

ADW JOHNSON PTY LIMITED

ABN 62 129 445 398

Sydney
Level 35 One International Towers
100 Barangaroo Avenue
Sydney NSW 2000
02 8046 7411
sydney@adwjohnson.com.au

Central Coast
5 Pioneer Avenue
Tuggerah NSW 2259
02 4305 4300

coast@adwjohnson.com.au

Hunter Region
7/335 Hillsborough Road
Warners Bay NSW 2282
02 4978 5100

hunter@adwjohnson.com.au

Statement of Environmental Effects

Proposed Battery Storage Facility (Electricity Generating Works)

Property:

Approved Lot 1 103 within Lot 22 DP 280089,
60 Riverside Drive, Mayfield West

Applicant:

Steel River West Pty Ltd

Date:

May 2022

Project Management • Town Planning • Engineering • Surveying
Visualisation • Social Impact • Urban Planning

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Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Reviewed By
A	Working Draft	23/05/2022	LDW/ZS	ZS
B	Final	24/05/2022	LDW/ZS	ZS

Limitations Statement

This report has been prepared in accordance with and for the purposes outlined in the scope of services agreed between ADW Johnson Pty Ltd and the Client. It has been prepared based on the information supplied by the Client, as well as investigation undertaken by ADW Johnson and the sub-consultants engaged by the Client for the project.

Unless otherwise specified in this report, information and advice received from external parties during the course of this project was not independently verified. However, any such information was, in our opinion, deemed to be current and relevant prior to its use. Whilst all reasonable skill, diligence and care have been taken to provide accurate information and appropriate recommendations, it is not warranted or guaranteed and no responsibility or liability for any information, opinion or commentary contained herein or for any consequences of its use will be accepted by ADW Johnson or by any person involved in the preparation of this assessment and report.

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Executive Summary

Steel River West Pty Ltd are seeking Development Consent from the City of Newcastle (CN) for a proposed Battery Storage Facility known as the Steel River Battery, within the Steel River Estate located at 60 Riverside Drive, Mayfield West.

The proposed battery system will comprise of a 28MW lithium-ion battery energy storage facility using one of three different battery systems, with two options for the final battery configuration proposed. The three battery systems involve containerised batteries, Tesla Megapack or a 'generic' battery system similar to the Tesla Model.

The land subject to the proposed development is zoned IN1 General Industrial zone under the Newcastle Local Environmental Plan 2012 (NLEP). The proposed Battery Storage Facility is defined as "*Electricity Generating Works*" (which includes electricity storage) is not listed as a permissible use within the IN1 zone. The proposed use falls within the provisions of State Environmental Planning Policy (Transport and Infrastructure) 2021, with this policy prevailing over Newcastle LEP 2012 as identified by Chapter 2, Part 2.1, Section 2.7 of the SEPP.

The proposed development is permissible with consent in accordance with Chapter 2, Part 2.3, Division 4, Section 2.36(1)(b) of State Environmental Planning Policy (Transport and Infrastructure) 2021.

City of Newcastle will be responsible for the environmental assessment of the Development Application, with the application determined by the Hunter and Central Coast Regional Planning Panel in accordance with Chapter 2, Schedule 6 of the State Environmental Planning Policy (Planning Systems) 2021, as the development has a capital investment value of more than \$5 million and falls under Section (5)(a) Private infrastructure and community facilities over \$5 million as an electricity generating works. The nominated capital investment value of the project is \$29.4 million.

DA2021/00007 was determined by the Joint Regional Planning Panel on the 14th October 2021, with Development Consent issued by City of Newcastle on the 20th October 2021 for a Battery Storage Facility on approved Lot 1102. As the industrial subdivision is still under construction, Steel River West Pty Ltd (the applicant) has further considered the most suitable location for the Battery Storage Facility within the estate and would like to relocate the Battery Storage Facility from Lot 1102 to Lot 1103.

It is not the applicant's intention to seek approval for a second Battery Storage Facility to be development within the estate as part of this application. If approved, following determination of this development application, DA2021/00007 will be required to be surrendered as a condition of any new development consent.

1.0 Introduction

1.1 INTRODUCTION

This Statement of Environmental Effects (SoEE) has been prepared by ADW Johnson Pty Ltd on behalf of Steel River West Pty Ltd to accompany a Development Application (DA) to the City of Newcastle (CN) for a proposed Battery Storage Facility known as the Steel River Battery, within the Steel River Estate located at 60 Riverside Drive, Mayfield West.

1.2 DEVELOPMENT APPLICATION DETAILS

STATEMENT OF ENVIRONMENTAL EFFECTS PREPARED BY:	
Name:	ADW Johnson Pty Ltd Unit 7, 335 Hillsborough Road WARNERS BAY NSW 2282
Contact:	Zac Smurthwaite Senior Planner Ph: (02) 4978 5100 Email: zacs@adwjohnson.com.au Website: www.adwjohnson.com.au
PROJECT DETAILS:	
Applicant Name:	Steel River West Pty Ltd & Edify Energy Pty Ltd
Applicant Address:	60 Riverside Drive, Mayfield West.
Property Description:	Part Lot 22 DP 280089. The site is currently approved for further subdivision and is situated within approved Lot 1103 which forms part of future Stage 11 Steel River Estate.
Project Description:	Proposed Battery Storage
PROJECT TEAM:	
Project Manager:	Precinct Capital & Edify Energy
Designer:	GCA Australia
Survey:	Monteath & Powys
Civil Engineering:	GCA Australia
Town Planning:	ADW Johnson
Landscaping & Visual	Terras Landscape Architects
Heritage:	Eikos Environment and Heritage
Acoustic:	Spectrum Acoustics
Hazard Assessment:	ARUP
Geotechnical:	RCA Australia
Quantity Surveyors:	Denary Quantity Surveying
Waste Management:	Steel River West Pty Ltd
Lighting:	Power Solutions

1.3 BACKGROUND

DA2021/00007 was approved by the Joint Regional Planning Panel on the 14th October 2021 for a Battery Storage Facility on approved Lot 1102. As the industrial subdivision is still under construction, Steel River West Pty Ltd (the applicant) has further considered the most suitable location for the Battery Storage Facility within the estate and has opted to relocate the Battery Storage Facility from Lot 1102 to Lot 1103.

This is considered to be an appropriate shift in the location for the Battery Storage Facility as it will move the facility to adjoin Stage 10 which is currently being delivered and further away from Maitland Road. As the remainder of the estate is yet to be developed, it will provide further flexibility to possible suitable development options across the remaining lots within Stage 11, in particular Lots 1101 and 1102.

It is not the applicant's intention to seek approval for a second Battery Storage Facility to be developed within the estate. If approved, following determination of this development application, DA2021/00007 will be required to be surrendered as a condition of any new development consent.

1.4 BRIEF OVERVIEW OF THE PROPOSAL

The subject site has a property description of Lot 22 DP 280089 with a street address of 60 Riverside Drive, Mayfield West. The site is currently approved to be further subdivided, with the subject site situated within approved Lot 1103 (DA2006/2076.02 as most recently amended) which forms part of Stage 11 of the Steel River Estate.

The owner of the subject site is Steel River West Pty Ltd. The Certificate of Title and Deposited Plan for the site are attached at **Appendix A**.

The land subject to the proposed development is zoned IN1 General Industrial zone under the Newcastle Local Environmental Plan 2012 (NLEP). The proposed Battery Storage Facility is defined as "Electricity Generating Works" (which includes electricity storage) is not listed as a permissible use within the IN1 zone. The proposed use falls within the provisions of SEPP (Transport and Infrastructure) 2021, with this policy prevailing over Newcastle LEP 2012 as identified by Chapter 2, Part 2.1, Section 2.7 of the SEPP.

The proposed development is permissible with consent in accordance with Chapter 2, Part 2.3, Division 4, Section 2.36(1)(b) of SEPP (Transport and Infrastructure) 2021.

As outlined within the Quantity Survey Report provided within **Appendix M** the proposal will have a capital investment value of more than \$5 million and will trigger Regionally Significant Development. Given this, the City of Newcastle will be responsible for the environmental assessment of the Development Application, with the application determined by the Hunter and Central Coast Regional Planning Panel.

The proponent is seeking development consent from City of Newcastle for the proposed Battery Storage Facility including associated earthworks, landscaping, stormwater management and utility infrastructure.

The subject site is part of a broader industrial subdivision that is currently being delivered in stages. Approved Lot 1103 is currently vacant industrial zoned land which is situated within approved Stage 11 of the Steel River Estate.

The lots within Stage 11 are to be delivered as part of the third stage of the Steel River Estate, which also includes the construction of the proposed intersection with Maitland Road and dedication of the section of public road to the southern boundary of Approved Lot 1203, located within future Stage 11.

The site is bound to the west by a railway line, the south by approved Lot 1102, to the north by Lot 16 DP 280089 (approved Lot 1004) and to the east by Riverside Drive (being Lot 1 Property and Open Accessway).

The subject site described as approved Lot 1103 has a total area of 5,272m².

The following figure shows the site and immediate surrounds:

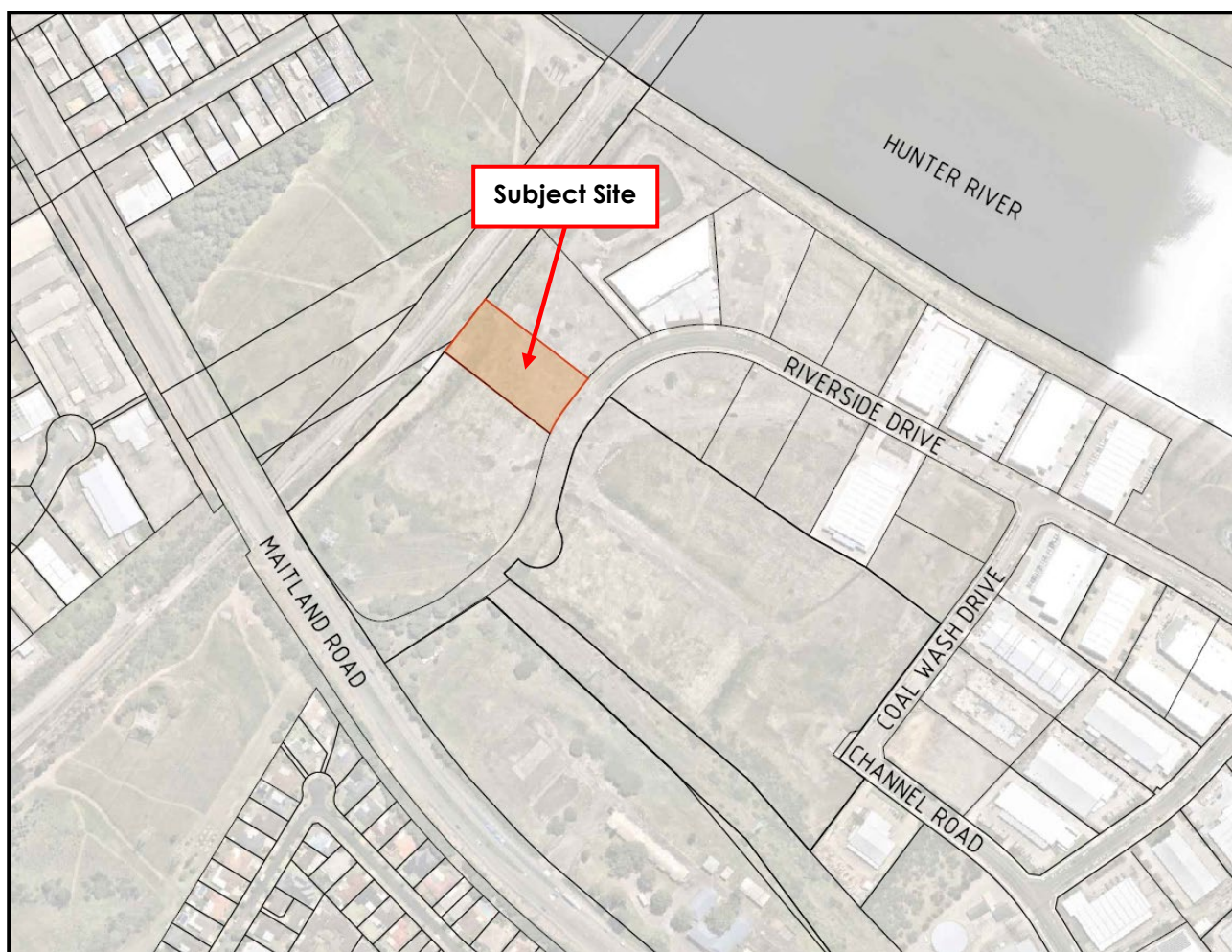


Figure 1: Site Locality Plan.

1.5 PURPOSE OF THE REPORT

This Statement of Environmental Effects (SoEE) has been prepared pursuant to Section 4.12(9) of the *Environmental Planning and Assessment Act 1979* and accompanying Regulation. Its purpose is to:

- Describe the proposed development;
- Identify and summarise the relevant controls which guide assessment of the proposal;
- Provide information on the site and its context;
- Review the key issues associated with the proposal to aid in assessment by the Consent Authority and other relevant authorities; and

- Consideration has been given to Council's guidelines in preparing this Statement of Environmental Effects as well the full range of other relevant legislation and development guidelines.

1.6 CONSULTATION

In establishing parameters and detailed design for the overall project, consultation was carried out by Edify Energy, Precinct Capital and ADW Johnson with key authorities as detailed below.

Contact was made prior to lodgement of DA2021/00007 with the following public authorities:

- City of Newcastle;
- NSW Fire & Rescue;
- Ausgrid; and
- Hunter Water.

Given the level of assessment undertaken as part of DA2021/00007, formal consultation has not been undertaken prior to the lodgement of this DA which simply seeks to shift the approved Battery Storage Facility to adjoining Lot 1103. Further opportunity for involvement of both authorities and the community will occur during the notification and referral phase of the assessment.

It is understood that Council will refer the application to Transgrid, Ausgrid, SafeWork for NSW, Sydney Trains and Australian Rail Track Corporation (ARTC).

A Section 50 Application has been submitted to Hunter Water Corporation prior to lodgement of the Development Application, a copy of the stamped plan is provided within **Appendix C**.

2.0 Proposed Development

2.1 OBJECTIVES OF THE PROPOSAL

The objective of the proposal is to provide significant benefits to the local Newcastle area as well as the wider New South Wales electricity network.

The proposal aligns with the objectives of the *Newcastle Climate Action Plan 2021-25* through the development of a large-scale battery storage facility, which embraces new technologies and innovative practices to improve the resilience of the local area. The proposal also supports emissions reductions through the improved ability to facilitate renewable energy integration.

The provision of battery storage systems to supplement the electricity grid will increasingly be considered an essential part of the system especially as greater reliance is placed on alternative energy forms such as solar power.

2.2 PROJECT PURPOSE

As a large-scale battery energy storage project, the Steel River Battery Project will operate as both a flexible and dispatchable generator and load on the electrical network, and be operated in the following ways:

- operation as a flexible and dispatchable generator, providing additional electricity to the market to meet electricity needs during times of peak demand including on hot days when the electricity network is strained;
- operation as a flexible and dispatchable load, being able to store excess electricity on the electrical network and provide for lower loading on particular areas of the network during times when they may otherwise be overloaded; and
- provision of a range of network ancillary services including frequency control which assist to improve the stability and resilience of the local electrical network.

Operation of the Steel River Battery Project in the above ways will provide a range of benefits to the New South Wales and wider Australian electricity network by providing the following benefits:

- increased uptake and ability to use renewable electricity by being able to provide a means to help provide dispatchable electricity which is stored from variable output electricity generating sources such as solar and wind and help to 'firm' these generation sources; and
- provision of embedded flexible generation able to operate to improve electricity network reliability and resilience.

2.3 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development has been designed by GCA Engineers and Edify Energy and a copy of the development plans are provided within **Appendix C** of this report. More specifically, the proposal incorporates the following:

Battery Storage Facility

The Steel River Battery will comprise of a 28MW lithium-ion battery energy storage facility located on approved Lot 1103. The Project will connect to the local Ausgrid 33kV electrical distribution network and will provide benefits to the local electricity network as well as network services to the wider New South Wales grid.

As the final battery technology is yet to be selected, three (3) battery systems are proposed with two (2) options for the final battery configuration for the site. These include:

- Modular cubical cabinets (comprising either a Tesla Megapack System or other battery brand) that are installed in an array around an inverter pack as illustrated in **Figure 2** below; and
- Containerised modules that have been preassembled in modified shipping containers prior to transport to site as illustrated in **Figure 3** below.

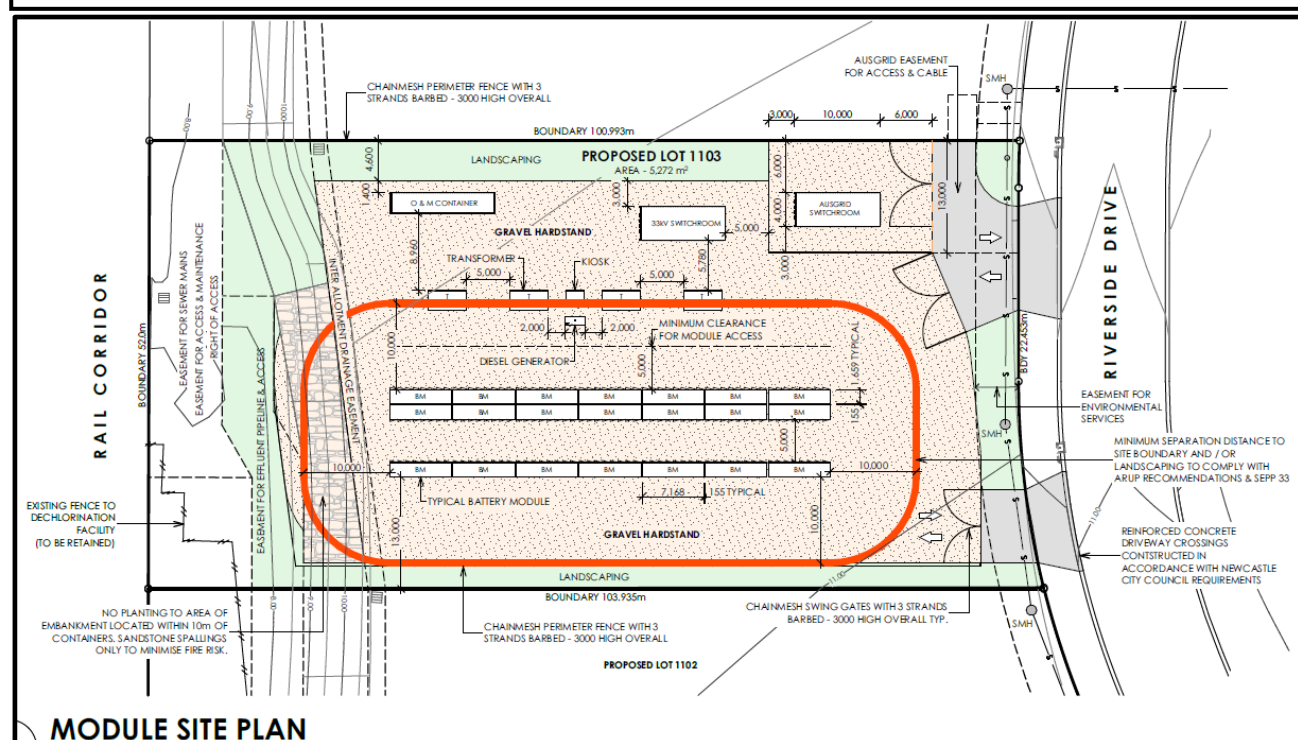
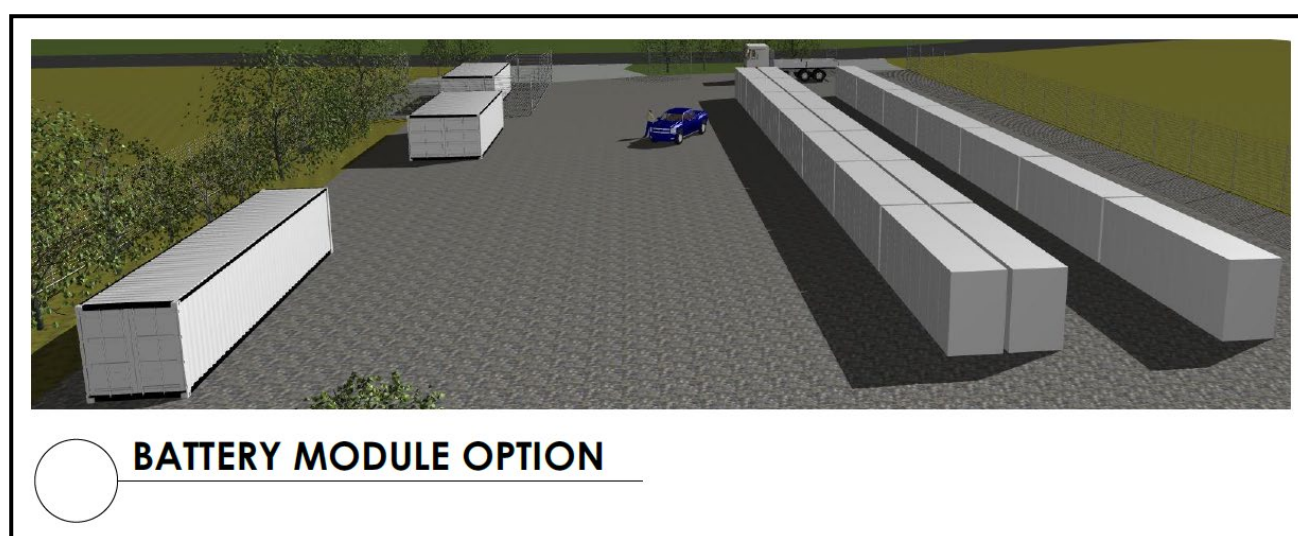
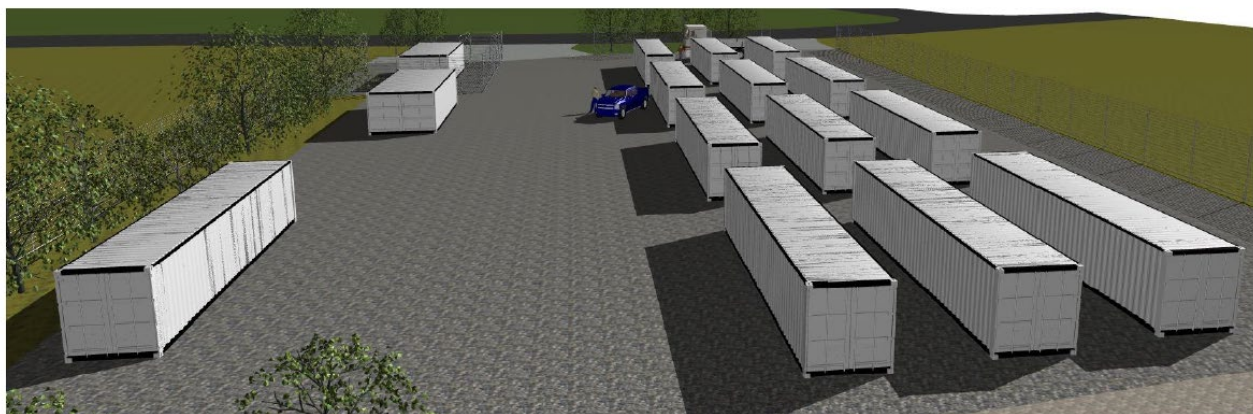


Figure 2: Indicative Image of Battery Module Option and Configuration (Tesla Megapack or Similar).



BATTERY CONTAINER OPTION

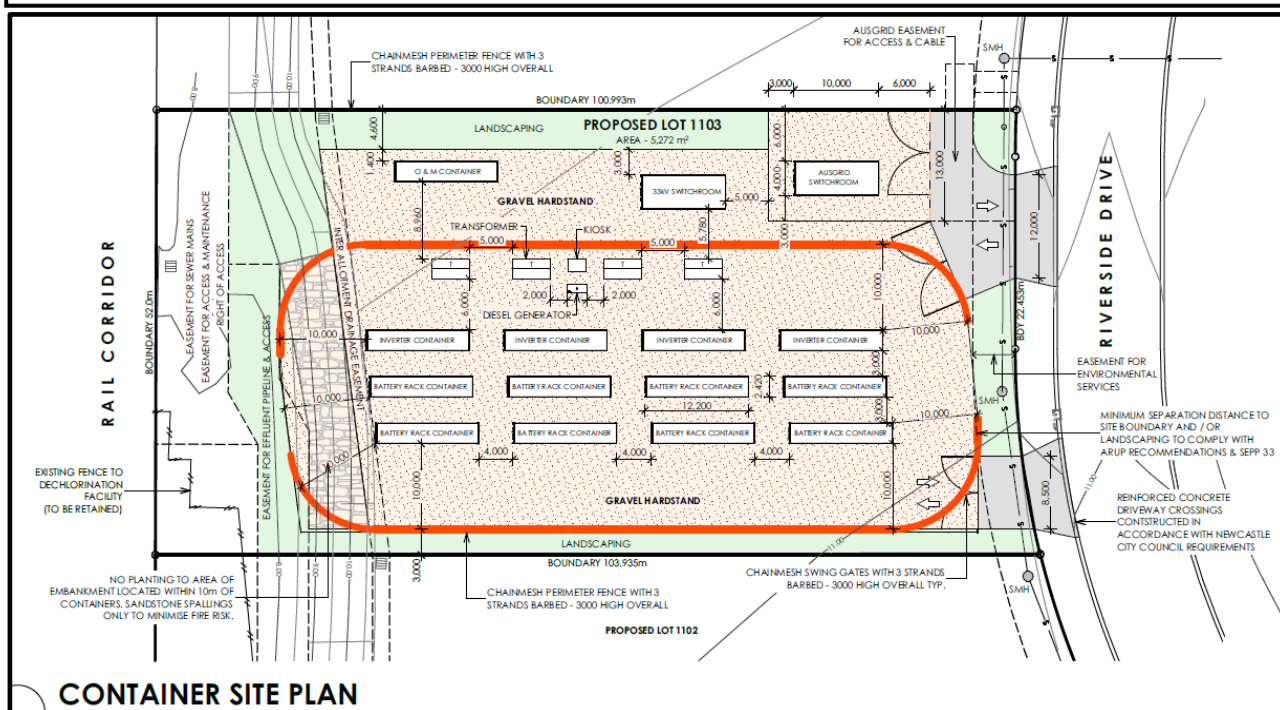


Figure 3: Indicative Image of Battery Container Option and Configuration.

The proposed battery storage facility as described above will comprise multiple individual cubicles (which would be directly mounted on a concrete plinth and connected together on-site or skid mounted and pre-commissioned) or the alternate containerised modules. Either option would appear similar, as the individual cubicles would be arranged in such a way as to appear as a single container.

The overall system will comprise of lithium-ion battery system with a bi-directional (charge and discharge) power conversion system and site controller. The system is expected to be highly modular and based on individual smaller power blocks to achieve the required system size. Each battery pack is comprised of thousands of smaller lithium-ion cells which are fully enclosed (within a climate-controlled HVAC system) connected together to form an integrated system.

The battery storage facility will be required to comply with the following safety standards:

- *UL 1642: Standard for Lithium Batteries; and*
- *UL 9540: Standard for Energy Storage Systems and Equipment.*

A summary of the main project details is provided in **Table 1** below:

Table 1: Summary of project details

PROJECT DETAIL	DESCRIPTION
Project Type	Stand-alone large scale battery storage connected to the National Electricity Market.
Electrical Connection	Ausgrid 33kV distribution network.
Battery Technology	Lithium-ion battery system.
Battery Capacity	Up to 28MW.
Battery Configuration	Twelve (12) outdoor modular battery units or containerised battery system with ancillary balance of plant equipment.
Battery Storage Duration	2 hours.
Project Location	Part Lot 22 DP 280089. Within approved Lot 1103 Riverside Drive, Mayfield West. Stage 11 of Steel River Estate.

As shown on the concept layout figure below, the Ausgrid electrical grid connection that will service the battery is located south of Approved Lot 1103 in Stage 11 as shown in **Figure 4** below. The proposed 33kv cable connection will extend from the south eastern corner of the subject site, along the frontage of approved Lot 1103 within an existing easement for environmental services and will be delivered as part of the Stage 11 subdivision works.

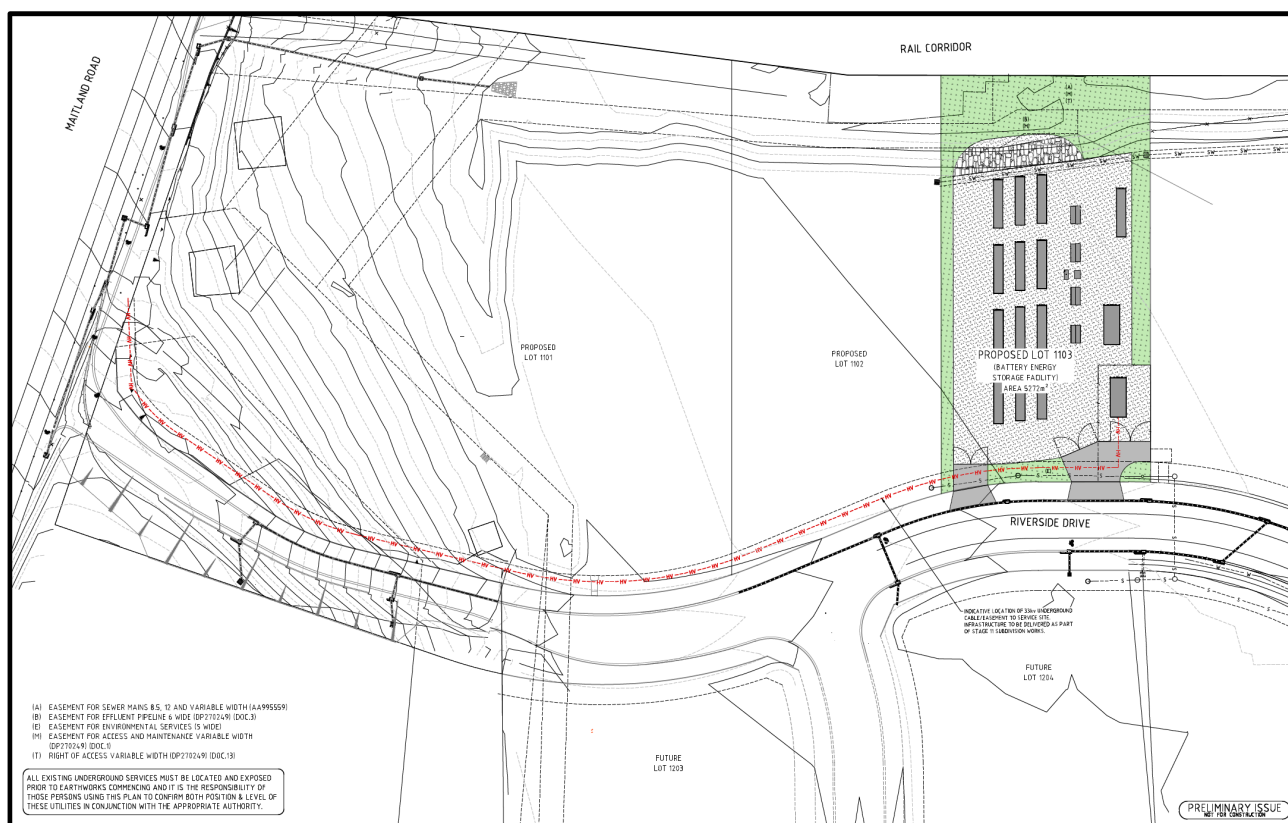


Figure 4: Indication of Ausgrid Connection Point (in red).

Proposal Summary

The proposed Battery Storage Facility will generally include the following components:

- Twelve (12) above ground battery enclosures (either modular battery units or containerised battery system as described above);
- Four (4) transformers;
- One (1) 33kv switchroom;
- One (1) Ausgrid switchroom;
- One (1) operation and maintenance container; and
- One (1) diesel generator; and
- One (1) kiosk.

Construction Works

It is anticipated that the total construction and commissioning period for the project will span approximately 6-9 months. The construction activities to be undertaken as a part of the project include:

- Minor earthworks including site levelling and digging of shallow trenches for cabling. Underground cable would require trenching with approximately 1.2m in depth and 0.6m in width;
- Establishment of concrete slabs for installation of battery systems and associated balance of plant;
- Erection of battery equipment and plant onto slabs and installation of the equipment;
- Installation of electrical cabling and connection of facility to the 33kV Ausgrid electrical network along the frontage of approved Lot 1103. This will likely incorporate a ground mounted circuit breaker with associated isolators, current transformers (CTs), voltage transformers (VTs) and protection equipment using Ausgrid approved equipment; and
- Initial testing and commissioning of the battery storage.

It is anticipated that during the peak of construction, approximately 20 construction personnel will be on site during the main period for installation of the equipment.

Operation and Maintenance

The proposed Battery Storage Facility is expected to operate in conjunction with the electrical grid to provide the following functions:

- Charging and discharging of energy from the electrical grid for shifting of energy to peak consumption periods when electricity is needed the most; and
- Participate in the electricity market to provide ancillary services which help contribute to the stability and functionality of the electrical grid.

The primary modes of operation are:

- Charging of the battery from the external electrical grid; or
- Discharging of the battery to the external electrical grid.

It should be noted that during regular operations of the proposed facility, no dangerous goods will be consistently used.

General operations, testing and preventative maintenance activities by staff would be undertaken during standard working hours of:

- Monday to Friday: 7:00 am to 5:00 pm.
- Saturday: 8:00 am to 1:00 pm.

Outside of emergencies, plant outages, major asset inspection and maintenance programs, night works and work on Sundays and public holidays would be minimised.

Decommissioning

The Battery Storage facility's life is specified for 15 years, as such it is likely that the battery enclosures would be refurbished at the end of year 15. The facility would operate for another 15 years, assuming the power plant's life is extended by an overhaul of the battery cells and associated power system equipment.

The refurbishment of the batteries at the end of year-15 would occur over a 2-3 month window. No changes to the concrete slab, cables and transformers would be expected, due to the longer design life of this infrastructure.

Landscaping

New Landscaping is proposed to be provided throughout the development site as shown in **Figure 5** below and on the Landscape Plans provided within **Appendix D**.

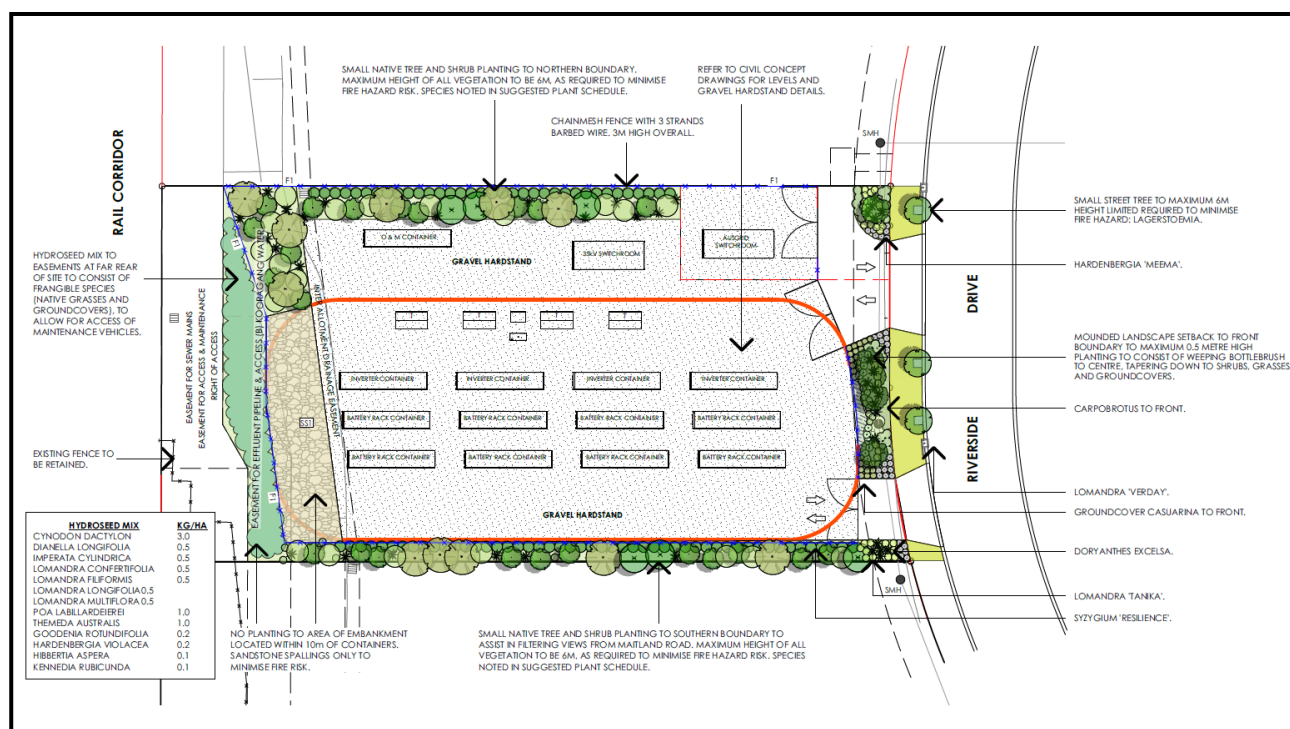


Figure 5: Landscape Concept Plan.

Landscaping will include the installation of small trees, screening shrubs, sections of turf and hydroseeding, and will provide screening and a visual buffer around the perimeter of the site. The landscaping has been proposed to provide adequate screening of the proposal when viewed from Maitland Road to the south west and Riverside Drive to the east.

Perimeter Fencing

A 3m high chainmesh security fence with three (3) strands barbed will be installed around the entire perimeter. The two (2) access driveways will feature 3m high chainmesh swing gates with three (3) strands barbed. The site will be permanently monitored for security purposes by a security system.

There will be a buffer of at least 10m between battery containers and the boundary of the site in accordance with the recommendations of the Preliminary Hazard Analysis provided within **Appendix G**.

Access

Access to the site will be provided via Riverside Drive (Lot 1 Property and Open Accessway) once constructed as part of the Steel River Estate in accordance with DA2006/2076.02 as most recently amended. As shown on the plans provided, concrete bidirectional access driveways have been provided to service the development with entrance / exit points at the north eastern and south eastern corners of the site ensuring vehicles can enter and exit the site in a forward direction. Swept Turing Paths have been shown on the plans provided to demonstrate that a 12.5m ridged truck can adequately enter and exit the site in a forward direction and manoeuvre throughout the site.

The site will comprise a compacted gravel hardstand which will allow maintenance vehicles to manoeuvre throughout the site as required. A secure gated access will also be provided to the Ausgrid switch room. The secured access and fencing locks shall be installed in accordance with the requirements of NEG EP07 *Network Access and Security - Locks and Keys* and Ausgrid specifications, such as T0057 NEG EP09 *Intruder Resistant Fences for Zone and Sub-transmission Substations*". As shown on the plans provided in **Appendix C**, necessary easements for access will also be created.

Given the nature of the proposal, once operational, the site will only be accessed for periodic maintenance involving one vehicle attending site typically a few times per month.

Traffic, access and parking is further discussed within **Sections 3 & 5** of this report.

Stormwater Management

A stormwater management system will be implemented as part of the proposal to manage surface water quality and quantity.

Concept Engineering Plans has been designed for the site and will be provided as part of the proposed development. A copy of the Concept Engineering Plans prepared by GCA are provided within **Appendix E**.

2.4 DOCUMENTATION

The following documentation has been provided to support the proposed development and includes the following:

- Certificate of Title and Deposited Plan – **Appendix A.**
- Detail Survey Plan (Monteath & Powys) – **Appendix B.**
- Development Plans (GCA Engineering Solutions) – **Appendix C.**
- Landscape Plans (Terras Landscape Architects) – **Appendix D.**
- Stormwater Management Plan and Erosion and Sediment Control (GCA Engineering Solutions) – **Appendix E.**
- Approved Subdivision Plan (Precinct Group) – **Appendix F.**
- Preliminary Hazard Assessment (ARUP) – **Appendix G.**
- Site Management Plan and Remediation Certificate B (RCA Australia) – **Appendix H.**
- Statement of Heritage Impact (Eikos Environment and Heritage) – **Appendix I.**
- Acid Sulfate Soils Potential Letter (RCA Australia) – **Appendix J.**
- Acoustic Assessment (Spectrum Acoustics) – **Appendix K.**
- Visual Impact Assessment (Terras Landscape Architects) – **Appendix L.**
- CIV Report (Denary Quantity Surveyors) – **Appendix M.**
- Waste Management Plan (Pro-Forma) – **Appendix N.**
- Steel River Strategic Impact Assessment Checklist – **Appendix O.**
- AHIMS Search Result – **Appendix P.**
- Obtrusive Lighting Report (Power Solutions) – **Appendix Q.**
- Approved Stage 11 Earthworks Plan (GCA Engineering Solutions) – **Appendix R.**
- Kooragang Water Approval for Landscaping in Easement – **Appendix S.**

2.5 SIMILAR DEVELOPMENTS

Battery storage facilities are a relatively new technology within Australia, as such the following is a list of similar developments recently approved in NSW including the approved Battery Storage Facility on Lot 1102 (DA2021/00007):

Name	Application	Capacity	LGA	Approval Date
Steel River Battery	DA2021/00007	28MW	City of Newcastle	20/10/2021
Hume Battery Energy Storage System	SSD-10460	20MW / 40 MWh	Albury City Council	21/01/2021
Wallgrove Battery energy Storage System	See Link to TransGrid and ARENA	50 MW / 75MWh	Western Sydney Regional Organisation of Councils	2020
Sapphire WF Battery Energy Storage System	SSD-8643	50 MW / 100 MWh	Inverell Shire Council	16/08/2018
Hay SF Battery Energy Storage System	SSD-8113-Mod-2	29 MW / 29 MWh	Hay Shire Council	03/05/2021
Culcairn SF Battery Energy Storage System	SSD-10288	100 MW / 200 MWh	Greater Hume Shire Council	25/03/2021
Quorn Park SF Battery Energy Storage System	SSD-9097	20MW / 20 MWh	Parkes Council	16/07/2020
New England SF Battery Energy Storage System	SSD-9255	200 MW / 400 MWh	Uralla Shire Council	09/05/2020

Name	Application	Capacity	LGA	Approval Date
Tamworth SF Battery Energy Storage System	SSD-9264	19 MW / 19 MWh	Tamworth Regional Council	30/11/2020
Wellington SF Battery Energy Storage System	SSD-8573	25 MW / 100 MWh	Dubbo Regional Council	03/03/2020
Jindera SF Battery Energy Storage System	SSD-9549	30 MW / 60 MWh	Greater Hume Shire Council	22/12/2020

It should be noted that the Hume Battery and Wallgrove Battery Energy Storage Systems are the only two 'standalone' utility-scale batteries that have been approved in NSW to date. The design of these batteries is similar to the proposed Steel River Battery. There is a number of other similar battery projects that have been approved and are co-located with either wind or solar farms. Some of these are also listed above.

3.0 Project Context

3.1 PROPERTY DESCRIPTION

The land subject to the proposal is described as:

- Approved Lot 1103 within Lot 22 DP 280089, with a physical address of 60 Riverside Drive, Mayfield West.

The site is currently approved for further subdivision and is situated within approved Lot 1103, part of future Stage 11 Steel River Business Estate. The approved lot has a total area of 5,272m². The site is currently vacant IN1 General Industrial zone land.

The subject site is owned by Steel River West Pty Ltd and a copy of the Certificate of Title and Deposited Plan are included as **Appendix A** of this report. Landowner's consent has been provided with the Development Application form.

3.2 LOCALITY

The development site is located within the Steel River Estate. The site is bound to the west by a railway line, to the south by approved Lot 1102, to the north by Lot 16 DP 280089 and to the east by future Riverside Drive. **Figure 6** below shows the location of the site within the context of the broader Newcastle Area.



Figure 6: Location of subject site within broader Newcastle area.

The aerial photographs below provide an indication of the current built form and pattern of development within the locality.



Figure 7: Aerial photo of the subject site.

As outlined above, the site is currently approved for further subdivision and is situated within approved Lot 1103, part of future Stage 11 Steel River Estate. The below figure provides an indication of where approved Lot 1103 is situated within the approved Steel River Estate (DA2006/2076.02 as most recently amended).



Figure 8: Subdivision Plan.

3.3 TOPOGRAPHY, DRAINAGE & FLOODING

Topography

The site is relatively flat with some fall across the site from east to west, with a small embankment along the western portion of the lot. It is understood that site drainage is proposed to be towards existing stormwater infrastructure located adjacent to the existing rail line along the north western boundary.

The site is generally bound by vacant land with Riverside Drive located to the east and the existing rail line to the west.

The site has been used for the stockpiling of materials sourced during the Stage 9 construction works of the Steel River Estate.

Stormwater

Stormwater from the site is proposed to be captured and directed into the overall stormwater management system being constructed as part of the Steel River Business Park.

A copy of the Concept Engineering Plans prepared by GCA are provided within **Appendix E**. Stormwater is also discussed further within **Section 2** and **5** of this report.

Flooding

The potential for flooding of the site is considered to be low based on the site's elevation above the Hunter River and the extensive low-lying land on the opposite side of the river.

The subject site has been identified on the City of Newcastle Flood Prone Land Map (**Figure 9**) as being Very Low Risk and is not considered to be Flood Prone Land (FPL) as it is outside the 1% AEP.

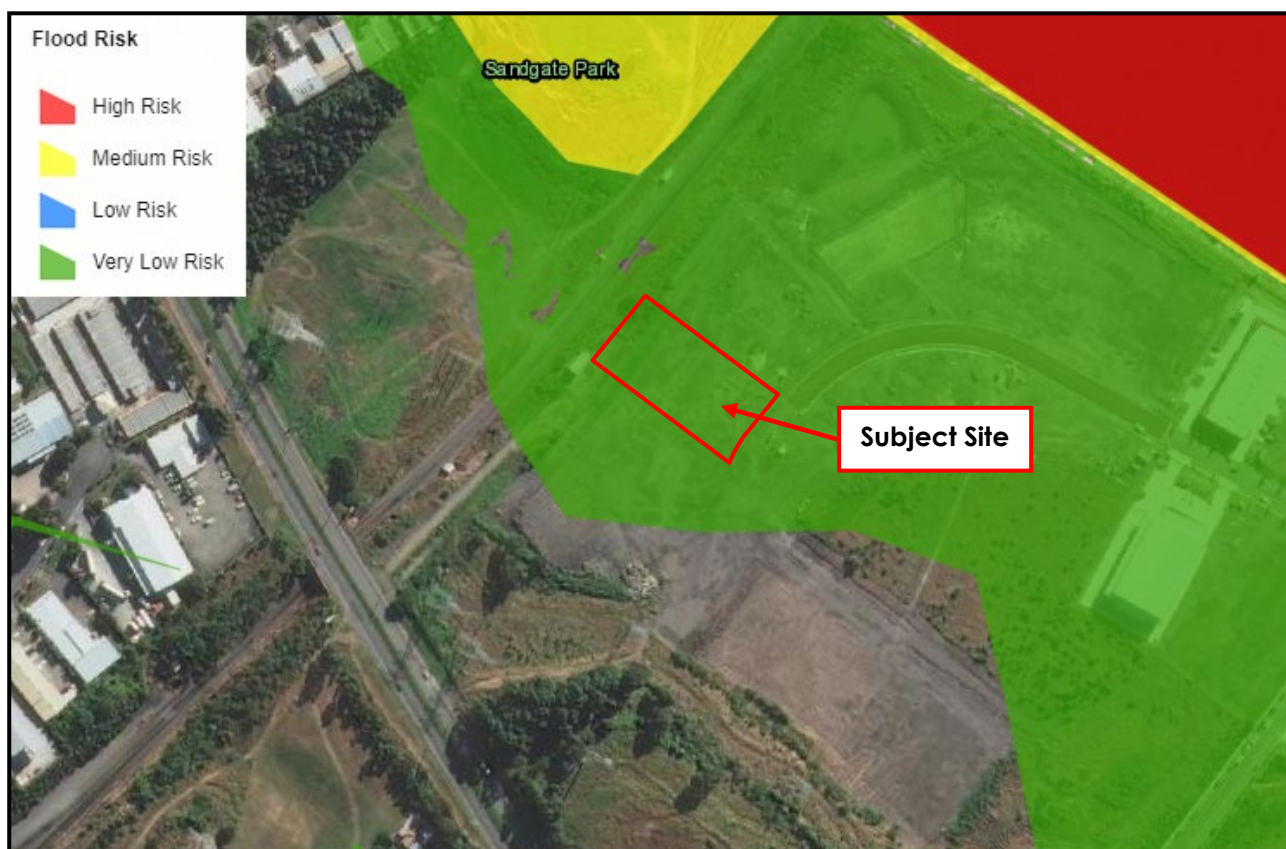


Figure 9: City of Newcastle Flood Mapping.

3.4 EASEMENTS

The site contains a number of easements. These are mapped and documented in **Figure 10** below.

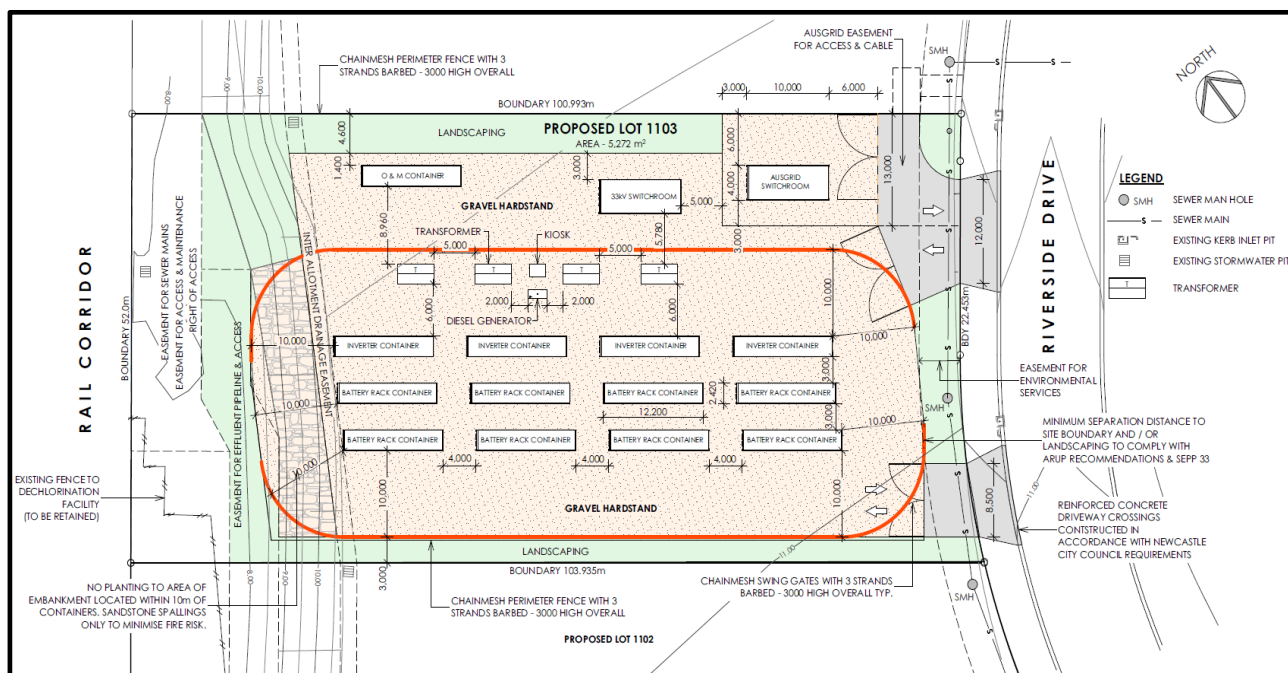


Figure 10: Easement Location within Site Plan.

