2024

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Tables

1.0 Introduction

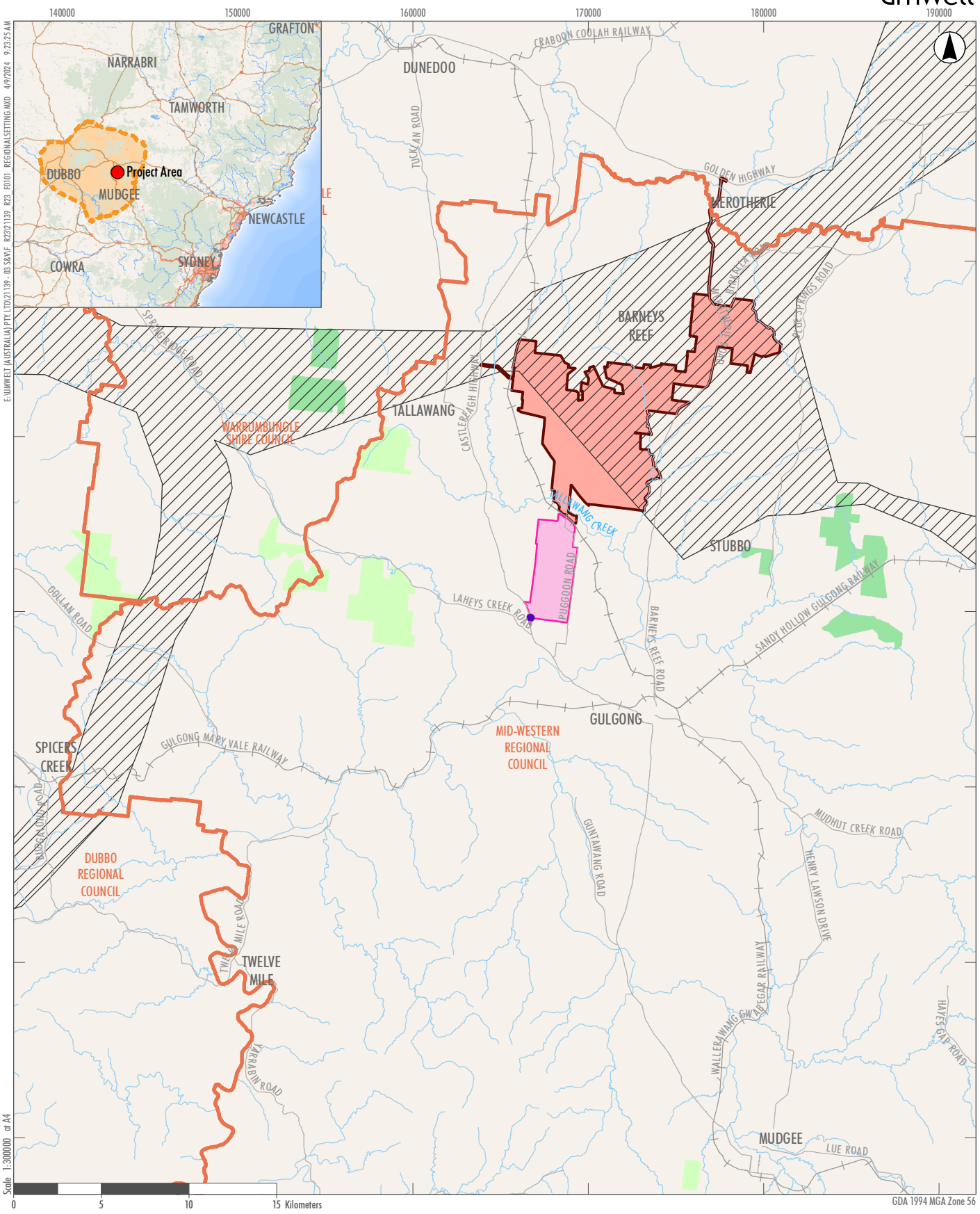
RES Australia Pty Ltd (RES) is proposing to develop the Tallawang Solar Farm (the Project) to generate solar energy to supply the people of New South Wales (NSW) with renewable energy. The Project is located in the Central West region of NSW, approximately 8 km northwest of Gulgong in the Mid-Western Regional Local Government Area (LGA) (refer **Figure 1.1**). The Project is proposed to include up to 500 megawatts (MW) of solar electricity generation with a Battery Energy Storage System (BESS) and associated infrastructure and works. The Project is proposing to connect to the grid via the proposed Central West Orana Renewable Energy Zone (CWO-REZ) Transmission Project currently being developed by the NSW Government to support the growth of the CWO-REZ.

Approval for the Project is being sought under the State Significant Development (SSD) provisions (Division 4.7) of Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as the Project is declared to be SSD under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP).

The Environmental Impact Statement (EIS) for the Tallawang Solar Farm (Umwelt, 2022) was placed on public exhibition from 28 October to 24 November 2022. During the exhibition period, 70 submissions were made on the Project. These comprised 16 government agency submissions and 54 community / organisation submissions.