As shown on the Development Plans provided within **Appendix C** and approved Subdivision Plan provided within **Appendix F**, the proposed battery storage facility has been sited on approved Lot 1103 to be clear of the easements which extend through the rear of the allotment.

3.5 CONTAMINATION & GEOTECHNICAL CHARACTERISTICS

3.5.1 Contamination

The broader Steel River Estate has been subject to remediation works which encompasses a staged validation process. The Site benefits from a Validation Certificate 'A' and a Validation Certificate 'B'. Certificate 'A' validated early works undertaken as part of the staged development of the estate, whilst the Certificate 'B' provides site specific validation.

A Site Management Plan and Certificate B for Lot 1103 has been prepared by RCA Australia and is provided within **Appendix H**. Contamination is addressed further in **Sections 4.0** and **5.0** of this report.

3.5.2 Mine Subsidence

The site is not located within a Mine Subsidence District and therefore referral to Subsidence Advisory NSW is not required (refer **Figure 11** below).

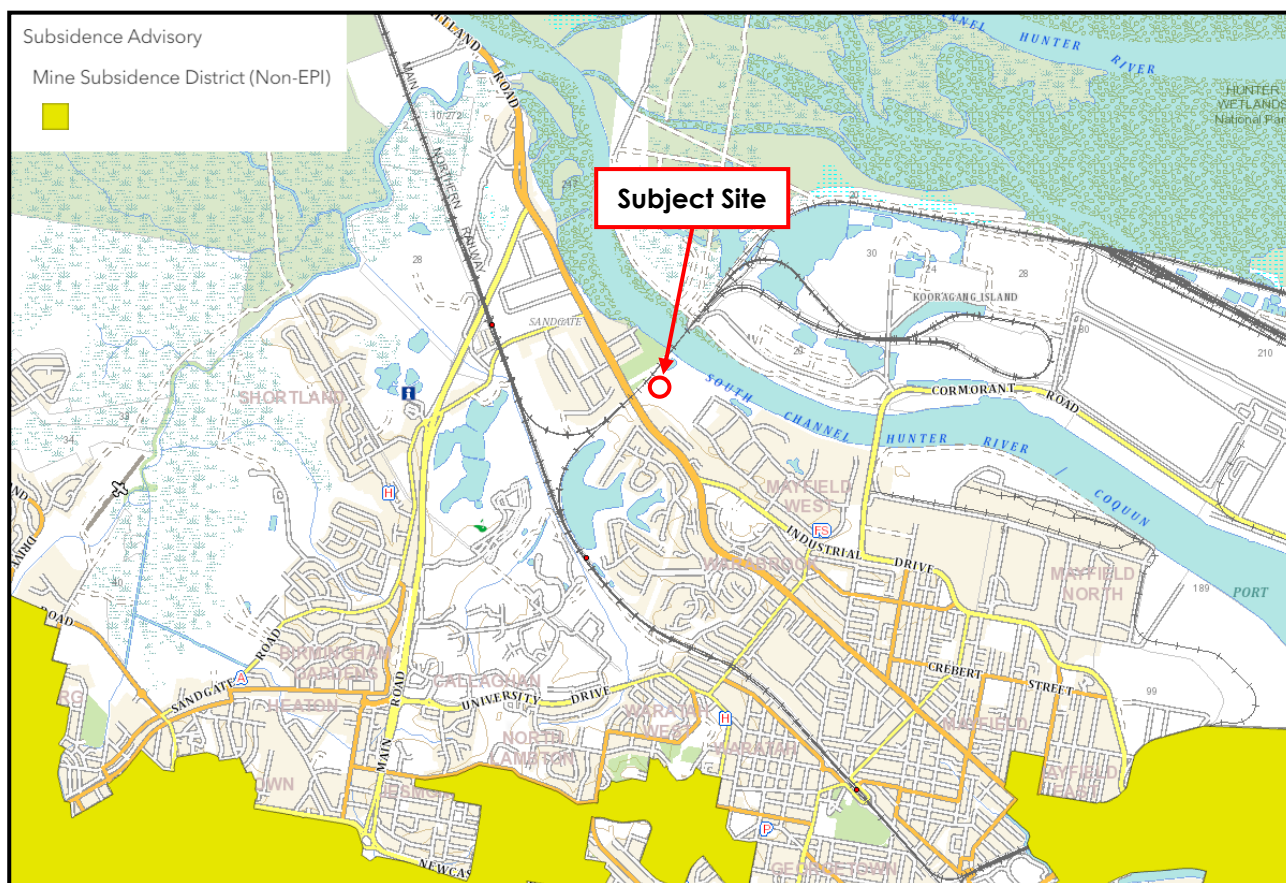


Figure 11: Mine Subsidence Map extract from NSW Planning Portal.

3.6 ACID SULPHATE SOILS

The subject site is identified as containing Class 2 Acid Sulfate Soils (refer **Figure 12** below).

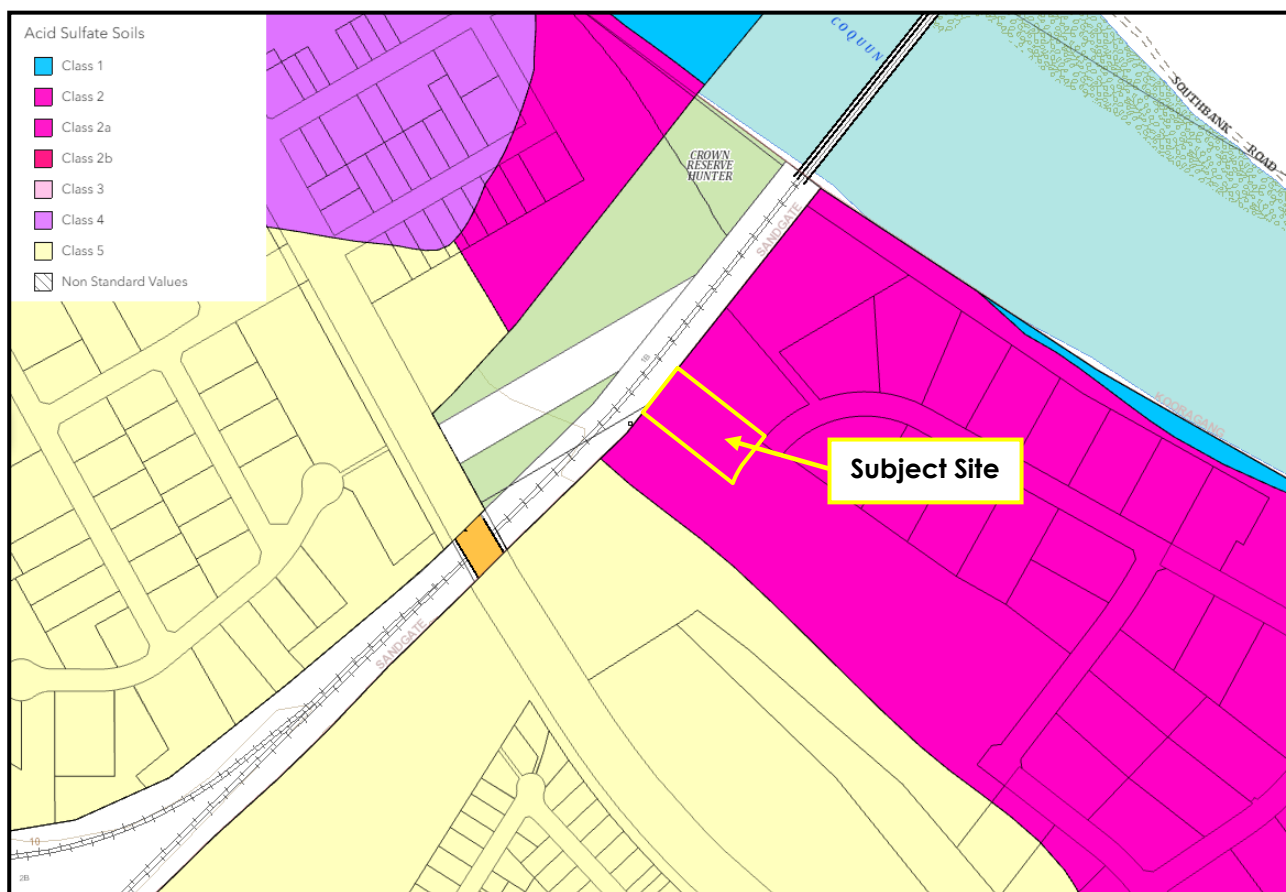


Figure 12: Acid Sulfate Soils Map extract.

A letter regarding Acid Sulfate Soil potential has been prepared by RCA Australia and is provided within **Appendix J**.

3.7 VEGETATION

The subject site does not contain any significant vegetation.

3.8 BUSHFIRE

The subject site is not identified on Council's Bushfire Prone Land map as being bushfire prone land.

3.9 ABORIGINAL & CULTURAL HERITAGE

The subject site is not identified as containing any items of Aboriginal or European Heritage Significance (refer **Figure 13** below).

The site is located approximately 140m from the Heritage Item I291 known as the former Migrant Camp.

A Statement of Heritage Impact has been prepared by Eikos Environment and Heritage and is provided within **Appendix I**. This is addressed further in **Section 5.0** of this report.

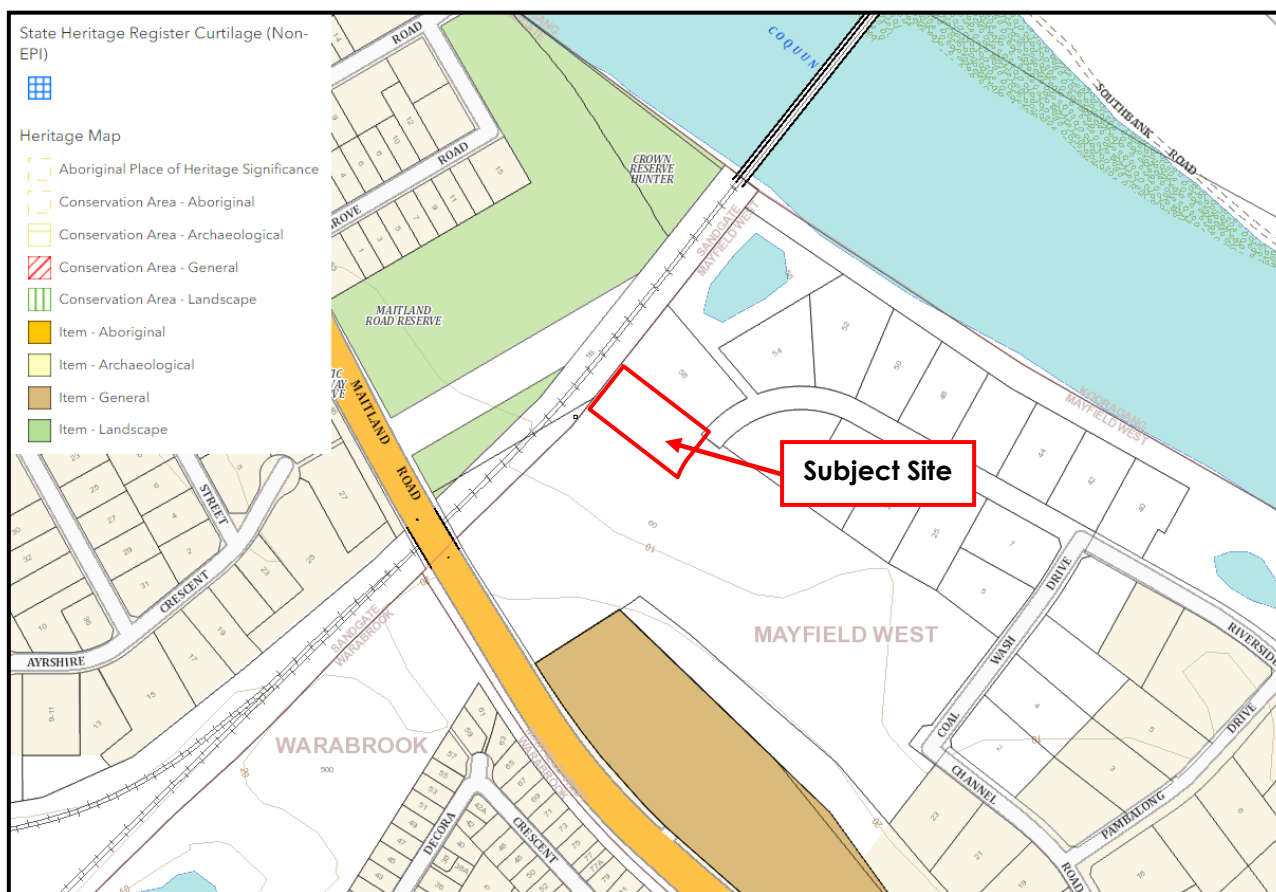


Figure 13: Heritage Map extract.

Based on a search of the OEH Aboriginal Heritage Information Management System (AHIMS) register on 29 April 2022, there are no recorded sites within the project site. A copy of the AHIMS search has been provided within **Appendix P**.

3.10 TRAFFIC, ACCESS & ROAD NETWORK

The subject site is to be accessed off Riverside Drive (once constructed). Access to Riverside Drive is provided via Steel River Boulevard and Channel Road to the east. Direct access to Riverside Drive will also become available off Maitland Road, once the intersection with Maitland Road is delivered as part of the Stage 11 subdivision works in accordance with DA2006/2076.02 as most recently amended. A portion of this road is to be dedicated as public road to the southern boundary of Approved Lot 1203, located within future Stage 11.

It is considered the Steel River Estate road network once constructed and the general surrounding local road network has sufficient spare capacity to cater for the small increase in traffic generated by the development and the development will not adversely impact on the surrounding and local road network.

Traffic and parking are addressed further in **Section 5.0** of this report.

3.11 COASTAL ZONE

The subject site has been identified as being within the Coastal Environment area and partially within the Coastal Use area under Chapter 2 of *State Environmental Planning Policy (Resilience and Hazards) 2021*. An extract of the Coastal Environment and Coastal Use area mapping is shown in **Figures 14** and **15** below. The provisions of this SEPP are further addressed in **Section 4.0** of this report.

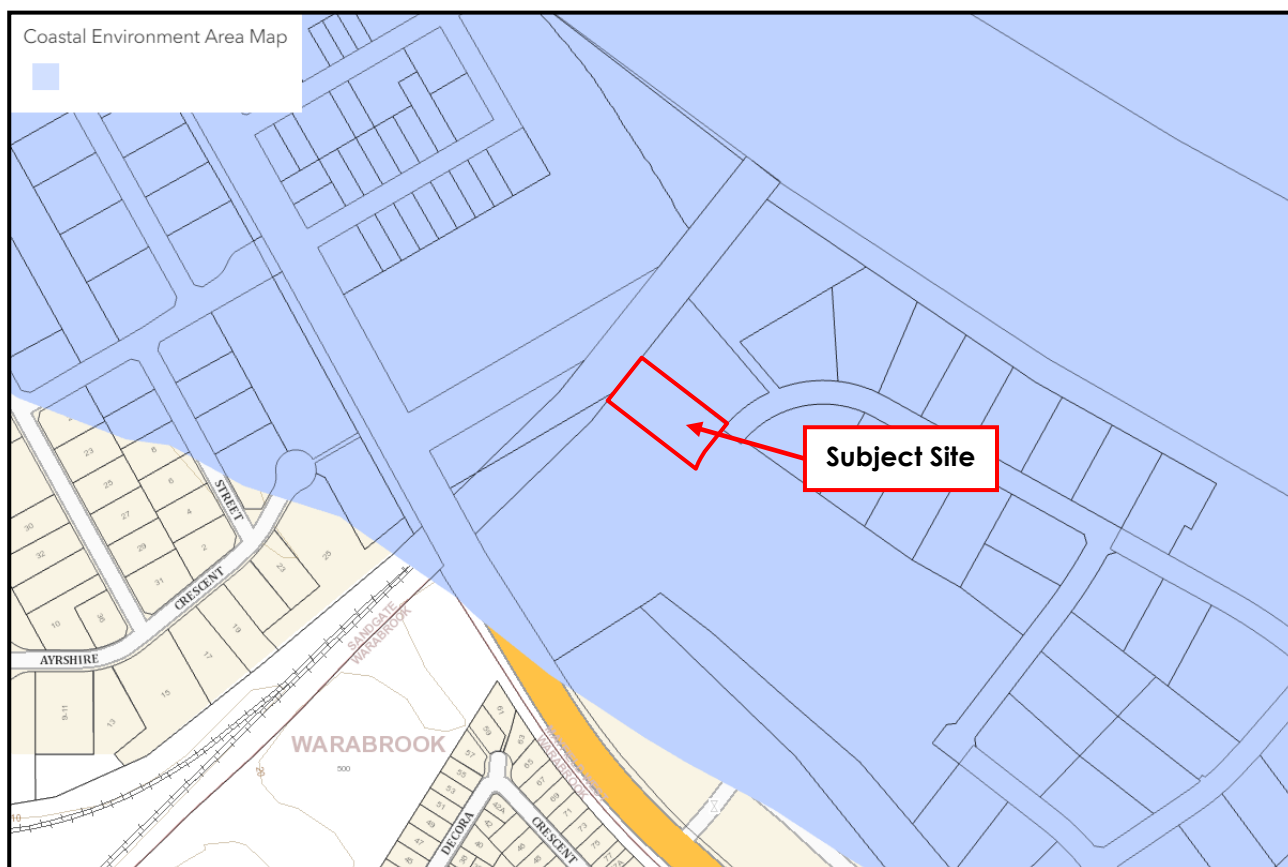


Figure 14: Coastal Environment Area Map.

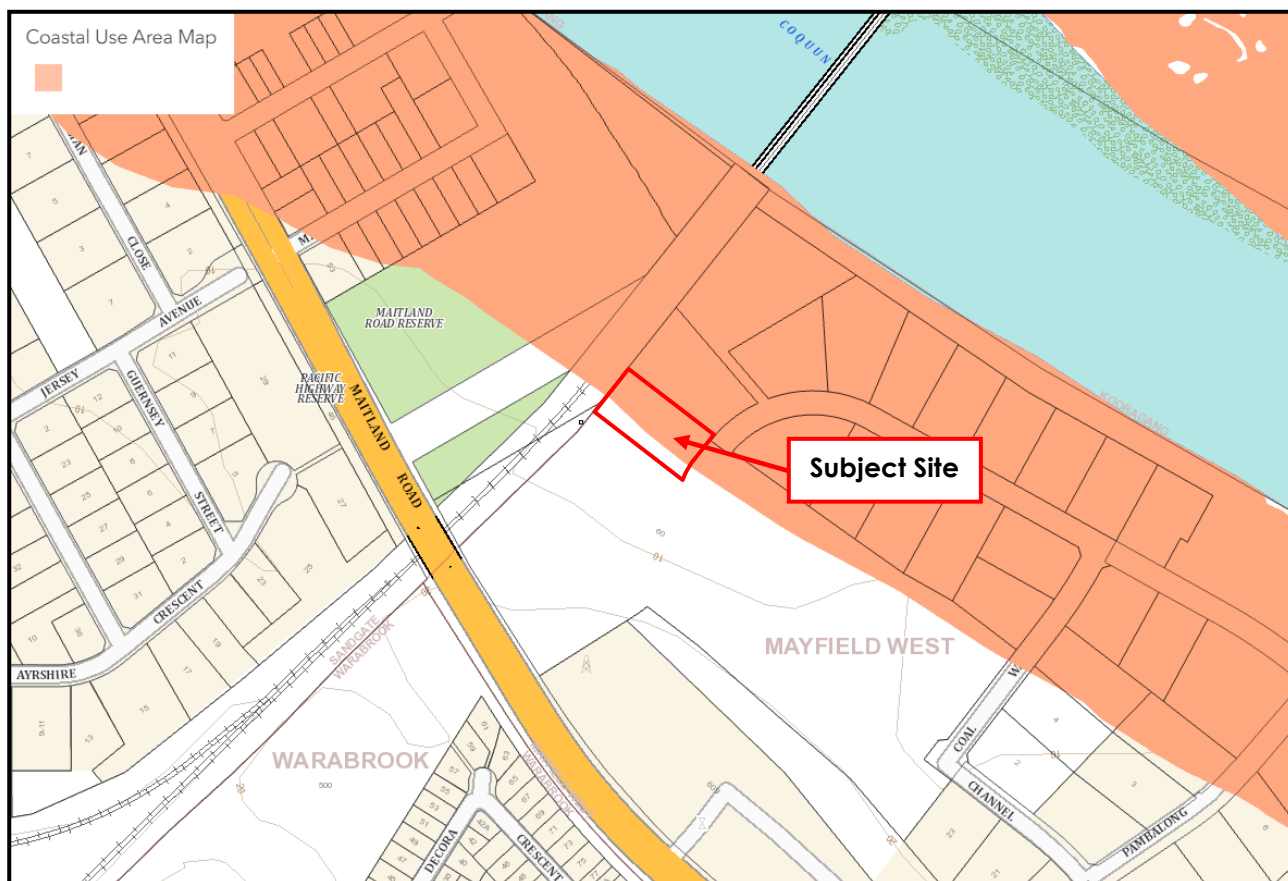


Figure 15: Coastal Use Area Map.

3.12 UTILITY SERVICES

At the completion of Stage 11 of the broader subdivision, all public utility services including reticulated water and sewer, electricity and telecommunications will be available to the site, and will be upgraded where necessary to service the proposed development.

4.0 Planning Controls

4.1 RELEVANT LEGISLATION

4.1.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides the framework for environmental planning and development approvals and includes provisions to ensure that the potential environmental impacts of a development are assessed and considered in the decision-making process.

As outlined previously, the proposed development is permissible with consent in accordance with Chapter 2, Part 2.3, Division 4, Section 2.36(1)(a) & (b) of SEPP (Transport and Infrastructure) 2021. The proposal is subject to assessment under Part 4 of the EP&A Act.

Integrated Development

The proposed development is not considered to be integrated development under Section 4.46 of the EP&A Act.

4.1.2 Environmental Planning and Assessment Regulation 2021

The proposal does not fall within the definition of an “*Electricity Generating Station*” in accordance with Schedule 3 Designated Development, Part 2, Section 24 of the Regulation. Accordingly, an EIS is not required.

4.1.3 Protection of the Environment Operations Act 1997

Activities required to obtain a licence under the Protection of the Environment Operations Act 1997 (POEO Act) are detailed in Schedule 1 of the Act.

The proposal is not consistent with the description of any activity listed in Schedule 1 of the POEO Act.

4.2 STATE PLANNING CONTROLS

A review of all State Environmental Planning Policies has been undertaken and the following policies are applicable to the proposed development.

4.2.1 State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021 (SEPP (Resilience and Hazards)) provides land use planning provisions relating to coastal management, hazardous and offensive development, and remediation of land.

Chapter 2 Coastal Management

Chapter 2 of this Policy aims to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the *Coastal Management Act 2016*. It seeks to manage development in the coastal zone and the environmental assets of the coast by employing different management techniques to areas within the coastal zone.

The subject site has been mapped within the Coastal Environment and Coastal Use areas by the SEPP.

The applicable Sections of the SEPP have been addressed below:

Division 3 Coastal Environment Area

2.10 Development on land within the coastal environment area

(1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—

- (a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*
- (b) coastal environmental values and natural coastal processes,*
- (c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,*
- (d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*
- (e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
- (f) Aboriginal cultural heritage, practices and places,*
- (g) the use of the surf zone.*

Comment: The development site has negligible ecological values and the proposal will not adversely impact the integrity and resilience of the biophysical environment. Contemporary stormwater management techniques will be employed to ensure stormwater drainage is of a suitable quality before leaving the site. The proposal is unlikely to impact coastal processes, Aboriginal heritage or use of the surf zone.

(2) Development consent must not be granted to development on land to which this section applies unless the consent authority is satisfied that—

- (a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subsection (1), or*
- (b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
- (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.*

Comment: The development site is spatially separated from significant coastal processes and the proposal is not likely to cause adverse impact to the functioning of the coastal zone.

Division 4 Coastal Use Area

2.11 Development on land within the coastal use area

(1) Development consent must not be granted to development on land that is within the coastal use area unless the consent authority—

(a) has considered whether the proposed development is likely to cause an adverse impact on the following—

- (i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
- (ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,*
- (iii) the visual amenity and scenic qualities of the coast, including coastal headlands,*
- (iv) Aboriginal cultural heritage, practices and places,*
- (v) cultural and built environment heritage, and*

Comment: The subject site does not provide any existing safe access to and along the Hunter River, and comprises negligible visual amenity and scenic qualities. The site is located within an emerging industrial precinct void of any heritage values.

(b) is satisfied that—

- (i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or*
- (ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
- (iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and*

Comment: The site does not contain any values referred to in Section 2.11(1)(a) of the SEPP.

(c) has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.

Comment: The site is located within an emerging industrial precinct and is of a suitable bulk, scale and size.

Division 5 General

2.12 Development in coastal zone generally - development not to increase risk of coastal hazards

Development consent must not be granted to development on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to cause increased risk of coastal hazards on that land or other land.

Comment: The site is spatially separated from significant coastal processes and the proposal is not likely to cause adverse impact to the functioning of the coastal zone.

Chapter 3 Hazardous and Offensive Development

This Chapter replaces SEPP 33 and aims to identify potentially hazardous or offensive industry and ensure that adequate measures are implemented to reduce the impact of such development.

The proposal is not one which is likely to potentially impact on human health or the biophysical environment. Appendix 3 of *Applying SEPP 33* provides a list of industries that may be potentially hazardous and fall within Chapter 3 of SEPP (resilience and Hazards). Development for the purpose of battery storage is not included within the list provided in Appendix 3.

ARUP have prepared a Preliminary Hazard Assessment (PHA) which has considered the applicability of SEPP (Resilience and Hazards) and undertaken a screening of the proposal against the provisions of this SEPP. A copy of this assessment is provided within **Appendix G**.

All the dangerous goods screened by ARUP do not exceed the SEPP (Resilience and Hazards) threshold, thus a PHA is not required for the development by this SEPP. It should be noted that by taking a conservative approach to land use planning, a PHA has been prepared to address the potential risks that may arise from this development.

The proposed development is not considered to meet the definition of hazardous industry or offensive industry, as defined by SEPP (Resilience and Hazards) and described in *Applying SEPP 33*.

Chapter 4 Remediation of Land

This Chapter provides state-wide planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed.

Section 4.6 of the SEPP requires contamination and remediation to be considered in determining a development application.

The broader Steel River Estate has been subject to remediation works which encompasses a staged validation process. The Site benefits from a Validation Certificate 'A' and a Validation Certificate 'B'. Certificate 'A' validated early works undertaken as part of the staged development of the estate, whilst the Certificate 'B' provides site specific validation.

A Site Management Plan and Remediation Certificate B prepared by RCA has been provided within **Appendix H** of this report. The certificate confirms:

"The Lot is suitable for commercial / industrial development subject to works being undertaken in accordance with the Steel River Construction Guidelines (Ref [4]), relevant management plan (Ref [5]), and Certificate C and Site Management Plan(s) that are yet to be prepared for the site".

For the purpose of Section 4.6 of the SEPP, the consent authority can be satisfied that the land has been appropriately remediated.

Notwithstanding, the staged validation process requires further site-specific certification of known as the 'Certificate C' and the preparation of a Site Management Plan based on the Steel River Site Development Guidelines. Having regard to the findings of Validation Certificate B, it is appropriate that any Notice of Determination Issued by Council requires that:

- A project specific Site Management Plan is prepared prior to the release of a construction certificate; and

- A Validation Certificate C is prepared and submitted to the Principle Certifying Authority prior to the release of the construction certificate.

As required by Certificate B a Site Management Plan has been prepared for the proposed works associated with the Battery Storage Facility on approved Lot 1103 and is provided within **Appendix H**.

This approach would ensure that the Certificate C is based on the approved documentation related to the project whilst providing a safeguard to ensure the certificate is in place prior to the commencement of works.

Based on the above findings it is evident that the land is suitable for the intended use, and that measures will form part of the detailed design and certification process to ensure the integrity of the estate specific validation process is maintained.

4.2.2 State Environmental Planning Policy (Transport and Infrastructure) 2021

Chapter 2 Infrastructure

Chapter 2 of this SEPP aims to facilitate the effective delivery of infrastructure across the State of NSW.

Part 2.3: Division 4 Electricity Generating Works or Solar Energy Systems

SEPP (Transport and Infrastructure), provides permissibility for this use as follows:

In accordance with Part 2.3, Division 4, Section 2.35 of SEPP (Transport and Infrastructure), the proposed Battery Storage is defined as:

“electricity generating works means a building or place used for the purpose of—
 (a) making or generating electricity, or
 (b) electricity storage”.

“prescribed rural, industrial or special use zone means any of the following land use zones or a land use zone that is equivalent to any of those zones-

...

(e) IN1 General Industrial,”

“Electricity Generating Works” are permitted with consent under Part 2.3, Division 4, Section 2.36 of the SEPP. Section 2.36 states:

2.36 Development permitted with consent

(1) Development for the purpose of electricity generating works may be carried out by any person with consent on the following land—

- (a) in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source—on any land,
- (b) in any other case—any land in a prescribed rural, industrial or special use zone.

As such, the proposed development is permissible with consent in accordance with Part 2.3, Division 4, Section 2.36(1)(b) of *State Environmental Planning Policy (Transport and Infrastructure) 2021*.

Part 2.3: Division 5 Electricity Transmission or Distribution

A review of survey information indicates that the connection to the Ausgrid network will require the 33kv cable to extend through an easement for overhead services.

This connection will be delivered as part of Stage 11 subdivision works, however in accordance with Part 2.3, Division 5, Section 2.48 of SEPP (Transport and Infrastructure), it is understood Council will refer the Development Application to the electrical supply authority (Ausgrid) for their consideration taking into account the relevant response, as the development site comprises the abovementioned easement for electricity purposes.

Part 2.3: Division 15 Railways

Section 2.97 applies to development on land that is in or immediately adjacent to a rail corridor, if the development:

- “(a) is likely to have an adverse effect on rail safety, or*
- (b) involves the placing of a metal finish on a structure and the rail corridor concerned is used by electric trains, or*
- (c) involves the use of a crane in air space above any rail corridor.*
- (d) is located within 5 metres of an exposed overhead electricity power line that is used for the purpose of railways or rail infrastructure facilities”.*

It is understood that Council will refer to the Development Application to Australian Rail Track Corporation (ARTC) in accordance with Section 2.97.

Part 2.3: Division 17 Roads and Traffic

Part 2.3, Division 17, Section 2.121 of the SEPP refers to traffic-generating development as listed in Column 1 of Schedule 3. The proposed development does not meet the parameters listed for industry in Schedule 3 and therefore is not considered a traffic-generating development in accordance with SEPP (Transport and Infrastructure).

4.2.3 State Environmental Planning Policy (Planning Systems) 2021

Chapter 2 State and Regional Development

The aims of this Chapter are to identify development that is State significant development, State significant infrastructure and critical State significant infrastructure.

Schedule 6, Section 5(a) of SEPP (Planning Systems) 2021 states:

5 Private infrastructure and community facilities over \$5 million

Development that has a capital investment value of more than \$5 million for any of the following purposes—

(a) air transport facilities, electricity generating works, port facilities, rail infrastructure facilities, road infrastructure facilities, sewerage systems, telecommunications facilities, waste or resource management facilities, water supply systems, or wharf or boating facilities,

The proposal will have a capital investment value of more than \$5 million and will trigger Regionally Significant Development. Given this, the City of Newcastle will be responsible for the environmental assessment of the Development Application, with the application determined by the Hunter and Central Coast Regional Planning Panel.

4.3 REGIONAL PLANNING CONTROLS

4.3.1 Hunter Regional Plan 2036

The NSW Government has developed the *Hunter Regional Plan 2036* as an overarching framework to guide land use planning priorities and infrastructure funding decisions in the Hunter region over the next 20 years.

The Plan sets priorities and provides a direction for regional planning decisions. It focuses on new housing and jobs, and targets growth in strategic centres and renewal corridors close to transport to deliver social and economic benefits. It sets in place line-of-sight land use planning for the region, regional districts like the Greater Newcastle metropolitan area and each council area.

The vision of the *Hunter Regional Plan 2036* is for the Hunter to be the leading regional economy in Australia with a vibrant new metropolitan city at its heart. To achieve this vision, the NSW Government has acknowledged the growing importance of Greater Newcastle and set the following regionally focused goals:

- The leading regional economy in Australia;
- A biodiversity-rich natural environment;
- Thriving communities; and
- Greater housing choice and jobs.

Figure 16 below provides the indicative boundaries of the Greater Newcastle area and identifies the location of the subject site within the Newcastle area.

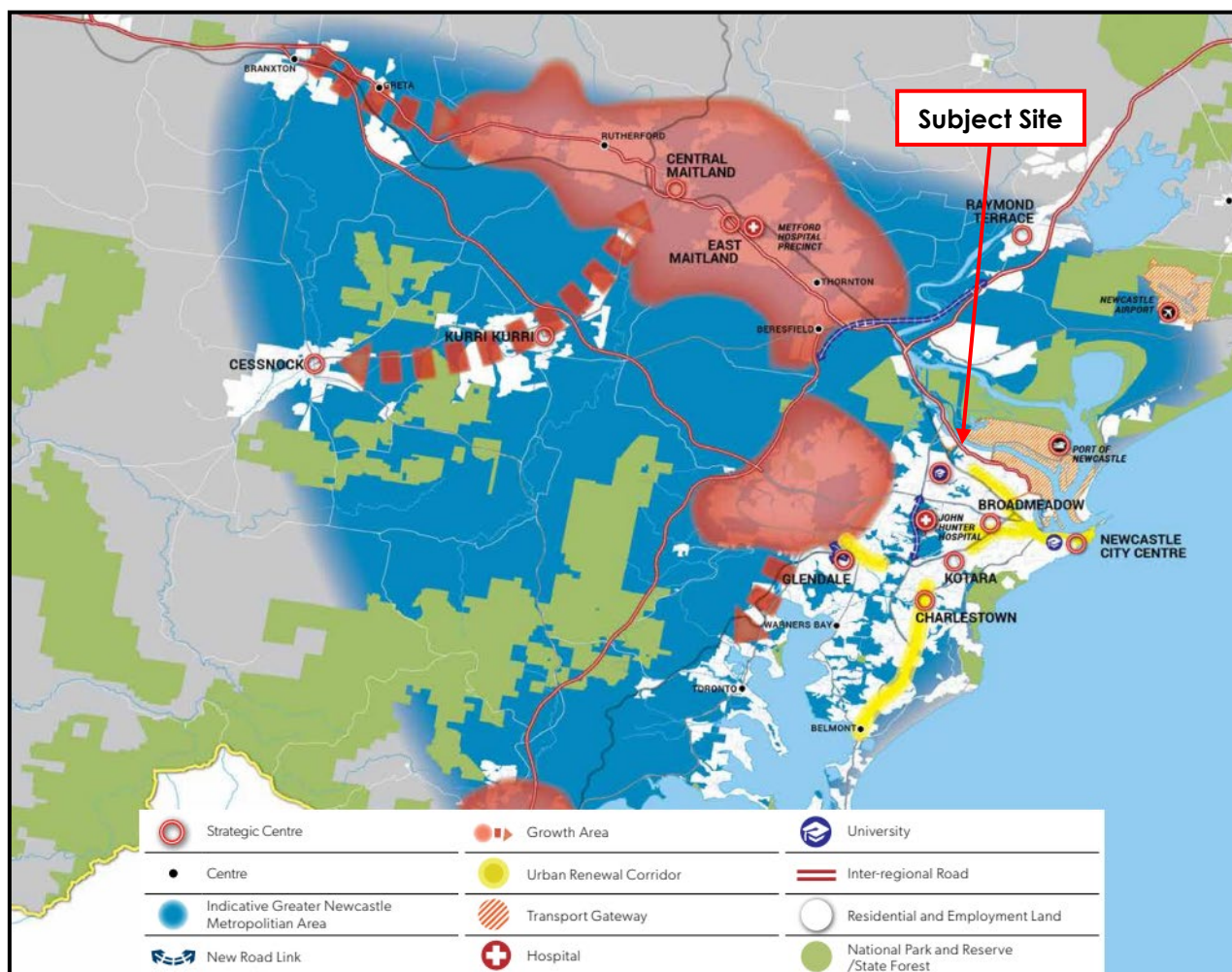


Figure 16: Extract from Hunter Regional Plan 2036.

The proposed battery storage facility is entirely consistent with Goal 1, Direction 12 of the Plan to Diversify and Grow the Energy Sector.

The Energy efficient and renewable energy technologies can drive innovation, improve business and agricultural productivity and underpin long term economic growth. Ground-source heat exchange, solar pumping in agriculture, bioenergy, small-scale hydro and storage technology advances have enormous potential to contribute to the regional economy.

With its energy industries and research base, the Hunter region has the potential to be a major hub for next-generation power.

It is considered that the proposal is entirely consistent with the relevant Direction and Actions within the *Hunter Regional Plan 2036*.

4.3.2 Draft Hunter Regional Plan 2041

The *Draft Hunter Regional Plan 2041* forms part of the five (5) year review of the *Hunter Regional Plan 2036*, and resets priorities for the area to ensure continued progress and prosperity for the Hunter community for the next 20 years. The Plan sets the strategic land use framework for continued economic transformation in one of Australia's most diverse and liveable regions.

Under this Plan, the regional vision for the Hunter is as follows:

“The leading regional economy in Australia, connected to and caring for Country, with a vibrant metropolitan city and sustainable 15-minute neighbourhoods at its heart.”

The proposed development is consistent with this vision, noting it will contribute to a thriving regional economy through the establishment of an innovative battery storage facility in a strategic industrial location within the Hunter region.

The proposed development is also entirely consistent with objective 6 within the Plan, which aims to reach net zero and increase resilience and sustainable infrastructure.

The proposed battery storage facility embraces new technologies and innovative practices to improve the resilience of the local area through the improved stability and functionality of the electrical grid. The proposal also supports emissions reductions through the improved ability to facilitate renewable energy integration.

The proposed development is generally consistent with the vision and relevant objectives of the *Draft Hunter Regional Plan 2041*.

4.3.3 Greater Newcastle Metropolitan Plan 2036

The *Greater Newcastle Metropolitan Plan 2036* (GNMP) is a priority action of the above referenced *Hunter Regional Plan 2036*. The vision set out for the greater Newcastle area in the GNMP is as follows:

Australia's newest and emerging economic and lifestyle city, connected with northern NSW and acknowledged globally as:

- *dynamic and entrepreneurial, with a globally competitive economy and the excitement of the inner city and green suburban communities;*
- *offering great lifestyles minutes from beaches or bushland, the airport or universities, and from the port to the lake; and*
- *a national leader in the new economy, with smarter cities and carbon neutral initiatives, and with collaborative governance that makes it a model to others in creating and adapting to change.*

The Plan sets out strategies and actions that will drive sustainable growth across Cessnock City, Lake Macquarie City, Maitland City, Newcastle City and Port Stephens communities, which together make up Greater Newcastle.

The site is identified in the GNMP as being located within the Port of Newcastle Catalyst Area which is provided below in **Figure 17**.



Figure 17: Extract from Greater Newcastle Metropolitan Plan 2036.

The GNMP identifies the site as being located within the Steel River Precinct, City of Newcastle will align local plans to facilitate engineering, research and high-tech manufacturing uses.

The proposed development supports these outcomes by providing a new and emerging technology in a suitable area which has been identified as requiring separation from adjoining land uses. It is considered that the proposed battery storage facility is compatible with the aims and objectives of the *Greater Newcastle Metropolitan Plan 2036*.

4.4 LOCAL PLANNING CONTROLS

4.4.1 Newcastle Local Environmental Plan 2012

The land subject to the proposed work is zoned IN1 General Industrial zone under the *Newcastle Local Environmental Plan 2012* (NLEP). The proposed Battery Storage Facility is defined as "Electricity Generating Works", which is not listed as a permissible use within the IN1 zone.

However, the proposed works fall within the provisions of SEPP (Transport and Infrastructure) 2021, this policy prevails over Newcastle LEP 2012 as identified by Section 2.7 of the SEPP and has been addressed in **Section 4.2** above.

The objectives of the IN1 General Industrial Zone are:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*
- *To support and protect industrial land for industrial uses.*
- *To allow commercial, retail or other development where it is—*
 - (i) ancillary to the use of land in this zone for industrial, research, service or storage purposes, or*
 - (ii) primarily intended to provide personal services and community facilities to persons occupied or employed in activities otherwise permitted in this zone or for the benefit of the local community.*
- *To ensure that any such commercial, retail or other development is unlikely to be prejudicial—*
 - (i) to employment-generating activities, or*
 - (ii) to the viability of existing commercial centres.*

The proposed development is considered to be consistent with the relevant objectives of the zone, in particular noting the following:

- The proposal provides a new technology on a site that is suitable within the Steel River Estate;
- The proposal will see the creation of 20 jobs during the construction period and up to two (2) full time equivalent roles once operational; and
- The subject site is considered to be an ideal location for the proposal with good connection to the local Ausgrid network.

Figure 18 is an extract from the NLEP zoning map and illustrates the IN1 zoning of the site in the context of the surrounding locality.

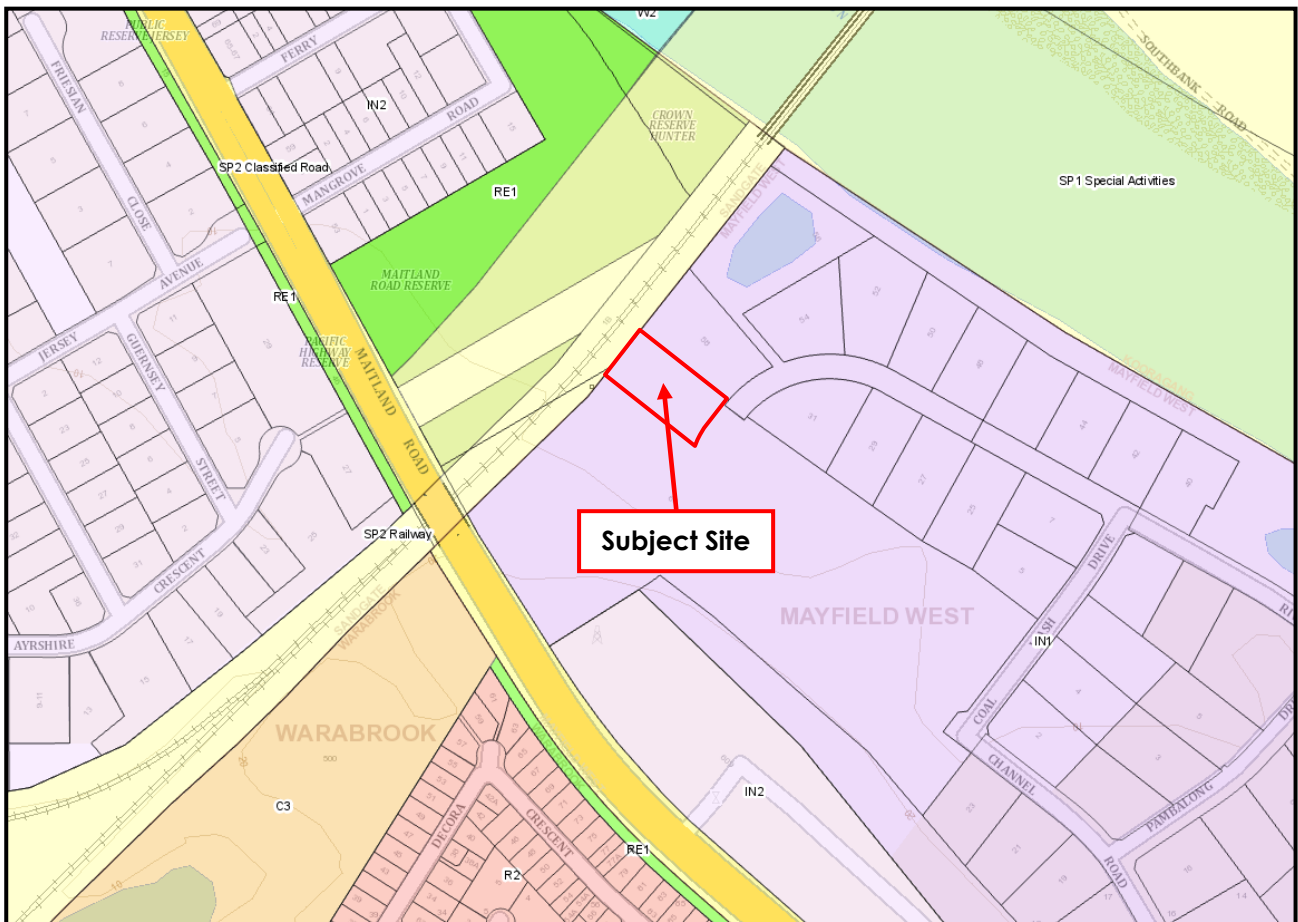


Figure 18: Zoning Map Extract from Newcastle LEP 2012.

4.4.2 Land Use Definitions & Permissibility

SEPP (Transport and Infrastructure) 2021 defines “Electricity Generating Works” as:

“electricity generating works means a building or place used for the purpose of—
 (a) making or generating electricity, or
 (b) electricity storage”.

“Electricity Generating Works” include electricity storage and are ‘permitted with consent’ under Chapter 2, Part 2.3, Division 4, Section 2.36 of SEPP (Transport and Infrastructure) 2021. Section 2.36 states:

“2.36 Development permitted with consent

(1) Development for the purpose of electricity generating works may be carried out by any person with consent on the following land—

- (a) in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source—on any land,
- (b) in any other case—any land in a prescribed rural, industrial or special use zone.”

The IN1 General Industrial zone is a prescribed industrial zone under Section 2.35 of the SEPP, and thus the proposed battery storage facility is permissible with consent under Section 2.36 of SEPP (Transport and Infrastructure) 2021.

4.4.3 Specific Newcastle LEP 2012 Clauses

Clause 5.10 – Heritage Conservation

The subject site is in the vicinity of a heritage item listed in Schedule 5 of the Newcastle LEP and is therefore subject to Clause 5.10 of the Newcastle LEP.

The consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned.

The heritage impact assessment prepared by Eikos Environment and Heritage which is provided within **Appendix I** has considered the effect of the proposed development on the heritage significance of the Former Migrant Camp (State nominated heritage item I291) and the extent to which the development would affect the heritage significance of the item.

To what extent does the proposal impact adjacent heritage items?

It is highly unlikely that the proposed development will have any significant impact on the adjacent Former Migrant Camp site. This site is located on top of a high ridge that runs parallel to Maitland Road with the main buildings and curtilage located on the opposite side of the Lot to the proposed development. Conversely, the proposed development site is located on low lying land below the ridge. In addition, there is a remnant native vegetation community on the western boundary of the site that provides a visual barrier between the proposed development site and the Former Migrant Camp site. It is recommended that this remnant vegetation be retained.

To what extent does the proposal impact the heritage conservation area?

Not Applicable – the proposed development is not in or adjacent to a Heritage Conservation Area.

To what extent does the proposal impact any significant fabric or heritage values of the subject site?

Not Applicable – as outlined in this SoHI, the proposed development will be located on land well below the ridge line and curtilage of the Former Migrant Camp site and not have any significant impact on either the aesthetic outlook or heritage values of the site.

A Statement of Heritage Impact prepared by Eikos Environment and Heritage is provided within **Appendix I**. Heritage is address further in **Section 5.0** of this report.

Clause 7.1 – Acid Sulfate Soils

The objective of this clause is to ensure that development does not disturb, expose or drain acid sulphate soils and cause environmental damage.

As outlined in **Section 3**, the subject site is identified as containing Class 2 Acid Sulfate Soils.

In accordance with Clause 7.1(6) of the NLEP, the proposed works are highly unlikely to disturb more than 1 tonne will not lower the water table. As such it is considered that an Acid Sulfate Soils Management Plan is not required to be prepared for this application.

Letter advice has been prepared by RCA Australia regarding Acid Sulfate Soil potential and is provided within **Appendix J**. This advice has indicated that Acid Sulfate Soils would not be encountered within the upper 2m of the site and likely until depths of up to 9m at the site.

Clause 7.2 – Earthworks

The objective of this clause is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

In consideration of the reports accompanying this application, no significant impacts that cannot be mitigated have been identified.

4.4.4 Newcastle Development Control Plan 2012

Newcastle Development Control Plan 2012 (DCP 2012) applies to the proposed development. The purpose of the DCP 2012 is to provide detailed provisions relating to matters of environmental planning significance for Newcastle to be taken into consideration by Newcastle City Council when exercising its environmental assessment and planning functions under the *Environmental Planning and Assessment Act 1979*.

DCP 2012 has been reviewed and the following elements are relevant for consideration:

Section 3.13 Industrial Development

The aims of this section are:

- *To outline Council's requirements for development within industrial, business development zones*
- *To promote the efficient and economic use of the city's industrial resources by ensuring that development proposed is appropriate to industrial areas.*
- *To outline Council's requirements for development on sites that are zoned SP1 under State Environmental Planning Policy (Three Ports) 2013 and are located outside of the Port of Newcastle Lease Area.*

It is considered that the development is consistent with the aims and objectives of this section of the DCP based on the following:

- *The proposal will result in an efficient use of available area within an ideally zoned site within the Steel River Estate;*
- *The proposal will see the establishment of new innovative electrical technologies which will contribute to the efficient use of resources within the Newcastle LGA;*
- *The proposed industrial premises will result in a positive contribution to the surrounding development;*
- *The proposed development is considered to be of an appropriate scale and form in the context of the area; and*
- *As shown on the Development Plans provided within **Appendix C**, the proposal has been appropriately designed and will provide an appropriately landscaped frontage to Riverside Drive.*

Section 4.04 Safety and Security

The aims of this Section are:

- *To ensure safe and activated places that are used by people day and night; and*
- *To encourage a built environment that maintains and enhances our sense of identity.*

The proposed development is consistent with this section of the DCP 2012 and is addressed further in **Section 4.0** of this report.