Following analysis of the EIS submissions, RES undertook a thorough review of the Project's design and layout. As a result, RES is proposing to amend the Project as presented in the EIS in response to concerns raised in the EIS submissions and based on further consultation with agencies, landholders and key stakeholders. The proposed amendments include the introduction of a 400-person Temporary Workers Accommodation (TWA) facility, removal of the proposed overhead electricity transmission line (ETL), BESS capacity increase and an updated treatment design for the proposed intersection upgrade at the new site access on the Castlereagh Highway (the amended Project). Some minor layout refinements and readjustment of the Project Area boundary and development footprint are also proposed as part of the amended Project.

This Preliminary Hazard Analysis addendum report (PHA Addendum) has been prepared to address the amendments to the Project (outlined in **Section 2.0**) and is supplementary to the previously prepared Umwelt report, *Tallawang Solar Farm Preliminary Hazard Analysis, Final*, dated June 2022 (Umwelt, 2022). This PHA Addendum provides an updated assessment of the hazards and risks associated with the Amended Project, in particular the BESS capacity increase and the provision of an onsite TWA facility. This PHA Addendum should be read in conjunction with the original PHA completed in support of the EIS.



Legend

- Tallawang Solar Farm Project Area
- Indicative Proposed Central West Orana REZ Transmission Corridor
- Indicative Central-West Orana Renewable Energy Zone
- Access Point
- Local Government Area Boundary
- State Forest
- National Parks (NPWS Estate)
- Road
- Drainage Line
- Railway Line

FIGURE 1.1

Location and Regional Setting

Image Source: Data source: DSFI (2022), RES (2024)

2.0 Description of Amendments

The proposed design amendments to the Project are summarised below and compared to EIS Project Description in **Table 2.1**. Amendments to the Project include:

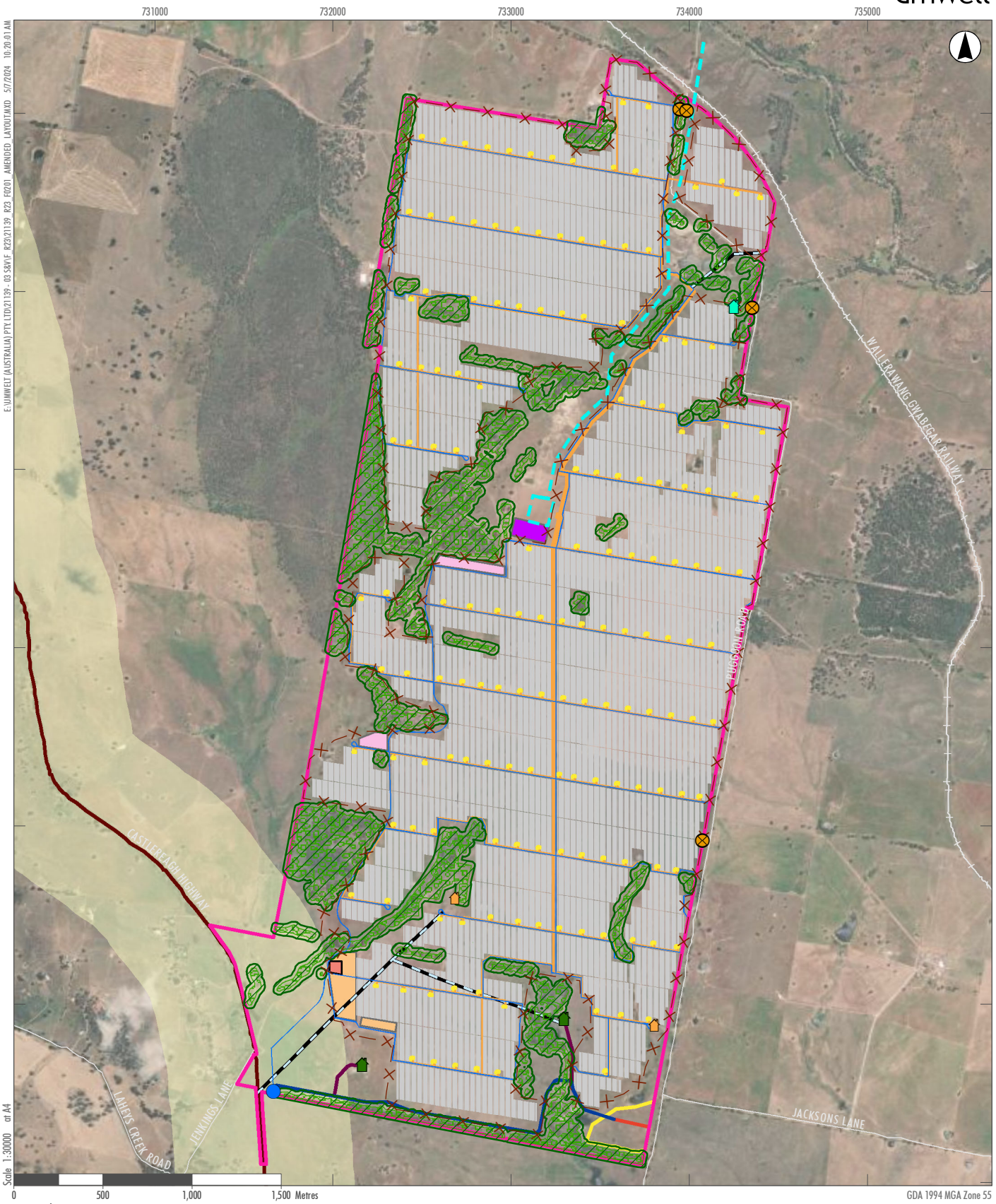
- Inclusion of a 400-person Temporary Workers Accommodation (TWA) facility within the Project Area
- Updated treatment for the proposed intersection upgrade at the newly proposed site access on the Castlereagh Highway
- Removal of the 13 km overhead ETL traversing through the Barneys Reef Wind Farm as this is now included in EnergyCo's CWO-REZ Transmission Project
- Increased BESS capacity from 200 MW/400MWh to 500 MW/1000MWh
- Minor layout refinements, including:
    - removal of the northern substation option
    - installation of additional solar panels within already disturbed areas
    - realignment of the security fence line to improve wildlife connectivity
- Minor readjustment of the Project Area boundary and development footprint.