Section 4.05 Social Impact

This section applies to any development as required under Council policy *Social Impact Assessment Policy for Development Applications*, 1999.

The aims of this Section are:

- *To provide clear guidelines as to the level of assessment required for a development application;*
- *To consider both positive and negative social impacts in achieving socially sustainable development through an evidence-based approach;*
- *To ensure consultation is undertaken with the community, stakeholders and relevant groups to identify public values and concerns; and*
- *To consider how potential social impacts of change can be best managed and mitigated.*

The proposed development is consistent with this section of the NDCP 2012 and social impact is addressed further in **Section 5** of this report.

Section 5.01 Soil Management

The aims of this section of the DCP are:

- *To prevent export of sediments from the site during construction;*
- *To prevent litter, sediment, nutrients and oils from entering waterways; and*
- *To minimise potential for landslip on sloping sites.*

An Erosion and Sediment Control Plan has been prepared for the site by GCA Engineering Solutions and provided within **Appendix E**.

Section 7.02 Landscape, Open Space and Visual Amenity

This section applies to all new buildings on land under NLEP 2012, and as such is applicable to the proposed development.

The aims of this section are:

- *To create public places that strengthen our social connections;*
- *To ensure public places provide for diverse leisure opportunities;*
- *To ensure landscaping is integrated into the design of the development;*
- *To improve stormwater quality and reduce quantity;*
- *To provide habitat for native plants and animals;*
- *To improve the microclimate and solar performance within the development;*

- To improve urban air quality;
- To plan and implement significant development with provision for open space, in scale with the development that can be linked to a local open space network;
- To encourage development that respects landscape opportunities, conserves significant and useful landscape elements and does not detract from the local environment; and
- To ensure buildings and structures do not detract from the character of rural areas.

A category 3 Landscaping Plan is included as **Appendix D** of this report. Landscaping is also discussed further in **Section 3.0** and **5.0** of this report.

The landscape requirements for the site are also addressed within Steel River Strategic Impact Assessment Checklist provided within **Appendix O**.

Section 7.03 Traffic, Parking and Access

Aims of this section:

- To ensure that parking and service provision is adequate relative to the likely demand;
- To encourage measures to reduce motor vehicle dependency and increase the use of public transport, walking and cycling;
- To ensure that the design of parking, access and servicing areas is in accordance with best practice standards; and
- To provide adequate and safe vehicle access to sites without compromising pedestrian access and streetscape qualities.

Traffic, Parking and Access is also discussed further in **Section 3.0** and **5.0** of this report.

Parking requirements for the site are also addressed within Steel River Strategic Impact Assessment Checklist provided within **Appendix O**.

Section 7.05 Energy Efficiency

This section applies to all development subject to the provisions of the NLEP 2012 and as such is applicable to the proposed development.

The aims of this section are:

- To encourage sustainable development;
- To encourage the innovation of energy efficient technologies and processes;
- To encourage efficient use of resources and the use of recycled materials;
- To promote best practice energy use;
- To improve the efficiency of energy use and reduce the long-term energy consumption for residential, business and industrial uses; and
- To restrict the reflection of sunlight from buildings onto surrounding areas and buildings.

The proposal will see the establishment of new innovative electrical technologies which will contribute to the efficient use of resources within the Newcastle LGA.

The proposed Battery Storage Facility will play an integral role in enhancing overall electric grid efficiency and reliability, while reducing reliance on fossil fuel generation. It can serve as an efficient investment alternative to more expensive, traditional network solutions, resulting in lower overall costs for electricity customers within the Newcastle LGA.

Section 7.06 Stormwater

This section applies to all development in the Newcastle LGA and as such is applicable to the proposed development.

The aims of this section are:

- *To outline Council's requirement for stormwater management for development;*
- *To adopt a whole of water cycle approach to development; and*
- *To ensure an appropriate quality and quantity of water enters waterways.*

A Concept Stormwater Management Plan has been prepared by GCA and is provided within **Appendix E** and addressed further in **Section 5.0** of this report.

Section 7.08 Waste Management

This section applies to all development requiring consent, which is likely to create waste, including demolition, construction or change in use. As such, it is applicable to the proposed development.

The aims of this section are:

- *To facilitate sustainable waste management within the local government area in a manner consistent with the principles of ESD,*
- *To assist applicants in planning for sustainable waste management, through the preparation of a site waste minimisation and management plan,*
- *To assist applicants to develop systems for waste management that ensure waste is transported and disposed of in a lawful manner, and*
- *To provide guidance in regard to space, storage, amenity and management of waste management facilities for new development.*

Waste management for the proposed development will be carried out in accordance with Council's Waste Management Guidelines. A Site Waste Minimisation and Management Plan (SWMMP) has been prepared and is included as **Appendix N**.

Waste management for the proposed development is also further addressed in **Section 5.0** of this report.

4.4.5 Strategic Impact Assessment Study

Section 8.9 of the *Steel River Strategic Impact Assessment Study* provides estate specific development guidelines that are relevant to the assessment of the subject application.

A comprehensive assessment of the proposal against the relevant elements of Section 8.9 Development Guidelines and Objectives has been undertaken and is provided within **Appendix O**.

4.4.6 Other Relevant Policies, Strategies & Controls

Newcastle 2040 – Community Strategic Plan

Newcastle 2040 – Community Strategic Plan (CSP) is the highest-level plan that CN prepares. Its purpose is to identify the community's main priorities and aspirations for the future and to plan strategies for achieving these goals. The CSP guides all other CN strategies and plans and must be developed with and on behalf of the community.

The priorities within the CSP that are applicable to the proposed development include:

- Innovative and connected city; and
- Opportunities in jobs, learning and innovation.

The proposed development is consistent with the CSP as it represents innovation and creativity within the electrical network by providing the implementation of renewable energy technologies.

It is considered that the proposed development is compatible with the provision of the *Newcastle 2040 – Community Strategic Plan*.

Newcastle Local Strategic Planning Statement

The *Local Strategic Planning Statement* (LSPS) is City of Newcastle's (CN) plan to guide land use planning over the next 20 years. The LSPS implements priorities from the *Community Strategic Plan* and *Newcastle 2030*, and brings together land use planning actions in other adopted strategies.

Planning Priority 6 aims to reduce carbon emissions and resource consumption throughout the Newcastle LGA. The proposed development is consistent with this planning priority, noting that the proposed battery storage facility improves the resilience of the local area through the improved stability and functionality of the electrical grid. The proposal also supports emissions reductions through the improved ability to facilitate renewable energy integration.

The site is also identified as being in the 'Steel River Precinct' within the Newcastle Port catalyst area, with growth and diversification of trade the area's key growth driver.

Planning Priority 15 of the strategy seeks to facilitate the growth and diversification of the Port to increase job opportunities while minimising environmental and amenity impacts on surrounding lands. The proposed development is consistent with this planning priority. The proposal is suitable for its industrial zoning, and diversifies the uses within the Port to provide an innovative battery storage facility.

The proposal is consistent with the Newcastle LSPS.

Newcastle Climate Action Plan 2021-25

The Newcastle Climate Action Plan (CAP) sits under the City of Newcastle's 2030 Community Strategic Plan (CSP) and environmental strategy, and its primary goal is to reduce emissions in the city. The CAP is separated into two parts – an action plan to reduce the City of Newcastle's operational emissions and an action plan to reduce emissions from the city as a whole.

The objectives of the CAP are:

- *To utilise 100% renewable energy supply for City of Newcastle operations.*
- *Ensure best practice use of resources across all City of Newcastle facilities and operations.*
- *Identify and implement actions to reduce emissions in products and procedures across City of Newcastle operations.*
- *Supporting the transition to clean, efficient, emissions-free transport across City of Newcastle.*
- *To create a resilient city that reduces its share of emissions to ensure a cleaner and more sustainable future.*

The proposed development aligns with the objectives of the CAP through the development of a large-scale battery storage facility. This facility embraces new electrical technologies and innovative practices, which include:

- *The operation as a flexible and dispatchable generator, providing electricity to the market to meet electricity needs during times of peak demand;*
- *The operation as a flexible and dispatchable load, with the ability to store excess electricity on the electrical network and provide for lower loading on particular areas of the network during times when they may otherwise be overloaded; and*
- *The provision of a range of network ancillary services including frequency control, which assists the improvement of stability and resilience of the local electrical network.*

The proposed development significantly improves electrical network reliability and resilience in the local area and supports emission reductions through the improved ability to facilitate renewable energy integration.

Newcastle Employment Lands Strategy 2019

The Newcastle Employment Lands Strategy analyses population and demographic trends to understand and plan for employment generation and appropriate land uses within the Newcastle LGA into the future.

The Strategy identifies that whilst generally employment in the industrial sector is predicted to decline, overall employment in industrial areas in Newcastle is expected to increase. The strategy highlights the importance of protecting the existing industrial precincts within the Newcastle LGA and creating mechanisms to deliver cost effective and reliable inputs, such as electricity, to Newcastle's industrial operators.

The proposed development is consistent with this plan as it is located within the Steel River Estate, and with the forecasted growth in renewable energies, it will be a key factor in the growth and protection of the area.

5.0 Development Issues

5.1 DEVELOPMENT DESIGN & BUILT FORM

The proposed development plans have been prepared by GCA Engineering Solutions and are provided within **Appendix C** of this report.

The proposed battery storage facility will comprise multiple individual cubicles (which would be directly mounted on a concrete plinth and connected together on-site or skid mounted and pre-commissioned) or otherwise a containerised system. Either option would appear similar, as the individual cubicles would be arranged in such a way as to appear as a single container.

5.2 LANDSCAPING

A Landscape Plan has been prepared by Terras Landscape Architects and is provided within **Appendix D** of this report.

The site is currently undeveloped and contains no significant landscaping. The proposal aims to develop the site in alignment with the objectives of Newcastle Council's planning controls.

The Landscaped areas of the site comprise approximately 20% of the site, which focused around screening along the sites boundaries and providing visual relief.

The landscape design includes the provision of new landscaping in the form of trees and groundcovers along Riverside Drive frontage, providing a significant buffer between the proposed development and the street. This form of landscaping will be duplicated along the southern boundary to screen the site from Maitland Road.

The landscape proposed is consistent with the recommendations of the Preliminary Hazard Assessment, with all proposed landscaping being setback 10m from the proposed batteries. Landscaping along the rear setback has also been restricted due to a number of easements extending along the rear of the site along which has limited available area for landscaping outside the 10m setback requirement. Sandstone spillings are to be provided along the rear of the site, which is also consistent with the findings of the Preliminary Hazard Assessment. Given the location and nature of the proposal, this is considered to be acceptable in this instance.

The proposed landscape scheme has ensured there is no landscaping which may conflict with the existing easements which extend along the rear of the site.

The rear of the site is burdened by the following easements:

1. Easement for Sewer Mains – Hunter Water (A);
2. Easement for Access & Maintenance – BHP (M);
3. Right of Access – Hunter Water (T); and
4. Easement for Effluent Pipeline – Kooragang Water (B).

A dechlorination facility is also located within easements (A), (M) & (T) which partly extend into the site. In order to reduce any potential conflict with the dechlorination facility and access to the facility the extent of landscaping has been reduced to easement (B) for effluent pipeline only. The proposed landscaping within the the easement (B) for effluent pipeline at the rear of this lot is proposed to include a hydroseed mix consisting of shallow rooted native grasses and ground covers noting that this selection of landscaping will allow for the continued access to the easement and will not impact upon the pipeline.

Although none of the easement terms that burden the lot actually restricts the landowner from installing any trafficable landscaping on the land, Steel River West Pty Ltd did seek confirmation that the benefited party of easement (B), Kooragang Water Pty Ltd, have no objection to the proposed landscaping. A copy of this correspondence has been provided within **Appendix S**.

The proposed battery storage facility has been sited on approved Lot 1103 to be clear of the easements which extend through the rear of the allotment.

The proposed landscaping will contribute towards achieving an aesthetically pleasing development within the industrial locality.

5.3 STORMWATER MANAGEMENT

Concept Engineering Plans have been prepared by GCA Engineering Solutions and is included as **Appendix E** of this report. A stormwater drainage concept plan has been prepared to demonstrate how the runoff generated by the proposed development is captured and conveyed to the Steel River Estate stormwater system to be constructed along Steel River Drive.

The majority of the site will be constructed as a gravel hardstand which will be impervious and as such the proposal will require limited formal stormwater infrastructure.

The site will be graded to ensure major flows are conveyed from the subject site to Riverside Drive and the inter allotment drainage running along the rear of the site.

Erosion and Sediment Control

An erosion and sediment control plan has been prepared in accordance with Council's requirements. A copy of this plan is included within the Concept Civil Plans provided within **Appendix E**.

Erosion and Sedimentation Control can be adequately treated within the space available on site to minimise sediment migration from the site during construction.

5.4 EARTHWORKS

To provide clarity around the existing and proposed site levels a copy of the approved earthworks plan for the Subdivision Works Certificate Plans issued for Lots 1101 to 1103 within Stage 11 of the Steel River Business Estate has been provided within **Appendix R**. The plans show the approved finished earthworks levels of the site (Lot 1103).

Concept Engineering Plans for the proposed development are enclosed within **Appendix E**. These plans also include the finished levels following completion Stage 11 and site cross sections.

There are minimal proposed changes in finished ground level required to facilitate the proposed battery facility as shown on the Development Plans and Concept Engineering Plans provided within **Appendix C** and **E**.

The proposed Battery Storage Facility does not rely on amending other approvals related to the broader subdivision. The site is currently approved for further subdivision (DA2006/2076.02 as most recently amended) and is situated within approved Lot 1103, part of future Stage 11 Steel River Estate.

5.5 ACCESS, TRAFFIC & PARKING

Access

The subject site is to be accessed off Riverside Drive (once constructed). Access to Riverside Drive is provided via Steel River Boulevard and Channel Road to the east. Direct access to Riverside Drive will also become available off Maitland Road, once the intersection with Maitland Road is delivered as part of the Stage 11 subdivision works in accordance with DA2006/2076.02 as most recently amended. A portion of this road is to be dedicated as public road to the southern boundary of Approved Lot 1203, located within future Stage 11.

The proposed development will see vehicles enter the site via a bidirectional access driveway, with entry and exists at the north eastern and south eastern corners of the site ensuring they can enter and exit the site in a forward direction. Chainmesh swing gates will be provided to both entries / exists. Swept Turing Paths have been shown on the plans provided to demonstrate that a 12.5m ridged truck can adequately enter and exit the site in a forward direction and manoeuvre throughout the site.

Vehicle access to the site would generally be confined to the standard hours of construction. Exceptions would occur as staff arrive and leave the site, before and after shifts for maintenance or emergency maintenance which may take place outside normal working hours.

The majority of the battery storage facility site will be a compacted gravel hardstand area which will allow maintenance vehicles to manoeuvre throughout the site for maintenance as required.

Traffic

The additional traffic associated with the construction and operation of the Battery Storage Facility would make up a minor component of the existing traffic loads on the surrounding local and state roads which are considered to have ample capacity to accommodate additional vehicle movements to and from the works area during the construction period.

Traffic impacts during the construction period are expected to be limited to delivery vehicles for the battery equipment to site which is expected to occur with heavy vehicle movements. There are not expected to be any oversize vehicle movements or any significant increase to local traffic. It is expected that a Construction Environmental Management Plan (CEMP) will be required to be prepared by the contractor prior to works commencing. The CEMP will include details on the required traffic and access management measures.

During operation, vehicles would use the local road network to access the site and travel within the site during the operational phase. Once operational, attendance to site will be via light vehicle, with the exception of extremely rare events resulting from a major equipment replacement, and occur typically a few times per month. Overall, traffic impacts from the proposal are expected to be low and manageable.

No major operational impacts are expected to be required during the course of normal operations. As such, the project is expected to generate minimal traffic.

Parking

No formal or dedicated parking facilities are proposed or required to be provided throughout the site, as the maintenance vehicles will park around the site as needed to service the batteries.

5.6 CONTAMINATION

A Site Management Plan and Remediation Certificate B prepared by RCA has been provided within **Appendix H** of this report.

As outlined in Section 4.1.3 above, the broader Steel River Estate has been subject to remediation works which encompasses a staged validation process. The Site benefits from a Validation Certificate 'A' and a Validation Certificate 'B'. Certificate 'A' validated early works undertaken as part of the staged development of the estate, whilst the Certificate 'B' provides site specific validation.

A Remediation Certificate B prepared by RCA has been provided within **Appendix H** of this report. The certificate confirms:

"The Lot is suitable for commercial / industrial development subject to works being undertaken in accordance with the Steel River Construction Guidelines (Ref [4]), relevant management plan (Ref [5]), and Certificate C and Site Management Plan(s) that are yet to be prepared for the site".

Notwithstanding, the staged validation process requires further site-specific certification of known as the 'Certificate C' and the preparation of a Site Management Plan based on the Steel River Site Development Guidelines. Having regard to the findings of Validation Certificate B, it is appropriate that any Notice of Determination Issued by Council requires that:

- A project specific Site Management Plan is prepared prior to the release of a construction certificate; and
- A Validation Certificate C is prepared and submitted to the Principle Certifying Authority prior to the release of the construction certificate.

As required by Certificate B a Site Management Plan has been prepared for the proposed works associated with the Battery Storage Facility on approved Lot 1103 and is provided within **Appendix H**.

This approach would ensure that the Certificate C is based on the approved documentation related to the project whilst providing a safeguard to ensure the certificate is in place prior to the commencement of works.

In accordance with Condition D.1.5 of DA2006/2076.02 a Validation Monitoring Report is required to be prepared for the completion of the Stage 11 subdivision works. The report is to be submitted to the appointed NSW Site Auditor and Council for review and approval prior to issue of the subdivision certificate for Stage 11.

Based on the above findings it is evident that the land is suitable for the intended use, and that measures will form part of the detailed design and certification process to ensure the integrity of the estate specific validation process is maintained.

5.7 VISUAL IMPACT

A Visual Impact Assessment prepared by Terras Landscape Architects is enclosed as **Appendix L**.

The Visual Impact Assessment prepared by Terras has considered the proposal from two (2) potential viewpoints located along Maitland Road as shown in **Figure 19** below. Due to local topography, existing vegetation and existing road alignment the proposal would only have visual effect upon those areas within or immediately adjacent to the site, and only experienced by road users for a very short period of time as they drive south-east along Maitland Road.



Figure 19: Viewpoint Locations.

Viewpoint – Maitland Road

The impact on road users travelling south east on Maitland Road is minimal due to the following:

- Visual access into the site is minimal due to the limited extent and short exposure of the site. As motorists travel past the site there is some existing vegetation adjacent to the road which will screen the development which allows only a relatively minor window which the development can be seen.
- The VIA shows that the combination of distance, approximately 150-190m, with the existing topography and proposed landscape screening, that the proposal would be of an acceptable impact. It is further noted that the Maitland Road is an 80 kilometer zone and, as such, the views to this area would be shorter duration "glimpses".
- The site is part of a larger industrial subdivision which has been partially developed with large warehouses, workshops and office buildings. When considering the scale of the existing development this proposal is relatively low scale in comparison.
- The views currently experienced from Maitland Road are across the existing railway corridor and also to the existing above ground electrical infrastructure which extends through part of the Steel River Estate.
- While there are some limitations to the amount of screening vegetation provided due to a fire safety risk assessment, a number of small trees have been proposed along the southern and eastern boundaries to screen where possible.

The below photomontages are taken from the visual impact assessment provided to give an indication of the what the proposed development will look like when viewed from Maitland Road.



Photo 1 – Viewpoint 1 of the Proposed Development with accurate colour scheme and mature planting when viewed heading south-east along Maitland Road.



Photo 2 – Viewpoint 2 of the Proposed Development with accurate colour scheme and mature planting when viewed heading south-east along Maitland Road from Rail Bridge.

It should be noted that the site will not be visible to motorists travelling in a north west direction due to the existing vegetation identified and topography of the site off Maitland Road.

Viewpoint – Riverside Drive:

Visually the project will present from street level as a modern, low scale development, enabling the surrounding landscaping to further add to the quality of the Steel River Estate.

The surrounding buildings in Steel River includes a variety of energy-based businesses such as CSIRO Energy Research, Line Gas, Yanmar Diesel amongst others, which will complement the character of the proposed project.

The impact on users within the subdivision will be limited due to the relatively low scale of development when comparing it to the existing development. New landscaping in the form of trees and groundcovers will be provided along the Riverside Drive frontage, providing a significant buffer between the proposed development and the street. The proposed security gates will be setback from Riverside Drive with one of the entrance gates partially screened by landscaping, particularly for vehicles travelling north along Riverside Drive as shown in **Figure 20** below.



Figure 20: Landscape screening when viewed from Riverside Drive.

It should also be noted, an alternative that was discussed for DA2021/00007 was the option of proposing screen walls or faux buildings. These were considered but deemed unacceptable as these would have had greater impacts than the measures adopted. The walls/faux buildings would have had to maintain the 10 metre separations from the battery systems for safety/risks, resulting in these structures being closer to the side boundaries (3.0 metres or less) when compared to the normal requirement of 6.0 metres and resulting in greater visual impacts.

Based on the photomontages provided as part of the Visual Impact Assessment, it is considered the physical separation of the proposed facility from key viewpoints along with the proposed Landscaping will contribute to achieving suitable visual mitigation of the proposal.

Overall, the proposal is acceptable in terms of visual appearance impacts.

5.8 HERITAGE

A Statement of Heritage Impact (SoHI) has been prepared by Eikos Environment and Heritage and is provided within **Appendix I** of this report.

The SoHI has considered the proposal and assessed any potential heritage impacts on the Former Migrant Camp which is within proximity to the subject site. The report has also considered the proposal against the requirements of the Newcastle Local Environment Plan 2012 (LEP) and relevant heritage legislation by considering the effects of the proposal on this State nominated heritage item.

This SoHI prepared by Eikos Environment and Heritage has been prepared in accordance with the Australia International Council on Monuments and Sites (ICOMOS) Charter for Conservation of Places of Cultural Significance (Burra Charter) and assists in the consideration of the proposed development using the methodology outlined in *Statements of Heritage Impact*, Heritage Office/ Department of Urban Affairs and Planning, 1996, and *Conservation Areas*, published by the Heritage Office and department of Urban Affairs & Planning, 1996.

Eikos Environment and Heritage has considered the effect of the proposed development on the heritage significance of the Former Migrant Camp (State nominated heritage item I291) and the extent to which the development would affect the heritage significance of the item.

To what extent does the proposal impact adjacent heritage items?

It is highly unlikely that the proposed development will have any significant impact on the adjacent Former Migrant Camp site. This site is located on top of a high ridge that runs parallel to Maitland Road with the main buildings and curtilage located on the opposite side of the Lot to the proposed development. Conversely, the proposed development site is located on low lying land below the ridge. In addition, there is a remnant native vegetation community on the western boundary of the site that provides a visual barrier between the proposed development site and the Former Migrant Camp site. It is recommended that this remnant vegetation be retained.

To what extent does the proposal impact the heritage conservation area?

Not Applicable – the proposed development is not in or adjacent to a Heritage Conservation Area.

To what extent does the proposal impact any significant fabric or heritage values of the subject site?

Not Applicable – as outlined in this SoHI, the proposed development will be located on land well below the ridge line and curtilage of the Former Migrant Camp site and not have any significant impact on either the aesthetic outlook or heritage values of the site.

Two battery options are proposed for the development. One option is for the construction of Battery Modules while the other is for Battery Containers. Eikos has assessed either option as acceptable from a heritage impact perspective.

Based on the findings of the SoHi, Eikos Environment and Heritage have confirmed that there is adequate separation both in elevation and distance between the location of the proposed development and the curtilage of the Former Migrant Camp to ensure that the heritage significance of the site is not adversely impacted.

In addition, the remnant native vegetation community including mature Spotted Gum and Ironbark on the south eastern boundary of the development site provides a visual buffer to the Former Migrant Camp and should be retained.

5.9 PRELIMINARY HAZARD ANALYSIS

A Preliminary Hazard Assessment (PHA) has been prepared by ARUP and is provided within **Appendix G** of this report. It is noted that this assessment was undertaken for the original proposed location on Approved Lot 1102 and as such an Updated Location Letter has been prepared by ARUP and is also attached at **Appendix G**. This letter confirms that Approved Lot 1103, for the purposes of the PHA, is identical in profile to what was previously Approved on Lot 1102 (DA2021/00007). The recommendations and findings of the PHA are therefore unchanged as a result of the new location.

This Preliminary Hazard Analysis (PHA) has been prepared in accordance with the relevant guidelines from NSW DPIE's *Multi-level Risk Assessment* and Hazardous Industry Planning Advisory Papers (HIPAPs) No. 4 – *Risk Criteria for Land Use Safety Planning* and No. 6 – *Hazard Analysis*. During the analysis of the identified risks, reference was made to the relevant general principles as defined by HIPAP 4 Section 2.4.1:

- The avoidance of all avoidable risks;
- The risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low; and

- The effects of significant risks should, wherever possible be contained within the site boundary.

Hazards and Consequences

The hazards assessed to be 'medium' risk or higher in the hazard identification study (HAZID), or where offsite consequences were anticipated have been carried forward for qualitative assessment. The following hazards have been assessed:

- Security breach leading to injury;
- Electrocution from an electrical facility;
- Injury to construction or operations personnel;
- Exposure to dangerous goods during a site emergency;
- Battery fire; and
- Battery explosion.

The two (2) hazards were identified as having the potential to cause offsite impacts, namely a battery fire and battery explosion. A quantitative consequence analysis was undertaken for these hazards. The findings of the analysis as they relate to the modular battery configuration are reproduced below:

Battery Fire

Modular Battery Configuration

For a fire in a modular/cabinet unit, in order to have a received radiant heat flux of less than 4.7kW/m^2 at the site boundary, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and site boundary = 2.25m; and
- Side modular/cabinet unit wall and site boundary = 9m.

Similarly, in order to have a received radiant heat flux of less than 12.6kW/m^2 on the adjacent modular/cabinet units, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and adjacent modular/cabinet unit = 1m; and
- Side modular/cabinet unit wall and adjacent modular/cabinet unit = 5m.

Until the modular supplier has been confirmed as a conservative measure, it is recommended that the separation distances are as follows:

- Between the long sides of the modular/cabinet units shall not be less than 5m;
- Between the ends of the modular/cabinet units shall not be less than 2m; and
- The distance from the site boundary shall not be less than 10m.

In the event the project does procure modular cabinets from Tesla the specific recommendations provided in Section 5 of the PHA and summarised on page 4 below will apply, which is based on fire testing performed using the UL UL9540A fire test method which ARUP have been able to obtain from Tesla. A copy of this test data is provided in A copy of the Test Report is provided within **Appendix G**.

As demonstrated on the plans provided, the Modular Battery configuration can be accommodated within the identified development footprint and will achieve the recommended separation distances as outlined in the PHA.

The Modular Batter configuration will result in a slightly smaller footprint when compared with the containerised option, with vehicle manoeuvring remaining to be accommodated throughout the site.

Battery Explosion

For an explosion in a battery unit, a vapour cloud explosion of vented gas was modelled. An overpressure of 7kPa – the accepted minimum for injury or fatality – was found to extend to a distance of 24m, and an overpressure of 35 kPa – corresponding to significant damage of structures – was found to extend to a distance of 7.5m.

Recommendations

The following recommendations are made to ensure that the residual risks for the identified hazards will be reduced so far as reasonably possible:

- Separate Battery Energy Storage System 24 m from the site boundary unless the following are met:
 1. Battery Energy Storage Systems shall have a means to safely vent or prevent an explosion designed to NFPA 68, NFPA 69, or an international equivalent to reduce this risk as far as reasonably possible;
 2. In the absence of more specific test data, containerised Battery Energy Storage Systems shall be separated from one another by not less than 3.25 m end to end and not less than 3 m side to side, and separated from the site boundary by not less than 10 m; and
 3. In the absence of more specific test data, modular/cabinet BESSs shall be separated from one another by not less than 2 m end to end and not less than 5 m side to side, and separated from the site boundary by not less than 10 m.

If specific test data exist, the recommended separation distances between units provided for (from the battery supplier/integrator) can be used in preference to the distances listed here. For example, the Tesla Megapack can be separated by 6 inches (155 mm) side-to-side or back-to-back (i.e. the sides of the unit without doors) as demonstrated by fire testing performed using the UL9504A Test Method, and as shown in Figure 11 in Section 4.1.3. A copy of the Test Report is provided within **Appendix G**.

- Ensure the Battery Energy Storage System manufacturer supplies the UL9540A fire test report for further refinement of separation distances; and
- Ensure Battery Energy Storage Systems have a fire suppression system, if they are to be entered for maintenance. Additionally:
 1. It is preferred for the fire suppression system to not rely on shutdown of the battery cooling system; and
 2. The fire suppression system design should also consider the explosion hazard.

As shown on the Development Plans provided within **Appendix C**, the proposed Battery Storage Facility has taken into considerations the recommendations of the Preliminary Hazard Assessment which are reflected within the design.

5.10 ACOUSTIC IMPACT

A Noise Impact Assessment has been prepared by Spectrum Acoustics and is provided within **Appendix K**.

Assessment Methodology

Confidential sound power test results proprietary to a modular system supplier were provided to inform the noise impact assessment and are suggested as indicative across a range of battery enclosure types supplied by other tier 1 vendors in the market. Under conditions that would occur for well over 95% of the time, mainly being temperatures less than 40C, the sound power level of a modular system, is 84 dB(A). The sound power level was established using acoustic intensity measurements on top of the unit where fans discharge air (and noise) vertically. A correction of -5 dB has been applied for calculation of propagation in a horizontal plane to the assessed residential receiver. There would be twelve of these units.

There are two options proposed for the battery units being the modular cubical cabinets and containerised modules. The data provided are for the modular units. There are no measurements for the containerised option, but it can be reasonably assumed that these would be quieter by an unknown amount. This assessment considers the modular units as a worst case for noise emissions.

The other significant noise sources are four transformers. These would be of the oil distribution type and data provided by the Proponent for another of their sites suggests a sound power level of 81 dB(A).

Results Operational Noise

As outlined in the assessment the calculated cumulative noise level at the closest receiver from all noise sources is 24 dB(A), Leq. Assuming constant operation for a 15-minute assessment period, this will equal the LA10 level. The predicted level is well below the SIA criteria of 48 dB(A) (day) and 30 dB(A) (night). Being considered as a constant noise source implies no exceedance of the 55 dB(A), L1 sleep disturbance criterion.

The noise impact assessment has found no exceedance of daytime off-site traffic noise criteria, construction or operational noise criteria at any industrial or residential receiver.

Based on these findings of this assessment, Spectrum Acoustics have recommended that the project may proceed without the need for targeted noise monitoring.

5.11 SOCIAL & ECONOMIC IMPACTS

The following further addresses the key social and economic considerations of the proposed development:

- The proposed development will see a direct investment of \$29.4 Million into the Newcastle LGA;
- The proposal will provide significant benefits to the local Newcastle area as well as the wider New South Wales electricity network;
- The proposal will see the introduction of a new technology and innovative practice to the area;

- The proposal is entirely consistent with the objectives of the Newcastle Climate Action Plan 2021-25;
- The proposal will generate local employment opportunity with approximately 20 jobs during the construction period and the equivalent of approximately 2 full time equivalent roles during operations and maintenance;
- Alignment with the objectives of the NSW Electricity Strategy through the implementation of electricity technologies aligned with the principles of a firm renewable energy supply and reserve power demand to meet the objectives of the Energy Security Target; and
- The proposed development is unlikely to be a high-risk development with respect to crime and public safety, and will improve casual surveillance from the site with an increased regular physical presence on the site.

The proposed development is considered to provide a net social and economic benefit.

5.12 CRIME PREVENTION

In 2001 the then Department of Urban Affairs and Planning produced a guideline titled "Crime Prevention and the assessment of development applications". The purpose of the guidelines is to assist Councils identify crime risk and minimise opportunities for crime through the appropriate assessment of development proposals.

Crime prevention for environmental designs seeks to influence the design of buildings and places by:

- Increasing the perception of risk to criminals by increasing the possibility of detection, challenge and capture;
- Increasing the effort required to commit the crime by increasing the time, energy or resources which need to be expended; and
- Reducing the potential rewards of crime by minimising, removing or concealing crime benefits and removing conditions that create confusion about required norms about behaviour.

During the design and development consideration has been given to the four (4) basic design principles contained in the guideline titled "Crime Prevention and Assessment of Development Applications", these are addressed as follows:

Surveillance

The attractiveness of crime targets can be reduced by providing opportunities for effective surveillance, both natural and technical.

The proposal incorporates:

- Clear sightlines between public and private spaces;
- Landscaping that does not provide opportunity for offenders to hide or entrap victims;
- Improved casual surveillance opportunities; and
- A physical presence through the redevelopment of the site for the purpose of a secure Batter Storage Facility.

The proposed Battery Storage Facility will be covered by an operations and maintenance contract which provide for regular and appropriate maintenance and inspections of the project as well as continuous 24/7 remote monitoring of the system from a remote location.

Continuously operating CCTV is integrated with the lighting design and provides surveillance to key areas within the site. CCTV cameras will be situated on each of the proposed light poles. The CCTV system will provide a back to base monitoring system. The CCTV will be monitored by an appropriately certified security company.

Operations personnel will attend site periodically as required for routine and scheduled maintenance activities. The site will be remotely monitored from an operations facility utilising the site SCADA system for continuous site monitoring and operations.

This site-based SCADA system will be designed to provide alarms and automatic operations to manage events.

Access Control

Physical and symbolic barriers can be used to attract, channel or restrict the movement of people. They minimise opportunities for crime and increase the effort required to commit crime.

A 3m high security fence will be installed around the entire perimeter. A security gate at the site entrance will allow controlled access. The site will be permanently monitored for security purposes by a security system.

Territorial Reinforcement

Community ownership of public space sends positive signals. People often feel comfortable in, and are most likely to visit places which feel owned and cared for. Well used places also reduce opportunities for crime and increase risk for criminals.

The design ensures a clear distinction as to what areas of the site are public versus private.

Space Management

Popular public space is often attractive, well maintained and well used space. Linked to the principle of territorial reinforcements space management ensures that space is appropriately utilised and well cared for.

The physical spaces have been designed such that they are able to be maintained so that the site appears to be well kept and therefore deter crime.

Overall, the proposed development will not introduce any specific elements likely to encourage crime.

5.13 LIGHTING

An Obtrusive Lighting Report has been prepared by Power Solutions for the subject site and is enclosed as **Appendix Q**.

The lighting design incorporates six (6) x 6.5m high light poles with 2m outreach. The luminaries proposed are Aidridge 17W LED RRW with Giara Shields fitted to reduce light spill. The light locations are shown in Section 3.2 of the Obtrusive Lighting Report provided within **Appendix Q**. The proposed lighting was found to be compliant with AS4282. All lighting will be installed and maintained in accordance with relevant Australian Standards, codes and policies.

The obtrusive light assessment has demonstrated that the proposed light design will not result in unacceptable lighting impacts on neighbouring future properties and the nearby roadways. The lighting proposed is considered to be acceptable and appropriate in this instance.

As mentioned above, continuously operating CCTV is integrated with the lighting design and provides surveillance to key areas within the site. CCTV cameras will be situated on each of the proposed light poles. The CCTV system will provide a back to base monitoring system. The CCTV will be monitored by an appropriately certified security company.

The intent of the proposed lighting and CCTV is to decrease opportunities for crime to occur and improve surveillance.

5.14 UTILITIES & SERVICES

At the completion of Stage 11 of the broader subdivision, all public utility services including reticulated water and sewer, electricity and telecommunications will be available to the site, and will be upgraded where necessary to service the proposed development.

5.15 WASTE MANAGEMENT

Waste management for the proposed development will be carried out in accordance with Council's Waste Management Guidelines.

A Site Waste Minimisation and Management Plan has been prepared and is included within **Appendix N** of this report.

A range of general waste and recycling products will be generated during the construction phase and, to a lesser extent, the operational phase. These will include wooden pallets, plastic wrapping, cans and bottles, and metal offcuts. A dedicated waste storage and handling area will be provided during construction. During the operation of the site, waste will be removed from the site by maintenance contractors and no on-site waste storage is required.

The following is a breakdown of the waste generated from the proposal and the proposed method of disposal.

Construction

Where possible, materials will be re-used on site, and where not possible, materials will be sent to an appropriate recycling contractor to be recycled. Given the nature of the proposed development, a large portion of the built form will be prefabricated and large amounts of waste are not envisioned during construction.

In all instances, correct quantities will be ordered to minimise waste on the site.

The Contractor is to utilise techniques that will minimise demolition and construction waste such as:

- Building to standard sizes;
- Building for deconstruction;
- Implementing data gathering processes to monitor waste generation;
- Litter management on site; and
- Litter abatement on site.

The Contractor's on-site representative will remain responsible for coordinating the removal of waste from the site once construction works have commenced. All waste will be disposed of at an appropriately licensed waste facility.

Operation

The operation of the battery storage facility will not generate significant volumes of waste. There will not be a permanent staff present on the site, with all maintenance and operational management undertaken by contractors.

The proposed development is a low maintenance facility. Contractors would access the site infrequently for maintenance and testing and as required if a fault occurs. All waste materials generated during maintenance and operational management activities will be removed from the site by the contractors which generated the waste. No storage of waste will occur on-site.

Batteries which are defective or at the end of their life will be returned to the manufacturer for recycling. Defective and end of life batteries will be removed from the site once removed from service, and transported to their recycling destination. Damaged or defective batteries will not be stored on the site. Any packaging associated with new batteries or components will be removed from the site by maintenance contractors and appropriately disposed of.

6.0 Conclusion

This Statement of Environmental Effects and supporting documentation comprehensively demonstrates that the proposed battery storage facility is an appropriate and suitable development when tested against the relevant heads of consideration detailed within Section 4.15 of the *Environmental Planning & Assessment Act 1979*.

The proposal can be supported based on the following:

- The proposed battery storage facility is permissible with consent in accordance with Part 2.3, Division 4, Section 2.36(1)(b) of *State Environmental Planning Policy (Transport and Infrastructure) 2021*;
- The proposed development will provide significant benefits to the local Newcastle area as well as the wider New South Wales electricity network;
- The proposal is consistent with the objectives of the *Newcastle Climate Action Plan 2021-25* through the development of large-scale battery storage facilities and embracing new technologies;
- The provision of battery storage systems to supplement the electricity grid will increasingly be considered an essential part of the system especially as greater reliance is placed on alternative energy forms such as solar power;
- The site is ideally positioned for connection into the Ausgrid network;
- Appropriate vehicle access will be provided;
- The development is in the public interest and will allow for the orderly and economic development of the site within an industrial estate; and
- No adverse social, economic or environmental impacts are likely to be generated by the proposal. The proposal will deliver net benefits to the local community and broader Newcastle LGA.

This statement has illustrated that the proposal will satisfy both statutory and merit-based planning considerations and that the proposal will make a positive contribution to the site and surrounding area. It is considered that there is no matter which should preclude the approval of the proposed development.

Appendix A

CERTIFICATE OF TITLE AND DEPOSITED PLAN

Appendix B

DETAIL SURVEY PLAN (MONTEATH & POWYS)

Appendix C

DEVELOPMENT PLANS (GCA ENGINEERING SOLUTIONS)

Appendix D

LANDSCAPE PLANS (TERRAS LANDSCAPE ARCHITECTS)

Appendix E

STORMWATER MANAGEMENT PLAN (GCA ENGINEERING SOLUTIONS)

Appendix F

SUBDIVISION PLAN (PRECINCT GROUP)

Appendix G

PRELIMMINARY HAZARD ASSESSMENT (ARUP)

Appendix H

SITE MANAGEMENT PLAN & REMEDIATION CERTIFICATE B (RCA AUSTRALIA)

Appendix I

STATEMENT OF HERITAGE IMPACT (EIKOS ENVIRONMENT AND HERITAGE)

Appendix J

ACID SULFATE SOILS POTENTIAL LETTER (RCA AUSTRALIA)

Appendix K

ACOUSTIC IMPACT ASSESSMENT (SPECTRUM ACOUSTICS)

Appendix L

VISUAL IMPACT ASSESSMENT (TERRAS LANDSCAPE ARCHITECTS)

Appendix M

QUANTITY SURVEYING REPORTS (DENARY QUANTITY SURVEYING)

Appendix N

SITE WASTE MINIMISATION MANAGEMENT PLAN

Appendix O

STEEL RIVER STRATEGIC IMPACT ASSESSMENT CHECKLIST

Appendix P

AHIMS SEARCH RESULTS

Appendix Q

LIGHTING REPORT

Appendix R

APPROVED STAGE 11 EARTHWORKS PLAN

Appendix S

KOORAGANG WATER APPROVAL FOR LANDSCAPING

By email
26 April 2022

James Allison
Precinct Capital
Level 1, 2 Barrack St
Sydney NSW 2000

Our ref 278292-00

Dear James,

Steel River Battery **Preliminary Hazard Analysis**

I refer to the Preliminary Hazard Analysis (PHA) for the Steel River Battery (Issue 5 dated 3 June 2021) produced by Arup on behalf of Edify Energy, and to your email dated 20 April 2022 outlining the proposed change to the location of the Steel River Battery within the Steel River development.

The findings of the PHA, including recommended separation distances from battery components, are based on an assessment of the battery modules and are not affected by the precise location of the batteries.

The new proposed location (lot 1103) is, for the purposes of the PHA, identical in profile to the original proposed location (lot 1102). The recommendations and findings of the PHA are therefore unchanged as a result of the new location.

Yours sincerely



Nigel Cann
Associate Principal

d +61 3 9668 5516
e nigel.cann@arup.com

cc Patrick Dale

Edify Energy
Steel River Battery Farm
Preliminary Hazard Analysis

Issue 5 | 3 June 2021

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 278292-00

Arup Australia Pty Ltd ABN 76 625 912 665

Arup
Level 5
151 Clarence Street
Sydney NSW 2000
Australia
www.arup.com

ARUP

Document verification

ARUP

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		Name	Ben Smith / Michael D'Souza	Ben Smith	Nigel Cann
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Document Verification

Page 2 of 3

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Document title		Preliminary Hazard Analysis		File reference			
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		Signature					
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		Signature					
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Appendices

Appendix A

HAZID Risk Register

Appendix B

Heat Radiation Calculations

Executive Summary

Background

Edify Energy Pty Ltd and Precinct Group are jointly developing a 28 MW advanced lithium ion battery energy storage facility known as the Steel River Battery, at the Steel River Industrial Park located in Mayfield, New South Wales.

The Project will connect to the local Ausgrid 33 kV electrical distribution network and will provide benefits to the local electricity network as well as network services to the wider New South Wales grid.

Project details are summarised in Table 1.

Table 1: Summary of project details

Project Detail	Description
Project Type	Stand-alone large scale battery storage connected to the National Electricity Market.
Electrical Connection	Ausgrid 33kV distribution network.
Battery Technology	Lithium ion battery system.
Battery Capacity	Up to 28MW
Battery Storage Duration	Up to 2 hours
Battery Configuration	Outdoor modular battery units or containerised battery system with ancillary balance of plant equipment.
Project Location	Proposed lots 1101 - 1102 Riverside Drive, Mayfield West. Part of future Stage 11 of Steel River Estate (Zoned IN1 General Industrial)

Methodology

This Preliminary Hazard Analysis (PHA) has been prepared in accordance with the relevant guidelines from NSW DPIE's *Multi-level Risk Assessment* [1] and Hazardous Industry Planning Advisory Papers (HIPAPs) No. 4 – *Risk Criteria for Land Use Safety Planning* [2] and No. 6 – *Hazard Analysis* [3].

During the analysis of the identified risks, reference was made to the relevant general principles as defined by HIPAP 4 [2] Section 2.4.1:

- The avoidance of all *avoidable* risks;
- The risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low; and
- The effects of significant risks should, wherever possible be contained within the site boundary.

Recommendations have been made against each of the identified risks to ensure that the residual risks will be reduced So Far as is Reasonably Practicable (SFAIRP).

Hazards and Consequences

The hazards assessed to be ‘medium’ risk or higher in the hazard identification study (HAZID), or where offsite consequences were anticipated have been carried forward for qualitative assessment. The following hazards have been assessed:

- Security breach leading to injury;
- Electrocution from an electrical facility;
- Injury to construction or operations personnel;
- Exposure to dangerous goods during a site emergency;
- Battery fire; and
- Battery explosion.

The two hazards that were identified as having the potential to cause offsite impacts, namely a battery fire and battery explosion, were carried forward for quantitative consequence analysis.

As the final battery technology has not yet been chosen for the site, these hazards were considered for both modular/cabinet and containerised solutions.

For a fire in a modular/cabinet unit, in order to have a received radiant heat flux of less than 4.7 kW/m^2 at the site boundary, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and site boundary = 2.25 m; and
- Side modular/cabinet unit wall and site boundary = 9 m.

Similarly, in order to have a received radiant heat flux of less than 12.6 kW/m^2 on the adjacent modular/cabinet units, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and adjacent modular/cabinet unit = 1 m; and
- Side modular/cabinet unit wall and adjacent modular/cabinet unit = 5 m.

For a fire in a container, in order to have a received radiant heat flux of less than 4.7 kW/m^2 at the site boundary, the required minimum separation distance between the:

- Front/end of the container and site boundary = 5.5 m; and
- Side container wall and site boundary = 5.25 m.

Similarly, in order to have a received radiant heat flux of less than 12.6 kW/m^2 on the adjacent containers, the required minimum separation distance between the:

- Front/end of the container and adjacent container = 3.25 m; and
- Side container wall and adjacent container = 2.0 m.

For an explosion in a battery unit, a vapour cloud explosion of vented gas was modelled. An overpressure of 7 kPa – the accepted minimum for injury or fatality – was found to extend to a distance of 24 m, and an overpressure of 35 kPa – corresponding to significant damage of structures – was found to extend to a distance of 7.5 m.

Recommendations

Arup makes the following recommendations to ensure that the residual risks for the identified hazards will be reduced SFAIRP:

- Separate BESS 24 m from the site boundary unless the following are met:
 1. BESSs shall have a means to safely vent or prevent an explosion designed to NFPA 68, NFPA 69, or an international equivalent to reduce this risk SFAIRP.
 2. In the absence of more specific test data, containerised BESSs shall be separated from one another by not less than 3.25 m end to end and not less than 3 m side to side, and separated from the site boundary by not less than 10 m.
 3. In the absence of more specific test data, modular/cabinet BESSs shall be separated from one another by not less than 2 m end to end and not less than 5 m side to side, and separated from the site boundary by not less than 10 m.

If specific test data exist, the recommended separation distances between units provided for in those data can be used in preference to the distances listed here. For example, the Tesla Megapack can be separated by 6 inches (155 mm) side-to-side or back-to-back (i.e. the sides of the unit without doors) as demonstrated by fire testing performed using the UL9504A Test Method, and as shown in Figure 11 in Section 4.1.3.

- Ensure the BESS manufacturer supplies the UL9540A fire test report for further refinement of separation distances.
- Ensure BESSs have a fire suppression system, if they are to be entered for maintenance. Additionally:
 1. It is preferred for the fire suppression system to not rely on shutdown of the battery cooling system.

The fire suppression system design should also consider the explosion hazard.

1 Introduction

1.1 Site Description and Surrounding Land Use

The subject site has a property description of Lot 12 DP 280089 with a street address of 27D Riverside Drive, Mayfield West. The site is currently approved for further earthworks and is situated within approved Lot 1102, part of future Stage 11 Steel River Business Park. The subject site has a combined total area of approximately 2.44 ha. The site is currently vacant IN1 General Industrial zone land.

1.2 Operational Process

The proposed Battery Energy Storage System (BESS) is expected to operate in conjunction with the electrical grid to provide the following functions:

- Charging and discharging of energy from the electrical grid for shifting of energy to peak consumption periods when electricity is needed the most; and
- Participate in the electricity market to provide ancillary services which help contribute to the stability and functionality of the electrical grid.

The primary modes of operation of the BESS are:

- Charging of the battery from the external electrical grid; or
- Discharging of the battery to the external electrical grid.

It should be noted that during regular operations of the proposed facility, no dangerous goods will be consistently used.

Two battery solutions are currently being considered for the site:

- Modular cubical cabinets (similar to the Tesla Megapack system, for example) that are installed in an array around an inverter pack as illustrated in Figure 1; and
- Containerised modules (containerised system) that have been preassembled in modified shipping containers prior to transport to site as illustrated in Figure 2

Both proposed battery technologies will consist of lithium ion battery technology. The system is expected to be highly modular and based on individual smaller power blocks to achieve the required system size. Each battery pack is comprised of multiple smaller lithium ion cells which are fully enclosed and connected to form an integrated system. The BESS will be required to conform with the following safety standards:

- UL 1642: *Standard for Lithium Batteries*
- UL 9540: *Standard for Energy Storage Systems and Equipment*



Figure 1 Indicative Tesla Megapack (example modular/cabinet unit)

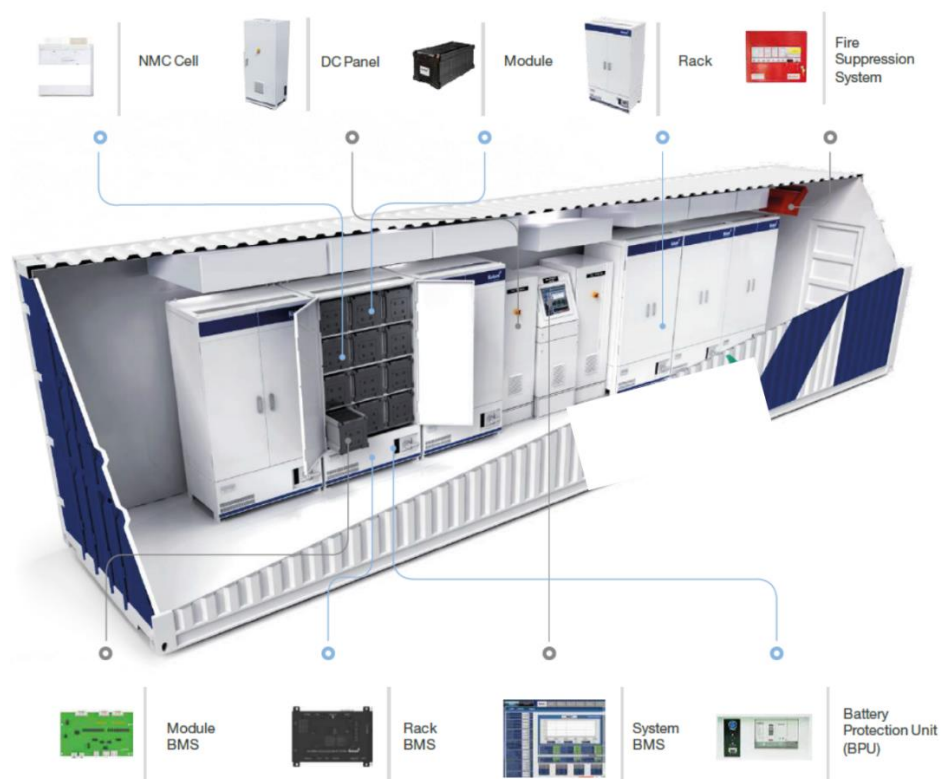


Figure 2 Indicative arrangement of containerised module

2 Applicability of SEPP 33

2.1 Dangerous Goods Used and Stored at the Facility

The list of dangerous goods to be used and stored at the facility has been based on the Darlington Point Solar Farm (DPSF) BESS dangerous goods storage. Table 22 below contains the estimated quantities of chemicals stored onsite.

Table 2: List of potentially hazardous goods used and stored at the facility

Item	UN No.	Dangerous Goods Class	Total Storage Onsite	Description
Lithium Ion Batteries	3481	9	~ 800 units	Installed as part of the battery units as solid material inside cells
Refrigerant (R 134a)	3159	2.2	~ 350 kg	Installed as part of the cooling system of some battery technologies (including the Tesla Megapack)
Miscellaneous Minor Chemicals Store	N/A	2.2, 3, 5.1, 8	< 1 t	Onsite storage for maintenance
Ethylene Glycol solution	3082	N/A, not a dangerous good	~ 3 t	Installed as part of the cooling system of some battery technologies (including the Tesla Megapack)
Transformer Oil	N/A, not a dangerous good		~ 45 t	Possibly in transformers

2.2 SEPP 33 Screening

It has been assumed that the goods stored onsite are stored in similar locations and so have been screened against SEPP 33 thresholds together, as per NSW Department of Planning, Industry and Environment's (DPIE's) *Applying SEPP 33* [4]. The screening can be found in Table 3 below.

Table 3: Screening against SEPP 33 thresholds

Dangerous Goods Class	Quantity	Threshold	Threshold Exceeded?
3	< 1 t	5 t	No
5.1	< 1 t	5 t	No
8 PGII	< 1 t	25 t	No

Note that Dangerous Goods Classes 2.2 and 9 are excluded from the risk screening. It should also be noted that no dangerous goods are expected to be transported (beyond the needs of minor maintenance) to or from the site on a regular basis and so no transportation screening has been undertaken.

As all the dangerous goods screened above do not exceed the SEPP 33 threshold, a PHA is not required for the development by SEPP 33. It should be noted that by taking a conservative approach to land use planning, a PHA has been prepared to address the potential risks that may arise from this development.

2.3 Relevant Guidance

This PHA has been prepared in accordance with the relevant guidelines from NSW DPIE's *Multi-level Risk Assessment* [1] and Hazardous Industry Planning Advisory Papers (HIPAPs) No. 4 – *Risk Criteria for Land Use Safety Planning* [2] and No. 6 – *Hazard Analysis* [3].

During the analysis of the identified risks, reference was made to the relevant general principles as defined by HIPAP 4 [2] Section 2.4.1:

- The avoidance of all *avoidable* risks;
- The risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low; and
- The effects of significant risks should, wherever possible be contained within the site boundary.

Recommendations have been made against each of the identified risks to ensure that the residual risks will be reduced So Far as is Reasonably Practicable (SFAIRP).

3 Hazard Identification

A hazard identification study (HAZID) was conducted for the site. This HAZID was conducted by personnel with relevant experience of grid scale BESS units.

The identified hazards and their qualitative likelihood and consequence scores can be found in Appendix A. The hazards assessed to be ‘medium’ risk or higher in the HAZID, or where offsite consequences were anticipated have been carried forward for qualitative assessment. The following hazards have been assessed:

- Security breach leading to injury;
- Electrocution from an electrical facility;
- Injury to construction or operations personnel;
- Exposure to dangerous goods during a site emergency;
- Release of firewater runoff;
- Battery fire; and
- Battery explosion.

These hazards have been discussed in more detail in Section 3.1 below.

3.1 Hazard Details

3.1.1 Security Breach

A security breach of the facility could credibly lead to theft of equipment or injury to personnel and individuals. This event is not considered likely to cause offsite impacts. Arup makes the following recommendations:

- Security fencing around the facility and separately around critical and hazardous assets should be installed;
- A CCTV security system should be installed; and
- Regular O&M inspections to monitor breaches should be undertaken.

As there is no potential for offsite impacts, the above recommendations are considered sufficient to mitigate the risk of this event.

3.1.2 Electrocution from Electrical Facility

Electrocution occurring in the BESS is a credible scenario that could lead to the injury or death of a maintenance worker. Arup makes the following recommendations:

- Electrical assets shall be installed in accordance with AS 3000: *Electrical Installations*; and
- Appropriately qualified maintenance personnel are to be used.

As there is no potential for offsite impacts, the above recommendations are considered sufficient to mitigate this risk.

3.1.3 Injury to Construction or Operations Personnel

During the construction and operation of the facility, there is a credible hazard associated with the injury of construction and operations personnel, respectively. This event is not considered likely to cause offsite impacts. Arup makes the following recommendations:

- The development of a Work, Health and Safety plan; and
- Detailed Safety in Design processes are to be carried out.

As there is no potential for offsite impacts, the above recommendations are considered sufficient to mitigate this risk.

3.1.4 Exposure to Dangerous Goods During Site Emergency

In the event of an emergency at the site, personnel may be exposed to dangerous goods and suffer injury. This event is not considered likely to cause offsite impacts. Arup makes the following recommendations:

- The development of a site-specific Emergency Response Plan;
- Appropriate signage and labelling to identify site-specific hazards are to be installed; and
- Emergency response workers are to be made aware of the response requirements.

As there is no potential for offsite impacts, the above recommendations are considered sufficient to mitigate this risk.

3.1.5 Release of Firewater Runoff

Following a fire event that requires extinguishing, the firewater used for extinguishment has the potential to be released into the environment without being controlled. This firewater is likely to be contaminated and will be required to be contained.

Broadly speaking, the contaminated firewater may be contained in one of two ways:

- Permanent containment system: the civil design of the site can be scoped such that it is possible to contain all runoff in a designated catchment area (e.g. a bund or some form of holding basin).
- Temporary containment: the site can be designed such that, in the event of a fire brigade response that may lead to contaminated runoff, drainage can be thoroughly sealed, and firewater contained on-site. In essence, this is a temporary bund.

The most appropriate approach is determined as a function of the choice of battery technology, the “acceptable loss” strategy (i.e. whether the response to a fire is to suppress and extinguish, or to allow the unit to burn while protecting adjacent units), the design and budget implications on the broader site development, and fire brigade input to all of the above. This is therefore a decision that is made as the project develops.

3.1.6 Battery Fire

As the final battery technology has not yet been chosen for the Site, this hazard has been considered for both modular/cabinet and containerised solutions.

A fire could credibly form in a lithium ion battery system as a result of a thermal runaway in one or more cells or from an external source such as a fire at the facility. The potential for this to have offsite impacts means it has been carried forward for consequence analysis in Section 4.1.

3.1.7 Battery Explosion

Flammable vapours may accumulate in the battery unit. This could result in a confined vapour cloud explosion (VCE) occurring. The potential for this to have offsite impacts means it has been carried forward for consequence analysis in Section 4.2.

4 Consequence Analysis

The two hazards that were identified as having the potential to cause offsite impacts, namely a battery fire and battery explosion, have been carried forward for quantitative consequence analysis.

4.1 Battery Fire

As the final battery technology has not yet been chosen for the site, this hazard has been considered for both modular/cabinet and containerised solutions.

4.1.1 Modular/Cabinet

A fire event in a battery container was modelled to assess the impact on its surroundings. The modelling assumed that the battery management system and other safety features are unable to control thermal runaway, leading to a fire in the container. Additionally, it is assumed that the fire suppression system is not functional as a worst-case scenario.

The dimensions of the Tesla Megapack were used as an indicative size for a modular/cabinet unit – approx. 7.14 m (L) x 1.60 m (W) x 2.36 m (H). Figure 3 shows a Tesla Megapack as an example of the modular/cabinet technology options.



Figure 3: Tesla Megapack (example modular/cabinet unit)

Key Assumptions and Fire Scenarios

The basis of the modelling is radiative heat transfer using the Stefan-Boltzmann Law and view factor method. Further description of this methodology and all equations used are presented in Appendix B.

The worst credible fire scenario has been considered in which all of the doors along the side of the modular/cabinet unit are left open.

- The temperature of the open side is set at 840 °C (flame temperature). This is representative of an emitting heat flux of 84 kW/m² which is used for fire spread design between buildings such as offices (Approved Document B) (HMCLG, 2010). While the units do contain batteries, which would have combustible contents and some plastic materials, the overall structure of the modular/cabinet unit and insulation is to be non-combustible and the majority of racking within the space is constructed of non-combustible metal. This results in a comparable fuel load. 840 °C is also within the flame temperature range recommended for use for fires based on the Fire Engineering Design Guide. While adiabatic flame temperature is based on the chemistry of a flame, within a compartment the overall compartment dynamics and air ratio influence the temperature of a flame.
- The radiating panel shall be 7.14 m x 2.36 m (at full door height and width) with 840 °C;
- The emissivity of the door opening is taken to be 0.9. This represents a conservative emissivity for a severe fire and a good radiator;
- The temperature of the end walls was set at 600 °C, which is generally the temperature at which flashover begins in a compartment as per the SFPE Handbook and CIBSE Guide E. This represents a severe fully developed fire throughout the modular/cabinet unit.
- It is assumed that the radiating panel shall be based on the full height and length of the modular/cabinet unit end wall with the dimension of 1.60 m (W) x 2.36 m (H) at 600 °C;
- The emissivity of the modular/cabinet unit end wall is taken to be 0.7. This represents the maximum steel emissivity that could be reached at high temperature (flashover temperature) based on research conducted by VTT [5];
- The heat flux from the emitting surface was assumed to be uniform; and
- No heat loss was assumed to intermediate media (i.e. to air or smoke).
- The basis of the fire modelling is to consider the worst-case conditions. It is a consequence-based assessment. In this context historical wind data does not affect the consequence assessment. Further as detailed above the fire modelling ignores that integrity and insulation rating of the unit, providing further conservativeness.

The fire scenario is represented pictorially in Figure 4.

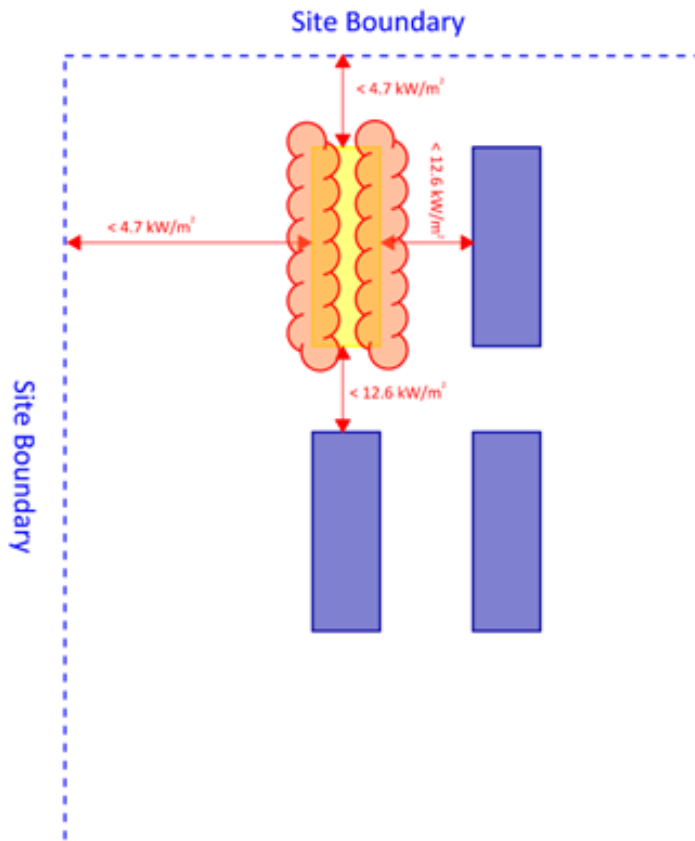


Figure 4 Pictorial representation of the fire modelling scenario

Acceptance Criteria

According to HIPAP 4 [2], a radiation intensity of 4.7 kW/m^2 will cause pain and burn injuries to humans. At 12.6 kW/m^2 , it is known that:

- The temperature of wood can rise to a point where it can be ignited by a naked flame after long exposure;
- Thin steel with insulation on the side away from the fire may reach a thermal stress level high enough to cause structural failure;
- There is a significant chance of fatality with extended exposure and a high chance of injury.

Therefore, sufficient separation distance must be provided such that:

- The heat radiation received at the site boundary is less than 4.7 kW/m^2 ; and
- The heat radiation on the adjacent modular/cabinet unit is less than 12.6 kW/m^2 .

Results

The results of the modelling are presented in Figure 5.

As shown in Figure 5, in order to have a received radiant heat flux of less than 4.7 kW/m^2 at the site boundary, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and site boundary = 2.25 m; and
- Side modular/cabinet unit wall and site boundary = 9 m.

Similarly, in order to have a received radiant heat flux of less than 12.6 kW/m^2 on the adjacent modular/container units, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and adjacent modular/cabinet unit = 1 m; and
- Side modular/cabinet unit wall and adjacent modular/cabinet unit = 5 m.

This is represented pictorially in Figure 10. However, as a conservative measure, it is recommended that the separation distances are as follows:

- Between the long sides of the modular/cabinet units shall not be less than 5 m;
- Between the ends of the modular/cabinet units shall not be less than 2 m; and
- The distance from the site boundary shall not be less than 10 m.

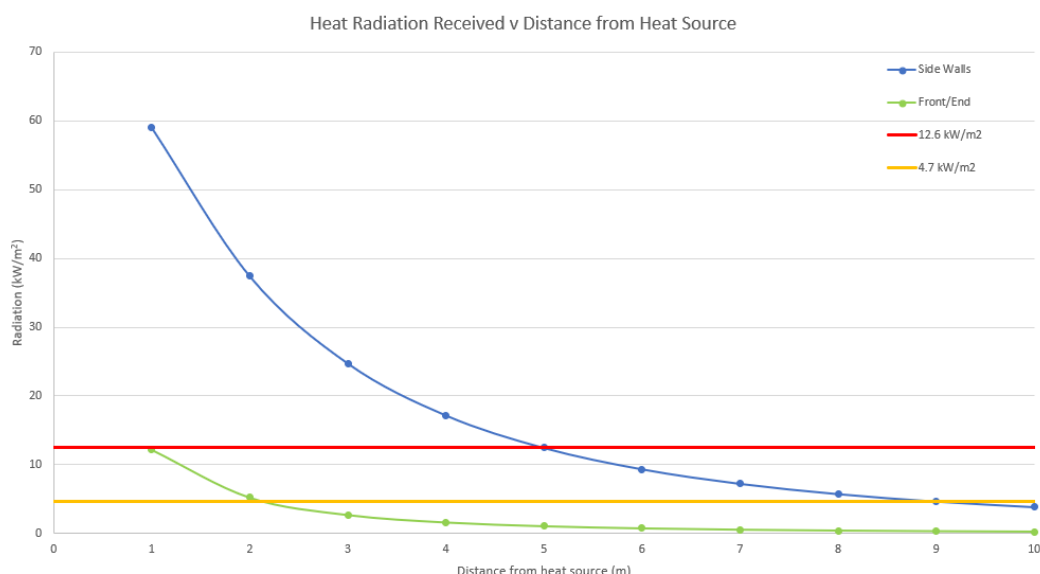


Figure 5 The results of the fire modelling, showing heat flux radiation plotted against the separation distance. The red line is set at 12.6 kW/m^2 while the orange line is set at 4.7 kW/m^2

4.1.2 Containerised

A fire event in a battery container was modelled to assess the impact on its surroundings. The modelling assumed that the battery management system and other safety features are unable to control thermal runaway, leading to a fire in the container. Additionally, it is assumed that the fire suppression system is not functional as a worst-case scenario.

It is understood from the Memo provided by Edify, the supplied battery container is a modified standard 40 ft shipping container - approx. 12.2 m (L) x 2.35 m (W) x 2.39 m (H). Figure 6 shows a typical modified shipping container of this type and Figure 7 shows the dimensions of the container. It will house battery cells and associated electrical infrastructure and be typically installed at ground level or slightly elevated on structure.



Figure 6 Typical 40 ft modified shipping container for battery energy storage (extracted from Edify Memo)

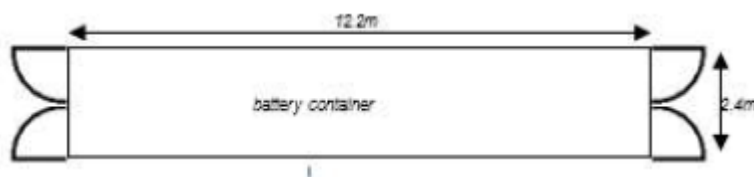


Figure 7 Containerised battery container layout illustrating the double-leaf door at both ends of the containers (extracted from Edify Memo)

Key Assumptions and Fire Scenarios

The basis of the modelling is radiative heat transfer using the Stefan-Boltzmann Law and view factor method. Further description of this methodology and all equations used are presented in Appendix B.

The worst credible fire scenario has been considered in which the double-leaf doors are left open at both ends of the container.

- The temperature of the open door is set at 840 °C (flame temperature). This is representative of an emitting heat flux of 84 kW/m² which is used for fire spread design between buildings such as offices (Approved Document B) (HMCLG, 2010). While the units do contain batteries, which would have combustible contents and some plastic materials, the overall structure of the container and insulation is to be non-combustible and the majority of racking within the space is constructed of non-combustible metal. This results in a comparable fuel load. 840 °C is also within the flame temperature range recommended for use for fires based on the Fire Engineering Design Guide. While adiabatic flame temperature is based on the chemistry of a flame, within a compartment the overall compartment dynamics and air ratio influence the temperature of a flame.

- It is assumed that the open double-leaf door is the full height and width of the container (see Figure 7), i.e. 2.4 m (W) x 2.4 m (H). The radiating panel shall be 2.4 m x 2.4 m (at full door height and width) with 840 °C;
- The emissivity of the door opening is taken to be 0.9. This represents a conservative emissivity for a severe fire and a good radiator;
- The temperature of the perimeter container walls was set at 600 °C, which is generally the temperature at which flashover begins in a compartment as per the SFPE Handbook and CIBSE Guide E. This represents a severe fully developed fire throughout the container.
- It is assumed that the radiating panel shall be based on the full height and length of the container side wall with the dimension of 12.2 m (L) x 2.4 m (H) at 600 °C;
- The emissivity of the container side wall is taken to be 0.7. This represents the maximum steel emissivity that could be reached at high temperature (flashover temperature) based on research conducted by VTT [5];
- The heat flux from the emitting surface was assumed to be uniform; and
- No heat loss was assumed to intermediate media (i.e. to air or smoke).
- The basis of the fire modelling is to consider the worst-case conditions. It is a consequence-based assessment. In this context historical wind data does not affect the consequence assessment. Further as detailed above the fire modelling ignores that integrity and insulation rating of the containers, providing further conservativeness.

The fire scenario is represented pictorially in Figure 8.

Acceptance Criteria

According to HIPAP 4 [2], a radiation intensity of 4.7 kW/m² will cause pain and burn injuries to humans. At 12.6 kW/m², it is known that:

- The temperature of wood can rise to a point where it can be ignited by a naked flame after long exposure;
- Thin steel with insulation on the side away from the fire may reach a thermal stress level high enough to cause structural failure;
- There is a significant chance of fatality with extended exposure and a high chance of injury.

Therefore, sufficient separation distance must be provided such that:

- The heat radiation received at the site boundary is less than 4.7kW/m²; and
- The heat radiation on the adjacent container is less than 12.6kW/m².

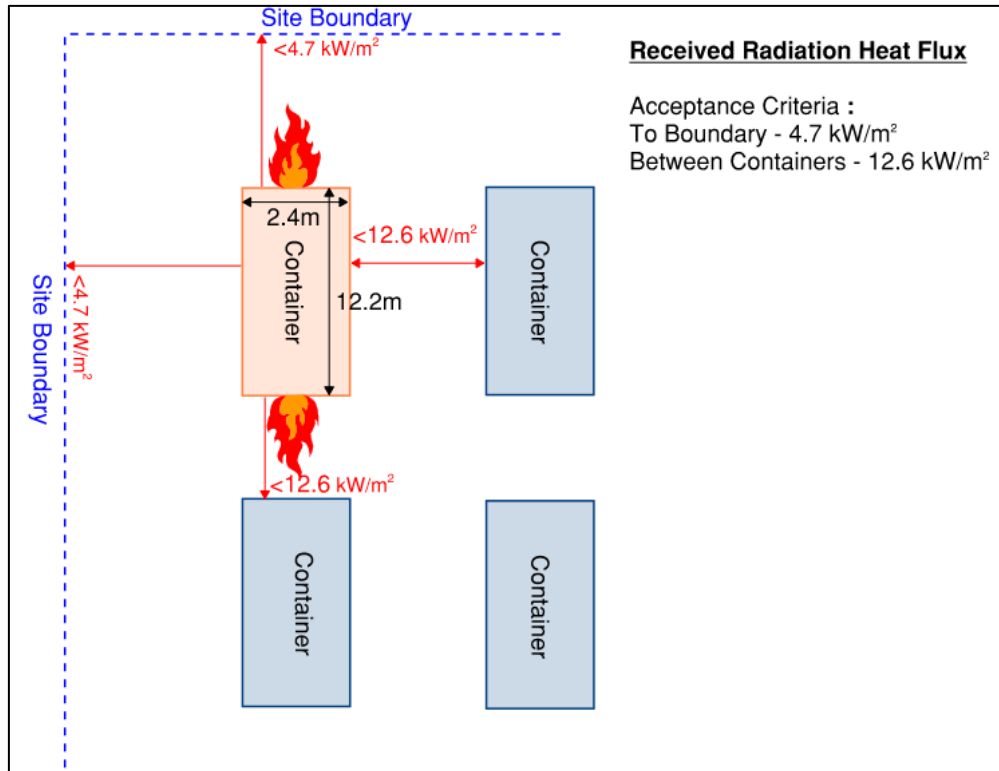


Figure 8 Pictorial representation of the fire modelling scenario.

Results

The results of the modelling are presented in Figure 9.

As shown in Figure 9, in order to have a received radiant heat flux of less than 4.7 kW/m² at the site boundary, the required minimum separation distance between the:

- Front/end of the container and site boundary = 5.5 m; and
- Side container wall and site boundary = 5.25 m.

Similarly, in order to have a received radiant heat flux of less than 12.6 kW/m² on the adjacent containers, the required minimum separation distance between the:

- Front/end of the container and adjacent container = 3.25 m; and
- Side container wall and adjacent container = 2.0 m.

This is represented pictorially in Figure 10. However, as a conservative measure, it is recommended that the separation distances are as follows:

- Between the long ends of the containers shall not be less than 3.25 m;
- Between the sides of the containers shall not be less than 3 m; and
- The distance from the site boundary shall not be less than 10m.

There is the potential for these values to be further refined upon review of the UL9540A fire test report that should be furnished by the BESS manufacturer.

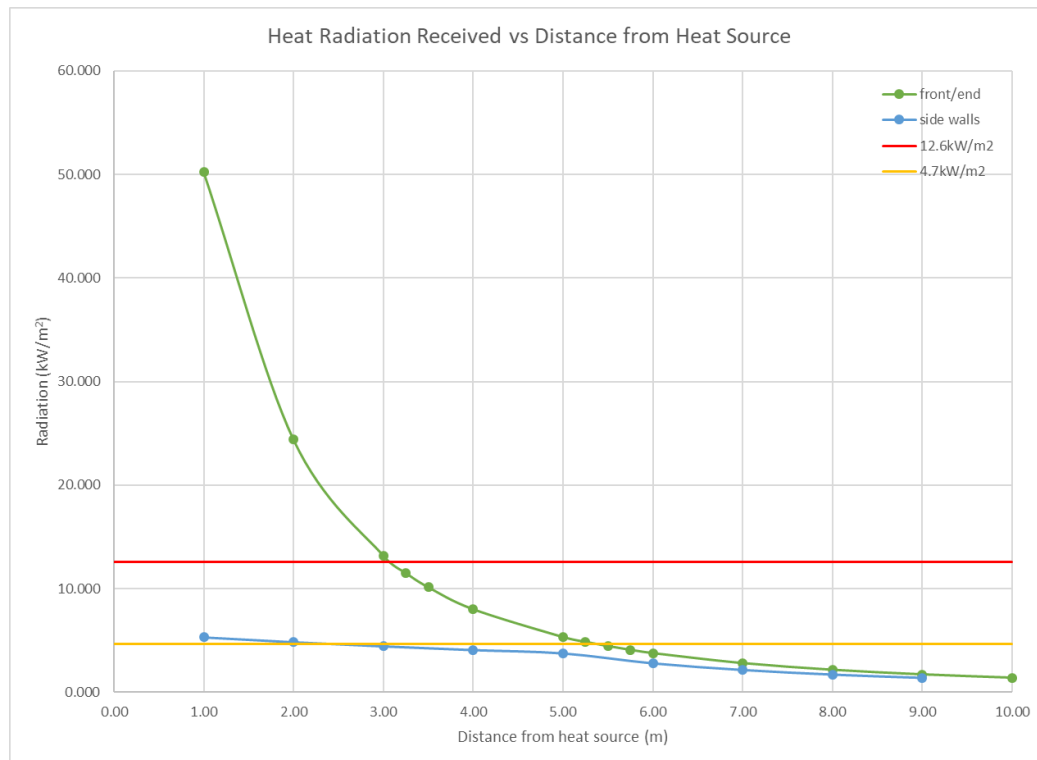


Figure 9 The results of the fire modelling, showing heat flux radiation plotted against the separation distance. The red line is set at 12.6 kW/m² while the orange line is set at 4.7 kW/m².

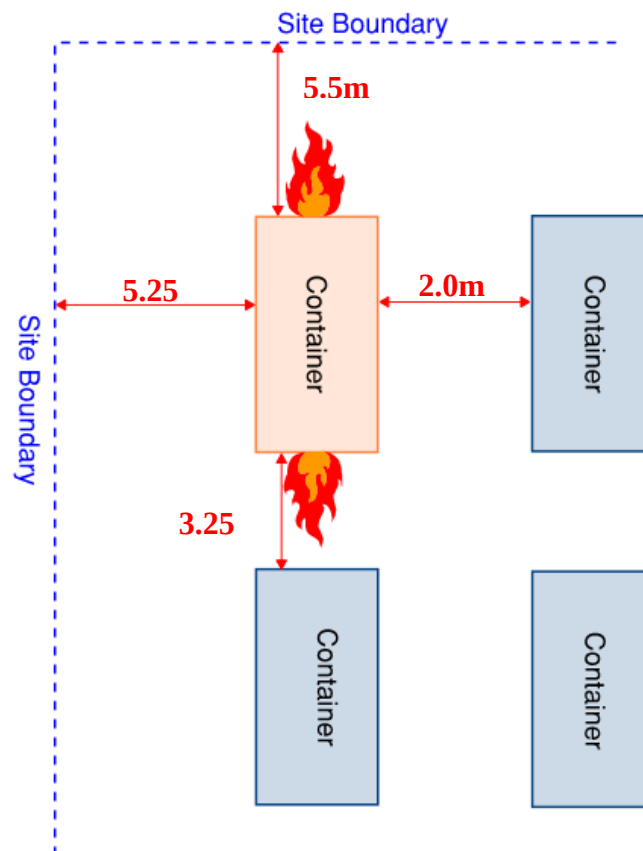


Figure 10 Pictorial representation of the fire modelling results.

Additionally, it is recommended that a containerised BESS, requiring entry for maintenance, have a fire suppression system. It is preferred for the fire suppression system to not rely on shutdown of the battery cooling system. The fire suppression system design should also consider the explosion hazard presented by offgassing, as discussed further in Section 4.2. These recommendations are considered sufficient to mitigate the offsite impact of this event SFAIRP.

4.1.3 Fire Tests

The analyses performed above are independent of the details of specific technology options; this is a conservative approach which allows for greater flexibility in the final selection of technology options as the project progresses.

However, in the course of performing this more conservative analysis, design and safety features are not taken into consideration. It is appropriate to consider these features if a more specific analysis has been performed. Typically, this analysis takes the form of a fire test performed to appropriate standards, such as those specified by the NFPA.

For example, the Tesla Megapack underwent fire testing using the UL9540A Test Method. The results of that testing, published in 2019, indicated that a separation distance of 6 inches (155 mm) between the sides and backs of Megapack units was acceptable to prevent fire spread from unit to unit. This is demonstrated in Figure 11.

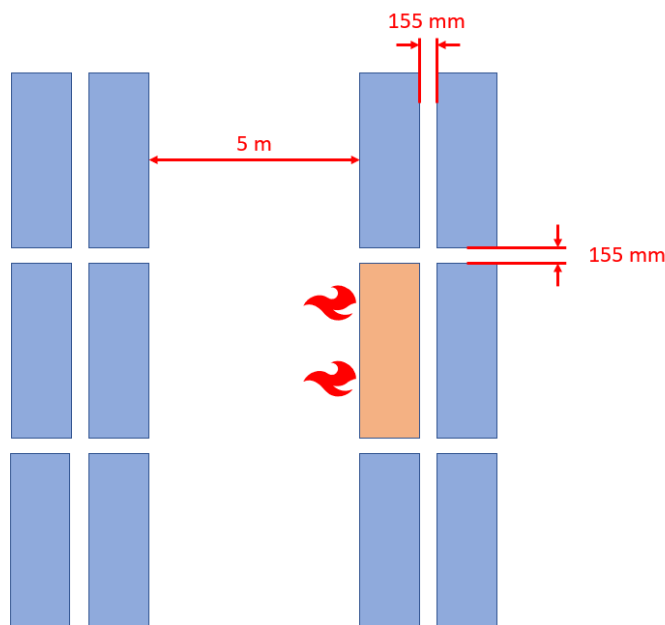


Figure 11: Acceptable spacing between Tesla Megapacks based on UL9540A testing results. (Note: 5 m separation is based on the analysis performed in this report.)

Should the Tesla Megapack be the technology option selected, the separation distances between units outlined in that 2019 fire test would be an appropriate basis for the BESS layout. Similarly, an equivalent fire test report for an alternative technology option would be applicable if that technology is ultimately used.

Arup recommends that the 10 m setback distance between the edge of the outermost battery unit in the BESS and the site boundary be maintained irrespective of the results of the fire tests.

4.2 Battery Explosion

As the final battery technology has not yet been chosen for the Site, this hazard has been considered for all technology options.

Due to the variety in BESS unit design options, a confined VCE was modelled for a vapour release scenario inside a battery container. Based on Arup's previous work, it is known that at high temperatures (100 °C or more), cells are designed to vent, to release internal gas pressure [6]. It is also known that for 20 ft containers, in a worst-case scenario, 400 L of hot gas will be released. This has been conservatively adjusted to be 800 L for the 40 ft containers being considered at the site. Teng et al. (2015) [7] give the compositions of gas generated by different electrolyte combinations at different charge levels. For 1:2 mixture of ethylene carbonate (EC) and diethyl carbonate (DEC), the composition of the released gas was derived from Teng et al.'s (2015) [7] testing and is shown in Table 4.

Table 4: Gas composition of a standard LiPF₆-EC-DEC electrolyte during a high temperature event

Material	Gas composition by mass (%)
Carbon Monoxide	34.8
Carbon Dioxide	0.2
Methane	0.3
Ethane	0.7
Ethylene	63.9

The scenario upon which the VCE model was based is an 800 L cloud of the released gas forming within the container. The indicative size of the container has been assumed to be 12.2 m (L) x 2.35 m (W) x 2.39 m (H), giving a volume of 68.5 m³. Assuming that the batteries and other equipment inside the container take up 50% of the available space, 34.25 m³ was available for the gas mixture to accumulate. Modelling was performed using DNV GL's modelling software *Phast* v8.22.

Using the ideal gas law $pV = nRT$, where $p = 101325 \text{ Pa}$, $V = 0.8 \text{ m}^3$, $R = 8.314 \text{ m}^3 \text{ Pa K}^{-1} \text{ mol}^{-1}$, and $T = 373.15 \text{ K}$ gives 26.1 moles of the gas mixture and air. The molecular weight of the released gas has been calculated to be 28 g/mol which gives 732 g of fuel at 100 °C and 1 atm.

The Multi-Energy method was used to model the explosion behaviour. One of the parameters used in this method is the 'explosion strength', which is a number between 1 and 10, and is used to define the equation used in the calculations. Due to the highly confined nature of the scenario, an explosion strength of 7 was deemed most appropriate for the situation.

The inputs for the model are given in Table 5 below.

Table 5: Input parameters for the VCE model

Parameter	Value
Material	LiPF ₆ -EC-DEC mixture
Flammable mass in cloud (kg)	0.732
Volume of confined source (m ³)	34.25
Strength of explosion	7

The results are presented in Figure 12 and Table 6 below.

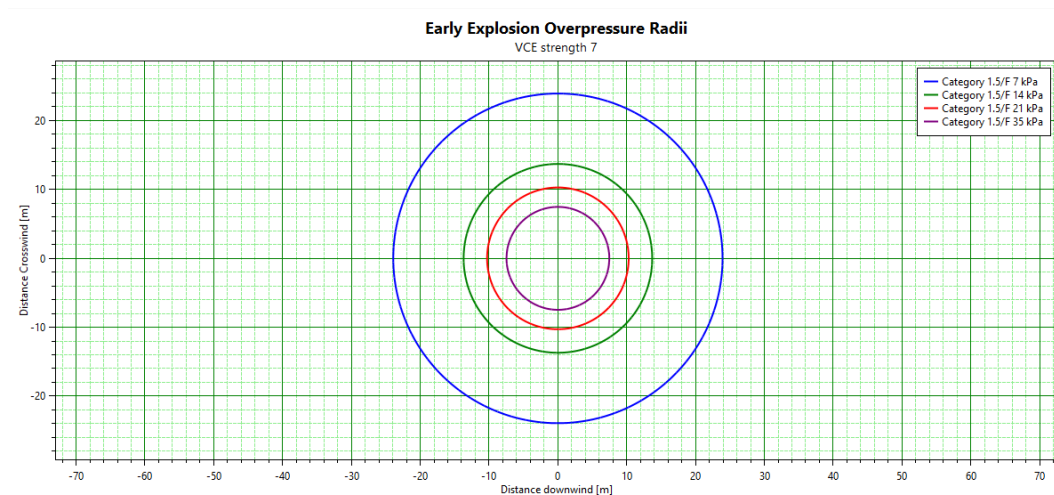


Figure 12 Overpressure contours for the VCE model

Table 6: Distances to overpressures of interest for VCE model

Overpressure (kPa)	Distance from blast centre (m)
7	24
14	14
21	10
35	7.5

HIPAP 4 [2] suggests that 7 kPa is an appropriate cut-off for risk criteria for offsite impacts. As such, it is recommended that a container without any explosion prevention or venting be at least 24 m from the site boundary to reduce the consequence of this risk. Alternatively, to reduce the likelihood and consequence of this event occurring, Arup makes the following recommendation:

- Procure a containerised BESS with explosion venting or an explosion prevention system designed to NFPA 68, NFPA 69, or an international equivalent.

The explosion venting or prevention system described above is considered sufficient mitigation to allow for the separation distances to the:

- Front/end of the container and adjacent container = 3.25 m
- Side container wall and adjacent container = 2.0 m

These recommendations are considered sufficient to mitigate the offsite impact of this event SFAIRP.

5 Findings and Recommendations

The two hazards that were identified as having the potential to cause offsite impacts, namely a battery fire and battery explosion, were carried forward for quantitative consequence analysis.

As the final battery technology has not yet been chosen for the site, these hazards were considered for both modular/cabinet and containerised solutions.

For a fire in a modular/cabinet unit, in order to have a received radiant heat flux of less than 4.7 kW/m^2 at the site boundary, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and site boundary = 2.25 m; and
- Side modular/cabinet unit wall and site boundary = 9 m.

Similarly, in order to have a received radiant heat flux of less than 12.6 kW/m^2 on the adjacent modular/cabinet units, the required minimum separation distance between the:

- Front/end of the modular/cabinet unit and adjacent modular/cabinet unit = 1 m; and
- Side modular/cabinet unit wall and adjacent modular/cabinet unit = 5 m.

For a fire in a container, in order to have a received radiant heat flux of less than 4.7 kW/m^2 at the site boundary, the required minimum separation distance between the:

- Front/end of the container and site boundary = 5.5 m; and
- Side container wall and site boundary = 5.25 m.

Similarly, in order to have a received radiant heat flux of less than 12.6 kW/m^2 on the adjacent containers, the required minimum separation distance between the:

- Front/end of the container and adjacent container = 3.25 m; and
- Side container wall and adjacent container = 2.0 m.

For an explosion in the unit, a vapour cloud explosion of vented gas was modelled. An overpressure of 7 kPa – the accepted minimum for injury or fatality – was found to extend to a distance of 24 m, and an overpressure of 35 kPa – corresponding to significant damage of structures – was found to extend to a distance of 7.5 m.

Arup makes the following recommendations to ensure that the residual risks for the identified hazards will be reduced SFAIRP:

- Separate the BESS 24 m from the site boundary unless the following are met:
 1. BESSs shall have a means to safely vent or prevent an explosion designed to NFPA 68, NFPA 69, or an international equivalent to reduce this risk SFAIRP.

2. In the absence of more specific test data, containerised BESSs shall be separated from one another by not less than 3.25 m end to end and not less than 3 m side to side, and separated from the site boundary by not less than 10 m.
3. In the absence of more specific test data, modular/cabinet BESSs shall be separated from one another by not less than 2 m end to end and not less than 5 m side to side, and separated from the site boundary by not less than 10 m.

If specific test data exist, the recommended separation distances between units provided for in those data can be used in preference to the distances listed here. For example, the Tesla Megapack can be separated by 6 inches (155 mm) side-to-side or back-to-back as demonstrated by fire testing performed using the UL9504A Test Method.

- Ensure the BESS manufacturer supplies the UL9540A fire test report for further refinement of separation distances.
- Ensure BESSs have a fire suppression system, if they are to be entered for maintenance. Additionally:
 1. It is preferred for the fire suppression system to not rely on shutdown of the battery cooling system.

The fire suppression system design should also consider the explosion hazard.

Bibliography

- [1] NSW Department of Planning, Industry and Environment (DPIE), *Multi-level Risk Assessment*, 2011.
- [2] NSW Department of Planning, Industry and Environment (DPIE), *HIPAP No. 4 - Risk Criteria for Land Use Safety Planning*, 2011.
- [3] NSW Department of Planning, Industry and Environment (DPIE), *HIPAP No. 6 - Guidelines for Hazard Analysis*, 2011.
- [4] NSW Department of Planning, Industry and Environment (DPIE), *Applying SEPP 33*, 2011.
- [5] T. P. a. L. Liedquist, *Steel Emissivity at High Temperature*, VTT Research Notes 2299, 2005.
- [6] Arup, “Preliminary Hazards Assessment for Sapphire Solar Farm and Battery Installation,” 2017.
- [7] Xin Teng et al., “In Situ Analysis of Gas Generation in Lithium-Ion Batteries with Different Carbonate-Based Electrolytes,” Beijing Key Laboratory of Environment Science and Engineering, School of Materials Science and Engineering, Beijing Institute of Technology, Beijing, 2015.
- [8] National Transport Commission Australia, *Australian Code for the Transport of Dangerous Goods by Road & Rail, Edition 7.6*, 2018.
- [9] US National Fire Protection Association, *Fire Hazard Assessment of Lithium Ion Battery Energy Storage Systems*, 2016.

Appendix A

HAZID Risk Register

A1 Risk Register

Facility/Event	Cause/Comment	Possible Results/Consequences	Risk (considering current and proposed controls)			
			Existing Controls	Likelihood	Consequence	Risk
Lithium Ion Cell Leakage	Damage to cells caused by external event	Leakage of battery materials requiring clean-up	Lithium batteries do not contain free liquid electrolytes Individual cells are used which minimises extent of release	Rare	Minor	Low
Damage to batteries from vehicle collision	Light vehicle strike to batteries	Damage to battery cells Electrical risks	Use of perimeter fence around battery facility Use of internal access roads with appropriate turning circles Limit of speed limit within fenced facility Earthing system installed as per normal electrical facilities	Rare	Moderate	Low
Transformer Oil Leakage	Corrosion of tank base or leakage of oil tank	Leakage of transformer oil to environment	Use of fully bunded oil storage for transformers in accordance with AS1940 Regular tank inspections included in O&M contract inspection requirements	Unlikely	Minor	Low
Overhead Line Failure	Collapse or fall of overhead electricity line onto battery storage facility	Falling of overhead line near facility	Location of all equipment outside TransGrid easements for overhead lines Normal electricity industry practice for plant shutdown Adherence to AS7000 for overhead lines	Rare	Minor	Low
Security Breach	Security breach into battery storage facility for theft of components	Theft of equipment or risk to personnel	Installation of security fencing around entire facility and also battery facility separately Installation of CCTV security system to monitor key areas O&M inspections to monitor for security breaches	Unlikely	Moderate	Medium
Fire Spreading Internally from Battery Packs	Spread of fire across battery facility between battery packs	Localised fire causing damage by spreading to facility	Separation distances between battery packs in accordance with manufacturer recommendations Adherence to bushfire management plan Coordination with local fire authorities Use of thermal CCTV security cameras to identify fires remotely	Rare	Moderate	Low

Facility/Event	Cause/Comment	Possible Results/Consequences	Risk (considering current and proposed controls)			
			Existing Controls	Likelihood	Consequence	Risk
Coolant leakage causing eye irritation	Minor spray in eye if working on battery coolant system	Minor leakage of coolant (typical of normal engine coolant) during minor maintenance activities at site	Use of appropriately qualified maintenance personnel Use of portable eye wash (squeeze bottle) for work on battery cooling system	Possible	Minor	Low
Electrocution from electrical facility	Electrocution due to electrical fault	Electrical fault causing personnel injury	Normal electrical standards including AS3000 and installation of appropriate earthing system Use of appropriately qualified maintenance personnel	Rare	Major	Medium
Damage due to lightning strike	Lightning striking facility and causing damage	Lightning strike causing damage to facility or personnel	Completion of a lightning risk assessment in accordance with AS1768 Include lightning protection measures if deemed necessary	Unlikely	Minor	Low
Flooding of facility causing damage	High rainfall and flooding to site	Damage to electrical equipment Restricted access to site	Undertake a site-specific flooding/hydrology study to determine site flood risk and Q100 flood levels Install all electrical equipment to be above the Q100 flood level with some freeboard Ensure suitable site access and egress at different locations	Rare	Moderate	Low
Miscellaneous and Small Stores of Dangerous Goods Being Spilled	Improper handling or storage of dangerous goods	Injury to personnel Minor spill to environment	Use an appropriately rated dangerous goods cabinet for small stores in accordance with Australian Standards Use appropriate bunding for chemicals stored in IBCs Provide all MSDSs on site and only use appropriately qualified personnel for handling Comply with appropriate transport requirements according to the Australian Dangerous Goods Code.	Possible	Low	Low
Explosion of Battery Cells	Explosion of cells from physical impact causing damage to equipment and personnel	Damage to surrounding equipment and injury to personnel	Liaise with battery OEM for relevant clearance distances And understand failure mechanics for battery explosion if relevant Use of perimeter fence around battery facility Use of internal access roads with appropriate turning circles Limit of speed limit within fenced facility	Rare	Moderate	Low

Facility/Event	Cause/Comment	Possible Results/Consequences	Risk (considering current and proposed controls)			
			Existing Controls	Likelihood	Consequence	Risk
Construction risks	General miscellaneous construction risks	Injuries to construction personnel	Develop a WHS plan Conduct detailed Safety in Design processes during project execution	Unlikely	Moderate	Medium
O&M risks	General miscellaneous O&M risks	Injuries to operations personnel	Develop a WHS plan Conduct detailed Safety in Design processes during project execution	Unlikely	Moderate	Medium
High wind events and seismic events	High wind or seismic events causing structural damage to equipment or battery packs	Damage to equipment and injury to personnel	Design in accordance with AS1170 considering appropriate wind speed and seismic design requirements	Rare	Minor	Low
Transport and delivery (manual handling)	Personnel injury through manual handling of equipment during operations	Personnel injury through inappropriate handling or spillage of handled equipment	Ensure a traffic management plan is in place during construction Adhere to requirements of a WHS plan and the ADG code Ensure site specific handling equipment of a 'trolley' is used for handling of battery equipment, including portable facilities for handling where appropriate	Unlikely	Minor	Low
Exposure to dangerous goods during site emergency	Site emergency event causing personnel injury through exposure to dangerous materials during site emergency	Site emergency event causing personnel injury through exposure to dangerous materials during site emergency	Have a site-specific Emergency Response Plan (ERP) for the facility Installation of appropriate signage and labelling to identify site specific hazards for different areas Liaise with emergency response workers for site specific response requirements	Rare	Major	Medium
Offsite impacts	Fire in or explosion of BESS with impacts extending past the site boundary	Societal and individual injuries and/or fatalities	Appropriate separation distances from the site boundary Ensure the BESS has a fire suppression system Containerised BESSs should have explosion venting or explosion prevention system	Rare	Major	Medium

Appendix B

Heat Radiation Calculations

B1 Heat Radiation Calculations

A fire event in a battery unit was modelled. In order to assess the worst credible case off-site risk, it was assumed that all fire prevention measures have failed and a unit has caught fire. One fire configuration was considered in which double doors at both ends of a container are open. Another fire configuration had doors along the long side of a modular/cabinet unit open.

The radiative heat flux emitted from the surface of the unit was calculated using the Stefan-Boltzmann Law:

$$j_{emitter}^* = \varepsilon \sigma T^4$$

where j^* is the radiant emittance, ε is the emissivity of the unit/smoke, σ is the Stefan-Boltzmann constant and T is the surface temperature. The heat flux received was calculated using the view factor method:

$$j_{receiver}^* = 4 \cdot \Phi \cdot j_{emitter}^*$$

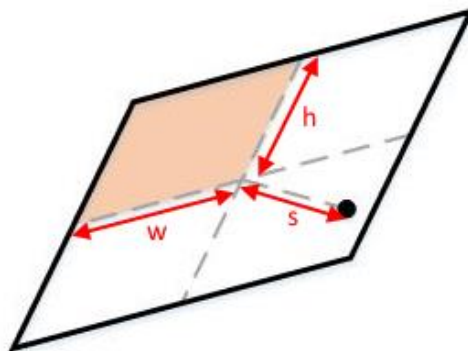
The view factor, Φ , is given by the equation

$$\Phi = \frac{1}{2\pi} \left[\frac{a}{(1+a^2)^{1/2}} \tan^{-1} \frac{b}{(1+a^2)^{1/2}} + \frac{b}{(1+b^2)^{1/2}} \tan^{-1} \frac{a}{(1+b^2)^{1/2}} \right]$$

The parameters a and b are given by the following equations, where h is half the height of the surface, w is half the width of the surface and s is the perpendicular distance from the surface to the point of interest:

$$a = \frac{h}{s} ; b = \frac{w}{s}$$

This is represented graphically as follows:



The radiative heat flux emitted was calculated using the Stefan-Boltzmann Law:

$$j_{emitter}^* = \varepsilon \sigma T^4$$

TEST REPORT	
ANSI/CAN/UL 9540A:2019	
Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems	
Report Number.....	32072059.002
Date of issue	Dec. 01, 2020
Total number of pages	27
Name of Testing Laboratory preparing the Report	TÜV Rheinland of North America, Inc. 1279 Quarry Lane, Suite A, Pleasanton, CA 94566
Applicant's name	Tesla, Inc.
Address	3500 Deer Creek Road, Palo Alto, CA 94304
Test specification:	
Standard	ANSI/CAN/UL 9540A:2019
Test procedure.....	Report
Non-standard test method	N/A
Test Report Form No.....	N/A
Test Report Form(s) Originator....	N/A
Master TRF	Dated 2019-01-17
General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the CB, responsible for this Test Report.	

Test item description	Battery Energy Storage System	
Trade Mark	Tesla	
Manufacturer	Tesla, Inc, (new # 1210368) 3500 Deer Creek Rd, Palo Alto, CA 94304	
Model/Type reference	1462965-XX-Y Megapack XX – can be any number from 00 to 99. XX – represents style codes used for different variants of the same part, having no impact on the safety and functionality of the entire product. Y – can be any upper case letter from A to Z. Y – represents pedigree and is used for tracking changes to parts that have already been released to suppliers or production, having no impact on the safety and functionality of the entire product	
Ratings	1) 480Vac, 1573 kVA 2) 505Vac, 1654.9 kVA (3 phase 3 wire or 3 phase 4 wire) Nominal Battery Power: 2 hr: 1341kW; 4 hr: 770.1kW Battery capacity 4hr: 3080.4kWh Battery capacity 2hr: 2682kWh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	Testing Laboratory:	TÜV Rheinland of North America, Inc. 1279 Quarry Lane, Suite A, Pleasanton, CA 94566
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
☒	Testing procedure: CTF Stage 1/TMP:	Tesla, Inc.
Testing location/ address		3500 Deer Creek Road, Palo Alto, CA 94304
Tested by (name, function, signature)		Justin Goh/ Himanshu Vaidya
Approved by (name, function, signature) ..		Howard Liu
☐	Testing procedure: CTF Stage 2/WMT:	
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) .		
Approved by (name, function, signature) ..		
☐	Testing procedure: CTF Stage 3/SMT:	
☐	Testing procedure: CTF Stage 4:	
Testing location/ address		
Tested by (name, function, signature)		
Witnessed by (name, function, signature) .		
Approved by (name, function, signature) ..		

Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment):

1. Test package with testing equipment list
2. Photo documentation

Summary of testing:

Tests performed (name of test and test clause):

9540A cl 9 – Unit Level

Testing location:

Tesla, Inc.
Tesla Battery Test Facility
Fernley, Nevada

Summary of compliance with National Differences (List of countries addressed): N/A

☐ The product fulfils the requirements of _____ (insert standard number and edition and delete the text in parenthesis, leave it blank or delete the whole sentence, if not applicable)

Possible test case verdicts:

- test case does not apply to the test object.....: N/A
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Date of receipt of test item May 10, 2020

Date (s) of performance of tests May 13, 2020

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Name and address of factory (ies) :

Copy of marking plate: Use – “Only for use with Tesla Products”

“The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCB' s that own these marks”

General product information and other remarks:

ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
CONSTRUCTION			--
5	General		--
5.1	Cell		P
5.1.1	The cells associated with the BESS that were tested shall be documented in the test report	Panasonic Model NCR2170D LiNiCoAlO ₂ Cylindrical Lithium ion battery Rated capacity (Ah): 3930mAh Nominal voltage (V): 3.6V Upper limit charging voltage (V) : 4.2V Nominal mass (g): 70.6g or less (68.1g typ) External dimensions (mm): 21+/-0.12mm diameter, 70+/-0.25mm height LG Model INR21700M48F (Note: Refer to A2.2.2. Its cell level testing was completed and evaluated to a baseline fire performance data.)	P
5.1.2	The cell documentation included in the test report shall indicate if the cells associated with the BESS comply with UL 1973	Battery module is compliant with UL 1973. Cell is compliant with UL 1642.	P
5.1.3	Refer to 7.6.1 for further details	See 7.6.1	N/A
5.2	Module		P

ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
5.2.1	The modules associated with the BESS that were tested shall be documented in the test report	Battery module (12 modules in series): Rated Voltage MV (before DCDC converter) nominal voltage: 400V MV max. charge voltage: 470 V(operational) (460 V full power) MV min. discharge voltage: 216 V (operational) (324 V full power) Rated Current Max. HV charge/discharge current: 116 A (2 hr), 58 A (4 hr) Max. MV charge/discharge current: 280.8 A (2 hr), 143.8 A (4 hr) Max. HV charge and discharge power: 125 kW (2 hr), 52 kW (4 hr) Battery module: Nominal voltage: 33.3 V Max charge voltage: 38.75 V(operational) (37.75 V full power) Min. discharge voltage: 18 V (operational) (27 V full power)	P
5.2.2	The module documentation included in the test report shall indicate if the modules associated with the BESS comply with UL 1973	Battery module is compliant with UL 1973	P
5.2.3	Refer to 8.3 for further details	See 8.3	N/A
5.3	Battery energy storage system unit		P
5.3.1	The BESS unit documentation included in the test report shall indicate the units that comply with UL 9540	UL 9540 compliant	P
5.3.2	For BESS units for which UL 9540 compliance cannot be determined,	See above	N/A
5.3.3	If applicable, the details of any fire detection and suppression systems that are an integral part of the BESS shall be noted in the test report	No fire detection and suppression systems used	N/A
5.3.4	Refer to 9.7, 10.4 and 10.7 for further details	See 9.7	P
5.4	Flow Batteries		N/A
5.4.1	For flow batteries, the report will cover the chemistry, as well as the electrical rating in capacity and nominal voltage of the cell stack	Not flow batteries	N/A
5.4.2	The flow battery documentation included in the test report shall indicate if the flow battery system complies with UL 1973		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
5.4.3	See 7.6.2 for further details		N/A
PERFORMANCE			--
6	General		N/A
6.1	The tests in this standard are extreme abuse conditions conducted on electrochemical energy storage devices that can result in fires		N/A
6.2	At the conclusion of testing, samples shall be discharged in accordance with the manufacturer's specifications		N/A
9	Unit Level		--
9.1	Sample and test configuration		--
9.1.1	The unit level test shall be conducted with BESS units installed as described in the manufacturer's instructions and this section. Test configurations include the following:		P
	a) Indoor floor mounted non-residential use BESS; b) Indoor floor mounted residential use BESS; c) Outdoor ground mounted non-residential use BESS; d) Outdoor ground mounted residential use BESS; e) Indoor wall mounted non-residential use BESS; f) Indoor wall mounted residential use BESS; g) Outdoor wall mounted non-residential use BESS; h) Outdoor wall mounted residential use BESS; and i) Rooftop and open garage non-residential use BESS installations.	Outdoor ground mounted non-residential use BESS	P
9.1.2	The unit level test requires one initiating BESS unit in which an internal fire condition in accordance with the module level test is initiated and target adjacent BESS units representative of an installation	One initiating BESS and two target adjacent BESS	P
	Exception: Testing can be conducted outdoors for outdoor only installations if there are the following controls and environmental conditions in place:	Testing can be conducted outdoors for outdoor only installations See Figure 1	P

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Clause	Requirement – Test	Result – Remark	Verdict
	a) Wind screens are utilized with a maximum wind speed maintained at ≤ 12 mph; b) The temperature range is within 10°C to 40°C (50°F to 104°F); c) The humidity is $< 90\%$ RH; d) There is sufficient light to observe the testing; e) There is no precipitation during the testing; f) There is control of vegetation and combustibles in the test area to prevent any impact on the testing and to prevent inadvertent fire spread from the test area; and g) There are protection mechanisms in place to prevent inadvertent access by unauthorized persons in the test area and to prevent exposure of persons to any hazards as a result of testing.	This was an outdoor installation test. The ambient temperature was varied between 10°C and 27°C and humidity less than 90% RH, and wind was under 12 mph.	P
9.1.3	Depending upon the configuration and design of the BESS (e.g. the BESS is composed of multiple separate parts within separate enclosures), this testing to determine fire characterization can be done at the battery system level	Testing performed at BESS level	N/A
9.1.4	The initiating BESS unit shall contain components representative of a BESS unit in a complete installation.	Complete unit in the testing	P
9.1.5	Target BESS units shall include the outer cabinet (if part of the design), racking, module enclosures, and components		P
9.1.6	The initiating BESS unit shall be at the maximum operating state of charge (MOSOC),	100% SOC	P
9.1.7	If a BESS unit includes an integral fire suppression system, there is an option of providing this with the DUT	No integral fire suppression system	N/A
9.1.8	Electronics and software controls such as the battery management system (BMS) in the BESS are not relied upon for this testing.		P
9.2	Test method – Indoor floor mounted BESS units	Outdoor ground mounted units. Used the test method described in the Section 9.2 except conflicted with Section 9.3.	--
9.2.1	Samples and test configurations are in accordance with 9.1.	Testing conducted outdoor	N/A
9.2.2	Any access door(s) or panels on the initiating BESS unit and adjacent target BESS units shall be closed,	Doors closed	P
9.2.3	The initiating BESS unit shall be positioned adjacent to two instrumented wall sections	No instrumented wall sections	N/A
9.2.4	Instrumented wall sections shall extend not less than 0.49 m (1.6 ft) horizontally beyond the exterior of the target BESS units.	No instrumented wall sections	N/A
9.2.5	Instrumented wall sections shall be at least 0.61-m (2-ft) taller than the BESS unit height	No instrumented wall sections	N/A
9.2.6	The surface of the instrumented wall sections shall be covered with 16-mm (5/8-in) gypsum wall board and painted flat black	No instrumented wall sections	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
9.2.7	The initiating BESS unit shall be centered underneath an appropriately sized smoke collection hood of an oxygen consumption calorimeter	Testing conducted outdoor	N/A
9.2.8	The light transmission in the calorimeter's exhaust duct shall be measured using a white light source and photo detector for the duration of the test	Testing conducted outdoor	N/A
9.2.9	The chemical and convective heat release rates shall be measured for the duration of the test, using the methodologies specified in 8.2.11 and 9.2.12, respectively	Testing conducted outdoor	N/A
9.2.10	With reference to 9.2.9, the heat release rate measurement system shall be calibrated	Testing conducted outdoor	N/A
9.2.11	With reference to 9.2.9, the convective heat release rate shall be measured using thermopile	Testing conducted outdoor	N/A
9.2.12	With reference to 9.2.9, the convective heat release rate shall be calculated using the following equation: $HRR_c = V_e A \frac{353.22}{T_e} \int_{T_0}^T C_p dT$	Testing conducted outdoor	N/A
9.2.13	The physical spacing between BESS units (both initiating and target) and adjacent walls shall be representative of the intended installation	No instrumented wall sections	N/A
9.2.14	Separation distances shall be specified by the manufacturer for distance between:		P
	a) The BESS units and the instrumented wall sections; and b) Adjacent BESS units.	a) No wall b) 6 inches from ISO knuckle of Initiating unit to Target unit. 4 inches from surface of initiating unit to target unit surface.	P
9.2.15	Wall surface temperature measurements shall be collected for BESS intended for installation in locations with combustible construction.	No instrumented wall sections	N/A
9.2.16	Wall surface temperatures shall be measured in vertical array(s) at 152-mm (6-in) intervals for the full height of the instrumented wall sections using No. 24-gauge or smaller,	No instrumented wall sections	N/A
9.2.17	Thermocouples shall be secured to gypsum surfaces by the use of staples placed over the insulated portion of the wires	No instrumented wall sections	N/A
9.2.18	Heat flux shall be measured with the sensing element of at least two water-cooled Schmidt-Boelter gauges at the surface of each instrumented wall:	No instrumented wall sections	N/A
	a) Both are collinear with the vertical thermocouple array;		N/A
	b) One is positioned at the elevation estimated to receive the greatest heat flux due to the thermal runaway of the initiating module; and		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	c) One is positioned at the elevation estimated to receive the greatest heat flux during potential propagation of thermal runaway within the initiating BESS unit.		N/A
9.2.19	Heat flux shall be measured with the sensing element of at least two water-cooled Schmidt-Boelter gauges at the surface of each adjacent target BESS unit that faces the initiating BESS unit:	No target facing the initiating BESS	N/A
	a) One is positioned at the elevation estimated to receive the greatest heat flux due to the thermal runaway of the initiating module within the initiating BESS; and		N/A
	b) One is positioned at the elevation estimated to receive the greatest surface heat flux due to the thermal runaway of the initiating BESS.		N/A
9.2.20	For non-residential use BESS, heat flux shall be measured with the sensing element of at least one water-cooled Schmidt-Boelter gauge	Testing conducted outdoor	N/A
9.2.21	No. 24-gauge or smaller, Type-K exposed junction thermocouples shall be installed to measure the temperature of the surface	No. 24-gauge, Type-K used	P
9.2.22	For residential use BESS, the DUT shall be covered with a single layer of cheese cloth	Non-residential	N/A
9.2.23	An internal fire condition in accordance with the module level test shall be created within a single module in the initiating BESS unit:	See Figure 2 Megapack can consist up to 17 Battery Module assemblies. Each module assembly contains 6 trays of 2 Modules each which is a total of 204 modules. The module that was set to initiate was located at location 72 and on Tray III. Two sections of heaters with 29 and 27 heater were setup to force thermal runaway.	P
	a) The position of the module shall be selected to present the greatest thermal exposure		P
	b) The setup (i.e. type, quantity and positioning) of equipment for initiating thermal runaway in the module shall be the same as that used to initiate and propagate thermal runaway within the module level test		P
9.2.24	The composition, velocity and temperature of the initiating BESS unit vent gases shall be measured within the calorimeter's exhaust duct	Testing conducted outdoor	N/A
9.2.25	The hydrocarbon content of the vent gas shall be measured using flame ionization detection	Testing conducted outdoor	N/A
9.2.26	The test shall be terminated if:		P
	a) Temperatures measured inside each module within the initiating BESS unit return to ambient temperature;	Applicable	P
	b) The fire propagates to adjacent units or to adjacent walls; or		N/A
	c) A condition hazardous to test staff or the test facility requires mitigation		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
9.2.27	For residential use systems, the gas collection data gathered in 9.2 shall be compared to the smallest room installation	Non-residential	N/A
9.3	Test method – Outdoor ground mounted units		--
9.3.1	Outdoor ground mounted non-residential use BESS being evaluated for installation in close proximity to buildings shall use the test method described in Section 9.2	See 9.2	P
9.3.2	except as noted in 9.3.3 and 9.3.4. Heat flux measurements for the accessible means of egress shall be measured in accordance with 9.2.20.	See 9.2	P
9.3.3	Test samples shall be installed as shown in Figure 9.2 in proximity to an instrumented wall section that is 3.66-m (12-ft) tall with a 0.3-m (1-ft) wide horizontal soffit	No instrumented wall sections	N/A
	Exception: If the manufacturer requires installation against non-flammable material, the test setup may include manufacturer recommended backing material between the unit and plywood wall		N/A
9.3.4	Target BESS shall be installed on each side of the initiating BESS in accordance with the manufacturer's installation specifications	No target unit on the front side	N/A
9.4	Test Method – Indoor wall mounted units	Testing conducted outdoor	N/A
9.4.1	Testing of indoor wall mounted BESS shall be in accordance with Section 9.2, except as modified in this section. See Figure 9.3.		N/A
9.4.2	The test shall be conducted in a standard NFPA 286 fire test room, 3.66 × 2.44 × 2.44-m (12 × 8 × 8-ft) high, with a 0.76 × 2.13-m (2-1/2 × 7-ft) high opening.		N/A
9.4.3	The initiating BESS unit shall be positioned on the wall opposite of the door opening		N/A
9.4.4	Target BESS shall be installed on the wall on each side of the initiating BESS		N/A
9.4.5	The wall on which the initiating and target BESS units are mounted shall be instrumented in accordance with Section 9.2.		N/A
9.4.6	The gas collection methods shall be in accordance with 9.2		N/A
9.4.7	For residential use BESS, the DUT shall be covered with a single layer of cheese cloth ignition indicator.		N/A
9.5	Test Method – Outdoor wall mounted units	Testing conducted outdoor, ground mounted	N/A
9.5.1	Testing of outdoor wall mounted BESS shall be in accordance with Section 9.2, except as modified in this section. See Figure 9.4.		N/A
9.5.2	Test samples shall be mounted on an instrumented wall section that is 3.66-m (12-ft) tall with a 0.3-m (1-ft) wide horizontal soffit (undersurface of the eave shown in Figure 9.4).		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
9.5.3	The initiating BESS unit shall be positioned on the instrumented wall, with its center located 1.22-m (4-ft) above the floor,		N/A
9.5.4	Target BESS shall be installed on the wall on each side of the initiating BESS, at the same height		N/A
9.5.5	The wall on which the initiating and target BESS units are mounted shall be instrumented in accordance with Section 9.2.		N/A
9.5.6	For residential use BESS, the DUT shall be covered with a single layer of cheese cloth		N/A
9.6	Rooftop and open garage installations	Testing conducted outdoor, ground mounted	N/A
9.6.1	Testing of BESS intended for non-residential use rooftop or open garage installations shall be in accordance with 9.2.		N/A
9.6.2	If intended for rooftop and open garage use only installations, the smoke release rate, the convective and chemical heat release rate and content, velocity and temperature of the released vent gases need not be measured		N/A
9.7	Unit level test report		--
9.7.1	The report on the unit level testing shall identify the type of installation being tested, as follows:		P
	a) Indoor floor mounted non-residential use BESS; b) Indoor floor mounted residential use BESS; c) Outdoor ground mounted non-residential use BESS; d) Outdoor ground mounted residential use BESS; e) Indoor wall mounted non-residential use BESS; f) Indoor wall mounted residential use BESS; g) Outdoor wall mounted non-residential use BESS; h) Outdoor wall mounted residential use BESS; i) Rooftop installed non-residential use BESS; or j) Open garage installed non-residential use BESS.	Outdoor ground mounted non-residential use BESS;	P
9.7.2	With reference to 9.7.1, if testing is intended to represent more than one installation type, this shall be noted in the report	One installation type	N/A
9.7.3	The report shall include the following, as applicable:	See Table 1	P

a) Unit manufacturer name and model number (and whether UL 9540 compliant); b) Number of modules in the initiating BESS unit; c) The construction of the initiating BESS unit per 5.3; d) Fire protection features/detection/suppression systems within unit; e) Module voltage(s) corresponding to the tested SOC; f) The thermal runaway initiation method used; g) Location of the initiating module within the BESS unit; h) Diagram and dimensions of the test setup including mounting location of the initiating and target BESS units, and the locations of walls, ceilings, and soffits; i) Observation of any flaming outside the initiating BESS enclosure and the maximum flame extension; j) Chemical and convective heat release rate versus time data; k) Separation distances from the initiating BESS unit to target walls (e. g. distances A and C in Figure 9.1); l) Separation distances from the initiating BESS unit to target BESS units (e.g. distances D and H in Figure 9.1); m) The maximum wall surface and target BESS temperatures achieved during the test and the location of the measuring thermocouple; n) The maximum ceiling or soffit surface temperatures achieved during the indoor or outdoor wall mounted test and the location of the measuring thermocouple; o) The maximum incident heat flux on target wall surfaces and target BESS units; p) The maximum incident heat flux on target ceiling or soffit surfaces achieved during the indoor or outdoor wall mounted test; q) Gas generation and composition data; r) Peak smoke release rate and total smoke release data; at which activation occurred; t) Observation of flying debris or explosive discharge of gases; u) Observation of re-ignition(s) from thermal runaway events; v) Observation(s) of sparks, electrical arcs, or other electrical events; w) Observations of the damage to: 1) The initiating BESS unit; 2) Target BESS units;		
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ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
	3) Adjacent walls, ceilings, or soffits; and x) Photos and video of the test.		
9.8	Performance at unit level testing		--
9.8.1	Installation level testing in Section 10 is not required if the following performance conditions outlined in Table 9.1 are met during the unit level test.	a) Peak flame extension was observed to be at about 10-12 ft upwards and 8-10 ft in front of the unit. b) Surface temperatures of the modules within the target BESS remained below 140.2C (cell vent temperature). Maximum temperature measured was 44.5C. c) Not intended for installation near exposures, no measurements taken to walls. d) No explosion hazards observed (no deflagration, detonation, or accumulation of battery vent gases) e) Maximum incident heat flux was 17.5kW/m² at 3 ft from the left of the initiating cabinet enclosure (Note: Megapack is not designed to be installed near accessible means of egress. Refer to Figure 10. Heat Flux results for more information on heat flux around the product).	--
10	Installation Level	Unit level testing only	N/A
10.1	General		N/A
10.1.1	The installation level test method assesses the effectiveness of the fire and explosion mitigation methods for the BESS in its intended installation		N/A
	a) Test Method 1 – "Effectiveness of sprinklers" is used		N/A
	b) Test Method 2 – "Effectiveness of fire protection plan" is used		N/A
10.1.2	Installation level testing is not appropriate for units only intended for outdoor use or residential use.	Outdoor use only	P
10.2	Sample		N/A
10.2.1	The samples (initiating BESS and target BESS) and their preparation for testing		N/A
10.2.2	A flame indicator consisting of a cable tray with fire rated cables that complies with UL 1685 and representative of the installation per the manufacturer's specifications		N/A
10.3	Test method 1 – Effectiveness of sprinklers		N/A
10.3.1	For BESS units with a height of 2.44 m (8 ft) or less, the test shall be conducted in a 6.10 × 6.10 × 3.05-m (20 × 20 × 10-ft) high test room		N/A

ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
10.3.2	The test room shall be fitted with four sprinklers at 3.05-m (10-ft) spacing in the center		N/A
10.3.3	Walls shall be constructed with 16-mm (5/8-in) gypsum wall board		N/A
10.3.4	The initiating BESS unit shall be positioned at manufacturer specified distances		N/A
10.3.5	Temperature measurements at the ceiling locations directly above the initiating and target BESS unit shall be collected by an array of thermocouples		N/A
10.3.6	Instrumented wall surface temperature measurements shall be collected in a vertical array at 152-mm (6-in) intervals		N/A
10.3.7	Thermocouples for wall surface temperature measurements shall be secured to gypsum surfaces by the use of staples		N/A
10.3.8	Heat flux shall be measured with the sensing element of at least two water-cooled Schmidt-Boelter gauges at the surface of each instrumented wall:		N/A
	a) Both are collinear with the vertical thermocouple array;		N/A
	b) One is positioned at the elevation estimated to receive the greatest heat flux due to the thermal runaway of the initiating module; and		N/A
	c) One is positioned at the elevation estimated to receive the greatest heat flux during potential propagation of thermal runaway within the initiating BESS unit.		N/A
10.3.9	Heat flux shall be measured with at least two sensing water-cooled Schmidt-Boelter gauges at the surface of each adjacent target BESS unit that faces the initiating BESS unit:		N/A
	a) One is positioned at the elevation estimated to receive the greatest heat flux due to the thermal runaway of the initiating module within the initiating BESS; and		N/A
	b) One is positioned at the elevation estimated to receive the greatest surface heat flux due to the thermal runaway of the initiating BESS.		N/A
10.3.10	The heat flux shall be measured with the sensing element of at least one water-cooled Schmidt-Boelter gauge		N/A
10.3.11	No. 24-gauge or smaller Type-K exposed junction thermocouples shall be installed		N/A
10.3.12	An internal fire condition in accordance with the module level test shall be created		N/A
	a) The position of the module shall be selected to present the greatest thermal exposure		N/A
	b) The setup (i.e. type, quantity and positioning) of equipment for initiating thermal runaway in the module shall be the same		N/A
10.3.13	The composition of BESS unit vent gases shall be measured		N/A
10.3.14	The test shall be terminated if:		N/A

ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
	a) Temperatures measured inside each module of the initiating BESS return to below the cell vent temperature;		N/A
	b) The fire propagates to adjacent units or to adjacent walls; or		N/A
	c) A condition hazardous to test staff or the test facility requires mitigation.		N/A
10.3.15	The initiating unit shall be under observation for 24 h after conclusion of the installation test		N/A
10.4	Installation level test report – Test method 1 – Effectiveness of sprinklers		N/A
10.4.1	The report on installation level testing shall include the following:		N/A

ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
	a) Unit manufacturer name and model number (and whether compliant with UL 9540); b) Number of modules in the initiating BESS unit; c) The construction of the initiating BESS unit per 5.3; d) Module voltage(s) of initiating BESS corresponding to the tested SOC; e) The thermal runaway initiation method used; f) Diagram and dimensions of the test setup including location of the initiating and target BESS units, and the locations of walls and ceilings; g) Location of initiating module within the BESS unit; h) Separation distances from the initiating BESS unit to (e.g. distances A and C in Figure 10.1); i) Separation distances from the initiating BESS unit to target BESS units (e.g. distances D and E in Figure 10.1); j) Distances of the flame indicator (if used) with respect to the BESS (e. g. distances A and B in Figure 10.2); k) Maximum temperature at the ceiling; l) Distance of fire spread within the flame indicator; m) The maximum wall surface and target BESS unit temperatures achieved during the test and the location of the measuring thermocouple; n) The maximum incident heat flux on target wall surfaces and target BESS units; o) Voltages of initiating BESS; p) Total number of sprinklers that operated and length of time the sprinklers operated during the test; q) Gas generation and composition data, if measured; r) Observation of flaming outside of the test room s) Observation of flying debris or explosive discharge of gases; t) Observation of re-ignition(s) from thermal runaway events; u) Observations of the damage to: 1) The initiating BESS unit; 2) Target BESS units; and 3) Adjacent walls; v) Photos and video of the test; w) Fire protection features/detection/suppression systems within unit; and x) Sprinkler K-factor, RTI, manufacturer and model, number of sprinklers and layout		N/A
10.5	Performance – Test method 1 – Effectiveness of sprinklers		N/A

ANSI/CAN/UL 9540A:2019			
Clause	Requirement – Test	Result – Remark	Verdict
10.5.1	For BESS units intended for installation in locations with combustible construction, surface temperature measurements along instrumented wall surfaces shall not exceed a temperature rise of 97°C		N/A
10.5.2	The surface temperature of modules within the BESS units adjacent to the initiating BESS unit shall not exceed the temperature at which thermally initiated cell venting occurs		N/A
10.5.3	The fire spread on the cables in the flame indicator shall not extend horizontally beyond the initiating BESS enclosure dimensions		N/A
10.5.4	There shall be no flaming outside the test room.		N/A
10.5.5	There is no observation of detonation.		N/A
10.5.6	Heat flux in the center of the accessible means of egress shall not exceed 1.3 kW/m ² .		N/A
10.5.7	There shall be no observation of re-ignition within the initiating unit after the installation test		N/A
10.5.8	An installation level test that does not meet the applicable performance criteria noted above is considered noncompliant and would need to be revised and retested		N/A
10.6	Test method 2 – Effectiveness of fire protection plan		N/A
10.6.1	The test method 2 test set-up and test procedures are identical to that in 10.3, except instead of the sprinkler system set up of 10.3.2, the room shall be fitted with the specified fire protection		N/A
10.7	Installation level test report – Test method 2 – Effectiveness of fire protection plan		N/A
10.7.1	The report on installation level testing shall include the following:		N/A
	a) The report information in 10.4.1 items (a) – (u), and (v) if applicable; b) Fire protection features/detection/suppression systems within installation; and c) Length of time of operation of the clean agent, or other suppression system in addition to any sprinklers used.		N/A
10.8	Performance – Test method 2 – Effectiveness of fire protection plan		N/A
10.8.1	See 10.5 for performance criteria		N/A

ANNEX A	Test Concepts And Application Of Test Results To Installations	INFORMATIVE	
A2.1	General		N/A
A2.2	Cell level testing		N/A

Report No. 32072059.002

A2.2.2	Cell level testing performed on the cells used within a BESS module establishes a base line fire test performance that can be evaluated against the fire performance of other battery cells the BESS manufacturer may choose to use within the unit's modules.	Panasonic NCR2170D cell provides a baseline fire test performance (Report 32082976.001). LG INR21700M48F cell has been tested (Report 32073357.001) and evaluated to the baseline fire performance data (Reference table below)	P
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Parameter	Panasonic NCR2170D	LG INR21700M48F
Type	Li ion	Li ion
Form factor	Cylindrical	Cylindrical
Diameter	21+/-0.12mm	21.16mm
Height	70+/-0.25mm	70.15mm
Rated Capacity	3930mAh	4600mAh
Nominal Voltage	3.6V	3.67V
Upper Limit charging voltage	4.2V	4.2V
Cell vent temperature	138.9C	207.5C
Thermal runaway temperature	242.7C	324.4C
LFL by vol%	6.04%	11%
Burning velocity	63.528cm/s	9.758cm/s
Pmax	5.71bar	6.01bar

ANNEX B	Safety Recommendations for Testing	INFORMATIVE	
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Figure 1. Site layout

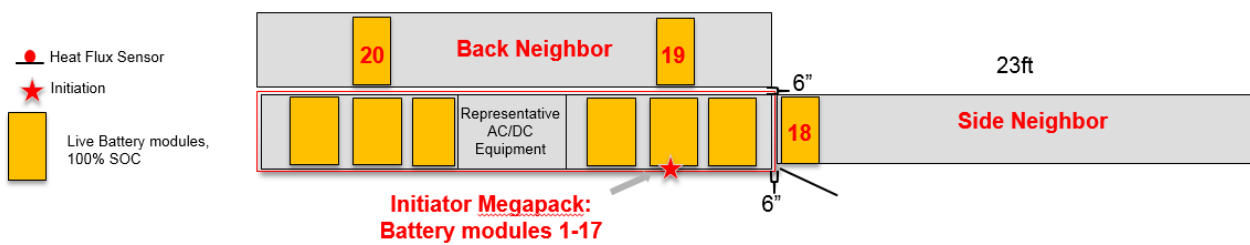


Figure 2. Test enclosure layout

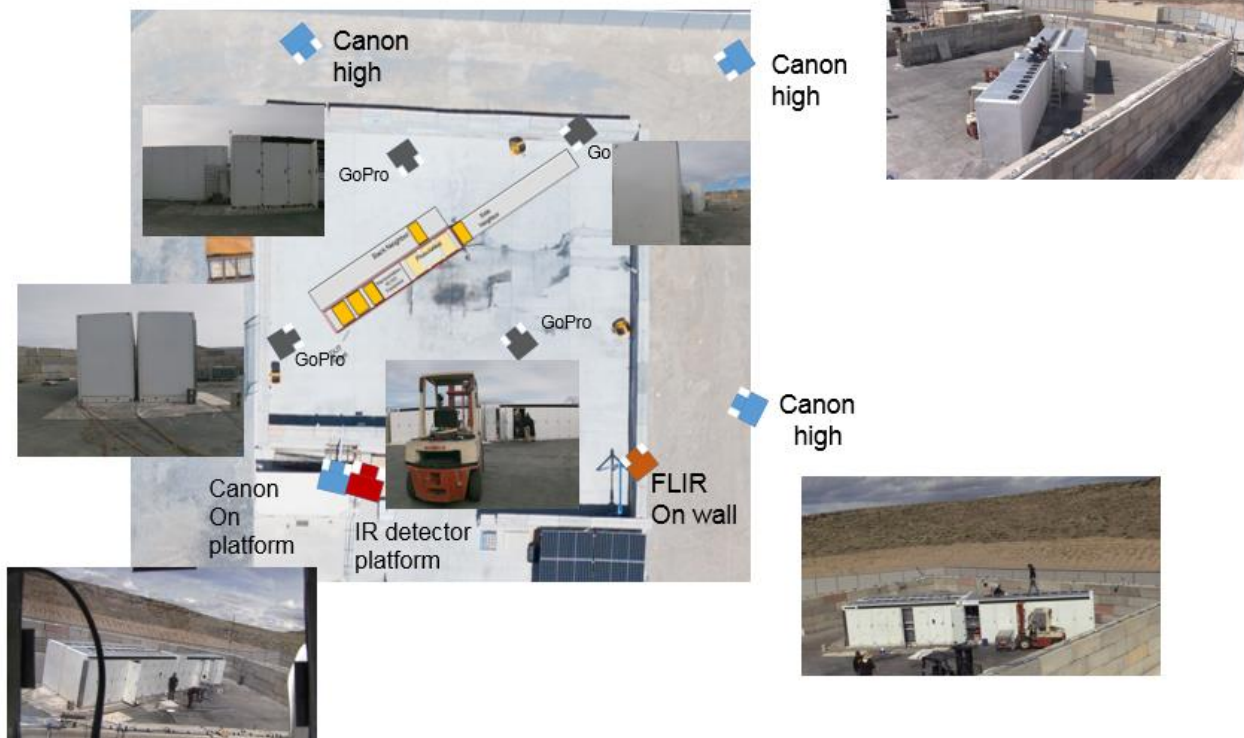
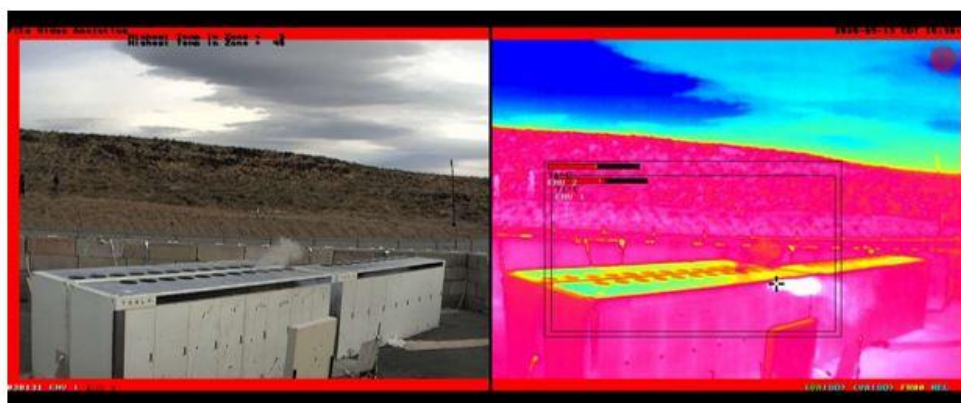


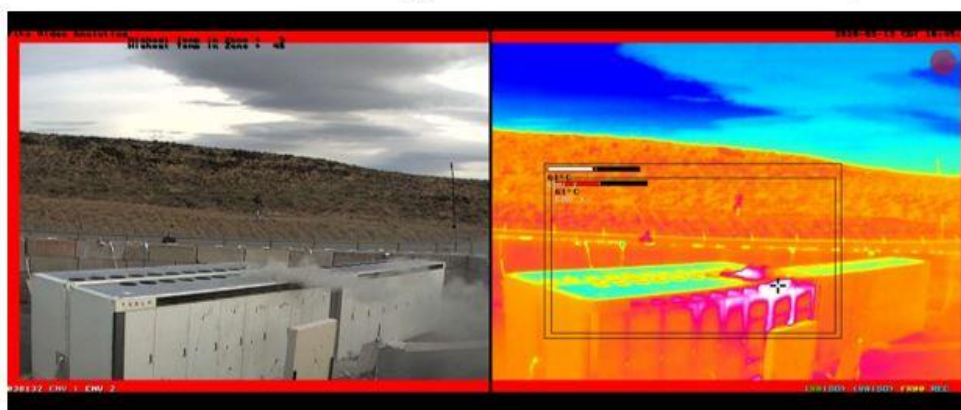
Figure 3. Camera and IR detector layout and view



Figure 4. White smoke indication



First alarm - 60 C trigger 38 seconds after first runaway



Second alarm - 60 C trigger 7 minutes 47 seconds after first alarm

Figure 5. IR detector alarm



Figure 6. Peak reaction rate site photo



Figure 7. End of test site photo

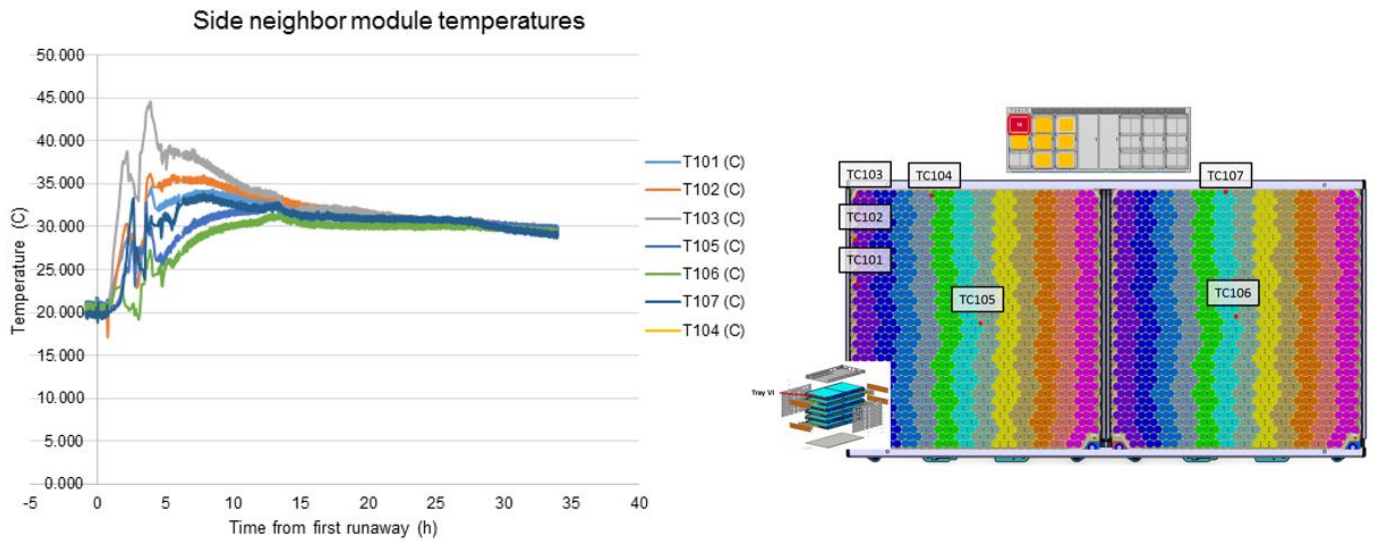


Figure 8. Side neighbor temperature result

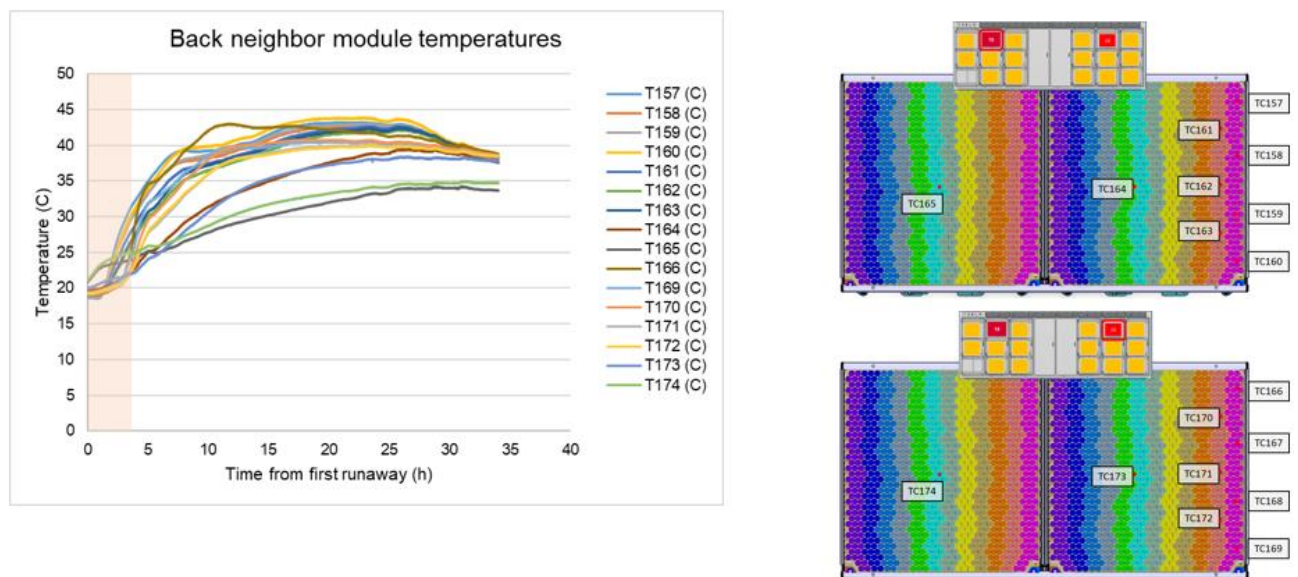


Figure 9. Back neighbor temperature result

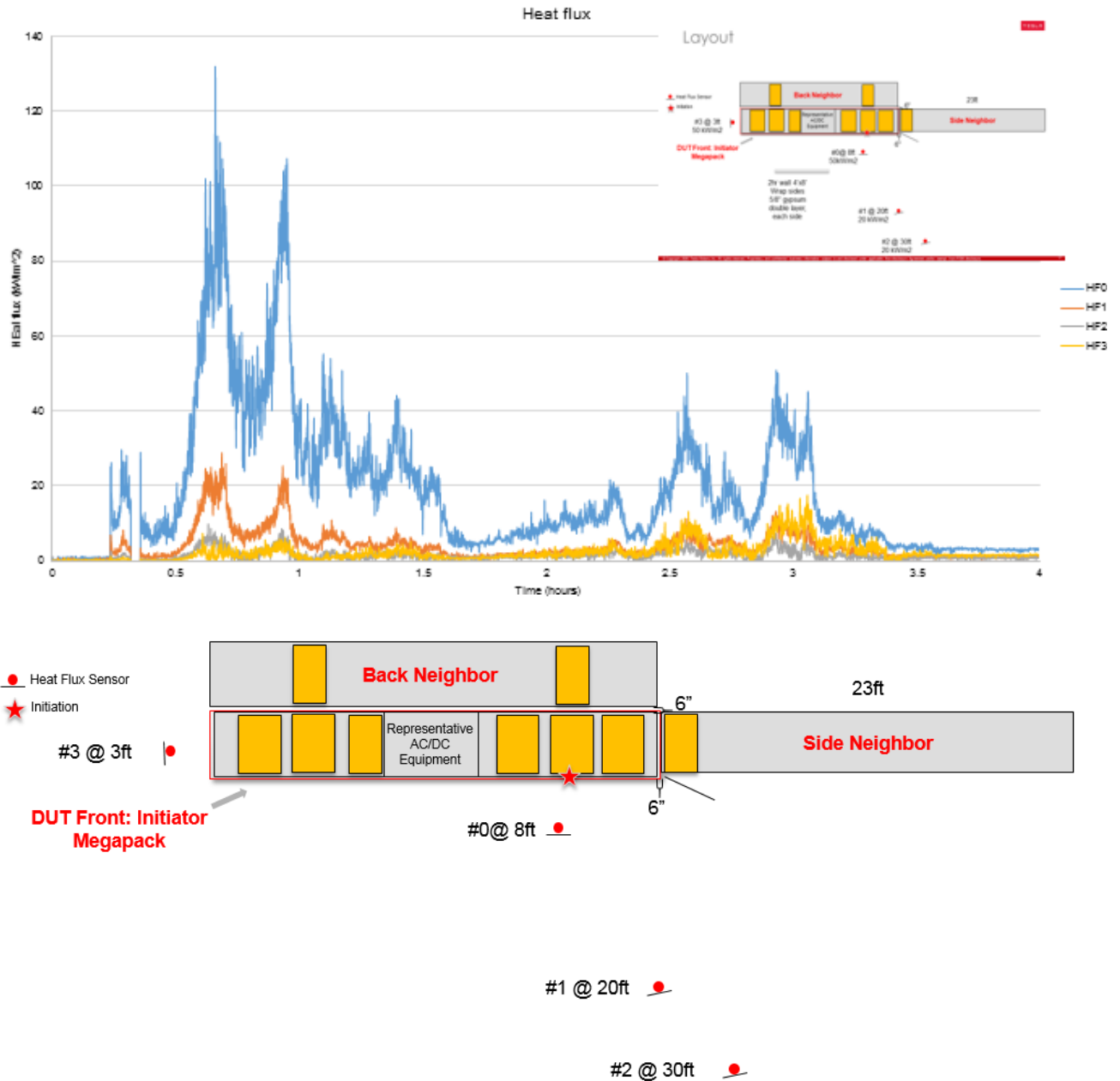


Figure 10. Heat flux results

Table 1. Test results per Clause 9.7

#	Items	Description
a)	Unit manufacturer name and model number (and whether UL 9540 compliant);	Tesla Megapack - 1462965
b)	Number of modules in the initiating BESS unit;	12 modules in a Battery assembly. Maximum 17 Battery assemblies in Megapack. 12 X 17 = 204
c)	The critical construction of the initiating BESS unit per 5.3;	UL 9540 compliant. Refer to TUV certificate CU 72200868
d)	Fire protection features/detection/suppression systems within unit;	Optional signal
e)	Module voltage(s) corresponding to the tested SOC;	100% SOC measured 4.1 V per brick (parallel connection of cells). 9 bricks in series in a module. 9 X 4.1V = 36.9V
f)	The thermal runaway initiation method used;	Heating of 27 cells simultaneously.
g)	Location of the initiating module within the BESS unit;	Initiator Megapack Battery assembly 72
h)	Diagram and dimensions of the test setup including mounting location of the initiating and target BESS units, and the locations of walls, ceilings, and soffits;	6 inches from ISO knuckle of Initiating unit to Target unit. 4 inches from surface of initiating unit to target unit surface; wall – N/A
i)	Observation of any flaming outside the initiating BESS enclosure;	Yes. 10-12 ft upwards and 8-10 ft in front of the unit.
j)	Chemical and convective heat release rate versus time data;	N/A
k)	Separation distances from the initiating BESS unit to target walls (e.g. distances A and C in Figure 9.1);	N/A
l)	Separation distances from the initiating BESS unit to target BESS units (e.g. distances D and H in Figure 9.1);	6 inches from ISO knuckle of Initiating unit to Target unit. 4 inches from surface of initiating unit to target unit surface
m)	The maximum wall surface and target BESS temperatures achieved during the test and the location of the measuring thermocouple;	Back neighbor Module: 43.9 C at location 19 Side neighbor module: 44.5 C at location 18 Wall surface: N/A
n)	The maximum ceiling or soffit surface temperatures achieved during the indoor or outdoor wall mounted test and the location of the measuring thermocouple;	N/A
o)	The maximum incident heat flux on target wall surfaces and target BESS units;	17.5 kW/m ² at 3 ft to left
p)	The maximum incident heat flux on target ceiling or soffit surfaces achieved during the indoor or outdoor wall mounted test;	N/A
q)	Gas generation and composition data;	N/A
r)	Peak smoke release rate and total smoke release data;	N/A
s)	Indication of the activation of integral fire protection systems and if activated the time into the test at which activation occurred;	N/A
t)	Observation of flying debris or explosive discharge of gases;	None observed

u)	Observation of re-ignition(s) from thermal runaway events;	None observed
v)	Observation(s) of sparks, electrical arcs, or other electrical events;	None observed
w)	Observations of the damage to: 1) The initiating BESS unit; 2) Target BESS units; and 3) Adjacent walls	1. Initiator internally fully consumed. All damage contained within the enclosure. 2. Back neighbor had some signs of fans and paint degradation. Side neighbor had some aesthetic degradation on the top left corner. 3. N/A
x)	Photos and video of the test	Attached

- End of Report -



412 King Street Newcastle NSW 2305. ABN 67129348842 0249294926

PHOTO MONTAGES - STEEL RIVER BATTERY STORAGE FACILITY
prepared for:

EDIFY ENERGY & PRECINCT CAPITAL

Rev 04 - 03.05.2022

Methodology

Visual impact assessment is concerned with changes to the physical landscape in terms of features/ elements that may give rise to changes in character. Visual appraisal is concerned with the changes that arise in the composition of available views as a result of changes to the landscape, people's responses to the changes and to the overall effects on visual amenity. Changes may result in adverse (negative) or beneficial (positive) effects.

The nature of landscape and visual assessment requires both objective analysis and subjective professional judgement. Accordingly, the following assessment is based on the best practice guidance listed above, information and data analysis techniques, uses subjective professional judgement.

A number of potential viewpoints were assessed for inclusion. Due to local topography, existing vegetation and existing road alignment the proposal would only have visual effect upon those areas within or immediately adjacent to the site, and only experienced by road users for a very short period of time as they drive south east along Maitland Rd.

Viewpoint – Maitland Rd

The impact on road users travelling south east on Maitland Rd is minimal due to the following:

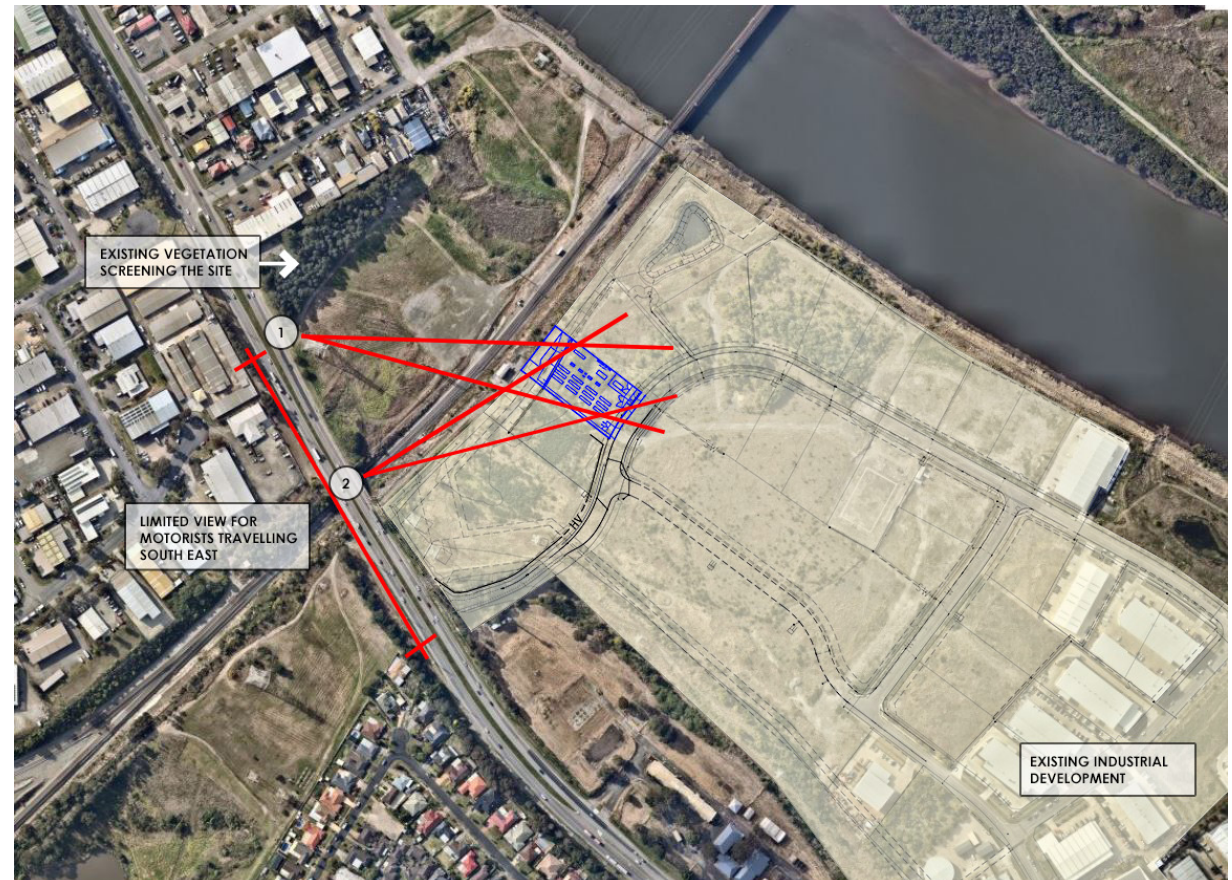
- Visual access into the site is minimal due to the limited extent and short exposure of the site
- The site is part of a larger industrial subdivision which has been partially developed with large warehouses, workshops and office buildings. When considering the scale of the existing development this proposal presents as a non intrusive, low scale development in keeping with the industrial precinct.
- While there are some limitations to the amount of screening vegetation provided due to a fire safety risk assessment, a number of trees have been proposed along the southern and eastern boundaries to effectively screen where possible.

NOTE:

The site will not be visible to motorists travelling north west due to the topography of Maitland Rd and major transmission towers frosting Maitland Rd.

Viewpoint – Riverside Drive (Within development)

The impact on users within the subdivision will be limited due to the relatively low scale of development when comparing it to the existing development. Refer to perspective views prepared by GCA as part of their DA submission.





VIEWPOINT 1 - Highlighted in red to identify the extent of the proposed development with no visual screening



VIEWPOINT 1 - Proposed development with accurate colour scheme and new planting



VIEWPOINT 1 - Proposed development with accurate colour scheme and mature planting



VIEWPOINT 2 - Highlighted in red to identify the extent of the proposed development with no visual screening



VIEWPOINT 2 - Proposed development with accurate colour scheme and new planting



VIEWPOINT 2 - Proposed development with accurate colour scheme and mature planting



Doc. No: 202064-9064

Noise Impact Assessment Proposed Battery Storage Facility Steel River, Mayfield West, NSW

Prepared for:

Precinct Capital Pty Ltd
Level 1, 2 Barrack Street
Sydney NSW 2000

Author:

.....
Neil Pennington
B.Sc., B. Math.(Hons), MAIP, MAAS, MASA
Principal / Director

May 2022

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1.0 INTRODUCTION

1.1 The Proposal

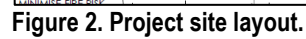
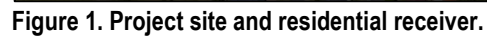
Spectrum Acoustics Pty Limited (Spectrum) has been engaged by Precinct Capital Pty Ltd to conduct a noise impact assessment for a proposed battery storage facility in the Steel River industrial estate Mayfield West, NSW. The proposal is to construct and operate a 28MW two-hour duration advanced lithium ion battery energy storage facility to be known as the Steel River Battery.

The project Traffic Noise Impact assessment advises there will be approximately 90 truck movements will occur throughout the approximately three-month construction phase. During the delivery of the battery cells and racks, approximately 20 of the truck movements will occur in the space of a couple of days, during the peak of construction. It is understood that truck movements would occur during normal daytime hours of 7am – 6pm Monday to Friday and 8am to 1pm on Saturdays. The project site and nearest residential receiver are shown in **Figure 1**. The proposed site layout is shown in **Figure 2**.