Table 2.1 Comparison Between the Project as Presented in the EIS and the Amended Project

Project Element	EIS Project	Amended Project
Project area	Approximately 1,370 ha	Approximately 1,300 ha
Development footprint	Approximately 866 ha	Approximately 1,016 ha
Schedule of lands	The Project comprises (wholly or partly) 35 cadastral lots	The Project comprises (wholly or partly) 19 freehold cadastral lots
Project access	Project access will be via the Castlereagh Highway at a newly proposed access point from a local gravel road directly south of the Project Area	No change
Intersection upgrade	A short Channelised Right turn (CHR) and an Auxiliary Left turn (AUL) treatment on the Castlereagh Highway	A standard (full sized) CHR & AUL treatments on the Castlereagh Highway
Targeted capacity (solar)	500 MW (AC)	No change
Targeted capacity (BESS)	200 MW / 400 MW-h (DC)	500 MW / 1000 MW-h
Grid connection	A new 330 kV ETL is proposed to connect the Project to the proposed CWO-REZ Transmission Line via the NSW Government's proposed switching station to be located on the adjacent Barneys Reef Wind Farm project	The Project's grid connection will be via the proposed CWO Transmission Project being developed by the Energy Corporation of NSW (EnergyCo) and the new 330 kV ETL is no longer proposed as part of this SSD application
BESS design	DC-coupled battery storage units will be distributed throughout the Project Area, adjacent to the inverters	No change
Substation	One onsite 330 kV substation and switchyard proposed at two possible locations ie. a northern and central location	One onsite 330 kV substation proposed at a central location, as shown on **Figure 2.1**
Photovoltaic modules	Approximately 1,136,400 bifacial solar PV solar panels in 2P configuration, arranged in a series of rows utilising east-west single-axis tracking with row spacing of up to 12 m and maximum height of 5 m at full tilt	No change
Temporary ancillary infrastructure	Temporary ancillary facilities required during construction would typically include: • site compound including storage area, offices and meeting room, ablution facilities, canteen and car parking • laydown areas involving areas suitable for storing plant and equipment, and deliveries including solar panels and cable drums, and areas to support waste management activities (e.g. cardboard and timber)	No change

Project Element	EIS Project	Amended Project
Transport route	Project transport will be via road from the Port of Newcastle, via the Golden Highway and then the Castlereagh Highway to the Project Area	No change
Workforce numbers	• **Construction** – Approximately 270 direct full time equivalent (FTE) and 430 indirect FTE jobs (Ethos Urban, 2022). At the Project's peak construction (for up to 6 months) this is expected to increase to about 580 direct FTE jobs (Ethos Urban, 2022) • **Operation** – Up to 7 direct FTE and 20 indirect FTE jobs	• **Construction** – Approximately 380 FTE jobs, with up to 420 workers on site during peak construction • **Operation** – no change
Construction period	Up to 34 months	Up to 36 months
Construction timing	Commence Q2 2024	Commence Q4 2026
Workers Accommodation	Dispersed across nearby towns and villages within the Mid-Western and Warrumbungle LGA's	Provision of an onsite Temporary Workers Accommodation facility, as shown on **Figure 2.1**
Project life	35 years	No change

This PHA Addendum addresses the increased BESS capacity of the decentralised BESS and the provision of an onsite Temporary Workers Accommodation facility.



Legend

- Project Area Boundary
- Proposed Single Axis Tracker
- Temporary Workers Accommodation (TWA)
- BESS and DC-DC Coupled PCS with Hardstanding
- Proposed Medium Voltage Reticulation
- Proposed Access
- Construction Compound
- Temporary Laydown
- Proposed O&M Facility
- Proposed Substation
- Grid Connection Infrastructure (proposed by EnergyCo)
- Primary Project Access
- Secondary Access
- Security Fence
- Proposed Landowner Access Track
- Temporary Workers Accommodation (TWA) Access
- Proposed Post Construction Landowner Access Track
- Involved Dwelling
- Involved, Unoccupied Dwelling
- Native vegetation (Umwelt)
- Native Vegetation Buffer, 20m
- Local Road
- State Road
- State Road (Highway) Buffer 500m
- 22kV Distribution Line (to be rerouted where necessary)

FIGURE 2.1

Amended Project Layout

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

3.0 Battery Energy Storage Systems

3.1 BESS Alternatives

The Project presented in the EIS included a 200 MW/400 MW-h BESS (DC coupled), distributed throughout the solar farm.

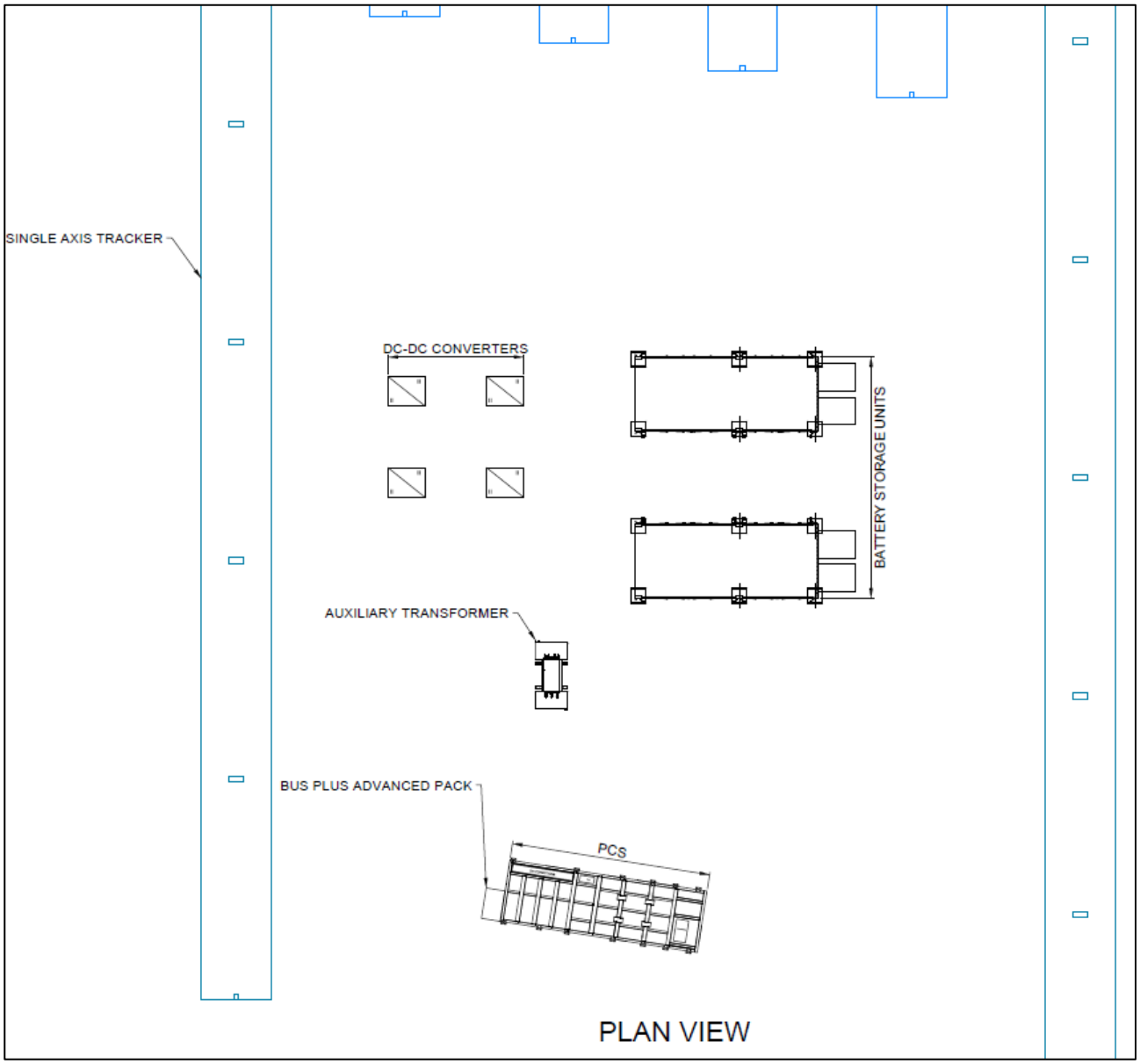
As part of the Amended Project, RES is proposing to amend the BESS design to allow for increased capacity. The capacity of the BESS is proposed to increase to 500 MW/1000 MW-h (DC coupled) to allow for greater energy storage capacity, required to safely and cost effectively decarbonise Australia's energy network. The distribution of the BESS units as part of the amended Project is shown on the conceptual layout on **Figure 2.1**. The conceptual layout of a DC Coupled Battery Station in the proposed decentralised BESS is presented in **Figure 3.1** and **Figure 3.2**.