2.0 DESCRIPTION OF TERMS

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

TABLE 1 DEFINITION OF ACOUSTICAL TERMS	
Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.



3.0 NOISE CRITERIA

3.1 Operational Noise

Section 3.13.07 of the Newcastle LEP 2012 requires that noise emissions from within the Steel River site must comply with noise emission criteria as contained in Part d, Section 8.4.2 of the Steel River Strategic Impact Assessment Study (SIAS, 1998) as follows:

Zone	Day-Time dB(A)	Night-Time dB(A)
2(a) 1 Residential on a main road or near an industrial area	$L_{A10} = 48$	$L_{A10} = 30$ $L_{A1} = 55$
2(a) Residential	$L_{A10} = 42$	$L_{A10} = 30$ $L_{A1} = 49$
4(b) General Industrial	$L_{A10} = 65$	$L_{A10} = 65$
5(a) Special Uses (Church, School)	$L_{A10} = 48$	NA
5(b), (c) and (e) (Railway, Road)	$L_{A10} = 65$	$L_{A10} = 65$
6(a) Open Space and Recreation	$L_{A10} = 50$	$L_{A10} = 40$ $L_{A1} = 50$
3(d) Commercial	$L_{A10} = 50$	$L_{A10} = 40$ $L_{A1} = 50$

The assessed residential receiver is in Zone 2(a) 1 as shown in Figure 1. There are Zone 2(a) receivers at greater distance from the site but these will be fully shielded by the intervening Zone 2(a) 1 receivers and noise levels will be negligible. The most stringent night time criterion will be adopted in this assessment and this applies at all residential receivers. Compliance with a criterion at the nearest, most potentially impacted receiver implies compliance at all receivers, Noise criteria at general industrial receivers is 65 dB(A), L_{10} at any time.

3.2 Construction Noise

There are no construction noise criteria nominated in the SIAS but in current methodology applied by the EPA in the Interim Construction Noise Guideline, construction noise is typically limited to 5 dB greater than operational noise criteria. Based on the operational noise criteria in the SIAS table above, daytime construction noise criteria have been adopted as follows:

Residential receiver: 53 dB(A), L_{10}
Industrial receiver: 70 dB(A), L_{10}

3.3 Vehicle Noise

In NSW, noise from vehicle movements associated with an industrial source is assessed in terms of the INP if the vehicles are not on a public road. If the vehicles are on a public road, the NSW *Road Noise Policy* (RNP) applies. Noise from the proposal must, therefore, be assessed against the project specific noise goals of the INP and also the criteria in the RNP.

The RNP recommends various criteria based on the functional categories of roads applied by the Roads and Traffic Authority (RTA). The RTA differentiates roads based on a number of factors including traffic volume, heavy vehicle use, through or local traffic, vehicle speeds and applicable traffic management options. Vehicles accessing the site will do so via Industrial Drive.

Table 2 below shows the noise criteria relevant to traffic on various road types extracted from Table 1 of the RNP. For the assessment of traffic noise, the day time period is from 7am to 10pm, whilst night is from 10pm to 7am.

TABLE 2 ROAD TRAFFIC NOISE CRITERIA		
Situation	Recommended Criteria	
	Day (7am to 10pm)	Night* (10pm to 7am)
3. Existing residences affected by additional traffic on existing arterial roads generated by land use developments	Leq (1hr) 60 (external)	Leq (1hr) 55 (external)

* Heavy vehicle movements would only occur during daytime hours so the night criterion is not applicable.

Application notes accompanying the RNP also state that “...for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.”

The site adjoins Industrial Drive which is the major heavy vehicle thoroughfare in Newcastle. The project would generate only small numbers of vehicle movements. The proponent has advised that at the peak of the construction phase there could be up to 20 heavy vehicles visit the site in a period of a few days. This is insignificant compared to the existing traffic volume and the 2 dB maximum allowable increase in traffic noise corresponds to a 50% increase in the total traffic volume and further assessment of traffic noise is not warranted.

4.0 ASSESSMENT METHODOLOGY

4.1 Source sound power levels

Confidential sound power test results proprietary to a modular system supplier were provided to inform the noise impact assessment and are suggested as indicative across a range of battery enclosure types supplied by other tier 1 vendors in the market. Under conditions that would occur for well over 95% of the time, mainly being temperatures less than 40°C, the sound power level of a typical cabinet unit, indicated in Figure 2 as a battery rack, is 84 dB(A). The sound power level was established using acoustic intensity measurements on top of the unit where fans discharge air (and noise) vertically. A correction of -5 dB has been applied for calculation of propagation in a horizontal plane to the assessed residential receiver. There would be twelve of these units.

There are two options proposed for the battery units: modular cubical cabinets and containerised modules. The data provided are for the modular units. There are no measurements for the containerised option, but it can be reasonably assumed that these would be quieter by an unknown amount. This assessment considers the modular units as a worst case for noise emissions.

The other significant noise sources are four transformers shown in Figure 2. These would be of the oil distribution type and data provided by the Proponent for another of their sites suggests a sound power level of 81 dB(A).

Construction activities would not involve major earthworks, pile driving, extensive multi-level concrete pouring or any of the known major sources of construction noise. At most, there would be civil works to provide service connections and delivery of equipment and materials to site and manoeuvring of this equipment with a crane. As such, the assessment of construction noise considers a small excavator and a Franna crane or similar both working at a location nominally near the centre of the proposal footprint. Both of these plant items have a sound power level in the order of 90 dB(A).

4.2 Noise calculation

Sound pressure levels at the nearest receiver were calculated based on the layout of machinery as shown in Figure 2 and the following factors:

- Hemispherical distance loss
- Shielding effects from other plant items
- Directivity from vertical discharge to horizontal propagation
- Atmospheric absorption for nominal 70% relative humidity, and
- Ground effects for packed earth and intervening stand of trees.

These factors are accounted for in our in-house spreadsheets based on reputable acoustics textbooks.

5.0 RESULTS AND DISCUSSION

5.1 Construction Noise

Considering the combined construction sound power level of 93 dB(A) as discussed in Section 4.1 and distances of approximately 50m and 300m to the nearest industrial and residential receivers respectively, the calculated sound pressure levels are:

Industrial receiver: 64 dB(A) (Criterion 70 dB(A))
Residential receiver: 46 dB

These predicted levels are at least 5 dB below the adopted construction noise criteria. As such, construction noise will not be significant enough to require the preparation of a Construction Noise Management Plan (CNMP).

5.2 Operational Noise

The calculated cumulative noise level at receiver R1 from all noise sources indicated in Figure 2 is 24 dB(A), Leq. Assuming constant operation for a 15-minute assessment period, this will equal the LA10 level. The predicted level is well below the SIAS criteria of 48 dB(A) (day) and 30 dB(A) (night). Being considered as a constant noise source implies no exceedance of the 55 dB(A), L1 sleep disturbance criterion.

5.3 Traffic Noise

It was found in Section 3.3 that traffic related noise had insignificant potential for adverse noise impacts and the relevant noise criteria would be easily achieved.

6.0 SUMMARY

A noise impact assessment of a proposed battery storage facility in the Steel River industrial estate Mayfield West, NSW has been conducted.

The study has found no exceedance of daytime off-site traffic noise criteria, construction or operational noise criteria at any industrial or residential receiver.

Based on these findings, it is recommended that the project may proceed without the need for targeted noise monitoring.

Precinct Capital

Steel River BESS Obtrusive Lighting Report

17th May 2022



C106/215 Pacific Hwy CHARLESTOWN NSW
810 Pacific Hwy GORDON NSW
PO BOX 278 CHARLESTOWN NSW 2290
t: **1300 732 293** f: (02) 4923 8199
e: office@powersol.com.au

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1 EXECUTIVE SUMMARY

Power Solutions was commissioned by Precinct Capital to assess the proposed lighting for the Steel River BESS and the surrounding area against the Australian lighting standard AS4282: Control of the obtrusive effects of outdoor lighting.

The proposed lighting layout for the Steel River BESS was found to be **compliant** with Australian Standard AS4282.

2 APPLICABLE STANDARDS

2.1 Australian Lighting Standard – Environmental Zone

Table 3.1 of AS2482 specifies the lighting environmental for the area:

TABLE 3.1
ENVIRONMENTAL ZONES

Zones	Description	Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA Dark Sky Parks. Major optical observatories No road lighting -unless specifically required by the road controlling authority
A1	Dark	Relatively uninhabited rural areas No road lighting - unless specifically required by the road controlling authority
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas
A3	Medium district brightness	Suburban areas in towns and cities
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas
TV	High district brightness	Vicinity of major sports stadium during TV broadcasts
V	Residences near traffic routes	Refer AS/NZS1158.1.1
R1	Residences near local roads with significant setback	Refer AS/NZS 1158.3.1
R2	Residences near local roads	Refer AS/NZS 1158.3.1
R3	Residences near a roundabout or local area traffic management device	Refer AS/NZS 1158.3.1
RX	Residences near a pedestrian crossing	Refer AS/NZS 1158.4

NOTE: Recreational areas are not considered commercial.

Based on the table above and the surrounding area, **zone 'A3'** has been used for this study.

Following on, Table 3.2 and 3.3 provide the maximum lighting values for the environmental zone:

TABLE 3.2
MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS

Zones	Vertical illuminance levels (E_v) lx		Threshold increment (TI)		Sky glow
	Non-curfew	Curfew	%	Default adaptation level (L_{ad})	Upward light ratio
A0	See Note 1	0	N/A	N/A	0
A1	2	0.1	N/A	N/A	0
A2	5	1	20%	0.2	0.01
A3	10	2	20%	1	0.02
A4	25	5	20%	5	0.03
TV	See Table 3.4	N/A	20%	10	0.08
V	N/A	4	Note 2	Note 2	Note 2
R1	N/A	1	20%	0.1	Note 3
R2	N/A	2	20%	0.1	Note 3
R3	N/A	4	20%	0.1	Note 3
RX	N/A	4	20%	5	Note 4

NOTES:

- 1 For A0, E_v shall be as close to zero as practicable without impacting safety considerations.
- 2 Refer to AS/NZS 1158.1.1.
- 3 Refer to AS/NZS 1158.3.1.
- 4 Refer to AS/NZS 1158.4.
- 5 N/A means 'Not Applicable'.
- 6 For an internally illuminated sign in an A2 zone, $L_{ad} \leq 0.25$ cd/m².

TABLE 3.3
MAXIMUM LUMINOUS INTENSITIES PER LUMINAIRE

Zone	Luminous intensity (I), cd		
	Non-curfew L1	Non-curfew L2	Curfew
A0	See Note	See Note	0
A1	2 500	5 000	500
A2	7 500	12 500	1 000
A3	12 500	25 000	2 500
A4	25 000	50 000	2 500
TV	100 000	150 000	0

NOTE: For A0, I shall be as close to zero as practicable without impacting safety considerations.

3 OBTRUSIVE LIGHTING MODEL

3.1 Australian Lighting Standard – Illuminance Calculation

Section 3.3.1.2 and 3.3.1.4 state the requirements for the illuminance calculation:

3.3.1.2 *Calculation of illuminance in a vertical plane (E_v)*

Limiting values are for the direct component of illuminance only. The illuminance calculations shall be made for a grid of points in the relevant vertical plane as described in Clause 3.3.1.3. The points shall be spaced at not more than 5 m horizontally, and 1 m vertically, unless there is a luminaire/s within 20 m of the vertical plane, then the points shall be spaced at not more than 2 m horizontally, and 1 m vertically.

3.3.1.4 *Height of the vertical calculation points*

The height of the points in the vertical plane shall be as follows (see Figure 3.2):

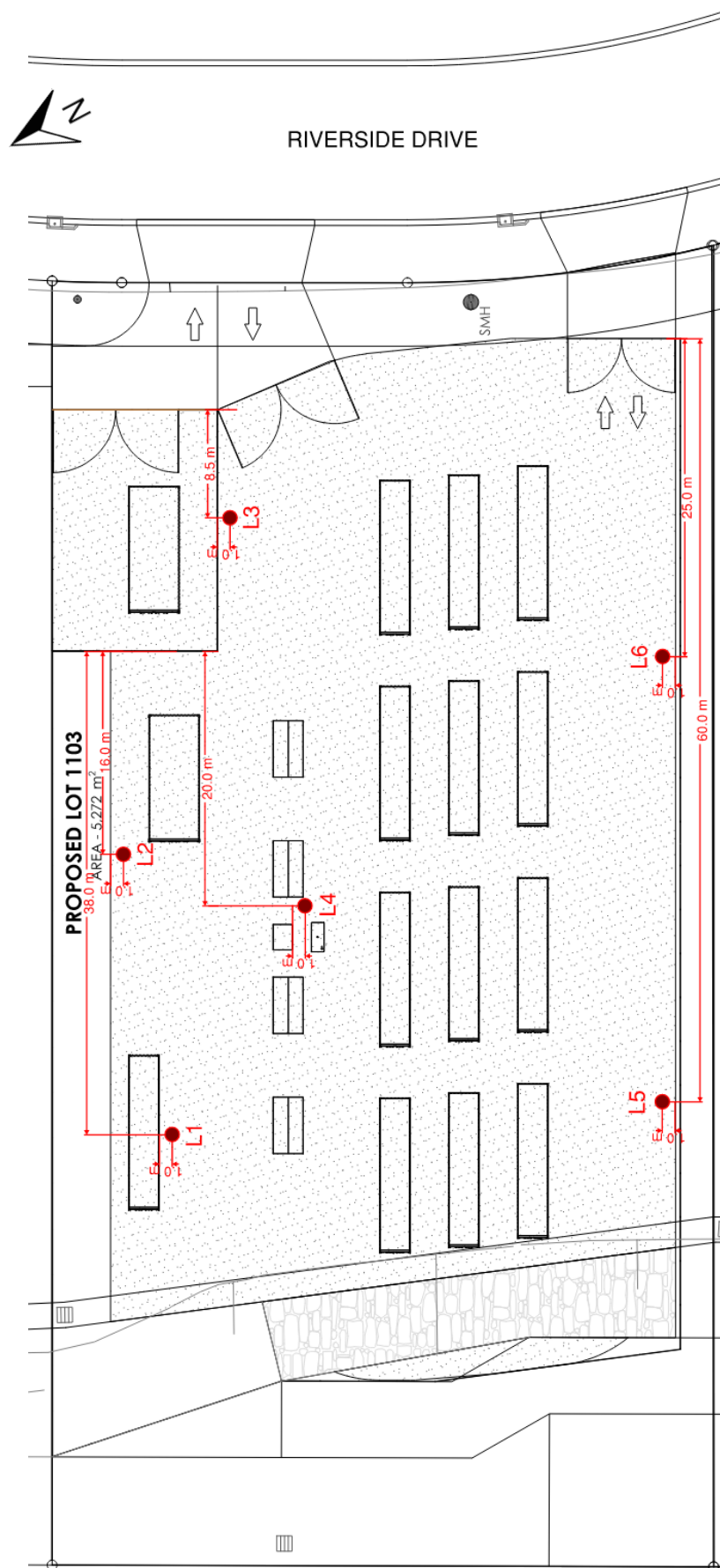
- (a) Where the calculation plane is along a building line of an existing building, the highest calculation points shall be taken to be the top of the highest window of the habitable rooms. The lowest calculation points shall be taken to be the bottom of the lowest window of the habitable rooms.
- (b) Where the calculation plane is along a boundary with a minimum dwelling or other setback, the highest calculation points shall be taken to be the maximum building height permitted by the land use zoning provisions. The lowest calculation point shall be 1.5 m or less above ground level. Where there is no maximum building height in the zoning the highest calculation point shall be equal to the height of the highest luminaire subject to analysis.

As there is no existing properties around the development, a setback of 6m (the closest any future building can be built) was used for the lighting assessment. The proposed luminaires are 6.5m high and there are no existing buildings around the site. To account for any future developments in the area, a vertical height of 10m was assumed for the calculation grid.

3.2 Luminaires Used

For this site, steel columns with a 6.5m height and 2m outreach were used (Ausgrid standard component – Stockcode 100115). The luminaires were Aldridge 17W LED RRW with Glare Shields fitted to reduce light spill (Ausgrid standard component – Stockcode 185760).

Luminaires were placed at the following locations:



4 CALCULATION RESULTS

From AGi32, the lighting arrangement was found to be in compliance with AS 4282 for environmental zone A3:

Obtrusive Light - Compliance Test

Test Parameters:

Standard: AS/NZS 4282:2019 Lighting Zone: A3 - Medium District Brightness Application Conditions: Curfew

Description: AS/NZS 4282:2019, A3 - Medium District Brightness, Curfew

☒ Illuminance: 2 Lux

☐ Luminous Intensity Per Luminaire: Show All Luminaires

Controlling Angle:

☒ Luminous Intensity At Vertical Planes: 2500 Cd

☐ Threshold Increment (TI): 20 %

☐ Veiling Luminance:

☐ Total Offsite Lumens: % Of Total Site Lumen Limit

Allowed Lumens Per Area: 0

Allowed Base Lumens Per Site: 0

Additional Allowance: 0 % Allowance Worksheet...

☒ Upward Waste Light Ratio (UWLR): 2

☐ Upward Flux Ratio: Worksheet

Run Test Close Help Print

Test Results

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Curfew

Filename: Steel River Obtrusive Lighting - 16052022

17/05/2022 8:39:24 AM

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (4):

Calculation Label	Test Results	Max. Illum.
ObtrusiveLight_Ill_Seg1	PASS	0.04
ObtrusiveLight_Ill_Seg2	PASS	0.19
ObtrusiveLight_Ill_Seg3	PASS	0.09
ObtrusiveLight_Ill_Seg4	PASS	0.09

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 2500 Cd

Calculations Tested (4):

Calculation Label	Test Results
ObtrusiveLight_Cd_Seg1	PASS
ObtrusiveLight_Cd_Seg2	PASS
ObtrusiveLight_Cd_Seg3	PASS
ObtrusiveLight_Cd_Seg4	PASS

Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 2.0 %

Calculated UWLR: 0.5 %

Test Results: PASS

5 CONCLUSIONS

From AGi32, the lighting arrangement was found to be in compliance with AS4282 for environmental zone A3 and no changes to the lighting arrangement are required.

landscape development application

STEEL RIVER WEST PTY LTD

STEEL RIVER BATTERY STORAGE FACILITY

Proposed Lot 1103, Subdivision of Lot 12 DP 280089, RIVERSIDE DRIVE, MAYFIELD WEST.

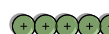
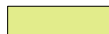
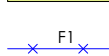


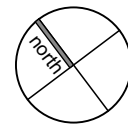
LANDSCAPE CONCEPT PLAN | L101

STEEL RIVER BATTERY STORAGE FACILITY

SITE AREA: 5272 SQM
LANDSCAPED AREA: 1048 SQM
= 20% OF SITE (APPROX)

LEGEND

-  SMALL STREET TREE:
LAGERSTROEMIA INDICA.
-  NEW SMALL TREES:
AS SCHEDULED.
-  SCREEN PLANTING:
AS NOTED ON PLAN.
-  ACCENT PLANTS:
DORYANTHES.
-  MASS PLANTING:
AS NOTED ON PLAN.
-  GROUNDCOVER PLANTING:
AS NOTED ON PLAN.
-  HYDROSEEDING TO EASEMENTS.
-  NEW TURF
-  CHAINMESH FENCE WITH 3 STRANDS BARBED WIRE. 3M HIGH TOTAL.
-  SANDSTONE SPALLINGS:
50-150MM DIAMETER



J	4/5/22	FOR APPROVAL
I	26/4/22	RELOCATED SITE
H	27/5/21	FOR APPROVAL
G	26/5/21	FOR APPROVAL
F	24/5/21	FOR APPROVAL
E	19/5/21	FOR APPROVAL
D	16/12/20	FOR APPROVAL
C	26/11/20	FOR APPROVAL
B	19/11/20	CLIENT REVIEW
A	13/11/20	PRELIMINARY FOR REVIEW
REV	DATE	COMMENTS

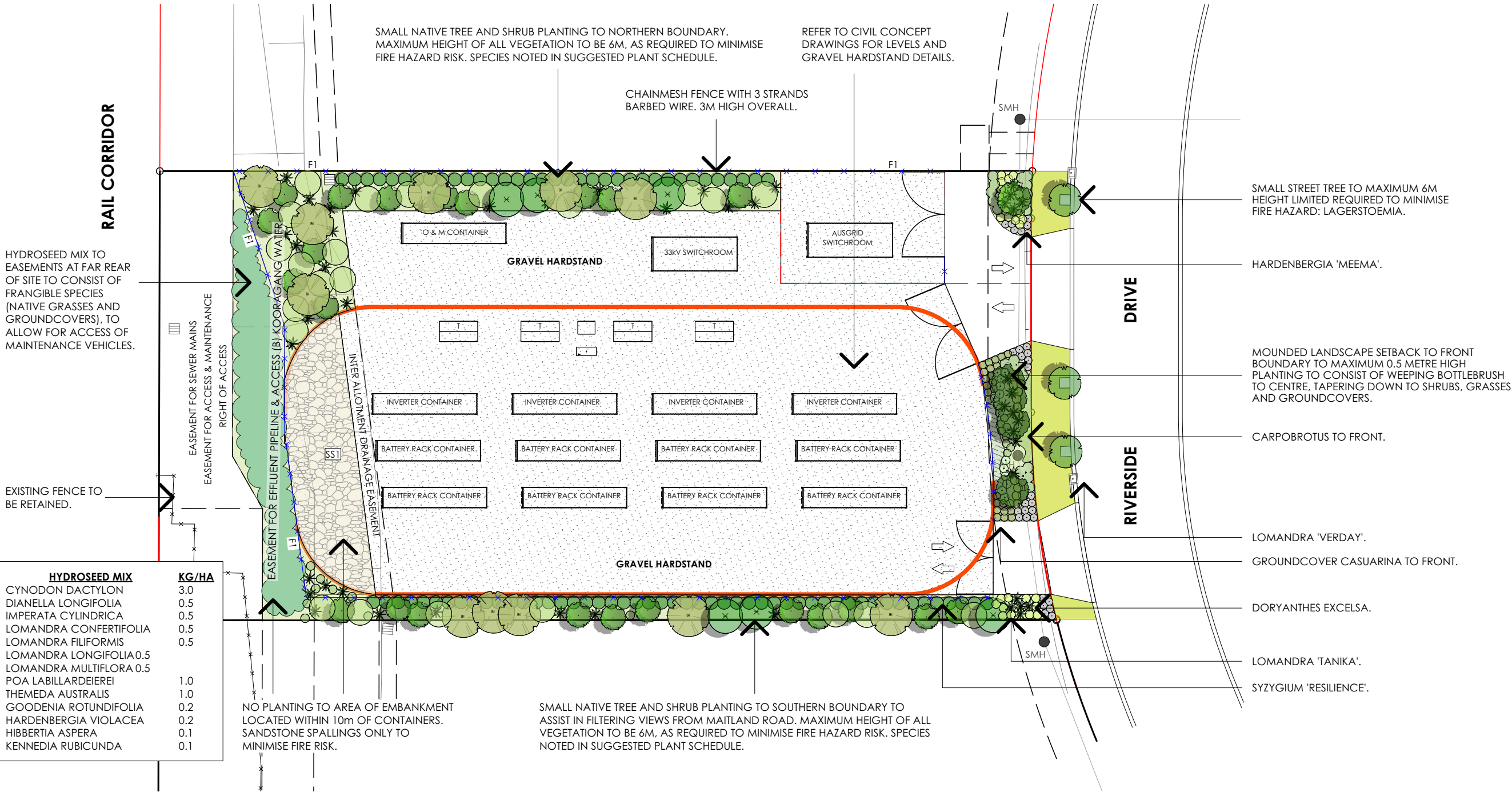
PROJECT:
STEEL RIVER BATTERY STORAGE FACILITY

SITE:
**Proposed Lot 1103,
Subdivision of Lot 12 DP
280089, RIVERSIDE DRIVE,
MAYFIELD WEST.
STEEL RIVER WEST PTY LTD**

13360.5-SRBSF-DA-REV J.vwx 4/5/22

DRAWN: DATE: SCALE:
KM/ GF 13.11.2020 1:500@A3

JOB NUMBER: PHASE: DWG No: REV:
13360.5 DA L101 J



PLANT PALETTE | L102

STEEL RIVER BATTERY STORAGE FACILITY



Lagerstroemia 'Natchez'



Callistemon 'Dawson River Weeper'



Banksia integrifolia



Syzygium 'Resilience'



Casuarina 'Cousin It'



Doryanthes excelsa



Lomandra 'Tanika'



Westringia 'Zena'



Hardenbergia 'Meema'



Myoporum parvifolium



Carpobrotus glaucescens

PLANT SCHEDULE			
ID	COMMON NAME	BOTANICAL NAME	POT SIZE
Trees			
Bl	Coastal Banksia	Banksia integrifolia	25 Litre
CA	Black Wattle	Callicoma serratifolia	25 Litre
CD	Weeping Bottlebrush	Callistemon 'Dawson River Weeper'	75 Litre
LN	Crepe Myrtle	Lagerstroemia 'Natchez'	100 Litre
Shrubs			
Ba	Wallum Banksia	Banksia aemulea	25 Litre
Bo	Breynia	Breynia oblongifolia	5 Litre
Cb	Better John	Callistemon 'Better John'	5 Litre
Cs	Bottlebrush	Callistemon salignus	25 litre
De	Gymea Lily	Doryanthes excelsa	45 Litre
Sp	Pinnacle	Syzygium 'Pinnacle'	25 Litre
Sr	Resilience	Syzygium 'Resilience'	5 Litre
Ground Covers			
Cg	Pigface	Carpobrotus glaucescens	2.5 Litre
Cc	Cousin It	Casuarina 'Cousin It'	2.5 Litre
Hm	Meema	Hardenbergia 'Meema'	2.5 Litre
Mp	Spreading Myoporum	Myoporum parvifolium 'Fine Leaf Form'	2.5 Litre
Wm	Groundcover Coastal Rosemary	Westringia 'Mundi'	2.5 Litre
Grasses			
Lt	Dwarf Mat Rush	Lomandra 'Tanika'	2.5 Litre
Lv	Verday	Lomandra 'Verday'	2.5 litre

J	4/5/22	FOR APPROVAL
I	26/4/22	RELOCATED SITE
H	27/5/21	FOR APPROVAL
G	26/5/21	FOR APPROVAL
F	24/5/21	FOR APPROVAL
E	19/5/21	FOR APPROVAL
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C	26/11/20	FOR APPROVAL
B	19/11/20	CLIENT REVIEW
A	13/11/20	PRELIMINARY FOR REVIEW
REV	DATE	COMMENTS

PROJECT:
STEEL RIVER BATTERY STORAGE FACILITY

SITE:
Proposed Lot 1103, Subdivision of Lot 12 DP 280089, RIVERSIDE DRIVE, MAYFIELD WEST. STEEL RIVER WEST PTY LTD

13360.5-SRBSF-DA-REV J.vwx 4/5/22

DRAWN: DATE: SCALE:
KM/ GF 13.11.2020 @A3

JOB NUMBER: PHASE: DWG No: REV:
13360.5 DA L102 J



Statement of Heritage Impact

Proposed Battery Storage Facility
60 Riverside Drive MAYFIELD WEST
Lot 22 DP 280089

Eikos Environment and Heritage

ABN 1960 770 8340

4 May 2022

Production

Statement of Heritage Impact – Proposed Battery Storage 60 Riverside Drive Mayfield West
prepared by Eikos Environment and Heritage ABN 1960 770 8340
web: www.eikos.com.au

Prepared on behalf of

Joint Venture between Precinct Group (Contact James Allison 0287904044 james@precinctgroup.com.au)
and Edify Energy (Contact Patrick Dale 0487 177 136 Patrick.dale@edifyenergy.com).

Version: **Final Amended Report**

4 May 2022 © Eikos Environment and Heritage

Disclaimer: The recommendations outlined in this report have been provided in accordance with the *Newcastle Local Environment Plan 2012 (LEP)*, the *Development Control Plan (DCP) 2012* and the principles and articles outlined in the *Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013*. Eikos Environment and Heritage has exercised all due care and diligence in the compilation of this report. Eikos Environment and Heritage takes no responsibility for any damage or loss that may be experienced from the implementation of these measures.

Front Cover: Photo showing entrance to the Former Migrant Camp Site off Maitland Road, Mayfield

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1.0 INTRODUCTION

This Statement of Heritage Impact (SoHI) was originally prepared in October 2020 to accompany a Development Application for a proposed battery storage facility to be known as 'Steel River Battery'.

The initial location of the site for the facility was Lot 1102. It has now been moved north to adjoining Lot 1103. Precinct Capital Pty Ltd have engaged Eikos Environment and Heritage to amend the SoHI to reflect the new location (Figures 1 and 2).

The Battery Storage Facility is part of a staged development within the Steel River Business Park located at 60 Riverside Drive Mayfield West. The Facility will contain several storage containers housing 28MW two hour duration advanced lithium ion batteries.

This amended SoHI will review the proposal and assess any potential heritage impacts on the Former Migrant Camp located nearby (Fig. 3). It will address the requirements of the Newcastle Local Environment Plan 2012 (LEP) and relevant heritage legislation by considering the effects of the proposal on this State nominated heritage item.

This SoHI is consistent with the Australia International Council on Monuments and Sites (ICOMOS) Charter for Conservation of Places of Cultural Significance (Burra Charter) and has been prepared to assist in the consideration of the proposed development using the methodology outlined in *Statements of Heritage Impact*, Heritage Office/ Department of Urban Affairs and Planning, 1996, and *Conservation Areas*, published by the Heritage Office and department of Urban Affairs & Planning, 1996.

1.1 AUTHORSHIP

The author of this document is Trevor Cameron, Director at Eikos Environment and Heritage. It remains the property of Eikos Environment and Heritage and must not be reproduced without the consent of the author, unless for client and consent authority use.

1.2 BACKGROUND AND DESIGN DOCUMENTATION

Eikos conducted an initial site inspection at the site of the proposed Battery Storage Facility and the Former Migrant Camp on 22 October 2020 and prepared a SoHI to accompany a DA for the proposed Battery Storage Facility.

Eikos conducted a second site inspection on 22 November 2021 of the overall Steel River Business Park site and the Former Migrant Camp and prepared a SoHI to accompany a DA for the Masterplan for the site.

This amended SoHI is to accompany the DA for the Battery Storage Facility, given that its location has been moved north to adjacent Lot 1103 (Fig's 1 and 2). A description of the proposal and extracts of the plans are provided in Section 2.0 and 3.0 below.

Figure 1 - Location of the original site for proposed Battery Storage Facility (source ADW Johnson)



Figure 2 - Location of the proposed new site for the Battery Storage Facility (source: GCA Engineering Solutions)



Figure 3 - Location of the Former Migrant Camp on the ridge to the south-east of the site
(source: Sixmaps)



2.0 DESCRIPTION OF THE SITE

Lot 1103 is located within Steel River Business Park in the IN1 General Industrial Zone. The overall area of the Business Park is approximately 3.75ha. It is a highly disturbed and modified site previously used as a chitter dump. This material has been cleared and the site levelled with roadway construction including kerb and guttering, footpaths and street tree landscaping.

The Former Migrant Camp is visually separated from the proposed development due to its elevation above the site. Given its position it is highly unlikely that the proposed development will have any adverse impact either on the curtilage or the heritage significance of the Former Migrant Camp.

3.0 OVERVIEW OF PROPOSAL

The proposal is to construct a 28MW two hour duration advanced lithium ion battery energy storage facility as part of Steel River Business Park located in Mayfield, New South Wales.

Eikos is advised that the Project will connect to the local Ausgrid 33kV electrical distribution network and will provide benefits to the local electricity network as well as network services to the wider New South Wales grid. A summary of the main project details is provided in Table 1 below.

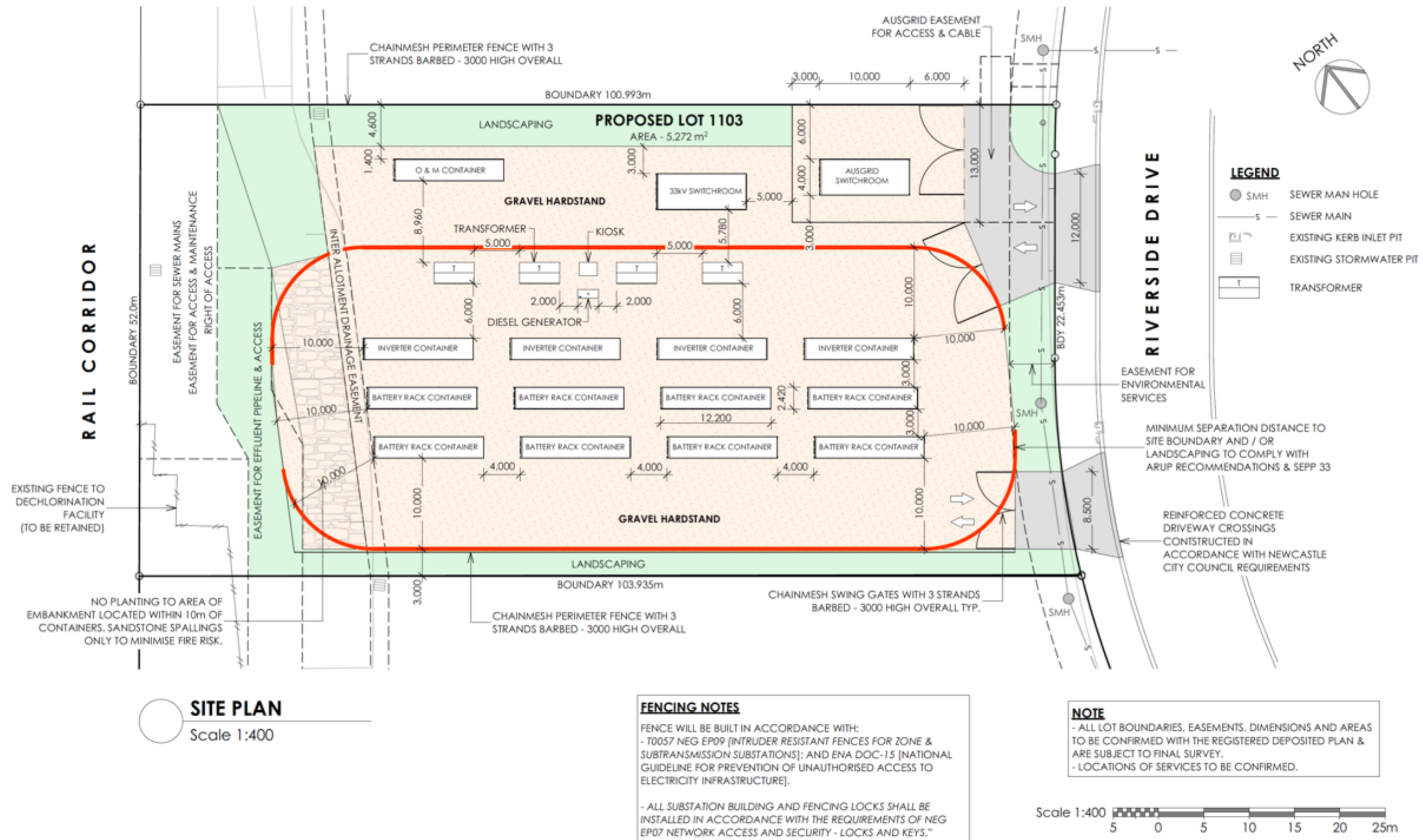
There are two design options proposed for the development. One option is for the construction of Battery Modules while the other is for Battery Containers (Fig 6). Eikos has assessed either option as acceptable from a heritage impact perspective.

Table 1 – Summary of Project Details

Project Detail	Description
Project Type	Stand-alone large scale battery storage connected to the National Electricity Market.
Electrical Connection	Ausgrid 33kV distribution network.
Battery Technology	Lithium ion battery system.
Battery Capacity	Up to 28MW.
Battery Configuration	Twelve (12) outdoor modular battery units or containerised battery system with ancillary balance of plant equipment.
Battery Storage Duration	2 hours.
Project Location	Approved Lot 1103 Riverside Drive, Mayfield West. Part of future Stage 11 of Steel River Estate.

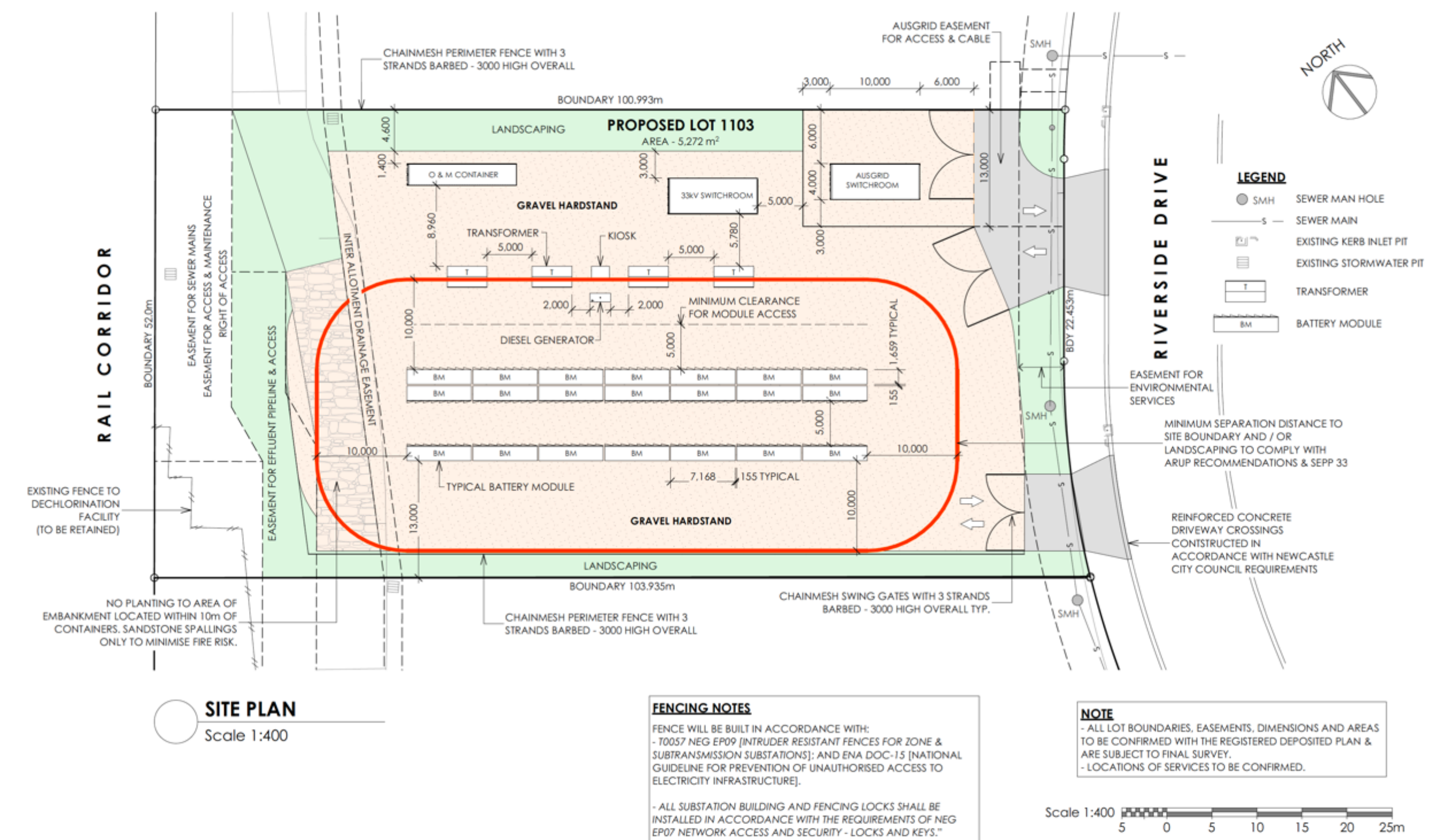
Source: ADW Johnson

Figure 4 – Site Plan showing Battery Container Option proposed layout for Lot 1103 (source: GCA Engineering)



4 17.03.22 DEVELOPMENT APPLICATION ISSUE MC 3 15.10.21 BATTERY RACK CONTAINERS MOVED BB 2 07.10.21 LANDSCAPING INCREASED BB 1 23.09.21 ORIGINAL ISSUE BB REV. DATE DESCRIPTION DRAWN 21343A DA01.pln Last saved on 21/03/2022 by Mark COPYRIGHT IN THE DRAWINGS, INFORMATION AND DATA RECORDED HEREON IS THE PROPERTY OF GEOFF CRAIG & ASSOCIATES PTY LTD AND MAY NOT BE USED, COPIED OR REPRODUCED IN WHOLE OR PART FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED WITHOUT THE PRIOR CONSENT OF GEOFF CRAIG & ASSOCIATES PTY LTD.				STEEL RIVER BUSINESS PARK GCA ENGINEERING SOLUTIONS GCA Engineering Solutions 1 Hartley Drive (PO Box 3337), Thornton NSW 2322 Ph 02 4964 1811 www.gca.net.au		Client STEEL RIVER WEST PTY LTD Project Status DEVELOPMENT APPLICATION Drawings scaled to an A3 sheet	Project Title PROPOSED BATTERY STORAGE FACILITY Project Address RIVERSIDE DRIVE MAYFIELD WEST Drawing Title SITE PLAN - BATTERY CONTAINER OPTION	Project No. 21343A Revision 4 Drawing No. DA01
---	--	--	--	--	--	--	---	---

Figure 5 – Site Plan showing Battery Module Option layout for Lot 1103 (source: GCA Engineering)



REV.	DATE	DESCRIPTION	DRAWN
4	17.03.22	DEVELOPMENT APPLICATION ISSUE	MC
3	15.10.21	BATTERY RACK CONTAINERS MOVED	BB
2	07.10.21	LANDSCAPING INCREASED	BB
1	23.09.21	ORIGINAL ISSUE	BB

21343A DA14.pln Last saved on 21/03/2022 by Mark

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GCA Engineering Solutions
1 Hartley Drive (PO Box 3337),
Thornton NSW 2322
Ph 02 4964 1811 www.gca.net.au

Client
STEEL RIVER WEST PTY LTD

Project Status
DEVELOPMENT APPLICATION

Drawings scaled to an A3 sheet

Project Title
PROPOSED BATTERY STORAGE FACILITY

Project Address
RIVERSIDE DRIVE MAYFIELD WEST

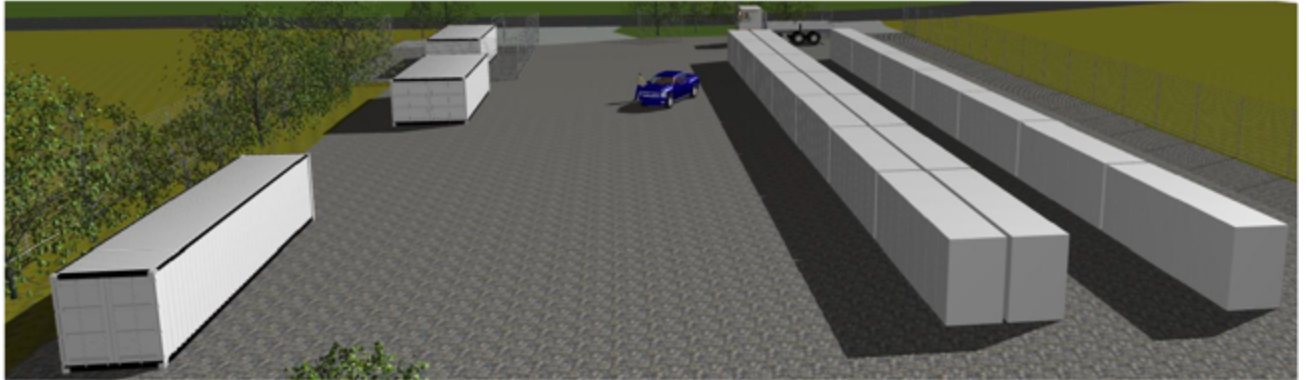
Drawing Title
SITE PLAN - BATTERY MODULE OPTION

Project No.
21343A

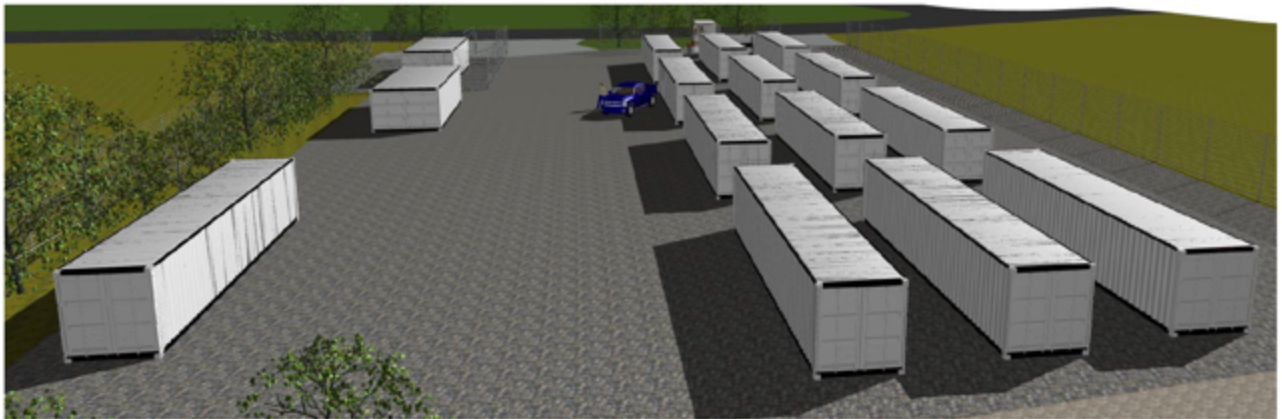
Revision
4

Drawing No.
DA04

Figure 6 – Extract of plans prepared by GCA Engineering showing the two Battery Storage Facility options neither of which will have any adverse heritage impact on the Former Migrant Camp site on Maitland Road.



 **BATTERY MODULE OPTION**



 **BATTERY CONTAINER OPTION**

Plate 1 – Overview of site looking north west from Riverside Drive showing the site levelled and cleared for the proposed development (Photo taken 22/11/21).



Plate 2 – Photo showing the former chitter/rubble piles looking east toward Steel River Industrial area (Photo taken 22/10/20)



Plate 3 – Overview of site from Riverside Drive looking toward Maitland Road showing the site levelled and cleared for the proposed development. The Former Migrant Camp buildings are visible on the ridge in the background on lhs (Photo taken 22/11/21).



Plate 4 – Photo looking south east from the site showing Former Migrant Camp buildings on the ridge line in the background (Photo taken 22/10/20)



4.0 FORMER MIGRANT CAMP SITE

The history of the Former Migrant Camp is well documented and a summary derived from the State Heritage Inventory (SHI) database is included at Appendix 1 (Heritage NSW). A map from the Newcastle LEP outlining the item and other heritage items in the Mayfield area is at Appendix 2.

The following key points are derived from the attached historic summary:

- The Former Migrant Camp at Mayfield was under construction by June 1949. It was purpose built as accommodation to house men from the Baltic States to fulfill work obligations at the BHP Steelworks under federal government 'assisted passage schemes'
- Their families were either accommodated at Greta, the largest migrant accommodation in the Hunter Valley, or at other camps further afield
- There were approximately 30 camps in NSW and Mayfield is notable as one of the six sizeable purpose built camps in the State
- The closure of the Former Migrant Camp was announced in September 1972
- The nine timber accommodation huts that stood alongside the Quonset building were demolished around the time the hostel was closed
- Remaining physical sites that demonstrate migration history are rare with only a handful retaining fabric associated with their hostel function including Villawood/Westbridge in Sydney and Balgownie Hostel in Wollongong
- The physical fabric of the former Mayfield Hostel: the workshop, gate house and landscape elements including roadways, the wishing well, and plantings, makes an important contribution to the surviving fabric of post-war migration in NSW
- The Quonset hut on the site also has rarity value in its own right, with only a few of these structures surviving in NSW, including the hut adapted to form the Crest Theatre at Granville, and the two surviving Quonset huts at the former Balgownie Hostel site

The photos outlined below provide a visual representation of the deterioration of the main buildings between 2007 and October 2020 (Plates 1 – 6). The Quonset hut and former gatehouse building remain intact however the site remains open to ongoing acts of vandalism.

The photo at Plate 7 shows the main group of Former Migrant Camp buildings and suggested curtilage boundary (Heritage NSW 2007 SHI Database). Plate 8 shows the view looking north-west over the proposed development site from the vacant land to the west of the Former Migrant Camp buildings.

Plate 1: showing main group of buildings at the Former Migrant Camp. Small gate house in the foreground and view along the Quonset hut and pitched roofed addition. Photo taken in 2007 by Sarah Cameron (copyright NCC).



Plate 2: showing current condition of the main group of buildings at the Former Migrant Camp



Plate 3: Current view of the west elevation including the small gate house in the foreground



Plate 4: Similar view as above showing surviving European plantings at the site



Plate 5: View along the south elevation Quonset building photo taken in 2007 by Sarah Cameron (copyright NCC).



Plate 6: Current view of the east elevation – although vandalised the Quonset building remains intact



Plate 7: Aerial photo showing main group of Former Migrant Camp buildings and suggested curtilage boundary (Source: SHI Database Heritage NSW 2007)



Plate 8: View looking north-west over part of the proposed Steel River Battery site on rhs. The site has since been levelled and cleared for the proposed development (Photo taken 22/10/20).



5.0 CULTURAL SIGNIFICANCE

5.1 FORMER MIGRANT CAMP STATEMENT OF SIGNIFICANCE

This Statement of Heritage Significance (SoS) for the Former Migrant Camp is derived from the State Heritage Inventory Database (Heritage NSW).

The Mayfield Migrant Hostel has historical and social significance for the State, and provides rare physical evidence of the arrival experience of post war migrants to NSW. The former Mayfield Migrant Hostel is of historical significance for the State of NSW for its association with the post-war migration program that radically altered the nature and composition of Australian society. The remaining site layout, buildings and landscape elements provide rare physical evidence of the first phase of the migration experience, accommodation in camps and the compulsory work obligation for men. The Migrant Hostel is of social significance for the State as a part of the network of camps which provided the first home for post-war migrants to Australia, and the place where they were introduced to Australian language, culture, food and people. As one of the few camps retaining significant original fabric, the camp may have the potential to preserve and evoke aspects of the experiences of migrants who came to other camps in the State, that have since been demolished. The former hostel is one of the few migrant hostel sites in the State which retains built and landscape elements articulate about the migration experience and its administration. With the remaining fabric of the Villawood, Scheyville and Balgownie hostels in particular, the surviving complex at Mayfield makes a significant and unique contribution to the story of post war migration in NSW.

Date significance updated: 24 September 2007

5.2 DESCRIPTION

The following description of the buildings and condition update is derived from the State Heritage Inventory Database on 25 September 2007. Note that since that time Telstra has left the site and it has become severely vandalised and the buildings are now in poor condition. The information outlined in the SHI database including the Table outlined below needs to be updated.