The proposed decentralised BESS includes:

- 160 battery stations each with 2 battery storage units approximately 6.0 m long, 2.4 m wide and 2.9 m high.
- A manufacture's specified energy storage capacity of 3.727 MWh per cabinet.
- A total nominated aggregate operational energy storage capacity of 1,000 MWh.
- Cabinets installed with a 3 m space between facing battery storage units. It is noted that FM Global's Property Loss Prevention *Data Sheet 5-33 Lithium-Ion Battery Energy Storage Systems* (2023) recommendations a minimum separation distance between sides that contain access panels, doors or deflagration vents should be at least 1.5 m (5 ft) for battery storage installations comprised of lithium iron phosphate (LFP) cells.
- A hardstand area for each DC Coupled Battery Station of approximately 20 m by 20 m to allow for a separation distance between combustible vegetation and battery storage units of at least 3 m (10 ft) in accordance with *NFPA 855 Clause 443.6*[1].
- A buffer zone between each DC Coupled Battery Station and the solar panels approximately 5 m or greater.
- An access road running adjacent to each DC Coupled Battery Station.
- Each DC Coupled Battery Station would have a footprint of approximately 400 m^2. Based on a 7.454. MWh capacity, the approximate stored energy density of the Decentralised BESS station would be 18 kWh/m^2.

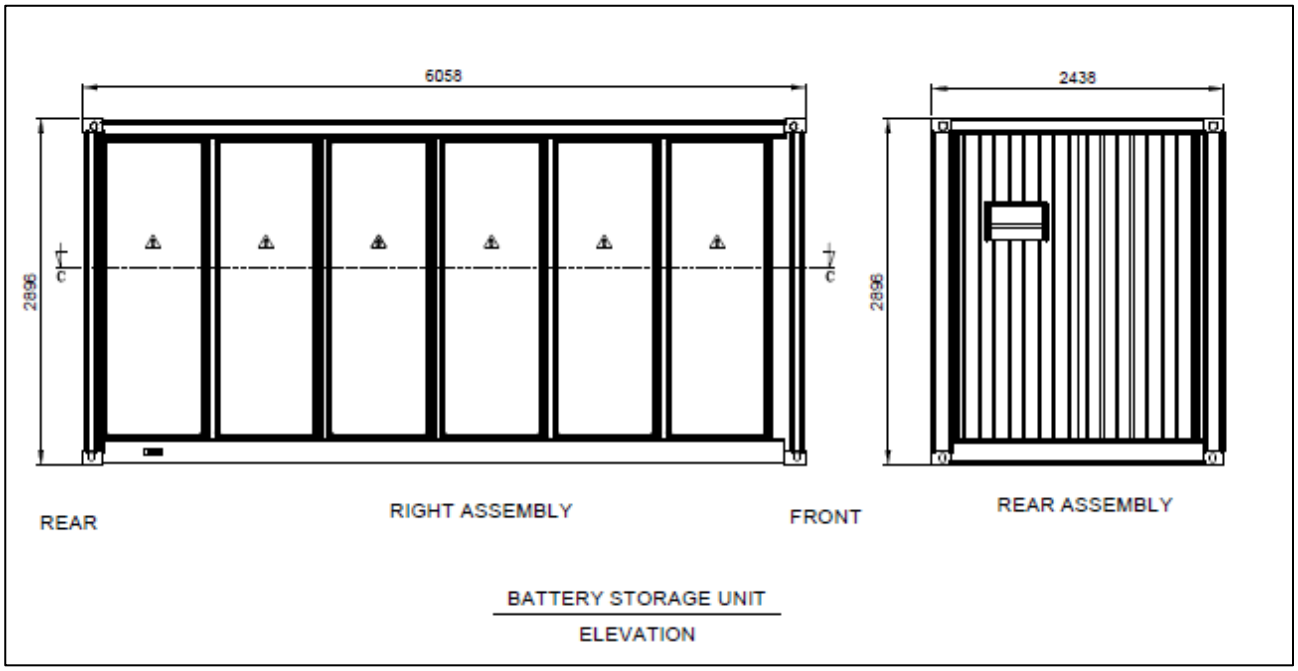
Given the low energy density of the proposed battery storage for the Project, it is considered that there will be sufficient area within each DC Coupled Battery Station compound to enable adequate separation distances between adjacent battery cabinets and other sensitive equipment to achieve non-propagation of thermal incidents.

[1] *National Fire Protection Agency, "Standard for the Installation of Stationary Energy Storage Systems," NFPA 855, 2023*



Source: RES (Drawing: 04651-RES-BAT-DR-PT-001)

Figure 3.1 Typical Layout of a DC Coupled Battery Station



Source: RES (Drawing: 04651-RES-BAT-DR-PT-001)

Figure 3.2 Indicative Size of a Battery Storage Unit

3.2 Separation Distances

The *Tallawang Solar Farm Preliminary Hazard Analysis* (2022) reported the modelled consequence distances presented in **Table 3.1** from lithium-ion batteries (LIBs) to fatal impacts and injury associated with fire, explosion and toxic gas release events.

Table 3.1 Modelled Consequence Distances

Hazard Event	Distance (m)
Fatal Impacts	
Fire (12.6 kW/m^2 contour)	11
Explosion (14 kPa contour)*	52
Toxic Gas Release (HF AEGL 3 contour, 44 ppm contour)	39
Injury Impacts	
Fire (4.7 kW/m^2 contour)	19
Explosion (7 kPa contour)*	86
Toxic Gas Release – Injury (HF AEGL 2 contour, 24 ppm contour)	61

* *Conservative assumption.*

The distances from the conceptual locations of the DC Coupled Battery Stations that make up the proposed decentralised BESS (shown on **Figure 2.1**) to the Project boundary ranges from 61 m from the rail corridor on the northeast boundary, 53 m from Puggoon Road on the eastern boundary, 340 m from the southern boundary and 100 m from the west boundary.

Figure 3.3 illustrates separation distances between the closest involved and non-associated dwellings. The closest non-associated dwelling (R200) from a DC Coupled Battery Station is over 830 m to the south-west, whereas the closest involved dwelling (R195) on the Project Area are over 190 m away. Other involved dwellings are between 250 and 290 m away (R016 and R194 respectively). The closest DC Coupled Battery Station to the proposed Temporary Workers Accommodation is approximately 218 m to the north-west to the proposed accommodation compound.

The Modelling distances in **Table 3.1** indicate the Amended Project has the potential for off-site impacts should a hazard events occur at a DC Coupled Battery Station that leads to an incident with a battery storage unit located adjacent to the project boundary. The *Tallawang Solar Farm Preliminary Hazard Analysis* (2022) provides a comprehensive description of the risk control strategies that would be implemented as part of the EIS Project. These remain applicable to the Amended Project and the management of a battery fire. However, it is recommended site-specific plans and procedures be prepared to address the residual risks associated with the DC Coupled Battery Stations located adjacent to the project boundary. This would include the temporary closure of Puggoon Road and the Wallerawang Gwabergar Railway line. This would be addressed post consent in a Fire Safety Study (FSS) prepared in accordance with HIPAP 2, a Fire Management Plan (FMP) prepared in consultation with NSW Rural Fire Service and an Emergency Response Plan (ERP) prepared in accordance with HIPAP 2.