Builder/Maker: Commonwealth of Australia

Construction years: 1948-1949

Physical description: The buildings surviving on the site comprise:

- The main workshop building, being a Quonset hut with a small gable roof extension to the west, the last part of which may have been a gatehouse
- The caretakers cottage, immediately adjacent to Maitland Road at the main entrance gates, being a simple timber cottage typical of the 1950s.

These buildings are situated to the north of the compact site beside the main entrance gates. The original access road runs up the southern side of the main

workshop. Kerbing and associated improvements survive, as do garden beds and edging and plantings, in particular cypress-style pines, planted during the operation of the hostel. A 'wishing well' is located amongst some mature trees on a grassed area overlooking Maitland Road. It is constructed of odd shaped concrete blocks, probably a recycled industrial material, complete with corrugated iron roof and timber pulley (currently detached), now planted with succulents.

All of the features described are situated within the northern one third-one half of the site, to the north of the short internal roadway which bisects the site.

The site runs lengthways along Maitland Road, slightly raised above road level. To the north-east of the site the land slopes away to the Hunter River, giving extended views of the river flats from the former hostel site.

**Physical condition
and/or
Archaeological
potential:**

The buildings on the site appear to be in fair condition. However, the wishing well requires maintenance, its roof having blown off is currently lying beside the well.

Date condition updated: 25 Sep 07

**Modifications and
dates:**

The sleeping huts and kitchen/dining hut, and possibly other structures have been removed from the site.

Current use:

Telstra depot

5.3 ASSESSMENT OF CULTURAL SIGNIFICANCE

The following Assessment of Significance is derived from the State Heritage Inventory Database (Heritage NSW) compiled on 25 September 2007.

SHR Criteria a)

[Historical significance]

The former Mayfield Migrant Hostel is of historical significance for the State of NSW for its association with the post-war migration program that radically altered the nature and composition of Australian society. The remaining site layout, buildings and landscape elements provide rare physical evidence of the first phase of the migration experience, accommodation in camps from several months to two years, and the compulsory work obligation for men. The austerity of the remaining buildings, and the nature of the site, perched on an isolated piece of land beyond the industrial part of Newcastle hugging the highway and looking out over the Hunter River flats, illustrate both the straitened circumstances of NSW as the State welcomed the new migrants amidst a severe post-war housing and materials shortage, and also evoke the indignity and loneliness of the migration experience. The wishing well and European plantings on the site provide rare physical evidence of the migrants' efforts to feel at home in their new country, and hopeful

SHR Criteria b)

[Associative significance]

about their prospects in Australia.

Within the limited research carried out for this review, the Hostel was not found to be of significance under this criterion.

SHR Criteria c)

[Aesthetic significance]

Within the limited research carried out for this review, the Hostel was not found to be of significance under this criterion.

SHR Criteria d)

[Social significance]

The Migrant Hostel is of social significance for the State as a part of the network of camps which provided the first home for post-war migrants to Australia, and the place where they were introduced to Australian language, culture, food and people. As one of the few camps retaining significant original fabric, the camp may have the potential to preserve and evoke aspects of the experiences of migrants who came to other camps in the State, that have since been demolished. The ongoing interest in the Hostel, and the wish of former residents to preserve their links with this part of their migration history is evidenced by the booklet, 'Memories of Mayfield, Mayfield Migrant Hostel 1949-1972', published 1997.

SHR Criteria e)

[Research potential]

Within the limited research carried out for this review, the Hostel was not found to be of significance under this criterion.

SHR Criteria f)

[Rarity]

The Mayfield Migrant Hostel provides rare physical evidence of the arrival experience of post war migrants to NSW. The former hostel is one of the few migrant hostel sites in the State which retains built and landscape elements articulate about the migration experience and its administration. With the remaining fabric of the Villawood, Scheyville and Balgownie hostels in particular, the surviving complex, comprising workshop, caretakers cottage, gate house, and landscape features makes a significant and unique contribution to the story of post war migration in NSW.

SHR Criteria g)

[Representativeness]

Within the limited research carried out for this review, the Hostel was not found to be of significance under this criterion.

Integrity/Intactness:

The majority of the sleeping huts were removed when the camp closed. The remaining built elements include a large Quonset Hut, with pitched roof extension, caretaker's cottage and gate house. These elements have a high level of integrity as built structures. Their arrangement on the site around the main entrance and roadways provides evidence about the function of the camp. There are many landscape features remaining which are evidence of the former layout of roads and garden beds and the choice of trees is emblematic of the cultural mix in the camp (Pines from southern Europe).

6.0 HERITAGE CONTROLS

6.1 NEWCASTLE LEP 2012 – CLAUSE 5.10 HERITAGE CONSERVATION

The subject site is in the vicinity of a heritage item listed in Schedule 5 of the Newcastle LEP and is therefore subject to the objectives and controls at Part 5 Clause 5.10 of the Newcastle LEP as outlined below:

5.10 Heritage conservation

Note—

Heritage items (if any) are listed and described in Schedule 5. Heritage conservation areas (if any) are shown on the Heritage Map as well as being described in Schedule 5.

(1) **Objectives** The objectives of this clause are as follows—

- (a) to conserve the environmental heritage of the City of Newcastle,
- (b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,
- (c) to conserve archaeological sites,
- (d) to conserve Aboriginal objects and Aboriginal places of heritage significance.

(2) **Requirement for consent** Development consent is required for any of the following—

- (a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance)—
 - (i) a heritage item,
 - (ii) an Aboriginal object,
 - (iii) a building, work, relic or tree within a heritage conservation area,
- (b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,
- (c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,
- (d) disturbing or excavating an Aboriginal place of heritage significance,
- (e) erecting a building on land—
 - (i) on which a heritage item is located or that is within a heritage conservation area, or
 - (ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,
- (f) subdividing land—
 - (i) on which a heritage item is located or that is within a heritage conservation area, or
 - (ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

(3) **When consent not required** However, development consent under this clause is not required if—

- (a) the applicant has notified the consent authority of the proposed development and the consent authority has advised the applicant in writing before any work is carried out that it is satisfied that the proposed development—
 - (i) is of a minor nature or is for the maintenance of the heritage item, Aboriginal object, Aboriginal place of heritage significance or archaeological site or a building, work, relic, tree or place within the heritage conservation area, and
 - (ii) would not adversely affect the heritage significance of the heritage item, Aboriginal object, Aboriginal place, archaeological site or heritage conservation area, or
- (b) the development is in a cemetery or burial ground and the proposed development—
 - (i) is the creation of a new grave or monument, or excavation or disturbance of land for the purpose of conserving or repairing monuments or grave markers, and
 - (ii) would not cause disturbance to human remains, relics, Aboriginal objects in the form of grave goods, or to an Aboriginal place of heritage significance, or
- (c) the development is limited to the removal of a tree or other vegetation that the Council is satisfied is a risk to human life or property, or
- (d) the development is exempt development.

(4) **Effect of proposed development on heritage significance** The consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. This subclause applies regardless of whether a heritage management document is prepared under subclause (5) or a heritage conservation management plan is submitted under subclause (6).

(5) **Heritage assessment** The consent authority may, before granting consent to any development—

- (a) on land on which a heritage item is located, or
- (b) on land that is within a heritage conservation area, or
- (c) on land that is within the vicinity of land referred to in paragraph (a) or (b), require a heritage management document to be prepared that assesses the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item or heritage conservation area concerned.

(6) **Heritage conservation management plans** The consent authority may require, after considering the heritage significance of a heritage item and the extent of change proposed to it, the submission of a heritage conservation management plan before granting consent under this clause.

(7) **Archaeological sites** The consent authority must, before granting consent under this clause to the carrying out of development on an archaeological site (other than land listed on the State Heritage Register or to which an interim heritage order under the [Heritage Act 1977](#) applies)—

- (a) notify the Heritage Council of its intention to grant consent, and
- (b) take into consideration any response received from the Heritage Council within 28 days after the notice is sent.

(8) **Aboriginal places of heritage significance** The consent authority must, before granting consent under this clause to the carrying out of development in an Aboriginal place of heritage significance—

- (a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and
 - (b) notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.
- (9) **Demolition of nominated State heritage items** The consent authority must, before granting consent under this clause for the demolition of a nominated State heritage item—
- (a) notify the Heritage Council about the application, and
 - (b) take into consideration any response received from the Heritage Council within 28 days after the notice is sent.
- (10) **Conservation incentives** The consent authority may grant consent to development for any purpose of a building that is a heritage item or of the land on which such a building is erected, or for any purpose on an Aboriginal place of heritage significance, even though development for that purpose would otherwise not be allowed by this Plan, if the consent authority is satisfied that—
- (a) the conservation of the heritage item or Aboriginal place of heritage significance is facilitated by the granting of consent, and
 - (b) the proposed development is in accordance with a heritage management document that has been approved by the consent authority, and
 - (c) the consent to the proposed development would require that all necessary conservation work identified in the heritage management document is carried out, and
 - (d) the proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance, and
 - (e) the proposed development would not have any significant adverse effect on the amenity of the surrounding area.

7.0 HERITAGE IMPACT ASSESSMENT

The proposed development must meet the relevant objectives and consent requirements outlined in the Newcastle LEP including:

(4) Effect of proposed development on heritage significance

The consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. This subclause applies regardless of whether a heritage management document is prepared under subclause (5) or a heritage conservation management plan is submitted under subclause (6); and

(5) Heritage assessment

The consent authority may, before granting consent to any development—

- (a) on land on which a heritage item is located, or
- (b) on land that is within a heritage conservation area, or
- (c) on land that is within the vicinity of land referred to in paragraph (a) or (b), require a heritage management document to be prepared that assesses the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item or heritage conservation area concerned.

The heritage impact assessment outlined below considers the effect of the proposed development on the heritage significance of the Former Migrant Camp (State nominated heritage item I291) and the extent to which the development would affect the heritage significance of the item.

To what extent does the proposal impact adjacent heritage items?

It is highly unlikely that the proposed development will have any significant impact on the adjacent Former Migrant Camp site. This site is located on top of a high ridge that runs parallel to Maitland Road with the main buildings and curtilage located on the opposite side of the Lot to the proposed development. Conversely, the proposed development site is located on low lying land below the ridge. In addition, there is a remnant native vegetation community on the western boundary of the site that provides a visual barrier between the proposed development site and the Former Migrant Camp site. It is recommended that this remnant vegetation be retained.

To what extent does the proposal impact the heritage conservation area?

Not Applicable – the proposed development is not in or adjacent to a Heritage Conservation Area.

To what extent does the proposal impact any significant fabric or heritage values of the subject site?

Not Applicable – as outlined in this SoHI, the proposed development will be located on land well below the ridge line and curtilage of the Former Migrant Camp site and not have any significant impact on either the aesthetic outlook or heritage values of the site.

8.0 CONCLUSION AND RECOMMENDATIONS

This Statement of Heritage Impact has assessed the potential impact of the proposed Battery Storage Facility on the heritage significance of the Former Migrant Camp at Mayfield.

It is noted that there are two design options proposed for the development. One option is for the construction of Battery Modules while the other is for Battery Containers. Eikos has assessed either option as acceptable from a heritage impact perspective.

Eikos concludes that there is adequate separation both in elevation and distance between the location of the proposed development and the curtilage of the Former Migrant Camp to ensure that the heritage significance of the site is not adversely impacted.

In addition, the remnant native vegetation community including mature Spotted Gum and Ironbark off Maitland Road in the south-eastern corner of the site provides a visual buffer to the Former Migrant Camp and should be retained.

The current poor condition of the Former Migrant Camp and the ongoing damage to this State nominated group of buildings is a concern. Eikos recommends that Council conduct an urgent review of the site and consider implementing security measures and a conservation management plan to protect the remaining significant structures and landscape features at the site.

9.0 REFERENCES

City of Newcastle (2012), *Newcastle Development Control Plan*.

City of Newcastle (2012), *Newcastle Local Environment Plan*.

Department of Urban Affairs and Planning (1996) *Statements of Heritage Impact and Conservation Areas*, published by the Heritage Office Department of Urban Affairs & Planning

ICOMOS (2013) *The Burra Charter: The Australian ICOMOS Charter for Places of Cultural Significance* - Australia ICOMOS Faculty of Arts and Education Deakin University, Burwood, Victoria

Edify Energy (2020) *Steel River Battery – Project Introduction: City of Newcastle Pre-Lodgement Meeting*

adw johnson (2020) *Correspondence and Description of Proposal Pre Development Application – Request for Meeting Proposed Battery Storage at 60 Riverside Drive, Mayfield West (Lot 22 DP 280089)*

Plans for the proposed Battery Storage Facility (Development Application Issue) dated 17/03/22 prepared by GCA Engineering Solutions

Heritage NSW State Heritage Inventory (SHI) Database accessed 12/10/20 – *Migrant Camp (Former)*
Database number 2171574 Local Government Area: Newcastle

APPENDIX 1 – Historical Notes: Former Migrant Camp (Source: Heritage NSW)

Historical Notes:

Mayfield Migrant Hostel is part of Australia's post war migration story. The site was originally part of Platt's estate, granted in 1821. Platt's house was built about where the Murray Dwyer Orphanage stood, and the hostel site appears to have been left undeveloped. After Platts death the land was sold to the AA Company c.1836, though again the hostel site appears to have been undeveloped. The company started to sell off parts of the land in 1913. Then, in 1920, 107 acres including the hostel site were acquired by the Commonwealth for War Services Homes. There is no evidence that this use was ever implemented by the government. The site was then selected by the government when they were looking to build a hostel for migrants who were to work at the BHP steelworks in the 1940s.

For 150 years following European settlement, government policies ensured that the majority of Australia's immigrants were of European origin and preferably British. After World War Two, however, feeling vulnerable after the near invasion by Japan, Australia looked to the rest of Europe desperate to 'populate or perish'. In 1945 Arthur Calwell was appointed the first Federal Government Immigration Minister and set about putting policies in place that would attract over 70,000 migrants a year. Migrants from Britain alone could not meet this number, and in 1947 the Australian Government reluctantly agreed to accept 'Displaced Persons', or refugees, from the war in Europe. Over the next five years nearly 171,000 migrants - mainly from Poland, Yugoslavia and the Baltic States - arrived. When this source of migrants was exhausted, the Government signed formal agreements to sponsor migrants from a number of European countries including Germany, Italy, Greece and Malta.

Between 1945 and 1975, Australia's population almost doubled. Almost three million migrants arrived, half from Britain and half from other European countries. However it was not until the election of Gough Whitlam's Federal Government in 1972 that the 'White Australia' policy was finally abandoned. The Immigration Minister, Al Grassby, declared in 1973 that 'every relic of past ethnic or racial discrimination' was to be abandoned and migrants welcomed from all countries. By the 1996 Census, the Australian population had reached 18 million including 5.6 million people who had immigrated from over 150 countries. (Migration Heritage Centre website; National Archives of Australia website)

Under these 'assisted passage' schemes, migrants were given temporary accommodation in exchange for their agreement to provide two years labour on government projects such as the Snowy Mountains Scheme. Almost 40 accommodation centres were established in New South Wales, often in old army barracks. Families were separated with husbands living in barracks close to their work and women and children staying behind in the migrant accommodation. (Migration Heritage Centre website; National Archives of Australia website) There were approximately thirty migrant camps in NSW, and Mayfield is notable as one of the six sizeable purpose built camps in the State. The Mayfield Migrant Hostel was purpose built as accommodation for men who were to fulfill their work obligation at the adjacent BHP steelworks. Their families were accommodated at Greta, the largest migrant accommodation facility in the Hunter Valley, or at other camps further afield. The Mayfield Hostel was under construction by June 1949, and was originally intended to house men from the Baltic States. (Ecotecture, 2000)

The trade unions did not welcome the migrants, as they provided a new pool of non-unionised labour that had the potential to be used to erode the union's achievements during the period of Post War social and economic reform. The men accommodated at Mayfield were promised employment at BHP whether they spoke any English or not, and often found their first period of employment there both tedious and somewhat terrifying. Although their accommodation was provided as part of an agreement that the men would work in Australian industries important in post-war economic reconstruction, the accommodation still came at a cost at least in some periods. In the late 1960s, men at Mayfield paid \$11.60 per week for accommodation and meals, including a cut lunch to take to the steel works, and paid for their families to stay at other camps. Later in the 1960s, families were also accommodated at Mayfield. (Memories of Mayfield, 1997, n/p) The Mayfield hostel manager, Mr B.W. Rawlinson, himself a migrant, described the hostels in 1966 as 'stepping stones from boat to abode', saying that they provided 'temporary accommodation for migrants for whom housing was not immediately available. More than this, they helped with the inevitable heartburn of transplantation'. He felt that Australia's migration and settling-in service was excellent. (Ecotecture, 2000) The experiences of the migrants themselves at the Mayfield hostel were often mixed, their time at the hostel being associated with separation from their families; with being transferred repeatedly between camps; and with the hard work of getting used to Australian culture mores, language, and not least, food. As Graham Brooks and Associates pointed out in their study of the former Villawood/Westbridge migrant hostel:

"For many of the early residents, who arrived before 1969, the hostel represented the indignity of migration. Many European residents had been dislocated by war, and had left comfortable homes, careers or professional employment in their flight to refugee camps. To arrive in Australia and live in a corrugated iron hut without plumbing or a kitchen, was a terrible blow, especially for women. For men the hostel was not the greatest blow, but the lack of skilled employment and recognition of qualifications. These great disappointments and the feeling of having to begin one's life over again, speak a new language, and eat different foods, contributed to the intensity of the hostel experience for everyone. In very many cases, the articulation of value was expressed as an emotional attachment to a place where a very intense and important period of one's life had been spent." (Graham Brooks and Associates, 2001, p. 58)

The wishing well, probably constructed by Fred Tanschuk and Stefan Kowt using bricks from the BHP dump, and still remaining on the site, was no doubt an effort to enhance the optimism of residents about their futures in Australia. (Memories of Mayfield, 1997, n/p) In 1966 the hostel had the capacity to accommodate 500 people, but there were only 270 in residence. Ninety per cent of the men residing there worked at the adjacent steelworks. (Ecotecture, 2000)

Post-war immigration changed the face of Newcastle adding a diversity to the mix of cultures living in Newcastle and the region. The suburbs of Hamilton and Mayfield, very close the hostel, came to be settled by Italians and many of these had come from the Abruzzi area prior to the war. Italians and other Europeans have had a lasting historical, social and economic impact on Newcastle in areas like Beaumont Street, which is still populated by Italian businesses and cafes. Bruce Hatherly, who was officer of the Commonwealth Bank's migrant information service in the Memories of Mayfield registered his appreciation of the diversification of the Australian cuisine and social and cultural life brought about by migrants to Newcastle. (Memories of Mayfield, 1997, n/p)

The closure of the hostel was announced in September 1972, in line with the new policy of migrant accommodation in apartments and houses as part of the general community. By this time there were only a few residents remaining. The nine timber accommodation huts, that stood in ranks to either side of the long metal igloo/kitchen building, were demolished at this time. The site was taken over by the PMG as a line yard c.1976, and since then continued in this role under Telecom/Telstra and now the NDC. (Ecotecture, 2000) The kitchen/dining hut appears to have been removed since 2000.

Migration is a highly important theme in the history of NSW, and post-war migration radically altered the nature and composition of Australian society. Yet, the comparative analysis provided by Graham Brooks and Associates, in their assessment of the Villawood/Westbridge Migrant Hostel, indicates that physical evidence of this early part of the migrant experience is rare, especially evidence of 'that moment of arrival and the first stages of the transition to becoming Australian':

'Physical sites which demonstrate migration history are rare. Most sites which are nominated for conservation as migrant heritage sites demonstrate settlement, rather than the act of migration. Many migrant heritage sites are illustrations of migration success. The oral history of the hostel residents, illustrates that migration was a fraught and difficult process. The fact that so many migrants had to live for years in a government hostel, in itself indicates the difficult beginnings of so many of Australia's migrants.' (Graham Brooks and Associates, 2001, p. 61)

In this sense any and all physical evidence which demonstrates the accommodation of migrants in hostels on their arrival, and while they fulfilled their work obligation, has a level of rarity value.

Of the thirty hostels which have been identified in NSW, only a handful are known to retain physical fabric associated with their hostel function, especially fabric associated with the late 1940s-1950s phase of migration. It would appear that no hostel established in the late 1940s-1950s survives in its entirety. A number of nissen huts and post-war fibro buildings survive at the Villawood/Westbridge hostel, amongst the brick and tile motel-style buildings which accommodated migrants on the site from the 1960s, and more recent buildings associated with the migrant detention function. The majority of the buildings associated with the late 1940s-1950s phase were demolished during the 1960s to make way for the new style of accommodation. Other examples include: Balgownie Hostel (Fairy Meadow, Wollongong) at which three huts, one Nissen and two Quonset, survive but have been relocated on the site to avoid further flood damage; Parkes Hostel, which retains a house and administration building only; Greta Hostel where all buildings have been demolished and only footings, roads and kerbs remain. The Scheyville Hostel, established in 1910 as a training farm and hostel for English child migrants, and then used as a general migrant hostel 1949-1964, retains a number of Nissen huts and other accommodation buildings, and mess and kitchen building, making it one of the more complete examples along with Villawood.

The former Mayfield Hostel, then, is one of a small group of migrant hostels which retain part of their physical fabric. The physical fabric of the former Mayfield Hostel: the workshop, gate house, caretakers cottage, and landscape elements including roadways, the wishing well, and plantings, makes an important contribution to the surviving fabric of post-war migration in NSW. Specifically, the Mayfield Hostel is an example of a medium sized facility, purpose built as a migrant hostel immediately following the war (pre-1950), which remained in use through several decades but closed down without

redeveloping the site to reflect the new standards of the 1970s. It is located in a regional centre and was initially intended to house working men away from their families. Many other sites demonstrating similar characteristics have been lost. For example, the Adamstown Hostel, also housing men working at the Newcastle steel works has been completely demolished, as has the Karingal Hostel at Wollongong, which housed men working at the local steel works. The purpose built Unanderra and Berkeley Hostels at Wollongong have been demolished, and the hostels at Cabramatta and East Hills were redeveloped in the 1970s and are thought to have lost their earlier buildings. Although the sleeping huts and kitchen/dining hut at Mayfield no longer remain, the remaining buildings and landscape elements form a cohesive group on the northern part of the site, which is articulate about the atmosphere of the hostel and how it functioned. The austerity of the remaining buildings, and the nature of the site, perched on an isolated piece of land beyond the industrial part of Newcastle hugging the highway and looking out over the Hunter River flats, illustrate both the straitened circumstances of NSW as the State welcomed the new migrants amidst a severe post-war housing and materials shortage, and also evoke the indignity and loneliness of the migration experience. The wishing well and European plantings on the site provide rare physical evidence of the migrants' efforts to feel at home in their new country, and hopeful about their prospects in Australia.

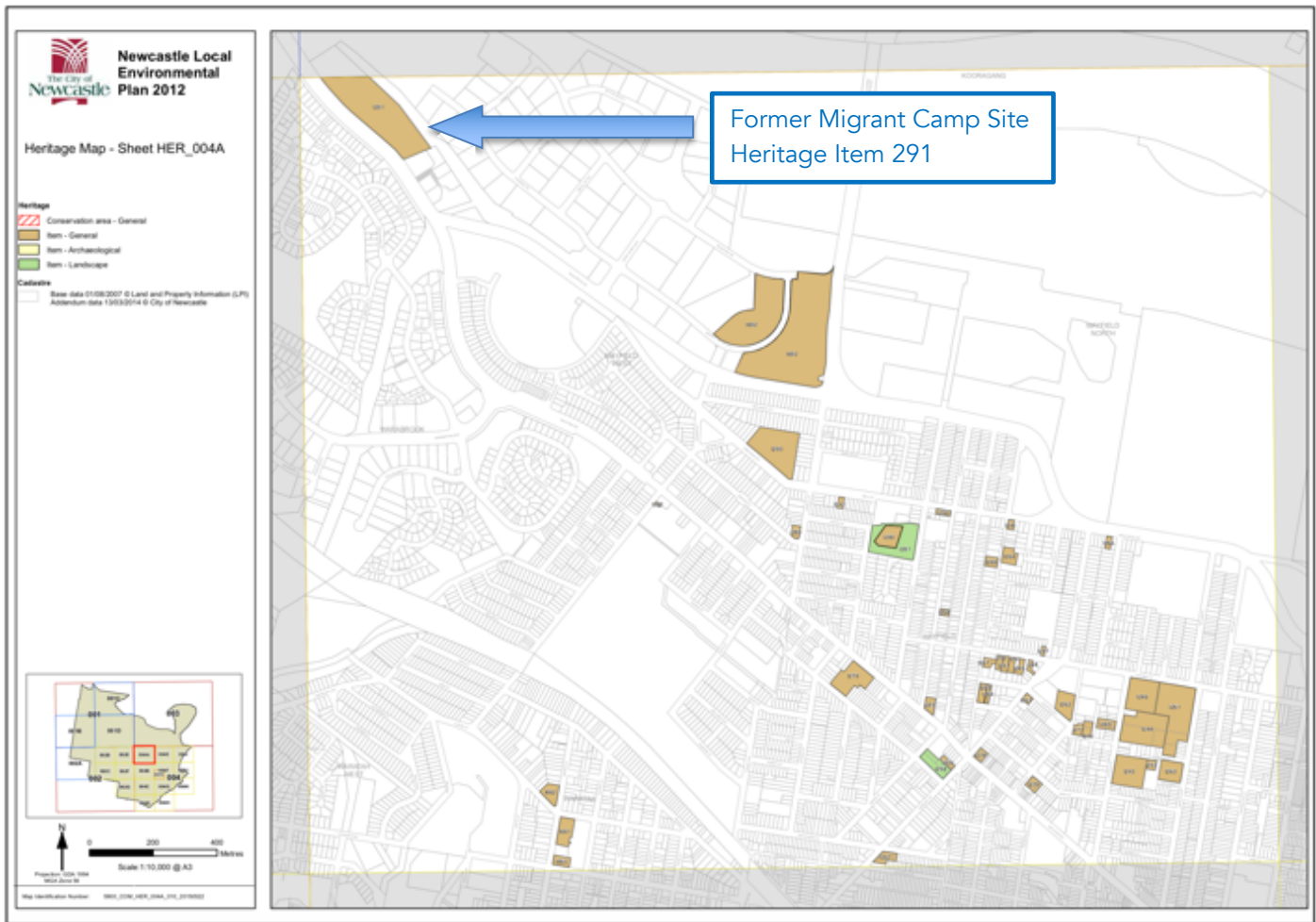
The Quonset hut on the site also has rarity value in its own right, with only a few of these structures surviving in NSW, including the hut adapted to form the Crest Theatre at Granville, and the two surviving Quonset huts at the former Balgownie Hostel site.

Historic Themes

Australian theme (abbrev)	NSW theme	Local theme
2. People – peopling the continent	Migration - Activities and processes associated with the resettling of people from one place to another (international, interstate, intrastate) and the impacts of such movements	(none)-
4. Settlement - Building settlements, towns and cities	Accommodation - Activities associated with the provision of accommodation, and particular types of accommodation – does not include architectural styles – use the theme of Creative Endeavour for such activities.	(none)-
5. Working - Working	Labour - Activities associated with work practises and organised and unorganised labour	(none)-
8. Culture - Developing cultural institutions and ways of life	Domestic life - Activities associated with creating, maintaining, living in and working around houses and institutions.	(none)-

Source: SHI Database Heritage NSW

APPENDIX 2 –Map of Heritage Items in the Mayfield Area



Source: Newcastle City Council LEP 2012

PROPOSED BATTERY ENERGY STORAGE FACILITY

PROPOSED LOT 1103 RIVER SIDE DRIVE MAYFIELD WEST
CONCEPT CIVIL ENGINEERING FOR DA

PRECINCT CAPITAL PTY LTD

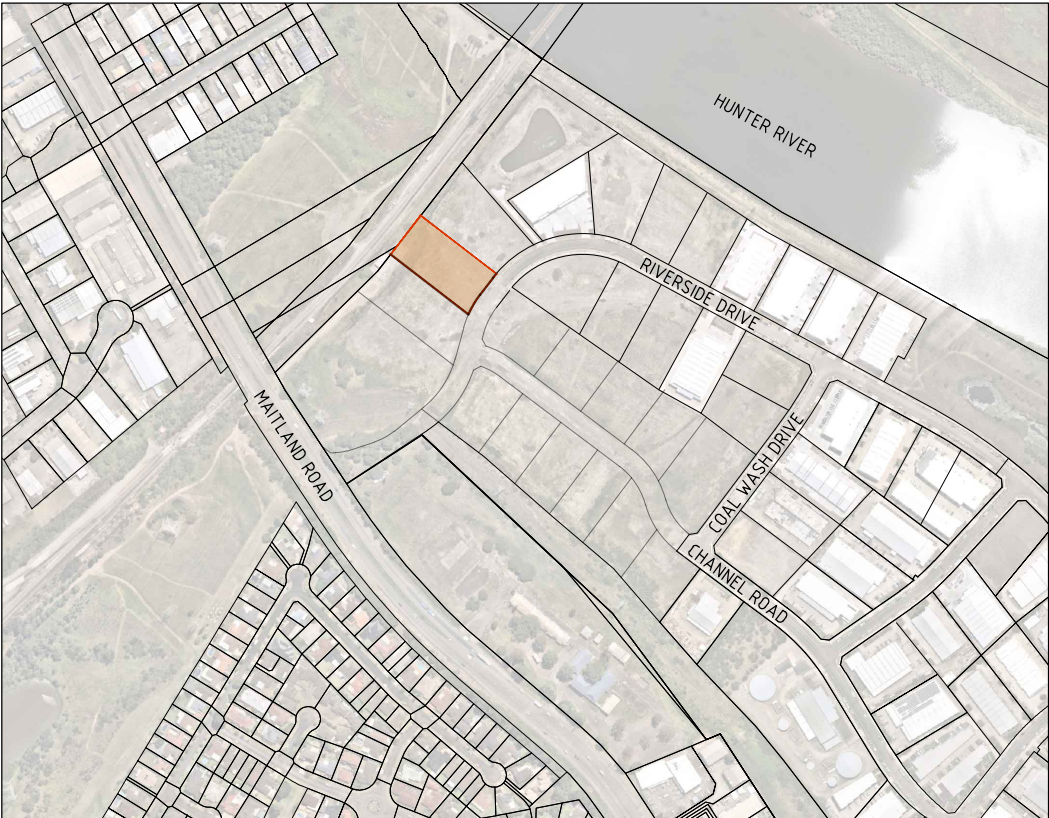
NEWCASTLE CITY COUNCIL

DRAWING SCHEDULE PROJECT No. 21343C

DWG No.	SHEET TITLE	REV
C00	COVER SHEET	2
C01	PLAN SHEET	2
C02	EROSION AND SEDIMENT CONTROL PLAN	2

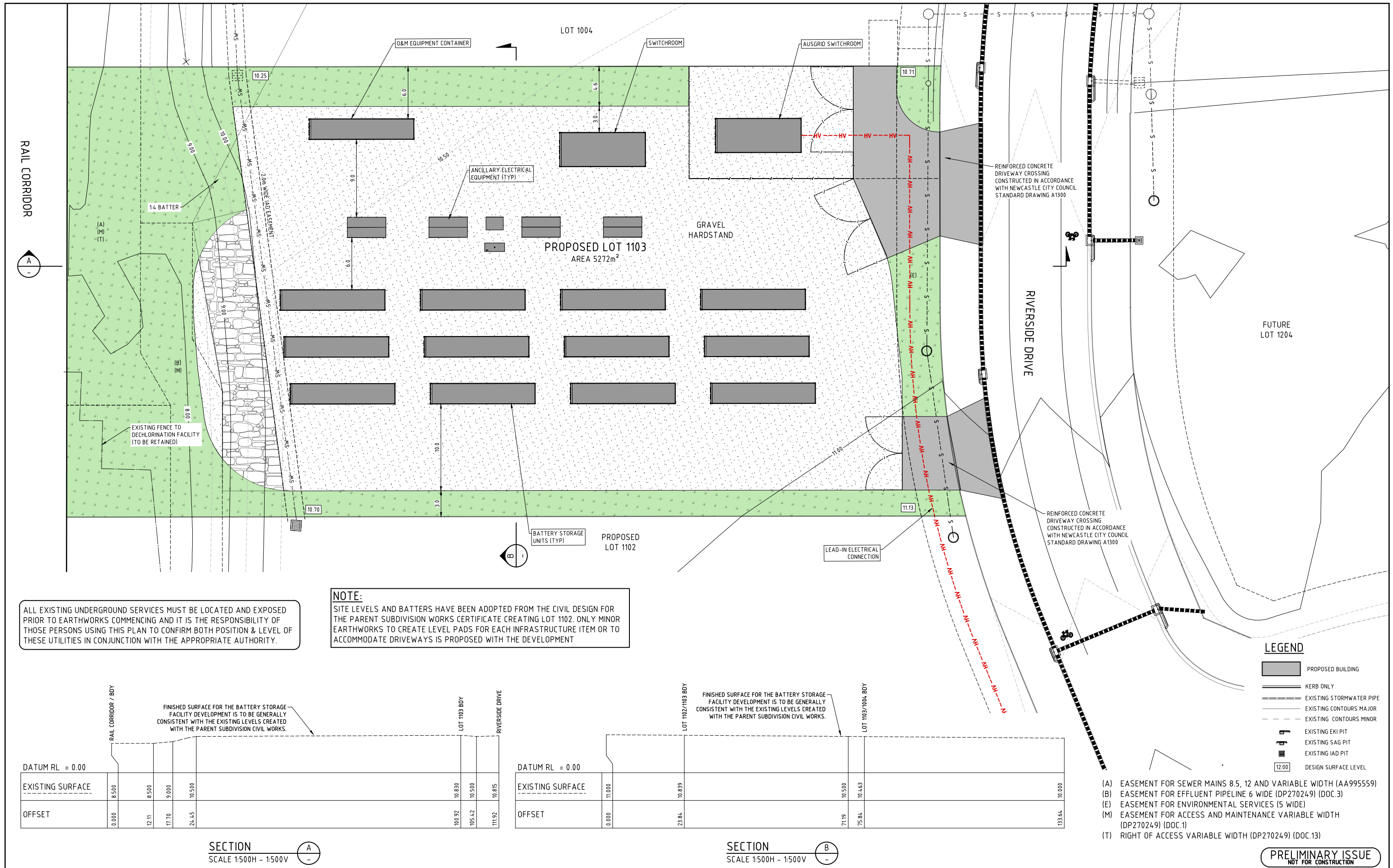


A.B.N. 92 086 017 745
1 HARTLEY DRIVE, THORNTON NSW 2322
PO BOX 3337, THORNTON NSW 2322
PHONE: (02) 4964 1811

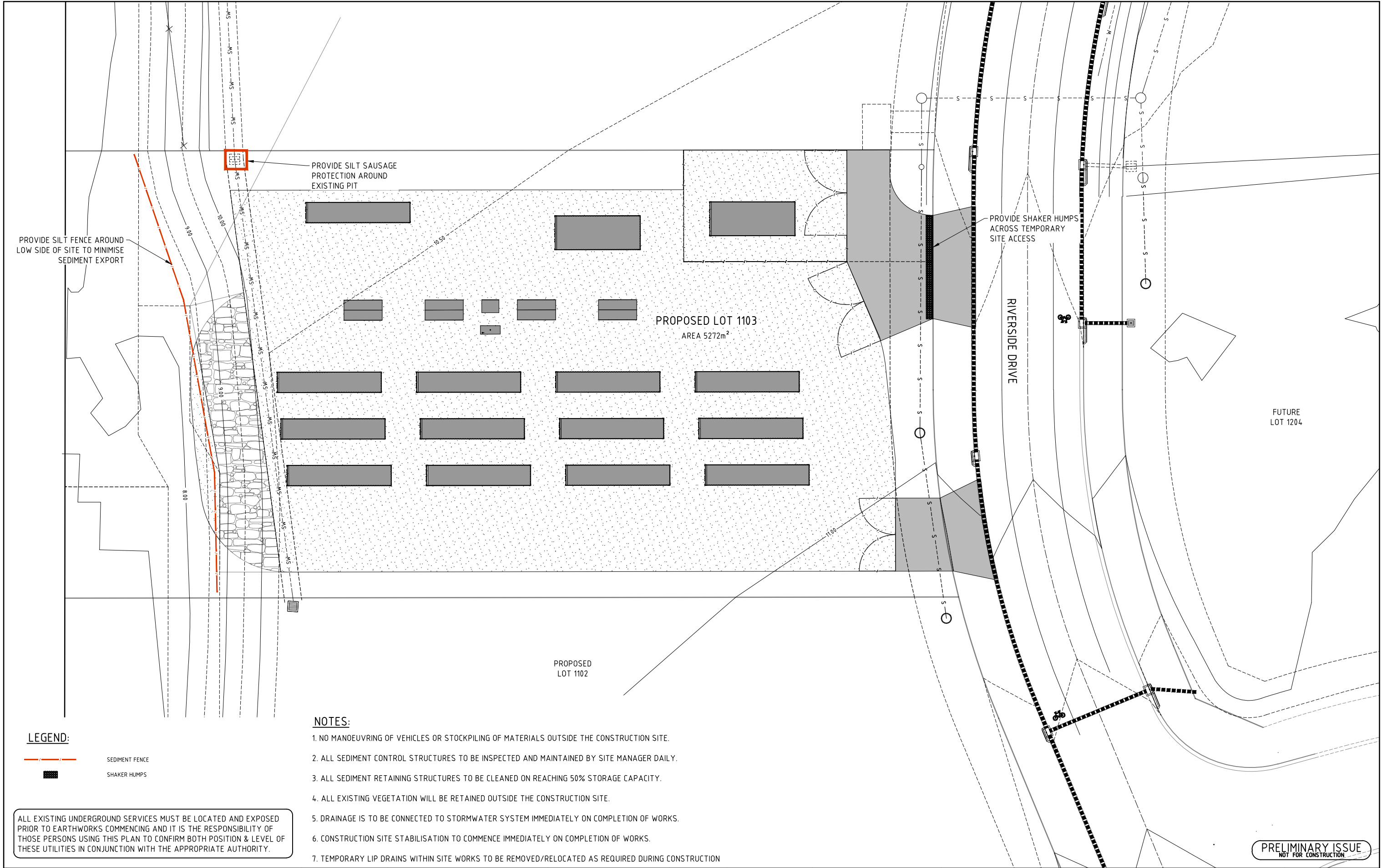


LOCALITY PLAN

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION



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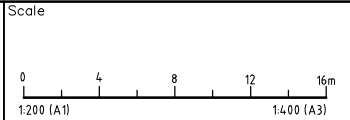
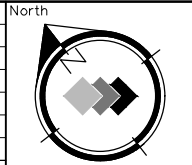
- SEDIMENT FENCE
- SHAKER HUMPS

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS THE RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION & LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

NOTES:

1. NO MANOEUVRING OF VEHICLES OR STOCKPILING OF MATERIALS OUTSIDE THE CONSTRUCTION SITE.
2. ALL SEDIMENT CONTROL STRUCTURES TO BE INSPECTED AND MAINTAINED BY SITE MANAGER DAILY.
3. ALL SEDIMENT RETAINING STRUCTURES TO BE CLEANED ON REACHING 50% STORAGE CAPACITY.
4. ALL EXISTING VEGETATION WILL BE RETAINED OUTSIDE THE CONSTRUCTION SITE.
5. DRAINAGE IS TO BE CONNECTED TO STORMWATER SYSTEM IMMEDIATELY ON COMPLETION OF WORKS.
6. CONSTRUCTION SITE STABILISATION TO COMMENCE IMMEDIATELY ON COMPLETION OF WORKS.
7. TEMPORARY LIP DRAINS WITHIN SITE WORKS TO BE REMOVED/RELOCATED AS REQUIRED DURING CONSTRUCTION

Amendment	Description	Drawn	App'd	Date
2	GENERAL REVISION	DB	AS	03.05.22
1	ORIGINAL ISSUE	DB	AS	22.03.22



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Designed A.M	Cad Reference 21343C C02 r2
Scale 1:200	A1 SHEET
Project Approval IAN HILL (B.E) Consulting Civil Engineer	

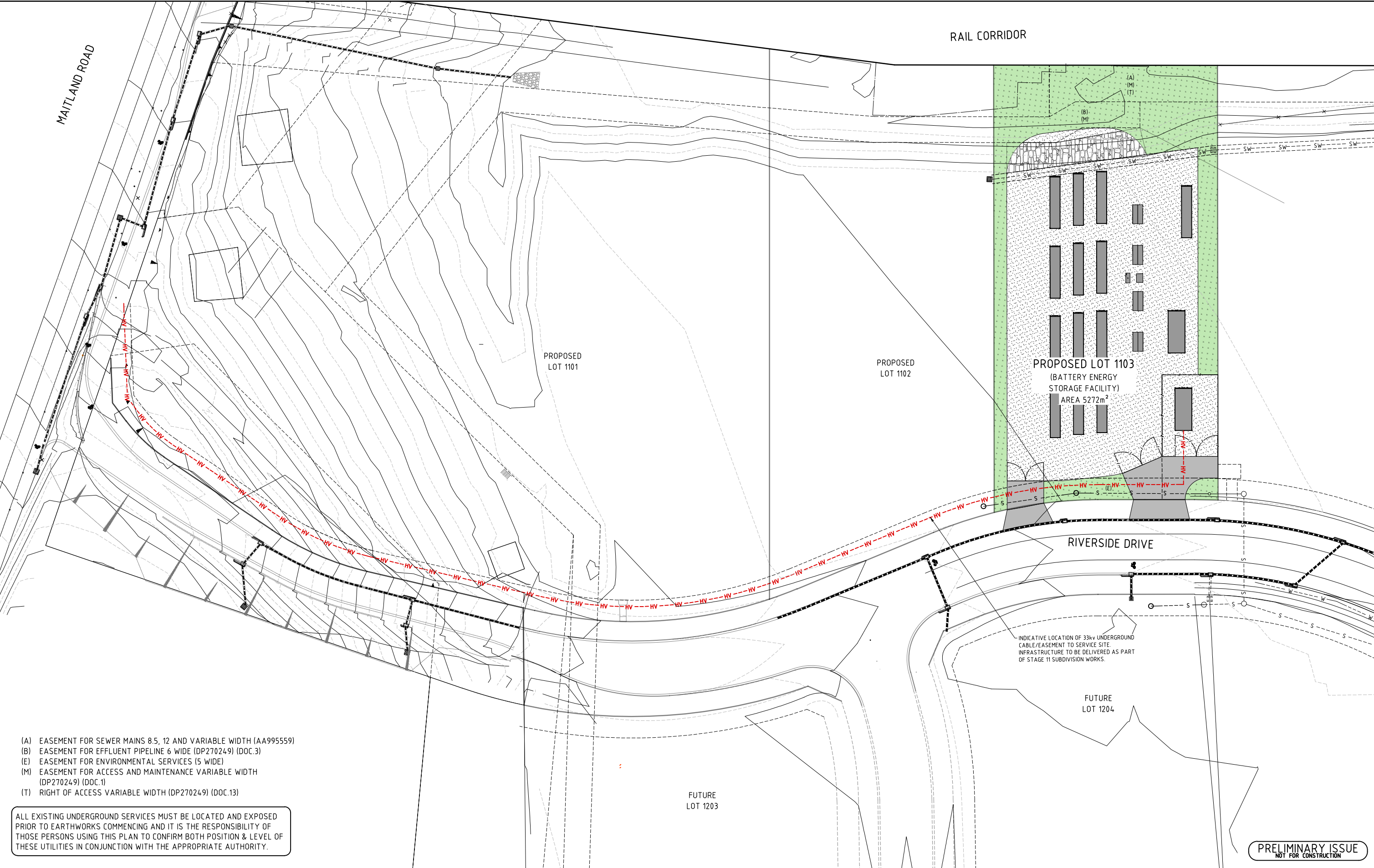
Client

A.B.N. 92 086 017 745
1 HARTLEY DRIVE, THORNTON NSW 2322
PO BOX 3337, THORNTON NSW 2322
PHONE: (02) 4964 1811

PROPOSED BATTERY ENERGY STORAGE FACILITY
RIVER SIDE DRIVE MAYFIELD WEST
PROPOSED LOT 1103
EROSION AND SEDIMENT CONTROL PLAN

Project No 21343C	Drawing No C02	Revision 2
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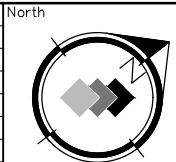
PRELIMINARY ISSUE
NOT FOR CONSTRUCTION



- (A) EASEMENT FOR SEWER MAINS 8.5, 12 AND VARIABLE WIDTH (AA995559)
- (B) EASEMENT FOR EFFLUENT PIPELINE 6 WIDE (DP270249) (DOC.3)
- (E) EASEMENT FOR ENVIRONMENTAL SERVICES (5 WIDE)
- (M) EASEMENT FOR ACCESS AND MAINTENANCE VARIABLE WIDTH (DP270249) (DOC.1)
- (T) RIGHT OF ACCESS VARIABLE WIDTH (DP270249) (DOC.13)

ALL EXISTING UNDERGROUND SERVICES MUST BE LOCATED AND EXPOSED PRIOR TO EARTHWORKS COMMENCING AND IT IS THE RESPONSIBILITY OF THOSE PERSONS USING THIS PLAN TO CONFIRM BOTH POSITION & LEVEL OF THESE UTILITIES IN CONJUNCTION WITH THE APPROPRIATE AUTHORITY.

1	ORIGINAL ISSUE		D.B	A.S	03.05.22
Amendment	Description	Drawn	App'd	Date	



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Designed A.M	Cad Reference 2134.3C E01 r1
Scale 1:400	A1 SHEET
Project Approval IAN HILL (B.E) Consulting Civil Engineer	

Client



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1 HARTLEY DRIVE, THORNTON NSW 2322
PO BOX 3337, THORNTON NSW 2322
PHONE: (02) 4964 1811

PROPOSED BATTERY ENERGY STORAGE FACILITY
RIVER SIDE DRIVE MAYFIELD WEST
PROPOSED LOT 1103
CONCEPT PLAN - LEAD IN ELECTRICAL CONNECTION

Project No	21343C
Drawing No	E01
Revision	1

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

DEVELOPMENT APPLICATION

PROPOSED BATTERY STORAGE FACILITY

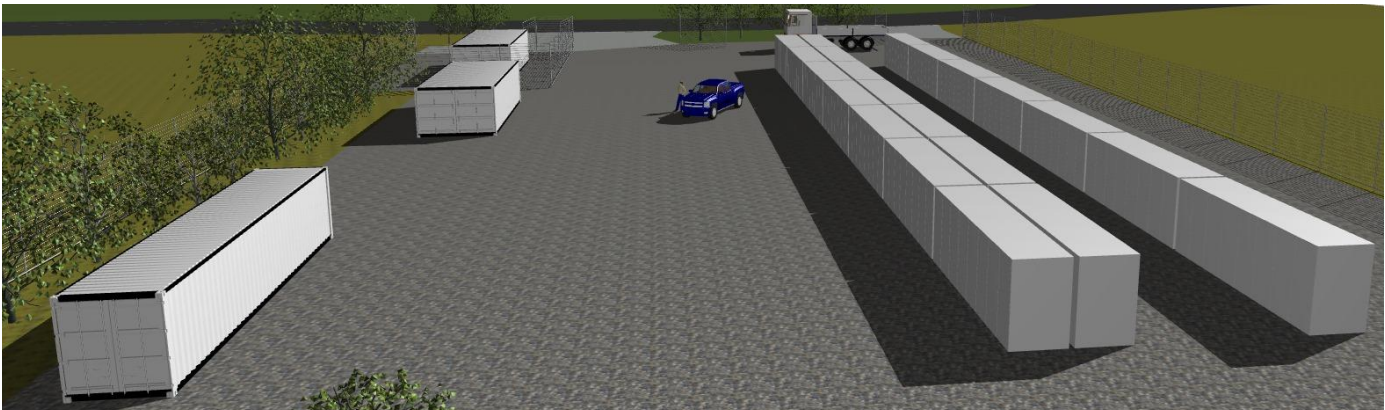
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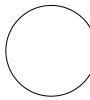
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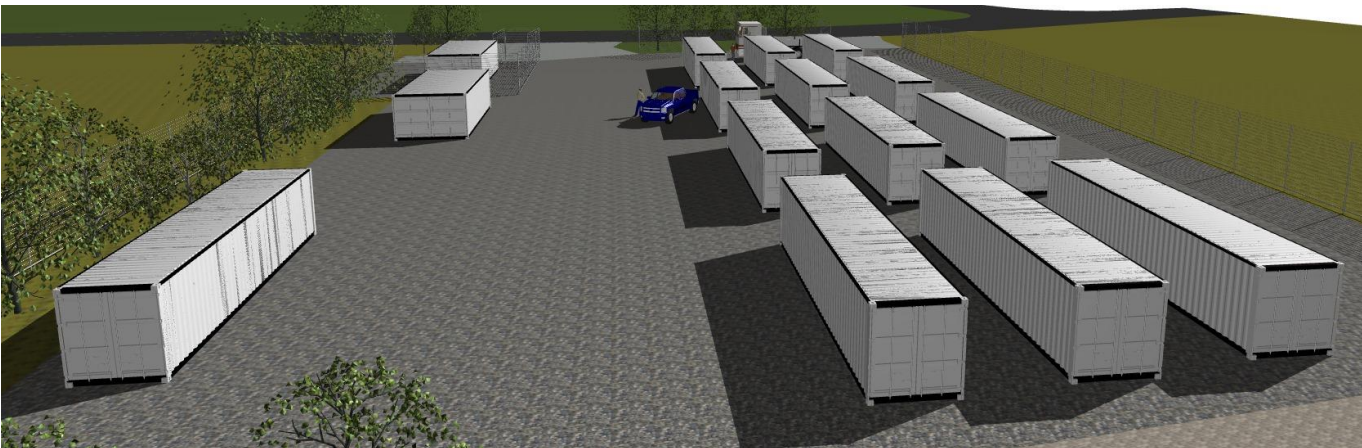
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PROJECT	SHEET	TITLE	REVISION
21343A	DA00	COVER SHEET	5
21343A	DA01	SITE PLAN - BATTERY CONTAINER OPTION	5
21343A	DA02	VEHICLE MOVEMENT PLAN	5
21343A	DA03	VEHICLE MOVEMENT PLAN	5
21343A	DA04	SITE PLAN - BATTERY MODULE OPTION	5
21343A	DA05	VEHICLE MOVEMENT PLAN	5
21343A	DA06	VEHICLE MOVEMENT PLAN	5

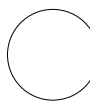


 **LOCALITY PLAN**
Not to Scale



 **BATTERY MODULE OPTION**



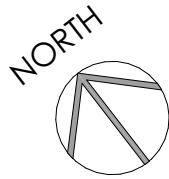
 **BATTERY CONTAINER OPTION**

Council
NEWCASTLE CITY COUNCIL

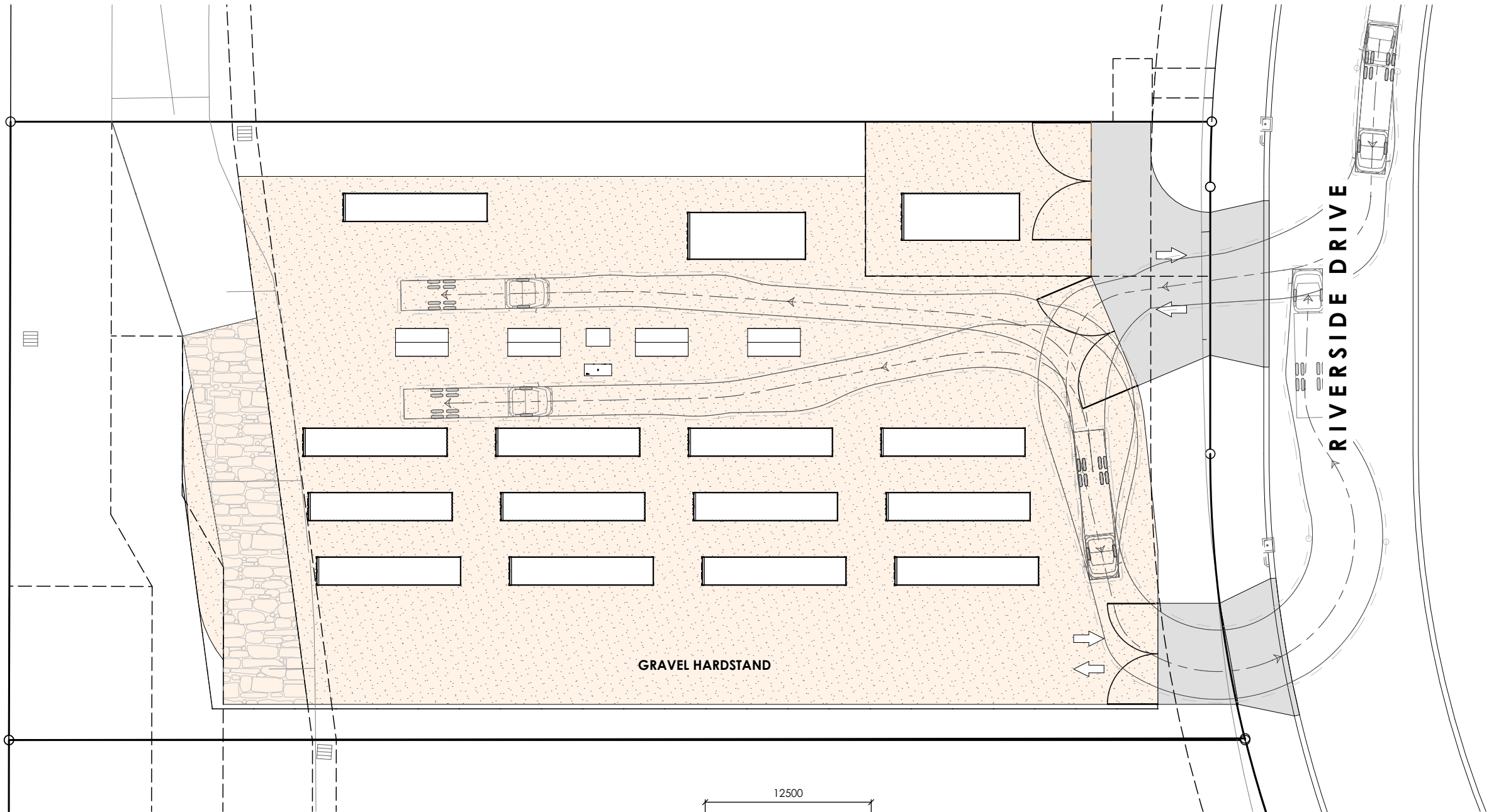
Client
STEEL RIVER WEST PTY LTD



GCA Engineering Solutions
1 Hartley Drive (PO Box 3337),
Thornton NSW 2322
Ph 02 4964 1811
www.gca.net.au

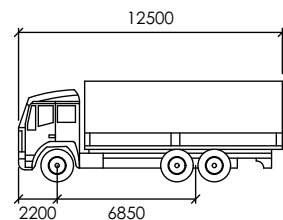


RAIL CORRIDOR



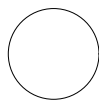
RIVERSIDE DRIVE

GRAVEL HARDSTAND



12.5m RIGID TRUCK
mm
Width : 2500
Track : 2500
Lock to Lock Time : 6.0
Steering Angle : 36.6

Scale 1:400



CONTAINER OPTION

Scale 1:400

5	06.05.22	ADDED SITE CONTOURS	MC
4	17.03.22	DEVELOPMENT APPLICATION ISSUE	MC
3	15.10.21	BATTERY RACK CONTAINERS MOVED	BB
2	07.10.21	LANDSCAPING INCREASED	BB
1	23.09.21	ORIGINAL ISSUE	BB

REV. DATE DESCRIPTION DRAWN

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Client
STEEL RIVER WEST PTY LTD

Project Status
DEVELOPMENT APPLICATION

Drawings scaled to an A3 sheet

Project Title
PROPOSED BATTERY STORAGE FACILITY

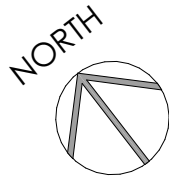
Project Address
RIVERSIDE DRIVE MAYFIELD WEST

Drawing Title
VEHICLE MOVEMENT PLAN

Project No.
21343A

Revision
5

Drawing No.
DA02

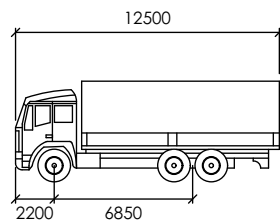


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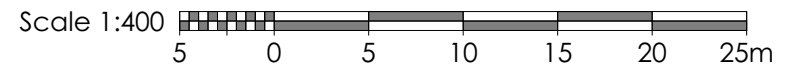
RIVERSIDE DRIVE

GRAVEL HARDSTAND

CONTAINER OPTION
Scale 1:400



12.5m RIGID TRUCK
mm
Width : 2500
Track : 2500
Lock to Lock Time : 6.0
Steering Angle : 36.6



5	06.05.22	ADDED SITE CONTOURS	MC
4	17.03.22	DEVELOPMENT APPLICATION ISSUE	MC
3	15.10.21	BATTERY RACK CONTAINERS MOVED	BB
2	07.10.21	LANDSCAPING INCREASED	BB
1	23.09.21	ORIGINAL ISSUE	BB

REV. DATE DESCRIPTION DRAWN

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Client
STEEL RIVER WEST PTY LTD

Project Status
DEVELOPMENT APPLICATION

Drawings scaled to an A3 sheet

Project Title
PROPOSED BATTERY STORAGE FACILITY

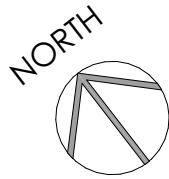
Project Address
RIVERSIDE DRIVE MAYFIELD WEST

Drawing Title
VEHICLE MOVEMENT PLAN

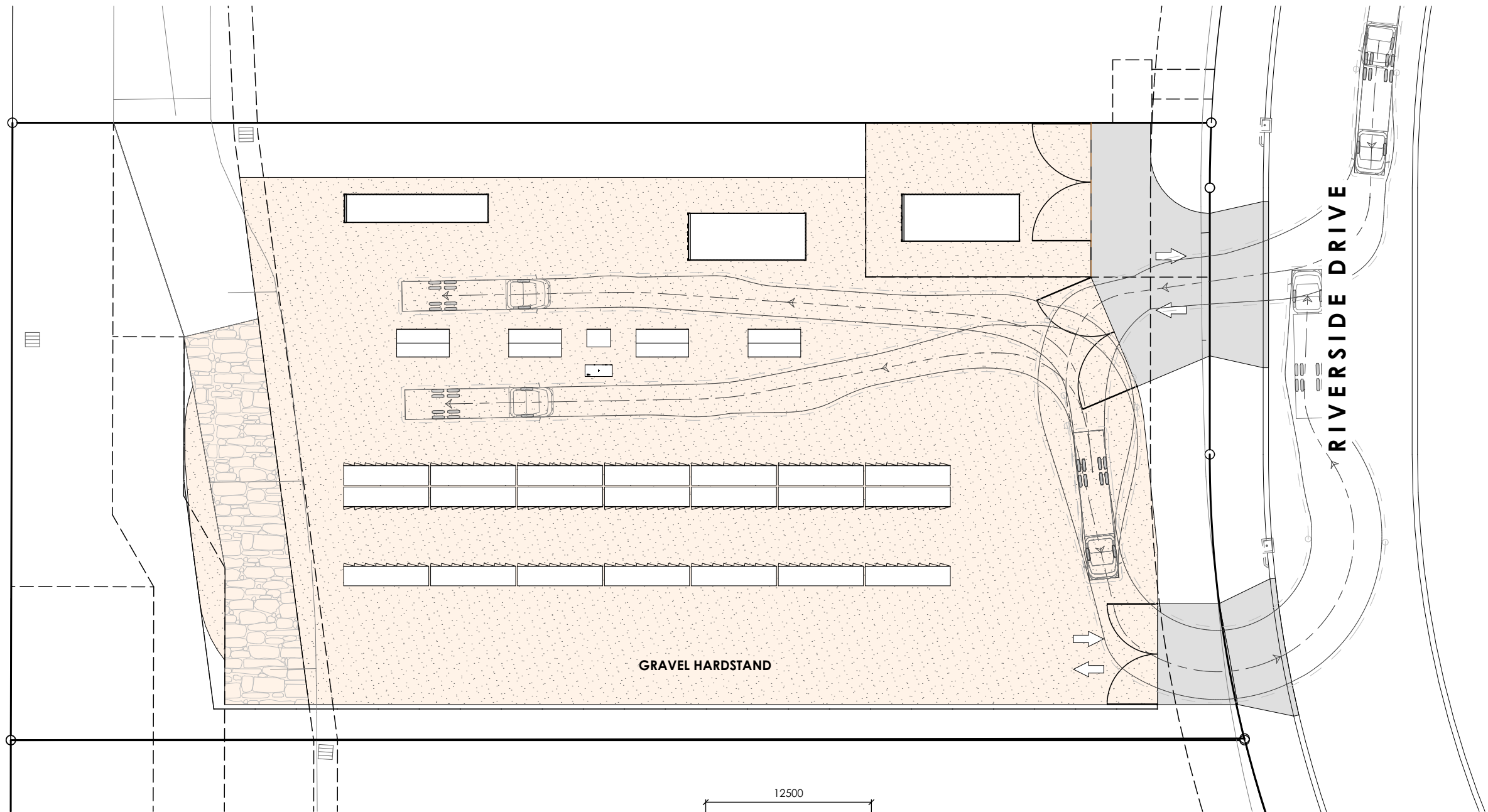
Project No.
21343A

Revision
5

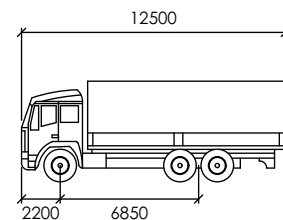
Drawing No.
DA03



RAIL CORRIDOR



MODULE OPTION
Scale 1:400



12.5m RIGID TRUCK
mm
Width : 2500
Track : 2500
Lock to Lock Time : 6.0
Steering Angle : 36.6

Scale 1:400
5 0 5 10 15 20 25m

5	06.05.22	ADDED SITE CONTOURS	MC
4	17.03.22	DEVELOPMENT APPLICATION ISSUE	MC
3	15.10.21	BATTERY RACK CONTAINERS MOVED	BB
2	07.10.21	LANDSCAPING INCREASED	BB
1	23.09.21	ORIGINAL ISSUE	BB

REV. DATE DESCRIPTION DRAWN

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Client
STEEL RIVER WEST PTY LTD

Project Status
DEVELOPMENT APPLICATION

Drawings scaled to an A3 sheet

Project Title
PROPOSED BATTERY STORAGE FACILITY

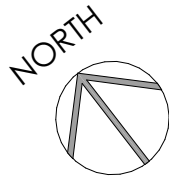
Project Address
RIVERSIDE DRIVE MAYFIELD WEST

Drawing Title
VEHICLE MOVEMENT PLAN

Project No.
21343A

Revision
5

Drawing No.
DA05

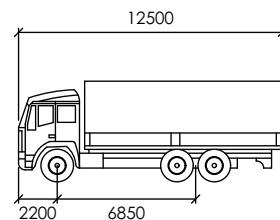


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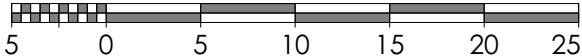
RIVERSIDE DRIVE

GRAVEL HARDSTAND

 **MODULE OPTION**
Scale 1:400



12.5m RIGID TRUCK
mm
Width : 2500
Track : 2500
Lock to Lock Time : 6.0
Steering Angle : 36.6

Scale 1:400 

5	06.05.22	ADDED SITE CONTOURS	MC
4	17.03.22	DEVELOPMENT APPLICATION ISSUE	MC
3	15.10.21	BATTERY RACK CONTAINERS MOVED	BB
2	07.10.21	LANDSCAPING INCREASED	BB
1	23.09.21	ORIGINAL ISSUE	BB
REV.	DATE	DESCRIPTION	DRAWN

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Client
STEEL RIVER WEST PTY LTD

Project Status
DEVELOPMENT APPLICATION

Drawings scaled to an A3 sheet

Project Title
PROPOSED BATTERY STORAGE FACILITY

Project Address
RIVERSIDE DRIVE MAYFIELD WEST

Drawing Title
VEHICLE MOVEMENT PLAN

Project No.
21343A

Revision
5

Drawing No.
DA06

RCA ref 13191e-401/0

27 November 2020

Steel River West Pty Ltd
Suite 5, Level 5
66 Hunter Street
Sydney, NSW, 2000

Attention: The Directors

Geotechnical Engineering

Engineering Geology

Environmental Engineering

Hydrogeology

Construction Materials Testing

Environmental Monitoring

Sound & Vibration

Occupational Hygiene

**LETTER REGARDING ACID SULFATE SOIL POTENTIAL
PROPOSED LOT 1102 STEEL RIVER, MAYFIELD WEST NSW**

The Directors,

This letter has been prepared to provide advice on the potential to encounter acid sulfate soil (ASS) during proposed development at Proposed Lot 1102 (within existing Lot 98 DP270249), Steel River, Mayfield West NSW.

Department of Natural Resources ASS Risk Maps published in 1997 show the site as being at the cusp of areas mapped as being disturbed terrain and no known occurrence of acid sulfate soils. The area mapped as being disturbed terrain is mapped as having a site surface being at 1-2m elevation at the time of survey.

It is noted that site capping remediation works were undertaken in 2004 (Ref [1]), with validation survey data showing the site at an elevation of 10m to 11m. This suggests a filling depth of approximately 9m across the site area.

A geotechnical investigation undertaken by RCA in December 2017 (Ref [2]) reported fill material to the limit of investigation, which was a minimum of 2m in depth from the existing surface. Test pit locations were primarily located on or adjacent to the Riverside Drive and Channel Road alignments. The material types encountered during the assessment of the test pit locations closest to the site (TP7 and TP8) consisted primarily of gravels with coal and siltstone rejects (including boulders up to 0.5-0.6m). These material types are not consistent with potential acid sulfate soils.

When potential ASS (PASS) is exposed to an oxygenated environment, oxidation occurs, therefore PASS is generally restricted to depth close to or below the existing groundwater table. The groundwater table present on the site is located at depths greater than 7m from the existing surface (Ref [3]), indicating that PASS are unlikely to be encountered during the proposed development construction.

It is considered that ASS would not be encountered within the upper 2m of the site, and likely not until depths of up to 9m at the site. However, given the groundwater table is approximately 7m in depth, it is recommended that any excavations beyond 7m, or where a natural estuarine soil profile is encountered, assessment for potential ASS should be undertaken and, if required, an ASS management plan prepared for those excavations at depth.

Yours faithfully

RCA AUSTRALIA



Kirsty Nealon
Senior Environmental Scientist

REFERENCES

- [1] URS Australia Pty Ltd, *Remediation Validation – Steel River Site*, 30 November 2004.
- [2] RCA Australia, *Geotechnical Investigation – Steel River West*, January 2018 (RCA ref: 13303-201/1).
- [3] RCA Australia, *Steel River Precinct Long-Term Environmental Management Plan and Road Opening Management Plan*, RCA ref: 13191a-405/2, January 2020

SITE MANAGEMENT PLAN

PROPOSED LOT 1103 RIVERSIDE DRIVE MAYFIELD WEST, NSW

Prepared for STEEL RIVER WEST PTY LTD

Prepared by RCA Australia

RCA ref 13191e-406/0

APRIL 2022



RCA AUSTRALIA

ABN 53 063 515 711

92 Hill Street, CARRINGTON NSW 2294

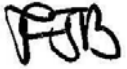
Telephone: +61 2 4902 9200

Facsimile: +61 2 4902 9299

Email: administrator@rca.com.au

Internet: www.rca.com.au

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APPENDIX A

DRAWING

APPENDIX B

CERTIFICATE B

RCA ref 13191e-406/0

27 April 2022

Steel River West Pty Ltd
Level 1
2 Barrack Street
SYDNEY NSW 2000

Attention: Mr James Allison

Geotechnical Engineering

Engineering Geology

Environmental Engineering

Hydrogeology

Construction Materials Testing

Environmental Monitoring

Sound & Vibration

Occupational Hygiene

**SITE MANAGEMENT PLAN
PROPOSED LOT 1103 RIVERSIDE DRIVE
STEEL RIVER INDUSTRIAL ESTATE, MAYFIELD WEST, NSW**

1 INTRODUCTION

This Site Management Plan (SMP) applies to the proposed Lot 1103, Riverside Drive, Steel River Industrial Estate, Mayfield West NSW. Proposed Lot 1103 is situated within the current Lot 22 DP280089 located on the western extent of the Estate.

The site location within the Steel River Estate is shown on **Drawing 1, Appendix A**. At the time of writing the Lot has not yet been registered, however for the purpose of this SMP the site is identified as proposed Lot 1103. It is noted that the final Lot number may be altered upon the completion of the subdivision.

The purpose of this SMP is to:

- Detail the management practices required during the construction works stage to protect:
 - The environment.
 - Human health.
 - The integrity of the Remediation Strategy.
- Describe the strategy for the long-term management of contaminated and potentially contaminated soils at the remaining site.

This SMP has been prepared at the request of Steel River West Pty Ltd.

1.1 WHY DOES THE SITE NEED A SMP?

The Steel River site was formerly used by BHP for the disposal of waste material, some of which includes polycyclic aromatic hydrocarbons (PAH) and tar resulting in significant soil

and groundwater contamination. This SMP is a statutory requirement of the development consent conditions from City of Newcastle and as part of the Steel River Project Site Development Guidelines, Section 1 (Ref [1]). The objective of the SMP is to ensure the proposed development does not compromise the remedial strategy during construction.

The Remedial Action Plan (RAP)/Environmental Impact Statement (EIS) (Ref [2]) for the area describes the remediation works proposed for the Steel River site. Remediation has been undertaken by capping, leaving contamination still remaining on site and preventing exposure by the placement of a layer of clean material. After completion of the remediation works, which were undertaken between 1998 and 2001, a validation report (Ref [3]) was prepared for the Steel River site.

The validation report (Ref [3]) concluded that remediation works for the site were successfully undertaken in accordance with, and to the specifications of, the remediation strategy for the subject site required by the RAP/EIS (Ref [2]). Proposed Lot 1103 is located within this validation area.

Based on the remediation strategy as detailed in the RAP/EIS (Ref [2]), Site Development Guidelines (Ref [1]) and other previous investigation across the Steel River site as a whole, the site's fill and underlying groundwater may contain unidentified contamination such as tar and other coke chemicals.

2 PLANNING SCHEME AND SITE SPECIFICS

The development of the Steel River Industrial Estate site has been approved in principal by City of Newcastle, with a staged approval programme for specific works at the site. Relevant information to the site regarding this process is summarised below:

2.1 CERTIFICATE A

The Certificate A applies to the whole of the Steel River Industrial Estate site and verifies that the whole of the Steel River site (more than one specific Lot) has been remediated. Proposed Lot 1103 is included in the Certificate A prepared for BHP Limited by URS Australia dated February 2001 (Ref [4]). The Certificate A reports that:

- The site is confirmed to have been remediated in accordance with the specifications of the Steel River Project.
- More broadly, validation of remediation works on, and surrounding the site confirmed:
 - Locations of natural and fill materials.
 - Locations of known contaminated materials were covered by two (2) metres of capping.
 - Locations of contamination cells.
 - The Primary Containment Cell is within Lot 22 however is not within the boundary of proposed Lot 1103.
 - Soil compaction.
 - CWR and other capping materials were suitable as capping.
 - Site surface levels.

2.2 CERTIFICATE B

Certificate B covers an individual parcel or Lot within Steel River. It describes the status of the remediated surface and specifies what is known about the subsurface conditions of the Lot. This certificate provides guidance in developing the design and layout of infrastructure and states that the Lot is suitable for industrial development and/or specifies any development restrictions that apply to the Lot.

The Certificate B (Ref [5], **Appendix C**) for the land (referred to as Lot 98 for historical consistency however representative of proposed Lot 1103) was prepared by RCA Australia for Steel River West Pty Ltd dated 18 March 2020. The certificates state that:

- The Lot 98 subdivision site essentially comprises the western section of the Steel River site.
- Remediation of site has been undertaken in accordance with, and to the specifications outlined in the RAP/EIS (Ref [2]).
- The subsurface conditions comprise minimum 2m capping of coal washery reject or other clean material with the exception of the Primary Containment Cell area for which capping comprises:
 - Overlying clean material (0.3-0.6m in thickness).
 - A drainage layer and associated drainage system.
 - Protective geotextile fabrics.
 - A high-density polyethylene (HDPE) liner.
 - Clean material / coal washery reject for a further 1.4-1.7m (depending on thickness of soil overlapping the HDPE).

A small part of Lot 15 extent is situated within the footprint of the primary containment cell.

- Material below the capping material includes slag, gravel, anthropogenic waste (wire, timber, brick, metal pieces), ash (fly and boiler) and tar overlying natural clays and estuarine sediments.

The report concludes that the Lot is suitable for commercial / industrial development subject to works being undertaken in accordance with the Steel River Construction Guidelines (Ref [1]) and a precinct wide management plan which has since been updated.

2.3 SITE MANAGEMENT PLAN

The SMP details the day-to-day requirements for construction work undertaken at the site. Specifically, the SMP requires the developer to detail soil movement, water management and workplace health and safety (WHS) controls required to ensure the protection of human health and the environment. The purpose of the SMP is to ensure the proposed construction works for the development will not compromise the Steel River Project – Construction Guidelines (Ref [1]), RAP/EIS (Ref [2]) and/or site specific remediation works (Ref [3]).

2.4 CERTIFICATE C

Certificate C assesses the suitability of the proposed development of each allotment based on specific engineering information and the known characteristics of the site. RCA understand that a Certificate C for the development of proposed Lot 1103 has not yet been prepared.

2.5 CERTIFICATE D

Certificate D is prepared at the completion of the development to document whether or not the works that were undertaken are as generally proposed and have not compromised the RAP/EIS and other site guidance documents. It details interactions with any contamination of the remedial surface and certifies that the remedial surface has been fully reinstated after the works.

3 WHEN DOES THE SMP APPLY?

The SMP applies during any intrusive works through the surface associated with the development/construction phase of proposed Lot 1103 including, but not necessarily being limited to, the excavation of footings, installation of services, roads, carparks and landscaping.

It is noted that after the completion of construction an Owners Management Plan is required to ensure that long-term management practices maintain the integrity of the cap and appropriate management procedures are implemented for occasions when intrusive works are required.

3.1 RESPONSIBILITY

The controls listed in the SMP must be followed to ensure the protection of human health and the environment during the development/construction phase of the site.

Any intrusive works during the development/construction phase have the potential to impact on the integrity of the capping layer. The owner is responsible for ensuring all workers are aware of the potential issues of the site and adhere to the management controls as described in this SMP.

All contractors on site prepare a Workplace Health and Safety Plan (WHSP) and that all personnel have been briefed on any potential hazards including potential contamination. Workers will be required to follow procedures as outlined in the WHSP. Non-compliance with this SMP may result in increased exposure to contamination and an unacceptable risk to human health and/or the environment.

3.2 DISTRIBUTION

The owner and occupier of the site must hold a copy of this SMP on site at all times. All contractors that are engaged to undertake works below the capping layer must receive or review a copy prior to work commencing to enable determination of potential risks for the proposed works.

4 SITE SPECIFIC ISSUES

Proposed Lot 1103 is currently vacant land. The site covers an area of approximately 5,272m².

4.1 TOPOGRAPHY AND SURFACE DRAINAGE

The site is located on the western side of Riverside Drive. The site is flat and it is understood that site drainage is proposed to be towards existing stormwater infrastructure located adjacent to the existing rail line along the western boundary as shown on **Drawing 1, Appendix A**. At the time of writing the site is generally bound by vacant land with proposed unfinished Riverside Drive located to the east and the existing rail line to the west. The site along with surrounding areas are within an area zoned 'IN1 – General Industrial' under the Newcastle Local Environmental Plan 2012 (Ref [6]).

The potential for flooding of the site is considered to be low based on the elevation above the Hunter River and the extensive low lying land on the opposite side of the River.

The Hunter River South Arm is located approximately 250m to the north east of the site and is considered the closest sensitive environment to the site. The closest sensitive use site is understood to be residents in Warabrook located approximately 250m to the south west of the site.

4.2 GEOLOGY AND HYDROGEOLOGY

No intrusive works were undertaken at the site specifically for this assessment. Based on the Steel River Project – Construction Guidelines (Ref [1]), shallow soils (approximately 0.6m) are likely to comprise re-contoured and compacted silty sand and gravel including slag material.

The Wallsend acid sulfate soil (ASS) map indicates that the site comprises disturbed terrain with a surface of 1-2m AHD at the time of publication (1997). It is noted that site capping undertaken for remedial works were undertaken in 2004 and validation data (Ref [3]) indicates that the site has an elevation of 10-11m AHD. As such it is considered that there has been a filling depth of approximately 9m across the area.

Groundwater is expected to be greater than 7.0m below the existing ground surface noting that groundwater levels are likely to fluctuate due to variations in tidal, climatic and site conditions. Groundwater flow is expected to be towards the north and Hunter River (South Arm).

5 PROPOSED LAND USE

The proposed works comprise the construction of twelve (12) above ground battery (rack) containers, four (4) transformers, one (1) 33kv switch room, one (1) operation and maintenance container and one (1) diesel generator and kiosk. A further switchroom will be situated on site to be operated by Ausgrid. All battery containers will be placed on concrete slab within the compacted gravel area of the site which comprises approximately 68% of the site area. Landscaped areas which comprise approximately 28% of the site area are proposed primarily within the western portion of the site however some landscaped areas will be present along the other boundaries. There are two (2) concrete driveways in the east of the site.

Minor earthworks will be required to achieve the desired grades and excavation of shallow trenches for buried cabling and services. The excavation works are not proposed to exceed depths of 2m below the current ground surface.

The site plan layout of the proposed development is included on **Drawing 1, Appendix A**.

6 OCCUPATIONAL HEALTH AND SAFETY

Any contractors engaged to undertake work on the site will be required to prepare a Workplace Health and Safety Plan (WHSP) due to the presence of potentially contaminated materials at the site. The WHSP should provide a general description of the proposed activity and consider whether that activity may encounter or otherwise impact potential contamination issues. Where there is a potential to encounter contamination issues, the WHSP must document measures to be implemented to reduce the risk to human health and the environment. An example of the hazard, likelihood and control measures is outlined in **Table 1**.

Table 1 *Chemical and Physical Hazards and Control Measure*

Hazard	Likelihood of hazard	Control Measure
Contact with potentially contaminated material	Excavations below the capping layer have the potential to excavate PAH and metal contaminated material. Contaminated material may not be identifiable by visual or olfactory means. Minimal potential to encounter free tar material and soil with elevated PAH concentrations within the current capping layer.	Wash areas are to be provided to allow workers to wash hands and face prior to taking meal breaks or leaving the site. Gloves are to be worn when handling soils.

All personnel involved in site works should attend a health and safety briefing/induction prior to work commencing on the site, with an overview of the project and potential concerns as described in **Table 2**, due to exposure to contamination. A record of attendees at this induction should be documented and attendees should sign an acknowledgment and understanding of the issues relating to potential for contamination at the site.

Table 2 *Issues Relating to Exposure to Contaminants*

Issue	Control Measure
Scheduled site activities and personnel responsibilities	All excavations undertaken on the site are to be carried out by personnel trained in the requirements of this Site Management Plan. It is the responsibility of the site supervisor to ensure that excavation works are carried out by appropriately trained personnel.
Site control procedures	Site control procedures are outlined in Table 3 .
Warning symptoms from exposure to contaminants	Warning symptoms can include olfactory evidence of contamination prior to onset of dizziness, headache and nausea which can occur from the inhalation of PAH vapours. If PAH odours are detected personnel are to vacate the area immediately and allow vapours to dissipate. An assessment of the contamination must be undertaken by a suitably qualified consultant prior to restarting works.
Protective equipment usage	No protective equipment is considered necessary in addition to standard construction wear for works within the capping material. In the event of excavations below the capping material, gloves, long sleeve shirts and long pants are required. Strict implementation of hygienic principles of washing hands and face before eating and drinking are required. The use of tyvek suits and masks may be required depending on the activity and the level of exposure to the contaminated material. Depending on the proposed extent of excavation within contaminated material, as determined by the WHSP, a decontamination facility may be required. This would be provided immediately outside the work area and is to include cold running water and hospital grade detergent for the purpose of hand washing.
Phase Separated Hydrocarbons	While the likelihood of free phase contaminants being encountered is extremely low, work procedures should specify the immediate cessation of all work and consultation with an appropriately qualified contamination professional. A specified Excavation Management Plan (prepared by an appropriately qualified contamination professional) may be required.
Emergency response	Personnel affected by contaminated soils at the site are to be taken for evaluation to the nearest hospital. This is to be undertaken following the emergency response plan for the site.

The WHSP should also address any other hazards associated with working on the site, as per the requirements of the *Work Health Safety Act 2011 No 10* and associated regulations. This should include as a minimum, identification of all hazards, their likelihood of occurrence and control measures to be undertaken. A Job Safety Analysis (JSA) should be included for these risks identified.

The health and safety briefing should be provided to any new personnel as they arrive at the site. In addition, on site safety meetings should periodically review safety requirements and discuss modifications to the Health and Safety Plan.

7 SITE MANAGEMENT WORKS

Table 3 details environmental management provisions relating to the management of soil for the protection of groundwater and surface water. These provisions are to be included in works methodology where appropriate during the construction period. Documentation is required to be maintained for later certification.

All phases of the development/construction must be undertaken in accordance with The Steel River Construction Guidelines (Ref [1]) and any management plans relevant for the site¹. These guidelines specify requirements for the handling of coal washery reject, handling of potentially contaminated material and disposal of any excess material. Handling procedures are detailed in the following sections.

Table 3 *Environmental Management Objectives and Control Measures*

Objective	Control Measure	Requirements
To maintain the integrity of the cap such that the remedial strategy isn't compromised.	Where capping material is removed as part of the construction, an equivalently low permeability material must be placed in its stead. The use of concrete/bitumen is suitable for this purpose.	Document areas from which capping is removed and what replacement material is used. Where replacement material does not comprise concrete/bitumen, the permeability of the material must be documented by the manufacturer's specifications as 1×10^{-7} m/s.
To control the movement of soils at the site	All soil materials are to be tracked during excavation and movement on site. Records should include material description, depth and area located on a plan and final placement including depth and area located on a plan. Contaminated materials can be excavated and moved across the site providing the capping layer is suitably replaced in both areas and soils that were previously above the water table remain above the water table i.e., soil excavated last should return to the base of the excavation where practicable. All potentially contaminated material excavated from beneath the capping layer is to be stockpiled on an impervious and bunded area to prevent surface water runoff. Any material impacted by tar or tar impacted products must be stockpiled separately. If excavated material is intended for re-use, differing material types should be segregated and stockpiled in order of excavation, and replaced into the excavation in the order they were removed.	Document material movement including material type, any visual or olfactory observations, location of placement. Health and safety plans for site work. Staff register which documents health and safety inductions.

¹ At time of writing a long term environmental management plan (Ref [7]) will apply to the subdivision area in which Lot 1103 is situated.

Objective	Control Measure	Requirements
To control erosion and potential sediment transport from the site by stormwater. To prevent surface run-off from becoming contaminated as a result of soil disturbance or contact with site contaminants.	Minimise disturbance of the site, and surface area disturbed by excavation activities at any one time. All reasonable steps are to be undertaken to prevent incursion of stormwater on to the site. Placement of straw bales/silt fence around any stormwater inlets and lower boundary of the site to prevent incursion of sediment into inlets or transport off site. Regular inspection and maintenance of erosion control structures. Erosion and sediment controls to be undertaken in accordance with the Soils and Construction Handbook 2004 (Ref [8]). In the event that excavations greater than 1000m² are required, earth bunds or diversion drains are to be constructed around the perimeter to prevent surface water ingress.	Inspection records of erosion control structures
To ensure that any contaminated materials encountered are appropriately managed including appropriate disposal	Contact an appropriately qualified contamination professional for advice regarding the disposal of any excess soil. Any excavated contaminated soil must be disposed of in accordance with the Remediation EIS (Ref [2]) and NSW waste legislation.	Suitable documentation of any material removed from the site
To ensure any buried or stockpiled waste material is appropriately managed including appropriate disposal.	Whilst not anticipated, in the event that any excavated waste material or surface waste material are encountered during works, these must be removed and disposed of in accordance with the relevant waste guidelines (Ref [9]).	Suitable documentation of any waste material removed from the site. Must be removed to a licenced waste facility.
To minimise the extent of soil transport and erosion	Minimise vehicular movement on the exposed soils, trade vehicles to park on road. Trucks to be loaded and unloaded while parked on roads or impervious surface where possible. No soil or other construction material is to enter the stormwater drains. Street sweepers or other methods are to be used whenever necessary to ensure that this material is removed.	Establish a materials movement database
To minimise contamination of surface water by groundwater	If groundwater is encountered, work must cease. An appropriately qualified contamination professional must be consulted for advice on how to proceed. Sampling may be required.	Records regarding encounter with groundwater and clearance to proceed

Objective	Control Measure	Requirements
To minimise dust emissions and prevent exposure to site workers	Minimising the surface area disturbed by excavation, stockpiling and/or filling locations. Confining vehicle movements to paved roads or available hardstand areas, to the extent possible. Restricting the speed of vehicle movements and ensure all trucks with loads are covered. Use of water sprays to suppress dust during excavations. Watering of active work areas (including stockpiles) by water cart and/or sprinklers to suppress dust in dry conditions where necessary. Water spray equipment should be on site and available for use whenever dust generation is likely. Dust monitoring is to be undertaken at the site if dust is likely to be generated.	Dust minimisation plan. Documentation of all dust monitoring undertaken.
To reduce odour emissions from the site	Odour emissions at the site are not likely, however, in the event that emissions occur the following precautions should be adopted: Water sprays and odour retardant are to be applied surrounding the excavation should odours be excessive and impacting on neighbouring premises.	Record area of odour impact and mitigation measures adopted
To minimise waste generation and ensure the appropriate handling of waste on the site	The contractor should ensure that site operations minimise the generation of waste products through recycling and re-use. It is the contractor's responsibility to dispose of all waste products from the site appropriately.	Document of waste disposal
To minimise noise from machinery	All work at the site is to be undertaken in accordance with the development consent for the project. Ensure noise mitigating measures on construction equipment are in place and operating correctly.	Register of hours worked and complaints to be kept
To reduce the likelihood of site contamination from machinery maintenance and operation	Only minor machinery maintenance is to be undertaken at the site and is to be undertaken within a designated area. No surface staining should occur and a spill response plan is to be developed for use in the event of accidental spillage. All refuelling of machinery is to be undertaken in a designated area of the site by dedicated fuel supply vehicles. Care should be taken to ensure that no surface staining occurs. A spill response kit is to be available at the site, and vehicle operators and site personnel suitably trained in its use. All spills are to be suitably remediated and recorded in the incident register.	Develop a Spill Response Plan

All documentation as detailed in **Table 3** must be provided for the compilation of Certificate D at the completion of the project.

8 CORRECTIVE ACTION PROCEDURES

In the event of any unexpected situation the site supervisor should be contacted immediately. The site supervisor would then be responsible for implementing the necessary steps outlined in the WHSP and contacting the relevant services and statutory authorities. If, for any reason, the site supervisor is not available a person should be delegated with those responsibilities normally undertaken by the site supervisor.

In the event that a management strategy fails or there is an environmental incident or community complaint then the site manager will review the situation and consult with the relevant regulatory body/bodies if required.

Following an environmental incident or community complaint an investigation shall be carried out and the following recorded:

- Incident and identified consequences.
- Action taken.
- Measures taken to prevent the incident or complaint from recurring.
- Date and time of notification of incident or complaint to appropriate authorities if required.

As a result of the investigation this management plan will be amended if required.

Conditions that may be encountered are often uncertain. **Table 4** summarises conditions that can reasonably be expected, and how they may be resolved.

Table 4 Contingency Planning, Potential Problems and Corrective Actions

Anticipated Problem	Corrective Action
Excessive rain	Before rain arrives protect the site to the extent possible (such as sealing earthworks with a roller and fully implement or reinforce sediment and run-off control measures). Dispose of excess water on site in accordance through a suitably licensed waste contractor or as approved by appropriate regulatory authority.
Excessive dust	Use water sprays and/or cease dust-generating activities until control can be achieved. Change methodology or await change in weather conditions to avoid issue further.
Release of fuel/oil from equipment	Apply Spill Response Plan procedures. Stop leak, remove fuel/oil, make any repairs as required. Appropriately treat and/or dispose of effected soil.
Inflow of groundwater	Sample and treat/dispose of groundwater that accumulates in excavations if required. Disposal should be undertaken by a suitably licensed waste contractor or as approved by appropriate regulatory authority.
Excessively wet materials	Stockpile and dry on site any wet material. If material is suspected of being contaminated, stockpile in a sealed and bunded area on site.

Anticipated Problem	Corrective Action
Encounter drums or other previously unknown impacted objects and materials	Cease work in the area and delineate the extent of any impacted material/objects. Set aside impacted material/objects in sealed and bunded area. If object is a drum, contact disposal specialists. Do not open if drum is swollen. A suitably qualified expert should assess material appropriately.
Encounter oil or grease on water	Collect with oil absorbent cloth.
Excessive odours	Spray materials with odour suppressant and reduce working area of excavation.
Excessive spoil generated	Segregate on excavation and have material assessed by a suitably qualified person prior to determining suitable on site placement.

9 LIMITATIONS

This report has been prepared for Steel River West Pty Ltd in accordance with an agreement with RCA Australia (RCA). The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Steel River West Pty Ltd and for Newcastle City Council in its assessment of the proposed development as detailed in this report. The report may not contain sufficient information for purposes of other uses or for parties other than Steel River West Pty Ltd and for Newcastle City Council in its assessment of the proposed development. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA Australia.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation.

Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

Yours faithfully

RCA AUSTRALIA



Fiona Brooker
Environmental Services Manager

REFERENCES

- [1] BHPB, *Steel River Site Construction Guidelines (Revision 1.0)*, November 2015.
- [2] Woodward-Clyde, *Steel River Project – Remedial Action Plan Environmental Impact Statement*, May 1997.
- [3] URS Australia Pty Ltd, *Remediation Validation, Steel River Site*, prepared for BHP Billiton by URS Australia, (URS ref: 34933-020), November 2004.
- [4] URS Australia Pty Ltd, *Certificate A, BHP Limited – for the Area Encompassing: the Former Boral Compound and Access Road, Lots 13, 14 and 15 of Sector G, Parts of Sectors B, C, D, F, H, I, FT 23*, 5 February 2001.
- [5] RCA Australia, *Certificate B, Lot 98, Steel River West*, March 2020.
- [6] Newcastle City Council, *Newcastle Local Environment Plan 2012*, Land Zoning Map – Sheet LZN_004A, 16 September 2016.
- [7] RCA Australia, *Steel River Precinct Long-Term Environmental, Management Plan and Road Opening Management Plan, Lot 98 Subdivision, Steel River Estate, Mayfield West*, RCA ref: 13191e-404/3, August 2021.
- [8] Soils and Construction Handbook, 4th Edition, Landcom, 2004.
- [9] NSW EPA, *Waste Classification Guidelines, Part 1; Classifying Waste*, November 2014.

Appendix A

Drawing

CDT-DWG-A3H-001/1



LEGEND

Approximate site boundary

Landscaped area

Gravel area

Concrete driveway

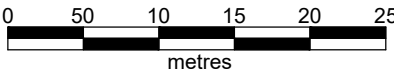
SW

Stormwater alignment

S

Sewer alignment

NOTE: Aerial image taken from Nearmap, 16 April 2022
(used in accordance with commercial licence)
Drawing adapted from drawing supplied by Steel River West Pty Ltd
(drawn by GCA Engineering Solutions, Ref No. 20269 Site Plan,
dated 29.10.2020)



SITE LOCALITY, LAYOUT PLAN, AND
PROPOSED SITE DEVELOPMENT
PROPOSED LOT 1103
STEEL RIVER
RIVERSIDE DRIVE, MAYFIELD WEST

CLIENT Steel River West Pty Ltd		RCA Ref 13191e-406/0	
DRAWN BY FB	SCALE 1:500 (A3)	DRAWING No 1	REV 0
APPROVED BY FB	DATE 27/04/2022	OFFICE NEWCASTLE	

Appendix B

Certificate B

RCA ref 13191c-408/0

18 March 2020

Steel River West Pty Ltd
Level 1
2 Barrack Street
SYDNEY NSW 2000

Attention: The Directors

Geotechnical Engineering

Engineering Geology

Environmental Engineering

Hydrogeology

Construction Materials Testing

Environmental Monitoring

Sound & Vibration

Occupational Hygiene

CERTIFICATE B – LOT 98, STEEL RIVER WEST

Remediation Validation Requirements for Certificate B*	Certification by RCA
Specific to a particular lot on site	Lot 98 DP 270249 This Certificate B replaces an Interim Certificate B issued in September 2009 for Lot 98 following the completion of a number of aspects at the site.
Description of the status of remedial surface on the lot and specifies what is known about the subsurface conditions on the site to aid in the environmental management procedures during development.	The subsurface conditions comprise minimum 2m capping of coal washery reject or other clean material with the exception of the Primary Containment Cell area (refer attached) for which capping comprises: • A presumed depth of between 1.4-1.7m coal washery reject or other clean material. • A high-density polyethylene (HDPE) liner. • Protective geotextile fabrics. • A drainage layer and associated drainage system. • Overlying clean material (0.3-0.6m in thickness) Material below the capping material includes slag, gravel, anthropogenic waste (wire, timber, brick, metal pieces), ash (fly and boiler) and tar overlying natural clays and estuarine sediments. A number of stockpiles of material are present on site: these have been assessed (Ref [1], Ref [2]) in accordance with current guidelines (Ref [3]) and found to be suitable for use on site.
States that the lot as remediated is suitable for certain types of development.	The Lot is suitable for commercial / industrial development subject to works being undertaken in accordance with the Steel River Construction Guidelines (Ref [4]), relevant management plan (Ref [5]), and Certificate C and Site Management Plan(s) that are yet to be prepared for the site.

* URS Remediation Validation Steel River Site 30 Nov 2004

Yours faithfully

RCA AUSTRALIA



Fiona Brooker
Manager of Environmental Services

REFERENCES

- [1] OHMS Environmental, *Characterisation of Stockpiles, Steel River – Stage 9 and 10, Lot 98 DP DP270249*, Report Number: J170520.
- [2] RCA Australia, *Stockpile Material Assessment, Steel River Estate, Mayfield West*, RCA ref: 13191a-407/0.
- [3] NEPC, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 as amended 2013.
- [4] URS updated by BHP Billiton Limited, *Steel River Site Construction Guidelines*, 24 November 2015.
- [5] RCA Australia, *Steel River Precinct Long-Term Environmental Management Plan and Road Opening Management Plan*, RCA ref: 13191a-405/2, January 2020



Preparing a Site Waste Minimisation and Management Plan (SWMMP)



Office Use - No.....

This form

This form can be used as a Site Waste Minimisation and Management Plan (SWMMP) and must accompany your development application for:

- erection or alteration of a building or structure
- major demolition works
- carrying out subdivision earthworks, clearing of land or similar

Completing this form will:

1. Assist you in identifying the type of waste that will be generated and in advise Council how you intend to reuse, recycle or dispose of the waste.
2. Facilitate waste management and reduction by identifying onsite sorting and storage of waste products pending reuse or collection.

The information provided on this form, together with your development plans, is designed to enable your development to be assessed against the relevant objectives and controls within [Section 7.08 Waste Management of Newcastle DCP 2012](#) and the [Waste Management Technical Manual](#).

Part A: Waste Minimisation and Management Plan details

1. Development for which this SWMMP has been prepared:

Describe the proposed development this SWMMP is for.

A ☒ Erection or alteration of a building or structure

B ☐ Demolition

C ☐ Subdivision works

D ☐ Site clearing, etc

E ☐ Other

If a building, what will it be used for?

Battery Storage Facility

2. Location of development

Describe the property which the development application relates.

Unit No..... House No. 60 Street Riverside Drive

Locality Mayfield West

Lot(s) 22 Section

Deposited Plan(s) 280089 Strata Plan

Other Approval Lot 1103

These details should represent the DA property description.

Part B: Construction waste, reuse, recycling and disposal details

3. Will your development generate any construction waste?

Will your proposal involve demolition, vegetation removal or other site clearing works or other activity which will generate the need for reuse & recycling or disposal of waste during the developments construction?

No ☐ proceed to 5 in Part C.

Yes ☒ please provide details in accordance with 4 below:

Type of material onsite		Reuse & recycling methods:		Disposal methods:
List type of general waste material eg. timber off-cuts, vegetation tiles concrete bricks etc.	Estimated Quantities		Specify reuse or recycling methods or contractor eg. crushed and reused, reused as flooring, mulched etc.	Specify contractor and landfill site (If known). e.g. Smith to any town tip, Alkene Asbestos to A place Steptoe & Son to Tip etc.
	Vol (m ³)	Wt (kg)		
Excavated material			Reuse for fill on-site where appropriate	Off-site disposal in accordance with validation certificate
Concrete				Off-site disposal at an appropriately licensed facility
Metal				Off-site disposal at an appropriately licensed facility
Timber				Off-site disposal at an appropriately licensed facility
General waste				Off-site disposal at an appropriately licensed facility

Please attach additional sheets if more space is required.

Part C: Ongoing waste management details (after construction)			
4. Will your development generate any waste as a result of its proposed use?		Will your development generate any ongoing waste as a result of its proposed use such as food waste, glass, paper, metal off-cuts etc? No ☐ proceed to 9 in Part E. Yes ☒ please provide details in accordance with 6 below:	
Expected waste		Proposed onsite storage and treatment facilities: (refer to DCP Section 7.08)	Destination:
Detail the types of operating waste expected to be generated by the development eg. food waste, glass, paper, metal off-cuts etc.	Vol./ week L or m³	Eg. Waste cupboard waste storage & recycling area, garbage chute, onsite composting compaction equipment.	Eg. Recycling, disposal or contractor.
Battery components		No on-site storage - removed from site immediately once taken from cubicle	Defective/end of life batteries returned to manufacturer for recycling
Timber pallets			Returned to manufacturer for re-use
Unused chemicals		No storage on-site - removed immediately by maintenance contractors	Disposed/recycled at appropriately licensed facility
Packaging waste (plastic/cardboard)		No storage required - removed immediately by maintenance contractors	Disposed of at appropriately licensed waste facility
Please attach additional sheets if more space is required.			
5. Ongoing management commitments (multi-unit, commercial & industrial buildings only) Provide details of ongoing waste management commitments onsite (eg. lease conditions, caretaker/site manager).		Management Commitments The site will be operated by contractors. All waste material generated during site maintenance and servicing will be removed from the site by the relevant contractors at the time the waste is generated. Please attach additional sheets if more space is required.	

Part D: Estimates (if you answered yes at either 3 or 5 above)	
6. Estimated quantities If you answered yes to either 3 or 5 above please provide details of how you arrived at your estimated quantities.	Please indicate the method used for predicting your development's anticipated levels of waste: ☒ Best guess ☐ Calculated assessment ☐ Industry data ☐ Waste Planning Guide for Development Applications Other
Part E: Checklist	
7. Have you indicated the location of Waste Management facilities on your development plans?	Yes ☐ N/A Not relevant ☐
8. Where necessary, have you provided acceptable administrative arrangements for ongoing waste management?	Yes ☒ Not relevant ☐
9. Is easy access to the recycling area, room or facilities for occupants and collection services provided?	Yes ☐ Not relevant ☒
10. Is a sufficiently sized waste collection area provided?	Yes ☐ Not relevant ☒
11. Is an unobstructed vehicular access and manoeuvring area provided for waste collection for commercial/ industrial and multi-unit development?	Yes ☒ Not relevant ☐
12. Do the development plans for construction/demolition show details of onsite storage space or waste container for the recycling and disposal of construction waste?	Yes ☐ To be provided at CC stage

Part F: Signatures

13. Applicants declaration

I declare this development achieves the waste objectives set out in the DCP. The details on this form are the provisions and intentions for minimising and managing waste related to this project. All records demonstrating lawful disposal of waste will be retained and kept readily accessible for inspection by regulatory authorities such as council, DECC or WorkCover NSW.

I declare that all the information given is true and correct. I also understand that:

- if incomplete, the application may be delayed or rejected.
- further information may be requested within 14 days of lodgement.

Name: James Allison

Signature: [Redacted Signature]

Date: 23/5/22

How to lodge your SWMMP

Include this plan with the documents required for the submission of your Development Application and address to:

The General Manager
City of Newcastle

Mail: PO Box 489,
Newcastle 2300

Courier or personal delivery:

Ground Floor,
282 King Street, Newcastle

How to contact us:

Phone: (02) 4974 2000

Fax: (02) 4974 2222

E-mail: mail@ncc.nsw.gov.au

Web: www.newcastle.nsw.gov.au

Coming in to see us?

Our Customer Enquiry Centre is located on the ground floor of the City of Newcastle Administration Building, 282 King Street, Newcastle, opposite Civic Park.

We are open for business from 8.30am to 5.00pm, Monday to Friday.

If you wish to discuss your SWMMP with one of our professional officers, it is essential that you arrange an appointment.