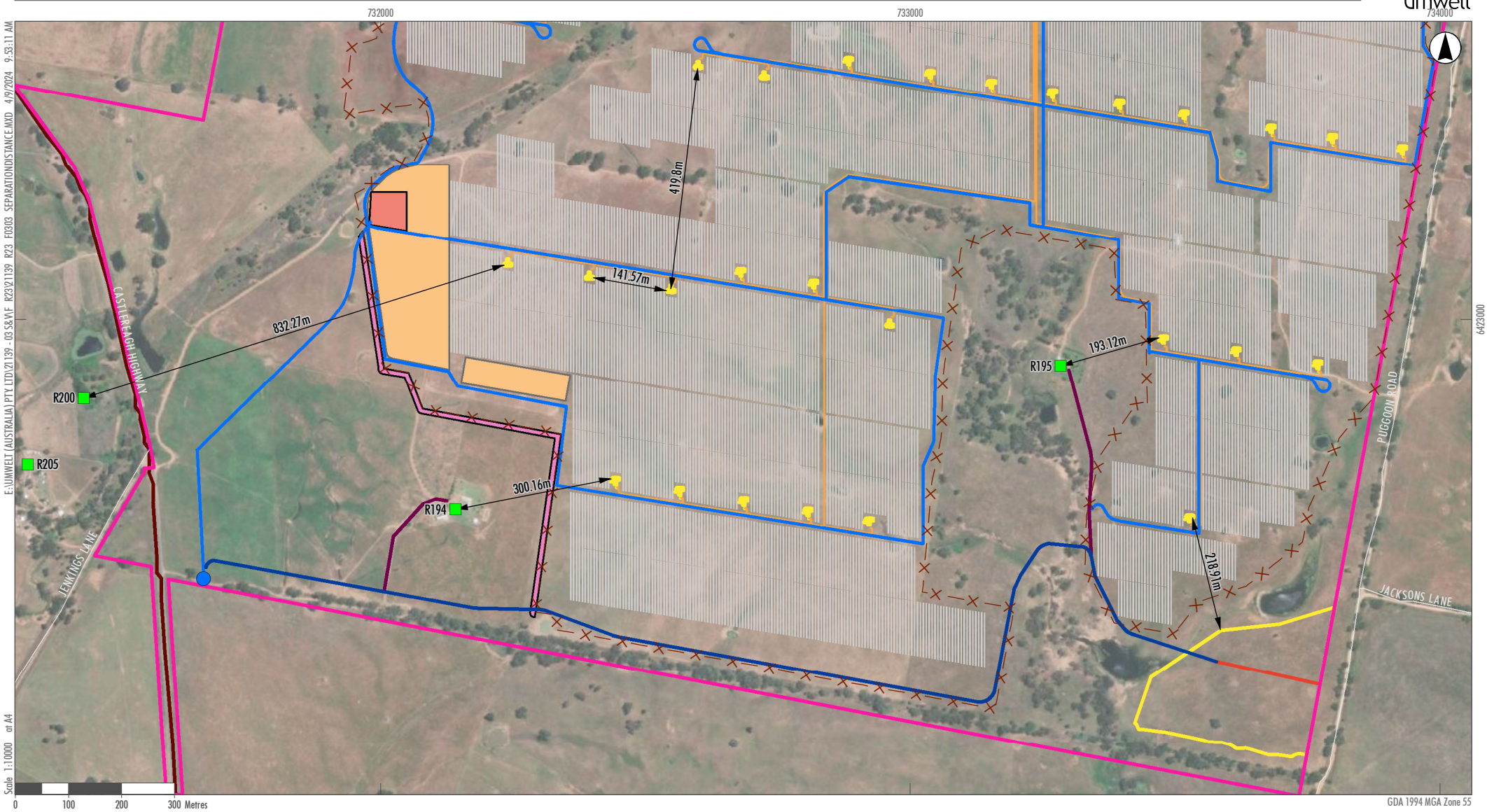


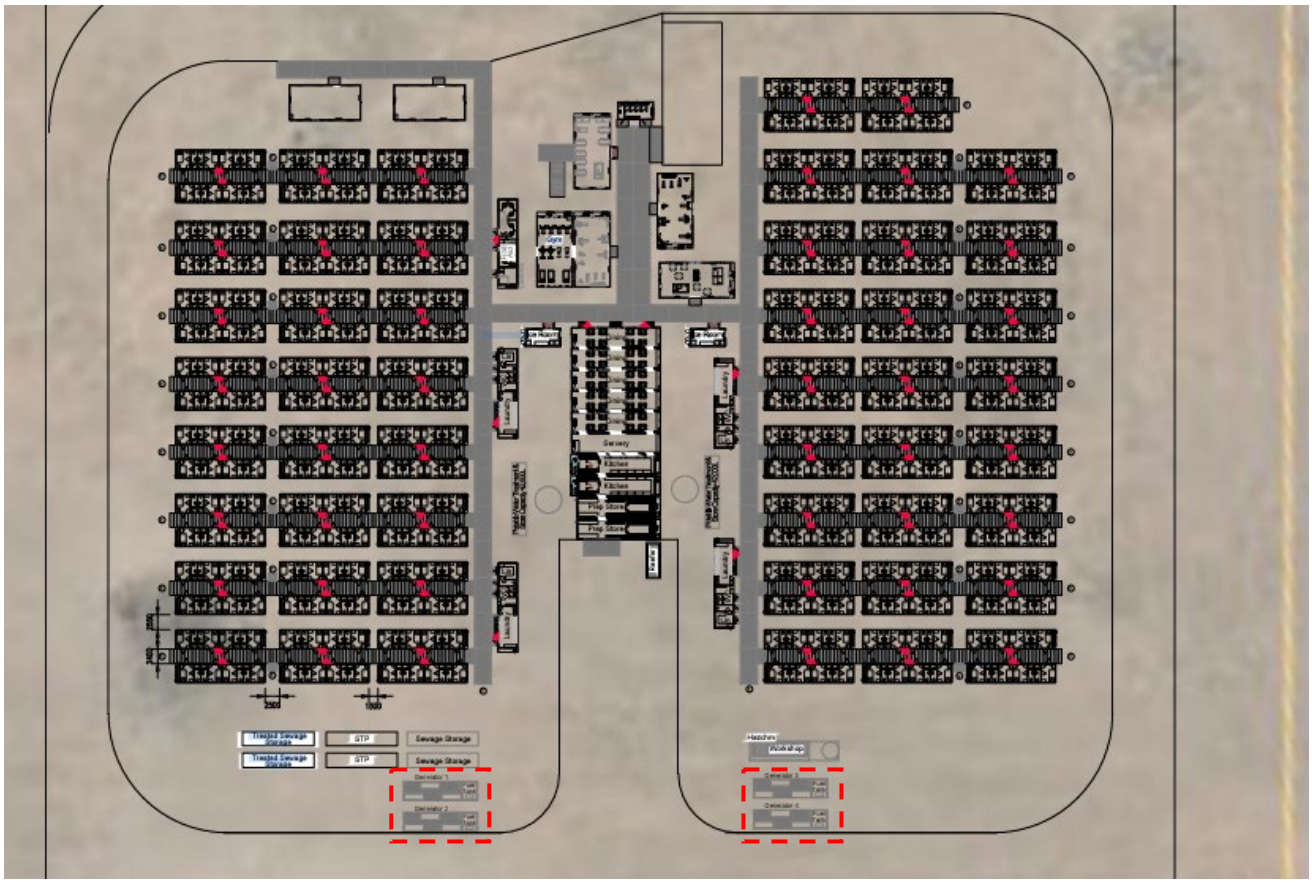
FIGURE 3.3

Separation Distances

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

4.0 Temporary Workers Accommodation

The proposed Temporary Workers Accommodation will be located in the southeast corner of the Project Area adjacent to Puggoon Road. The conceptual layout Temporary Workers Accommodation includes four (4) diesel fuelled generators shown on **Figure 4.1** between the accommodation area and the southern boundary of the Project Area.



Source: RES (400 Room Camp-RES-Site-Overlay-C.pdf)

Figure 4.1 **Indicative Layout of the Temporary Workers Accommodation**
(Location of four (4) diesel fuel generators outlined in red)

Diesel fuel oil is a Class 3 C1 (UN3082) combustible liquid that is stored in accordance with Australian Standard *AS1940 Storage and Handling of Flammable and Combustible Liquids* (AS1940). While combustibles liquids are difficult to ignite in the absence of a direct flame, fires are possible if a strong ignition source is present. According to *Applying SEPP 33*[2] diesel does not have a storage quantity threshold.

Given diesel fuel oil will be 'in use', is a Class 3 C1 combustible liquid and does not require assessment under Appling SEPP33 no further assessment of the Temporary Workers Accommodation is required. However, to ensure the safe use of the diesel generators on the Project Area:

- The diesel generators will be located in a designated area.
- The diesel generators will have secondary containment within the container contain spills or leaks.
- Spill response materials will be readily accessible near the generators.
- The diesel generators will be regular inspection and maintenance to prevent pollution.
- Stormwater will be directed away from the generator installation.

[2] The NSW Department of Planning and Environment consolidated the state environmental planning policies (SEPPs) in December 2021, for introduction in March 2022. As a result, the previously named *SEPP 33 -Hazardous and Offensive Development* provisions have been transferred to the SEPP (Resilience and Hazard). The Department of Planning and Environment, NSW, 2011 guideline, *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines* (Applying SEPP33) continues to provide the process for assessing if developments are potentially hazardous or offensive, including threshold levels that trigger the potentially hazardous or offensive status.

5.0 Risk Management

The *Tallawang Solar Farm Preliminary Hazard Analysis* (2022) provides a comprehensive description of the risk control strategies that would be implemented as part of the EIS Project. These remain applicable to the Amended Project.

In response to the proposed modification to the BESS capacity and the introduction of the TWA, further information is provided regarding management of residual risks. The following section outlines RES's commitment to the development and documentation of the site-specific plans and procedures designed to manage the residual risk presented by the EIS Project following the implementation of technical and non-technical controls described in the EIS PHA. As stated above, these remain applicable to the Amended Project.

A Fire Safety Study (FSS) will be prepared in accordance with HIPAP 2 prior to commencing construction of the BESS. The FSS will consider:

- the operational capability of local fire agencies and the need for the facility to achieve an adequate level of on-site fire and life safety independence
- fire propagation and a worst-case scenario
- the requirements of the Fire Management Plan (FMP) that would be prepared in consultation with NSW Rural Fire Service.

It is noted the FSS will also inform the requirements of the FMP including:

- the methods and resources needed to manage and extinguish lithium battery fires
- the management of a defendable Asset Protection Zone (APZ) as described in *Planning for Bush Fire Protection* 2019.

The FSS will inform the requirements of an Emergency Response Plan (ERP) that will be prepared in accordance with HIPAP 2 prior to commencing construction of the BESS. The ERP will inform the requirements of an Emergency Services Information Package (ESIP) that would be prepared in accordance with FRNSW fire safety guideline – *Emergency services information package and tactical fire plans*. Both the ERP and the ESIP will:

- inform first responders of site-specific features and safety measures required to ensure they are able to undertake their duties effectively
- include agency specific Standard Operational Guidelines.

6.0 Conclusion

The *Tallawang River Solar Farm Preliminary Hazard Analysis* (2022) prepared for the EIS Project identified a number of hazard events involving lithium-ion batteries (LIBs) with the potential for harmful impacts. The consequence modelling identified maximum distances to fatal impacts and injury impacts for thermal radiation, explosion overpressure and toxic gas dispersion. The *Tallawang River Solar Farm Preliminary Hazard Analysis* (2022) found that these impacts were contained within the site and that the potential for adverse impacts was associated with first responders attending a hazard event.

The impacts from hazard events associated with the proposed amendments to the Project, specifically the increased BESS capacity and the location of the DC Coupled Battery Station has the potential for off-site impacts should an incident occur with a battery storage unit located adjacent to the project boundary. It is recommended this is addressed through the preparation of site-specific plans and procedures as part of the Fire Safety Study, preparation of the Fire Management Plan (FMP) and preparation of the Emergency Response Plan for the Project.

There is also the potential for adverse impacts on first responders attending a hazard event. As outlined in **Section 5.0**, this will be addressed through RES's commitment to the development and documentation of the site-specific plans and procedure designed to manage the residual risk presented by the Project.

7.0 References

Applying SEPP 33: Hazardous and Offensive Development Application Guidelines, NSW Department of Planning, 2011

Australian Standard *AS1940 Storage and Handling of Flammable and Combustible Liquids*

Battery Energy Storage Systems Guidance Report, Australian Energy Council Limited, GHD, 2023

Chemical Storage and Spill Response Guidelines (DMS-SD-066/7.0), Transport for NSW, 2021

Hazardous Industry Planning and Advisory Paper 4 – Risk Criteria for Land Use Safety Planning, NSW Department of Planning, 2011

Hazardous Industry Planning and Advisory Paper 6 – Hazard Analysis, NSW Department of Planning, 2011

NFPA 855 Standard for the Installation of Stationary Energy Storage Systems, National Fire Protection Association, 2020

Property Loss Prevention Data Sheet 5-33, Electrical Energy Storage Systems, FM Global, 2020

State Environmental Planning Policy (Resilience and Hazards), NSW Government, 2021.

Preliminary Hazard Analysis – Tallawang Solar Farm, Umwelt, 2022.

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